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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the Radio Resource Control protocol for the radio interface between UE and NG-RAN.

The scope of the present document also includes:

- the radio related information transported in a transparent container between source gNB and target gNB upon inter gNB handover;
- the radio related information transported in a transparent container between a source or target gNB and another system upon inter RAT handover.
- the radio related information transported in a transparent container between a source eNB and target gNB during E-UTRA-NR Dual Connectivity.

The RRC protocol is also used to configure the radio interface between an IAB-node and its parent node [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.300: "NR; Overall description; Stage 2".

[3] 3GPP TS 38.321: "NR; Medium Access Control (MAC); Protocol specification".

[4] 3GPP TS 38.322: "NR; Radio Link Control (RLC) protocol specification".

[5] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) protocol specification".

[6] ITU-T Recommendation X.680 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation" (Same as the ISO/IEC International Standard 8824-1).

[7] ITU-T Recommendation X.681 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Information object specification" (Same as the ISO/IEC International Standard 8824-2).

[8] ITU-T Recommendation X.691 (08/2015) "Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)" (Same as the ISO/IEC International Standard 8825-2).

[9] 3GPP TS 38.215: "NR; Physical layer measurements".

[10] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".

[11] 3GPP TS 33.501: "Security Architecture and Procedures for 5G System".

[12] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[13] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[14] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[15] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[16] 3GPP TS 38.211: "NR; Physical channels and modulation".

[17] 3GPP TS 38.212: "NR; Multiplexing and channel coding".

[18] ITU-T Recommendation X.683 (08/2015) "Information Technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications" (Same as the ISO/IEC International Standard 8824-4).

[19] 3GPP TS 38.214: "NR; Physical layer procedures for data".

[20] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state".

[21] 3GPP TS 23.003: "Numbering, addressing and identification".

[22] 3GPP TS 36.101: "E-UTRA; User Equipment (UE) radio transmission and reception".

[23] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[24] 3GPP TS 37.324: "Service Data Adaptation Protocol (SDAP) specification".

[25] 3GPP TS 22.261: "Service requirements for the 5G System".

[26] 3GPP TS 38.306: "User Equipment (UE) radio access capabilities".

[27] 3GPP TS 36.304: "E-UTRA; User Equipment (UE) procedures in idle mode".

[28] ATIS 0700041: "WEA 3.0: Device-Based Geo-Fencing".

[29] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[30] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[31] 3GPP TS 36.211: "E-UTRA; Physical channels and modulation".

[32] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[33] 3GPP TS 36.104:"E-UTRA; Base Station (BS) radio transmission and reception".

[34] 3GPP TS 38.101-3 "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".

[35] 3GPP TS 38.423: "NG-RAN, Xn application protocol (XnAP)".

[36] 3GPP TS 38.473: "NG-RAN; F1 application protocol (F1AP)".

[37] 3GPP TS 36.423: "E-UTRA; X2 application protocol (X2AP)".

[38] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".

[39] 3GPP TS 38.101-2 "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[40] 3GPP TS 36.133:"E-UTRA; Requirements for support of radio resource management".

[41] 3GPP TS 37.340: "E-UTRA and NR; Multi-connectivity; Stage 2".

[42] 3GPP TS 38.413: "NG-RAN, NG Application Protocol (NGAP)".

[43] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[44] 3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence ".

[45] 3GPP TS 25.331: "Universal Terrestrial Radio Access (UTRA); Radio Resource Control (RRC); Protocol specification".

[46] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".

[47] 3GPP TS 38.340: "Backhaul Adaptation Protocol (BAP) specification"

[48] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access".

[49] 3GPP TS 37.355: "LTE Positioning Protocol (LPP)".

[50] IEEE 802.11-2012, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.

[51] Bluetooth Special Interest Group: "Bluetooth Core Specification v5.0", December 2016.

[52] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[53] 3GPP TS 38.314: "NR; layer 2 measurements".

[54] Void.

[55] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[56] 3GPP TS 23.285: "Technical Specification Group Services and System Aspects; Architecture enhancements for V2X services".

[57] 3GPP TS 24.587: " Technical Specification Group Core Network and Terminals; Vehicle-to-Everything (V2X) services in 5G System (5GS)".

[58] Military Standard WGS84 Metric MIL-STD-2401 (11 January 1994): "Military Standard Department of Defence World Geodetic System (WGS)".

[59] 3GPP TS 38.101-4 "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance Requirements".

[60] 3GPP TS 33.536: "Technical Specification Group Services and System Aspects; Security aspects of 3GPP support for advanced Vehicle-to-Everything (V2X) services".

[61] 3GPP TS 37.320: "Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

[62] 3GPP TS 36.306: "User Equipment (UE) radio access capabilities".

[63] 3GPP TS 38.174: "NR; Integrated Access and Backhaul (IAB) radio transmission and reception".

[64] 3GPP TS 38.472: "NG-RAN; F1 signalling transport".

[65] 3GPP TS 23.304: "Proximity based Services (ProSe) in the 5G System (5GS)".

[66] 3GPP TS 38.351: "NR; Sidelink Relay Adaptation Protocol (SRAP) Specification".

[67] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2"

[68] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[69] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia Telephony; Media handling and interaction".

[70] 3GPP TS 26.118: "Virtual Reality (VR) profiles for streaming applications".

[71] NIMA TR 8350.2, Third Edition, Amendment 1, 3 January 2000: "DEPARTMENT OF DEFENSE WORLD GEODETIC SYSTEM 1984".

[72] 3GPP TS 24.554: "Technical Specification Group Core Network and Terminals; Proximity-services (ProSe) in 5G System (5GS) protocol".

[73] 3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".

[74] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".

[75] 3GPP TS 38.101-5: "User Equipment (UE) radio transmission and reception; Part 5: Satellite access Radio Frequency (RF) and performance requirements".

3 Definitions, symbols and abbreviations

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.

Frequency Selection Area ID: An identity used for broadcast MBS session to guide the frequency selection of the UE as defined in TS 23.247 [67].

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 ProSe Communication (including ProSe UE-to-Network Relay and non-Relay communication) 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 ProSe non-Relay 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 by *PUCCH-Config*.

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
ECEF	Earth-Centered, Earth-Fixed
ECI	Earth-Centered Inertial
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
HST	High Speed Train
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
LEO	Low Earth Orbit
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	Single Frequency Network
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.

4 General

4.1 Introduction

This specification is organised as follows:

- clause 4.2 describes the RRC protocol model;
- clause 4.3 specifies the services provided to upper layers as well as the services expected from lower layers;
- clause 4.4 lists the RRC functions;
- clause 5 specifies RRC procedures, including UE state transitions;

- clause 6 specifies the RRC messages in ASN.1 and description;
- clause 7 specifies the variables (including protocol timers and constants) and counters to be used by the UE;
- clause 8 specifies the encoding of the RRC messages;
- clause 9 specifies the specified and default radio configurations;
- clause 10 specifies generic error handling;
- clause 11 specifies the RRC messages transferred across network nodes;
- clause 12 specifies the UE capability related constraints and performance requirements.

4.2 Architecture

4.2.1 UE states and state transitions including inter RAT

A UE is either in RRC_CONNECTED state or in RRC_INACTIVE state when an RRC connection has been established. If this is not the case, i.e. no RRC connection is established, the UE is in RRC_IDLE state. The RRC states can further be characterised as follows:

- **RRC_IDLE**:
  - A UE specific DRX may be configured by upper layers;
  - At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast;
  - UE controlled mobility based on network configuration;
  - The UE:
    - Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5);
    - Monitors a Paging channel for CN paging using 5G-S-TMSI, except if the UE is acting as a L2 U2N Remote UE;
    - If configured by upper layers for MBS multicast reception, monitors a Paging channel for CN paging using TMGI;
    - Performs neighbouring cell measurements and cell (re-)selection;
    - Acquires system information and can send SI request (if configured);
    - Performs logging of available measurements together with location and time for logged measurement configured UEs;
    - Performs idle/inactive measurements for idle/inactive measurement configured UEs;
    - If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data.
- **RRC_INACTIVE**:
  - A UE specific DRX may be configured by upper layers or by RRC layer;
  - At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast;
  - UE controlled mobility based on network configuration;
  - The UE stores the UE Inactive AS context;
  - A RAN-based notification area is configured by RRC layer;
  - Transfer of unicast data and/or signalling to/from UE over radio bearers configured for SDT.

- The UE:
  - Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5);
  - During SDT procedure, monitors control channels associated with the shared data channel to determine if data is scheduled for it;
  - While SDT procedure is not ongoing, monitors a Paging channel for CN paging using 5G-S-TMSI and RAN paging using fullI-RNTI, except if the UE is acting as a L2 U2N Remote UE;
  - If configured by upper layers for MBS multicast reception, while SDT procedure is not ongoing, monitors a Paging channel for paging using TMGI;
  - Performs neighbouring cell measurements and cell (re-)selection;
  - Performs RAN-based notification area updates periodically and when moving outside the configured RAN-based notification area;
  - Acquires system information and, while SDT procedure is not ongoing, can send SI request (if configured);
  - While SDT procedure is not ongoing, performs logging of available measurements together with location and time for logged measurement configured UEs;
  - While SDT procedure is not ongoing, performs idle/inactive measurements for idle/inactive measurement configured UEs;
  - If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data;
  - Transmits SRS for Positioning.

- **RRC_CONNECTED:**
  - The UE stores the AS context;
  - Transfer of unicast data to/from UE;
  - Transfer of MBS multicast data to UE;
  - At lower layers, the UE may be configured with a UE specific DRX;
  - At lower layers, the UE may be configured with a DRX for PTM transmission of MBS broadcast and/or a DRX for MBS multicast;
  - For UEs supporting CA, use of one or more SCells, aggregated with the SpCell, for increased bandwidth;
  - For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;
  - Network controlled mobility within NR, to/from E-UTRA, and to UTRA-FDD;
  - Network controlled mobility (path switch) between a serving cell and a L2 U2N Relay UE, or vice versa.
  - The UE:
    - Monitors Short Messages transmitted with P-RNTI over DCI (see clause 6.5), if configured;
    - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
    - Provides channel quality and feedback information;
    - Performs neighbouring cell measurements and measurement reporting;
    - Acquires system information;
    - Performs immediate MDT measurement together with available location reporting;

- If configured by upper layers for MBS broadcast reception, acquires MCCH change notification and MBS broadcast control information and data.

Figure 4.2.1-1 illustrates an overview of UE RRC state machine and state transitions in NR. A UE has only one RRC state in NR at one time.

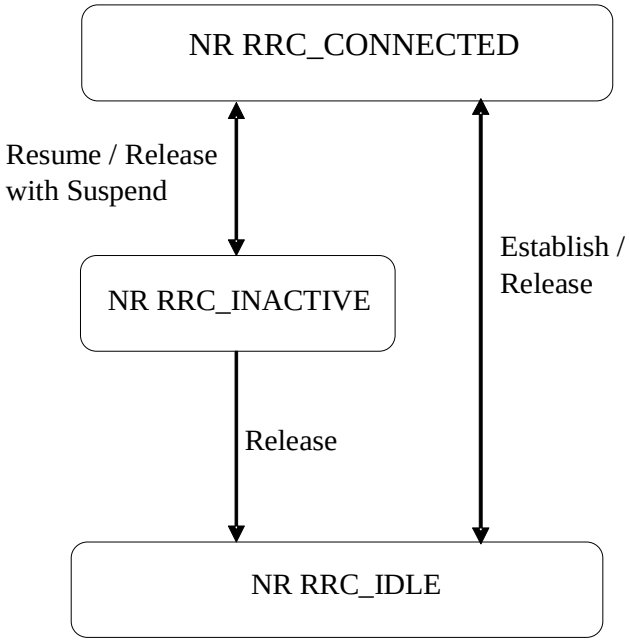

Figure 4.2.1-1: UE state machine and state transitions in NR

Figure 4.2.1-2 illustrates an overview of UE state machine and state transitions in NR as well as the mobility procedures supported between NR/5GC, E-UTRA/EPC and E-UTRA/5GC.

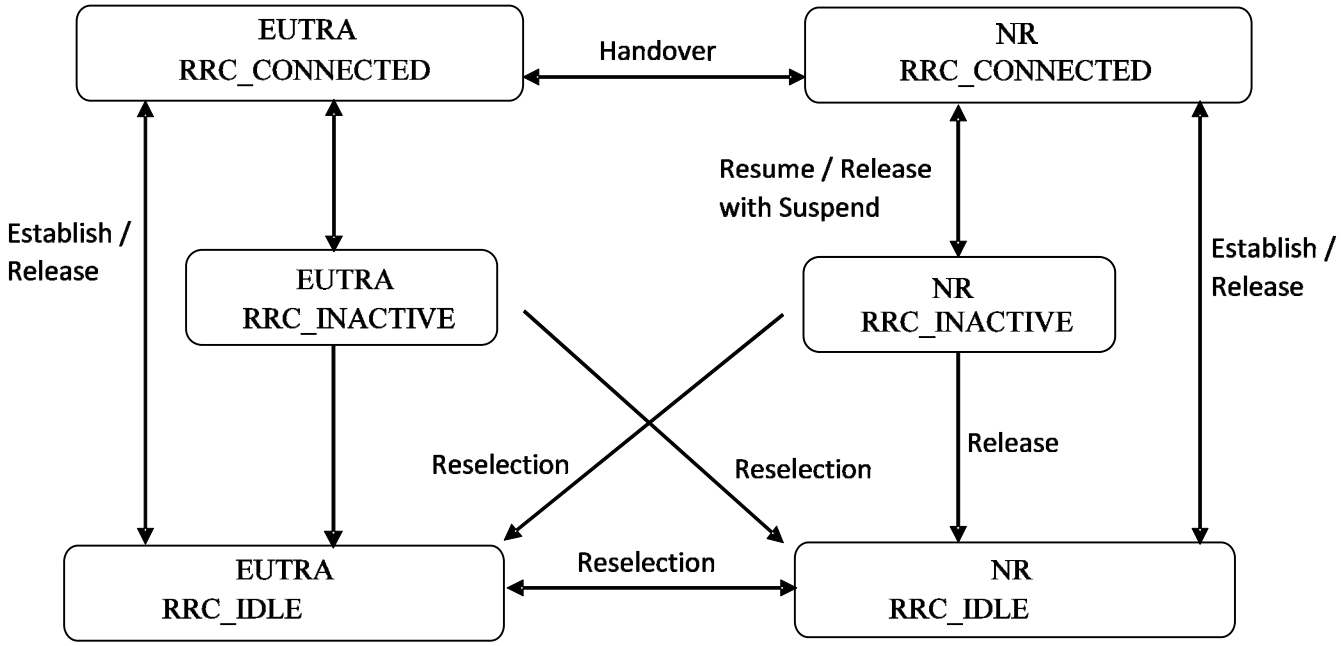

Figure 4.2.1-2: UE state machine and state transitions between NR/5GC, E-UTRA/EPC and E-UTRA/5GC

Figure 4.2.1-3 illustrates the mobility procedure supported between NR/5GC and UTRA-FDD.

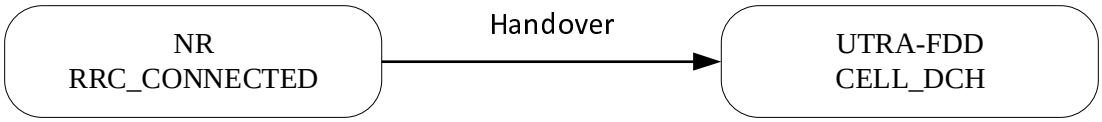

Figure 4.2.1-3: Mobility procedure supported between NR/5GC and UTRA-FDD

4.2.2 Signalling radio bearers

"Signalling Radio Bearers" (SRBs) are defined as Radio Bearers (RBs) that are used only for the transmission of RRC and NAS messages. More specifically, the following SRBs are defined:

- SRB0 is for RRC messages using the CCCH logical channel;
- SRB1 is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the establishment of SRB2, all using DCCH logical channel;
- SRB2 is for NAS messages and for RRC messages which include logged measurement information, all using DCCH logical channel. SRB2 has a lower priority than SRB1 and may be configured by the network after AS security activation;
- SRB3 is for specific RRC messages when UE is in (NG)EN-DC or NR-DC, all using DCCH logical channel;
- SRB4 is for RRC messages which include application layer measurement report information, all using DCCH logical channel. SRB4 has a lower priority than SRB1 and can only be configured by the network after AS security activation.

In downlink, piggybacking of NAS messages is used only for one dependant (i.e. with joint success/failure) procedure: bearer establishment/modification/release. In uplink piggybacking of NAS message is used only for transferring the initial NAS message during connection setup and connection resume.

NOTE 1: The NAS messages transferred via SRB2 are also contained in RRC messages, which however do not include any RRC protocol control information.

Once AS security is activated, all RRC messages on SRB1, SRB2, SRB3 and SRB4, including those containing NAS messages, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages, see TS 24.501 [23].

Split SRB is supported for all the MR-DC options in both SRB1 and SRB2 (split SRB is not supported for SRB0, SRB3 and SRB4).

For operation with shared spectrum channel access in FR1, SRB0, SRB1 and SRB3 are assigned with the highest priority Channel Access Priority Class (CAPC), (i.e. CAPC = 1) while CAPC for SRB2 is configurable.

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of common control information;
- Notification of UEs in RRC_IDLE, e.g. about a mobile terminating call;
- Notification of UEs about ETWS and/or CMAS;
- Transfer of dedicated signalling;

- Broadcast of positioning assistance data;
- Transfer of application layer measurement configuration and reporting.

4.3.2 Services expected from lower layers

In brief, the following are the main services that RRC expects from lower layers:

- Integrity protection, ciphering and loss-less in-sequence delivery of information without duplication;

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
  - Including NAS common information;
  - Information applicable for UEs in RRC_IDLE and RRC_INACTIVE (e.g. cell (re-)selection parameters, neighbouring cell information) and information (also) applicable for UEs in RRC_CONNECTED (e.g. common channel configuration information);
  - Including ETWS notification, CMAS notification;
  - Including positioning assistance data.
- RRC connection control:
  - Paging;
  - Establishment/modification/suspension/resumption/release of RRC connection, including e.g. assignment/modification of UE identity (C-RNTI, fullI-RNTI, etc.), establishment/modification/suspension/resumption/release of SRBs (except for SRB0);
  - Access barring;
  - Initial AS security activation, i.e. initial configuration of AS integrity protection (SRBs, DRBs) and AS ciphering (SRBs, DRBs);
  - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, path switch from a PCell to a target L2 U2N Relay UE or from a L2 U2N Relay UE to a target PCell, associated AS security handling, i.e. key/algorithm change, specification of RRC context information transferred between network nodes;
  - Establishment/modification/suspension/resumption/release of RBs carrying user data (DRBs/MRBs);
  - Radio configuration control including e.g. assignment/modification of ARQ configuration, HARQ configuration, DRX configuration;
  - In case of DC, cell management including e.g. change of PSCell, addition/modification/release of SCG cell(s);
  - In case of CA, cell management including e.g. addition/modification/release of SCell(s);
  - QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration and configured grant configuration for DL and UL respectively, assignment/ modification of parameters for UL rate control in the UE, i.e. allocation of a priority and a prioritised bit rate (PBR) for each RB of UE and logical channel of IAB-MT.
  - Recovery from radio link failure.
- Inter-RAT mobility including e.g. AS security activation, transfer of RRC context information;
- Measurement configuration and reporting:

- Establishment/modification/release of measurement configuration (e.g. intra-frequency, inter-frequency and inter- RAT measurements);
- Setup and release of measurement gaps;
- Measurement reporting.

- Configuration of BAP entity and BH RLC channels for the support of IAB-node.
- Configuration of SRAP entity and Uu/PC5 Relay RLC channels for the support of L2 U2N relay.
- Other functions including e.g. generic protocol error handling, transfer of dedicated NAS information, transfer of UE radio access capability information.
- Support of self-configuration and self-optimisation.
- Support of measurement logging and reporting for network performance optimisation, as specified in TS 37.320 [61];
- Support of transfer of application layer measurement configuration and reporting.

5 Procedures

5.1 General

5.1.1 Introduction

This clause covers the general requirements.

5.1.2 General requirements

The UE shall:

1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message;

NOTE: Network may initiate a subsequent procedure prior to receiving the UE's response of a previously initiated procedure.

1> within a clause execute the steps according to the order specified in the procedural description;

1> consider the term 'radio bearer' (RB) to cover SRBs, DRBs and MRBs unless explicitly stated otherwise;

1> set the *rrc-TransactionIdentifier* in the response message, if included, to the same value as included in the message received from the network that triggered the response message;

1> upon receiving a choice value set to *setup*:

2> apply the corresponding received configuration and start using the associated resources, unless explicitly specified otherwise;

1> upon receiving a choice value set to *release*:

2> clear the corresponding configuration and stop using the associated resources;

1> in case the size of a list is extended, upon receiving an extension field comprising the entries in addition to the ones carried by the original field (regardless of whether the network signals more entries in total); apply the following generic behaviour unless explicitly stated otherwise:

2> create a combined list by concatenating the additional entries included in the extension field to the original field while maintaining the order among both the original and the additional entries;

2> for the combined list, created according to the previous, apply the same behaviour as defined for the original field.

5.1.3 Requirements for UE in MR-DC

In this specification, the UE considers itself to be in:

- EN-DC, if and only if it is configured with *nr-SecondaryCellGroupConfig* according to TS 36.331[10], and it is connected to EPC,
- NGEN-DC, if and only if it is configured with *nr-SecondaryCellGroupConfig* according to TS 36.331[10], and it is connected to 5GC,
- NE-DC, if and only if it is configured with *mrdc-SecondaryCellGroup* set to *eutra-SCG*,
- NR-DC, if and only if it is configured with *mrdc-SecondaryCellGroup* set to *nr-SCG*,
- MR-DC, if and only if it is in (NG)EN-DC, NE-DC or NR-DC.

NOTE: This use of these terms deviates from the definition in TS 37.340 [41] and other specifications. In TS 37.340, these terms include also the case where the UE is configured with E-UTRA or NR MCG only (i.e. no NR or E-UTRA SCG) but with one or more bearers terminated in a secondary node (i.e. using NR PDCP).

The UE in (NG)EN-DC only executes a subclause of clause 5 in this specification when the subclause:

- is referred to from a subclause under execution, either in this specification or in TS 36.331 [10]; or
- applies to a message received on SRB3 (if SRB3 is established); or
- applies to field(s), IE(s), UE variable(s) or timer(s) in this specification that the UE is configured with.

When executing a subclause of clause 5 in this specification, the UE follows the requirements in clause 5.1.2 and in all subclauses of this specification applicable to the messages (including processing time requirements), fields, IEs, timers and UE variables indicated in the subclause under execution.

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;

NOTE 1: If the period of SSB is larger than 80 ms, the MIB is transmitted with the same periodicity as that 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 different SI messages, i.e. an SI message contains either only SIBs or only posSIBs. 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 repeated with the same content 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*.
  Each SIB and each posSIB is mapped to a single SI message. posSIBs of the same *posSibType* carrying GNSS Generic Assistance Data for different GNSS/SBAS (identified by *gnss-id/sbas-id*, see TS 37.355 [49]) are mapped to different SI messages.
  Each SIB and posSIB is contained at most once in an SI message.
  For SIBs and posSIBs with segments, the segments contained in SI messages are transmitted according to the SI message periodicity, with one segment of a particular *sibType*/*posSibType* in each 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 2: 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

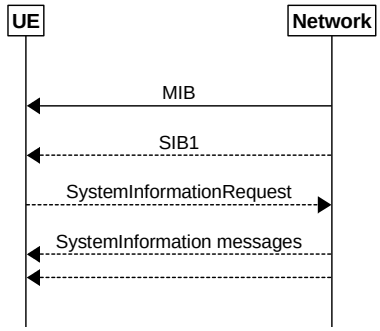

Figure 5.2.2.1-1: System information acquisition

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 is capable of slice-based cell reselection and the UE receives NSAG information for cell reselection from upper layer), *SIB17* (if the UE is using TRS resources for power saving in RRC_IDLE and RRC_INACTIVE) and *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*, 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 5.8.9.9.3. 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 IDLE 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 SDT procedure is not ongoing shall monitor for SI change indication in its own paging occasion(s) that the UE monitors as specified in TS 38.304 [20]. 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 SDT procedure is ongoing shall monitor for SI change indication in any paging occasion at least once per modification period, if the initial downlink BWP on which the SDT procedure is ongoing is associated with a CD-SSB.

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 SDT procedure is not ongoing shall monitor for indications about PWS notification in its own paging occasion(s) that the UE monitors as specified in TS 38.304 [20]. 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 SDT procedure is ongoing shall monitor for indication about PWS notification in any paging occasion at least once every *defaultPagingCycle*, if the initial downlink BWP on which the SDT procedure is ongoing is associated with a CD-SSB.

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 does not operate an IDLE 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 operates an 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 1: 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 SDT procedure is ongoing, 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.

NOTE 2: UE in RRC_INACTIVE that does not support *inactiveStateNTN-r17* enters RRC_IDLE upon cell reselection between TN cell and NTN cell, and initiates the NAS signalling connection recovery (see TS 24.501 [23]).

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 $[x \times N+K]^{th}$ PDCCH monitoring occasion (s) for SI message in SI-window corresponds to the K^{th} 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 $x = (n - 1) \times w$, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where $a = x \bmod N$, 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 $x = (si\text{-}WindowPosition - 1) \times w$, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where $a = x \bmod N$, 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 $x = (n - 1) \times w$, where *w* is the *si-WindowLength*;

3> the SI-window starts at the slot #*a*, where $a = x \bmod N$, 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 $x = m \times w + (n - 1) \times w$, where *w* is the *si-WindowLength;*

3> the SI-window starts at the slot #*a*, where $a = x \bmod N$, 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;

1> if all the SIB(s) and/or posSIB(s) requested in *DedicatedSIBRequest* message have been acquired:

2> stop timer T350, if running;

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 SDT procedure is not ongoing:

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 TS 38.321 [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-RequestConfigRedCap* 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-RequestConfigRedcap* 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 with *rrcSystemInfoRequest* in accordance with 5.2.2.3.4;

3> if acknowledgement for *RRCSystemInfoRequest* message with *rrcSystemInfoRequest* 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 *rrcSystemInfoRequest*:

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 SDT procedure is not ongoing:

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 TS 38.321 [3] using the PRACH preamble(s) and PRACH resource(s) in *posSI-RequestConfigSUL* 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 if the UE is a RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *posSI-SchedulingInfo* containing *posSI-RequestConfigRedCap* 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-RequestConfigRedCap* 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 access is not for NTN or the UE is not capable of NTN; and

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*.

NOTE: A UE capable of NTN access should acquire SIB1 to determine whether the cell is an NTN cell.

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 access is for NTN:

2> if the UE is in RRC_IDLE or in RRC_INACTIVE, or if the UE is in RRC_CONNECTED while *T311* is running; and

2> if the *cellBarredNTN* in the acquired *SIB1* is set to *barred* or the *cellBarredNTN* is not included in the acquired *SIB1*:

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], upon which the procedure ends;

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, upon which the procedure ends;

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], upon which the procedure ends;

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 the UE in RRC_INACTIVE is configured for feature(s) that it does not support in current serving cell:

2> not use the corresponding configuration in current serving cell;

NOTE 0: The requirement above applies only to UE that indicates different support of UE capabilities for TN and NTN.

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 included;

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 1: 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], TS 38.101-2 [39], and TS 38.101-5 [75]) 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 RedCap-specific initial uplink BWP if configured), and which
- is wider than or equal to the bandwidth of the initial uplink BWP or, for RedCap UE, of the RedCap-specific initial uplink BWP if configured, and

2> if the UE supports a downlink channel bandwidth with a maximum transmission bandwidth configuration (see TS 38.101-1 [15], TS 38.101-2 [39], and TS 38.101-5 [75]) 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 RedCap-specific initial downlink BWP if configured), and which
- is wider than or equal to the bandwidth of the initial downlink BWP or, for RedCap UE, of the RedCap-specific initial downlink BWP 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, and

2> if the UE is not a RedCap UE, or if the UE is a RedCap UE and *halfDuplexRedCapAllowed* is present, or if the UE is a RedCap UE and the RedCap UE supports full-duplex FDD operation on this band:

3> if neither *trackingAreaCode* nor *trackingAreaList* is 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 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, RedCap-specific initial uplink BWP, 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 RedCap-specific initial uplink BWP 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, RedCap-specific initial downlink BWP, 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 RedCap-specific initial downlink BWP 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, and for RedCap UEs if the *halfDuplexRedCapAllowed* is not present, for which the UE supports full-duplex FDD operation;

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/SNPN to 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 is not a RedCap UE, or if the UE is a RedCap UE and *halfDuplexRedCapAllowed* is present, or if the UE is a RedCap UE and the RedCap UE supports full-duplex FDD operation on the frequency bands indicated in the *frequencyBandList* for the *supplementaryUplink*; 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, and for RedCap UEs if the *halfDuplexRedCapAllowed* is not present, for which the UE supports full-duplex FDD operation;

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;

NOTE 2: For an out of coverage L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE receiving SIB1 from its connected L2 U2N Relay UE, it is up to Remote UE implementation whether to consider and apply the following parameters: *frequencyBandList*, *carrierBandwidth*, *frequencyShift7p5khz*, frequency band, channel bandwidth, the configuration included in the *servingCellConfigCommon*, the specified PCCH configuration, *additionalSpectrumEmission*, *additionalPmax*, and *p-Max*.

2> else:

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

3> perform barring as if *intraFreqReselection*, or *intraFreqReselectionRedCap* for RedCap UEs, 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* or *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> if the UE is configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages and *sl-L2U2N-Relay* is included in SIB12; or

4> if the UE is configured by upper layers to transmit NR sidelink L3 U2N relay discovery messages and *sl-L3U2N-RelayDiscovery* is included in SIB12; or

4> if the UE is configured by upper layers to transmit NR sidelink non-relay discovery messages and *sl-NonRelayDiscovery* is included in SIB12:

5> 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;

5> 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;

5> 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 *sl-TimersAndConstantsRemoteUE* is included in *SIB12*:

3> use values for timers T300, T301 and T319 as included in the *sl-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 in RRC_CONNECTED shall:

1> start or restart T430 for serving cell with the timer value set to *ntn-UlSyncValidityDuration* for the serving cell from the subframe indicated by *epochTime* for the serving cell;

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*, or *intraFreqReselectionRedCap* for RedCap UEs, 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> perform 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].

NOTE: The *SIB19* is essential for NTN access. If UE is unable to acquire the *SIB19* for NTN access, the action is up to UE implementation (e.g., cell re-selection to other cells).

5.2.2.6 T430 expiry

The UE shall:

1> if T430 for serving cell expires and 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 when UL synchronisation is obtained;

NOTE: The exact time when UL synchronisation is obtained (after SIB19 is acquired) is left to UE implementation, which can be from the subframe indicated by *epochTime* and optionally before the subframe indicated by *epochTime*.

5.3 Connection control

5.3.1 Introduction

5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. The network completes RRC connection establishment prior to completing the establishment of the NG connection, i.e. prior to receiving the UE context information from the 5GC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the network may configure the UE to perform measurement reporting, but the UE only sends the corresponding measurement reports after successful AS security activation. However, the UE only accepts a re-configuration with sync message when AS security has been activated.

Upon receiving the UE context from the 5GC, the RAN activates AS security (both ciphering and integrity protection) using the initial AS security activation procedure. The RRC messages to activate AS security (command and successful response) are integrity protected, while ciphering is started only after completion of the procedure. That is, the response to the message used to activate AS security is not ciphered, while the subsequent messages (e.g. used to establish SRB2, DRBs and multicast MRBs) are both integrity protected and ciphered. After having initiated the initial AS security activation procedure, the network may initiate the establishment of SRB2 and DRBs and/or multicast MRBs, i.e. the network may do this prior to receiving the confirmation of the initial AS security activation from the UE. In any case, the network will apply both ciphering and integrity protection for the RRC reconfiguration messages used to establish SRB2, DRBs and/or multicast MRBs. The network should release the RRC connection if the initial AS security activation and/ or the radio bearer establishment fails. A configuration with SRB2 without DRB or multicast MRB, or with DRB or multicast MRB without SRB2 is not supported (i.e., SRB2 and at least one DRB or multicast MRB must be configured in the same RRC Reconfiguration message, and it is not allowed to release all the DRBs and multicast MRBs without releasing the RRC Connection). For IAB-MT, a configuration with SRB2 without any DRB/MRB is supported.

The release of the RRC connection normally is initiated by the network. The procedure may be used to re-direct the UE to an NR frequency or an E-UTRA carrier frequency.

The suspension of the RRC connection is initiated by the network. When the RRC connection is suspended, the UE stores the UE Inactive AS context and any configuration received from the network, and transits to RRC_INACTIVE state. The RRC message to suspend the RRC connection is integrity protected and ciphered.

The resumption of a suspended RRC connection is initiated by upper layers when the UE needs to transit from RRC_INACTIVE state to RRC_CONNECTED state or by RRC layer to perform a RNA update or by RAN paging from NG-RAN or for SDT. When the RRC connection is resumed, network configures the UE according to the RRC connection resume procedure based on the stored UE Inactive AS context and any RRC configuration received from the network. The RRC connection resume procedure re-activates AS security and re-establishes SRB(s) and DRB(s) and/or multicast MRB(s), if configured.

Upon initiating the resume procedure for SDT, AS security (both ciphering and integrity protection) is re-activated for SRB2 (if configured for SDT) and for SRB1. In addition, AS security is also re-activated (if security is configured) for all the DRBs configured for SDT. Further, the PDCP entities of SRB1 and PDCP entities of the radio bearers configured for SDT are re-established and resumed whilst the UE remains in RRC_INACTIVE state. Transmission and reception of data and/or signalling messages over radio bearers configured for SDT can happen whilst the UE is in RRC_INACTIVE state and SDT procedure is ongoing.

In response to a request to resume the RRC connection or in response to a resume procedure initiated for SDT, the network may resume the suspended RRC connection and send UE to RRC_CONNECTED, or reject the request to resume and send UE to RRC_INACTIVE (with a wait timer), or directly re-suspend the RRC connection and send UE to RRC_INACTIVE, or directly release the RRC connection and send UE to RRC_IDLE, or instruct the UE to initiate NAS level recovery (in this case the network sends an RRC setup message).

NOTE: In case the UE receives the configurations for NR sidelink communication via the E-UTRA, the configurations for NR sidelink communication in *SIB12* and *sl-ConfigDedicatedNR* within *RRCReconfiguration* used in clause 5.3 are provided by the configurations in *SystemInformationBlockType28* and *sl-ConfigDedicatedForNR* within *RRCConnectionReconfiguration* as specified in TS 36.331[10], respectively.

5.3.1.2 AS Security

AS security comprises of the integrity protection and ciphering of RRC signalling (SRBs) and user data (DRBs).

RRC handles the configuration of the AS security parameters which are part of the AS configuration: the integrity protection algorithm, the ciphering algorithm, if integrity protection and/or ciphering is enabled for a DRB and two parameters, namely the *keySetChangeIndicator* and the *nextHopChainingCount*, which are used by the UE to determine the AS security keys upon reconfiguration with sync (with key change), connection re-establishment and/or connection resume.

The integrity protection algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured) and DRBs configured with integrity protection, with the same *keyToUse* value. The ciphering algorithm is common for SRB1, SRB2, SRB3 (if configured), SRB4 (if configured) and DRBs configured with the same *keyToUse* value. Neither integrity protection nor ciphering applies for SRB0.

NOTE 0: All DRBs related to the same PDU session have the same enable/disable setting for ciphering and the same enable/disable setting for integrity protection, as specified in TS 33.501 [11].

RRC integrity protection and ciphering are always activated together, i.e. in one message/procedure. RRC integrity protection and ciphering for SRBs are never de-activated. However, it is possible to switch to a '*NULL*' ciphering algorithm (*nea0*).

The '*NULL*' integrity protection algorithm (*nia0*) is used only for SRBs and for the UE in limited service mode, see TS 33.501 [11] and when used for SRBs, integrity protection is disabled for DRBs. In case the *'NULL*' integrity protection algorithm is used, '*NULL*' ciphering algorithm is also used.

NOTE 1: Lower layers discard RRC messages for which the integrity protection check has failed and indicate the integrity protection verification check failure to RRC.

The AS applies four different security keys: one for the integrity protection of RRC signalling (K_{RRCint}), one for the ciphering of RRC signalling (K_{RRCenc}), one for integrity protection of user data (K_{UPint}) and one for the ciphering of user data (K_{UPenc}). All four AS keys are derived from the K_{gNB} key. The K_{gNB} key is based on the K_{AMF} key (as specified in TS 33.501 [11]), which is handled by upper layers.

The integrity protection and ciphering algorithms can only be changed with reconfiguration with sync. The AS keys (K_{gNB}, K_{RRCint}, K_{RRCenc}, K_{UPint} and K_{UPenc}) change upon reconfiguration with sync (if *masterKeyUpdate* is included), and upon connection re-establishment and connection resume.

For each radio bearer an independent counter (*COUNT*, as specified in TS 38.323 [5]) is maintained for each direction. For each radio bearer, the *COUNT* is used as input for ciphering and integrity protection.

It is not allowed to use the same *COUNT* value more than once for a given security key. As specified in TS 33.501 clause 6.9.4.1 [11], the network is responsible for avoiding reuse of the *COUNT* with the same RB identity and with the same key, e.g. due to the transfer of large volumes of data, release and establishment of new RBs, and multiple termination point changes for RLC-UM bearers and multiple termination point changes for RLC-AM bearer with SN terminated PDCP re-establishment (COUNT reset) due to SN only full configuration whilst the key stream inputs (i.e. bearer ID, security key) at MN have not been updated. In order to avoid such re-use, the network may e.g. use different RB identities for RB establishments, change the AS security key, or an RRC_CONNECTED to RRC_IDLE/RRC_INACTIVE and then to RRC_CONNECTED transition.

In order to limit the signalling overhead, individual messages/ packets include a short sequence number (PDCP SN, as specified in TS 38.323 [5]). In addition, an overflow counter mechanism is used: the hyper frame number (*HFN*, as specified in TS 38.323 [5]). The HFN needs to be synchronized between the UE and the network.

For each SRB, the value provided by RRC to lower layers to derive the 5-bit BEARER parameter used as input for ciphering and for integrity protection is the value of the corresponding *srb-Identity* with the MSBs padded with zeroes.

For a UE provided with an *sk-counter*, *keyToUse* indicates whether the UE uses the master key (K_{gNB}) or the secondary key (S-K_{eNB} or S-K_{gNB}) for a particular DRB. The secondary key is derived from the master key and *sk-Counter*, as defined in TS 33.501[11]. Whenever there is a need to refresh the secondary key, e.g. upon change of MN with K_{gNB} change or to avoid COUNT reuse, the security key update is used (see 5.3.5.7). When the UE is in NR-DC, the network may provide a UE configured with an SCG with an *sk-Counter* even when no DRB is setup using the secondary key (S-K_{gNB}) in order to allow the configuration of SRB3. The network can also provide the UE with an *sk-Counter*, even if no SCG is configured, when using SN terminated MCG bearers.

5.3.2 Paging

5.3.2.1 General

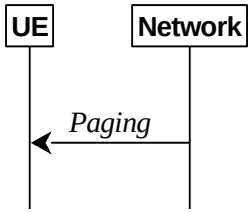

Figure 5.3.2.1-1: Paging

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE or RRC_INACTIVE.
- to transmit paging information for a L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE to its serving L2 U2N Relay UE in any RRC state.

5.3.2.2 Initiation

The network initiates the paging procedure by transmitting the *Paging* message at the UE's paging occasion as specified in TS 38.304 [20]. The network may address multiple UEs within a *Paging* message by including one *PagingRecord* for each UE. The network may also include one or multiple TMGI(s) in the *Paging* message to page UEs for specific MBS multicast session(s).

5.3.2.3 Reception of the *Paging message* by the UE or *PagingRecord* by the L2 U2N Remote UE

Upon receiving the *Paging* message by the UE or receiving *PagingRecord* from its connected L2 U2N Relay UE by a L2 U2N Remote UE, the UE shall:

1> if in RRC_IDLE, for each of the *PagingRecord*, if any, included in the *Paging* message, or

1> if in RRC_IDLE, for the *PagingRecord*, if any, included in the *UuMessageTransferSidelink* message received from the connected L2 U2N Relay UE:

2> if the *ue-Identity* included in the *PagingRecord* matches the UE identity allocated by upper layers:

3> if upper layers indicate the support of paging cause:

4> forward the *ue-Identity*, *accessType* (if present) and paging cause (if determined) to the upper layers;

3> else:

4> forward the *ue-Identity* and *accessType* (if present) to the upper layers;

1> if in RRC_INACTIVE, for each of the *PagingRecord*, if any, included in the *Paging* message, or

1> if in RRC_INACTIVE, for the *PagingRecord*, if any, included in the *UuMessageTransferSidelink* message received from the connected L2 U2N Relay UE:

2> if the *ue-Identity* included in the *PagingRecord* matches the UE's stored *fullI-RNTI*:

3> if the UE is configured by upper layers with Access Identity 1:

4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mps-PriorityAccess*;

3> else if the UE is configured by upper layers with Access Identity 2:

4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mcs-PriorityAccess*;

3> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:

4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *highPriorityAccess*;

3> else:

4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mt-Access*;

NOTE: A MUSIM UE may not initiate the RRC connection resumption procedure, e.g. when it decides not to respond to the *Paging* message due to UE implementation constraints as specified in TS 24.501 [23].

2> else if the *ue-Identity* included in the *PagingRecord* matches the UE identity allocated by upper layers:

3> if upper layers indicate the support of paging cause:

4> forward the *ue-Identity*, *accessType* (if present) and paging cause (if determined) to the upper layers;

3> else:

4> forward the *ue-Identity* and *accessType* (if present) to the upper layers;

3> perform the actions upon going to RRC_IDLE as specified in 5.3.11 with release cause 'other';

1> if in RRC_IDLE, for each *TMGI* included in *pagingGroupList*, if any, included in the *Paging* message:

2> if the UE has joined an MBS session indicated by the *TMGI* included in the *pagingGroupList*:

3> forward the *TMGI* to the upper layers;

1> if in RRC_INACTIVE and the UE has joined one or more MBS session(s) indicated by the *TMGI(s)* included in the *pagingGroupList*:

2> if *PagingRecordList* is not included in the *Paging* message; or

2> if none of the *ue-Identity* included in any of the *PagingRecord* matches the UE identity allocated by upper layers or the UE's stored *fullI-RNTI*:

3> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set as below:

4> if the UE is configured by upper layers with Access Identity 1:

5> set *resumeCause* to *mps-PriorityAccess*;

4> else if the UE is configured by upper layers with Access Identity 2:

5> set *resumeCause* to *mcs-PriorityAccess*;

4> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:

5> set *resumeCause* to *highPriorityAccess*;

4> else:

5> set *resumeCause* to *mt-Access*;

2> else if the *ue-Identity* included in any of the *PagingRecord* matches the UE identity allocated by upper layers:

3> forward the *TMGI(s)* to the upper layers;

1> if the UE is acting as a L2 U2N Relay UE, for each of the *PagingRecord*, if any, included in the *Paging* message:

2> if the *ue-Identity* included in the *PagingRecord* in the *Paging* message matches the UE identity in *sl-PagingIdentityRemoteUE* included in *sl-PagingInfo-RemoteUE* received in *RemoteUEInformationSidelink* message from a L2 U2N Remote UE:

3> inititate the Uu Message transfer in sidelink to that UE as specified in 5.8.9.9;

5.3.3 RRC connection establishment

5.3.3.1 General

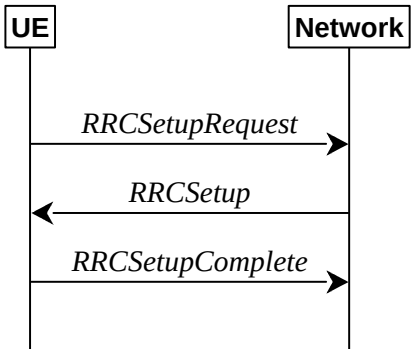

Figure 5.3.3.1-1: RRC connection establishment, successful

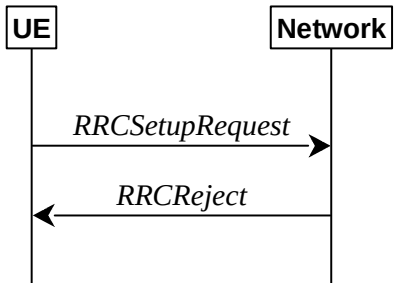

Figure 5.3.3.1-2: RRC connection establishment, network reject

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 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;

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

2> if the UE is configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages and *sl-L2U2N-Relay* is included in *SIB12*; or

2> if the UE is configured by upper layers to transmit NR sidelink L3 U2N relay discovery messages and *sl-L3U2N-RelayDiscovery* is included in *SIB12*; or

2> if the UE is configured by upper layers to transmit NR sidelink non-relay discovery messages and *sl-NonRelayDiscovery* is included in *SIB12*:

3> 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* includes neither *sl-DiscTxPoolSelected* nor *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 upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):

2> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and/or in *RA-PrioritizationSliceInfo*), and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);

NOTE: If there are multiple NSAGs with the same highest NAS-provided NSAG priority identified for access attempt as above, it is left to UE implementation to select the NSAG to be applied in the Random Access procedure.

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

2> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;

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 $0..2^{39}$-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 RedCap-specific initial downlink BWP 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> if *srs-PosRRC-Inactive* is configured:

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

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

2> discard any current AS security context including the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key;

2> release radio resources for all established RBs except SRB0 and broadcast MRBs, 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, CCCH configuration and broadcast MRBs;

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;

1> if T319a is running:

2> stop T319a;

2> consider SDT procedure is not ongoing;

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 after failing to perform reestablishment and if this is the first *RRCSetup* received by the UE after declaring the failure:

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 after failing to perform reestablishment and if this is the first *RRCSetup* received by the UE after declaring the failure:

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 (re)selection 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 (except broadcast MRBs);

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 any entry of *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* and the UE variable *VarConnEstFailReportList*, 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 *NotificationMessageSidelink* 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 (except broadcast MRBs).

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

The L2 U2N Remote UE indicates to upper layers to trigger PC5 unicast link release with its connected L2 U2N Relay UE.

5.3.4 Initial AS security activation

5.3.4.1 General

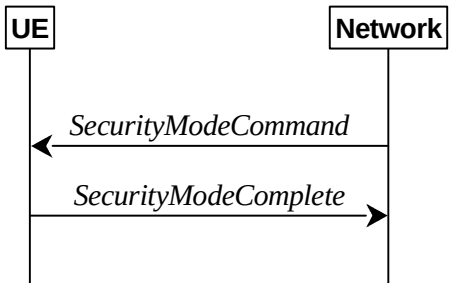

Figure 5.3.4.1-1: Security mode command, successful

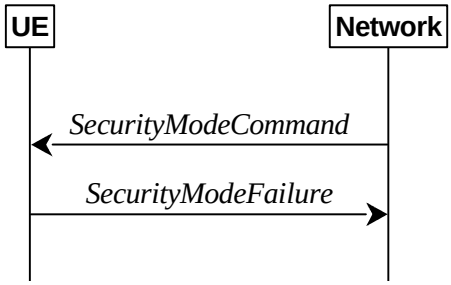

Figure 5.3.4.1-2: Security mode command, failure

The purpose of this procedure is to activate AS security upon RRC connection establishment.

5.3.4.2 Initiation

The network initiates the security mode command procedure to a UE in RRC_CONNECTED. Moreover, the network applies the procedure as follows:

- when only SRB1 is established, i.e. prior to establishment of SRB2, multicast MRBs and/ or DRBs.

5.3.4.3 Reception of the *SecurityModeCommand* by the UE

The UE shall:

1> derive the K_{gNB} key, as specified in TS 33.501 [11];

1> derive the K_{RRCint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];

1> request lower layers to verify the integrity protection of the *SecurityModeCommand* message, using the algorithm indicated by the *integrityProtAlgorithm* as included in the *SecurityModeCommand* message and the K_{RRCint} key;

1> if the *SecurityModeCommand* message passes the integrity protection check:

2> derive the K_{RRCenc} key and the K_{UPenc} key associated with the *cipheringAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];

2> derive the K_{UPint} key associated with the *integrityProtAlgorithm* indicated in the *SecurityModeCommand* message, as specified in TS 33.501 [11];

2> configure lower layers to apply SRB integrity protection using the indicated algorithm and the K_{RRCint} key immediately, i.e. integrity protection shall be applied to all subsequent messages received and sent by the UE, including the *SecurityModeComplete* message;

2> configure lower layers to apply SRB ciphering using the indicated algorithm, the K_{RRCenc} keyafter completing the procedure, i.e. ciphering shall be applied to all subsequent messages received and sent by the UE, except for the *SecurityModeComplete* message which is sent unciphered;

2> consider AS security to be activated;

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

1> else:

2> continue using the configuration used prior to the reception of the *SecurityModeCommand* message, i.e. neither apply integrity protection nor ciphering.

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

5.3.5 RRC reconfiguration

5.3.5.1 General

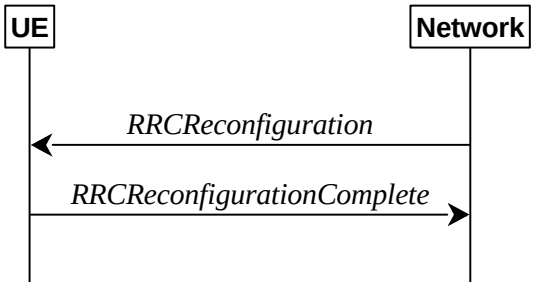

Figure 5.3.5.1-1: RRC reconfiguration, successful

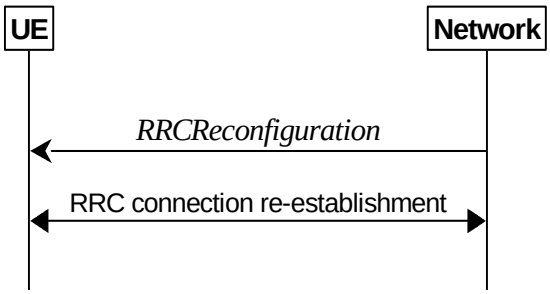

Figure 5.3.5.1-2: RRC reconfiguration, failure

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 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 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 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 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 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-K_{gNB} or SRB3, and to reconfigure SDAP for DRBs associated with S-K_{gNB} 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) 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) 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 the MCG and the SCG *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 K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} 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;

2> if all the SIB(s) and/or posSIB(s) requested in *DedicatedSIBRequest* message have been acquired:

3> stop timer T350, if running;

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;

2> if all the SIB(s) and/or posSIB(s) requested in *DedicatedSIBRequest* message have been acquired:

3> stop timer T350, if running;

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 *onDemandSIB-Request*:

2> if *onDemandSIB-Request* is set to *setup*:

3> consider itself to be configured to request SIB(s) or posSIB(s) in RRC_CONNECTED in accordance with clause 5.2.2.3.5;

2> else:

3> consider itself not to be configured to request SIB(s) or posSIB(s) in RRC_CONNECTED in accordance with clause 5.2.2.3.5;

3> stop timer T350, if running;

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> perform the MUSIM gap configuration procedure as specified in 5.3.5.9a;

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

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

1> if the *RRCReconfiguration* message includes the *ue-TxTEG-RequestUL-TDOA-Config*:

2> if *ue-TxTEG-RequestUL-TDOA-Config* is set to *setup*:

3> perform the UE positioning assistance information procedure as specified in 5.7.14;

2> else:

3> release the configuration of UE positioning assistance information;

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 *masterCellGroup* containing the *reportUplinkTxDirectCurrentMoreCarrier*:

3> include in the *uplinkTxDirectCurrentMoreCarrierList* 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;

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

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

NOTE 0b: The UE does not expect that the *reportUplinkTxDirectCurrentTwoCarrier* or *reportUplinkTxDirectCurrentMoreCarrier* is received in both *masterCellGroup* and in *secondaryCellGroup*. Network only configures at most one of *reportUplinkTxDirectCurrent*, *reportUplinkTxDirectCurrentTwoCarrier* or *reportUplinkTxDirectCurrentMoreCarrier* in one RRC message.

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 in at least one of the entries of *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 message (*RRCConnectionReconfiguration* or *RRCConnectionResume*) 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 the procedure ends;

4> else 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 the *scg-State* is not included in the *RRCConnectionReconfiguration*:

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

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

4> else the procedure ends;

3> else:

4> perform SCG deactivation as specified in 5.3.5.13b;

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> 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 the procedure ends;

3> else 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 the *scg-State* is not included in the *RRCReconfiguration* message containing the *RRCReconfiguration* message:

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

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

5> else:

6> the procedure ends;

4> else:

5> perform SCG deactivation as specified in 5.3.5.13b;

5> the procedure ends;

3> else:

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

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

6> perform SCG deactivation as specified in 5.3.5.13b;

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

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

4> indicate TA report initiation to lower layers;

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, and Uu Relay RLC channels for L2 U2N Relay UE, 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;

3> reset MAC used in the source cell;

NOTE 2b: PDCP and SDAP configured by the source prior to the path switch that are reconfigured and re-used by target when delta signalling is used, are not released as part of this procedure.

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 the MCG and the SCG *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;

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

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 an *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 an *MBSInterestIndication* message after having received this *RRCReconfiguration* message:

4> initiate transmission of an *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> remove all the entries within the SCG *VarConditionalReconfig*, if any;

2> if SCG release was triggered by NR (i.e. NR-DC case):

3> remove all the entries within the MCG *VarConditionalReconfig* for which the *RRCReconfiguration* within *condRRCReconfig* does not include the *masterCellGroup* with *reconfigurationWithSync*, if any;

2> else (i.e. EN-DC case):

3> perform *VarConditionalReconfiguration* CPC removal as specified in TS 36.331 [10] clause 5.3.5.9.7;

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> stop timer T430 if running;

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> 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];

2> if *NTN-Config* is configured for the target cell:

3> start timer T430 with the timer value set to *ntn-UlSyncValidityDuration* from the subframe indicated by *epochTime*, according to the target cell *NTN-Config*;

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 *NotificationMessageSidelink* 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. For MRB, the network does not re-associate an already configured logical channel with DRB or SRB or another MRB (i.e. MRB with another PDCP entity). Hence *multicastRLC-BearerConfig* is not present in this case. If a radio bearer is released and another is added with the same radio bearer identity, it is considered as a new (different) radio bearer. Hence, the network also releases the RLC bearer(s) associated with the released radio bearer.

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 if *rlf-TimersAndConstants* is not configured for this cell group or *SpCellConfig* contains the *rlf-TimersAndConstants* which is set to *release*:

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, or received in an *RRCReconfiguration* message

embedded in an *RRCReconfiguration* message or embedded in an E-UTRA *RRCConnectionReconfiguration* message activating deactivated SCG:

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 if any DAPS bearer is 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 established for the PDU sessions, 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 established for the MBS multicast sessions, if any, 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 (K_{RRCenc} and K_{RRCint}) associated with the master key (K_{gNB});

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 (K_{RRCenc} and K_{RRCint}) 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 (K_{RRCenc} and K_{RRCint}) associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) 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 (K_{RRCenc} and K_{RRCint}) associated with the master key (K_{eNB}/ K_{gNB}) or secondary key (S-K_{gNB}) 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 K_{RRCint} 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 K_{RRCenc} 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 K_{RRCint} key associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}), 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 K_{RRCenc} key associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) 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 K_{RRCint} key associated with the master key (K_{eNB}/K_{gNB}) or secondary key (S-K_{gNB}), 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 K_{RRCenc} key associated with the master key (K_{eNB}/K_{gNB}) or secondary key (S-K_{gNB}) 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 K_{UPenc} 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 (K_{UPenc}) associated with the master key (K_{eNB}) or secondary key (S-K_{gNB}) 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 K_{UPenc} key associated with the master key (K_{eNB}/K_{gNB}) or the secondary key (S-K_{gNB}/S-K_{eNB}) 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 K_{UPint} key associated with the master (K_{eNB}/K_{gNB}) or the secondary key (S-K_{gNB}) 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 K_{UPenc} key associated with the master key (K_{gNB}), 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 K_{UPint} key associated with the master key (K_{gNB}) 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 K_{UPenc} 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 K_{UPenc} key associated with the master key (K_{eNB}) or the secondary key (S-K_{gNB}), 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 K_{UPenc} key associated with the master key (K_{eNB}/ K_{gNB}) or the secondary key (S-K_{gNB}/S-K_{eNB}), 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 K_{UPint} key associated with the master key (K_{eNB}/K_{gNB}) or the secondary key (S-K_{gNB}) 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 (K_{eNB} to S-K_{gNB}, K_{gNB} to S-K_{eNB}, K_{gNB} to S-K_{gNB}, 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*;

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 (i.e., 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* is not part of the UE configuration (i.e., 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> associate the established multicast MRB with the corresponding *mbs-SessionId*;

2> if an SDAP entity with the received *mbs-SessionId* 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 *mbs-SessionId* did not exist prior to receiving this reconfiguration:

4> indicate the establishment of the user plane resources for the *mbs-SessionId* 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. The network 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-K_{gNB} key based on the K_{eNB} 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 K_{RRCenc} and K_{UPenc} keys as specified in TS 33.401 [30] for EN-DC, or TS 33.501 [11] for NGEN-DC;

3> derive the K_{RRCint} and K_{UPint} 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 K_{gNB} key based on the K_{AMF} key, as specified in TS 33.501 [11];

2> else:

3> derive or update the K_{gNB} key based on the current K_{gNB} 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 K_{gNB} key as follows:

3> if the *securityAlgorithmConfig* is included in *SecurityConfig*:

4> derive the K_{RRCenc} and K_{UPenc} keys associated with the *cipheringAlgorithm* indicated in the *securityAlgorithmConfig*, as specified in TS 33.501 [11];

4> derive the K_{RRCint} and K_{UPint} keys associated with the *integrityProtAlgorithm* indicated in the *securityAlgorithmConfig*, as specified in TS 33.501 [11];

3> else:

4> derive the K_{RRCenc} and K_{UPenc} keys associated with the current *cipheringAlgorithm*, as specified in TS 33.501 [11];

4> derive the K_{RRCint} and K_{UPint} 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-K_{gNB} 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 K_{RRCenc} key and the K_{UPenc} key as specified in TS 33.501 [11] using the ciphering algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-K_{gNB} or S-KeNB) as indicated by *keyToUse*;

2> derive the K_{RRCint} key and the K_{UPint} key as specified in TS 33.501 [11] using the integrity protection algorithms indicated in the *RadioBearerConfig* associated with the secondary key (S-K_{gNB} 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 following, and 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 fields in *ServingCellConfigCommon* that are defined in Rel-16 and later.
- The fields of *searchSpaceMCCH* and s*earchSpaceMTCH* in *PDCCH-ConfigCommon* that are defined in Rel-17 and later.

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 K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} 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> release dedicated msgA PUSCH resources 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, *SCGFailureInformation* and successful handover report;

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.

5.3.5.9a MUSIM gap configuration

The UE shall:

1> if *musim-GapConfig* is set to *setup*:

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

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

2> for each *MUSIM-Gap* included in the received *musim-GapToAddModList*:

3> setup periodic MUSIM gap configuration indicated by the *MUSIM-Gap* in accordance with the received *musim-GapRepetitionAndOffset* (providing *musim-GapRepetition* and *Offset* value for the following condition) i.e. the first subframe of each periodic MUSIM gap occurs at an SFN and subframe of the NR PCell meeting the following condition:

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

subframe = *Offset* mod 10;

with *T* = *musim-GapRepetition*/10;

2> if *musim-AperiodicGap* is included:

3> setup aperiodic MUSIM gap configuration indicated by the *musim-AperiodicGap* in accordance with the received *musim-Starting-SFN-AndSubframe*, i.e. the first subframe of aperiodic MUSIM gap occurs at an SFN and subframe of the NR PCell meeting the following condition:

SFN = *starting-SFN*;

subframe = *startingSubframe*;

1> else if *musim-GapConfig* is set to *release*:

2> release the MUSIM gap configuration.

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*, PC5 Relay RLC channel as configured by *SL-RLC-ChannelConfig*, and Uu Relay RLC channel as configured by *Uu-RelayRLC-ChannelConfig*. 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> if *sl-PathSwitchConfig* was included in *reconfigurationWithSync*:

3> use the default values specified in 9.2.3 for timer T311;

2> else:

3> 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> if the UE is acting as L2 U2N Remote UE at the target side during reconfiguration with sync, or after re-establishment, or during RRC resume:

2> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with the SRB1;

1> else:

2> 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*;

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

2> for each *srb-Identity* value included in the *srb-ToAddModList* (SRB reconfiguration):

3> establish an RLC entity for the corresponding SRB;

3> 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 *mbs-SessionId* that is part of the current UE configuration and associated to a multicast MRB:

2> release the SDAP entity (clause 5.1.2 in TS 37.324 [24]);

2> release each multicast MRB associated to the *mbs-SessionId* as specified in 5.3.5.6.6;

NOTE 4: This will retain the *mbs-SessionId* 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 *mbs-SessionId* 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 *mbs-SessionId* that is part of the current UE configuration but not added with the same *mbs-SessionId* 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 *mbs-SessionId* to upper layers after successful reconfiguration with sync;

2> else:

3> indicate the release of the user plane resources for the *mbs-SessionId* 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*:

2> release the concerned *bap-Config*;

2> if there is no other configured *bap-Config* for the MCG or for the SCG

3> 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 *condRRCReconfig*.

In NR-DC, the UE may receive two independent *conditionalReconfiguration*:

- a *conditionalReconfiguration* associated with MCG, that is included in the *RRCReconfiguration* message received via SRB1; and
- a *conditionalReconfiguration*, 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 *VarConditionalReconfig*, one associated with each *conditionalReconfiguration*;
- the UE independently performs all the procedures in clause 5.3.5.13 for each *conditionalReconfiguration* and the associated *VarConditionalReconfig*, unless explicitly stated otherwise;
- the UE performs the procedures in clause 5.5 for the *VarConditionalReconfig* associated with the same cell group like the *measConfig*.

In EN-DC, the *VarConditionalReconfig* is associated with the SCG.

In NE-DC and when no SCG is configured, the *VarConditionalReconfig* is associated with the MCG.

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 conditions 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 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 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 the applicable cell are fulfilled:

3> consider the applicable cell, 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: Void.

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: Void.

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> resume performing radio link monitoring on the SCG, if previously stopped;

2> indicate to lower layers to resume beam failure detection on the PSCell, if previously stopped;

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 report containers becomes full.

NOTE 2: The transmission of RAN visible application layer measurement reports and *appLayerSessionStatus* 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.

NOTE 1: The UE is expected to update the mapping between the Destination Layer-2 ID and the destination index for the stored NR sidelink measurement configuration after the UE updates the destination list and reports to the gNB.

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.

NOTE 2: The UE is expected to update the mapping between the Destination Layer-2 ID and the destination index for the stored NR sidelink DRX configuration after the UE updates the destination list and reports to the gNB.

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* or *RRCSetup*:

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 L2 U2N Relay UE shall:

1> if *sl-L2RelayUE-Config* is set to setup:

2> if the *sl-L2RelayUE-Config* contains the *sl-RemoteUE-ToReleaseList*:

3> perform the L2 U2N Remote UE release as specified in 5.3.5.15.2;

2> if the *sl-L2RelayUE-Config* contains the *sl-RemoteUE-ToAddModList*:

3> perform the L2 U2N Remote UE addition/modification as specified in 5.3.5.15.3;

1> else if *sl-L2RelayUE-Config* is set to *release*:

2> release the relay operation related configurations.

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> indicate upper layers to trigger PC5 unicast link release.

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-ConfigRelay*;

2> if SRB1 is included in *sl-MappingToAddModList*, and *sl-EgressRLC-ChannelPC5* is configured:

3> release SL-RLC1, if established;

3> associate the PC5 Relay RLC channel as indicated by *sl-EgressRLC-ChannelPC5* with SRB1;

2> else: (i.e. SRB1 is not included in *sl-MappingToAddModList*, or SRB1 is included in *sl-MappingToAddModList*, but *sl-EgressRLC-ChannelPC5* is not configured)

3> if SL-RLC1 is not established:

4> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with 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-ConfigRelay*;

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 L2 U2N Remote UE shall:

1> if *sl-L2RemoteUE-Config* is set to *setup* or received from *RRCSetup* message:

2> if the *sl-L2RemoteUE-Config* contains the *sl-SRAP-ConfigRemote*:

3> if no SRAP entity has been established:

4> establish a SRAP entity as specified in TS 38.351 [66];

3> configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigRemote*;

3> if SRB1 is included in *sl-MappingToAddModList*, and *sl-EgressRLC-ChannelPC5* is configured:

4> release SL-RLC1, if established;

4> associate the PC5 Relay RLC channel as indicated by *sl-EgressRLC-ChannelPC5* with SRB1;

3> else: (i.e. SRB1 is not included in *sl-MappingToAddModList*, or SRB1 is included in *sl-MappingToAddModList*, but *sl-EgressRLC-ChannelPC5* is not configured)

4> if SL-RLC1 is not established:

5> apply the default configuration of SL-RLC1 as specified in clause 9.2.4 and associate it with the SRB1;

2> if the *sl-L2RemoteUE-Config* contains the *sl-UEIdentityRemote*:

3> use the value of the *sl-UEIdentityRemote* as the C-RNTI in the PCell.

1> else if *sl-L2RemoteUE-Config* is set to *release*:

2> release the relay operation related configurations.

5.3.6 Counter check

5.3.6.1 General

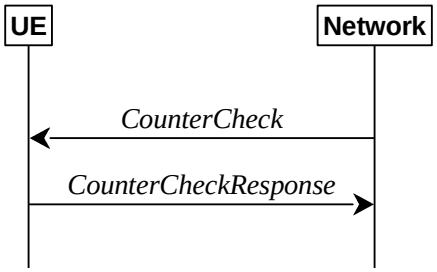

Figure 5.3.6.1-1: Counter check procedure

The counter check procedure is used by the network to request the UE to verify the amount of data sent/ received on each DRB. More specifically, the UE is requested to check if, for each DRB, the most significant bits of the COUNT match with the values indicated by the network.

NOTE: The procedure enables the network to detect packet insertion by an intruder (a 'man in the middle').

5.3.6.2 Initiation

The network initiates the procedure by sending a *CounterCheck* message.

NOTE: The network may initiate the procedure when any of the COUNT values reaches a specific value.

5.3.6.3 Reception of the *CounterCheck* message by the UE

Upon receiving the *CounterCheck* message, the UE shall:

1> for each DRB that is established:

2> if no COUNT exists for a given direction (uplink or downlink) because it is a uni-directional bearer configured only for the other direction:

3> assume the COUNT value to be 0 for the unused direction;

2> if the *drb-Identity* is not included in the *drb-CountMSB-InfoList*:

3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of TX_NEXT – 1 and RX_NEXT – 1 (specified in TS 38.323 [5]), respectively;

2> else if, for at least one direction, the most significant bits of the COUNT are different from the value indicated in the *drb-CountMSB-InfoList*:

3> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* set to the value of TX_NEXT – 1 and RX_NEXT – 1 (specified in TS 38.323 [5]), respectively;

1> for each DRB that is included in the *drb-CountMSB-InfoList* in the *CounterCheck* message that is not established:

2> include the DRB in the *drb-CountInfoList* in the *CounterCheckResponse* message by including the *drb-Identity*, the *count-Uplink* and the *count-Downlink* with the most significant bits set identical to the corresponding values in the *drb-CountMSB-InfoList* and the least significant bits set to zero;

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

5.3.7 RRC connection re-establishment

5.3.7.1 General

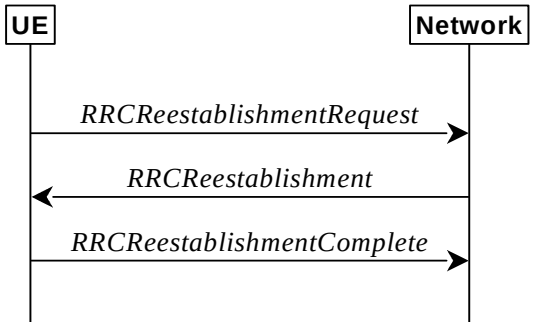

Figure 5.3.7.1-1: RRC connection re-establishment, successful

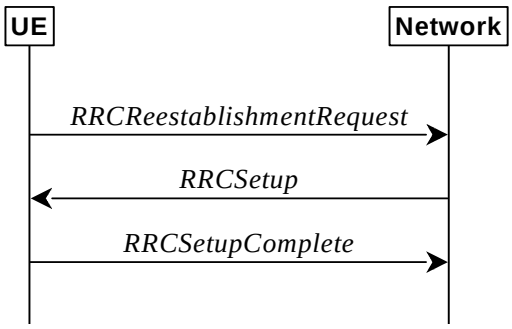

Figure 5.3.7.1-2: RRC re-establishment, fallback to RRC establishment, successful

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 while T301 is not running.

NOTE 0: It is up to UE implementation whether to initiate the procedure while T346g is running.

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;

2> release *maxBW-PreferenceConfigFR2-2*, if configured;

2> release *maxMIMO-LayerPreferenceConfigFR2-2*, if configured;

2> release *minSchedulingOffsetPreferenceConfigExt*, 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 K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} 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> indicate upper layers to trigger PC5 unicast link release;

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> if the UE is capable of L2 U2N Remote UE:

3> perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;

2> else:

3> 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 the MCG *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> release *maxBW-PreferenceConfigFR2-2*, if configured;

3> release *maxMIMO-LayerPreferenceConfigFR2-2*, if configured;

3> release *minSchedulingOffsetPreferenceConfigExt*, if configured;

3> suspend all RBs, and BH RLC channels for the IAB-MT, except SRB0 and broadcast MRBs;

2> remove all the entries within the MCG *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> release the PC5 RLC entity for SL-RLC0, if any;

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.

NOTE 3: A L2 U2N Relay UE may re-establish (e.g. via release and establish) the SL-RLC0 and SL-RLC1 of the connected L2 Remote UE(s).

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> indicate to upper layer to trigger the PC5 unicast link establishment with the selected L2 U2N Relay UE, if a new L2 U2N Relay UE is selected;

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 selection procedure, if ongoing;

1> start timer T301;

1> release the RLC entity for SRB0, if any;

1> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;

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 K_{RRCint} 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-establish (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> 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> if *ta-Report* is configured with value *enabled* and the UE supports TA reporting:

2> indicate TA report initiation to lower layers;

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 K_{gNB} key based on the current K_{gNB} 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 K_{RRCenc} and K_{UPenc} keys associated with the previously configured *cipheringAlgorithm*, as specified in TS 33.501 [11];

1> derive the K_{RRCint} and K_{UPint} 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 K_{RRCint} 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 K_{RRCint} 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 K_{RRCenc} 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> 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 in at least one of the entries of *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> if *SIB21* is provided by the PCell:

2> if the UE initiated transmission of an *MBSInterestIndication* message during the last 1 second preceding detection of radio link failure:

3> initiate transmission of an *MBSInterestIndication* message in accordance with 5.9.4;

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 reception of *NotificationMessageSidelink* indicating *relayUE-HO* or *relayUE-CellReselection*; or

1> upon PC5 unicast link release indicated by upper layer at L2 U2N Remote UE:

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

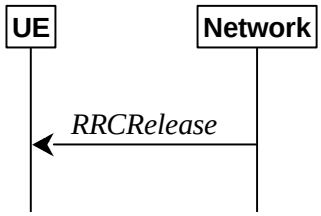

Figure 5.3.8.1-1: RRC connection release, successful

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;

NOTE 0: When the *RRCRelease* message is received on a HARQ process with disabled HARQ feedback, and when STATUS reporting, as defined in TS 38.322 [4], has not been triggered for a logical channel associated with the SRB1, the lower layers can be considered to have indicated that the receipt of the *RRCRelease* message has been successfully acknowledged.

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 the AS 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 (except those associated with broadcast MRBs) 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*;

NOTE 1b: The Network should provide full configuration to UE for SRS for Positioning in RRC_INACTIVE.

2> remove all the entries within the MCG and the SCG *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> if the PC5-RRC connection with the U2N Relay UE is determined to be released:

4> indicate upper layers to trigger PC5 unicast link release;

3> else (i.e., maintain the PC5 RRC connection):

4> 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> replace the K_{gNB} and K_{RRCint} keys with the current K_{gNB} and K_{RRCint} 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 identity with 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 identity with 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 K_{gNB};

3> stop the timer T319a if running and consider SDT procedure is not ongoing;

2> else:

3> store in the UE Inactive AS Context the *nextHopChainingCount* received in the *RRCRelease* message, the current K_{gNB} and K_{RRCint} keys, the ROHC state, the EHC context(s), the UDC 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;

NOTE 1c: *suspendConfig* is not stored as part of UE Inactive AS Context, except for the fields explicitly specified.

3> store any previously or subsequently received application layer measurement report containers 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 and broadcast MRBs;

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

2> release Uu Relay RLC channel(s), if configured;

2> release PC5 Relay RLC channel(s), if configured;

2> release the SRAP entity, if configured;

NOTE 2a: A L2 U2N Relay UE may re-establish the SL-RLC0, SL-RLC1 and SRAP entity after release.

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> if the UE is capable of L2 U2N Remote UE:

3> enter RRC_INACTIVE, and perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;

2> else:

3> 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'.

NOTE 3: Whether to release the PC5 unicast link is left to L2 U2N Remote UE's implementation.

NOTE 4: It is left to UE implementation whether to stop T430, if running, when going to RRC_INACTIVE.

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'.

5.3.9 RRC connection release requested by upper layers

5.3.9.1 General

The purpose of this procedure is to release the RRC connection. Access to the current PCell may be barred as a result of this procedure.

5.3.9.2 Initiation

The UE initiates the procedure when upper layers request the release of the RRC connection as specified in TS 24.501 [23]. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

1> if the upper layers indicate barring of the PCell:

2> treat the PCell used prior to entering RRC_IDLE as barred according to TS 38.304 [20];

1> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other'.

5.3.10 Radio link failure related actions

5.3.10.1 Detection of physical layer problems in RRC_CONNECTED

The UE shall:

1> if any DAPS bearer is configured, upon receiving N310 consecutive "out-of-sync" indications for the source SpCell from lower layers and T304 is running:

2> start timer T310 for the source SpCell.

1> upon receiving N310 consecutive "out-of-sync" indications for the SpCell from lower layers while neither T300, T301, T304, T311, T316 nor T319 are running:

2> start timer T310 for the corresponding SpCell.

5.3.10.2 Recovery of physical layer problems

Upon receiving N311 consecutive "in-sync" indications for the SpCell from lower layers while T310 is running, the UE shall:

1> stop timer T310 for the corresponding SpCell.

1> stop timer T312 for the corresponding SpCell, if running.

NOTE 1: In this case, the UE maintains the RRC connection without explicit signalling, i.e. the UE maintains the entire radio resource configuration.

NOTE 2: Periods in time where neither "in-sync" nor "out-of-sync" is reported by L1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

5.3.10.3 Detection of radio link failure

The UE shall:

1> if any DAPS bearer is configured and T304 is running:

2> upon T310 expiry in source SpCell; or

2> upon random access problem indication from source MCG MAC; or

2> upon indication from source MCG RLC that the maximum number of retransmissions has been reached; or

2> upon consistent uplink LBT failure indication from source MCG MAC:

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

3> suspend the transmission and reception of all DRBs and multicast MRBs in the source MCG;

3> reset MAC for the source MCG;

3> release the source connection.

1> else:

2> during a DAPS handover: the following only applies for the target PCell;

2> upon T310 expiry in PCell; or

2> upon T312 expiry in PCell; or

2> upon random access problem indication from MCG MAC while neither T300, T301, T304, T311 nor T319 are running and SDT procedure is not ongoing; or

2> upon indication from MCG RLC that the maximum number of retransmissions has been reached while SDT procedure is not ongoing; or

2> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the MCG; or

2> upon consistent uplink LBT failure indication from MCG MAC while T304 is not running:

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

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

3> else:

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

4> discard any segments of segmented RRC messages stored according to 5.7.6.3;

NOTE: Void.

4> if AS security has not been activated:

5> perform the actions upon going to RRC_IDLE as specified in 5.3.11, with release cause 'other';-

4> 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:

5> store the radio link failure information in the *VarRLF-Report* as described in clause 5.3.10.5;

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

4> else:

5> store the radio link failure information in the *VarRLF-Report* as described in clause 5.3.10.5;

5> if T316 is configured; and

5> if SCG transmission is not suspended; and

5> if the SCG is not deactivated; and

5> if neither PSCell change nor PSCell addition is ongoing (i.e. timer T304 for the NR PSCell is not running in case of NR-DC or timer T307 of the E-UTRA PSCell is not running as specified in TS 36.331 [10], clause 5.3.10.10, in NE-DC):

6> initiate the MCG failure information procedure as specified in 5.7.3b to report MCG radio link failure.

5> else:

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

A L2/L3 U2N Relay UE shall:

1> upon detecting radio link failure:

2> either indicate to upper layers (to trigger PC5 unicast link release) or send *NotificationMessageSidelink* to the connected L2/L3 U2N Remote UE(s) in accordance with 5.8.9.10.

The UE shall:

1> upon T310 expiry in PSCell; or

1> upon T312 expiry in PSCell; or

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

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

1> if connected as an IAB-node, upon BH RLF indication received on BAP entity from the SCG; or

1> upon consistent uplink LBT failure indication from SCG MAC:

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

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

2> else:

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

3> if the SCG is deactivated:

4> stop radio link monitoring on the SCG;

4> indicate to lower layers to stop beam failure detection on the PSCell;

3> if MCG transmission is not suspended:

4> initiate the SCG failure information procedure as specified in 5.7.3 to report SCG radio link failure.

3> else:

4> if the UE is in NR-DC:

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

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

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

5.3.10.4 RLF cause determination

The UE shall set the *rlf-Cause* in the *VarRLF-Report* as follows:

1> if the UE declares radio link failure due to T310 expiry:

2> set the *rlf-Cause* as *t310-Expiry*;

1> else if the UE declares radio link failure due to the random access problem indication from MCG MAC:

2> if the random access procedure was initiated for beam failure recovery:

3> set the *rlf-Cause* as *beamFailureRecoveryFailure*;

2> else:

3> set the *rlf-Cause* as *randomAccessProblem*;

1> else if the UE declares radio link failure due to the reaching of maximum number of retransmissions from the MCG RLC:

2> set the *rlf-Cause* as *rlc-MaxNumRetx*;

1> else if the UE declares radio link failure due to consistent uplink LBT failures:

2> set the *rlf-Cause* as *lbtFailure*;

1> else if the IAB-MT declares radio link failure due to the reception of a BH RLF indication on BAP entity:

2> set the *rlf-Cause* as *bh-rlfRecoveryFailure*.

1> else if the UE declares radio link failure due to T312 expiry:

2> set the *rlf-Cause* as *t312-Expiry*;

5.3.10.5 RLF report content determination

The UE shall determine the content in the *VarRLF-Report* as follows:

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

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

1> set the *measResultLastServCell* to include the cell level RSRP, RSRQ and the available SINR, of the source PCell (in case HO failure) or PCell (in case RLF) based on the available SSB and CSI-RS measurements collected up to the moment the UE detected failure;

1> if the SS/PBCH block-based measurement quantities are available:

2> set the *rsIndexResults* in *measResultLastServCell* to include all the available measurement quantities of the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise the highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE detected failure;

1> if the CSI-RS based measurement quantities are available:

2> set the *rsIndexResults* in *measResultLastServCell* to include all the available measurement quantities of the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the highest CSI-RS RSRQ is listed

first if CSI-RS RSRQ measurement results are available, otherwise the highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE detected failure;

1> set the *ssbRLMConfigBitmap* and/or *csi-rsRLMConfigBitmap* in *measResultLastServCell* to include the radio link monitoring configuration of the source PCell (in case HO failure) or PCell (in case RLF), if available;

1> for each of the configured *measObjectNR* in which measurements are available:

2> if the SS/PBCH block-based measurement quantities are available:

3> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the cell with highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the cell with highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise the cell with highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE detected failure;

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

NOTE 0a: For the neighboring cells included in *measResultListNR* in *measResultNeighCells* ordered based on the SS/PBCH block measurement quantities, UE also includes the CSI-RS based measurement quantities, if available.

2> if the CSI-RS based measurement quantities are available:

3> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell (in case HO failure) or PCell (in case RLF), ordered such that the cell with highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the cell with highest CSI-RS RSRQ is listed first if CSI-RS RSRQ measurement results are available, otherwise the cell with highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE detected radio link failure;

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

NOTE 0b: For ordering the neighboring cells based on the CSI-RS measurement quantities, UE includes measurements only for the cells not yet included in *measResultListNR* in *measResultNeighCells* to avoid overriding SS/PBCH block-based ordered measurements.

2> for each neighbour cell, if any, included in *measResultListNR* in *measResultNeighCells*:

3> if the UE supports RLF-Report for conditional handover and if the neighbour cell is one of the candidate cells for which the *reconfigurationWithSync* is included in the *masterCellGroup* in the MCG *VarConditionalReconfig* at the moment of the detected failure:

4> set *choConfig* in *MeasResult2NR* to the execution condition for each *measId* within *condTriggerConfig* associated to the neighbour cell within the MCG *VarConditionalReconfig*;

4> if the first entry of *choConfig* corresponds to a fulfilled execution condition at the moment of handover failure, or radio link failure; or

4> if the second entry of *choConfig*, if available, corresponds to a fulfilled execution condition at the moment of handover failure, or radio link failure:

5> set *firstTriggeredEvent* to the execution condition *condFirstEvent* corresponding to the first entry of *choConfig* or to the execution condition *condSecondEvent* corresponding to the second entry of *choConfig*, whichever execution condition was fulfilled first in time;

5> set *timeBetweenEvents* to the elapsed time between the point in time of fullfilling the condition in *choConfig* that was fulfilled first in time, and the point in time of fullfilling the condition in *choConfig* that was fulfilled second in time, if both the first execution condition corresponding to the first entry and the second execution condition corresponding to the second entry in the *choConfig* were fullfilled;

1> for each of the configured EUTRA frequencies in which measurements are available;

2> set the *measResultListEUTRA* in *measResultNeighCells* to include the best measured cells ordered such that the cell with highest RSRP is listed first if RSRP measurement results are available, otherwise the cell with highest RSRQ is listed first, and based on measurements collected up to the moment the UE detected failure;

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

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

1> set the *c-RNTI* to the C-RNTI used in the source PCell (in case HO failure) or PCell (in case RLF);

1> if the failure is detected due to reconfiguration with sync failure as described in 5.3.5.8.3, set the fields in *VarRLF-report* as follows:

2> set the *connectionFailureType* to *hof*;

2> if the UE supports RLF-Report for DAPS handover and if any DAPS bearer was configured while T304 was running:

3> set *lastHO-Type* to *daps*;

3> if radio link failure was detected in the source PCell, according to clause 5.3.10.3:

4> set *timeConnSourceDAPS-Failure* to the time between the initiation of the DAPS handover execution and the radio link failure detected in the source PCell while T304 was running;

4> set the *rlf-Cause* to the trigger for detecting the source radio link failure in accordance with clause 5.3.10.4;

2> if the UE supports RLF-Report for conditional handover and if configuration of the conditional handover is available in the MCG *VarConditionalReconfig* at the moment of the handover failure:

3> if the UE executed a conditional handover toward target PCell according to the *condRRCReconfig* of the target PCell:

4> set *timeSinceCHO-Reconfig* to the time elapsed between the execution of the last *RRCReconfiguration* message including *reconfigurationWithSync* for the target PCell of the failed conditional handover, and the reception in the source PCell of the last *conditionalReconfiguration* including the *condRRCReconfig* of the target PCell of the failed conditional handover;

3> else:

4> set *timeSinceCHO-Reconfig* to the time elapsed between the execution of the last *RRCReconfiguration* message including *reconfigurationWithSync* for the target PCell of the failed handover, and the reception in the source PCell of the last *conditionalReconfiguration* including the *condRRCReconfig*;

3> set *choCandidateCellList* to include the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of each of the candidate target cells for conditional handover included in *condRRCReconfig* within the MCG *VarConditionalReconfig* at the time of the failed handover, excluding the candidate target cells included in *measResultNeighCells*;

2> if the UE supports RLF-Report for conditional handover and if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a conditional handover:

3> set *lastHO-Type* to *cho*;

2> set the *nrFailedPCellId* in *failedPCellId* to the global cell identity and tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;

2> include *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and tracking area code of the PCell where the last *RRCReconfiguration* message including *reconfigurationWithSync* was received;

2> set the *timeConnFailure* to the elapsed time since the execution of the last *RRCReconfiguration* message including the *reconfigurationWithSync*;

1> else if the failure is detected due to Mobility from NR failure as described in 5.4.3.5, set the fields in *VarRLF-report* as follows:

2> set the *connectionFailureType* to *hof*;

2> if last *MobilityFromNRCommand* concerned a failed inter-RAT handover from NR to E-UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA (NR to EUTRA):

3> set the *eutraFailedPCellId* in *failedPCellId* to the global cell identity and tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;

2> include *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and tracking area code of the PCell where the last *MobilityFromNRCommand* message was received;

2> set the *timeConnFailure* to the elapsed time since the initialization of the handover associated to the last *MobilityFromNRCommand* message;

1> else if the failure is detected due to radio link failure as described in 5.3.10.3, set the fields in *VarRLF-report* as follows:

2> set the *connectionFailureType* to *rlf*;

2> set the *rlf-Cause* to the trigger for detecting radio link failure in accordance with clause 5.3.10.4;

2> set the *nrFailedPCellId* in *failedPCellId* to the global cell identity and the tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected;

2> if an *RRCReconfiguration* message including the *reconfigurationWithSync* was received before the connection failure:

3> if the last successfully executed *RRCReconfiguration* message including the *reconfigurationWithSync* concerned an intra NR handover and it was received while connected to the previous PCell to which the UE was connected before connecting to the PCell where radio link failure is detected; and

3> if T311 was not running before entering the PCell in which the radio link failure was detected:

4> include the *nrPreviousCell* in *previousPCellId* and set it to the global cell identity and the tracking area code of the PCell where the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was received;

4> if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a DAPS handover:

5> set *lastHO-Type* to *daps*;

4> else if the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was concerning a conditional handover:

5> set *lastHO-Type* to *cho*;

4> set the *timeConnFailure* to the elapsed time since the execution of the last *RRCReconfiguration* message including the *reconfigurationWithSync*;

3> else if the last *RRCReconfiguration* message including the *reconfigurationWithSync* concerned a handover to NR from E-UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:

4> include the *eutraPreviousCell* in *previousPCellId* and set it to the global cell identity and the tracking area code of the E-UTRA PCell where the last *RRCReconfiguration* message including *reconfigurationWithSync* was received embedded in E-UTRA RRC message *MobilityFromEUTRACommand* message as specified in TS 36.331 [10] clause 5.4.3.3;

4> set the *timeConnFailure* to the elapsed time since reception of the last *RRCReconfiguration* message including the *reconfigurationWithSync* embedded in E-UTRA RRC message *MobilityFromEUTRACommand* message as specified in TS 36.331 [10] clause 5.4.3.3;

2> if configuration of the conditional handover is available in the MCG *VarConditionalReconfig* at the moment of declaring the radio link failure:

3> set *timeSinceCHO-Reconfig* to the time elapsed between the detection of the radio link failure, and the reception, in the source PCell, of the last *conditionalReconfiguration* including the *condRRCReconfig* message;

3> set *choCandidateCellList* to include the global cell identity if available, and otherwise to the physical cell identity and carrier frequency of each of all the candidate target cells for conditional handover included in *condRRCReconfig* within the MCG *VarConditionalReconfig* at the time of radio link failure, excluding the candidate target cells included in *measResultNeighCells*;

1> if *connectionFailureType* is *rlf* and the *rlf-Cause* is set to *randomAccessProblem* or *beamFailureRecoveryFailure*; or

1> if *connectionFailureType* is *hof* and if the failed handover is an intra-RAT handover:

2> set the *ra-InformationCommon* to include the random-access related information as described in clause 5.7.10.5;

1> if available, set the *locationInfo* as in 5.3.3.7.

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

NOTE 2: In this clause, the term 'handover failure' has been used to refer to 'reconfiguration with sync failure'.

5.3.11 UE actions upon going to RRC_IDLE

The UE shall:

1> reset MAC;

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

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

2> if T302 is running:

3> stop timer T302;

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

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

1> else:

2> if T302 is running:

3> stop timer T302;

3> perform the actions as specified in 5.3.14.4;

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the UE is leaving RRC_INACTIVE:

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

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

3> stop the timer T320, if running;

2> if T319a is running:

3> stop timer T319a;

3> consider SDT procedure is not ongoing;

1> stop all timers that are running except T302, T320, T325, T330, T331, T400 and T430;

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

1> release the *suspendConfig*, if configured;

1> remove all the entries within the MCG and the SCG *VarConditionalReconfig*, if any;

1> for each *measId*, if the associated *reportConfig* has a *reportType* set to *condTriggerConfig*:

2> for the associated *reportConfigId*:

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

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

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

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

1> discard the K_{gNB} key, the S-K_{gNB} key, the S-K_{eNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key, if any;

1> release all radio resources, including release of the RLC entity, the BAP entity, the MAC configuration and the associated PDCP entity and SDAP for all established RBs (except for broadcast MRBs), BH RLC channels, Uu Relay RLC channels, PC5 Relay RLC channels and SRAP entity;

NOTE 0: A L2 U2N Relay UE may re-establish the SL-RLC0, SL-RLC1 and SRAP entity after release.

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

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

1> discard any application layer measurement reports which were not yet submitted to lower layers for transmission;

1> discard any segments of segmented RRC messages stored according to 5.7.6.3;

1> except if going to RRC_IDLE was triggered by inter-RAT cell reselection while the UE is in RRC_INACTIVE or RRC_IDLE or when selecting an inter-RAT cell while T311 was running or when selecting an E-UTRA cell for EPS fallback for IMS voice as specified in 5.4.3.5:

2> if the UE is capable of L2 U2N Remote UE:

3> enter RRC_IDLE, and perform either cell selection as specified in TS 38.304 [20], or relay selection as specified in clause 5.8.15.3, or both;

2> else:

3> enter RRC_IDLE and perform cell selection as specified in TS 38.304 [20];

NOTE 1: Whether to release the PC5 unicast link is left to L2 U2N Remote UE's implementation.

NOTE 2: It is left to UE implementation whether to stop T430, if running, when going to RRC_IDLE.

5.3.12 UE actions upon PUCCH/SRS release request

Upon receiving a PUCCH release request from lower layers, for all bandwidth parts of an indicated serving cell the UE shall:

1> release PUCCH-CSI-Resources configured in *CSI-ReportConfig*;

1> release *SchedulingRequestResourceConfig* instances configured in *PUCCH-Config*.

Upon receiving an SRS release request from lower layers, for all bandwidth parts of an indicated serving cell the UE shall:

1> release *SRS-Resource* instances configured in *SRS-Config*.

Upon receiving a positioning SRS configuration for RRC_INACTIVE release request from lower layers, the UE shall:

1> release the configured *srs-PosRRC-Inactive*.

5.3.13 RRC connection resume

5.3.13.1 General

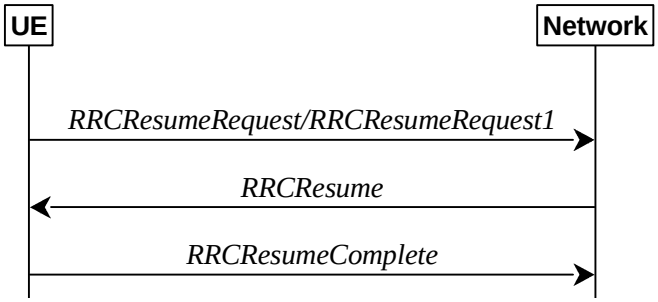

Figure 5.3.13.1-1: RRC connection resume, successful

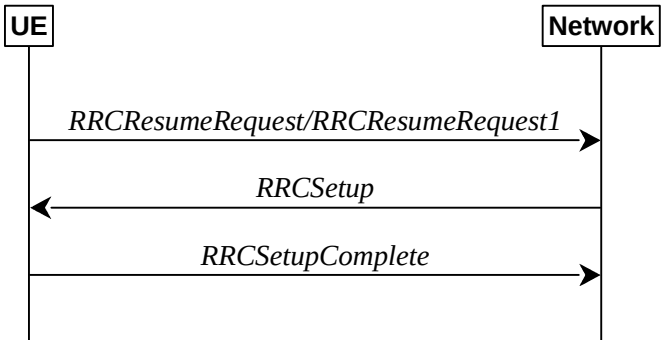

Figure 5.3.13.1-2: RRC connection resume fallback to RRC connection establishment, successful

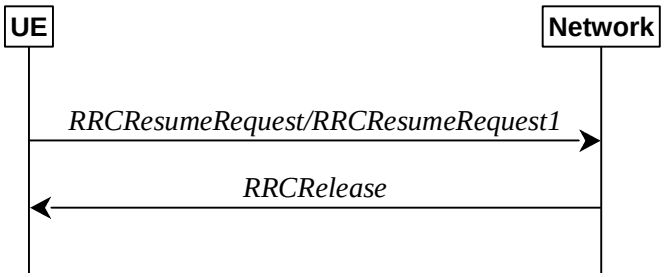

Figure 5.3.13.1-3: RRC connection resume followed by network release, successful

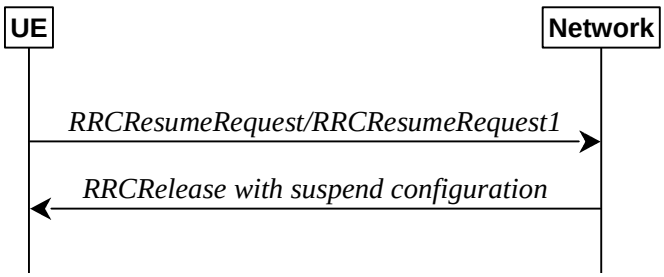

Figure 5.3.13.1-4: RRC connection resume followed by network suspend, successful

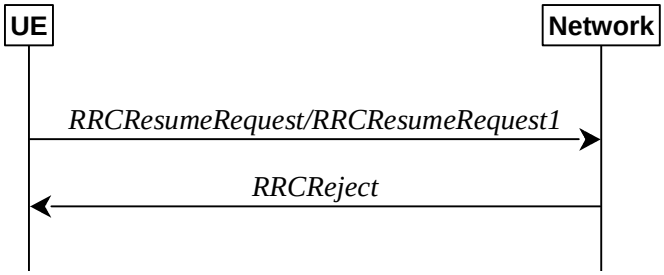

Figure 5.3.13.1-5: RRC connection resume, network reject

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 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;

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

2> if the UE is configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages and *sl-L2U2N-Relay* is included in *SIB12*; or

2> if the UE is configured by upper layers to transmit NR sidelink L3 U2N relay discovery messages and *sl-L3U2N-RelayDiscovery* is included in *SIB12*; or

2> if the UE is configured by upper layers to transmit NR sidelink non-relay discovery messages and *sl-NonRelayDiscovery* is included in *SIB12*:

3> 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> for a RedCap UE when RedCap-specific initial downlink BWP includes no CD-SSB, *ncd-SSB-RedCapInitialBWP-SDT* is configured; 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 upper layers provide NSAG information and one or more S-NSSAI(s) triggering the access attempt (TS 23.501 [32] and TS 24.501 [23]):

3> apply the NSAG with highest NSAG priority among the NSAGs that are included in *SIB1* (i.e., in *FeatureCombination* and/or in *RA-PrioritizationSliceInfo*), and that are associated with the S-NSSAI(s) triggering the access attempt, in the Random Access procedure (TS 38.321 [3], clause 5.1);

NOTE: If there are multiple NSAGs with the same highest NAS-provided NSAG priority identified for access attempt as above, it is left to UE implementation to select the NSAG to be applied in the Random Access procedure.

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> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;

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> 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* and *maxBW-PreferenceConfigFR2-2* 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* and *maxMIMO-LayerPreferenceConfigFR2-2* 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* and *minSchedulingOffsetPreferenceConfigExt* 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 *ncd-SSB-RedCapInitialBWP-SDT* 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 *ncd-SSB-RedCapInitialBWP-SDT*:

3> release the stored *ncd-SSB-RedCapInitialBWP-SDT;*

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;

2> consider SDT procedure is ongoing;

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 EHC context(s), the UDC state, the stored QoS flow to DRB mapping rules and the K_{gNB} and K_{RRCint} 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 K_{RRCint} 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 K_{gNB} key based on the current K_{gNB} 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 K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key;

1> configure lower layers to apply integrity protection for all radio bearers except SRB0 and MRBs using the configured algorithm and the K_{RRCint} key and K_{UPint} 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 K_{RRCenc} key and the K_{UPenc} 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> if the radio bearer is a DRB configured with Ethernet Header Compression:

4> indicate to lower layer that *ethernetHeaderCompression* is not configured;

3> if the radio bearer is a DRB configured with UDC:

4> indicate to lower layer that *uplinkDataCompression* is not configured;

3> if the radio bearer is a DRB configured with ROHC function:

4> if *sdt-DRB-ContinueROHC* is set to *cell* and the resume procedure is initiated in a cell that is the same as the PCell in which the UE received the previous *RRCRelease* message; or

4> if *sdt-DRB-ContinueROHC* is set to *rna* and the resume procedure is initiated in a cell belonging to the same RNA as the PCell in which the UE received the previous *RRCRelease* message:

5> indicate to lower layer that *drb-continueROHC* is configured;

4> else:

5> indicate to lower layer that *drb-continueROHC* is not configured;

3> re-establish PDCP entity for the radio bearer that is configured for SDT 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 is running or SDT procedure is ongoing, perform actions specified in 5.3.13.5.

If the UE is a RedCap UE and the RedCap-specific initial downlink BWP 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 and consider SDT procedure is not ongoing;

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 K_{gNB};

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> if *srs-PosRRC-Inactive* is configured:

2> instruct the MAC entity to stop *inactivePosSRS-TimeAlignmentTimer*, if it is 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> 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;

NOTE 1: If the SCG is deactivated, resuming SRB3 and all DRBs does not imply that PDCP or RRC PDUs can be transmitted or received on SCG RLC bearers.

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 *masterCellGroup* contains the *reportUplinkTxDirectCurrentMoreCarrier*:

3> include in the *uplinkTxDirectCurrentMoreCarrierList* 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 in at least one of the entries of *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.

NOTE 2: Network only configures at most one of *reportUplinkTxDirectCurrent*, *reportUplinkTxDirectCurrentTwoCarrier* or *reportUplinkTxDirectCurrentMoreCarrier* in one RRC message.

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 any entry of *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 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 SDT procedure is ongoing; or

1> if random access problem indication is received from MCG MAC while SDT procedure is ongoing; 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 SDT procedure is ongoing; or

1> if integrity check failure indication is received from lower layers while SDT procedure is ongoing; or

1> if T319a expires:

2> consider SDT procedure is not ongoing;

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* and the UE variable *VarConnEstFailReportList*, 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 *NotificationMessageSidelink* 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 or T302 is running or SDT procedure is ongoing (UE in RRC_INACTIVE) or SRS transmission in RRC_INACTIVE is configured

The UE shall:

1> if cell reselection occurs while T319 or T302 is running or while SDT procedure is ongoing; 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 T319 is not running and SDT procedure is not ongoing:

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'.

5.3.14 Unified Access Control

5.3.14.1 General

The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT. This procedure does not apply to L2 U2N Relay UE initiating RRC connection establishment or RRC connection resume upon reception of any message from a L2 U2N remote UE via SL-RLC0 or SL-RLC1 in accordance to 5.3.3.1a or 5.3.13.1a.

After a PCell change in RRC_CONNECTED the UE shall defer access barring checks until it has obtained *SIB1* (as specified in 5.2.2.2) from the target cell.

5.3.14.2 Initiation

Upon initiation of the procedure, the UE shall:

1> if timer T390 is running for the Access Category:

2> consider the access attempt as barred;

1> else if timer T302 is running and the Access Category is neither '2' nor '0':

2> consider the access attempt as barred;

1> else:

2> if the Access Category is '0':

3> consider the access attempt as allowed;

2> else:

3> if *SIB1* includes *uac-BarringPerPLMN-List* that contains a *UAC-BarringPerPLMN* for the selected PLMN or SNPN:

4> if the procedure in 5.2.2.4.2 for a selected PLMN resulted in use of information in *npn-IdentityInfoList* and *UAC-BarringPerPLMN* has an entry with the *plmn-IdentityIndex* corresponding to used information in this list:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to used information in the *npn-IdentityInfoList*;

4> else:

5> select the *UAC-BarringPerPLMN* entry with the *plmn-IdentityIndex* corresponding to the selected PLMN and the *PLMN-IdentityInfo, if any*, or the selected SNPN and the *npn-IdentityInfoList*;

3> if any *UAC-BarringPerPLMN* entry is selected:

4> in the remainder of this procedure, use the selected *UAC-BarringPerPLMN* entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the *uac-BarringForCommon* included in *SIB1*;

3> else if SIB1 includes *uac-BarringForCommon*:

4> in the remainder of this procedure use the *uac-BarringForCommon* (i.e. presence or absence of these parameters) included in *SIB1*;

3> else:

4> consider the access attempt as allowed;

3> if *uac-BarringForCommon* is applicable or the *uac-ACBarringListType* indicates that *uac-ExplicitACBarringList* is used:

4> if the corresponding *UAC-BarringPerCatList* contains a *UAC-BarringPerCat* entry corresponding to the Access Category:

5> select the *UAC-BarringPerCat* entry;

5> if the *uac-BarringInfoSetList* contains a *UAC-BarringInfoSet* entry corresponding to the selected *uac-barringInfoSetIndex* in the *UAC-BarringPerCat*:

6> select the *UAC-BarringInfoSet* entry;

6> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

5> else:

6> consider the access attempt as allowed;

4> else:

5> consider the access attempt as allowed;

3> else if the *uac-ACBarringListType* indicates that *uac-ImplicitACBarringList* is used:

4> select the *uac-BarringInfoSetIndex* corresponding to the Access Category in the *uac-ImplicitACBarringList*;

4> if the *uac-BarringInfoSetList* contains the *UAC-BarringInfoSet* entry corresponding to the selected *uac-BarringInfoSetIndex*:

5> select the *UAC-BarringInfoSet* entry;

5> perform access barring check for the Access Category as specified in 5.3.14.5, using the selected *UAC-BarringInfoSet* as "UAC barring parameter";

4> else:

5> consider the access attempt as allowed;

3> else:

4> consider the access attempt as allowed;

1> if the access barring check was requested by upper layers:

2> if the access attempt is considered as barred:

3> if timer T302 is running:

4> if timer T390 is running for Access Category '2':

5> inform the upper layer that access barring is applicable for all access categories except categories '0', upon which the procedure ends;

4> else

5> inform the upper layer that access barring is applicable for all access categories except categories '0' and '2', upon which the procedure ends;

3> else:

4> inform upper layers that the access attempt for the Access Category is barred, upon which the procedure ends;

2> else:

3> inform upper layers that the access attempt for the Access Category is allowed, upon which the procedure ends;

1> else:

2> the procedure ends.

5.3.14.3 Void

5.3.14.4 T302, T390 expiry or stop (Barring alleviation)

The UE shall:

1> if timer T302 expires or is stopped:

2> for each Access Category for which T390 is not running:

3> consider the barring for this Access Category to be alleviated:

1> else if timer T390 corresponding to an Access Category other than '2' expires or is stopped, and if timer T302 is not running:

2> consider the barring for this Access Category to be alleviated;

1> else if timer T390 corresponding to the Access Category '2' expires or is stopped:

2> consider the barring for this Access Category to be alleviated;

1> when barring for an Access Category is considered being alleviated:

2> if the Access Category was informed to upper layers as barred:

3> inform upper layers about barring alleviation for the Access Category.

2> if barring is alleviated for Access Category '8'; or

2> if barring is alleviated for Access Category '2':

3> perform actions specified in 5.3.13.8;

5.3.14.5 Access barring check

The UE shall:

1> if one or more Access Identities equal to 1, 2, 11, 12, 13, 14, or 15 are indicated according to TS 24.501 [23], and

1> if for at least one of these Access Identities the corresponding bit in the *uac-BarringForAccessIdentity* contained in "UAC barring parameter" is set to *zero*:

2> consider the access attempt as allowed;

1> else:

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

2> if the bit corresponding to Access Identity 1 in the *uac-BarringForAccessIdentity* contained in the "UAC barring parameter" is set to *zero:*

3> consider the access attempt as allowed;

2> else if Access Identity 3 is indicated:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ rand < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactorForAI3* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

2> else:

3> draw a random number '*rand*' uniformly distributed in the range: 0 ≤ *rand* < 1;

3> if '*rand*' is lower than the value indicated by *uac-BarringFactor* included in "UAC barring parameter":

4> consider the access attempt as allowed;

3> else:

4> consider the access attempt as barred;

1> if the access attempt is considered as barred:

2> draw a random number '*rand*' that is uniformly distributed in the range 0 ≤ *rand* < 1;

2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in "UAC barring parameter":

T390 = (0.7+ 0.6 * *rand*) * *uac-BarringTime.*

5.3.15 RRC connection reject

5.3.15.1 Initiation

The UE initiates the procedure upon the reception of *RRCReject* when the UE tries to establish or resume an RRC connection.

5.3.15.2 Reception of the *RRCReject* by the UE

The UE shall:

1> stop timer T300, if running;

1> stop timer T319, if running;

1> stop timer T319a, if running and consider SDT procedure is not ongoing;

1> stop timer T302, if running;

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

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

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

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

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

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

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

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

2> if resume is triggered by upper layers:

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

2> if resume is triggered due to an RNA update; or

2> if resume is triggered for SDT and T380 has expired:

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

2> discard the current K_{gNB} key, the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key derived in accordance with 5.3.13.3;

2> if resume is triggered for SDT:

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];

4> re-establish the RLC entity as specified in TS 38.322 [4];

3> for each DRB that is not suspended:

4> indicate PDCP suspend to lower layers;

4> re-establish the RLC entity as specified in TS 38.322 [4];

2> suspend SRB1 and the radio bearers configured for SDT, if any;

2> the procedure ends.

Upon L2 U2N Relay UE receives *RRCReject*, it either indicates to upper layers (to trigger PC5 unicast link release) or sends *NotificationMessageSidelink* message to the connected L2 U2N Remote UE(s) in accordance with 5.8.9.10.

The RRC_INACTIVE UE shall continue to monitor paging while the timer T302 is running.

NOTE: If timer T331 is running, the UE continues to perform idle/inactive measurements according to 5.7.8.

5.4 Inter-RAT mobility

5.4.1 Introduction

Network controlled inter-RAT mobility between NR and E-UTRA, where E-UTRA can be connected to either EPC or 5GC, and from NR to UTRA-FDD is supported.

5.4.2 Handover to NR

5.4.2.1 General

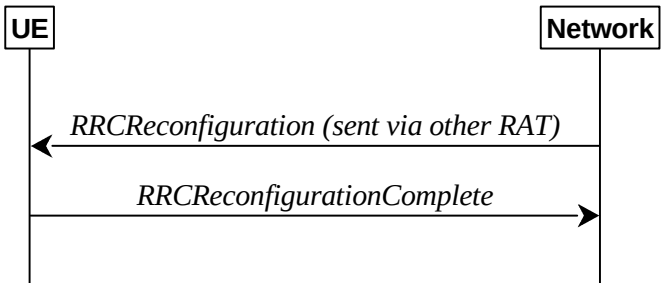

Figure 5.4.2.1-1: Handover to NR, successful

The purpose of this procedure is to, under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. E-UTRAN) to NR.

The handover to NR procedure applies when SRBs, possibly in combination with DRBs, are established in another RAT. Handover from E-UTRA to NR applies only after integrity has been activated in E-UTRA.

5.4.2.2 Initiation

The RAN using another RAT initiates the handover to NR procedure, in accordance with the specifications applicable for the other RAT, by sending the *RRCReconfiguration* message via the radio access technology from which the inter-RAT handover is performed.

The network applies the procedure as follows:

- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to re-establish SRBs and one or more DRBs;

5.4.2.3 Reception of the *RRCReconfiguration* by the UE

The UE shall:

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

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

1> perform RRC reconfiguration procedure as specified in 5.3.5;

NOTE: If the UE is connected to 5GC of the source E-UTRA cell, the delta configuration for PDCP and SDAP can be used for intra-system inter-RAT handover. For other cases, source RAT configuration is not considered when the UE applies the reconfiguration message of target RAT.

5.4.3 Mobility from NR

5.4.3.1 General

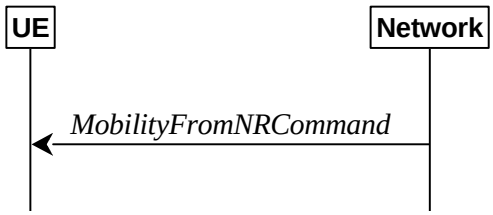

Figure 5.4.3.1-1: Mobility from NR, successful

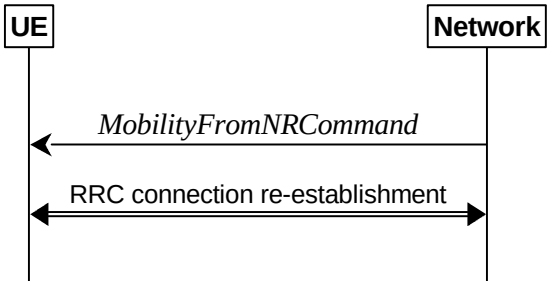

Figure 5.4.3.1-2: Mobility from NR, failure

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using other RAT, e.g. E-UTRA, UTRA-FDD. The mobility from NR procedure covers the following type of mobility:

- handover, i.e. the *MobilityFromNRCommand* message includes radio resources that have been allocated for the UE in the target cell;

5.4.3.2 Initiation

The network initiates the mobility from NR procedure to a UE in RRC_CONNECTED, possibly in response to a *MeasurementReport* or an *MCGFailureInformation* message, by sending a *MobilityFromNRCommand* message. The network applies the procedure as follows:

- the procedure is initiated only when AS security has been activated, and SRB2 with at least one DRB or multicast MRB are setup and not suspended;
- the procedure is not initiated if any DAPS bearer is configured;

5.4.3.3 Reception of the *MobilityFromNRCommand* by the UE

The UE shall:

1> stop timer T310, if running;

1> stop timer T312, if running;

1> if T316 is running:

2> stop timer T316;

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

1> if T390 is running:

2> stop timer T390 for all access categories;

2> perform the actions as specified in 5.3.14.4;

1> if the *targetRAT-Type* is set to *eutra*:

2> consider inter-RAT mobility as initiated towards E-UTRA;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> else if the *targetRAT-Type* is set to *utra-fdd*:

2> consider inter-RAT mobility as initiated towards UTRA-FDD;

2> forward the *nas-SecurityParamFromNR* to the upper layers, if included;

1> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT.

5.4.3.4 Successful completion of the mobility from NR

Upon successfully completing the handover, at the source side the UE shall:

1> reset MAC;

1> stop all timers that are running except T325, T330 and T400;

1> release *ran-NotificationAreaInfo*, if stored;

1> release the AS security context including the K_{RRCenc} key, the K_{RRCint} key, the K_{UPint} key and the K_{UPenc} key, if stored;

1> release all radio resources, including release of the RLC entity and the MAC configuration;

1> release the associated PDCP entity and SDAP entity for all established RBs;

NOTE : PDCP and SDAP configured by the source RAT prior to the handover that are reconfigured and re-used by target RAT when delta signalling (i.e., during inter-RAT intra-system handover when *fullConfig* is not present) is used, are not released as part of this procedure.

1> if the *targetRAT-Type* is set to *eutra* and the *nas-SecurityParamFromNR* is included: or

1> if the *targetRAT-Type* is set to *utra-fdd*:

2> indicate the release of the RRC connection to upper layers together with the release cause 'other'.

5.4.3.5 Mobility from NR failure

The UE shall:

1> if the UE does not succeed in establishing the connection to the target radio access technology:

2> if the *targetRAT-Type* in the received *MobilityFromNRCommand* is set to *eutra* and the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:

3> store handover failure information in *VarRLF-Report* according to 5.3.10.5;

2> if *voiceFallbackIndication* is included in the *MobilityFromNRCommand* message; or

2> if the mobility from NR procedure is for emergency services fallback as specified in TS 23.502 [43]:

3> attempt to select an E-UTRA cell:

4> if a suitable E-UTRA cell is selected; or

4> if no suitable E-UTRA cell is available and an acceptable E-UTRA cell supporting emergency call is selected when the UE has an ongoing emergency call:

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

4> else:

5> revert back to the configuration used in the source PCell;

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

NOTE: It is left to UE implementation to determine whether the mobility from NR procedure is for emergency services fallback as specified in TS 23.502 [43].

2> else:

3> revert back to the configuration used in the source PCell;

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

1> else if the UE is unable to comply with any part of the configuration included in the *MobilityFromNRCommand* message; or

1> if there is a protocol error in the inter RAT information included in the *MobilityFromNRCommand* message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:

2> if the *targetRAT-Type* in the received *MobilityFromNRCommand* is set to *eutra* and the UE supports Radio Link Failure Report for Inter-RAT MRO EUTRA:

3> store handover failure information in *VarRLF-Report* according to 5.3.10.5;

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

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

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 threshold value of the RSRP indicated by the received value of *s-MeasureConfig* which is derived as specified in 6.3.2*;*

2> else, set parameter *csi-RSRP* of *s-MeasureConfig* within *VarMeasConfig* to the threshold value of the RSRP indicated by the received value of *s-MeasureConfig* which is derived as specified in 6.3.2.

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* to 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 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*, *ssb-PositionQCL-CellsToAddModList*, *cca-CellsToRemoveList*, and *cca-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 matching identity of the transmission resource pool exists 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*;

3> if the received *measObject* includes the *cca-CellsToRemoveList*:

4> for each *physCellId* included in the *cca-CellsToRemoveList*:

5> remove the entry with the matching *physCellId* from the *cca-CellsToAddModList*;

3> if the received *measObject* includes the *cca-CellsToAddModList*:

4> for each *physCellId* included in the *cca-CellsToAddModList*:

5> if an entry with the matching *physCellId* exists in the *cca-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 *cca-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 *offset* parameter in each *SSB-MTC4* configuration and use the *duration* parameter and *periodicity* (derived from parameter *periodicityAndOffset*) 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*. If configured, the UE performs RSSI measurements according to the TCI state configured by *tci-StateId* in the reference BWP configured by *ref-BWPId* of the reference serving cell configured by *ref-ServCellId* (see TS 38.133 [14], clause 9.2A.7 and clause 9.3A.8).If the UE has no serving cell in FR2-2 and configured with inter-frequency RSSI measurement in FR2-2, it is up to the UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2.

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*, the *measId* is within the MCG *VarMeasConfig* and is indicated in the *condExecutionCond* associated to a *condReconfigId* in the MCG *VarConditionalReconfig* (for CHO, CPA or MN-initiated inter-SN CPC in NR-DC); or

2> if the *reportType* for the associated *reportConfig* is *condTriggerConfig*, the *measId* is within the SCG *VarMeasConfig* and is indicated in the *condExecutionCond* associated to a *condReconfigId* in the SCG *VarConditionalReconfig* (for intra-SN CPC); or

2> if the *reportType* for the associated *reportConfig* is *condTriggerConfig*, the *measId* is within the SCG *VarMeasConfig* and is indicated in the *condExecutionCondSCG* associated to a *condReconfigId* in the MCG *VarConditionalReconfig* (for SN-initiated inter-SN CPC in NR-DC); or

2> if the *reportType* for the associated *reportConfig* is *condTriggerConfig*, the *measId* is within the SCG *VarMeasConfig* and is indicated in the *triggerConditionSN* associated to a *condReconfigurationId* in *VarConditionalReconfiguration* as specified in TS 36.331 [10] (for SN-initiated inter-SN CPC in EN-DC):

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 configured by *rmtc-Frequency* in the associated *measObject*;

NOTE 0: The network avoids configuring UEs supporting only CHO and/or Rel-16 CPC with measurements not referred to by any execution condition.

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*.

The UE acting as a L2 U2N Remote UE whenever configured with *measConfig* shall:

1> perform the corresponding measurements associated to the serving L2 U2N Relay UE, as described in 5.5.3.4;

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 included in *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* for the 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* for the concerned frequency:

4> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* or *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* for the 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* for the 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* for the concerned frequency:

5> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* or *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* for the 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* is included in *SidelinkPreconfigNR* for the concerned frequency; or

2> if configured with NR sidelink discovery and *sl-TxPoolSelectedNormal* 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* 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* 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*.

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, for each candidate L2 U2N Relay UE measurement quantity according to 5.5.3.4, for evaluating the detected NR sidelink U2N Relay UEs according to 5.8.15.3, and for evaluating the SyncRef UE according to 5.8.5 and 5.8.6:

2> filter the measured result, before using for evaluation of reporting criteria, for measurement reporting, for U2N Relay (re)selection evaluation or for evaluating the SyncRef UE, by the following formula:

$$F_n = (1 - a) * F_{n-1} + a * M_n$$

where

M_n is the latest received measurement result from the physical layer;

F_n is the updated filtered measurement result, that is used for evaluation of reporting criteria, for measurement reporting, for U2N Relay (re)selection evaluation or for evaluating the SyncRef UE;

F_{n-1} is the old filtered measurement result, where F_0 is set to M_1 when the first measurement result from the physical layer is received; and for *MeasObjectNR*, $a = 1/2^{(k_i/4)}$, where k_i 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, for measurement reporting, for U2N Relay (re)selection evaluation or for evaluating the SyncRef UE, 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 PSSCH/PSCCH DMRS as described in TS 38.215 [9];

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> 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> 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 for this event within the *VarMeasConfig*, while the *VarMeasReportList* does not include a measurement reporting entry 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> 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> 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.

Thresh1is 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)

$Ms - Hys > Thresh$

Inequality C1-2 (Leaving condition)

$Ms + Hys < Thresh$

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)

$Ms + Hys < Thresh$

Inequality C2-2 (Leaving condition)

Ms – Hys > Thresh

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 (Distance between UE and referenceLocation1 is above threshold1 and distance between UE and referenceLocation2 is below threshold2)

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)

$Ml1 - Hys > Thresh1$

Inequality D1-2 (Entering condition 2)

$Ml2 + Hys < Thresh2$

Inequality D1-3 (Leaving condition 1)

$Ml1 + Hys < Thresh1$

Inequality D1-4 (Leaving condition 2)

$Ml2 - Hys > Thresh2$

The variables in the formula are defined as follows:

Ml1 is the distance between UE and a reference location for this event (i.e. *referenceLocation1* as defined within *reportConfigNR* for this event), not taking into account any offsets.

Ml2 is the distance between UE and a reference location 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. *hysteresisLocation* 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 (Time measured at UE is within a duration from threshold)

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)

$Mt > Thresh1$

Inequality T1-2 (Leaving condition)

$Mt > Thresh1 + Duration$

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 > Thresh

Inequality Y2-2 (Leaving condition)

Mr + Hys < Thresh

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 *measResultNeighCellListNR* 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* in accordance with the following:

3> set the *cellIdentity* to include the *cellAccessRelatedInfo* contained in the discovery message received from the serving L2 U2N Relay UE;

3> set the *sl-RelayUE-Identity* to include the Source L2 ID of the serving L2 U2N Relay;

3> set the *sl-MeasResult* to include the SL-RSRP of the serving L2 U2N Relay UE;

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 *maxNrofRelayMeas* 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;

6> set the *sl-MeasResult* to include the SD-RSRP 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> include *coarseLocationInfo*, if available;

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 in 5.7.2a.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*) or in the *x1-Threshold2* (for *eventX1*) 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 *y1-Threshold2-Relay* (for *eventY1-Relay*) or *y2-Threshold-Relay* (*for eventY2-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

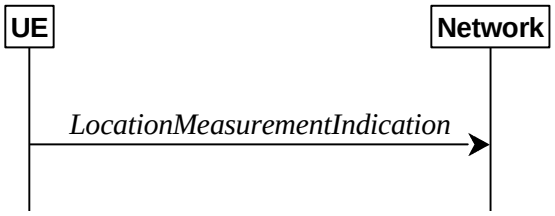

Figure 5.5.6.1-1: Location measurement indication

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 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 and *posMG-Request* are configured and the UE considers that at least one of the preconfigured measurement 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 [3];

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> if there is previously triggered UL MAC CE transmission for the measurement gap activation for positioning:

4> indicate to the lower layers to cancel the triggered UL MAC CE transmission for the measurement gap activation as specified in TS 38.321 [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 [3].

2> if there is configured measurement gap used for positioning and the measurement gap is not the activated preconfigured measurement gap for positioning:

3> initiate the procedure to indicate stop as specified in 5.5.6.3.

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.

5.5a Logged Measurements

5.5a.1 Logged Measurement Configuration

5.5a.1.1 General

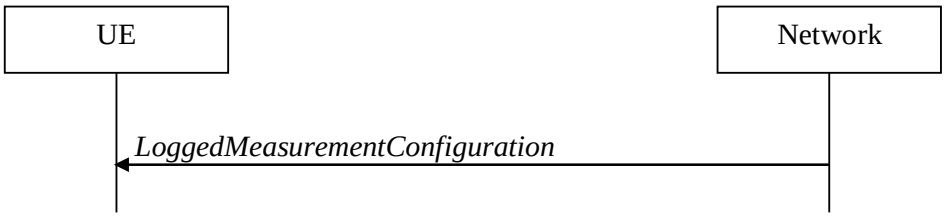

Figure 5.5a.1.1-1: Logged measurement configuration

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and RRC_INACTIVE. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE: NG-RAN may retrieve stored logged measurement information by means of the UE information procedure.

5.5a.1.2 Initiation

NG-RAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the *LoggedMeasurementConfiguration* message.

5.5a.1.3 Reception of the *LoggedMeasurementConfiguration* by the UE

Upon receiving the *LoggedMeasurementConfiguration* message the UE shall:

1> discard the logged measurement configuration as well as the logged measurement information as specified in 5.5a.2;

1> store the received *loggingDuration*, *reportType* and *areaConfiguration*, if included, in *VarLogMeasConfig*;

1> if the *LoggedMeasurementConfiguration* message includes *plmn-IdentityList*:

2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN as well as the PLMNs included in *plmn-IdentityList*;

1> else:

2> set *plmn-IdentityList* in *VarLogMeasReport* to include the RPLMN;

1> store the received *absoluteTimeInfo*, *traceReference*, *traceRecordingSessionRef*, and *tce-Id* in *VarLogMeasReport*;

1> store the received *bt-NameList*, if included, in *VarLogMeasConfig*;

1> store the received *wlan-NameList*, if included, in *VarLogMeasConfig*;

1> store the received *sensor-NameList*, if included, in *VarLogMeasConfig*;

1> start timer T330 with the timer value set to the *loggingDuration*;

1> store the received *sigLoggedMeasType*, if included, in *VarLogMeasReport*;

1> store the received *earlyMeasIndication*, if included, in *VarLogMeasConfig*;

5.5a.1.4 T330 expiry

Upon expiry of T330 the UE shall:

1> release *VarLogMeasConfig*;

The UE is allowed to discard stored logged measurements, i.e. to release *VarLogMeasReport*, 48 hours after T330 expiry.

5.5a.2 Release of Logged Measurement Configuration

5.5a.2.1 General

The purpose of this procedure is to release the logged measurement configuration as well as the logged measurement information.

5.5a.2.2 Initiation

The UE shall initiate the procedure upon receiving a logged measurement configuration in same or another RAT. The UE shall also initiate the procedure upon power off or upon deregistration.

The UE shall:

1> stop timer T330, if running;

1> if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables *VarLogMeasConfig* and *VarLogMeasReport*.

5.5a.3 Measurements logging

5.5a.3.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE and RRC_INACTIVE that has a logged measurement configuration. The actual process of logging within the UE, takes place in RRC IDLE state could continue in RRC INACTIVE state or vice versa.

5.5a.3.2 Initiation

While T330 is running and SDT procedure is not ongoing, the UE shall:

1> if measurement logging is suspended:

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

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

2> if the *reportType* is set to *periodical* in the *VarLogMeasConfig*:

3> if the UE is in any cell selection state (as specified in TS 38.304 [20]):

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

3> if the UE is in camped normally state on an NR cell and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

4> if areaConfiguration is not included in *VarLogMeasConfig*; or

4> if the serving cell is part of the area indicated by *areaConfig* in *areaConfiguration* in *VarLogMeasConfig*:

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

2> else if the *reportType* is set to *eventTriggered*, and *eventType* is set to *outOfCoverage*:

3> perform the logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig* only when the UE is in any cell selection state;

3> upon transition from any cell selection state to camped normally state in NR:

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

4> if *areaConfiguration* is not included in *VarLogMeasConfig* or if the current camping cell is part of the area indicated by *areaConfig* of *areaConfiguration* in *VarLogMeasConfig*:

5> perform the logging;

2> else if the *reportType* is set to *eventTriggered* and *eventType* is set to *eventL1*:

3> if the UE is in camped normally state on an NR cell and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

4> if *areaConfiguration* is not included in *VarLogMeasConfig*; or

4> if the serving cell is part of the area indicated by *areaConfig* in *areaConfiguration* in *VarLogMeasConfig*;

5> perform the logging at regular time intervals as defined by the *loggingInterval* in *VarLogMeasConfig* only when the conditions indicated by the *eventL1* are met;

2> when performing the logging:

3> if *InterFreqTargetInfo* is configured and if the UE detected IDC problems on at least one of the frequencies included in *InterFreqTargetInfo* or any inter-RAT frequency during the last logging interval, or

3> if *InterFreqTargetInfo* is not configured and if the UE detected IDC problems during the last logging interval:

4> if *measResultServingCell* in the *VarLogMeasReport* is not empty:

5> include *inDeviceCoexDetected*;

5> suspend measurement logging from the next logging interval;

4> else:

5> suspend measurement logging;

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

3> if location information became available during the last logging interval, set the content of the *locationInfo* as in 5.3.3.7:

3> if the UE is in any cell selection state (as specified in TS 38.304 [20]):

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

4> if the *reportType* is set to *eventTriggered* in the *VarLogMeasConfig*; and

4> if the RPLMN at the time of entering the any cell selection state is included in *plmn-IdentityList* stored in *VarLogMeasReport*; and

4> if *areaConfiguration* is not included in *VarLogMeasConfig* or if the last suitable cell that the UE was camping on is part of the area indicated by *areaConfig* of *areaConfiguration* in *VarLogMeasConfig*:

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

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

4> else if the *reportType* is set to *periodical* in the *VarLogMeasConfig*:

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

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

3> else:

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

4> set the *measResultServingCell* to include the quantities of the cell the UE is camping on;

3> if available, set the *measResultNeighCells*, in order of decreasing ranking-criterion as used for cell re-selection, to include measurements of neighbouring cell that became available during the last logging interval and according to the following:

4> include measurement results for at most 6 neighbouring cells on the NR serving frequency and for at most 3 cells per NR neighbouring frequency and for the NR neighbouring frequencies in accordance with the following:

5> if *interFreqTargetInfo* is included in *VarLogMeasConfig*:

6> if *earlyMeasIndication* is included in *VarLogMeasConfig*;

7> include measurement results for NR neighbouring frequencies that are included in both *interFreqTargetInfo* and either in *measIdleCarrierListNR* (within the *VarMeasIdleConfig*) or *SIB4*;

6> else:

7> include measurement results for NR neighbouring frequencies that are included in both *interFreqTargetInfo* and *SIB4*;

5> else:

6> if *earlyMeasIndication* is included in *VarLogMeasConfig*;

7> include measurement results for NR neighbouring frequencies that are included in either *measIdleCarrierListNR* (within the *VarMeasIdleConfig*) or *SIB4*;

6> else:

7> include measurement results for NR neighbouring frequencies that are included in *SIB4*;

4> include measurement results for at most 3 neighbours per inter-RAT frequency in accordance with the following:

5> if *earlyMeasIndication* is included in *VarLogMeasConfig*:

6> include measurement results for inter-RAT neighbouring frequencies that are included in either *measIdleCarrierListEUTRA* (within the *VarMeasIdleConfig*) or *SIB5*;

5> else:

6> include measurement results for inter-RAT frequencies that are included in *SIB5*;

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

NOTE 1: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or RRC_INACTIVE, which are performed in accordance with the performance requirements as specified in TS 38.133 [14].

NOTE 2: For logging the measurements on frequencies (indicated in *measIdleCarrierListNR/ measIdleCarrierListEUTRA*) in the logged measurement, the *qualityThreshold* in *measIdleConfig* should not be applied, and how the UE logs the measurements on the frequencies is left to the UE implementation.

2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.5a.1.4.

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.

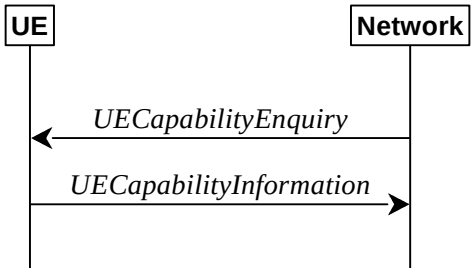

Figure 5.6.1.1-1: UE capability transfer

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* associated with the terrestrial network 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 (NG)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* and *srs-SwitchingAffectedBandsListNR* 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* and *srs-SwitchingAffectedBandsListNR* 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*, *supportedBandCombinationListSL-RelayDiscovery* or *supportedBandCombinationListSL-NonRelayDiscovery*:

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;

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*, *srs-SwitchingTimesListEUTRA* and *srs-SwitchingAffectedBandsListNR* 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*, *srs-SwitchingTimesListEUTRA* and *srs-SwitchingAffectedBandsListNR* 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* and the 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

5.7 Other

5.7.1 DL information transfer

5.7.1.1 General

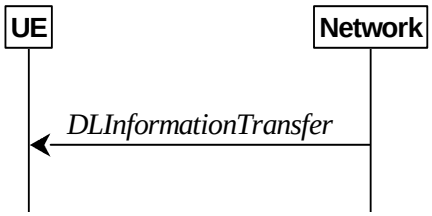

Figure 5.7.1.1-1: DL information transfer

The purpose of this procedure is to transfer NAS dedicated information from NG-RAN to a UE in RRC_CONNECTED or to a UE in RRC_INACTIVE during SDT, or to transfer F1-C related information from IAB Donor-CU to IAB-DU via the collocated IAB-MT in RRC_CONNECTED.

5.7.1.2 Initiation

The network initiates the DL information transfer procedure whenever there is a need to transfer NAS dedicated information, or F1-C related information to an IAB-node. The network initiates the DL information transfer procedure by sending the *DLInformationTransfer* message.

5.7.1.3 Reception of the *DLInformationTransfer* by the UE

Upon receiving *DLInformationTransfer* message, the UE shall:

1> if *dedicatedNAS-Message* is included:

2> forward *dedicatedNAS-Message* to upper layers.

1> if *referenceTimeInfo* is included:

2> calculate the reference time based on the *time*, *referenceSFN* and *timeInfoType* if it is included;

2> calculate the uncertainty of the reference time based on the *uncertainty*, if *uncertainty* is included;

2> inform upper layers of the reference time and, if *uncertainty* is included, of the uncertainty;

2> ignore all further *referenceTimeInfo* received in *SIB9*, if any.

1> if *sib9Fallback* is included:

2> apply *referenceTimeInfo* in SIB9.

1> if *rxTxTimeDiff-gNB* is included:

2> calculate the propagation delay based on the UE Rx-Tx time difference measurement and the received Rx-Tx time difference measurement at the gNB;

2> inform upper layers of the propagation delay.

1> if *ta-PDC* is set to *activate*:

2> inform upper layers of the propagation delay determined by the accumulated Timing Advance commands.

Upon receiving *DLInformationTransfer* message, the IAB-MT shall:

1> if *dedicatedInfoF1c* is included:

2> forward *dedicatedInfoF1c* to the collocated IAB-DU.

5.7.1a DL information transfer for MR-DC

5.7.1a.1 General

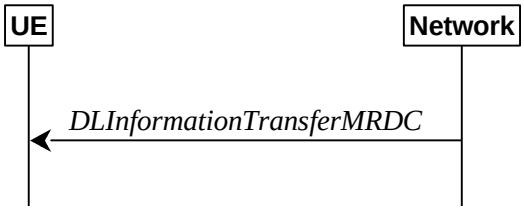

Figure 5.7.1a.1-1: DL information transfer MR-DC

The purpose of this procedure is to transfer RRC messages from the network to the UE over SRB3 (e.g. an NR RRC reconfiguration message including *reconfigurationWithSync*, an E-UTRA RRC connection reconfiguration message including *mobilityControlInfo*, an RRC connection release message, a *MobilityFromNRCommand* message, or a *MobilityFromEUTRACommand* message) during fast MCG link recovery.

5.7.1a.2 Initiation

The network initiates this procedure whenever there is a need to transfer an RRC message during fast MCG link recovery.

5.7.1a.3 Actions related to reception of *DLInformationTransferMRDC* message

Upon receiving the *DLInformationTransferMRDC*, the UE shall:

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

2> perform the RRC reconfiguration procedure according to 5.3.5.3;

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

2> perform the RRC release procedure according to 5.3.8;

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

2> perform the mobility from NR procedure according to 5.4.3.3;

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

2> perform the RRC connection reconfiguration procedure as specified in TS 36.331 [10], clause 5.3.5.4;

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

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

1> else if the *MobilityFromEUTRACommand* message is included in the *dl-DCCH-MessageEUTRA*:

2> perform the mobility from E-UTRA procedure as specified in TS 36.331 [10], clause 5.4.3.3;

5.7.2 UL information transfer

5.7.2.1 General

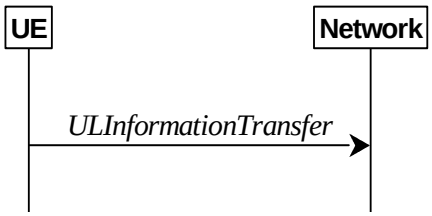

Figure 5.7.2.1-1: UL information transfer

The purpose of this procedure is to transfer NAS dedicated information from the UE to the network in RRC_CONNECTED or in RRC_INACTIVE during SDT, or to transfer F1-C related information from IAB-DU to IAB Donor-CU via the collocated IAB-MT in RRC_CONNECTED.

5.7.2.2 Initiation

A UE in RRC_CONNECTED or a UE in RRC_INACTIVE during SDT initiates the UL information transfer procedure whenever there is a need to transfer NAS dedicated information. The UE initiates the UL information transfer procedure by sending the ULInformationTransfer message. In addition, an IAB-MT in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer F1-C related information. When F1-C related information has to be transferred, the IAB-MT shall initiate the procedure only if SRB2 or split SRB2 is established.

5.7.2.3 Actions related to transmission of *ULInformationTransfer* message

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

1> if the upper layer provides NAS PDU:

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

1> for the IAB-MT, if there is a need to transfer F1-C related information:

2> include the *dedicatedInfoF1c*;

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

5.7.2.4 Failure to deliver *ULInformationTransfer* message

The UE shall:

1> if AS security is not started and radio link failure occurs before the successful delivery of *ULInformationTransfer* messages has been confirmed by lower layers; or

1> if PDCP re-establishment or release/addition (e.g due to key refresh upon PCell or PSCell change, or RRC connection re-establishment, or failure of resume procedure initiated for SDT) occurs on an SRB on which *ULInformationTransfer* messages were submitted for transmission but successful delivery of these messages was not confirmed by lower layers:

2> inform upper layers about the possible failure to deliver the information contained in the concerned *ULInformationTransfer* messages, unless the messages only include *dedicatedInfoF1c*.

5.7.2a UL information transfer for MR-DC

5.7.2a.1 General

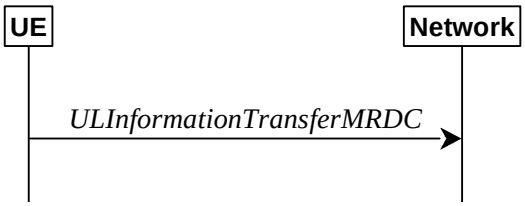

Figure 5.7.2a.1-1: UL information transfer MR-DC

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

5.7.2a.2 Initiation

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

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

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

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

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

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

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

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

5.7.2b UL transfer of IRAT information

5.7.2b.1 General

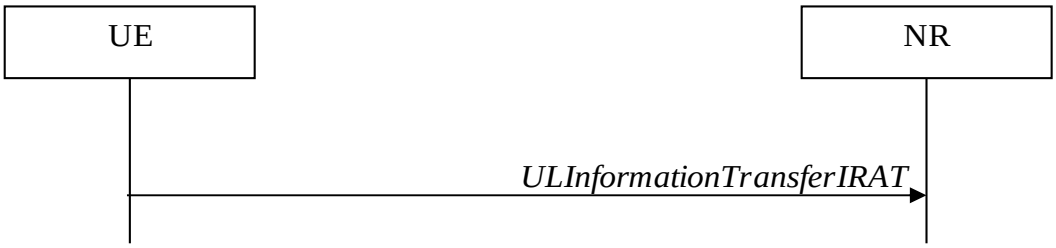

Figure 5.7.2b.1-1: UL transfer of IRAT information

The purpose of this procedure is to transfer from the UE to NR MCG dedicated information terminated at the NR MCG but specified by another RAT e.g. the E-UTRA *MeasurementReport* message, the E-UTRA *SidelinkUEInformation*

message or the E-UTRA *UEAssistanceInformation* message. The specific information transferred in this message is set in accordance with:

- the procedure specified in 5.6.10 of TS 36.331 [10] for E-UTRA *UEAssistanceInformation* message;
- the procedure specified in 5.10.2 of TS 36.331 [10] for E-UTRA *SidelinkUEInformation* message;
- the procedure specified in 5.5.5 of TS 36.331 [10] for E-UTRA *MeasurementReport* Message.

5.7.2b.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer dedicated inter-RAT information as specified in TS 36.331 [10].

5.7.2b.3 Actions related to transmission of *ULInformationTransferIRAT* message

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

1> if there is a need to transfer dedicated LTE information related to V2X sidelink communications:

2> set the *ul-DCCH-MessageEUTRA* to include the V2X sidelink communication information to be transferred (e.g. the E-UTRA RRC *MeasurementReport* message, the E-UTRA RRC *SidelinkUEInformation* message, or the E-UTRA RRC *UEAssistanceInformation* message);

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

5.7.3 SCG failure information

5.7.3.1 General

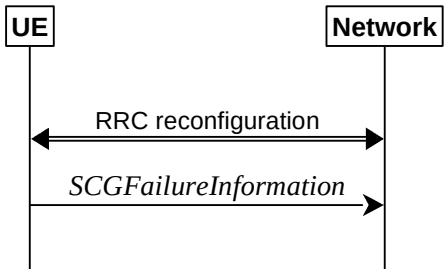

Figure 5.7.3.1-1: SCG failure information

The purpose of this procedure is to inform E-UTRAN or NR MN about an SCG failure the UE has experienced i.e. SCG radio link failure, beam failure of the PSCell while the SCG is deactivated, failure of SCG reconfiguration with sync, SCG configuration failure for RRC message on SRB3, SCG integrity check failure, and consistent uplink LBT failures on PSCell for operation with shared spectrum channel access.

5.7.3.2 Initiation

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

1> upon detecting radio link failure for the SCG, in accordance with clause 5.3.10.3;

1> upon detecting beam failure of the PSCell while the SCG is deactivated, in accordance with TS 38.321[3];

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

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

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

Upon initiating the procedure, the UE shall:

1> if the procedure was not initiated due to beam failure of the PSCell while the SCG is deactivated:

2> suspend SCG transmission for all SRBs, DRBs and, if any, BH RLC channels;

2> reset SCG MAC;

1> stop T304 for the SCG, if running;

1> stop conditional reconfiguration evaluation for CPC or CPA, if configured;

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

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

1> else:

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

5.7.3.3 Failure type determination for (NG)EN-DC

The UE shall set the SCG failure type as follows:

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

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

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to T312 expiry:

2> set the *failureType* as any value and set the *failureType-v1610* as t312-Expiry;

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message to provide reconfiguration with sync failure information for an SCG:

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

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

2> if the random access procedure was initiated for beam failure recovery:

3> set the *failureType* as *randomAccessProblem* and set the *failureType-v1610* as *beamFailureRecoveryFailure*;

2> else:

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

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

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

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to SRB3 integrity check failure:

2> set the *failureType* as *srb3-IntegrityFailure*;

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to Reconfiguration failure of NR RRC reconfiguration message:

2> set the *failureType* as *scg-reconfigFailure*;

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to consistent uplink LBT failures:

2> set the *failureType* as any value and set the *failureType-v1610* as *scg-lbtFailure*;

1> else if connected as an IAB-node and the *SCGFailureInformationNR* is initiated due to the reception of a BH RLF indication on BAP entity from the SCG:

2> set the *failureType* as any value and set *failureType-v1610* as *bh-RLF*.

1> else if the UE initiates transmission of the *SCGFailureInformationNR* message due to beam failure of the PSCell while the SCG is deactivated:

2> set the *failureType* as any value and set *failureType-v1610* as *beamFailure*.

5.7.3.4 Setting the contents of *MeasResultSCG-Failure*

The UE shall set the contents of the *MeasResultSCG-Failure* as follows:

1> for each *MeasObjectNR* configured on NR SCG for which a *measId* is configured and measurement results are available:

2> include an entry in *measResultPerMOList*;

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

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

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

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

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

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

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

3> ordering the cells with sorting as follows:

4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;

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

3> for each neighbour cell included:

4> include the optional fields that are available.

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

1> if available, set the *locationInfo* as in 5.3.3.7 according to the *otherConfig* associated with the NR SCG.

5.7.3.5 Actions related to transmission of *SCGFailureInformation* message

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

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

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

1> else if the UE initiates transmission of the *SCGFailureInformation* message due to T312 expiry:

2> set the *failureType* as *other* and set the *failureType-v1610* as *t312-Expiry*;

1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide reconfiguration with sync failure information for an SCG:

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

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

2> if the random access procedure was initiated for beam failure recovery:

3> set the *failureType* as *other* and set the *failureType-v1610* as *beamFailureRecoveryFailure*;

2> else:

3> set the *failureTyp*e as *randomAccessProblem*;

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

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

1> else if the UE initiates transmission of the *SCGFailureInformation* message due to SRB3 IP check failure:

2> set the *failureType* as *srb3-IntegrityFailure*;

1> else if the UE initiates transmission of the *SCGFailureInformation* message due to Reconfiguration failure of NR RRC reconfiguration message:

2> set the *failureType* as *scg-reconfigFailure*;

1> else if the UE initiates transmission of the *SCGFailureInformation* message due to consistent uplink LBT failures:

2> set the *failureType* as *other* and set the *failureType-v1610* as *scg-lbtFailure*;

1> else if connected as an IAB-node and the *SCGFailureInformation* is initiated due to the reception of a BH RLF indication on BAP entity from the SCG:

2> set the *failureType* as *other* and set *failureType-v1610* as *bh-RLF*;

1> else if the UE initiates transmission of the *SCGFailureInformation* message due to beam failure of the PSCell while the SCG is deactivated:

2> set the *failureType* as *other* and set *failureType-v1610* as *beamFailure;*

1> include and set *MeasResultSCG*-Failure in accordance with 5.7.3.4;

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

2> include an entry in *measResultFreqList*;

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

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

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

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

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

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

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

3> ordering the cells with sorting as follows:

4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;

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

3> for each neighbour cell included:

4> include the optional fields that are available.

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

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

1> if available, set the *locationInfo* as in 5.3.3.7 according to the *otherConfig* associated with the NR MCG.

1> if the UE supports SCG failure for mobility robustness optimization:

2> if the *failureType* is set to *synchReconfigFailureSCG*; or

2> if the *failureType* is set to *randomAccessProblem* and the SCG failure was declared while T304 was running:

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

3> set the *failedPSCellId* to the physical cell identity and carrier frequency of the target PSCell of the failed PSCell change;

3> set the *previousPSCellId* to the physical cell identity and carrier frequency of the source PSCell associated to the last received *RRCReconfiguration* message including *reconfigurationWithSync* for the SCG, if available;

3> set the *timeSCGFailure* to the elapsed time since the last execution of *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG until declaring the SCG failure;

2> else:

3> set the *failedPSCellId* to the physical cell identity and carrier frequency of the PSCell in which the SCG failure was declared;

3> if the last *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG was received to enter the PSCell in which the SCG failure was declared:

4> set the *timeSCGFailure* to the elapsed time since the last execution of *RRCReconfiguration* message including the *reconfigurationWithSync* for the SCG until declaring the SCG failure;

4> set the *previousPSCellId* to the physical cell identity and carrier frequency of the source PSCell associated to the last received *RRCReconfiguration* message including *reconfigurationWithSync* for the SCG;

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

5.7.3a EUTRA SCG failure information

5.7.3a.1 General

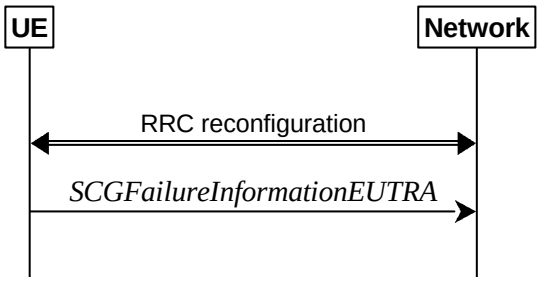

Figure 5.7.3a.1-1: EUTRA SCG failure information

The purpose of this procedure is to inform NR MN about an SCG failure on E-UTRA SN the UE has experienced (e.g. SCG radio link failure, SCG change failure), as specified in TS 36.331 [10] clause 5.6.13.2.

5.7.3a.2 Initiation

A UE initiates the procedure to report EUTRA SCG failures when neither NR MCG nor EUTRA SCG transmission is suspended and in accordance with TS 36.331 [10] clause 5.6.13.2. Actions the UE shall perform upon initiating the procedure, other than related to the transmission of the *SCGFailureInformationEUTRA* message are specified in TS 36.331 [10] clause 5.6.13.2.

5.7.3a.3 Actions related to transmission of *SCGFailureInformationEUTRA* message

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

1> include *failureType* within *failureReportSCG-EUTRA* and set it to indicate the SCG failure in accordance with TS 36.331 [10] clause 5.6.13.4;

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

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

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

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

1> if available, set the *locationInfo* as in 5.3.3.7.:

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

5.7.3b MCG failure information

5.7.3b.1 General

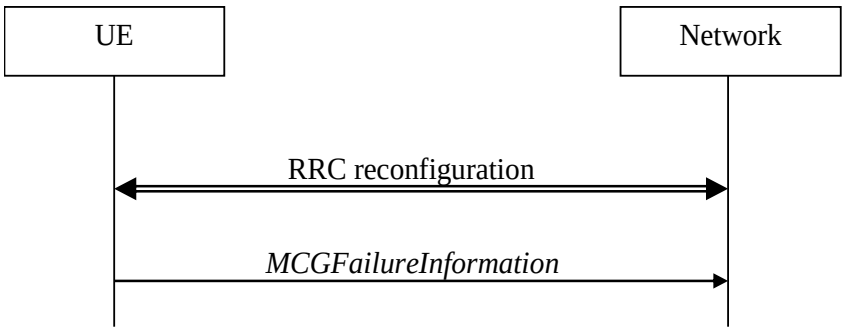

Figure 5.7.3b.1-1: MCG failure information

The purpose of this procedure is to inform the network about an MCG failure the UE has experienced i.e. MCG radio link failure. A UE in RRC_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB or multicast MRB setup or, for IAB, SRB2, may initiate the fast MCG link recovery procedure in order to continue the RRC connection without re-establishment.

5.7.3b.2 Initiation

A UE configured with split SRB1 or SRB3 initiates the procedure to report MCG failures when neither MCG nor SCG transmission is suspended, the SCG is not deactivated, *t316* is configured, and when the following condition is met:

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

Upon initiating the procedure, the UE shall:

1> stop timer T310 for the PCell, if running;

1> stop timer T312 for the PCell, if running;

1> suspend MCG transmission for all SRBs, DRBs, multicast MRBs, except SRB0, and, if any, BH RLC channels;

1> reset MCG MAC;

1> stop conditional reconfiguration evaluation for CHO, if configured;

1> stop conditional reconfiguration evaluation for CPC, if configured;

1> initiate transmission of the *MCGFailureInformation* message in accordance with 5.7.3b.4.

NOTE: The handling of any outstanding UL RRC messages during the initiation of the fast MCG link recovery is left to UE implementation.

5.7.3b.3 Failure type determination

The UE shall set the MCG failure type as follows:

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

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

1> else if the UE initiates transmission of the *MCGFailureInformation* message due to T312 expiry:

2> set the *failureType* as *t312-Expiry*;

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

2> if the random access procedure was initiated for beam failure recovery:

3> set the *failureType* as *beamFailureRecoveryFailure*;

2> else:

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

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

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

1> else if the UE initiates transmission of the *MCGFailureInformation* message due to consistent uplink LBT failures on the MCG:

2> set the *failureType* as *lbt-Failure*;

1> else if connected as an IAB-node and the *MCGFailureInformation* message is initiated due to the reception of a BH RLF indication on BAP entity from the MCG:

2> set the *failureType* as *bh-RLF*.

5.7.3b.4 Actions related to transmission of *MCGFailureInformation* message

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

1> include and set *failureType* in accordance with 5.7.3b.3;

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

2> include an entry in *measResultFreqList*;

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

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

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

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

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

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

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

3> ordering the cells with sorting as follows:

4> based on SS/PBCH block if SS/PBCH block measurement results are available and otherwise based on CSI-RS;

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

3> for each neighbour cell included:

4> include the optional fields that are available.

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

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

1> for each UTRA-FDD frequency the UE is configured to measure by *measConfig* for which measurement results are available:

2> set the *measResultFreqListUTRA-FDD* to include the best measured cells, ordered such that the best cell is listed first using RSCP to order the cells if RSCP measurement results are available for cells on this frequency, otherwise using EcN0 to order the cells, based on measurements collected up to the moment the UE detected the failure, and for each cell that is included, include the optional fields that are available;

1> if the UE is in NR-DC:

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

1> if the UE is in NE-DC:

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

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

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

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

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

2> if the *primaryPath* for the PDCP entity of SRB1 refers to the MCG:

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

The UE shall:

1> start timer T316;

1> if SRB1 is configured as split SRB:

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

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

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

5.7.3b.5 T316 expiry

The UE shall:

1> if T316 expires:

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

5.7.4 UE Assistance Information

5.7.4.1 General

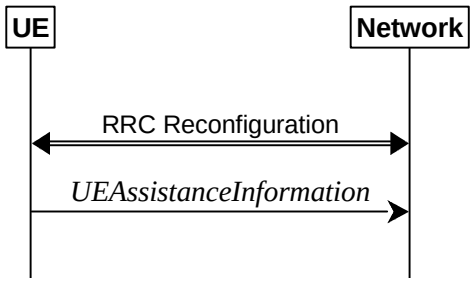

Figure 5.7.4.1-1: UE Assistance Information

The purpose of this procedure is for the UE to inform the network of:

- its delay budget report carrying desired increment/decrement in the connected mode DRX cycle length, or;
- its overheating assistance information, or;
- its IDC assistance information, or;
- its preference on DRX parameters for power saving, or;
- its preference on the maximum aggregated bandwidth for power saving, or;
- its preference on the maximum number of secondary component carriers for power saving, or;
- its preference on the maximum number of MIMO layers for power saving, or;
- its preference on the minimum scheduling offset for cross-slot scheduling for power saving, or;
- its preference on the RRC state, or;
- configured grant assistance information for NR sidelink communication, or;
- its preference in being provisioned with reference time information, or;
- its preference for FR2 UL gap, or;
- its preference to transition out of RRC_CONNECTED state for MUSIM operation, or;
- its preference on the MUSIM gaps, or;
- its relaxation state for RLM measurements, or;
- its relaxation state for BFD measurements, or;
- availability of data and/or signalling mapped to radio bearers which are not configured for SDT, or;
- its preference for the SCG to be deactivated, or;
- availability of uplink data to transmit for a DRB for which there is no MCG RLC bearer while the SCG is deactivated, or;
- change of its fulfilment status for RRM measurement relaxation criterion, or;
- service link (specified in TS 38.300 [2]) propagation delay difference between serving cell and neighbour cell(s).

5.7.4.2 Initiation

A UE capable of providing delay budget report in RRC_CONNECTED may initiate the procedure in several cases, including upon being configured to provide delay budget report and upon change of delay budget preference.

A UE capable of providing overheating assistance information in RRC_CONNECTED may initiate the procedure if it was configured to do so, upon detecting internal overheating, or upon detecting that it is no longer experiencing an overheating condition.

A UE capable of providing IDC assistance information in RRC_CONNECTED may initiate the procedure if it was configured to do so, upon detecting IDC problem if the UE did not transmit an IDC assistance information since it was configured to provide IDC indications, or upon change of IDC problem information.

A UE capable of providing its preference on DRX parameters of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a preference on DRX parameters and upon change of its preference on DRX parameters.

A UE capable of providing its preference on the maximum aggregated bandwidth of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum aggregated bandwidth preference and upon change of its maximum aggregated bandwidth preference.

A UE capable of providing its preference on the maximum number of secondary component carriers of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of secondary component carriers preference and upon change of its maximum number of secondary component carriers preference.

A UE capable of providing its preference on the maximum number of MIMO layers of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a maximum number of MIMO layers preference and upon change of its maximum number of MIMO layers preference.

A UE capable of providing its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving in RRC_CONNECTED may initiate the procedure in several cases, if it was configured to do so, including upon having a minimum scheduling offset preference and upon change of its minimum scheduling offset preference.

A UE capable of providing assistance information to transition out of RRC_CONNECTED state may initiate the procedure if it was configured to do so, upon determining that it prefers to transition out of RRC_CONNECTED state, or upon change of its preferred RRC state.

A UE capable of providing configured grant assistance information for NR sidelink communication in RRC_CONNECTED may initiate the procedure in several cases, including upon being configured to provide traffic pattern information and upon change of traffic patterns.

A UE capable of providing an indication of its preference in being provisioned with reference time information may initiate the procedure upon being configured to provide this indication, or if it was configured to provide this indication and upon change of its preference.

A UE capable of providing an indication of its preference in FR2 UL gap may initiate the procedure if it was configured to do so, upon detecting the need of FR2 UL gap activation/deactivation.

A UE capable of providing MUSIM assistance information for gap preference may initiate the procedure if it was configured to do so, upon determining it needs the gaps, or upon change of the gap preference information.

A UE capable of providing MUSIM assistance information for leave indication may initiate the procedure if it was configured to do so upon determining that it needs to leave RRC_CONNECTED state.

A UE capable of relaxing its RLM measurements of a cell group in RRC_CONNECTED state shall initiate the procedure for providing an indication of its relaxation state for RLM measurements upon being configured to do so, and upon change of its relaxation state for RLM measurements in RRC_CONNECTED state.

A UE capable of relaxing its BFD measurements in serving cells of a cell group in RRC_CONNECTED shall initiate the procedure for providing an indication of its relaxation state for BFD measurements upon being configured to do so, and upon change of its relaxation state for BFD measurements in RRC_CONNECTED state.

A UE capable of SDT initiates this procedure when data and/or signalling mapped to radio bearers that are not configured for SDT becomes available during SDT (i.e. while SDT procedure is ongoing).

A UE capable of providing its preference for SCG deactivation may initiate the procedure if it was configured to do so, upon determining that it prefers or does no more prefer the SCG to be deactivated.

A UE that has uplink data to transmit for a DRB for which there is no MCG RLC bearer while the SCG is deactivated shall initiate the procedure.

A UE capable of providing an indication of fulfilment of the RRM measurement relaxation criterion in connected mode may initiate the procedure if it was configured to do so, upon change of its fulfilment status for RRM measurement relaxation criterion for connected mode.

A UE capable of providing service link propagation delay difference between serving cell and neighbour cell(s) shall initiate the procedure upon being configured to do so, and upon determining that service link propagation delay difference between serving cell and a neighbour cell has changed more than *threshPropDelayDiff* compared with the last reported value.

Upon initiating the procedure, the UE shall:

1> if configured to provide delay budget report:

2> if the UE did not transmit a *UEAssistanceInformation* message with *delayBudgetReport* since it was configured to provide delay budget report; or

2> if the current delay budget is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *delayBudgetReport* and timer T342 is not running:

3> start or restart timer T342 with the timer value set to the *delayBudgetReportingProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide a delay budget report;

1> if configured to provide overheating assistance information:

2> if the overheating condition has been detected and T345 is not running; or

2> if the current overheating assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *overheatingAssistance* and timer T345 is not running:

3> start timer T345 with the timer value set to the *overheatingIndicationProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide overheating assistance information;

1> if configured to provide IDC assistance information:

2> if the UE did not transmit a *UEAssistanceInformation* message with *idc-Assistance* since it was configured to provide IDC assistance information:

3> if on one or more frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself; or

3> if on one or more supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information;

2> else if the current IDC assistance information is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide IDC assistance information;

NOTE 1: The term "IDC problems" refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.

NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.
For frequencies on which a SCell or SCells is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCell or SCells would result in interference issues that the UE would not be able to solve by itself.
For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.

1> if configured to provide its preference on DRX parameters of a cell group for power saving:

2> if the UE has a preference on DRX parameters of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters of the cell group for power saving; or

2> if the current *drx-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a associated with the cell group is not running:

3> start the timer T346a with the timer value set to the *drx-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *drx-Preference*;

1> if configured to provide its preference on the maximum aggregated bandwidth of a cell group for power saving:

2> if the UE has a preference on the maximum aggregated bandwidth of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxBW-Preference* and/or *maxBW-PreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum aggregated bandwidth of the cell group for power saving; or

2> if the current *maxBW-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxBW-Preference* and/or *maxBW-PreferenceFR2-2*for the cell group and timer T346b associated with the cell group is not running:

3> start the timer T346b with the timer value set to the *maxBW-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxBW-Preference* and/or *maxBW-PreferenceFR2-2*;

1> if configured to provide its preference on the maximum number of secondary component carriers of a cell group for power saving:

2> if the UE has a preference on the maximum number of secondary component carriers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxCC-Preference* for the cell group since it was configured to provide its preference on the maximum number of secondary component carriers of the cell group for power saving; or

2> if the current *maxCC-Preference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxCC-Preference* for the cell group and timer T346c associated with the cell group is not running:

3> start the timer T346c with the timer value set to the *maxCC-PreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxCC-Preference*;

1> if configured to provide its preference on the maximum number of MIMO layers of a cell group for power saving:

2> if the UE has a preference on the maximum number of MIMO layers of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2* for the cell group since it was configured to provide its preference on the maximum number of MIMO layers of the cell group for power saving; or

2> if the current *maxMIMO-LayerPreference* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2* for the cell group and timer T346d associated with the cell group is not running:

3> start the timer T346d with the timer value set to the *maxMIMO-LayerPreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *maxMIMO-LayerPreference* and/or *maxMIMO-LayerPreferenceFR2-2*;

1> if configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving:

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* for the cell group since it was configured to provide its preference on the minimum scheduling offset for cross-slot scheduling of the cell group for power saving; or

2> if the current *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* information for the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt* for the cell group and timer T346e associated with the cell group is not running:

3> start the timer T346e with the timer value set to the *minSchedulingOffsetPreferenceProhibitTimer* of the cell group;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *minSchedulingOffsetPreference* and/or *minSchedulingOffsetPreferenceExt*;

1> if configured to provide its release preference and timer T346f is not running:

2> if the UE determines that it would prefer to transition out of RRC_CONNECTED state; or

2> if the UE is configured with *connectedReporting* and the UE determines that it would prefer to revert an earlier indication to transition out of RRC_CONNECTED state:

3> start timer T346f with the timer value set to the *releasePreferenceProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the release preference;

1> if configured to provide configured grant assistance information for NR sidelink communication:

2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide configured grant assistance information for NR sidelink communication;

1> if configured to provide preference in being provisioned with reference time information:

2> if the UE did not transmit a *UEAssistanceInformation* message with *referenceTimeInfoPreference* since it was configured to provide preference; or

2> if the UE's preference changed from the last time UE initiated transmission of the *UEAssistanceInformation* message including *referenceTimeInfoPreference*:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide preference in being provisioned with reference time information.

1> if configured to provide its preference on FR2 UL gap:

2> if the UE did not transmit a *UEAssistanceInformation* message with *ul-GapFR2-Preference* since it was configured to provide its preference on FR2 UL gap information:

3> if the UE has a preference on FR2 UL gap activation/deactivation:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide FR2 UL gap preference;

2> else if the current FR2 UL gap preference is different from the one indicated in the last transmission of the *UEAssistanceInformation* message:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide FR2 UL gap preference.

1> if configured to provide MUSIM assistance information for leaving RRC_CONNECTED:

2> if the UE needs to leave RRC_CONNECTED state and the timer T346g is not running:

3> initiate transmission of the UEAssistanceInformation message in accordance with 5.7.4.3 to provide MUSIM assistance information for leaving RRC_CONNECTED;

3> start the timer T346g with the timer value set to the *musim-LeaveWithoutResponseTimer*;

1> if configured to provide MUSIM assistance information for gap preference:

2> if the UE has a preference on the MUSIM gap(s) and the UE did not transmit a *UEAssistanceInformation* message with *musim-GapPreferenceList* since it was configured to provide MUSIM assistance information for gap preference; or

2> if the current *musim-GapPreferenceList* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-GapPreferenceList* and the timer T346h is not running:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-GapPreferenceList*;

3> start or restart the timer T346h with the timer value set to the *musim-GapProhibitTimer*.

NOTE 3: The UE does not need to initiate transmission of the *UEAssistanceInformation* message if the difference between the current *musim-GapPreferenceList* and the last transmission of the *UEAssistanceInformation* message including *musim-GapPreferenceList* is only due to removal of an ended aperiodic gap.

1> if configured to provide the relaxation state of RLM measurements of a cell group and RLM measurement of the cell group is not stopped:

2> if the UE did not transmit a *UEAssistanceInformation* message with *rlm-MeasRelaxationState* since it was configured to provide the relaxation state of RLM measurements for the cell group; or

2> if the relaxation state of RLM measurements for the cell group is currently different from the relaxation state reported in the last transmission of the *UEAssistanceInformation* message including *rlm-MeasRelaxationState* of the cell group and timer T346j associated with the cell group is not running:

3> start timer T346j with the timer value set to the *rlm-RelaxtionReportingProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the relaxation state of RLM measurements of the cell group;

1> if configured to provide the relaxation state of BFD measurements of serving cells of a cell group and BFD measurement of the cell group is not stopped:

2> if the UE did not transmit a *UEAssistanceInformation* message with *bfd-MeasRelaxationState* since it was configured to provide the relaxation state of BFD measurements for the cell group; or

2> if the relaxation state of BFD measurements in any serving cell of the cell group is currently different from the relaxation state reported in the last transmission of the *UEAssistanceInformation* message including *bfd-MeasRelaxationState* of the cell group and timer T346k associated with the cell group is not running:

3> start timer T346k with the timer value set to the *bfd-RelaxtionReportingProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the relaxation state of BFD measurements of serving cells of the cell group.

1> if data and/or signalling mapped to radio bearers not configured for SDT becomes available during SDT (i.e. while SDT procedure is ongoing):

2> if the UE did not transmit a *UEAssistanceInformation* message with *nonSDT-DataIndication* since the initiation of the current resume procedure for SDT:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide *nonSDT-DataIndication*.

1> if configured to provide its preference for SCG deactivation and timer T346i is not running;

2> if the UE prefers the SCG to be deactivated and did not transmit a *UEAssistanceInformation* message with *scg-DeactivationPreference* since it was configured to provide its SCG deactivation preference; or

2> if the UE preference for SCG deactivation is different from the last indicated *scg-DeactivationPreference*:

3> start timer T346i with the timer value set to the *scg-DeactivationPreferenceProhibitTimer*;

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the UE preference for SCG deactivation;

1> if the SCG is deactivated, and,

1> the UE has uplink data to send for an SCG RLC entity while the UE previously did not have any uplink data to send for any SCG RLC entity:

2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the UE has uplink data to send for a DRB whose *DRB-Identity* is not included in any *RLC-BearerConfig* in the *CellGroupConfig* associated with the MCG.

1> if configured to send indications of RRM measurement relaxation criterion fulfilment:

2> if the criterion in 5.7.4.4 is met for a period of $T_{SearchDeltaP\text{-}StationaryConnected}$:

3> if the UE did not transmit a *UEAssistanceInformation* message with *rrm-MeasRelaxationFulfilment* as *true* since it was configured to provide indications of RRM measurement relaxation criterion fulfilment; or

3> the last *UEAssistanceInformation* message indicated the criterion in 5.7.4.4 is not fulfilled with *rrm-MeasRelaxationFulfilment* as *false*:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the criterion for RRM measurement relaxation for connected mode is fulfilled;

2> else:

3> if the last *UEAssistanceInformation* message indicated fulfilment of the criterion in 5.7.4.4 with *rrm-MeasRelaxationFulfilment* as *true*:

4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate that the criterion for RRM measurement relaxation for connected mode is not fulfilled.

1> if configured to provide service link propagation delay difference between serving cell and neighbour cell(s);

2> if the UE did not transmit a *UEAssistanceInformation* message with *propagationDelayDifference* since it was configured to provide service link propagation delay difference between serving cell and neighbour cell(s); or

2> for any neighbour cell in *neighCellInfoList*, if the service link propagation delay difference between serving cell and the neighbour cell has changed more than *threshPropDelayDiff* since the last transmission of the *UEAssistanceInformation* message including *propagationDelayDifference*:

3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide service link propagation delay difference between serving cell and each neighbour cell included in the *neighCellInfoList*;

5.7.4.3 Actions related to transmission of *UEAssistanceInformation* message

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

1> if transmission of the *UEAssistanceInformation* message is initiated to provide a delay budget report according to 5.7.4.2 or 5.3.5.3;

2> set *delayBudgetReport* to *type1* according to a desired value;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide overheating assistance information according to 5.7.4.2 or 5.3.5.3;

2> if the UE experiences internal overheating:

3> if the UE prefers to temporarily reduce the number of maximum secondary component carriers:

4> include *reducedMaxCCs* in the *OverheatingAssistance* IE;

4> set *reducedCCsDL* to the number of maximum SCells the UE prefers to be temporarily configured in downlink;

4> set *reducedCCsUL* to the number of maximum SCells the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1:

4> include *reducedMaxBW-FR1* in the *OverheatingAssistance* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1:

4> include *reducedMaxBW-FR2* in the *OverheatingAssistance* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1;

3> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-2:

4> include *reducedMaxBW-FR2-2* in the *OverheatingAssistance IE*;

4> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-2;

4> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-2;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1:

4> include *reducedMaxMIMO-LayersFR1* in the *OverheatingAssistance* IE;

4> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:

4> include *reducedMaxMIMO-LayersFR2* in the *OverheatingAssistance* IE;

4> set *reducedMIMO-LayersFR2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 the UE prefers to be temporarily configured in uplink;

3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-2:

4> include *reducedMaxMIMO-LayersFR2-2* in the *OverheatingAssistance IE*;

4> set *reducedMIMO-LayersFR2-2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in downlink;

4> set *reducedMIMO-LayersFR2-2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2 the UE prefers to be temporarily configured in uplink;

2> else (if the UE no longer experiences an overheating condition):

3> do not include *reducedMaxCCs*, *reducedMaxBW-FR1*, *reducedMaxBW-FR2*, *reducedMaxBW-FR2-2*, *reducedMaxMIMO-LayersFR1*, *reducedMaxMIMO-LayersFR2* or *reducedMaxMIMO-LayersFR2-2* in *OverheatingAssistance* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide IDC assistance information according to 5.7.4.2 or 5.3.5.3:

2> if there is at least one carrier frequency included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

3> include the field *affectedCarrierFreqList* with an entry for each affected carrier frequency included in *candidateServingFreqListNR*;

3> for each carrier frequency included in the field *affectedCarrierFreqList*, include *interferenceDirection* and set it accordingly;

2> if there is at least one supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, the UE is experiencing IDC problems that it cannot solve by itself:

3> include *victimSystemType* for each UL CA combination included in *affectedCarrierFreqCombList*;

3> if the UE sets *victimSystemType* to *wlan* or *bluetooth*:

4> include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;

3> else:

4> optionally include *affectedCarrierFreqCombList* with an entry for each supported UL CA combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;

NOTE 1: When sending an *UEAssistanceInformation* message to inform the IDC problems, the UE includes all IDC assistance information (rather than providing e.g. the changed part(s) of the IDC assistance information).

NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the *UEAssistanceInformation* message (e.g. by not including the IDC assistance information in the *idc-Assistance* field).

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *drx-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *drx-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on DRX parameters for the cell group:

3> if the UE has a preference for the long DRX cycle:

4> include *preferredDRX-LongCycle* in the *DRX-Preference* IE and set it to the preferred value;

3> if the UE has a preference for the DRX inactivity timer:

4> include *preferredDRX-InactivityTimer* in the *DRX-Preference* IE and set it to the preferred value;

3> if the UE has a preference for the short DRX cycle:

4> include *preferredDRX-ShortCycle* in the *DRX-Preference* IE and set it to the preferred value;

3> if the UE has a preference for the short DRX timer:

4> include *preferredDRX-ShortCycleTimer* in the *DRX-Preference* IE and set it to the preferred value;

2> else (if the UE has no preference on DRX parameters for the cell group):

3> do not include *preferredDRX-LongCycle*, *preferredDRX-InactivityTimer*, *preferredDRX-ShortCycle* and *preferredDRX-ShortCycleTimer* in the *DRX-Preference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxBW-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum aggregated bandwidth for the cell group:

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR1:

4> include *reducedMaxBW-FR1* in the *MaxBW-Preference* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR1 in the cell group;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR1 in the cell group;

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-1:

4> include *reducedMaxBW-FR2* in the *MaxBW-Preference* IE;

4> set *reducedBW-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-1 in the cell group;

4> set *reducedBW-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-1 in the cell group;

2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):

3> do not include *reducedMaxBW-FR1* and *reducedMaxBW-FR2* in the *MaxBW-Preference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxBW-PreferenceFR2-2* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxBW-PreferenceFR2-2* in the *UEAssistanceInformation* message;

3> if the UE prefers to reduce the maximum aggregated bandwidth of FR2-2:

4> include *reducedMaxBW-FR2-2* in the M*axBW-PreferenceFR2-2* IE;

4> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE desires to have configured across all downlink carriers of FR2-2 in the cell group;

4> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE desires to have configured across all uplink carriers of FR2-2 in the cell group;

2> else (if the UE has no preference on the maximum aggregated bandwidth for the cell group):

3> do not include *reducedMaxBW-FR2-2* in the *MaxBW-PreferenceFR2-2* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxCC-Preference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxCC-Preference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of secondary component carriers for the cell group:

3> include *reducedMaxCCs* in the *MaxCC-Preference* IE;

3> set *reducedCCsDL* to the number of maximum SCells the UE desires to have configured in downlink in the cell group;

3> set *reducedCCsUL* to the number of maximum SCells the UE desires to have configured in uplink in the cell group;

2> else (if the UE has no preference on the maximum number of secondary component carriers for the cell group):

3> do not include *reducedMaxCCs* in the *MaxCC-Preference* IE;

NOTE 3: The UE can implicitly indicate a preference for NR SCG release by reporting the maximum aggregated bandwidth preference for power saving of the cell group, if configured, as zero for both FR1 and FR2, and by reporting the maximum number of secondary component carriers for power saving of the cell group, if configured, as zero for both uplink and downlink.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO-LayerPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxMIMO-LayerPreference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of MIMO layers for the cell group:

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR1:

4> include *reducedMaxMIMO-LayersFR1* in the *MaxMIMO-LayerPreference* IE;

4> set *reducedMIMO-LayersFR1-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR1 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR1-UL* to the preferred maximum number of uplink MIMO layers of each FR1 serving cell that the UE operates on in the cell group;

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2-1:

4> include *reducedMaxMIMO-LayersFR2* in the *MaxMIMO-LayerPreference* IE;

4> set *reducedMIMO-LayersFR2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-1 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-1 serving cell that the UE operates on in the cell group;

2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):

3> do not include *reducedMaxMIMO-LayersFR1* and *reducedMaxMIMO-LayersFR2* in the *MaxMIMO-LayerPreference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *maxMIMO LayerPreferenceFR2* 2 of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *maxMIMO-LayerPreferenceFR2-2* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the maximum number of MIMO layers for the cell group for FR2-2:

3> if the UE prefers to reduce the number of maximum MIMO layers of each serving cell operating on FR2 2:

4> include *reducedMaxMIMO-LayersFR2-2* in the *MaxMIMO-LayerPreferenceFR2 2* IE;

4> set *reducedMIMO-LayersFR2-2-DL* to the preferred maximum number of downlink MIMO layers of each BWP of each FR2-2 serving cell that the UE operates on in the cell group;

4> set *reducedMIMO-LayersFR2-2-UL* to the preferred maximum number of uplink MIMO layers of each FR2-2 serving cell that the UE operates on in the cell group;

2> else (if the UE has no preference on the maximum number of MIMO layers for the cell group):

3> do not include reducedMaxMIMO-LayersFR2-2 in the *MaxMIMO-LayerPreferenceFR2*-2 IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreference* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *minSchedulingOffsetPreference* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group:

3> if the UE has a preference for the value of K_0 (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 15 kHz SCS:

4> include *preferredK0-SCS-15kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_0;

3> if the UE has a preference for the value of K_0 for cross-slot scheduling with 30 kHz SCS:

4> include *preferredK0-SCS-30kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_0;

3> if the UE has a preference for the value of K_0 for cross-slot scheduling with 60 kHz SCS:

4> include *preferredK0-SCS-60kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_0;

3> if the UE has a preference for the value of K_0 for cross-slot scheduling with 120 kHz SCS:

4> include *preferredK0-SCS-120kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_0;

3> if the UE has a preference for the value of K_2 (TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling with 15 kHz SCS:

4> include *preferredK2-SCS-15kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_2;

3> if the UE has a preference for the value of K_2 for cross-slot scheduling with 30 kHz SCS:

4> include *preferredK2-SCS-30kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_2;

3> if the UE has a preference for the value of K_2 for cross-slot scheduling with 60 kHz SCS:

4> include *preferredK2-SCS-60kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_2;

3> if the UE has a preference for the value of K_2 for cross-slot scheduling with 120 kHz SCS:

4> include *preferredK2-SCS-120kHz* in the *MinSchedulingOffsetPreference* IE and set it to the desired value of K_2;

2> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):

3> do not include *preferredK0* and *preferredK2* in the *MinSchedulingOffsetPreference* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide *minSchedulingOffsetPreferenceExt* of a cell group for power saving according to 5.7.4.2 or 5.3.5.3:

2> include *minSchedulingOffsetPreferenceExt* in the *UEAssistanceInformation* message;

2> if the UE has a preference on the minimum scheduling offset for cross-slot scheduling for the cell group for FR2-2:

3> include *minSchedulingOffsetPreferenceExt* in the *UEAssistanceInformation* message;

4> if the UE has a preference for the value of K_0 (TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling with 480 kHz SCS:

5> include *preferredK0-SCS-480kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of K_0;

4> if the UE has a preference for the value of K_0 for cross-slot scheduling with 960 kHz SCS:

5> include *preferredK0-SCS-960kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of K_0;

4> if the UE has a preference for the value of K_2 for cross-slot scheduling with 480 kHz SCS:

5> include *preferredK2-SCS-480kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of K_2;

4> if the UE has a preference for the value of K_2 for cross-slot scheduling with 960 kHz SCS:

5> include *preferredK2-SCS-960kHz* in the *minSchedulingOffsetPreferenceExt* IE and set it to the desired value of K_2;

3> else (if the UE has no preference on the minimum scheduling offset for cross-slot scheduling for the cell group):

4> do not include *preferredK0* and *preferredK2* in the *minSchedulingOffsetPreferenceExt* IE;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide a release preference according to 5.7.4.2 or 5.3.5.3:

2> include *releasePreference* in the *UEAssistanceInformation* message;

2> set *preferredRRC-State* to the desired RRC state on transmission of the *UEAssistanceInformation* message;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication of preference in being provisioned with reference time information according to 5.7.4.2 or 5.3.5.3:

2> if the UE has a preference in being provisioned with reference time information:

3> set *referenceTimeInfoPreference* to *true*;

2> else:

3> set *referenceTimeInfoPreference* to *false*.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide preference on FR2 UL gap according to 5.7.4.2 or 5.3.5.3:

2> if the UE has a preference for FR2 UL gap configuration:

3> set *ul-GapFR2-PatternPreference* to the preferred FR2 UL gap pattern;

2> else (if the UE has no preference for the FR2 UL gap configuration):

3> do not include *ul-GapFR2-PatternPreference* in the *UL-GapFR2-Preference* IE.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide MUSIM assistance information according to 5.7.4.2 or 5.3.5.3:

2> if the UE has a preference for MUSIM periodic gap(s):

3> include *musim-GapPreferenceList* with an entry for each periodic gap the UE prefers to be configured;

4> set *musim-GapLength* and *musim-GapRepetitionAndOffset* in the *musim-GapInfo* IE to the values of the length and the repetition/offset of the gap(s), respectively, the UE prefers to be configured with;

2> if the UE has a preference for MUSIM aperiodic gap:

3> include the field *musim-GapPreferenceList*, with one entry for the aperiodic gap the UE prefers to be configured;

4> include *musim-GapLength* in the *musim-GapInfo* IE and set it to the values of the length of the gap the UE prefers to be configured with;

4> optionally include *musim-Starting-SFN-AndSubframe* in the *musim-GapInfo* IE and set it to the starting SFN/subframe of the gap the UE prefers to be configured with;

2> if the UE has no longer preference for the periodic/aperiodic gaps:

3> do not include *musim-GapPreferenceList* in the *musim-Assistance* IE;

2> if UE has a preference to leave RRC_CONNECTED state:

3> set *musim-PreferredRRC-State* to the preferred RRC state.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide the relaxation state of RLM measurements of a cell group according to 5.7.4.2:

2> if the UE performs RLM measurement relaxation on the cell group according to TS 38.133 [14]:

3> set the *rlm-MeasRelaxationState* to *true*;

2> else:

3> set the *rlm-MeasRelaxationState* to *false*;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide the relaxation state of BFD measurements of a cell group:

2> for each serving cell of the cell group:

3> if the UE performs BFD measurement relaxation on this serving cell according to TS 38.133 [14]:

4> set the n-th bit of *bfd-MeasRelaxationState* to '1', where n is equal to the *servCellIndex* value + 1 of the serving cell;

3> else:

4> set the n-th bit of *bfd-MeasRelaxationState* to '0', where n is equal to the *servCellIndex* value + 1 of the serving cell.

1> if transmission of the *UEAssistanceInformation* message is initiated to indicate availability of data mapped to radio bearers not configured for SDT according to 5.7.4.2:

2> include the *nonSDT-DataIndication* in the *UEAssistanceInformation* message;

2> include and set the *resumeCause* according to the information received from the upper layers, if provided.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication of preference for SCG deactivation according to 5.7.4.2:

2> include *scg-DeactivationPreference* in the *UEAssistanceInformation* message;

2> set the *scg-DeactivationPreference* to *scgDeactivationPreferred* if the UE prefers the SCG to be deactivated, otherwise set it to *noPreference*;

1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication that the UE has uplink data related to a deactivated SCG according to 5.7.4.2:

2> include *uplinkData* in the *UEAssistanceInformation* message.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide an indication about whether the criterion for RRM relaxation for connected mode is fulfilled or not fulfilled:

2> if the criterion for RRM measurement relaxation for connected mode is fulfilled:

3> set the *rrm-MeasRelaxationFulfilment* to *true*;

2> else:

3> set the *rrm-MeasRelaxationFulfilment* to *false*.

1> if transmission of the *UEAssistanceInformation* message is initiated to provide the service link propagation delay difference between serving cell and neighbour cell(s) according to 5.7.4.2;

2> include the *propagationDelayDifference* for each neighbour cell in the *neighCellInfoList*;

The UE shall set the contents of the *UEAssistanceInformation* message for configured grant assistance information for NR sidelink communication:

1> if configured to provide configured grant assistance information for NR sidelink communication:

2> include the *sl-UE-AssistanceInformationNR*;

NOTE 4: It is up to UE implementation when and how to trigger configured grant assistance information for NR sidelink communication.

The UE shall:

1> if the procedure was triggered to provide configured grant assistance information for NR sidelink communication by an NR *RRCReconfiguration* message that was embedded within an E-UTRA *RRCConnectionReconfiguration*:

2> submit the *UEAssistanceInformation* 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 if the procedure was triggered to provide UE preference for SCG deactivation or to indicate that the UE with a deactivate SCG has uplink data to send on a DRB for which there is no MCG RLC bearer:

2> submit the *UEAssistanceInformation* via SRB1 to lower layers for transmission;

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

2> if SRB3 is configured and the SCG is not deactivated:

3> submit the *UEAssistanceInformation* message via SRB3 to lower layers for transmission;

2> else:

3> submit the *UEAssistanceInformation* message via the E-UTRA MCG 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 UE assistance configuration that triggered this UE assistance information is associated with the SCG:

3> if SRB3 is configured and the SCG is not deactivated:

4> submit the *UEAssistanceInformation* message via SRB3 to lower layers for transmission;

3> else:

4> submit the *UEAssistanceInformation* message via the NR MCG embedded in NR RRC message *ULInformationTransferMRDC* as specified in 5.7.2a.3;

2> else:

3> submit the *UEAssistanceInformation* message via SRB1 to lower layers for transmission;

1> else:

2> submit the *UEAssistanceInformation* message to lower layers for transmission.

5.7.4.3a Setting the contents of *OverheatingAssistance* IE

The UE shall set the contents of *OverheatingAssistance* IE if initiated to provide overheating assistance indication for SCG in (NG)EN-DC according to clause 5.6.10.3 as specified in TS 36.331 [10]:

1> if the UE prefers to temporarily reduce the number of maximum secondary component carriers for SCG:

2> include *reducedMaxCCs* in the *OverheatingAssistance* IE;

2> set *reducedCCsDL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedCCsUL* to the number of maximum SCells of the SCG the UE prefers to be temporarily configured in uplink;

1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR1 for SCG:

2> include *reducedMaxBW-FR1* in the *OverheatingAssistance* IE;

2> set *reducedBW-FR1-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR1 of the SCG;

2> set *reducedBW-FR1-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR1 of the SCG;

1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-1 for SCG:

2> include *reducedMaxBW-FR2* in the *OverheatingAssistance* IE;

2> set *reducedBW-FR2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-1 of the SCG;

2> set *reducedBW-FR2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-1 of the SCG;

1> if the UE prefers to temporarily reduce maximum aggregated bandwidth of FR2-2 for SCG:

2> include *reducedMaxBW-FR2-2* in the *OverheatingAssistance* IE;

2> set *reducedBW-FR2-2-DL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all downlink carriers of FR2-2 of the SCG;

2> set *reducedBW-FR2-2-UL* to the maximum aggregated bandwidth the UE prefers to be temporarily configured across all uplink carriers of FR2-2 of the SCG;

1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1 for SCG:

2> include *reducedMaxMIMO-LayersFR1* in the *OverheatingAssistance* IE;

2> set *reducedMIMO-LayersFR1-DL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedMIMO-LayersFR1-UL* to the number of maximum MIMO layers of each serving cell operating on FR1 of the SCG the UE prefers to be temporarily configured in uplink;

1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-1 for SCG:

2> include *reducedMaxMIMO-LayersFR2* in the *OverheatingAssistance* IE;

2> set *reducedMIMO-LayersFR2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedMIMO-LayersFR2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-1 of the SCG the UE prefers to be temporarily configured in uplink;

1> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2-2 for SCG:

2> include *reducedMaxMIMO-LayersFR2-2* in the *OverheatingAssistance* IE;

2> set *reducedMIMO-LayersFR2-2-DL* to the number of maximum MIMO layers of each serving cell operating on FR2-2 of the SCG the UE prefers to be temporarily configured in downlink;

2> set *reducedMIMO-LayersFR2-2-UL* to the number of maximum MIMO layers of each serving cell operating on FR2-2 of the SCG the UE prefers to be temporarily configured in uplink;

5.7.4.4 Relaxed measurement criterion for a stationary RedCap UE

The relaxed measurement criterion for a stationary UE is met when:

- $(\text{SS-RSRP}_{\text{RefStationaryConnected}} - \text{SS-RSRP}) < S_{\text{SearchDeltaP-StationaryConnected}}$,

Where:

- SS-RSRP = current L3 RSRP measurement of the PCell based on SSB (dB).
- $\text{SS-RSRP}_{\text{RefStationaryConnected}}$ = reference SS-RSRP value of the PCell (dB), set as follows:
  - at the end of RRC reconfiguration procedure as specified in 5.3.5.3, when *rrm-MeasRelaxationReportingConfig* is included in the *RRCReconfiguration* message; or
  - after MAC successfully completes a Random Access procedure after applying a *reconfigurationWithSync* in *spCellConfig* while stationary criterion is configured; or
  - if $(\text{SS-RSRP} - \text{SS-RSRP}_{\text{RefStationaryConnected}}) > 0$; or
  - if the relaxed measurement criterion has not been met for $T_{\text{SearchDeltaP-StationaryConnected}}$:
    - UE shall set the value of $\text{SS-RSRP}_{\text{RefStationaryConnected}}$ to the current SS-RSRP value of the serving cell.

5.7.4a Void

5.7.5 Failure information

5.7.5.1 General

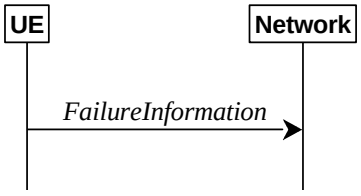

Figure 5.7.5.1-1: Failure information

The purpose of this procedure is to inform the network about a failure detected by the UE.

5.7.5.2 Initiation

A UE initiates the procedure when there is a need inform the network about a failure detected by the UE. In particular, the UE initiates the procedure when the following condition is met:

1> upon detecting failure for an RLC bearer, in accordance with 5.3.10.3;

1> upon detecting DAPS handover failure, in accordance with 5.3.5.8.3;

Upon initiating the procedure, the UE shall:

1> initiate transmission of the *FailureInformation* message as specified in 5.7.5.3;

5.7.5.3 Actions related to transmission of *FailureInformation* message

The UE shall:

1> if initiated to provide RLC failure information, set *FailureInfoRLC-Bearer* as follows:

2> set *logicalChannelIdentity* to the logical channel identity of the failing RLC bearer;

2> set *cellGroupId* to the cell group identity of the failing RLC bearer;

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

1> if initiated to provide DAPS failure information, set *FailureInfoDAPS* as follows:

2> set the *failureType* as *daps-failure*;

1> if used to inform the network about a failure for an MCG RLC bearer or DAPS failure information:

2> submit the *FailureInformation* message to lower layers for transmission via SRB1;

1> else if used to inform the network about a failure for an SCG RLC bearer:

2> if SRB3 is configured;

3> submit the *FailureInformation* message to lower layers for transmission via SRB3;

2> else;

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

4> submit the *FailureInformation* message via E-UTRA SRB1 embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10].

3> else if the UE is in NR-DC:

4> submit the *FailureInformation* message via SRB1 embedded in NR RRC message *ULInformationTransferMRDC* as specified in clause 5.7.2a.3.

5.7.6 DL message segment transfer

5.7.6.1 General

Figure 5.7.6.1-1: DL message segment transfer

The purpose of this procedure is to transfer segments of DL DCCH messages from the network to the UE.

NOTE: The segmentation of DL DCCH message is only applicable to *RRCReconfiguration* and *RRCResume* messages in this release.

5.7.6.2 Initiation

The network initiates the DL Dedicated Message Segment transfer procedure whenever the encoded RRC message PDU exceeds the maximum PDCP SDU size. The network initiates the DL Dedicated Message Segment transfer procedure by sending the *DLDedicatedMessageSegment* message.

5.7.6.3 Reception of *DLDedicatedMessageSegment* by the UE

Upon receiving *DLDedicatedMessageSegment* message, the UE shall:

1> store the segment included in *rrc-MessageSegmentContainer*;

1> if all segments of the message have been received:

2> assemble the message from the received segments and process the message according to 5.3.5.3 for the *RRCReconfiguration* message or 5.3.13.4 for the *RRCResume* message;

2> discard all segments.

5.7.7 UL message segment transfer

5.7.7.1 General

Figure 5.7.7.1-1: UL message segment transfer

The purpose of this procedure is to transfer segments of UL DCCH messages from UE to a NG-RAN in RRC_CONNECTED.

NOTE: The segmentation of UL DCCH message is only applicable to *UECapabilityInformation* and *MeasurementReportAppLayer* in this release.

5.7.7.2 Initiation

A UE capable of UL RRC message segmentation in RRC_CONNECTED will initiate the procedure when the following conditions are met:

1> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received, and

1> if the encoded RRC message is larger than the maximum supported size of a PDCP SDU specified in TS 38.323 [5];

Upon initiating the procedure, the UE shall:

1> initiate transmission of the *ULDedicatedMessageSegment* message as specified in 5.7.7.3;

5.7.7.3 Actions related to transmission of *ULDedicatedMessageSegment* message

The UE shall segment the encoded RRC PDU based on the maximum supported size of a PDCP SDU specified in TS 38.323 [5]. UE shall minimize the number of segments and set the contents of the *ULDedicatedMessageSegment* messages as follows:

1> For each new UL DCCH message, set the *segmentNumber* to 0 for the first message segment and increment the *segmentNumber* for each subsequent RRC message segment;

1> set *rrc-MessageSegmentContainer* to include the segment of the UL DCCH message corresponding to the *segmentNumber*;

1> if the segment included in the *rrc-MessageSegmentContainer* is the last segment of the UL DCCH message:

2> set the rrc-MessageSegmentType to lastSegment;

1> else:

2> set the *rrc-MessageSegmentType* to *notLastSegment*;

1> submit all the *ULDedicatedMessageSegment* messages generated for the segmented RRC message to lower layers for transmission in ascending order based on the *segmentNumber*, upon which the procedure ends.

5.7.8 Idle/inactive Measurements

5.7.8.1 General

This procedure specifies the measurements to be performed and stored by a UE in RRC_IDLE and RRC_INACTIVE when it has an idle/inactive measurement configuration.

5.7.8.1a Measurement configuration

The purpose of this procedure is to update the idle/inactive measurement configuration.

The UE initiates this procedure while T331 is running and SDT procedure is not ongoing and one of the following conditions is met:

1> upon selecting a cell when entering RRC_IDLE or RRC-INACTIVE from RRC_CONNECTED or RRC_INACTIVE; or

1> upon update of system information (*SIB4*, or *SIB11*), e.g. due to intra-RAT cell (re)selection;

While in RRC_IDLE or RRC_INACTIVE, and T331 is running, the UE shall:

1> if *VarMeasIdleConfig* includes neither a *measIdleCarrierListEUTRA* nor a *measIdleCarrierListNR* received from the *RRCRelease* message:

2> if the UE supports *idleInactiveEUTRA-MeasReport*:

3> if the SIB11 includes the *measIdleConfigSIB* and contains *measIdleCarrierListEUTRA*:

4> store or replace the *measIdleCarrierListEUTRA* of *measIdleConfigSIB* of SIB11 within *VarMeasIdleConfig*;

3> else:

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

2> if the UE supports *idleInactiveNR-MeasReport*:

3> if *SIB11* includes the *measIdleConfigSIB* and contains *measIdleCarrierListNR*:

4> store or replace the *measIdleCarrierListNR* of *measIdleConfigSIB* of *SIB11* within *VarMeasIdleConfig*;

3> else:

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

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

2> if there is an entry in *measIdleCarrierListNR* in *measIdleConfigSIB* of *SIB11* that has the same carrier frequency and subcarrier spacing as the entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* and that contains *ssb-MeasConfig*:

3> delete the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

3> store the SSB measurement configuration from *SIB11* into *nrofSS-BlocksToAverage*, *absThreshSS-BlocksConsolidation*, *smtc*, *ssb-ToMeasure*, *deriveSSB-IndexFromCell*, and *ss-RSSI-Measurement* within *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

2> else if there is an entry in *interFreqCarrierFreqList* of *SIB4* with the same carrier frequency and subcarrier spacing as the entry in *measIdleCarrierListNR* within *VarMeasIdleConfig*:

3> delete the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

3> store the SSB measurement configuration from *SIB4* into *nrofSS-BlocksToAverage*, *absThreshSS-BlocksConsolidation*, *smtc*, *ssb-ToMeasure*, *deriveSSB-IndexFromCell*, and *ss-RSSI-Measurement* within *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

2> else:

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

1> perform measurements according to 5.7.8.2a.

5.7.8.2 Void

5.7.8.2a Performing measurements

When performing measurements on NR carriers according to this clause, the UE shall derive the cell quality as specified in 5.5.3.3 and consider the beam quality to be the value of the measurement results of the concerned beam, where each result is averaged as described in TS 38.215 [9].

While in RRC_IDLE or RRC_INACTIVE, and T331 is running and SDT procedure is not ongoing, the UE shall:

1> perform the measurements in accordance with the following:

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListEUTRA* and the *SIB1* contains *idleModeMeasurementsEUTRA*:

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

4> if UE supports NE-DC between the serving carrier and the carrier frequency indicated by *carrierFreqEUTRA* within the corresponding entry:

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

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

6> consider RSRQ as the sorting quantity;

5> else:

6> consider RSRP as the sorting quantity;

5> if the *measCellListEUTRA* is included:

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

5> else:

6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;

5> for all cells applicable for idle/inactive measurement reporting, derive measurement results for the measurement quantities indicated by *reportQuantitiesEUTRA;*

5> store the derived measurement results as indicated by *reportQuantitiesEUTRA* within the *measReportIdleEUTRA* in *VarMeasIdleReport* in decreasing order of the sorting quantity, i.e. the best cell is included first, as follows:

6> if *qualityThresholdEUTRA* is configured:

7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThresholdEUTRA;*

6> else:

7> include the measurement results from all cells applicable for idle/inactive measurement reporting;

2> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and the SIB1 contains *idleModeMeasurementsNR*:

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

4> if UE supports carrier aggregation or NR-DC between serving carrier and the carrier frequency and subcarrier spacing indicated by *carrierFreq* and *ssbSubCarrierSpacing* within the corresponding entry:

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

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

6> consider RSRQ as the cell sorting quantity;

5> else:

6> consider RSRP as the cell sorting quantity;

5> if the *measCellListNR* is included:

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

5> else:

6> consider up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting;

5> for all cells applicable for idle/inactive measurement reporting, derive cell measurement results for the measurement quantities indicated by *reportQuantities;*

5> store the derived cell measurement results as indicated by *reportQuantities* for cells applicable for idle/inactive measurement reporting within *measResultsPerCarrierListIdleNR* in the *measReportIdleNR* in *VarMeasIdleReport* in decreasing order of the cell sorting quantity, i.e. the best cell is included first, as follows:

6> if *qualityThreshold* is configured:

7> include the measurement results from the cells applicable for idle/inactive measurement reporting whose RSRP/RSRQ measurement results are above the value(s) provided in *qualityThreshold;*

6> else:

7> include the measurement results from all cells applicable for idle/inactive measurement reporting;

5> if *beamMeasConfigIdle* is included in the associated entry in *measIdleCarrierListNR* and if UE supports *idleInactiveNR-MeasBeamReport* for the FR of the carrier frequency indicated by *carrierFreq* within the associated entry, for each cell in the measurement results:

6> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];

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

7> consider RSRQ as the beam sorting quantity;

6> else:

7> consider RSRP as the beam sorting quantity;

6> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:

7> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;

6> if the *includeBeamMeasurements* is set to *true*:

7> include the beam measurement results as indicated by *reportQuantityRS-Indexes*;

2> if, as a result of the procedure in this clause, the UE performs measurements in one or more carrier frequency indicated by *measIdleCarrierListNR* or *measIdleCarrierListEUTRA*:

3> store the cell measurement results for RSRP and RSRQ for the serving cell within *measResultServingCell* in the measReportIdleNR in *VarMeasIdleReport*.

3> if the *VarMeasIdleConfig* includes the *measIdleCarrierListNR* and it contains an entry with *carrierFreq* set to the value of the serving frequency:

4> if *beamMeasConfigIdle* is included in that entry, and if the UE supports *idleInactiveNR-MeasBeamReport* for the FR of the serving cell:

5> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in TS 38.215 [9];

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

6> consider RSRQ as the beam sorting quantity;

5> else:

6> consider RSRP as the beam sorting quantity;

5> set *resultsSSB-Indexes* to include up to *maxNrofRS-IndexesToReport* SS/PBCH block indexes in order of decreasing beam sorting quantity as follows:

6> include the index associated to the best beam for the sorting quantity and if *absThreshSS-BlocksConsolidation* is included in *SIB2* of serving cell, the remaining beams whose sorting quantity is above *absThreshSS-BlocksConsolidation*;

5> if the *includeBeamMeasurements* is set to true:

6> include the beam measurement results as indicated by *reportQuantityRS-Indexes*;

NOTE 1: How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 38.133 [14] are met for measurement reporting.

NOTE 2: The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier provided via dedicated signaling is different from the SSB configuration broadcasted in the serving cell, if any.

NOTE 3: How the UE prioritizes which frequencies to measure or report (in case it is configured with more frequencies than it can measure or report) is left to UE implementation.

NOTE 4: When *idleModeMeasVoiceFallback* is included in SIB5, UE may decide to measure and report idle/inactive measurements for EUTRA carrier frequencies included in SIB5 even if it does not support NE-DC between the serving carrier and the EUTRA carrier frequencies.

5.7.8.3 T331 expiry or stop

The UE shall:

1> if T331 expires or is stopped:

2> release the *VarMeasIdleConfig*.

NOTE: It is up to UE implementation whether to continue idle/inactive measurements according to SIB11 and SIB4 configurations or according to E-UTRA SIB5 and E-UTRA SIB24 configurations as specified in TS 36.331 [10] upon inter-RAT cell reselection to E-UTRA, after T331 has expired or stopped.

5.7.8.4 Cell re-selection or cell selection while T331 is running

The UE shall:

1> if intra-RAT cell selection or reselection occurs while T331 is running:

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

3> if the serving frequency does not match with the *carrierFreq* of an entry in the *validityAreaList*; or

3> if the serving frequency matches with the *carrierFreq* of an entry in the *validityAreaList*, the *validityCellList* is included in that entry, and the physical cell identity of the serving cell does not match with any entry in *validityCellList*:

4> stop timer T331;

4> perform the actions as specified in 5.7.8.3, upon which the procedure ends.

1> else if inter-RAT cell selection or reselection occurs while T331 is running:

2> stop timer T331;

2> perform the actions as specified in 5.7.8.3;

5.7.9 Mobility history information

5.7.9.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_IDLE, RRC_INACTIVE and RRC_CONNECTED.

5.7.9.2 Initiation

If the UE supports storage of mobility history information, the UE shall:

1> If the UE supports PSCell mobility history information and upon addition of a PSCell:

2> include an entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:

3> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:

4> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;

5> remove the oldest entry in the *visitedPSCellInfoListReport*;

3> else:

4> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;

2> for the included entry:

3> set the field *timeSpent* of the entry according to following:

4> if this is the first PSCell entry for the current PCell since entering the current PCell in RRC_CONNECTED:

5> include the entry as the time spent with no PSCell since entering the current PCell in RRC_CONNECTED;

4> else:

5> include the time spent with no PSCell since last PSCell release since entering the current PCell in RRC_CONNECTED;

1> If the UE supports PSCell mobility history information and upon change, or release of a PSCell while being connected to the current PCell:

2> include an entry in *visitedPSCellInfoList* of the variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:

3> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:

4> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;

5> remove the oldest entry in the *visitedPSCellInfoListReport*;

3> else:

4> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;

2> for the included entry:

3> if the global cell identity of the previous PSCell is available:

4> include the global cell identity of that cell in the field *visitedCellId* of the entry;

3> else:

4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;

3> set the field *timeSpent* of the entry as the time spent in the previous PSCell while being connected to the current PCell;

1> Upon change of suitable cell, consisting of PCell in RRC_CONNECTED (for NR or E-UTRA cell) or serving cell in RRC_INACTIVE (for NR cell) or in RRC_IDLE (for NR or E-UTRA cell), to another NR or E-UTRA cell, or when entering any cell selection' state from 'camped normally' state in NR or LTE or when entering 'any cell selection' state from a suitable cell in RRC_CONNECTED state in NR or LTE:

2> include an entry in *visitedCellInfoList* of the variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following*:*

3> if the global cell identity of the previous PCell/serving cell is available:

4> include the global cell identity of that cell in the field *visitedCellId* of the entry;

3> else:

4> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;

3> set the field *timeSpent* of the entry as the time spent in the previous PCell/serving cell;

3> if the UE supports PSCell mobility history information and if the UE continues to be connected to the same PSCell during the change of the PCell in RRC_CONNECTED; or

3> if the UE supports PSCell mobility history information and if the UE changes PSCell at the same time as the change of the PCell in RRC_CONNECTED; or

3> if the UE supports PSCell mobility history information and if the PSCell is released at the same time as the change of the PCell in RRC_CONNECTED:

4> include an entry in *visitedPSCellInfoList* of the variable *VarMobilityHistoryReport* possibly after performing the following, if necessary:

5> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:

6> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;

7> remove the oldest entry in the *visitedPSCellInfoListReport*;

5> else:

6> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;

4> for the included entry:

5> if the global cell identity of the PSCell (in case the UE continues to be connected to the same PSCell) or the previous PSCell (in case the UE changes PSCell, or in case PSCell is released) is available:

6> include the global cell identity of that cell in the field *visitedCellId* of the entry;

5> else:

6> include the physical cell identity and carrier frequency of that cell in the field *visitedCellId* of the entry;

5> set the field *timeSpent* of the entry as the time spent in the PSCell, while being connected to previous PCell;

3> if the UE supports PSCell mobility history information and if the UE was not configured with a PSCell at the time of change of PCell in RRC_CONNECTED:

4> include an entry in *visitedPSCellInfoList* after performing the following, if necessary;

5> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:

6> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;

7> remove the oldest entry in the *visitedPSCellInfoListReport*;

5> else:

6> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;

4> for the included entry:

5> set the field *timeSpent* of the entry as the time without PSCell according to the following:

6> if the UE experienced a PSCell release since entering the previous PCell in RRC_CONNECTED:

7> include the time spent with no PSCell since last PSCell release since entering the previous PCell in RRC_CONNECTED;

6> else:

7> include the time spent with no PSCell since entering the previous PCell in RRC_CONNECTED;

3> if the UE supports PSCell mobility history information and if *visitedPSCellInfoList* exists in *VarMobilityHistoryReport*:

4> include *visitedPSCellInfoList* in *VarMobilityHistoryReport* in the *visitedPSCellInfoListReport* within the entry of the *visitedCellInfoList* associated to the latest PCell entry;

4> remove *visitedPSCellInfoList* from the variable *VarMobilityHistoryReport*;

1> if the UE supports PSCell mobility history information and upon entering 'camped normally' state in NR (in RRC_IDLE or RRC_INACTIVE) or E-UTRA (in RRC_IDLE) while previously in RRC_CONNECTED state NR or LTE while not connected to a PSCell:

2> include an entry in *visitedPSCellInfoList* after performing the following, if necessary;

3> if *visitedPSCellInfoListReport* is available in the *visitedCellInfoList* in variable *VarMobilityHistoryReport*:

4> for the oldest PCell entry in *visitedCellInfoList* including *visitedPSCellInfoListReport*;

5> remove the oldest entry in the *visitedPSCellInfoListReport*;

3> else:

4> remove the oldest entry in *visitedPSCellInfoList* in variable *VarMobilityHistoryReport*;

2> for the included entry:

3> set the field *timeSpent* of the entry as the time without PSCell according to the following:

4> if the UE experienced a PSCell release since entering the current PCell in RRC_CONNECTED:

5> include the time spent with no PSCell since last PSCell release after entering the current PCell in RRC_CONNECTED;

4> else:

5> include the time spent with no PSCell since entering the current PCell in RRC_CONNECTED;

1> upon entering 'camped normally' state in NR (in RRC_IDLE or RRC_INACTIVE) or E-UTRA (in RRC_IDLE) while previously in 'any cell selection' state or 'camped on any cell' state in NR or LTE:

2> include an entry in variable *VarMobilityHistoryReport* possibly after removing the oldest entry, if necessary, according to following:

3> set the field *timeSpent* of the entry as the time spent in 'any cell selection' state and/or 'camped on any cell' state in NR or LTE.

5.7.10 UE Information

5.7.10.1 General

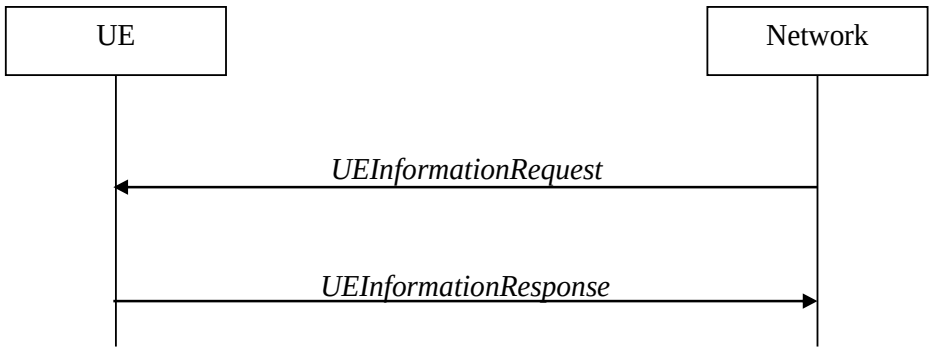

Figure 5.7.10.1-1: UE information procedure

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

5.7.10.2 Initiation

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

5.7.10.3 Reception of the *UEInformationRequest* message

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

1> if the *idleModeMeasurementReq* is included in the *UEInformationRequest* and the UE has stored *VarMeasIdleReport* that contains measurement information concerning cells other than the PCell:

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

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

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

1> if the *logMeasReportReq* is present and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*:

2> if *VarLogMeasReport* includes one or more logged measurement entries, set the contents of the *logMeasReport* in the *UEInformationResponse* message as follows:

3> include the *absoluteTimeStamp* and set it to the value of *absoluteTimeInfo* in the *VarLogMeasReport*;

3> include the *traceReference* and set it to the value of *traceReference* in the *VarLogMeasReport*;

3> include the *traceRecordingSessionRef* and set it to the value of *traceRecordingSessionRef* in the *VarLogMeasReport;*

3> include the *tce-Id* and set it to the value of *tce-Id* in the *VarLogMeasReport*;

3> include the *logMeasInfoList* and set it to include one or more entries from the *VarLogMeasReport* starting from the entries logged first, and for each entry of the *logMeasInfoList* that is included, include all information stored in the corresponding *logMeasInfoList* entry in *VarLogMeasReport*;

3> if the *VarLogMeasReport* includes one or more additional logged measurement entries that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:

4> include the *logMeasAvailable*;

4> if *bt-LocationInfo* is included in *locationInfo* of one or more of the additional logged measurement entries in *VarLogMeasReport* that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:

5> include the *logMeasAvailableBT*;

4> if *wlan-LocationInfo* is included in *locationInfo* of one or more of the additional logged measurement entries in *VarLogMeasReport* that are not included in the *logMeasInfoList* within the *UEInformationResponse* message:

5> include the *logMeasAvailableWLAN*;

1> if *ra-ReportReq* is set to *true* and the UE has random access related information available in *VarRA-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarRA-Report*:

2> set the *ra-ReportList* in the *UEInformationResponse* message to the value of *ra-ReportList* in *VarRA-Report*;

2> discard the *ra-ReportList* from *VarRA-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> if *rlf-ReportReq* is set to *true*:

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

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

3> set the *rlf-Report* in the *UEInformationResponse* message to the value of *rlf-Report* in *VarRLF-Report*;

3> discard the *rlf-Report* from *VarRLF-Report* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

2> else if the UE is capable of cross-RAT RLF reporting as defined in TS 38.306 [26] and has radio link failure information 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]:

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

3> set failedPCellId-EUTRA in the *rlf-Report* in the *UEInformationResponse* message to indicate the PCell in which RLF was detected or the source PCell of the failed handover in the *VarRLF-Report* of TS 36.331 [10];

3> set the *measResult-RLF-Report-EUTRA* in the *rlf-Report* in the *UEInformationResponse* message to the value of *rlf-Report* in *VarRLF-Report* of TS 36.331 [10];

3> discard the *rlf-Report* from *VarRLF-Report* of TS 36.331 [10] upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> if *connEstFailReportReq* is set to *true* and the UE has connection establishment failure or connection resume failure information 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*:

2> set *timeSinceFailure* in *VarConnEstFailReport* to the time that elapsed since the last connection establishment failure or connection resume failure in NR;

2> set the *connEstFailReport* in the *UEInformationResponse* message to the value of *connEstFailReport* in *VarConnEstFailReport*;

2> if the UE supports multiple CEF report:

3> for each *connEstFailReport* in the *connEstFailReportList* in *VarConnEstFailReportList*:

4> set *timeSinceFailure* to the time that elapsed since the associated connection establishment failure or connection resume failure in NR;

2> for each *connEstFailReport* in the *connEstFailReportList* in the *UEInformationResponse* message, set the value to the value of *connEstFailReport* in *VarConnEstFailReport* in *VarConnEstFailReportList*;

2> discard the *connEstFailReport* from *VarConnEstFailReport* and *VarConnEstFailReportList* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> if the *mobilityHistoryReportReq* is set to *true*:

2> include the *mobilityHistoryReport* and set it to include *visitedCellInfoList* from *VarMobilityHistoryReport*;

2> include in the *mobilityHistoryReport* an entry for the current PCell, possibly after removing the oldest entry if required, and set its fields as follows:

3> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PCell:

3> set field *timeSpent* to the time spent in the current PCell;

3> if the UE supports PSCell mobility history information and if *visitedPSCellInfoList* is present in *VarMobilityHistoryReport*:

4> for the newest entry of the PCell in the *mobilityHistoryReport*, include *visitedPSCellInfoList* from *VarMobilityHistoryReport*;

4> if the UE is configured with a PSCell:

5> for the newest entry of the PCell in the *mobilityHistoryReport*, include the current PSCell information in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:

6> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PSCell:

6> set field *timeSpent* to the time spent in the current PSCell while being connected to the current PCell;

4> else:

5> for the newest entry of the PCell in the *mobilityHistoryReport*, include a new entry in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:

6> set field *timeSpent* to the time spent without PSCell in the current PCell since last PSCell release since connected to the current PCell in RRC_CONNECTED;

3> else if the UE supports PSCell mobility history information:

4> if the UE is configured with a PSCell:

5> for the newest entry of the PCell in the *mobilityHistoryReport*, include the current PSCell information in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:

6> set *visitedCellId* to the global cell identity or the physical cell identity and carrier frequency of the current PSCell:

6> set field *timeSpent* to the time spent in the current PSCell while being connected to the current PCell;

4> else:

5> for the newest entry of the PCell in the *mobilityHistoryReport*, include a new entry in the *visitedPSCellInfoListReport*, possibly after removing the oldest PSCell entry of a PCell in the *mobilityHistoryReport*, if required, and set its fields as follows:

6> set field *timeSpent* to the time spent without PSCell in the current PCell since connected to the current PCell in RRC_CONNECTED;

1> if the *successHO-ReportReq* is set to *true* and if the UE has successful handover related information available in *VarSuccessHO-Report* and if the RPLMN is included in the *plmn-IdentityList* stored in *VarSuccessHO-Report*:

2> if the *successHO-Report* in the *VarSuccessHO-Report* concerns a DAPS handover and if a PDCP PDU has been received from the source cell of the concerned HO and a non-duplicated PDCP PDU has been received from the target cell of the concerned HO:

3> set *upInterruptionTimeAtHO* in *VarSuccessHO-Report* to include the time elapsed between the time of arrival of the last PDCP PDU received from the source cell of the concerned handover and the time of arrival of the first non-duplicate PDCP PDU received from the target cell of the concerned handover, as measured at the time of arrival of the first non-duplicate PDCP PDU received from the target cell;

2> set the *successHO-Report* in the *UEInformationResponse* message to the value of *successHO-Report* in the *VarSuccessHO-Report*, if available;

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

1> if the *coarseLocationRequest* is set to *true*:

2> include *coarseLocationInfo*, if available;

1> if the *logMeasReport* is included in the *UEInformationResponse*:

2> submit the *UEInformationResponse* message to lower layers for transmission via SRB2;

2> discard the logged measurement entries included in the *logMeasInfoList* from *VarLogMeasReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

1> else:

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

5.7.10.4 Actions upon successful completion of a random-access procedure or on completion of a request of on-demand system information

Upon successfully performing random-access procedure initialized with 4-step or 2-step RA type, or upon failed or successfully completed on-demand system information acquisition procedure in RRC_IDLE or RRC_INACTIVE state, the UE shall:

1> if the RPLMN or the PLMN selected by upper layers (see TS24.501 [23]) from the PLMN(s) included in the *plmn-IdentityList* in *SIB1* is not included in *plmn-IdentityList* stored in a non-empty *VarRA-Report*:

2> clear the information included in *VarRA-Report*;

1> if the number of *RA-Report* entries stored in the *ra-ReportList* in *VarRA-Report* is less than *maxRAReport*:

2> if the number of PLMN entries in *plmn-IdentityList* stored in *VarRA-Report* is less than *maxPLMN*; or

2> if the number of PLMN entries in *plmn-IdentityList* stored in *VarRA-Report* is equal to *maxPLMN* and the list of EPLMNs is subset of or equal to the *plmn-IdentityList* stored in *VarRA-Report*:

3> append the following contents associated to the successfully completed random-access procedure or the failed or successfully completed on-demand system information acquisition procedure as a new entry in the *VarRA-Report*:

4> if the list of EPLMNs has been stored by the UE:

5> set the *plmn-IdentityList* to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN) without exceeding the limit of *maxPLMN*;

4> else:

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

4> set the *cellId* to the global cell identity and the tracking area code, if available, otherwise to the physical cell identity and carrier frequency of the cell in which the corresponding random-access preamble was transmitted;

4> if the UE supports spCell ID indication:

5> if the corresponding random-access procedure was performed on an SCell of MCG:

6> set the *spCellId* to the global cell identity of the PCell;

5> if the corresponding random-access procedure was performed on an SCell of SCG:

6> set the *spCellId* to the global cell identity of the PSCell, if available, otherwise, set the *spCellId* to the global cell identity of the PCell;

5> if the corresponding random-access procedure was performed on PSCell:

6> if the *cellId* is not set to the global cell identity of the PSCell, set the *spCellId* to the global cell identity of the PCell;

4> set the *raPurpose* to include the purpose of triggering the random-access procedure;

4> set the *ra-InformationCommon* as specified in clause 5.7.10.5.

The UE may discard the random access report information, i.e. release the UE variable *VarRA-Report*, 48 hours after the last successful random access procedure or the failed or successfully completed on-demand system information acquisition procedure related information is added to the *VarRA-Report*.

NOTE 1: The UE does not log the RA information in the RA report if the triggering event of the random access is consistent UL LBT on SpCell as specified in TS 38.321 [6].

5.7.10.5 RA information determination

The UE shall set the content in *ra-InformationCommon* as follows:

1> set the *absoluteFrequencyPointA* to indicate the absolute frequency of the reference resource block associated to the random-access resources used in the random-access procedure;

1> set the *locationAndBandwidth* and *subcarrierSpacing* associated to the UL BWP of the random-access resources used in the random-access procedure;

1> if contention based random-access resources are used in the random-access procedure:

2> set the *msgA_RO-FrequencyStart* and *msgA-RO-FDM* and *msgA-SubcarrierSpacing* associated to the 2 step random- access resources if used in the random-access procedure;

2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:

3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;

2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:

3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

2> set the *msg1-FrequencyStart* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FrequencyStart* if it is included in the *ra-InformationCommon*;

2> set the *msg1-FDM* associated to the 4 step random-access resources if used in the random-access procedure, and if its value is different from the value of *msgA-RO-FDMCFRA* if it is included in the *ra-InformationCommon;*

2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available, and if its value is different from the value of *msgA-SubcarrierSpacing* if it is included in the *ra-InformationCommon*:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

2> else:

3> set the *msg1-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4-step random-access procedure, and if its value is different from the value of *msgA-SCS-From-prach-ConfigurationIndex* if it is included in the *ra-InformationCommon*;

1> if contention free random-access resources are used in the random-access procedure:

2> set the *msg1-FrequencyStartCFRA* and *msg1-FDMCFRA* associated to the 4 step random-access resources if used in the random-access procedure;

2> if *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure is available:

3> set the *msg1-SubcarrierSpacingCFRA* associated to the 4 step random-access resources used in the random-access procedure;

2> else:

3> set the *msg1-SCS-From-prach-ConfigurationIndexCFRA* to the subcarrier spacing as derived from the *prach-ConfigurationIndex* used in the 4 step random-access procedure;

2> set the *msgA-RO-FrequencyStartCFRA* and *msgA-RO-FDMCFRA* associated to the 2 step contention free random access resources if used in the random-access procedure;

2> set the *msgA-MCS*, the *nrofPRBs-PerMsgA-PO*, the *msgA-PUSCH-TimeDomainAllocation*, the *frequencyStartMsgA-PUSCH*, the *nrofMsgA-PO-FDM* associated to the 2 step random-access resources if used in the random-access procedure;

2> if *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure is available:

3> set the *msgA-SubcarrierSpacing* associated to the 2 step random-access resources used in the random-access procedure;

2> else if only 2 step random-access resources are available in the UL BWP used in the random-access procedure:

3> set the *msgA-SCS-From-prach-ConfigurationIndex* to the subcarrier spacing as derived from the *msgA-PRACH-ConfigurationIndex* used in the 2-step random-access procedure;

2> else:

3> set the *msg1-SubcarrierSpacing* associated to the 4 step random-access resources used in the random-access procedure;

1> if the random access procedure is initialized with *RA_TYPE* set to *2-stepRA* as described in TS 38.321 [3]:

2> set the *dlPathlossRSRP* to the measeured RSRP of the DL pathloss reference obtained at the time of *RA_Type* selection stage of the initialization of the RA procedure as captured in TS 38.321 [3];

2> if the configuration for the random access *msgA-TransMax* was configured in *RACH-ConfigDedicated* for this random access procedure, and *raPurpose* is set to *reconfigurationWithSync*:

3> set *msgA-TransMax* to the value of *msgA-TransMax* in *RACH-ConfigDedicated*;

2> else if *msgA-TransMax* was configured in *RACH-ConfigCommonTwoStepRA*:

3> set *msgA-TransMax* to the value of *msgA-TransMax* in *RACH-ConfigCommonTwoStepRA*;

2> set the *msgA-PUSCH-PayloadSize* to the size of the overall payload available in the UE buffer at the time of initiating the 2 step RA procedure;

1> if the purpose of the random access procedure is to request on-demand system information (i.e., if the *raPurpose* is set to *requestForOtherSI* or *msg3RequestForOtherSI*):

2> set the *intendedSIBs* to indicate the SIB(s) the UE wanted to receive as a result of the SI request;

2> set the *ssbsForSI-Acquisition* to indicate the SSB(s) used to receive the SI message;

2> if the on-demand system information acquisition was successful:

3> set the *onDemandSISuccess* to *true*;

1> set the parameters associated to the successive random-access attempts associated to the selected beam in the *perRAInfoList* as follows:

2> if the random-access resource used is associated to a SS/PBCH block, set the associated random-access parameters for the successive random-access attempts associated to the same SS/PBCH block for one or more random-access attempts as follows:

3> set the *ssb-Index* to include the SS/PBCH block index associated to the used random-access resource;

3> set the *numberOfPreamblesSentOnSSB* to indicate the number of successive random-access attempts associated to the SS/PBCH block;

3> for each random-access attempt performed on the random-access resource, include the following parameters in the chronological order of the random-access attempt:

4> if the random-access attempt is performed on the contention based random-access resource and if *raPurpose* is not equal to '*requestForOtherSI*', include *contentionDetected* as follows:

5> if contention resolution was not successful as specified in TS 38.321 [6] for the transmitted preamble:

6> set the *contentionDetected* to *true*;

5> else:

6> set the *contentionDetected* to *false*;

4> if the random access attempt is a 2-step random access attempt:

5> if fallback from 2-step random access to 4-step random access occurred during the random access attempt:

6> set *fallbackToFourStepRA* to *true*;

4> if the random-access attempt is performed on the contention based random-access resource; or

4> if the random-access attempt is performed on the contention free random-access resource and if the random-access procedure was initiated due to the PDCCH ordering:

5> if the random access attempt is a 4-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *rsrp-ThresholdSSB*; or

5> if the random access attempt is a 2-step random access attempt and the SS/PBCH block RSRP of the SS/PBCH block corresponding to the random-access resource used in the random-access attempt is above *msgA-RSRP-ThresholdSSB*:

6> set the *dlRSRPAboveThreshold* to *true*;

5> else:

6> set the *dlRSRPAboveThreshold* to *false*;

2> else if the random-access resource used is associated to a CSI-RS, set the associated random-access parameters for the successive random-access attempts associated to the same CSI-RS for one or more random-access attempts as follows:

3> set the *csi-RS-Index* to include the CSI-RS index associated to the used random-access resource;

3> set the *numberOfPreamblesSentOnCSI-RS* to indicate the number of successive random-access attempts associated to the CSI-RS.

NOTE 1: Void.

5.7.10.6 Actions for the successful handover report determination

The UE shall for the PCell:

1> if the ratio between the value of the elapsed time of the timer T304 and the configured value of the timer T304, included in the last applied *RRCReconfiguration* message including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304* if included in the *successHO-Config* received before executing the last reconfiguration with sync; or

1> if the ratio between the value of the elapsed time of the timer T310 and the configured value of the timer T310, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync; or

1> if the T312 associated to the measurement identity of the target cell was running at the time of initiating the execution of the reconfiguration with sync procedure and if the ratio between the value of the elapsed time of the timer T312 and the configured value of the timer T312, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312* included in the s*uccessHO-Config* if configured by the source PCell before executing the last reconfiguration with sync; or

1> if *sourceDAPS-FailureReporting* is included in the *successHO-Config* before executing the last reconfiguration with sync and is set to *true* and if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:

2> store the successful handover information in *VarSuccessHO-Report* and determine the content in *VarSuccessHO-Report* as follows:

3> clear the information included in *VarSuccessHO-Report*, if any;

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

3> set the *c-RNTI* to the C-RNTI assigned by the target PCell of the handover;

3> for the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:

4> set the *sourcePCellID* in *sourceCellInfo* to the global cell identity and tracking area code, if available, of the source PCell;

4> set the *sourceCellMeas* in *sourceCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the source PCell based on the available SSB and CSI-RS measurements collected up to the moment the UE sends *RRCReconfigurationComplete* message*;*

4> set the *rsIndexResults* in *sourceCellMeas* to include all the available SSB and CSI-RS measurement quantities of the source PCell collected up to the moment the UE sends *RRCReconfigurationComplete* message;

4> if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:

5> set the *rlf-InSourceDAPS* in *sourceCellInfo* to *true*;

3> for the target PCell indicated in the last applied *RRCReconfiguration* message including *reconfigurationWithSync*:

4> set the *targetPCellID* in *targetCellInfo* to the global cell identity and tracking area code, if available, of the target PCell;

4> set the *targetCellMeas* in *targetCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the target PCell based on the available SSB and CSI-RS measurements collected up to the moment the UE sends *RRCReconfigurationComplete* message;

4> set the *rsIndexResults* in *targetCellMeas* to include all the available SSB and CSI-RS measurement quantities of the target PCell collected up to the moment the UE sends *RRCReconfigurationComplete* message;

4> if the last applied *RRCReconfiguration* message including *reconfigurationWithSync* was included in the stored *condRRCReconfig*:

5> set the *timeSinceCHO-Reconfig* to the time elapsed between the initiation of the execution of conditional reconfiguration for the target PCell and the reception of the last *conditionalReconfiguration* including the *condRRCReconfig* of the target PCell in the source PCell;

3> if the ratio between the value of the elapsed time of the timer T304 and the configured value of the T304 timer, included in the last applied *RRCReconfiguration* message including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304* if included in the *successHO-Config* received before executing the last reconfiguration with sync:

4> set *t304-cause* in *shr-Cause* to *true*;

4> set the *ra-InformationCommon* to include the random-access related information associated to the random access procedure in the target PCell, as specified in clause 5.7.10.5;

3> if the ratio between the value of the elapsed time of the timer T310 and the configured value of the T310 timer, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync:

4> set *t310-cause* in *shr-Cause* to *true*;

3> if the T312 associated to the measurement identity of the target cell was running at the time of initiating the execution of the reconfiguration with sync procedure and if the ratio between the value of the elapsed time of the timer T312 and the configured value of the T312 timer, configured while the UE was connected to the source PCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312* included in the s*uccessHO-Config* if configured by the source PCell before executing the last reconfiguration with sync:

4> set *t312-cause* in *shr-Cause* to *true*;

3> if *sourceDAPS-FailureReporting* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync is set to *true*, and if the last executed handover was a DAPS handover and if an RLF occurred at the source PCell during the DAPS handover while T304 was running:

4> set *sourceDAPS-Failure* in *shr-Cause* to *true*;

3> for each of the *measObjectNR*, configured by the source PCell, in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:

4> if measurements are available for the *measObjectNR*:

5> if the SS/PBCH block-based measurement quantities are available:

6> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell or target PCell, ordered such that the cell with highest SS/PBCH block RSRP is listed first if SS/PBCH block RSRP measurement results are available, otherwise the cell with highest SS/PBCH block RSRQ is listed first if SS/PBCH block RSRQ measurement results are available, otherwise the cell with highest SS/PBCH block SINR is listed first, based on the available SS/PBCH block based measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;

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

NOTE 1: For the neighboring cells set included in *measResultListNR* in *measResultNeighCells* ordered based on the SS/PBCH block measurement quantities, the UE includes also the CSI-RS based measurement quantities, if available.

5> if the CSI-RS measurement quantities are available:

6> set the *measResultListNR* in *measResultNeighCells* to include all the available measurement quantities of the best measured cells, other than the source PCell and target PCell, ordered such that the cell with highest CSI-RS RSRP is listed first if CSI-RS RSRP measurement results are available, otherwise the cell with highest CSI-RS RSRQ is listed first if CSI-RS RSRQ measurement results are available, otherwise the cell with highest CSI-RS SINR is listed first, based on the available CSI-RS based measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;

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

NOTE 2: For the neighboring cells set ordered based on the CSI-RS measurement quantities, the UE includes measurements only for the cells not yet included in *measResultListNR* in *measResultNeighCells* to avoid overriding SS/PBCH block-based ordered measurements.

3> for each of the *measObjectEUTRA*, configured by the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:

4> if measurements are available for the *measObjectEUTRA*:

5> set the *measResultListEUTRA* in *measResultNeighCells* to include the best measured cells ordered such that the cell with highest RSRP is listed first if RSRP measurement results are available, otherwise the cell with highest RSRQ is listed first, based on measurements collected up to the moment the UE sends the *RRCReconfigurationComplete* message;

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

3> for each of the neighbour cells included in *measResultNeighCells*:

4> if the cell was a candidate target cell included in the *condRRCReconfig* within the *conditionalReconfiguration* configured by the source PCell, in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied:

5> set the *choCandidate* to *true* in *measResultNR*;

3> if available, set the *locationInfo* as in 5.3.3.7;

1> release *successHO-Config* configured by the source PCell and *thresholdPercentageT304* if configured by the target PCell.

The UE may discard the successful handover information, i.e., release the UE variable *VarSuccessHO-Report*, 48 hours after the last successful handover information is added to the *VarSuccessHO-Report*.

5.7.11 Void

5.7.12 IAB Other Information

5.7.12.1 General

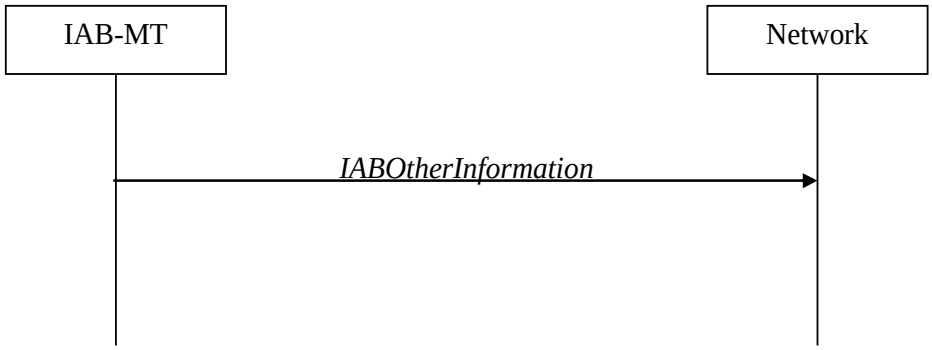

Figure 5.7.12.1-1: IAB Other Information procedure

The IAB Other Information procedure is used by IAB-MT to request the IAB-donor-CU to allocate IP address or inform the IAB-donor-CU of the IP address for the collocated IAB-DU.

5.7.12.2 Initiation

Upon initiation of the procedure, the IAB-MT shall:

1> initiate transmission of the *IABOtherInformation* message in accordance with 5.7.12.3;

5.7.12.3 Actions related to transmission of *IABOtherInformation* message

The IAB-MT shall set the contents of *IABOtherInformation* message as follows:

1> if the procedure is used to request IP addresses:

2> if IPv4 addresses are requested:

3> set the *iab-IPv4-AddressNumReq* to the number of IPv4 addresses requested per specific usage;

2> if IPv6 addresses or IPv6 address prefixes are requested:

3> if IPv6 addresses are requested:

4> set the *iab-IPv6-AddressNumReq* to the number of IPv6 addresses requested per specific usage;

3> else if IPv6 address prefixes are requested:

4> set the *iab-IPv6-AddressPrefixReq* to *true* per specific usage;

1> if the procedure is used to report IP addresses:

2> if IPv4 addresses are reported:

3> include *iPv4-Address* in *iab-IPv4-AddressReport*, and for each IP address included:

4> if IPv4 addresses are used for F1-C traffic:

5> include these addresses in *f1-C-Traffic-IP-Address*.

4> if IPv4 addresses are used for F1-U traffic:

5> include these addresses in *f1-U-Traffic-IP-Address*.

4> if IPv4 address are used for non-F1 traffic:

5> include these addresses in *non-f1-Traffic-IP-Address*.

4> if IPv4 addresses are used for all traffic:

5> include these addresses in *all-Traffic-IAB-IP-Address*.

2> if IPv6 addresses or IPv6 address prefixes are reported:

3> if IPv6 addresses are reported:

4> include *iPv6-Address* in *iab-IPv6-AddressReport*, and for each IP address included;

5> if IPv6 addresses are used for F1-C traffic:

6> include these addresses in *f1-C-Traffic-IP-Address*.

5> if IPv6 addresses are used for F1-U traffic:

6> include these addresses in *f1-U-Traffic-IP-Address*.

5> if IPv6 addresses are used for non-F1 traffic:

6> include these addresses in *non-f1-Traffic-IP-Address*.

5> if IPv6 addresses are used for all traffic:

6> include these addresses in *all-Traffic-IAB-IP-Address*.

3> else if IPv6 address prefixes are reported:

4> include these *iPv6-Prefix* in *iab-IPv6-PrefixReport*, and for each IP address prefix included;

5> if this IPv6 address prefix is used for F1-C traffic:

6> include this prefix in *f1-C-Traffic-IP-Address*.

5> if this IPv6 address prefix is used for F1-U traffic:

6> include this prefix in *f1-U-Traffic-IP-Address*.

5> if this IPv6 address prefix is used for non-F1 traffic:

6> include this prefix in *non-f1-Traffic-IP-Address*.

5> if this IPv6 address prefix is used for all traffic:

6> include this prefix in *all-Traffic-IAB-IP-Address*.

1> if the IAB-MT is in (NG)EN-DC, or

1> if the IAB-MT is in NR-DC and the IAB Other Information procedure is towards the IAB-donor-CU in the SN:

2> if SRB3 is configured:

3> submit the *IABOtherInformation* message via SRB3 to lower layers for transmission;

2> else if the IAB-MT is in (NG)EN-DC:

3> submit the *IABOtherInformation* message via the E-UTRA MCG embedded in E-UTRA RRC message *ULInformationTransferMRDC* as specified in TS 36.331 [10];

2> else:

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

1> else:

2> submit the *IABOtherInformation* message to lower layers for transmission.

5.7.13 RLM/BFD relaxation

In case both low mobility criterion and good serving cell criterion are configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when both relaxed measurement criterion for low mobility and relaxed measurement criterion for good serving cell quality are met.

In case only the good serving cell quality criterion is configured for RLM/BFD relaxation, the UE is allowed to perform RLM and/or BFD relaxation according to requirements specified in TS 38.133 [14] when the relaxed measurement criterion for good serving cell quality is met.

5.7.13.1 Relaxed measurement criterion for low mobility

The relaxed measurement criterion for UE with low mobility in RRC_CONNECTED is fulfilled when:

- $(\text{SS-RSRP}_{\text{Ref}} - \text{SS-RSRP}) < S_{\text{SearchDeltaP-Connected}}$,

Where:

- SS-RSRP = current L3 RSRP measurement of the SpCell based on SSB (dB).
- $\text{SS-RSRP}_{\text{Ref}}$ = reference L3 RSRP measurement of the SpCell based on SSB (dB), set as follows:
  - After receiving low mobility criterion configuration, or
  - After MAC of the CG successfully completes a Random Access procedure after applying a *reconfigurationWithSync* in *spCellConfig* of the CG while low mobility criterion is configured, or
  - If $(\text{SS-RSRP} - \text{SS-RSRP}_{\text{Ref}}) > 0$, or
  - If the relaxed measurement criterion has not been met for $T_{\text{SearchDeltaP-Connected}}$:
    - The UE shall set the value of $\text{SS-RSRP}_{\text{Ref}}$ to the current SS-RSRP value of the SpCell.

5.7.13.2 Relaxed measurement criterion for good serving cell quality

The relaxed measurement criterion of good serving cell quality for RLM is fulfilled when the downlink radio link quality on the configured RLM-RS resource is evaluated to be better than the threshold Q_{in}+XdB, wherein

- Q_{in} is specified in clause 8.1 of TS 38.133 [14].
- X is the parameter *offset* in *goodServingCellEvaluationRLM* for the evaluated serving cell.

The relaxed measurement criterion of good serving cell quality for BFD is fulfilled when the downlink radio link quality on the configured BFD-RS resource is evaluated to be better than the threshold Q_{in}+XdB, wherein

- Q_{in} is specified in clause 8.1 of TS 38.133 [14].
- X is the parameter *offset* in *goodServingCellEvaluationBFD* for the evaluated serving cell.

5.7.14 UE Positioning Assistance Information

5.7.14.1 General

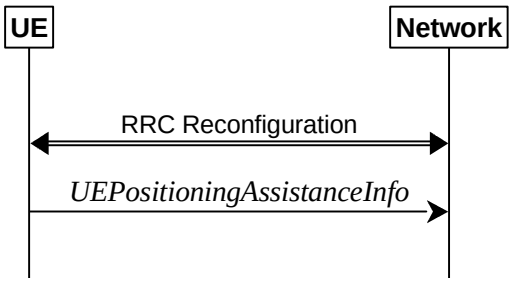

Figure 5.7.14.1-1: UE Positioning Assistance Information procedure

The UE Positioning Assistance Information procedure is used by UE to report the UE Positioning Assistance Information. The UE reports the association between SRS resources for positioning and the UE Tx TEG ID as defined in TS 38.305 [73].

5.7.14.2 Initiation

A UE capable of providing the association between SRS resource for positioning and UE Tx TEG ID in RRC_CONNECTED may initiate the procedure upon being configured to provide this association information.

Upon initiation of the procedure, the UE shall:

1> initiate transmission of the *UEPositioningAssistanceInfo* message in accordance with 5.7.14.3 to provide the association.

5.7.14.3 Actions related to transmission of *UEPositioningAssistanceInfo* message

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

1> if *ue-TxTEG-RequestUL-TDOA-Config* in *RRCReconfiguration* message is configured with *periodicReporting*:

2> for all the association changes store *ue-TxTEG-Association* corresponding to each *ue-TxTEG-ID* with *nr-TimeStamp*;

2> include the results in *ue-TxTEG-AssociationList* in the *UEPositioningAssistanceInfo* message on expiry of each configured period;

2> optionally include one *ue-TxTEG-TimingErrorMarginValue* for each *UEPositioningAssistanceInfo* message;

1> else if *ue-TxTEG-RequestUL-TDOA-Config* in *RRCReconfiguration* message is configured with *oneShot*:

2> identify the *ue-TxTEG-Association* corresponding to each *ue-TxTEG-ID* with *nr-TimeStamp*;

2> include the results in *ue-TxTEG-AssociationList* in the *UEPositioningAssistanceInfo* message only one time;

2> optionally include one *ue-TxTEG-TimingErrorMarginValue* for each *UEPositioningAssistanceInfo* message.

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

5.7.15 Void

5.7.16 Application layer measurement reporting

5.7.16.1 General

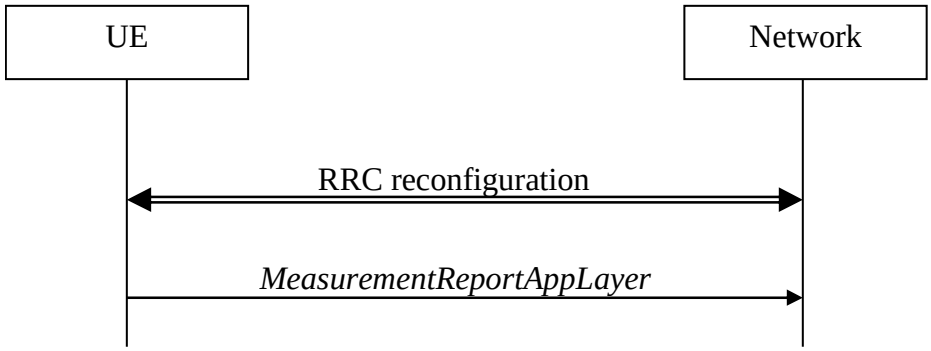

Figure 5.7.16.1-1: Application layer measurement reporting

The purpose of this procedure is to send application layer measurement reports to the network.

5.7.16.2 Initiation

A UE capable of application layer measurement reporting in RRC_CONNECTED may initiate the procedure when configured with application layer measurement, i.e. when *appLayerMeasConfig* and SRB4 have been configured by the network.

Upon initiating the procedure, the UE shall:

1> for each *measConfigAppLayerId* received from upper layers:

2> if the UE AS has received application layer measurement report container from upper layers which has not been transmitted; and

2> if the application layer measurement reporting has not been suspended for the *measConfigAppLayerId* associated with the application layer measurement report container according to clause 5.3.5.13d:

3> set the *measReportAppLayerContainer* in the *MeasurementReportAppLayer* message to the received value in the application layer measurement report container;

2> set the *measConfigAppLayerId* in the *MeasurementReportAppLayer* message to the value of the *measConfigAppLayerId* received together with application layer measurement report information;

2> if session start or stop information has been received from upper layers for the *measConfigAppLayerId*:

3> set the *appLayerSessionStatus* in the *MeasurementReportAppLayer* message to the received value of session start or stop information;

2> if RAN visible application layer measurement report has been received from upper layers:

3> for each *appLayerBufferLevel* value in the received RAN visible application layer measurement report:

4> set the *appLayerBufferLevel* values in the *appLayerBufferLevelList* in the *MeasurementReportAppLayer* message to the buffer level values received from the upper layer in the order with the first *appLayerBufferLevel* value set to the newest received buffer level value, the second *appLayerBufferLevel* value set to the second newest received buffer level value, and so on until all the buffer level values received from the upper layer have been assigned or the maximum number of values have been set according to *appLayerBufferLevel*, if configured;

3> set the *playoutDelayForMediaStartup* in the *MeasurementReportAppLayer* message to the received value of playout delay for media startup in the RAN visible application layer measurement report, if any;

3> for each PDU session ID value indicated in the received RAN visible application layer measurement report, if any:

4> set the *PDU-SessionID* field in the *pdu-SessionIdList* in the *MeasurementReportAppLayer* message to the indicated PDU session ID value;

1> if the encoded RRC message is larger than the maximum supported size of one PDCP SDU specified in TS 38.323 [5]:

2> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received in *appLayerMeasConfig*:

3> initiate the UL message segment transfer procedure as specified in clause 5.7.7;

2> else:

3> discard the RRC message;

1> else:

2> submit the *MeasurementReportAppLayer* message to lower layers for transmission upon which the procedure ends.

5.7.17 Derivation of pathloss reference for TA validation of SRS for Positioning transmission and CG-SDT in RRC_INACTIVE

Upon request from lower layer for pathloss reference derivation for TA validation for SRS for Positioning transmission or CG-SDT in RRC_INACTIVE, the UE shall:

1> acquire *SIB2*, if stored version is invalid;

1> if *nrofSS-BlocksToAverage* or *absThreshSS-BlocksConsolidation* is not present or if a*bsThreshSS-BlocksConsolidation* is present and the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*:

2> derive the downlink pathloss reference RSRP for TA validation as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [24];

1> else:

2> derive the downlink pathloss reference RSRP for TA validation as the linear average of the power values of up to *nrofSS-BlocksToAverage* of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation*, where each beam measurement quantity is described in TS 38.215 [24].

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 applied 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] or TS 24.554 [72], 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].

NOTE 5: The selection of NULL algorithms means that the PC5 messages are considered protected for the purposes of being allowed to be sent or received.

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 TS 24.554 [72] 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

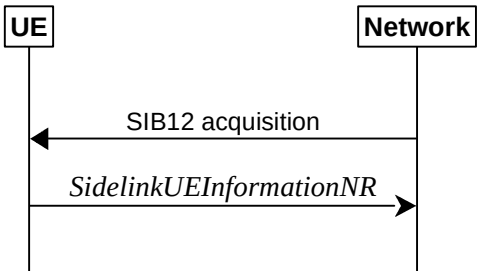

Figure 5.8.3.1-1: Sidelink UE information for NR sidelink communication/discovery

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, when the UE is configured with *sl-ScheduledConfig*,
- is reporting, for NR sidelink groupcast or broadcast reception, the Destination Layer-2 ID and QoS profile(s) associated with its interested services to which sidelink DRX is applied,
- is reporting DRX configuration reject information from its associated peer UE for NR sidelink unicast transmission, when the UE is configured with *sl-ScheduledConfig*,
- 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 profile(s), 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 configured with *sl-ScheduledConfig* and is performing sidelink unicast transmission 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 configured with *sl-ScheduledConfig* and is performing sidelink groupcast transmission may initiate the procedure to report the sidelink DRX on/off indication for the associated Destination Layer-2 ID.

A 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(s) associated with its interested service(s) 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;

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 non-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 non-relay 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*; or

4> if the UE is selecting a U2N Relay UE / has a selected U2N Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommon*:

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 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-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/ configured with measurement object associated to L2 U2N Relay UEs, 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 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-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; or

3> if configured by upper layers not to transmit either NR sidelink L2 U2N relay communication or NR sidelink L3 U2N relay communication, and if the last transmission of the *SidelinkUEInformationNR* message includes both *sl-TxResourceReqL2U2N-Relay* and *sl-TxResourceReqL3U2N-Relay*:

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

3> if the UE received a sidelink DRX configuration in the *RRCReconfigurationSidelink* message for NR sidelink unicast reception from the associated peer UE and the UE accepted the sidelink DRX configuration:

4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or

4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or

4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxDRX-ReportList*; or if the information carried by *sl-RxDRX-ReportList* has changed since the last transmission of the *SidelinkUEInformationNR* message:

5> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX configuration in accordance with 5.8.3.3;

3> else:

4> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxDRX-ReportList*:

5> initiate transmission of the *SidelinkUEInformationNR* message to indicate the sidelink DRX configuration is no longer used in accordance with 5.8.3.3;

3> if the UE is performing NR sidelink groupcast or broadcast reception and is interested in a service that sidelink DRX is applied:

4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or

4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or

4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-RxInterestedGC-BC-DestList*; or if the information carried by *sl-RxInterestedGC-BC-DestList* has changed since the last transmission of the *SidelinkUEInformationNR* message:

5> initiate transmission of the *SidelinkUEInformationNR* message to report the Destination Layer-2 ID and QoS profile(s) associated with the service(s) in accordance with 5.8.3.3;

3> else:

4> if the last transmission of the *SidelinkUEInformationNR* message included *sl-RxInterestedGC-BC-DestList*:

5> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in the service that sidelink DRX is applied 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 and *if sl-DRX-ConfigCommonGC-BC* is included in *SIB12-IEs* and if the UE is configured with *sl-ScheduledConfig*:

3> if the UE received a sidelink DRX assistance information or a sidelink DRX configuration reject information from the associated peer UE for NR sidelink unicast transmission:

4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or

4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or

4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-DRX-InfoFromRxList* or *sl-FailureList*; or if the information carried by *sl-DRX-InfoFromRxList* or *sl-FailureList* has changed since the last transmission of the *SidelinkUEInformationNR* message:

5> initiate transmission of the *SidelinkUEInformationNR* message to report the sidelink DRX assistance information or the sidelink DRX configuration reject information in accordance with 5.8.3.3;

NOTE: After including the SL-DRX reject information in *sl-FailureList* in the last transmission of the *SidelinkUEInformationNR* message, it is up to UE implementation to consider another sidelink DRX rejection of a new SL DRX configuration from the same associated peer UE as "change" of *sl-FailureList.*

3> if the UE is performing NR sidelink groupcast transmission:

4> if the UE did not transmit a *SidelinkUEInformationNR* message since last entering RRC_CONNECTED state; or

4> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell not providing *SIB12* including *sl-DRX-ConfigCommonGC-BC*; or

4> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-DRX-Indication*; or if the information carried by *sl-DRX-Indication* has changed since the last transmission of the *SidelinkUEInformationNR* message:

5> initiate transmission of the *SidelinkUEInformationNR* message to report sidelink DRX on/off indication for the corresponding destination 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

1> if the UE initiates the procedure 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

1> if the UE initiates the procedure to report to the network the sidelink DRX configuration for NR sidelink unicast reception; or

1> if the UE initiates the procedure to report to the network the sidelink DRX assistance information or the sidelink DRX configuration reject information for NR sidelink unicast transmission; or

1> if the UE initiates the procedure to report to the network the Destination Layer-2 ID and QoS profile(s) associated with its interested service(s) that sidelink DRX is applied for NR sidelink groupcast or broadcast reception; or

1> if the UE initiates the procedure to report to the network the Destination Layer-2 ID and the sidelink DRX on/off indication for the corresponding destination for NR sidelink groupcast transmission; or

1> if the UE initiates the procedure to indicate it is (no more) interested to receive NR sidelink discovery messages; or

1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink discovery messages transmission resources; or

1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink U2N relay communication transmission resources or report other parameters related to U2N relay operation (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 and/or to transmit NR sidelink relay 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 configuration by *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* includes *sl-NonRelayDiscovery* and if configured by upper layers to receive NR sidelink non-relay discovery messages, or if *SIB12* includes *sl-L2U2N-Relay* and if configured by upper layers to receive NR sidelink L2 U2N relay discovery messages, or if *SIB12* includes *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;

3> if *SIB12* includes *sl-L2U2N-Relay* and the UE is capable of L2 U2N remote UE:

4> 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* includes *sl-NonRelayDiscovery* and if configured by upper layers to transmit NR sidelink non-relay discovery messages, or if *SIB12* includes *sl-L2U2N-Relay* and if configured by upper layers to transmit NR sidelink L2 U2N relay discovery messages, or if *SIB12* includes *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 discovery messages 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 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* includes *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 transiting to RRC_CONNECTED or in RRC_CONNECTED state;

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* includes *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* includes *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 configuration by *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-ConfigCommonGC-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;

5> include *sl-RxInterestedGC-BC-DestList* and set its fields (if needed) as follows for each Destination Layer-2 ID for which it reports to network:

6> set *sl-RxInterestedQoS-InfoList* to include the QoS profile of its interested service(s) that sidelink DRX is applied for the associated destination for NR sidelink groupcast or broadcast reception;

NOTE 1: It is up to UE implementation to set the QoS profile in *sl-RxInterestedQoS-InfoList* for reception of NR sidelink discovery message or ProSe Direct Link Establishment Request message as described in TS 24.554 [72], or for reception of Direct Link Establishment Request message as described in TS 24.587 [57].

6> set *sl-DestinationIdentity* to the associated destination identity configured by upper layer for NR sidelink groupcast or broadcast reception;

4> if configured by upper layers to perform NR sidelink transmission and configured with *sl-ScheduledConfig*:

5> include *sl-TxResourceReqList* and/or *sl-TxResourceReqListCommRelay* and/or *sl-FailureList* and set its fields (if needed) as follows for each destination for which it reports to network:

6> set *sl-DRX-InfoFromRxList* to include the sidelink DRX assistance information of the associated destination, if any, received from the associated peer UE;

6> if the *RRCReconfigurationCompleteSidelink* message includes the *sl-DRX-ConfigReject*:

7> set *sl-Failure* as *drxReject-v1710* for the associated destination for the NR sidelink communication transmission;

6> set *sl-DRX-Indication* to include the sidelink DRX on/off indication for the associated destination for NR sidelink groupcast transmission;

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.

NOTE 2: When multiple lists are reported in *SidelinkUEInformationNR*, a UE can report up to *maxNrofSL-Dest-r16* SL destinations in *sl-TxResourceReqList*, *sl-TxResourceReqListDisc* and *sl-TxResourceReqListCommRela*y in total.

5.8.4 Void

5.8.5 Sidelink synchronisation information transmission for NR sidelink communication/discovery

5.8.5.1 General

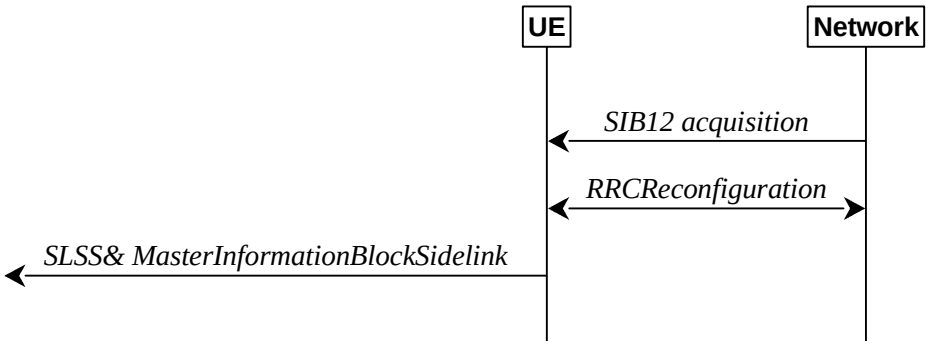

Figure 5.8.5.1-1: Synchronisation information transmission for NR sidelink communication/discovery, in (partial) coverage

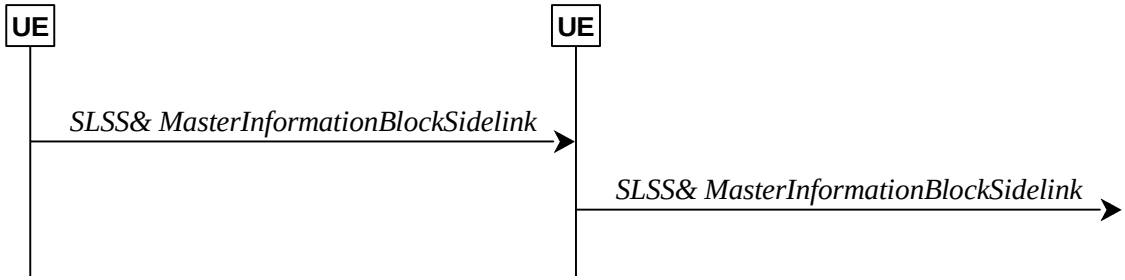

Figure 5.8.5.1-2: Synchronisation information transmission for NR sidelink communication/discovery, out of coverage

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 included in *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 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;

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 included in *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*, which is 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

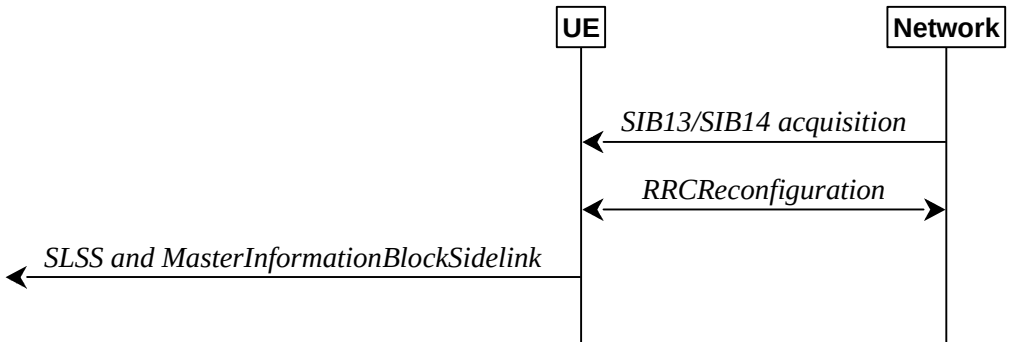

Figure 5.8.5a.1-1: Synchronisation information transmission for V2X sidelink communication, in (partial) coverage

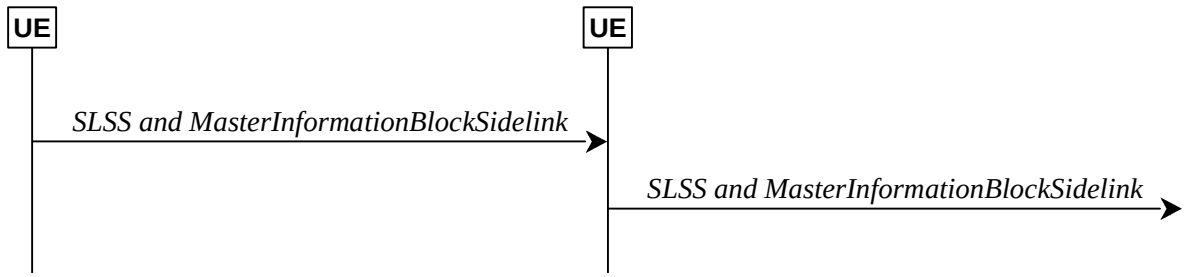

Figure 5.8.5a.1-2: Synchronisation information transmission for V2X sidelink communication, out of coverage

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 included in *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:

NOTE 1: When an out of coverage L2 U2N Remote UE receives SIB12 with *sl-SyncPriority* set to *gnbEnb*, the L2 U2N Remote UE continues using the current synchronization source until higher priority synchronization source is found or the current synchronization source becomes unreliable.

1> else if the frequency used for NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *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* in *SL-SyncConfig*, 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 2: 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(s) 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(s) 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(s) of resources that were preconfigured by *sl-RxPool* in *SL-PreconfigurationNR*, as defined 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 included in *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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-TxPoolSelectedNormal* is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:

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-TxPoolSelectedNormal* 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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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 the pool 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 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* 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.

NOTE 4: In case that the network does not provide resource pools in *SIB12*, a UE which is out of coverage, will be unable to obtain sidelink resources to send the first UL RRC message.

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

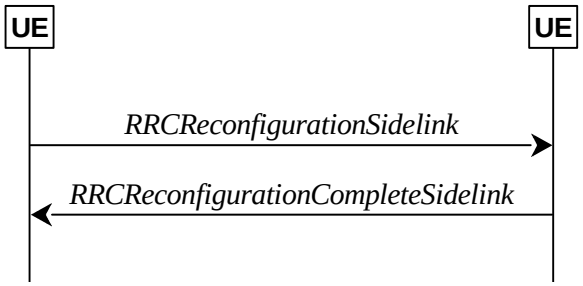

Figure 5.8.9.1.1-1: Sidelink RRC reconfiguration, successful

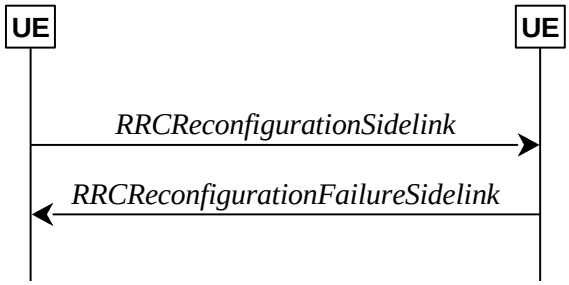

Figure 5.8.9.1.1-2: Sidelink RRC reconfiguration, failure

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 entry 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> if a sidelink DRB is to be established:

3> assign a new logical channel identity for the logical channel to be associated with the sidelink DRB and set *sl-MAC-LogicalChannelConfigPC5* in the *SLRB-Config* to include the new logical channel identity;

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*;

1> set the *sl-ResetConfig*;

NOTE 1: Whether/how to set the parameters included in *sl-LatencyBoundIUC-Report*, *sl-CSI-RS-Config*, *sl-LatencyBoundCSI-Report* and *sl-ResetConfig* 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> if a PC5 Relay RLC channel is to be established:

3> assign a new logical channel identity for the logical channel to be associated with the PC5 Relay RLC channel and set *sl-MAC-LogicalChannelConfigPC5* in the *SL-RLC-ChannelConfigPC5* to include the new logical channel identity;

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, including setting *sl-RLC-ChannelID-PC5* to the same value of *sl-RLC-ChannelID* received in *SL-RLC-ChannelConfig*;

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 entry 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 Relay 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;

4> consider no sidelink DRX to be applied for the corresponding sidelink unicast communication;

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 implementation 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 is included 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 *SIB12* 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 is included 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 is to 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 if this procedure was due to the reception of a *RRCReconfigurationCompleteSidelink* message:

3> configure the MAC entity with a logical channel associated with the sidelink DRB, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR;*

2> else (i.e. for groupcast/broadcast):

3> configure the MAC entity with a logical channel associated with the sidelink DRB, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* and assign a new LCID to this logical channel.

NOTE 1: When a sidelink DRB addition is due to the configuration by *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.

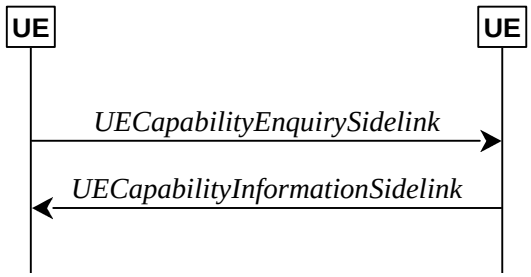

Figure 5.8.9.2.1-1: Sidelink UE capability transfer

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 for the destination:

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

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]. 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 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;

5.8.9.6 Sidelink UE assistance information

5.8.9.6.1 General

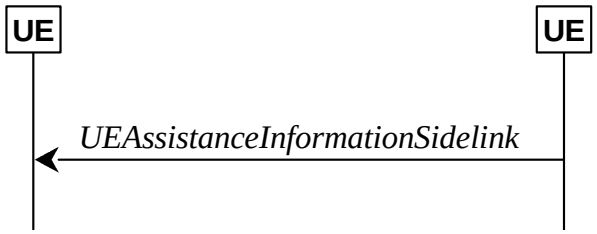

Figure 5.8.9.6.1-1: Sidelink UE assistance information

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* 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*;

1> if the PC5 Relay RLC channel release was triggered for a specific destination by upper layers as specified in 5.8.9.5 or due to sidelink RLF as specified in 5.8.9.3:

2> release the RLC entity and the corresponding logical channel associated with the *SL-RLC-ChannelID* 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> establish a SRAP entity as specified in TS 38.351 [66], if no SRAP entity has been established;

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 defined 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 triggered 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

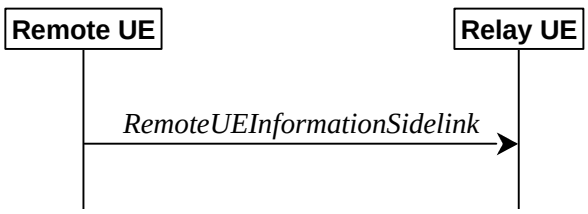

Figure 5.8.9.8.1-1: Remote UE information

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 SIB request information to provide (e.g. 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):

2> include *sl-RequestedSIB-List* in the *RemoteUEInformationSidelink* to indicate the requested SIB(s);

1> if the UE has paging related information to provide (e.g. 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> 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> if T301 is not running, 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> indicate upper layers to trigger PC5 unicast link release;

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 1: 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.

NOTE 2: The L2 U2N Remote UE may ignore the *NotificationMessageSidelink* if it does not release the PC5 unicast link in source side yet during an indirect-to-direct path switch, i.e. T304 is running.

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 PSSCH 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 PSSCH 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 *VarMeasReportListSL* 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:

$$x_1 = \text{Floor}\ (x / L)\ \text{Mod}\ 64;$$

$$y_1 = \text{Floor}\ (y / L)\ \text{Mod}\ 64;$$

$$\text{Zone\_id} = y_1 * 64 + x_1.$$

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:

$$DFN = \text{Floor}\ (0.1*(Tcurrent - Tref - OffsetDFN))\ \text{mod}\ 1024$$

$$SubframeNumber = \text{Floor}\ (Tcurrent - Tref - OffsetDFN)\ \text{mod}\ 10$$

$$SlotNumber = \text{Floor}((Tcurrent - Tref - OffsetDFN)*2^{\mu}) \bmod (10*2^{\mu})$$

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 included in *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 discovery reception 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 discovery reception 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*, as defined 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*, as defined in clause 9.3;

NOTE: If *sl-DiscRxPool* and *sl-RxPool* are both included 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; or if the frequency used for NR sidelink discovery is included in *sl-FreqInfoList* within *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 *sl-DiscConfig* is included in *RRCReconfiguration*, 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/ configured with measurement object associated to L2 U2N Relay UEs and *sl-DiscConfig* is included in *RRCReconfiguration*, 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] for NR sidelink discovery transmission;

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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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] for NR sidelink discovery transmission;

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 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-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 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 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 *sl-DiscConfigCommon* is included in *SIB12*, 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 *sl-DiscConfigCommon* is included in *SIB12*, 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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-DiscTxPoolSelected* for NR sidelink discovery transmission is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:

5> 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-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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in the *sl-TxPoolSelectedNormal* for NR

sidelink discovery transmission is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-AllowedResourceSelectionConfig*, is selected:

5> 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-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 full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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* and if a result of full/partial sensing, if selected and is allowed by *sl-AllowedResourceSelectionConfig*, 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 NR sidelink discovery transmission on 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; 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-PreconfigDiscConfig* 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 resource selection operation according to *sl-AllowedResourceSelectionConfig* (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*.

NOTE: 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.

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 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 transmit NR sidelink discovery message to evaluate AS layer conditions. The procedure is also used to perform selection and reselection of NR sidelink U2N Relay UE.

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);

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 PCell/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

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 *SIB12* (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;

3> if the UE detects any suitable NR sidelink U2N Relay UE(s):

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> else:

4> consider no NR sidelink U2N Relay UE to be selected.

5.9 MBS Broadcast

5.9.1 Introduction

5.9.1.1 General

UE receiving or interested to receive MBS broadcast service(s) applies MBS broadcast procedures described in this clause as well as the MBS Interest Indication procedure as specified in clause 5.9.4.

MBS broadcast configuration information, except CFR configuration for MCCH/MTCH, is provided on MCCH logical channel. MCCH carries the *MBSBroadcastConfiguration* message which indicates the MBS broadcast sessions that are provided in the cell as well as the corresponding scheduling related information for these sessions. Optionally, the

MBSBroadcastConfiguration message may also contain a list of neighbour cells providing the same broadcast MBS service(s) as provided in the current cell. The configuration information required by the UE to receive MCCH is provided in *SIB1* and *SIB20*. Additionally, System Information may provide information related to service continuity of MBS broadcast in *SIB21*.

5.9.1.2 MCCH scheduling

The MCCH information (i.e. information transmitted in messages sent over MCCH) is transmitted periodically, using a configurable repetition period and within a configured transmission window. MCCH transmissions (and the associated radio resources and MCS) are indicated via the PDCCH addressed to MCCH-RNTI. PDCCH monitoring occasion(s) for MCCH transmission are determined according to the common search space indicated by *searchspaceMCCH*. If *searchspaceMCCH* is set to zero, PDCCH monitoring occasions for MCCH message reception in the MCCH transmission window are the same as PDCCH monitoring occasions for *SIB1* where the mapping between PDCCH monitoring occasions and SSBs is specified in TS 38.213[13]. If *searchspaceMCCH* is not set to zero, PDCCH monitoring occasions for MCCH message are determined based on search space indicated by *searchspaceMCCH*. PDCCH monitoring occasions for MCCH message which are not overlapping with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered from one in the MCCH transmission window. The $[x \times N+K]^{th}$ PDCCH monitoring occasion for MCCH message in MCCH transmission window corresponds to the K^{th} 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 MCCH transmission window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes. The UE assumes that, in the MCCH transmission window, PDCCH for an MCCH message is transmitted in at least one PDCCH monitoring occasion corresponding to each transmitted SSB and thus the selection of SSB for the reception MCCH messages is up to UE implementation.

5.9.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period).

When the network changes (some of) the MCCH information, it notifies the UEs about the change starting from the beginning of the MCCH modification period via PDCCH which schedules the MCCH in every repetition in that modification period.

Upon receiving a change notification, a UE receiving or interested to receive MBS services transmitted using MBS broadcast acquires the new MCCH information starting from the same slot. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information. The notification is transmitted with a 2-bit bitmap, see TS 38.212 [17] clause 7.3.1.5.1. The MSB in the 2-bit bitmap, when set to '1', indicates the start of new MBS service(s). The LSB in the 2-bit bitmap, when set to '1', indicates modification of MCCH information other than the change caused by start of new MBS service(s), e.g. modification of a configuration of an on-going MBS session(s), MBS session(s) stop or neighbouring cell information modification.

5.9.2 MCCH information acquisition

5.9.2.1 General

Figure 5.9.2.1-1: MCCH information acquisition

The UE applies the MCCH information acquisition procedure to acquire the MBS broadcast configuration information broadcasted by the network. The procedure applies to MBS capable UEs interested to receive or that are receiving MBS

broadcast services that are in RRC_IDLE, RRC_INACTIVE or RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceMCCH*.

5.9.2.2 Initiation

A UE shall apply the MCCH information acquisition procedure upon becoming interested to receive MBS broadcast services. A UE interested to receive MBS broadcast services shall apply the MCCH information acquisition procedure upon entering the cell providing *SIB20* (e.g. upon power on, following UE mobility), upon receiving *SIB20* of an SCell via dedicated signalling and upon receiving a notification that the MCCH information has changed due to the start of new MBS service(s). A UE that is receiving data via broadcast MRB shall apply the MCCH information acquisition procedure upon receiving a notification that the MCCH information has changed due to MCCH information modification other than the change caused by the start of new MBS service(s).

NOTE 1: It is up to UE implementation how to address a possibility of the UE missing an MCCH change notification.

NOTE 2: It is up to UE implementation to use the cell/tracking area list in the USD to avoid acquiring the MCCH when the UE is outside the MBS service area of the MBS broadcast service.

Unless explicitly stated otherwise in the procedural specification, the MCCH information acquisition procedure overwrites any stored MCCH information, i.e. delta configuration is not applicable for MCCH information and the UE discontinues using a field if it is absent in MCCH information.

5.9.2.3 MCCH information acquisition by the UE

An MBS capable UE interested to receive or receiving an MBS broadcast service shall:

1> if the procedure is triggered by an MCCH information change notification:

2> start acquiring the *MBSBroadcastConfiguration* message on MCCH in the concerned cell from the slot in which the change notification was received;

1> if the UE enters a cell providing *SIB20*; or

1> if the UE receives *sCellSIB20*:

2> acquire the *MBSBroadcastConfiguration* message on MCCH in the concerned cell at the next repetition period.

5.9.2.4 Actions upon reception of the *MBSBroadcastConfiguration* message

No UE requirements related to the contents of the *MBSBroadcastConfiguration* message apply other than those specified elsewhere e.g. within the corresponding field descriptions.

5.9.3 Broadcast MRB configuration

5.9.3.1 General

The broadcast MRB configuration procedure is used by the UE to configure PDCP, RLC, MAC and the physical layer upon starting and/or stopping to receive a broadcast MRB transmitted on MTCH, or upon modification of a configuration of a broadcast MRB received by the UE. The procedure applies to MBS capable UEs that are interested to receive or that are receiving an MBS broadcast service that are in RRC_IDLE, RRC_INACTIVE or RRC_CONNECTED with an active BWP with common search space configured by *searchSpaceMTCH* or *searchSpaceMCCH*.

NOTE: How to perform a modification of a broadcast MRB which is already configured in the UE is left to UE implementation.

5.9.3.2 Initiation

The UE applies the broadcast MRB establishment procedure to start receiving an MBS session of an MBS broadcast service it is interested in. The procedure may be initiated e.g. upon start of the MBS session, upon entering a cell providing an MBS broadcast service the UE is interested in, upon becoming interested in the ongoing MBS broadcast service, upon removal of the UE capability limitations inhibiting reception of the ongoing MBS broadcast service UE is interested in.

The UE applies the broadcast MRB release procedure to stop receiving a session of an MBS broadcast service. The procedure may be initiated e.g. upon stop of the MBS session, upon leaving the cell broadcasting the MBS service the UE is interested in, upon losing interest in the MBS service, when capability limitations start inhibiting reception of the concerned service.

5.9.3.3 Broadcast MRB establishment

Upon a broadcast MRB establishment, the UE shall:

1> establish a PDCP entity and an RLC entity in accordance with *MRB-InfoBroadcast* for this broadcast MRB included in the *MBSBroadcastConfiguration* message and the configuration specified in 9.1.1.7;

1> configure the MAC layer in accordance with the *mtch-SchedulingInfo* (if included);

1> configure the physical layer in accordance with the *mbs-SessionInfoList*, *searchSpaceMTCH*, and *pdsch-ConfigMTCH*, applicable for the broadcast MRB;

1> if an SDAP entity with the received *mbs-SessionId* does not exist:

2> establish an SDAP entity as specified in TS 37.324 [24] clause 5.1.1;

2> indicate the establishment of the user plane resources for the *mbs-SessionId* to upper layers;

1> receive DL-SCH on the cell where the *MBSBroadcastConfiguration* message was received for the established broadcast MRB using *g-RNTI* and *mtch-SchedulingInfo* (if included) in this message for this MBS broadcast service.

5.9.3.4 Broadcast MRB release

Upon broadcast MRB release for MBS broadcast service, the UE shall:

1> release the PDCP entity, RLC entity as well as the related MAC and physical layer configuration;

1> if the SDAP entity associated with the corresponding *mbs-SessionId* has no associated MRB:

2> release the SDAP entity, as specified in TS 37.324 [24] clause 5.1.2;

2> indicate the release of the user plane resources for the *mbs-SessionId* to upper layers.

5.9.4 MBS Interest Indication

5.9.4.1 General

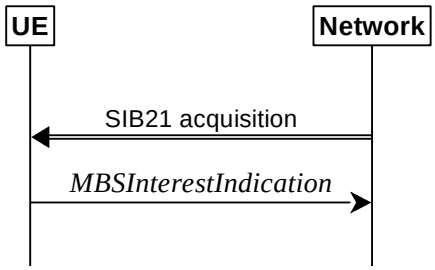

Figure 5.9.4.1-1: MBS Interest Indication

The purpose of this procedure is to inform the network that the UE in RRC_CONNECTED is receiving or is interested to receive MBS broadcast service(s) and to inform the network about the priority of MBS broadcast versus unicast and multicast MRB reception. MBS Interest Indication can only be sent after AS security activation.

5.9.4.2 Initiation

An MBS capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment/resume, upon entering or leaving the broadcast service area, upon MBS broadcast session start or stop, upon change of interest, upon change of priority between MBS broadcast reception and unicast/multicast reception, upon change to a PCell providing *SIB21* (i.e. where the *SIB1* scheduling information contains *SIB21*), upon receiving *SIB20* of an SCell via dedicated signalling, upon handover, and upon RRC connection re-establishment.

Upon initiating the procedure, the UE shall:

1> if *SIB21* is provided by the PCell:

2> ensure having a valid version of *SIB21* for the PCell;

2> if the UE did not transmit MBS Interest Indication since last entering RRC_CONNECTED state; or

2> if since the last time the UE transmitted an MBS Interest Indication, the UE connected to a PCell not providing *SIB21*:

3> if the set of MBS broadcast frequencies of interest, determined in accordance with 5.9.4.3, is not empty:

4> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate transmission of the *MBSInterestIndication* message;

2> else:

3> if the set of MBS broadcast frequencies of interest, determined in accordance with 5.9.4.3, is different from *mbs-FreqList* included in the last transmission of the MBS Interest Indication; or

3> if the prioritisation of reception of all indicated MBS broadcast frequencies compared to reception of any of the established unicast bearers and multicast MRBs has changed since the last transmission of the MBS Interest Indication:

4> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate transmission of the *MBSInterestIndication* message;

NOTE: The UE may send MBS Interest Indication even when it is able to receive the MBS services it is interested in, i.e. to avoid that the network allocates a configuration inhibiting MBS broadcast reception.

3> else if *SIB20* is provided for the PCell or for the SCell:

4> if since the last time the UE transmitted the MBS Interest Indication, the UE connected to a PCell not providing *SIB20* and the UE was not provided with *SIB20* for an SCell; or

4> if the set of MBS broadcast services of interest determined in accordance with 5.9.4.4 is different from *mbs-ServiceList* included in the last transmission of the MBS Interest Indication:

5> set the contents of MBS Interest Indication according to 5.9.4.5 and initiate the transmission of *MBSInterestIndication* message.

5.9.4.3 MBS frequencies of interest determination

The UE shall:

1> consider a frequency to be part of the MBS frequencies of interest if the following conditions are met:

2> at least one MBS session the UE is receiving or interested to receive via a broadcast MRB is ongoing or about to start; and

NOTE 1: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see TS 38.300 [2] or TS 23.247 [67].

2> for at least one of these MBS sessions, *SIB21* acquired from the PCell includes mapping between the concerned frequency and one or more MBS FSAIs indicated in the USD for this session, or for at least one of these MBS sessions, the concerned frequency is not included in *SIB21* but is indicated in the USD for this session; and

NOTE 2: The UE considers a frequency to be part of the MBS frequencies of interest even though NG-RAN may (temporarily) not employ a broadcast MRB for the concerned session, i.e., the UE does not verify if the session is indicated on MCCH.

2> the *supportedBandCombinationList* the UE included in *UE-NR-Capability* contains at least one band combination including the concerned MBS frequency.

NOTE 3: When evaluating which frequencies the UE is capable of receiving, the UE does not take into account whether they are currently configured as serving frequencies.

5.9.4.4 MBS services of interest determination

The UE shall:

1> consider an MBS service to be part of the MBS services of interest if the following conditions are met:

2> the UE is receiving or interested to receive this service via a broadcast MRB; and

2> the session of this service is ongoing or about to start; and

2> one or more MBS FSAIs in the USD for this service is included in *SIB21* acquired from the PCell for a frequency belonging to the set of MBS frequencies of interest, determined according to 5.9.4.3 or *SIB21* acquired from the PCell does not provide the frequency mapping for the concerned service but that frequency is included in the USD of this service.

NOTE: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see TS 38.300 [2] or TS 23.247 [67].

5.9.4.5 Setting of the contents of MBS Interest Indication

The UE shall set the contents of the MBS Interest Indication as follows:

1> if the set of MBS frequencies of interest, determined in accordance with 5.9.4.3, is not empty:

2> include *mbs-FreqList* and set it to include the MBS frequencies of interest sorted by decreasing order of interest, using the *absoluteFrequencySSB* for serving frequency, if applicable, and the *ARFCN-ValueNR*(s) as included in *SIB21* or in USD (for neighbouring frequencies);

2> include *mbs-Priority* if the UE prioritises reception of all indicated MBS frequencies above reception of any of the unicast bearers and multicast MRBs;

NOTE 1: If the UE prioritises MBS broadcast reception and unicast/multicast data cannot be supported because of congestion on the MBS carrier(s), NG-RAN may for example initiate release of unicast bearers/multicast MRBs.

2> if *SIB20* is provided for the PCell or for the SCell:

3> include *mbs-ServiceList* and set it to indicate the set of MBS services of interest sorted by decreasing order of interest determined in accordance with 5.9.4.4.

NOTE 2: The *mbs-ServiceList* is not required to be used by the NG-RAN to determine the frequency on which to enable MBS broadcast reception for the UE.

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

6.1 General

6.1.1 Introduction

The contents of each RRC message is specified in clause 6.2 using ASN.1 to specify the message syntax and using tables when needed to provide further detailed information about the fields specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in clause 6.3.

Usage of the text "Network always configures the UE with a value for this field" in the field description indicates that the network has to provide a value for the field in this or in a previous message based on delta configuration (for an optional field with Need M). It does not imply a mandatory presence of the field.

6.1.2 Need codes and conditions for optional fields

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as OPTIONAL in the abstract notation (ASN.1), is specified by means of comment text tags attached to the OPTIONAL statement in the abstract syntax. All comment text tags are available for use in the downlink direction for RRC message and in the sidelink for PC5 RRC message. The meaning of each tag is specified in table 6.1.2-1.

If conditions are used, a conditional presence table is provided for the message or information element specifying the need of the field for each condition case. The table also specifies whether UE maintains or releases the value in case the field is absent. The conditions clarify what the UE may expect regarding the setting of the message by the network for the RRC message or by the peer UE in the sidelink RRC message. Violation of conditions is regarded as invalid network behaviour when transmitting downlink RRC message or invalid UE behavior when transmitting PC5 RRC message, which the UE is not required to cope with. Hence the general error handling defined in 10.4 does not apply in case a field is absent although it is mandatory according to the CondC or CondM condition.

For guidelines on the use of need codes and conditions, see Annex A.6 and A.7.

Table 6.1.2-1: Meaning of abbreviations used to specify the need for fields to be present

Abbreviation	Meaning
Cond conditionTag	Conditionally present Presence of the field is specified in a tabular form following the ASN.1 segment.
CondC conditionTag	Configuration condition Presence of the field is conditional to other configuration settings.
CondM conditionTag	Message condition Presence of the field is conditional to other fields included in the message.
Need S	*Specified* Used for (configuration) fields, whose field description or procedure **specifies** the UE behavior performed upon receiving a message with the field absent (and not if field description or procedure specifies the UE behavior when field is not configured).
Need M	*Maintain* Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE maintains the current value.
Need N	*No action* (one-shot configuration that is not maintained) Used for (configuration) fields that are not stored and whose presence causes a one-time action by the UE. Upon receiving message with the field absent, the UE takes no action.
Need R	*Release* Used for (configuration) fields that are stored by the UE i.e. not one-shot. Upon receiving a message with the field absent, the UE releases the current value.

NOTE: In this version of the specification, the condition tags CondC and CondM are not used.

Any field with Need M or Need N in system information shall be interpreted as Need R.

The need code used within a CondX definition only applies for the case (part of the condition) where it is defined: A condition may have different need codes for different parts of the condition. In particular, the CondX definition may contain the following "otherwise the field is absent" parts:

- "Otherwise, the field is absent": The field is not relevant or should not be configured when this part of the condition applies. In particular, the UE behaviour is not defined when the field is configured via another part of the condition and is reconfigured to this part of the condition. A need code is not provided when the transition from another part of the condition to this part of the condition is not supported, when the field clearly is a one-shot or there is no difference whether UE maintains or releases the value (e.g., in case the field is mandatory present according to the other part of the condition).

- "Otherwise, the field is absent, Need R": The field is released if absent when this part of the condition applies. This handles UE behaviour in case the field is configured via another part of the condition and this part of the condition applies (which means that network when transmitting downlink RRC message or peer UE transmitting PC5 RRC message can assume UE releases the field if this part of the condition is valid).

- "Otherwise, the field is absent, Need M": The UE retains the field if it was already configured when this part of the condition applies. This means the network when transmitting downlink RRC message or the peer UE when transmitting PC5 RRC message cannot release the field, but UE retains the previously configured value.

Use of different Need codes in different parts of a condition should be avoided.

For downlink RRC message and sidelink PC5 RRC messages, the need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. Thus, if the parent is absent the UE shall not release the field unless the absence of the parent field implies that.

For (parent) fields without need codes in downlink RRC messages or sidelink PC5 RRC message, if the parent field is absent, UE shall follow the need codes of the child fields. Thus, if parent field is absent, the need code of each child field is followed (i.e. Need R child fields are released, Need M child fields are not modified and the actions for Need S child fields depend on the specified conditions of each field). Examples of (parent) fields in downlink RRC messages and sidelink PC5 RRC message without need codes where this rule applies are:

- *nonCriticalExtension* fields at the end of a message using empty SEQUENCE extension mechanism,
- groups of non-critical extensions using double brackets (referred to as extension groups), and
- non-critical extensions at the end of a message or at the end of a structure, contained in a BIT STRING or OCTET STRING (referred to as parent extension fields).

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```
-- /example/ ASN1START

RRCMessage-IEs ::=              SEQUENCE {
    field1                          InformationElement1         OPTIONAL,  -- Need M
    field2                          InformationElement2         OPTIONAL,  -- Need R
    nonCriticalExtension            RRCMessage-v1570-IEs        OPTIONAL
}

RRCMessage-1570-IEs ::=         SEQUENCE {
    field3                          InformationElement3         OPTIONAL,  -- Need M
    nonCriticalExtension            RRCMessage-v1640-IEs        OPTIONAL
}

RRCMessage-v1640-IEs ::=        SEQUENCE {
    field4                          InformationElement4         OPTIONAL,  -- Need R
    nonCriticalExtension            SEQUENCE {}                 OPTIONAL
}

InformationElement1 ::=         SEQUENCE {
    field10                         InformationElement10        OPTIONAL,  -- Need N
    field11                         InformationElement11        OPTIONAL,  -- Need M
    field12                         InformationElement12        OPTIONAL,  -- Need R
    ...,
    [[
    field13                         InformationElement13        OPTIONAL,  -- Need R
    field14                         InformationElement14        OPTIONAL   -- Need M
    ]]
}

InformationElement2 ::=         SEQUENCE {
    field21                         InformationElement11        OPTIONAL,  -- Need M
    ...
}

-- ASN1STOP
```

The handling of need codes as specified in the previous implies that:

- if *field1* in *RRCMessage-IEs* is absent, UE does not modify or take action on any child fields configured within *field1* (regardless of their need codes);
- if *field2* in *RRCMessage-IEs* is absent, UE releases the *field2* (and also its child field *field21*);
- if *field1* or *field2* in *RRCMessage-IEs* is present, UE retains or releases their child fields according to the child field presence conditions;
- if *field1* in *RRCMessage-IEs* is present but the extension group containing *field13* and *field14* is absent, the UE releases *field13* but does not modify *field14*;
- if *nonCriticalExtension* defined by IE *RRCMessage-v1570-IEs* is absent, the UE does not modify *field3* but releases *field4*;

6.1.3 General rules

In the ASN.1 of this specification, the first bit of a bit string refers to the leftmost bit, unless stated otherwise.

Upon reception of a list not using ToAddModList and ToReleaseList structure, the UE shall delete all entries of the list currently in the UE configuration before applying the received list and shall consider each entry as newly created. This applies also to lists whose size is extended (i.e. with a second list structure in the ASN.1 comprising additional entries), unless otherwise specified. This implies that Need M should not be used for fields in the entries of these lists; if used, UE will handle such fields equivalent to a Need R.

6.2 RRC messages

6.2.1 General message structure

– *NR-RRC-Definitions*

This ASN.1 segment is the start of the NR RRC PDU definitions.

```
-- ASN1START
-- TAG-NR-RRC-DEFINITIONS-START

NR-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- TAG-NR-RRC-DEFINITIONS-STOP
-- ASN1STOP
```

– *BCCH-BCH-Message*

The *BCCH-BCH-Message* class is the set of RRC messages that may be sent from the network to the UE via BCH on the BCCH logical channel.

```
-- ASN1START
-- TAG-BCCH-BCH-MESSAGE-START
```

```
BCCH-BCH-Message ::=            SEQUENCE {
    message                         BCCH-BCH-MessageType
}

BCCH-BCH-MessageType ::=        CHOICE {
    mib                             MIB,
    messageClassExtension           SEQUENCE {}
}

-- TAG-BCCH-BCH-MESSAGE-STOP
-- ASN1STOP
```

– *BCCH-DL-SCH-Message*

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

```
-- ASN1START
-- TAG-BCCH-DL-SCH-MESSAGE-START

BCCH-DL-SCH-Message ::=         SEQUENCE {
    message                         BCCH-DL-SCH-MessageType
}

BCCH-DL-SCH-MessageType ::=     CHOICE {
    c1                              CHOICE {
        systemInformation               SystemInformation,
        systemInformationBlockType1     SIB1
    },
    messageClassExtension           SEQUENCE {}
}

-- TAG-BCCH-DL-SCH-MESSAGE-STOP
-- ASN1STOP
```

– *DL-CCCH-Message*

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

```
-- ASN1START
-- TAG-DL-CCCH-MESSAGE-START

DL-CCCH-Message ::=             SEQUENCE {
    message                         DL-CCCH-MessageType
}

DL-CCCH-MessageType ::=         CHOICE {
    c1                              CHOICE {
        rrcReject                       RRCReject,
```

```
        rrcSetup                        RRCSetup,
        spare2                          NULL,
        spare1                          NULL
    },
    messageClassExtension           SEQUENCE {}
}

-- TAG-DL-CCCH-MESSAGE-STOP
-- ASN1STOP
```

– *DL-DCCH-Message*

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

```
-- ASN1START
-- TAG-DL-DCCH-MESSAGE-START

DL-DCCH-Message ::=                 SEQUENCE {
    message                             DL-DCCH-MessageType
}

DL-DCCH-MessageType ::=             CHOICE {
    c1                                  CHOICE {
        rrcReconfiguration                  RRCReconfiguration,
        rrcResume                           RRCResume,
        rrcRelease                          RRCRelease,
        rrcReestablishment                  RRCReestablishment,
        securityModeCommand                 SecurityModeCommand,
        dlInformationTransfer               DLInformationTransfer,
        ueCapabilityEnquiry                 UECapabilityEnquiry,
        counterCheck                        CounterCheck,
        mobilityFromNRCommand               MobilityFromNRCommand,
        dlDedicatedMessageSegment-r16       DLDedicatedMessageSegment-r16,
        ueInformationRequest-r16            UEInformationRequest-r16,
        dlInformationTransferMRDC-r16       DLInformationTransferMRDC-r16,
        loggedMeasurementConfiguration-r16  LoggedMeasurementConfiguration-r16,
                spare3 NULL, spare2 NULL, spare1 NULL
    },
    messageClassExtension   SEQUENCE {}
}

-- TAG-DL-DCCH-MESSAGE-STOP
-- ASN1STOP
```

– *MCCH-Message*

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

```
-- ASN1START
```

```
-- TAG-MCCH-MESSAGE-START

MCCH-Message-r17 ::= SEQUENCE {
    message              MCCH-MessageType-r17
}

MCCH-MessageType-r17 ::= CHOICE {
    c1                       CHOICE {
        mbsBroadcastConfiguration-r17     MBSBroadcastConfiguration-r17,
        spare1                            NULL
    },
    messageClassExtension   SEQUENCE {}
}

-- TAG-MCCH-MESSAGE-STOP
-- ASN1STOP
```

– *PCCH-Message*

The *PCCH-Message* class is the set of RRC messages that may be sent from the Network to the UE on the PCCH logical channel.

```
-- ASN1START
-- TAG-PCCH-PCH-MESSAGE-START

PCCH-Message ::=                SEQUENCE {
    message                         PCCH-MessageType
}

PCCH-MessageType ::=            CHOICE {
    c1                              CHOICE {
        paging                          Paging,
        spare1  NULL
    },
    messageClassExtension       SEQUENCE {}
}

-- TAG-PCCH-PCH-MESSAGE-STOP
-- ASN1STOP
```

– *UL-CCCH-Message*

The *UL-CCCH-Message* class is the set of 48-bits RRC messages that may be sent from the UE to the Network on the uplink CCCH logical channel.

```
-- ASN1START
-- TAG-UL-CCCH-MESSAGE-START


UL-CCCH-Message ::=             SEQUENCE {
    message                         UL-CCCH-MessageType
```

```
}

UL-CCCH-MessageType ::=         CHOICE {
    c1                              CHOICE {
        rrcSetupRequest                 RRCSetupRequest,
        rrcResumeRequest                RRCResumeRequest,
        rrcReestablishmentRequest       RRCReestablishmentRequest,
        rrcSystemInfoRequest            RRCSystemInfoRequest
    },
    messageClassExtension           SEQUENCE {}
}

-- TAG-UL-CCCH-MESSAGE-STOP
-- ASN1STOP
```

– *UL-CCCH1-Message*

The *UL-CCCH1-Message* class is the set of 64-bits RRC messages that may be sent from the UE to the Network on the uplink CCCH1 logical channel.

```
-- ASN1START
-- TAG-UL-CCCH1-MESSAGE-START


UL-CCCH1-Message ::=            SEQUENCE {
    message                         UL-CCCH1-MessageType
}

UL-CCCH1-MessageType ::=        CHOICE {
    c1                              CHOICE {
        rrcResumeRequest1               RRCResumeRequest1,
        spare3 NULL,
        spare2 NULL,
        spare1 NULL

    },
    messageClassExtension SEQUENCE {}
}

-- TAG-UL-CCCH1-MESSAGE-STOP
-- ASN1STOP
```

– *UL-DCCH-Message*

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

```
-- ASN1START
-- TAG-UL-DCCH-MESSAGE-START

UL-DCCH-Message ::=             SEQUENCE {
```

```
    message                         UL-DCCH-MessageType
}

UL-DCCH-MessageType ::=         CHOICE {
    c1                              CHOICE {
        measurementReport               MeasurementReport,
        rrcReconfigurationComplete      RRCReconfigurationComplete,
        rrcSetupComplete                RRCSetupComplete,
        rrcReestablishmentComplete      RRCReestablishmentComplete,
        rrcResumeComplete               RRCResumeComplete,
        securityModeComplete            SecurityModeComplete,
        securityModeFailure             SecurityModeFailure,
        ulInformationTransfer           ULInformationTransfer,
        locationMeasurementIndication   LocationMeasurementIndication,
        ueCapabilityInformation         UECapabilityInformation,
        counterCheckResponse            CounterCheckResponse,
        ueAssistanceInformation         UEAssistanceInformation,
        failureInformation              FailureInformation,
        ulInformationTransferMRDC       ULInformationTransferMRDC,
        scgFailureInformation           SCGFailureInformation,
        scgFailureInformationEUTRA      SCGFailureInformationEUTRA
    },
    messageClassExtension           CHOICE {
        c2                              CHOICE {
            ulDedicatedMessageSegment-r16    ULDedicatedMessageSegment-r16,
            dedicatedSIBRequest-r16          DedicatedSIBRequest-r16,
            mcgFailureInformation-r16        MCGFailureInformation-r16,
            ueInformationResponse-r16        UEInformationResponse-r16,
            sidelinkUEInformationNR-r16      SidelinkUEInformationNR-r16,
            ulInformationTransferIRAT-r16    ULInformationTransferIRAT-r16,
            iabOtherInformation-r16          IABOtherInformation-r16,
            mbsInterestIndication-r17        MBSInterestIndication-r17,
            uePositioningAssistanceInfo-r17 UEPositioningAssistanceInfo-r17,
            measurementReportAppLayer-r17   MeasurementReportAppLayer-r17,
                                            spare6 NULL, spare5 NULL, spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL
        },
        messageClassExtensionFuture-r16    SEQUENCE {}
    }
}

-- TAG-UL-DCCH-MESSAGE-STOP
-- ASN1STOP
```

6.2.2 Message definitions

– *CounterCheck*

The *CounterCheck* message is used by the network to indicate the current COUNT MSB values associated to each DRB and to request the UE to compare these to its COUNT MSB values and to report the comparison results to the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

CounterCheck message

```
-- ASN1START
-- TAG-COUNTERCHECK-START


CounterCheck ::=                SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        counterCheck                    CounterCheck-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

CounterCheck-IEs ::=            SEQUENCE {
    drb-CountMSB-InfoList           DRB-CountMSB-InfoList,
    lateNonCriticalExtension        OCTET STRING                        OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL
}

DRB-CountMSB-InfoList ::=       SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info

DRB-CountMSB-Info ::=           SEQUENCE {
    drb-Identity                    DRB-Identity,
    countMSB-Uplink                 INTEGER(0..33554431),
    countMSB-Downlink               INTEGER(0..33554431)
}

-- TAG-COUNTERCHECK-STOP
-- ASN1STOP
```

***CounterCheck-IEs* field descriptions**
drb-CountMSB-InfoList
Indicates the MSBs of the COUNT values of the DRBs.

***DRB-CountMSB-Info* field descriptions**
countMSB-Downlink
Indicates the value of 25 MSBs from RX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.
countMSB-Uplink
Indicates the value of 25 MSBs from TX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.

– *CounterCheckResponse*

The *CounterCheckResponse* message is used by the UE to respond to a *CounterCheck* message.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

CounterCheckResponse message

```
-- ASN1START
-- TAG-COUNTERCHECKRESPONSE-START

CounterCheckResponse ::=        SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        counterCheckResponse            CounterCheckResponse-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

CounterCheckResponse-IEs ::=    SEQUENCE {
    drb-CountInfoList               DRB-CountInfoList,
    lateNonCriticalExtension        OCTET STRING                        OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                         OPTIONAL

}

DRB-CountInfoList ::=           SEQUENCE (SIZE (0..maxDRB)) OF DRB-CountInfo

DRB-CountInfo ::=               SEQUENCE {
    drb-Identity                    DRB-Identity,
    count-Uplink                    INTEGER(0..4294967295),
```

```
    count-Downlink                  INTEGER(0..4294967295)
}

-- TAG-COUNTERCHECKRESPONSE-STOP
-- ASN1STOP
```

***CounterCheckResponse-IEs* field descriptions**
drb-CountInfoList Indicates the COUNT values of the DRBs.

***DRB-CountInfo* field descriptions**
count-Downlink Indicates the value of RX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.
count-Uplink Indicates the value of TX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.

– *DedicatedSIBRequest*

The *DedicatedSIBRequest* message is used to request SIB(s) required by the UE in RRC_CONNECTED as specified in clause 5.2.2.3.5.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

DedicatedSIBRequest message

```
-- ASN1START
-- TAG-DEDICATEDSIBREQUEST-START

DedicatedSIBRequest-r16 ::=      SEQUENCE {
    criticalExtensions               CHOICE {
        dedicatedSIBRequest-r16          DedicatedSIBRequest-r16-IEs,
        criticalExtensionsFuture         SEQUENCE {}
    }
}

DedicatedSIBRequest-r16-IEs ::=  SEQUENCE {
    onDemandSIB-RequestList-r16       SEQUENCE {

        requestedSIB-List-r16            SEQUENCE (SIZE (1..maxOnDemandSIB-r16)) OF SIB-ReqInfo-r16               OPTIONAL,
        requestedPosSIB-List-r16         SEQUENCE (SIZE (1..maxOnDemandPosSIB-r16)) OF PosSIB-ReqInfo-r16          OPTIONAL
    } OPTIONAL,
```

```
    lateNonCriticalExtension        OCTET STRING            OPTIONAL,
    nonCriticalExtension            SEQUENCE {}             OPTIONAL
}

SIB-ReqInfo-r16 ::=                 ENUMERATED { sib12, sib13, sib14, sib20-v1700, sib21-v1700, spare3, spare2, spare1 }

PosSIB-ReqInfo-r16 ::=      SEQUENCE {
    gnss-id-r16                 GNSS-ID-r16                 OPTIONAL,
    sbas-id-r16                 SBAS-ID-r16                 OPTIONAL,
    posSibType-r16              ENUMERATED { posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,
                                             posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4,
                                             posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10,
                                             posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15,
                                             posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20,
                                             posSibType2-21, posSibType2-22, posSibType2-23, posSibType3-1, posSibType4-1,
                                             posSibType5-1, posSibType6-1, posSibType6-2, posSibType6-3,..., posSibType1-9-v1710,
                                             posSibType1-10-v1710, posSibType2-24-v1710, posSibType2-25-v1710,
                                             posSibType6-4-v1710, posSibType6-5-v1710, posSibType6-6-v1710, posSibType2-17a-v1770,
                                             posSibType2-18a-v1770, posSibType2-20a-v1770 }
}

-- TAG-DEDICATEDSIBREQUEST-STOP
-- ASN1STOP
```

DedicatedSIBRequest field descriptions
requestedSIB-List Contains a list of SIB(s) the UE requests while in RRC_CONNECTED.
requestedPosSIB-List Contains a list of posSIB(s) the UE requests while in RRC_CONNECTED.

***PosSIB-ReqInfo* field descriptions**

gnss-id The presence of this field indicates that the request positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49])
sbas-id The presence of this field indicates that the request positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]). If the UE includes this field it shall set *gnss-id* to *sbas*.

– *DLDedicatedMessageSegment*

The *DLDedicatedMessageSegment* message is used to transfer one segment of the *RRCResume* or *RRCReconfiguration* messages.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLDedicatedMessageSegment message

```
-- ASN1START
-- TAG-DLDEDICATEDMESSAGESEGMENT-START


DLDedicatedMessageSegment-r16 ::=       SEQUENCE {
    criticalExtensions                      CHOICE {
        dlDedicatedMessageSegment-r16           DLDedicatedMessageSegment-r16-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

DLDedicatedMessageSegment-r16-IEs ::=   SEQUENCE {
    segmentNumber-r16                       INTEGER(0..4),
    rrc-MessageSegmentContainer-r16         OCTET STRING,
    rrc-MessageSegmentType-r16              ENUMERATED {notLastSegment, lastSegment},
    lateNonCriticalExtension                OCTET STRING                                OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                 OPTIONAL
}

-- TAG-DLDEDICATEDMESSAGESEGMENT-STOP
-- ASN1STOP
```

***DLDedicatedMessageSegment* field descriptions**
segmentNumber Identifies the sequence number of a segment within the encoded DL DCCH message. The network transmits the segments with continuously increasing *segmentNumber* order so that the UE's RRC layer may expect to obtain them from lower layers in the correct order. Hence, the UE is not required to perform segment re-ordering on RRC level.
rrc-MessageSegmentContainer Includes a segment of the encoded DL DCCH message. The size of the included segment in this container should be small enough so the resulting encoded RRC message PDU is less than or equal to the PDCP SDU size limit.
rrc-MessageSegmentType Indicates whether the included DL DCCH message segment is the last segment of the message or not.

– *DLInformationTransfer*

The *DLInformationTransfer* message is used for the downlink transfer of NAS dedicated information, timing information for the 5G internal system clock, or IAB-DU specific F1-C related information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet). If SRB2 is suspended, the network does not send this message until SRB2 is resumed. If only *dedicatedInfoF1c* is included, SRB2 is used.

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLInformationTransfer message

```
-- ASN1START
-- TAG-DLINFORMATIONTRANSFER-START

DLInformationTransfer ::=           SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        dlInformationTransfer           DLInformationTransfer-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

DLInformationTransfer-IEs ::=       SEQUENCE {
    dedicatedNAS-Message                DedicatedNAS-Message                OPTIONAL,   -- Need N
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                DLInformationTransfer-v1610-IEs     OPTIONAL
}

DLInformationTransfer-v1610-IEs ::= SEQUENCE {
    referenceTimeInfo-r16               ReferenceTimeInfo-r16               OPTIONAL,   -- Need N
    nonCriticalExtension                DLInformationTransfer-v1700-IEs     OPTIONAL
}

DLInformationTransfer-v1700-IEs ::= SEQUENCE {
    dedicatedInfoF1c-r17                DedicatedInfoF1c-r17                OPTIONAL,   -- Need N
    rxTxTimeDiff-gNB-r17                RxTxTimeDiff-r17                    OPTIONAL,   -- Need N
    ta-PDC-r17                          ENUMERATED {activate,deactivate}    OPTIONAL,   -- Need N
    sib9Fallback-r17                    ENUMERATED {true}                   OPTIONAL,   -- Need N
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- TAG-DLINFORMATIONTRANSFER-STOP
-- ASN1STOP
```

***DLInformationTransfer* field descriptions**
rxTxTimeDiff-gNB Indicates the Rx-Tx time difference measurement at the gNB (see clause 5.2.3, TS 38.215 [9]). Upon receiving this field, the UE calculates the propagation delay based on the RTT-based PDC mechanism method as described in TS 38.300 [2]. The network does not configure this field, if the UE is configured with *ta-PDC* with value *activate*.
sib9Fallback Indicates that the UE fallbacks to receive *referenceTimeInfo* in SIB9.
ta-PDC Indicates whether the UE-side TA-based propagation delay compensation (PDC) is activated or de-activated. The network does not configure this field with *activate,* if the field *rxTxTimeDiff-gNB* is configured.

– *DLInformationTransferMRDC*

The *DLInformationTransferMRDC* message is used for the downlink transfer of RRC messages during fast MCG link recovery.

Signalling radio bearer: SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

DLInformationTransferMRDC message

```
-- ASN1START
-- TAG-DLINFORMATIONTRANSFERMRDC-START

DLInformationTransferMRDC-r16 ::=       SEQUENCE {
    criticalExtensions                      CHOICE {
        c1                                      CHOICE {
            dlInformationTransferMRDC-r16           DLInformationTransferMRDC-r16-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture                SEQUENCE {}
    }
}

DLInformationTransferMRDC-r16-IEs::=    SEQUENCE {
    dl-DCCH-MessageNR-r16                   OCTET STRING            OPTIONAL, -- Need N
    dl-DCCH-MessageEUTRA-r16                OCTET STRING            OPTIONAL, -- Need N
    lateNonCriticalExtension                OCTET STRING            OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}             OPTIONAL
}

-- TAG-DLINFORMATIONTRANSFERMRDC-STOP
-- ASN1STOP
```

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

– *FailureInformation*

The *FailureInformation* message is used to inform the network about a failure detected by the UE.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

FailureInformation message

```
-- ASN1START
-- TAG-FAILUREINFORMATION-START

FailureInformation ::=          SEQUENCE {
    criticalExtensions              CHOICE {
        failureInformation              FailureInformation-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

FailureInformation-IEs ::=      SEQUENCE {
    failureInfoRLC-Bearer           FailureInfoRLC-Bearer        OPTIONAL,
    lateNonCriticalExtension        OCTET STRING                 OPTIONAL,
    nonCriticalExtension            FailureInformation-v1610-IEs OPTIONAL
}

FailureInfoRLC-Bearer ::=       SEQUENCE {
    cellGroupId                     CellGroupId,
    logicalChannelIdentity          LogicalChannelIdentity,
    failureType                     ENUMERATED {rlc-failure, spare3, spare2, spare1}
}

FailureInformation-v1610-IEs ::= SEQUENCE {
    failureInfoDAPS-r16               FailureInfoDAPS-r16        OPTIONAL,
    nonCriticalExtension              SEQUENCE {}                OPTIONAL
}

FailureInfoDAPS-r16 ::=           SEQUENCE {
    failureType-r16                   ENUMERATED {daps-failure, spare3, spare2, spare1}
}

-- TAG-FAILUREINFORMATION-STOP
-- ASN1STOP
```

– *IABOtherInformation*

The *IABOtherInformation* message is used by IAB-MT to request the network to allocate IP addresses for the collocated IAB-DU or inform the network about IP addresses allocated to the collocated IAB-DU.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: IAB-MT to Network

IABOtherInformation message

```
-- ASN1START
-- TAG-IABOTHERINFORMATION-START

IABOtherInformation-r16 ::=     SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              CHOICE {
        iabOtherInformation-r16         IABOtherInformation-r16-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

IABOtherInformation-r16-IEs ::=         SEQUENCE {
    ip-InfoType-r16                         CHOICE {
        iab-IP-Request-r16                      SEQUENCE {
            iab-IPv4-AddressNumReq-r16              IAB-IP-AddressNumReq-r16                OPTIONAL,
            iab-IPv6-AddressReq-r16                 CHOICE {
                iab-IPv6-AddressNumReq-r16              IAB-IP-AddressNumReq-r16,
                iab-IPv6-AddressPrefixReq-r16           IAB-IP-AddressPrefixReq-r16,
                ...
            }                                                                           OPTIONAL
        },
        iab-IP-Report-r16               SEQUENCE {
            iab-IPv4-AddressReport-r16      IAB-IP-AddressAndTraffic-r16                OPTIONAL,
            iab-IPv6-Report-r16             CHOICE {
                iab-IPv6-AddressReport-r16      IAB-IP-AddressAndTraffic-r16,
                iab-IPv6-PrefixReport-r16       IAB-IP-PrefixAndTraffic-r16,
                ...
            }                                                                           OPTIONAL
        },
        ...
    },
    lateNonCriticalExtension        OCTET STRING                                        OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                                         OPTIONAL
}

IAB-IP-AddressNumReq-r16 ::=    SEQUENCE {
    all-Traffic-NumReq-r16          INTEGER (1..8)                              OPTIONAL,
```

```
    f1-C-Traffic-NumReq-r16         INTEGER (1..8)                          OPTIONAL,
    f1-U-Traffic-NumReq-r16         INTEGER (1..8)                          OPTIONAL,
    non-F1-Traffic-NumReq-r16       INTEGER (1..8)                          OPTIONAL,
    ...
}

IAB-IP-AddressPrefixReq-r16 ::= SEQUENCE {
    all-Traffic-PrefixReq-r16       ENUMERATED {true}                       OPTIONAL,
    f1-C-Traffic-PrefixReq-r16      ENUMERATED {true}                       OPTIONAL,
    f1-U-Traffic-PrefixReq-r16      ENUMERATED {true}                       OPTIONAL,
    non-F1-Traffic-PrefixReq-r16    ENUMERATED {true}                       OPTIONAL,
    ...
}

IAB-IP-AddressAndTraffic-r16 ::= SEQUENCE {
    all-Traffic-IAB-IP-Address-r16  SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16     OPTIONAL,
    f1-C-Traffic-IP-Address-r16     SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16     OPTIONAL,
    f1-U-Traffic-IP-Address-r16     SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16     OPTIONAL,
    non-F1-Traffic-IP-Address-r16   SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16     OPTIONAL
}

IAB-IP-PrefixAndTraffic-r16 ::= SEQUENCE {
    all-Traffic-IAB-IP-Address-r16  IAB-IP-Address-r16                      OPTIONAL,
    f1-C-Traffic-IP-Address-r16     IAB-IP-Address-r16                      OPTIONAL,
    f1-U-Traffic-IP-Address-r16     IAB-IP-Address-r16                      OPTIONAL,
    non-F1-Traffic-IP-Address-r16   IAB-IP-Address-r16                      OPTIONAL
}

-- TAG-IABOTHERINFORMATION-STOP
-- ASN1STOP
```

***IABOtherInformation-IEs* field descriptions**
iab-IPv4-AddressNumReq This field is used to request the numbers of IPv4 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.
iab-IPv4-AddressReport This field is used to report the IPv4 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.
iab-IPv6-AddressNumReq This field is used to request the numbers of IPv6 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.
iab-IPv6-AddressPrefixReq This field is used to request the prefix of IPv6 address per specific usage. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.
iab-IPv6-AddressReport This field is used to report the IPv6 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.
iab-IPv6-PrefixReport This field is used to report the prefix of IPv6 address per specific usage assigned by OAM for IAB-DU. The specific usages include F1-C traffic, F1-U traffic, non-F1 traffic and all traffic.

IAB-IP-AddressNumReq-IEs field descriptions
all-Traffic-NumReq This field is used to request the numbers of IP address for all traffic.
f1-C-Traffic-NumReq This field is used to request the numbers of IP address for F1-C traffic.
f1-U-Traffic-NumReq This field is used to request the numbers of IP address for F1-U traffic.
non-F1-Traffic-NumReq This field is used to request the numbers of IP address for non-F1 traffic.

IAB-IP-AddressPrefixReq-IEs field descriptions
all-Traffic-PrefixReq This field is used to request the IPv6 address prefix for all traffic. The length of allocated IPv6 prefix is fixed to 64.
f1-C-Traffic-PrefixReq This field is used to request the IPv6 address prefix for F1-C traffic. The length of allocated IPv6 prefix is fixed to 64.
f1-U-Traffic-PrefixReq This field is used to request the IPv6 address prefix for F1-U traffic. The length of allocated IPv6 prefix is fixed to 64.
non-F1-Traffic-PrefixReq This field is used to request the IPv6 address prefix for non-F1 traffic. The length of allocated IPv6 prefix is fixed to 64.

IAB-IP-AddressAndTraffic-IEs field descriptions
all-Traffic-IAB-IP-Address This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for all traffic.
f1-C-Traffic-IP-Address This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-C traffic.
f1-U-Traffic-IP-Address This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-U traffic.
non-F1-Traffic-IP-Address This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for non-F1 traffic.

– *LocationMeasurementIndication*

The *LocationMeasurementIndication* message is used to indicate that the UE is going to either start or stop location related measurement which requires measurement gaps.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

LocationMeasurementIndication message

```
-- ASN1START
-- TAG-LOCATIONMEASUREMENTINDICATION-START

LocationMeasurementIndication ::=           SEQUENCE {
    criticalExtensions                          CHOICE {
        locationMeasurementIndication               LocationMeasurementIndication-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

LocationMeasurementIndication-IEs ::=       SEQUENCE {
    measurementIndication                       SetupRelease {LocationMeasurementInfo},
    lateNonCriticalExtension                    OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                        SEQUENCE{}                                      OPTIONAL
}

-- TAG-LOCATIONMEASUREMENTINDICATION-STOP
-- ASN1STOP
```

– *LoggedMeasurementConfiguration*

The *LoggedMeasurementConfiguration* message is used to perform logging of measurement results while in RRC_IDLE or RRC_INACTIVE. It is used to transfer the logged measurement configuration for network performance optimisation.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

LoggedMeasurementConfiguration message

```
-- ASN1START
-- TAG-LOGGEDMEASUREMENTCONFIGURATION-START

LoggedMeasurementConfiguration-r16 ::=  SEQUENCE {
    criticalExtensions                      CHOICE {
        loggedMeasurementConfiguration-r16      LoggedMeasurementConfiguration-r16-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

LoggedMeasurementConfiguration-r16-IEs ::=  SEQUENCE {
    traceReference-r16                          TraceReference-r16,
    traceRecordingSessionRef-r16                OCTET STRING (SIZE (2)),
```

```
    tce-Id-r16                                  OCTET STRING (SIZE (1)),
    absoluteTimeInfo-r16                        AbsoluteTimeInfo-r16,
    areaConfiguration-r16                       AreaConfiguration-r16                   OPTIONAL,  --Need R
    plmn-IdentityList-r16                       PLMN-IdentityList2-r16                  OPTIONAL,  --Need R
    bt-NameList-r16                             SetupRelease {BT-NameList-r16}          OPTIONAL,  --Need M
    wlan-NameList-r16                           SetupRelease {WLAN-NameList-r16}        OPTIONAL,  --Need M
    sensor-NameList-r16                         SetupRelease {Sensor-NameList-r16}      OPTIONAL,  --Need M
    loggingDuration-r16                         LoggingDuration-r16,
    reportType                                  CHOICE {
        periodical                                  LoggedPeriodicalReportConfig-r16,
        eventTriggered                              LoggedEventTriggerConfig-r16,
        ...
    },
    lateNonCriticalExtension                    OCTET STRING                            OPTIONAL,
    nonCriticalExtension                        LoggedMeasurementConfiguration-v1700-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1700-IEs ::= SEQUENCE {
    sigLoggedMeasType-r17                       ENUMERATED {true}                       OPTIONAL, -- Need R
    earlyMeasIndication-r17                     ENUMERATED {true}                       OPTIONAL, -- Need R
    areaConfiguration-r17                       AreaConfiguration-r17                   OPTIONAL,  --Need R
    nonCriticalExtension                        SEQUENCE {}                             OPTIONAL
}

LoggedPeriodicalReportConfig-r16 ::=            SEQUENCE {
    loggingInterval-r16                             LoggingInterval-r16,
    ...
 }

LoggedEventTriggerConfig-r16 ::=                SEQUENCE {
    eventType-r16                                   EventType-r16,
    loggingInterval-r16                             LoggingInterval-r16,
    ...
}

EventType-r16 ::= CHOICE {
    outOfCoverage     NULL,
    eventL1           SEQUENCE {
        l1-Threshold      MeasTriggerQuantity,
        hysteresis        Hysteresis,
        timeToTrigger     TimeToTrigger
    },
    ...
}

-- TAG-LOGGEDMEASUREMENTCONFIGURATION-STOP
-- ASN1STOP
```

***LoggedMeasurementConfiguration* field descriptions**
absoluteTimeInfo Indicates the absolute time in the current cell.
areaConfiguration Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/ frequencies. If *areaConfiguration-r17* is present, the UE shall ignore *areaConfiguration-r16*.
earlyMeasIndication If included, the field indicates the UE is allowed to log measurements on early measurement related frequencies in logged measurements.
eventType The value outOfCoverage indicates the UE to perform logging of measurements when the UE enters any cell selection state, and the value eventL1 indicates the UE to perform logging of measurements when the triggering condition (similar as event A2 as specified in 5.5.4.3) as configured in the event is met for the camping cell in camped normally state.
plmn-IdentityList Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs.
sigLoggedMeasType If included, the field indicates a signalling based logged measurement configuration (See TS 37.320 [61]).
tce-Id Parameter Trace Collection Entity Id: See TS 32.422 [52].
traceRecordingSessionRef Parameter Trace Recording Session Reference: See TS 32.422 [52].
reportType Parameter configures the type of MDT configuration, specifically Periodic MDT configuration or Event Triggerd MDT configuration.

– *MBSBroadcastConfiguration*

The *MBSBroadcastConfiguration* message contains the control information applicable for MBS broadcast services transmitted via broadcast MRB.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: Network to UE

MBSBroadcastConfiguration message

```
-- ASN1START
-- TAG-MBSBROADCASTCONFIGURATION-START

MBSBroadcastConfiguration-r17 ::= SEQUENCE {
    criticalExtensions                CHOICE {
        mbsBroadcastConfiguration-r17     MBSBroadcastConfiguration-r17-IEs,
        criticalExtensionsFuture          SEQUENCE {}
    }
```

```
}

MBSBroadcastConfiguration-r17-IEs ::= SEQUENCE {
    mbs-SessionInfoList-r17             MBS-SessionInfoList-r17                                                 OPTIONAL,   -- Need R
    mbs-NeighbourCellList-r17           MBS-NeighbourCellList-r17                                               OPTIONAL,   -- Need S
    drx-ConfigPTM-List-r17              SEQUENCE (SIZE (1..maxNrofDRX-ConfigPTM-r17)) OF DRX-ConfigPTM-r17      OPTIONAL,   -- Need R
    pdsch-ConfigMTCH-r17                PDSCH-ConfigBroadcast-r17                                               OPTIONAL,   -- Need S
    mtch-SSB-MappingWindowList-r17      MTCH-SSB-MappingWindowList-r17                                          OPTIONAL,   -- Need R
    lateNonCriticalExtension            OCTET STRING                                                            OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                                                             OPTIONAL
}

-- TAG-MBSBROADCASTCONFIGURATION-STOP
-- ASN1STOP
```

***MBSBroadcastConfiguration* field descriptions**
pdsch-ConfigMTCH   Provides parameters for acquiring the PDSCH for MTCH. When this field is absent, the UE shall use parameters in *pdsch-ConfigMCCH* to acquire the PDSCH for MTCH.
mbs-SessionInfoList   Provides the configuration of each MBS session provided by MBS broadcast in the current cell.
mbs-NeighbourCellList   List of neighbour cells providing one or more MBS broadcast services via broadcast MRB that are provided by the current cell. This field is used by the UE together with *mtch-NeighbourCell* field signalled for each MBS session in the corresponding *MBS-SessionInfo*. When an empty *mbs-NeighbourCellList* list is signalled, the UE shall assume that MBS broadcast services signalled in *mbs-SessionInfoList* in the *MBSBroadcastConfiguration* message are not provided in any neighbour cell. When a non-empty *mbs-NeighbourCellList* is signalled, the current serving cell does not provide information about MBS broadcast services of a neighbour cell that is not included in *mbs-NeighbourCellList*, i.e., the UE cannot determine the presence or absence of an MBS service of a neighbour cell that is absent. When the field *mbs-NeighbourCellList* is absent, the current serving cell does not provide information about MBS broadcast services in the neighbouring cells, i.e. the UE cannot determine the presence or absence of an MBS service in neighbouring cells based on the absence of this field.

– *MBSInterestIndication*

The *MBSInterestIndication* message is used to inform network that the UE is receiving/ interested to receive or no longer receiving/ interested to receive MBS broadcast service(s) via a broadcast MRB.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MBSInterestIndication message

```
-- ASN1START
-- TAG-MBSINTERESTINDICATION-START
```

```
MBSInterestIndication-r17 ::= SEQUENCE {
    criticalExtensions            CHOICE {
        mbsInterestIndication-r17     MBSInterestIndication-r17-IEs,
        criticalExtensionsFuture      SEQUENCE {}
    }
}

MBSInterestIndication-r17-IEs ::= SEQUENCE {
    mbs-FreqList-r17                  CarrierFreqListMBS-r17              OPTIONAL,
    mbs-Priority-r17                  ENUMERATED {true}                   OPTIONAL,
    mbs-ServiceList-r17               MBS-ServiceList-r17                 OPTIONAL,
    lateNonCriticalExtension          OCTET STRING                        OPTIONAL,
    nonCriticalExtension              SEQUENCE {}                         OPTIONAL
}

-- TAG-MBSINTERESTINDICATION-STOP
-- ASN1STOP
```

***MBSInterestIndication* field descriptions**
mbs-FreqList List of MBS frequencies on which the UE is receiving or interested to receive MBS broadcast service via a broadcast MRB.
mbs-Priority Indicates whether the UE prioritises MBS broadcast reception above unicast and MBS multicast reception. The field is present (i.e. value *true*), if the UE prioritises reception of broadcast services, on frequencies indicated in *mbs-FreqLis*t, above a reception of any of the unicast bearers and multicast MRBs. Otherwise the field is absent.
mbs-ServiceList List of MBS broadcast services which the UE is receiving or interested to receive.

– *MCGFailureInformation*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***MCGFailureInformation* message**

```
-- ASN1START
-- TAG-MCGFAILUREINFORMATION-START

MCGFailureInformation-r16 ::=    SEQUENCE {
```

```
    criticalExtensions              CHOICE {
        mcgFailureInformation-r16       MCGFailureInformation-r16-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

MCGFailureInformation-r16-IEs ::= SEQUENCE {
    failureReportMCG-r16            FailureReportMCG-r16                        OPTIONAL,
    lateNonCriticalExtension        OCTET STRING                                OPTIONAL,
    nonCriticalExtension            SEQUENCE {}                                 OPTIONAL
}

FailureReportMCG-r16 ::=          SEQUENCE {
    failureType-r16                 ENUMERATED {t310-Expiry, randomAccessProblem, rlc-MaxNumRetx,
                                                t312-Expiry-r16, lbt-Failure-r16, beamFailureRecoveryFailure-r16,
                                    bh-RLF-r16, spare1}                                                     OPTIONAL,
    measResultFreqList-r16          MeasResultList2NR                                                       OPTIONAL,
    measResultFreqListEUTRA-r16     MeasResultList2EUTRA                                                    OPTIONAL,
    measResultSCG-r16               OCTET STRING (CONTAINING MeasResultSCG-Failure)                         OPTIONAL,
    measResultSCG-EUTRA-r16         OCTET STRING                                                            OPTIONAL,
    measResultFreqListUTRA-FDD-r16  MeasResultList2UTRA                                                     OPTIONAL,
    ...
}

MeasResultList2UTRA ::=    SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-FDD-r16

MeasResult2UTRA-FDD-r16 ::=       SEQUENCE {
    carrierFreq-r16                 ARFCN-ValueUTRA-FDD-r16,
    measResultNeighCellList-r16     MeasResultListUTRA-FDD-r16
}

MeasResultList2EUTRA ::=          SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r16

-- TAG-MCGFAILUREINFORMATION-STOP
-- ASN1STOP
```

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

– *MeasurementReport*

The *MeasurementReport* message is used for the indication of measurement results.

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MeasurementReport message

```
-- ASN1START
-- TAG-MEASUREMENTREPORT-START

MeasurementReport ::=               SEQUENCE {
    criticalExtensions                  CHOICE {
        measurementReport                   MeasurementReport-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

MeasurementReport-IEs ::=           SEQUENCE {
    measResults                         MeasResults,

    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

-- TAG-MEASUREMENTREPORT-STOP
-- ASN1STOP
```

– *MeasurementReportAppLayer*

The *MeasurementReportAppLayer* message is used for sending application layer measurement report.

Signalling radio bearer: SRB4

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

MeasurementReportAppLayer message

```
-- ASN1START
-- TAG-MEASUREMENTREPORTAPPLAYER-START

MeasurementReportAppLayer-r17 ::=     SEQUENCE {
    criticalExtensions                    CHOICE {
        measurementReportAppLayer-r17     MeasurementReportAppLayer-r17-IEs,
        criticalExtensionsFuture              SEQUENCE {}
    }
}

MeasurementReportAppLayer-r17-IEs ::=   SEQUENCE {
    measurementReportAppLayerList-r17       MeasurementReportAppLayerList-r17,
    lateNonCriticalExtension                OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                    SEQUENCE{}                                      OPTIONAL
}

MeasurementReportAppLayerList-r17 ::= SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasReportAppLayer-r17

MeasReportAppLayer-r17 ::=        SEQUENCE {
    measConfigAppLayerId-r17              MeasConfigAppLayerId-r17,
    measReportAppLayerContainer-r17       OCTET STRING                                    OPTIONAL,
    appLayerSessionStatus-r17             ENUMERATED {start, stop}                        OPTIONAL,
    ran-VisibleMeasurements-r17           RAN-VisibleMeasurements-r17                     OPTIONAL
}

RAN-VisibleMeasurements-r17 ::=       SEQUENCE {
    appLayerBufferLevelList-r17           SEQUENCE (SIZE (1..8)) OF AppLayerBufferLevel-r17   OPTIONAL,
    playoutDelayForMediaStartup-r17       INTEGER (0..30000)                              OPTIONAL,
    pdu-SessionIdList-r17                 SEQUENCE (SIZE (1..maxNrofPDU-Sessions-r17)) OF PDU-SessionID   OPTIONAL,
    ...
}

AppLayerBufferLevel-r17 ::= INTEGER (0..30000)

-- TAG-MEASUREMENTREPORTAPPLAYER-STOP
-- ASN1STOP
```

***MeasReportAppLayer* field descriptions**
appLayerSessionStatus Indicates that an application layer measurement session in the application layer starts or ends.
measReportAppLayerContainer The field contains the application layer measurement report container, see Annex L (normative) in TS 26.247 [68], clause 16.5 in TS 26.114 [69] and TS 26.118 [70].
ran-VisibleMeasurements The field contains the RAN visible application layer measurement report.

***RAN-VisibleMeasurements* field descriptions**
appLayerBufferLevelList
The field indicates a list of application layer buffer levels, and each *AppLayerBufferLevel* indicates the application layer buffer level in ms. Value 0 corresponds to 0ms, value 1 corresponds to 10ms, value 2 corresponds to 20 ms and so on. If the buffer level is larger than the maximum value of 30000 (5 minutes), the UE reports 30000.
playoutDelayForMediaStartup
Indicates the application layer playout delay for media start-up in ms. Value 0 corresponds to 0ms, value 1 corresponds to 1ms, value 2 corresponds to 2 ms and so on. If the playout delay for media start-up is larger than the maximum value of 30000ms, the UE reports 30000.
pdu-SessionIdList
Contains the identity of the PDU session, or the identities of the PDU sessions, used for application data flows subject to the RAN visible application layer measurements.

– *MIB*

The *MIB* includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: Network to UE

MIB

```
-- ASN1START
-- TAG-MIB-START

MIB ::=                             SEQUENCE {
    systemFrameNumber                   BIT STRING (SIZE (6)),
    subCarrierSpacingCommon             ENUMERATED {scs15or60, scs30or120},
    ssb-SubcarrierOffset                INTEGER (0..15),
    dmrs-TypeA-Position                 ENUMERATED {pos2, pos3},
    pdcch-ConfigSIB1                    PDCCH-ConfigSIB1,
    cellBarred                          ENUMERATED {barred, notBarred},
    intraFreqReselection                ENUMERATED {allowed, notAllowed},
    spare                               BIT STRING (SIZE (1))
}

-- TAG-MIB-STOP
-- ASN1STOP
```

***MIB* field descriptions**
cellBarred Value *barred* means that the cell is barred, as defined in TS 38.304 [20]. This field is ignored by IAB-MT. This field is ignored for connectivity to NTN.
dmrs-TypeA-Position Position of (first) DM-RS for downlink (see TS 38.211 [16], clause 7.4.1.1.2) and uplink (see TS 38.211 [16], clause 6.4.1.1.3).
intraFreqReselection Controls cell selection/reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 38.304 [20]. This field is ignored by IAB-MT.
pdcch-ConfigSIB1 Determines a common *ControlResourceSet* (CORESET), a common search space and necessary PDCCH parameters. If the field *ssb-SubcarrierOffset* indicates that *SIB1* is absent, the field *pdcch-ConfigSIB1* indicates the frequency positions where the UE may find SS/PBCH block with *SIB1* or the frequency range where the network does not provide SS/PBCH block with *SIB1* (see TS 38.213 [13], clause 13).
ssb-SubcarrierOffset Corresponds to k_{SSB} (see TS 38.213 [13]), which is the frequency domain offset between SSB and the overall resource block grid in number of subcarriers. (See TS 38.211 [16], clause 7.4.3.1). For operation with shared spectrum channel access in FR1 (see 37.213 [48]), this field corresponds to $\bar{k}_{SSB}$, and k_{SSB} is obtained from $\bar{k}_{SSB}$ (see TS 38.211 [16], clause 7.4.3.1); the LSB of this field is used also for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1. The value range of this field may be extended by an additional most significant bit encoded within PBCH as specified in TS 38.213 [13]. This field may indicate that this cell does not provide *SIB1* and that there is hence no CORESET#0 configured in *MIB* (see TS 38.213 [13], clause 13). In this case, the field *pdcch-ConfigSIB1* may indicate the frequency positions where the UE may (not) find a SS/PBCH with a control resource set and search space for *SIB1* (see TS 38.213 [13], clause 13).
subCarrierSpacingCommon Subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages. If the UE acquires this *MIB* on an FR1 carrier frequency, the value *scs15or60* corresponds to 15 kHz and the value *scs30or120* corresponds to 30 kHz. If the UE acquires this *MIB* on an FR2 carrier frequency, the value *scs15or60* corresponds to 60 kHz and the value *scs30or120* corresponds to 120 kHz. For operation with shared spectrum channel access in FR1 (see 37.213 [48]) and for operation in FR2-2, the subcarrier spacing for *SIB1*, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages is same as that for the corresponding SSB. For operation with shared spectrum channel access, this field instead is used for deriving the QCL relation between SS/PBCH blocks as specified in TS 38.213 [13], clause 4.1.
systemFrameNumber The 6 most significant bits (MSB) of the 10-bit System Frame Number (SFN). The 4 LSB of the SFN are conveyed in the PBCH transport block as part of channel coding (i.e. outside the *MIB* encoding), as defined in clause 7.1 in TS 38.212 [17].

– *MobilityFromNRCommand*

The *MobilityFromNRCommand* message is used to command handover from NR to E-UTRA/EPC, E-UTRA/5GC or UTRA-FDD.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

***MobilityFromNRCommand* message**

```
-- ASN1START
```

```
-- TAG-MOBILITYFROMNRCOMMAND-START

MobilityFromNRCommand ::=           SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
            mobilityFromNRCommand           MobilityFromNRCommand-IEs,
            criticalExtensionsFuture        SEQUENCE {}
    }
}

MobilityFromNRCommand-IEs ::=       SEQUENCE {
    targetRAT-Type                      ENUMERATED { eutra, utra-fdd-v1610, spare2, spare1, ...},
    targetRAT-MessageContainer          OCTET STRING,
    nas-SecurityParamFromNR             OCTET STRING                                        OPTIONAL,   -- Cond HO-ToEPCUTRAN
    lateNonCriticalExtension            OCTET STRING                                        OPTIONAL,
    nonCriticalExtension                MobilityFromNRCommand-v1610-IEs                     OPTIONAL
}

MobilityFromNRCommand-v1610-IEs ::=     SEQUENCE {
    voiceFallbackIndication-r16         ENUMERATED {true}                                   OPTIONAL,   -- Need N
    nonCriticalExtension                SEQUENCE {}                                         OPTIONAL
}

-- TAG-MOBILITYFROMNRCOMMAND-STOP
-- ASN1STOP
```

***MobilityFromNRCommand-IEs* field descriptions**
nas-SecurityParamFromNR If *targetRAT-Type* is *eutra*, this field is used to deliver the key synchronisation and Key freshness for the NR to LTE/EPC handovers and a part of the downlink NAS COUNT as specified in TS 33.501 [11] and the content of the parameter is defined in TS 24.501 [23]. If *targetRAT-Type* is *utra-fdd*, this field is used to deliver the key synchronisation and Key freshness for the NR to FDD UTRAN handover and a part of the downlink NAS COUNT as specified in TS 33.501 [11] and the content of the parameter is defined in TS 24.501 [23].
targetRAT-MessageContainer The field contains a message specified in another standard, as indicated by the *targetRAT-Type*, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology. A complete message is included, as specified in the other standard. See NOTE 1
targetRAT-Type Indicates the target RAT type.
voiceFallbackIndication Indicates the handover is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43].

NOTE 1: The correspondence between the value of the *targetRAT-Type*, the standard to apply, and the message contained within the *targetRAT-MessageContainer* is shown in the table below:

targetRAT-Type	Standard to apply	targetRAT-MessageContainer
eutra	TS 36.331 [10] (clause 5.4.2)	*DL-DCCH-Message* including the *RRCConnectionReconfiguration*
utra-fdd	TS 25.331 [45] (clause 10.2.16a)	*Handover TO UTRAN command*

Conditional Presence	Explanation
HO-ToEPCUTRAN	This field is mandatory present in case of inter system handover to "EPC" or "FDD UTRAN". Otherwise it is absent.

– *Paging*

The *Paging* message is used for the notification of one or more UEs.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: PCCH

Direction: Network to UE

Paging message

```
-- ASN1START
-- TAG-PAGING-START

Paging ::=                          SEQUENCE {
    pagingRecordList                    PagingRecordList                                    OPTIONAL, -- Need N
    lateNonCriticalExtension            OCTET STRING                                        OPTIONAL,
    nonCriticalExtension                Paging-v1700-IEs                                    OPTIONAL
}

Paging-v1700-IEs ::=                SEQUENCE {
    pagingRecordList-v1700              PagingRecordList-v1700                              OPTIONAL, -- Need N
    pagingGroupList-r17                 PagingGroupList-r17                                 OPTIONAL, -- Need N
    nonCriticalExtension                SEQUENCE {}                                         OPTIONAL
}

PagingRecordList ::=                SEQUENCE (SIZE(1..maxNrofPageRec)) OF PagingRecord

PagingRecordList-v1700 ::=          SEQUENCE (SIZE(1..maxNrofPageRec)) OF PagingRecord-v1700

PagingGroupList-r17 ::=             SEQUENCE (SIZE(1..maxNrofPageGroup-r17)) OF TMGI-r17

PagingRecord ::=                    SEQUENCE {
    ue-Identity                         PagingUE-Identity,
    accessType                          ENUMERATED {non3GPP}    OPTIONAL,   -- Need N
    ...
}

PagingRecord-v1700 ::=              SEQUENCE {
    pagingCause-r17                     ENUMERATED {voice}      OPTIONAL    -- Need N
}

PagingUE-Identity ::=               CHOICE {
```

```
    ng-5G-S-TMSI                    NG-5G-S-TMSI,
    fullI-RNTI                      I-RNTI-Value,
    ...
}

-- TAG-PAGING-STOP
-- ASN1STOP
```

***PagingRecord* field descriptions**
accessType   Indicates whether the *Paging* message is originated due to the PDU sessions from the non-3GPP access.
pagingRecordList   If the network includes pagingRecordList-v1700, it includes the same number of entries, and listed in the same order, as in pagingRecordList (i.e. without suffix).
pagingCause   Indicates whether the Paging message is originated due to IMS voice. If this field is present, it implies that the corresponding paging entry is for IMS voice. If upper layers indicate the support of paging cause and if this field is not present but pagingRecordList-v1700 is present, it implies that the corresponding paging entry is for a service other than IMS voice. Otherwise, paging cause is undetermined.

– *RRCReestablishment*

The *RRCReestablishment* message is used to re-establish SRB1.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCReestablishment message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENT-START

RRCReestablishment ::=              SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcReestablishment                  RRCReestablishment-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCReestablishment-IEs ::=          SEQUENCE {
    nextHopChainingCount                NextHopChainingCount,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                RRCReestablishment-v1700-IEs         OPTIONAL
```

```
}

RRCReestablishment-v1700-IEs ::=    SEQUENCE {
    sl-L2RemoteUE-Config-r17            SetupRelease {SL-L2RemoteUE-Config-r17}    OPTIONAL, -- Cond L2RemoteUE
    nonCriticalExtension                SEQUENCE {}                                OPTIONAL
}

-- TAG-RRCREESTABLISHMENT-STOP
-- ASN1STOP
```

***RRCReestablishment-IEs* field descriptions**
sl-L2RemoteUE-Config   Contains dedicated configurations used for L2 U2N relay related operation. The network configures only the SRAP configuration for local UE ID.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.

– *RRCReestablishmentComplete*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCReestablishmentComplete message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENTCOMPLETE-START

RRCReestablishmentComplete ::=              SEQUENCE {
    rrc-TransactionIdentifier                   RRC-TransactionIdentifier,
    criticalExtensions                          CHOICE {
        rrcReestablishmentComplete                  RRCReestablishmentComplete-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

RRCReestablishmentComplete-IEs ::=          SEQUENCE {
    lateNonCriticalExtension                    OCTET STRING                            OPTIONAL,
    nonCriticalExtension                        RRCReestablishmentComplete-v1610-IEs    OPTIONAL
}
```

```
RRCReestablishmentComplete-v1610-IEs ::=    SEQUENCE {
    ue-MeasurementsAvailable-r16                UE-MeasurementsAvailable-r16    OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                     OPTIONAL
}

-- TAG-RRCREESTABLISHMENTCOMPLETE-STOP
-- ASN1STOP
```

– *RRCReestablishmentRequest*

The *RRCReestablishmentRequest* message is used to request the reestablishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCReestablishmentRequest message

```
-- ASN1START
-- TAG-RRCREESTABLISHMENTREQUEST-START


RRCReestablishmentRequest ::=       SEQUENCE {
    rrcReestablishmentRequest           RRCReestablishmentRequest-IEs
}

RRCReestablishmentRequest-IEs ::=   SEQUENCE {
    ue-Identity                         ReestabUE-Identity,
    reestablishmentCause                ReestablishmentCause,
    spare                               BIT STRING (SIZE (1))
}

ReestabUE-Identity ::=              SEQUENCE {
    c-RNTI                              RNTI-Value,
    physCellId                          PhysCellId,
    shortMAC-I                          ShortMAC-I
}

ReestablishmentCause ::=            ENUMERATED {reconfigurationFailure, handoverFailure, otherFailure, spare1}

-- TAG-RRCREESTABLISHMENTREQUEST-STOP
-- ASN1STOP
```

***ReestabUE-Identity* field descriptions**
physCellId
The Physical Cell Identity of the PCell the UE was connected to prior to the failure.

***RRCReestablishmentRequest-IEs* field descriptions**
reestablishmentCause
Indicates the failure cause that triggered the re-establishment procedure. gNB is not expected to reject a *RRCReestablishmentRequest* due to unknown cause value being used by the UE.
ue-Identity
UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.

– *RRCReconfiguration*

The *RRCReconfiguration* message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) and AS security configuration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCReconfiguration message

```
-- ASN1START
-- TAG-RRCRECONFIGURATION-START

RRCReconfiguration ::=                SEQUENCE {
    rrc-TransactionIdentifier             RRC-TransactionIdentifier,
    criticalExtensions                    CHOICE {
        rrcReconfiguration                    RRCReconfiguration-IEs,
        criticalExtensionsFuture              SEQUENCE {}
    }
}

RRCReconfiguration-IEs ::=            SEQUENCE {
    radioBearerConfig                     RadioBearerConfig                                   OPTIONAL, -- Need M
    secondaryCellGroup                    OCTET STRING (CONTAINING CellGroupConfig)           OPTIONAL, -- Cond SCG
    measConfig                            MeasConfig                                          OPTIONAL, -- Need M
    lateNonCriticalExtension              OCTET STRING                                        OPTIONAL,
    nonCriticalExtension                  RRCReconfiguration-v1530-IEs                        OPTIONAL
}

RRCReconfiguration-v1530-IEs ::=          SEQUENCE {
    masterCellGroup                       OCTET STRING (CONTAINING CellGroupConfig)           OPTIONAL, -- Need M
```

```
    fullConfig                          ENUMERATED {true}                                       OPTIONAL, -- Cond FullConfig
    dedicatedNAS-MessageList            SEQUENCE (SIZE(1..maxDRB)) OF DedicatedNAS-Message      OPTIONAL, -- Cond nonHO
    masterKeyUpdate                     MasterKeyUpdate                                         OPTIONAL, -- Cond
MasterKeyChange
    dedicatedSIB1-Delivery              OCTET STRING (CONTAINING SIB1)                          OPTIONAL, -- Need N
    dedicatedSystemInformationDelivery  OCTET STRING (CONTAINING SystemInformation)             OPTIONAL, -- Need N
    otherConfig                         OtherConfig                                             OPTIONAL, -- Need M
    nonCriticalExtension                RRCReconfiguration-v1540-IEs                            OPTIONAL
}

RRCReconfiguration-v1540-IEs ::=        SEQUENCE {
    otherConfig-v1540                       OtherConfig-v1540                                   OPTIONAL, -- Need M
    nonCriticalExtension                    RRCReconfiguration-v1560-IEs                        OPTIONAL
}

RRCReconfiguration-v1560-IEs ::=         SEQUENCE {
    mrdc-SecondaryCellGroupConfig            SetupRelease { MRDC-SecondaryCellGroupConfig }     OPTIONAL,   -- Need M
    radioBearerConfig2                       OCTET STRING (CONTAINING RadioBearerConfig)        OPTIONAL,   -- Need M
    sk-Counter                               SK-Counter                                         OPTIONAL,   -- Need N
    nonCriticalExtension                     RRCReconfiguration-v1610-IEs                       OPTIONAL
}
RRCReconfiguration-v1610-IEs ::=        SEQUENCE {
    otherConfig-v1610                       OtherConfig-v1610                                   OPTIONAL, -- Need M
    bap-Config-r16                          SetupRelease { BAP-Config-r16 }                     OPTIONAL, -- Need M
    iab-IP-AddressConfigurationList-r16     IAB-IP-AddressConfigurationList-r16                 OPTIONAL, -- Need M
    conditionalReconfiguration-r16          ConditionalReconfiguration-r16                      OPTIONAL, -- Need M
    daps-SourceRelease-r16                  ENUMERATED{true}                                    OPTIONAL, -- Need N
    t316-r16                                SetupRelease {T316-r16}                             OPTIONAL, -- Need M
    needForGapsConfigNR-r16                 SetupRelease {NeedForGapsConfigNR-r16}              OPTIONAL, -- Need M
    onDemandSIB-Request-r16                 SetupRelease { OnDemandSIB-Request-r16 }            OPTIONAL, -- Need M
    dedicatedPosSysInfoDelivery-r16         OCTET STRING (CONTAINING PosSystemInformation-r16-IEs) OPTIONAL, -- Need N
    sl-ConfigDedicatedNR-r16                SetupRelease {SL-ConfigDedicatedNR-r16}             OPTIONAL, -- Need M
    sl-ConfigDedicatedEUTRA-Info-r16        SetupRelease {SL-ConfigDedicatedEUTRA-Info-r16}     OPTIONAL, -- Need M
    targetCellSMTC-SCG-r16                  SSB-MTC                                             OPTIONAL, -- Need S
    nonCriticalExtension                    RRCReconfiguration-v1700-IEs                        OPTIONAL
}

RRCReconfiguration-v1700-IEs ::=        SEQUENCE {
    otherConfig-v1700                       OtherConfig-v1700                                   OPTIONAL, -- Need M
    sl-L2RelayUE-Config-r17                 SetupRelease { SL-L2RelayUE-Config-r17 }            OPTIONAL, -- Need M
    sl-L2RemoteUE-Config-r17                SetupRelease { SL-L2RemoteUE-Config-r17 }           OPTIONAL, -- Need M
    dedicatedPagingDelivery-r17             OCTET STRING (CONTAINING Paging)                    OPTIONAL, -- Cond PagingRelay
    needForGapNCSG-ConfigNR-r17             SetupRelease {NeedForGapNCSG-ConfigNR-r17}          OPTIONAL, -- Need M
    needForGapNCSG-ConfigEUTRA-r17          SetupRelease {NeedForGapNCSG-ConfigEUTRA-r17}       OPTIONAL, -- Need M
    musim-GapConfig-r17                     SetupRelease {MUSIM-GapConfig-r17}                  OPTIONAL, -- Need M
    ul-GapFR2-Config-r17                    SetupRelease { UL-GapFR2-Config-r17 }               OPTIONAL, -- Need M
    scg-State-r17                           ENUMERATED { deactivated }                          OPTIONAL, -- Need N
    appLayerMeasConfig-r17                  AppLayerMeasConfig-r17                              OPTIONAL, -- Need M
    ue-TxTEG-RequestUL-TDOA-Config-r17      SetupRelease {UE-TxTEG-RequestUL-TDOA-Config-r17}   OPTIONAL,  -- Need M
    nonCriticalExtension                    SEQUENCE {}                                         OPTIONAL
}

MRDC-SecondaryCellGroupConfig ::=       SEQUENCE {
    mrdc-ReleaseAndAdd                      ENUMERATED {true}                                       OPTIONAL,   -- Need N
```

```
    mrdc-SecondaryCellGroup                 CHOICE {
        nr-SCG                                  OCTET STRING  (CONTAINING RRCReconfiguration),
        eutra-SCG                               OCTET STRING
    }
}

BAP-Config-r16 ::=                      SEQUENCE {
    bap-Address-r16                         BIT STRING (SIZE (10))                                  OPTIONAL, -- Need M
    defaultUL-BAP-RoutingID-r16             BAP-RoutingID-r16                                       OPTIONAL, -- Need M
    defaultUL-BH-RLC-Channel-r16            BH-RLC-ChannelID-r16                                    OPTIONAL, -- Need M
    flowControlFeedbackType-r16             ENUMERATED {perBH-RLC-Channel, perRoutingID, both}      OPTIONAL, -- Need R
    ...
}

MasterKeyUpdate ::=                 SEQUENCE {
    keySetChangeIndicator           BOOLEAN,
    nextHopChainingCount            NextHopChainingCount,
    nas-Container                   OCTET STRING                                            OPTIONAL,    -- Cond securityNASC
    ...
}

OnDemandSIB-Request-r16 ::=                 SEQUENCE {
    onDemandSIB-RequestProhibitTimer-r16        ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30}
}

T316-r16 ::=        ENUMERATED {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000, ms1500, ms2000}

IAB-IP-AddressConfigurationList-r16 ::= SEQUENCE {
    iab-IP-AddressToAddModList-r16      SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressConfiguration-r16 OPTIONAL, -- Need N
    iab-IP-AddressToReleaseList-r16     SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressIndex-r16         OPTIONAL, -- Need N
    ...
}

IAB-IP-AddressConfiguration-r16 ::=     SEQUENCE {
    iab-IP-AddressIndex-r16                 IAB-IP-AddressIndex-r16,
    iab-IP-Address-r16                      IAB-IP-Address-r16                                  OPTIONAL,  -- Need M
    iab-IP-Usage-r16                        IAB-IP-Usage-r16                                    OPTIONAL,  -- Need M
    iab-donor-DU-BAP-Address-r16            BIT STRING (SIZE(10))                               OPTIONAL,  -- Need M
...
}

SL-ConfigDedicatedEUTRA-Info-r16 ::=            SEQUENCE {
    sl-ConfigDedicatedEUTRA-r16                    OCTET STRING                                 OPTIONAL,  -- Need M
    sl-TimeOffsetEUTRA-List-r16                    SEQUENCE (SIZE (8)) OF SL-TimeOffsetEUTRA-r16    OPTIONAL    -- Need M
}

SL-TimeOffsetEUTRA-r16 ::=        ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1, ms1dot25, ms1dot5, ms1dot75,
                                              ms2, ms2dot5, ms3, ms4, ms5, ms6, ms8, ms10, ms20}

UE-TxTEG-RequestUL-TDOA-Config-r17 ::=  CHOICE {
    oneShot-r17                             NULL,
    periodicReporting-r17                   ENUMERATED { ms160, ms320, ms1280, ms2560, ms61440, ms81920, ms368640, ms737280 }
}
-- TAG-RRCRECONFIGURATION-STOP
```

```
-- ASN1STOP
```

***RRCReconfiguration-IEs* field descriptions**
appLayerMeasConfig This field is used to configure application layer measurements. This field is absent when the UE is configured to operate with shared spectrum channel access or if *sl-L2RemoteUE-Config-r17* is configured or not released.
bap-Config This field is used to configure the BAP entity for IAB nodes.
bap-Address Indicates the BAP address of an IAB-node. The BAP address of an IAB-node cannot be changed once configured for the cell group to the BAP entity.
conditionalReconfiguration Configuration of candidate target SpCell(s) and execution condition(s) for conditional handover, conditional PSCell addition or conditional PSCell change. The field is absent if any DAPS bearer is configured or if the *masterCellGroup* includes *ReconfigurationWithSync* or if the *sl-L2RemoteUE-Config* or *sl-L2RelayUE-Config* is configured. For conditional PSCell change, the field is absent if the *secondaryCellGroup* includes *ReconfigurationWithSync*. The *RRCReconfiguration* message contained in *DLInformationTransferMRDC* cannot contain the field *conditionalReconfiguration* for conditional PSCell change or for conditional PSCell addition.
daps-SourceRelease Indicates to UE that the source cell part of DAPS operation is to be stopped and the source cell part of DAPS configuration is to be released.
dedicatedNAS-MessageList This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.
dedicatedPagingDelivery This field is used to transfer *Paging* message for the associated L2 U2N Remote UE to the L2 U2N Relay UE in RRC_CONNECTED.
dedicatedPosSysInfoDelivery This field is used to transfer *SIBPos* to the UE in RRC_CONNECTED.
dedicatedSIB1-Delivery This field is used to transfer *SIB1* to the UE (including L2 U2N Remote UE). The field has the same values as the corresponding configuration in *servingCellConfigCommon*.
dedicatedSystemInformationDelivery This field is used to transfer *SIB6*, *SIB7*, *SIB8, SIB19, SIB20, SIB21* to the UE with an active BWP with no common search space configured or the L2 U2N Remote UE in RRC_CONNECTED. For UEs in RRC_CONNECTED (including L2 U2N Remote UE), this field is also used to transfer the SIBs requested on-demand.
defaultUL-BAP-RoutingID This field is used for IAB-node to configure the default uplink Routing ID, which is used by IAB-node during IAB-node bootstrapping, migration, IAB-MT RRC resume and IAB-MT RRC re-establishment for *F1-C* and *non-F1* traffic. The *defaultUL-BAP-RoutingID* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes. This field is mandatory only for IAB-node bootstrapping.
defaultUL-BH-RLC-Channel This field is used for IAB-nodes to configure the default uplink BH RLC channel, which is used by IAB-node during IAB-node bootstrapping, migration, IAB-MT RRC resume and IAB-MT RRC re-establishment *for F1-C and non-F1 traffic*. The *defaultUL-BH-RLC-Channel* can be (re-)configured when IAB-node IP address for *F1-C* related traffic changes, and the new IP address is anchored at a different IAB-donor-DU. This field is mandatory for IAB-node bootstrapping. If the IAB-MT is operating in EN-DC, the default uplink BH RLC channel is referring to an RLC channel on the SCG; Otherwise, it is referring to an RLC channel either on the MCG or on the SCG depending on whether the MN or the SN configures this field.
flowControlFeedbackType This field is only used for IAB-node that support hop-by-hop flow control to configure the type of flow control feedback. Value *perBH-RLC-Channel* indicates that the IAB-node shall provide flow control feedback per BH RLC channel, value *perRoutingID* indicates that the IAB-node shall provide flow control feedback per routing ID, and value *both* indicates that the IAB-node shall provide flow control feedback both per BH RLC channel and per routing ID.
fullConfig Indicates that the full configuration option is applicable for the *RRCReconfiguration* message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, *fullConfig* indicates whether or not delta signalling of SDAP/PDCP from source RAT is applicable. This field is absent if any DAPS bearer is configured or when the *RRCReconfiguration* message is transmitted on SRB3, and in an *RRCReconfiguration* message for SCG contained in another *RRCReconfiguration* message (or *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1.
iab-IP-Address This field is used to provide the IP address information for IAB-node.

iab-IP-AddressIndex This field is used to identify a configuration of an IP address.
iab-IP-AddressToAddModList List of IP addresses allocated for IAB-node to be added and modified.
iab-IP-AddressToReleaseList List of IP address allocated for IAB-node to be released.
iab-IP-Usage This field is used to indicate the usage of the assigned IP address. If this field is not configured, the assigned IP address is used for all traffic.
iab-donor-DU-BAP-Address This field is used to indicate the BAP address of the IAB-donor-DU where the IP address is anchored.
keySetChangeIndicator Indicates whether UE shall derive a new K_{gNB}. If *reconfigurationWithSync* is included, value *true* indicates that a K_{gNB} key is derived from a K_{AMF} key taken into use through the latest successful NAS SMC procedure, or N2 handover procedure with K_{AMF} change, as described in TS 33.501 [11] for K_{gNB} re-keying. Value *false* indicates that the new K_{gNB} key is obtained from the current K_{gNB} key or from the NH as described in TS 33.501 [11].
masterCellGroup Configuration of master cell group.
mrdc-ReleaseAndAdd This field indicates that the current SCG configuration is released and a new SCG is added at the same time.
mrdc-SecondaryCellGroup Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (nr-SCG), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup, otherConfig, conditionalReconfiguration, measConfig, bap-Config* and *IAB-IP-AddressConfigurationList*. For NE-DC (eutra-SCG), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*.
musim-GapConfig Indicates the MUSIM gap configuration and controls setup/release of MUSIM gaps. In this version of the specification, the network does not configure MUSIM gap together with concurrent measurement gap or preconfigured measurement gap for positioning.
nas-Container This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS security after inter-system handover to NR. The content is defined in TS 24.501 [23].
needForGapsConfigNR Configuration for the UE to report measurement gap requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
needForGapNCSG-ConfigEUTRA Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
needForGapNCSG-ConfigNR Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
nextHopChainingCount Parameter NCC: See TS 33.501 [11]
onDemandSIB-Request If the field is present, the UE is allowed to request SIB(s) on-demand while in RRC_CONNECTED according to clause 5.2.2.3.5.
onDemandSIB-RequestProhibitTimer Prohibit timer for requesting SIB(s) on-demand while in RRC_CONNECTED according to clause 5.2.2.3.5. Value in seconds. Value s0 means prohibit timer is set to 0 seconds, value s0dot5 means prohibit timer is set to 0.5 seconds, value s1 means prohibit timer is set to 1 second and so on.

otherConfig Contains configuration related to other configurations. When configured for the SCG, only fields *drx-PreferenceConfig, maxBW-PreferenceConfig, maxBW-PreferenceConfigFR2-2, maxCC-PreferenceConfig, maxMIMO-LayerPreferenceConfig*, *maxMIMO-LayerPreferenceConfigFR2-2*, *minSchedulingOffsetPreferenceConfig, minSchedulingOffsetPreferenceConfigExt, rlm-RelaxationReportingConfig, bfd-RelaxationReportingConfig, btNameList, wlanNameList, sensorNameList* and *obtainCommonLocation* can be included.
radioBearerConfig Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP. In (NG)EN-DC this field may only be present if the *RRCReconfiguration* is transmitted over SRB3. SRB4 should not be configured if *sl-L2RemoteUE-Config-r17* is configured or not released.
radioBearerConfig2 Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC.

scg-State
Indicates that the SCG is in deactivated state.
This field is not used
- in an *RRCReconfiguration* message received:
  - within *mrdc-SecondaryCellGroup*, or
  - in an E-UTRA *RRCConnectionReconfiguration* message, or
  - in an E-UTRA *RRCConnectionResume* message or
- in an *RRCReconfiguration* message received via SRB3, except if the *RRCReconfiguration* message is included in *DLInformationTransferMRDC*.
The field is absent if CPA or CPC is configured for the UE, or if the *RRCReconfiguration* message is contained in *CondRRCReconfig*.

sl-L2RelayUE-Config Contains L2 U2N relay operation related configurations used by a UE acting as or to be acting as a L2 U2N Relay UE. The field is absent if *conditionalReconfiguration* is configured for CHO.
sl-L2RemoteUE-Config Contains L2 U2N relay operation related configurations used by a UE acting as or to be acting as a L2 U2N Remote UE. The field is absent if *conditionalReconfiguration* is configured for CHO, or if *appLayerMeasConfig* or SRB4 is configured/not released.
secondaryCellGroup Configuration of secondary cell group ((NG)EN-DC or NR-DC).
sk-Counter A counter used upon initial configuration of S-K_{gNB} or S-K_{eNB}, as well as upon refresh of S-K_{gNB} or S-K_{eNB}. This field is always included either upon initial configuration of an NR SCG or upon configuration of the first RB with *keyToUse* set to *secondary*, whichever happens first. This field is absent if there is neither any NR SCG nor any RB with *keyToUse* set to *secondary*.
sl-ConfigDedicatedNR This field is used to provide the dedicated configurations for NR sidelink communication/discovery.
sl-ConfigDedicatedEUTRA-Info This field includes the E-UTRA *RRCConnectionReconfiguration* as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* can only includes sidelink related fields for V2X sidelink communication, i.e. *sl-V2X-ConfigDedicated*, *sl-V2X-SPS-Config*, *measConfig* and/or *otherConfig*.
sl-TimeOffsetEUTRA This field indicates the possible time offset to (de)activation of V2X sidelink transmission after receiving DCI format 3_1 used for scheduling V2X sidelink communication. Value *ms0dpt75* corresponds to 0.75ms, *ms1* corresponds to 1ms and so on. The network includes this field only when *sl-ConfigDedicatedEUTRA* is configured.
targetCellSMTC-SCG The SSB periodicity/offset/duration configuration of target cell for NR PSCell addition and SN change. When UE receives this field, UE applies the configuration based on the timing reference of NR PCell for PSCell addition and PSCell change for the case of no reconfiguration with sync of MCG, and UE applies the configuration based on the timing reference of target NR PCell for the case of reconfiguration with sync of MCG. If both this field and the *smtc* in *secondaryCellGroup -> SpCellConfig -> reconfigurationWithSync* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message.
t316 Indicates the value for timer T316 as described in clause 7.1. Value *ms50* corresponds to 50 ms, value *ms100* corresponds to 100 ms and so on. This field can be configured only if the UE is configured with split SRB1 or SRB3.

ue-TxTEG-RequestUL-TDOA-Config Configures the periodicity of UE reporting for the association between Tx TEG and SRS Positioning resources. When configured with *oneShot* UE reports the association only one time. When configured with *periodicReporting* UE reports the association periodically and the *periodicReporting* indicates the periodicity. Value *ms160* corresponds to 160ms, value *ms320* corresponds to 320ms and so on.
ul-GapFR2-Config Indicates the FR2 UL gap configuration to UE. In EN-DC and NGEN-DC, the SN decides and configures the FR2 UL gap pattern. In NE-DC, the MN decides and configures the FR2 UL gap pattern. In NR-DC without FR2-FR2 band combination, the network entity which is configured with FR2 serving cell(s) decides and configures the FR2 UL gap pattern.

Conditional Presence	Explanation
nonHO	The field is absent in case of reconfiguration with sync within NR or to NR; otherwise it is optionally present, need N.
securityNASC	This field is mandatory present in case of inter system handover. Otherwise the field is optionally present, need N.
MasterKeyChange	This field is mandatory present in case *masterCellGroup* includes *ReconfigurationWithSync* and *RadioBearerConfig* includes *SecurityConfig* with *SecurityAlgorithmConfig*, indicating a change of the AS security algorithms associated to the master key. If *ReconfigurationWithSync* is included for other cases, this field is optionally present, need N. Otherwise the field is absent.
FullConfig	The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N, during reconfiguration with sync and also in first reconfiguration after reestablishment; or for intra-system handover from E-UTRA/5GC to NR. It is absent otherwise.
SCG	The field is mandatory present in: - an *RRCReconfiguration* message contained in an *RRCResume* message (or in an *RRCConnectionResume* message, see TS 36.331 [10]), - an *RRCReconfiguration* message contained in an *RRCConnectionReconfiguration* message, see TS 36.331 [10], which is contained in *DLInformationTransferMRDC* transmitted on SRB3 (as a response to *ULInformationTransferMRDC* including an *MCGFailureInformation*). The field is optional present, Need M, in: - an *RRCReconfiguration* message transmitted on SRB3, - an *RRCReconfiguration* message contained in another *RRCReconfiguration* message (or in an *RRCConnectionReconfiguration* message, see TS 36.331 [10]) transmitted on SRB1 - an *RRCReconfiguration* message contained in another *RRCReconfiguration* message which is contained in *DLInformationTransferMRDC* transmitted on SRB3 (as a response to *ULInformationTransferMRDC* including an *MCGFailureInformation*) Otherwise, the field is absent
PagingRelay	For L2 U2N Relay UE, the field is optionally present, Need N. Otherwise, it is absent.

– *RRCReconfigurationComplete*

The *RRCReconfigurationComplete* message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1 or SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCReconfigurationComplete message

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONCOMPLETE-START

RRCReconfigurationComplete ::=              SEQUENCE {
    rrc-TransactionIdentifier                   RRC-TransactionIdentifier,
    criticalExtensions                          CHOICE {
        rrcReconfigurationComplete                  RRCReconfigurationComplete-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

RRCReconfigurationComplete-IEs ::=          SEQUENCE {
    lateNonCriticalExtension                    OCTET STRING                                                    OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1530-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1530-IEs ::=    SEQUENCE {
    uplinkTxDirectCurrentList                   UplinkTxDirectCurrentList                                       OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1560-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1560-IEs ::=    SEQUENCE {
    scg-Response                                CHOICE {
        nr-SCG-Response                             OCTET STRING (CONTAINING RRCReconfigurationComplete),
        eutra-SCG-Response                          OCTET STRING
    }                                                                                                               OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1610-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1610-IEs ::=    SEQUENCE {
    ue-MeasurementsAvailable-r16                UE-MeasurementsAvailable-r16                                    OPTIONAL,
    needForGapsInfoNR-r16                       NeedForGapsInfoNR-r16                                           OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1640-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1640-IEs ::=    SEQUENCE {
    uplinkTxDirectCurrentTwoCarrierList-r16     UplinkTxDirectCurrentTwoCarrierList-r16                         OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1700-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1700-IEs ::=    SEQUENCE {
    needForGapNCSG-InfoNR-r17                   NeedForGapNCSG-InfoNR-r17                                       OPTIONAL,
    needForGapNCSG-InfoEUTRA-r17                NeedForGapNCSG-InfoEUTRA-r17                                    OPTIONAL,
    selectedCondRRCReconfig-r17                 CondReconfigId-r16                                              OPTIONAL,
    nonCriticalExtension                        RRCReconfigurationComplete-v1720-IEs                            OPTIONAL
}

RRCReconfigurationComplete-v1720-IEs ::=    SEQUENCE {
    uplinkTxDirectCurrentMoreCarrierList-r17    UplinkTxDirectCurrentMoreCarrierList-r17                        OPTIONAL,
```

```
    nonCriticalExtension                SEQUENCE {}                                 OPTIONAL
}

-- TAG-RRCRECONFIGURATIONCOMPLETE-STOP
-- ASN1STOP
```

***RRCReconfigurationComplete-IEs* field descriptions**
needForGapsInfoNR This field is used to indicate the measurement gap requirement information of the UE for NR target bands.
needForGapNCSG-InfoEUTRA This field is used to indicate the measurement gap and NCSG requirement information of the UE for E-UTRA target bands.
needForGapNCSG-InfoNR This field is used to indicate the measurement gap and NCSG requirement information of the UE for NR target bands.
scg-Response In case of NR-DC (*nr-SCG-Response*), this field includes the *RRCReconfigurationComplete* message. In case of NE-DC (*eutra-SCG-Response*), this field includes the E-UTRA *RRCConnectionReconfigurationComplete* message as specified in TS 36.331 [10].
selectedCondRRCReconfig This field indicates the ID of the selected conditional reconfiguration the UE applied upon the execution of CPA or inter-SN CPC.
uplinkTxDirectCurrentList The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see *reportUplinkTxDirectCurrent* in *CellGroupConfig*).
uplinkTxDirectCurrentMoreCarrierList The Tx Direct Current locations for the configured intra-band CA requested by *reportUplinkTxDirectCurrentMoreCarrier-r17*.
uplinkTxDirectCurrentTwoCarrierList The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see *reportUplinkTxDirectCurrentTwoCarrier-r16* in *CellGroupConfig*).

– *RRCReject*

The *RRCReject* message is used to reject an RRC connection establishment or an RRC connection resumption.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: Network to UE

***RRCReject* message**

```
-- ASN1START
-- TAG-RRCREJECT-START

RRCReject ::=                       SEQUENCE {
    criticalExtensions                  CHOICE {
```

```
        rrcReject                           RRCReject-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCReject-IEs ::=                   SEQUENCE {
    waitTime                            RejectWaitTime                                  OPTIONAL,   -- Need N
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

-- TAG-RRCREJECT-STOP
-- ASN1STOP
```

***RRCReject-IEs* field descriptions**
waitTime
Wait time value in seconds. The field is always included.

– *RRCRelease*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

RRCRelease message

```
-- ASN1START
-- TAG-RRCRELEASE-START

RRCRelease ::=                      SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcRelease                          RRCRelease-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCRelease-IEs ::=                  SEQUENCE {
    redirectedCarrierInfo               RedirectedCarrierInfo                           OPTIONAL,   -- Need N
    cellReselectionPriorities           CellReselectionPriorities                       OPTIONAL,   -- Need R
    suspendConfig                       SuspendConfig                                   OPTIONAL,   -- Need R
    deprioritisationReq                 SEQUENCE {
```

```
        deprioritisationType                ENUMERATED {frequency, nr},
        deprioritisationTimer               ENUMERATED {min5, min10, min15, min30}
    }                                                                                   OPTIONAL,   -- Need N
    lateNonCriticalExtension                OCTET STRING                              OPTIONAL,
    nonCriticalExtension                    RRCRelease-v1540-IEs                      OPTIONAL
}

RRCRelease-v1540-IEs ::=            SEQUENCE {
    waitTime                            RejectWaitTime              OPTIONAL, -- Need N
    nonCriticalExtension                RRCRelease-v1610-IEs        OPTIONAL
}

RRCRelease-v1610-IEs ::=            SEQUENCE {
    voiceFallbackIndication-r16         ENUMERATED {true}                           OPTIONAL, -- Need N
    measIdleConfig-r16                  SetupRelease {MeasIdleConfigDedicated-r16}  OPTIONAL, -- Need M
    nonCriticalExtension                RRCRelease-v1650-IEs                        OPTIONAL
}

RRCRelease-v1650-IEs ::=            SEQUENCE {
    mpsPriorityIndication-r16           ENUMERATED {true}                           OPTIONAL, -- Cond Redirection2
    nonCriticalExtension                RRCRelease-v1710-IEs                        OPTIONAL
}

RRCRelease-v1710-IEs ::=            SEQUENCE {
    noLastCellUpdate-r17                ENUMERATED {true}                           OPTIONAL,   -- Need S
    nonCriticalExtension                SEQUENCE {}                                 OPTIONAL
}

RedirectedCarrierInfo ::=           CHOICE {
    nr                                  CarrierInfoNR,
    eutra                               RedirectedCarrierInfo-EUTRA,
    ...
}

RedirectedCarrierInfo-EUTRA ::=     SEQUENCE {
    eutraFrequency                      ARFCN-ValueEUTRA,
    cnType                              ENUMERATED {epc,fiveGC}                                 OPTIONAL    -- Need N
}

CarrierInfoNR ::=                   SEQUENCE {
    carrierFreq                         ARFCN-ValueNR,
    ssbSubcarrierSpacing                SubcarrierSpacing,
    smtc                                SSB-MTC                                                 OPTIONAL,       -- Need S
    ...
}

SuspendConfig ::=                   SEQUENCE {
    fullI-RNTI                          I-RNTI-Value,
    shortI-RNTI                         ShortI-RNTI-Value,
    ran-PagingCycle                     PagingCycle,
    ran-NotificationAreaInfo            RAN-NotificationAreaInfo                                OPTIONAL,   -- Need M
    t380                                PeriodicRNAU-TimerValue                                 OPTIONAL,   -- Need R
    nextHopChainingCount                NextHopChainingCount,
    ...,
```

```
    [[
    sl-UEIdentityRemote-r17             RNTI-Value                                                  OPTIONAL, -- Cond L2RemoteUE
    sdt-Config-r17                      SetupRelease { SDT-Config-r17 }                             OPTIONAL,   -- Need M
    srs-PosRRC-Inactive-r17             SetupRelease { SRS-PosRRC-Inactive-r17 }                    OPTIONAL,   -- Need M
    ran-ExtendedPagingCycle-r17         ExtendedPagingCycle-r17                                     OPTIONAL    -- Cond RANPaging
    ]],
    [[
    ncd-SSB-RedCapInitialBWP-SDT-r17    SetupRelease {NonCellDefiningSSB-r17}                       OPTIONAL    -- Need M
    ]]
}

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

CellReselectionPriorities ::=       SEQUENCE {
    freqPriorityListEUTRA               FreqPriorityListEUTRA                                       OPTIONAL,       -- Need M
    freqPriorityListNR                  FreqPriorityListNR                                          OPTIONAL,       -- Need M
    t320                                ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL,     -- Need R
    ...,
    [[
    freqPriorityListDedicatedSlicing-r17 FreqPriorityListDedicatedSlicing-r17                       OPTIONAL        -- Need M
    ]]
}

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

ExtendedPagingCycle-r17 ::=         ENUMERATED {rf256, rf512, rf1024, spare1}

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

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

FreqPriorityEUTRA ::=               SEQUENCE {
    carrierFreq                         ARFCN-ValueEUTRA,
    cellReselectionPriority             CellReselectionPriority,
    cellReselectionSubPriority          CellReselectionSubPriority                                  OPTIONAL        -- Need R
}

FreqPriorityNR ::=                  SEQUENCE {
    carrierFreq                         ARFCN-ValueNR,
    cellReselectionPriority             CellReselectionPriority,
    cellReselectionSubPriority          CellReselectionSubPriority                                  OPTIONAL        -- Need R
}

RAN-NotificationAreaInfo ::=        CHOICE {
    cellList                            PLMN-RAN-AreaCellList,
    ran-AreaConfigList                  PLMN-RAN-AreaConfigList,
    ...
}

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

PLMN-RAN-AreaCell ::=               SEQUENCE {
    plmn-Identity                       PLMN-Identity                                               OPTIONAL,   -- Need S
    ran-AreaCells                       SEQUENCE (SIZE (1..32)) OF  CellIdentity
```

```
}

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

PLMN-RAN-AreaConfig ::=             SEQUENCE {
    plmn-Identity                       PLMN-Identity                                                   OPTIONAL,   -- Need S
    ran-Area                            SEQUENCE (SIZE (1..16)) OF  RAN-AreaConfig
}

RAN-AreaConfig ::=                  SEQUENCE {
    trackingAreaCode                    TrackingAreaCode,
    ran-AreaCodeList                    SEQUENCE (SIZE (1..32)) OF  RAN-AreaCode                        OPTIONAL    -- Need R
}

SDT-Config-r17 ::=                  SEQUENCE {
    sdt-DRB-List-r17                    SEQUENCE (SIZE (0..maxDRB)) OF DRB-Identity                     OPTIONAL,   -- Need M
    sdt-SRB2-Indication-r17             ENUMERATED {allowed}                                            OPTIONAL,   -- Need R
    sdt-MAC-PHY-CG-Config-r17           SetupRelease {SDT-CG-Config-r17}                                OPTIONAL,   -- Need M
    sdt-DRB-ContinueROHC-r17            ENUMERATED { cell, rna }                                        OPTIONAL    -- Need S
}

SDT-CG-Config-r17 ::= OCTET STRING (CONTAINING SDT-MAC-PHY-CG-Config-r17)

SDT-MAC-PHY-CG-Config-r17 ::=       SEQUENCE {
    -- CG-SDT specific configuration
    cg-SDT-ConfigLCH-RestrictionToAddModList-r17 SEQUENCE (SIZE(1..maxLC-ID)) OF  CG-SDT-ConfigLCH-Restriction-r17 OPTIONAL,   -- Need N
    cg-SDT-ConfigLCH-RestrictionToReleaseList-r17 SEQUENCE (SIZE(1..maxLC-ID)) OF  LogicalChannelIdentity  OPTIONAL,   -- Need N
    cg-SDT-ConfigInitialBWP-NUL-r17       SetupRelease {BWP-UplinkDedicatedSDT-r17}                 OPTIONAL,   -- Need M
    cg-SDT-ConfigInitialBWP-SUL-r17       SetupRelease {BWP-UplinkDedicatedSDT-r17}                 OPTIONAL,   -- Need M
    cg-SDT-ConfigInitialBWP-DL-r17        BWP-DownlinkDedicatedSDT-r17                              OPTIONAL,   -- Need M
    cg-SDT-TimeAlignmentTimer-r17           TimeAlignmentTimer                                          OPTIONAL,   -- Need M
    cg-SDT-RSRP-ThresholdSSB-r17            RSRP-Range                                                  OPTIONAL,   -- Need M
    cg-SDT-TA-ValidationConfig-r17          SetupRelease { CG-SDT-TA-ValidationConfig-r17 }             OPTIONAL,   -- Need M
    cg-SDT-CS-RNTI-r17                      RNTI-Value                                                  OPTIONAL,   -- Need M
    ...
}

CG-SDT-TA-ValidationConfig-r17 ::=  SEQUENCE {
    cg-SDT-RSRP-ChangeThreshold-r17     ENUMERATED { dB2, dB4, dB6, dB8, dB10, dB14, dB18, dB22,
                                            dB26, dB30, dB34, spare5, spare4, spare3, spare2, spare1}
}

BWP-DownlinkDedicatedSDT-r17 ::=    SEQUENCE {
    pdcch-Config-r17                    SetupRelease { PDCCH-Config }                                   OPTIONAL,   -- Need M
    pdsch-Config-r17                    SetupRelease { PDSCH-Config }                                   OPTIONAL,   -- Need M
   ...
}

BWP-UplinkDedicatedSDT-r17 ::=      SEQUENCE {
    pusch-Config-r17                    SetupRelease { PUSCH-Config }                                   OPTIONAL,   -- Need M
    configuredGrantConfigToAddModList-r17               ConfiguredGrantConfigToAddModList-r16           OPTIONAL,   -- Need N
    configuredGrantConfigToReleaseList-r17              ConfiguredGrantConfigToReleaseList-r16          OPTIONAL,   -- Need N
   ...
}
```

```
CG-SDT-ConfigLCH-Restriction-r17 ::= SEQUENCE {
    logicalChannelIdentity-r17          LogicalChannelIdentity,
    configuredGrantType1Allowed-r17     ENUMERATED {true}                                                   OPTIONAL,   -- Need R
    allowedCG-List-r17                  SEQUENCE (SIZE (0.. maxNrofConfiguredGrantConfigMAC-1-r16)) OF ConfiguredGrantConfigIndexMAC-r16
                                                                                                            OPTIONAL    -- Need R
}

SRS-PosRRC-Inactive-r17 ::= OCTET STRING (CONTAINING SRS-PosRRC-InactiveConfig-r17)

SRS-PosRRC-InactiveConfig-r17 ::=       SEQUENCE {
    srs-PosConfigNUL-r17                    SRS-PosConfig-r17                                               OPTIONAL,    -- Need R
    srs-PosConfigSUL-r17                    SRS-PosConfig-r17                                               OPTIONAL,    -- Need R
    bwp-NUL-r17                             BWP                                                             OPTIONAL,    -- Need S
    bwp-SUL-r17                             BWP                                                             OPTIONAL,    -- Need S
    inactivePosSRS-TimeAlignmentTimer-r17   TimeAlignmentTimer                                              OPTIONAL,    -- Need M
    inactivePosSRS-RSRP-ChangeThreshold-r17 RSRP-ChangeThreshold-r17                                        OPTIONAL     -- Need M
}

RSRP-ChangeThreshold-r17 ::= ENUMERATED {dB4, dB6, dB8, dB10, dB14, dB18, dB22, dB26, dB30, dB34, spare6, spare5, spare4, spare3, spare2, spare1}

SRS-PosConfig-r17 ::=               SEQUENCE {
    srs-PosResourceSetToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16 OPTIONAL,-- Need N
    srs-PosResourceSetToAddModList-r17  SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16  OPTIONAL,-- Need N
    srs-PosResourceToReleaseList-r17    SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16      OPTIONAL,-- Need N
    srs-PosResourceToAddModList-r17     SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16        OPTIONAL -- Need N
}

-- TAG-RRCRELEASE-STOP
-- ASN1STOP
```

***RRCRelease-IEs* field descriptions**
cellReselectionPriorities Dedicated priorities to be used for cell reselection as specified in TS 38.304 [20]. The maximum number of NR carrier frequencies that the network can configure through *FreqPriorityListNR* and *FreqPriorityListDedicatedSlicing* together is eight. If the same frequency is configured in both *FreqPriorityListNR* and *FreqPriorityListDedicatedSlicing*, the frequency is only counted once.
cnType Indicate that the UE is redirected to EPC or 5GC.
deprioritisationReq Indicates whether the current frequency or RAT is to be de-prioritised.
deprioritisationTimer Indicates the period for which either the current carrier frequency or NR is deprioritised. Value *minN* corresponds to N minutes.
measIdleConfig Indicates measurement configuration to be stored and used by the UE while in RRC_IDLE or RRC_INACTIVE.
mpsPriorityIndication Indicates the UE can set the establishment cause to *mps-PriorityAccess* for a new connection following a redirect to NR or set the resume cause to *mps-PriorityAccess* for a resume following a redirect to NR. If the target RAT is E-UTRA, see TS 36.331 [10]. The gNB sets the indication only for UEs authorized to receive MPS treatment as indicated by ARP and/or QoS characteristics at the gNB, and it is applicable only for this instance of release with redirection to carrier/RAT included in the *redirectedCarrierInfo* field in the *RRCRelease* message.
noLastCellUpdate Presence of the field indicates that the last used cell for PEI shall not be updated. When the field is absent, the PEI-capable UE shall update its last used cell with the current cell. The UE shall not update its last used cell with the current cell if the AS security is not activated.
srs-PosRRC-Inactive SRS for positioning configuration during RRC_INACTIVE state.
suspendConfig Indicates configuration for the RRC_INACTIVE state. The network does not configure *suspendConfig* when the network redirect the UE to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer.
redirectedCarrierInfo Indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an NR or an inter-RAT carrier frequency, by means of cell selection at transition to RRC_IDLE or RRC_INACTIVE as specified in TS 38.304 [20]. Based on UE capability, the network may include *redirectedCarrierInfo* in *RRCRelease* message with *suspendConfig* if this message is sent in response to an *RRCResumeRequest* or an *RRCResumeRequest1* which is triggered by the NAS layer (see 5.3.1.4 in TS 24.501 [23]).
voiceFallbackIndication Indicates the RRC release is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43].

***CarrierInfoNR* field descriptions**
carrierFreq Indicates the redirected NR frequency.
ssbSubcarrierSpacing Subcarrier spacing of SSB in the redirected SSB frequency. 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
smtc The SSB periodicity/offset/duration configuration for the redirected SSB frequency. It is based on timing reference of PCell. If the field is absent, the UE uses the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing.

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

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

***PLMN-RAN-AreaCell* field descriptions**
plmn-Identity PLMN Identity to which the cells in *ran-AreaCells* belong. If the field is absent the UE not in SNPN access mode uses the ID of the registered PLMN. This field is not included for UE in SNPN access mode (for UE in SNPN access mode the *ran-AreaCells* always belongs to the registered SNPN).
ran-AreaCells The total number of cells of all PLMNs does not exceed 32.

***SDT-Config* field descriptions**
sdt-DRB-ContinueROHC Indicates whether the PDCP entity of the radio bearers configured for SDT continues or resets the ROHC header compression protocol during PDCP re-establishment during SDT procedure, as specified in TS 38.323 [5]. Value *cell* indicates that ROHC header compression continues when the UE resumes for SDT in the same cell as the PCell when the RRCRelease message was received. Value *rna* indicates that ROHC header compression continues when the UE resumes for SDT in a cell belonging to the same RNA as the PCell where the RRCRelease message was received. If the field is absent, the UE releases any stored value for this field and the PDCP entity of the radio bearers configured for SDT always resets the ROHC header compression protocol during PDCP re-establishment when SDT procedure is initiated, as specified in TS 38.323 [5].
sdt-DRB-List Indicates the ID(s) of the DRB(s) that are configured for SDT. If size of the sequence is zero, then the UE assumes that none of the DRBs are configured for SDT. The network only configures MN terminated MCG bearers for SDT.
sdt-SRB2-Indication Indiates whether SRB2 is configured for SDT or not.

***SDT-MAC-PHY-CG-Config* field descriptions**
cg-SDT-ConfigInitialBWP-DL Downlink BWP configuration for CG-SDT. If a UE is a RedCap UE and if the *initialDownlinkBWP-RedCap* is configured in *downlinkConfigCommon* in *SIB1*, this field is configured for *initialDownlinkBWP-RedCap*, otherwise it is configured for *initialDownlinkBWP*.
cg-SDT-ConfigInitialBWP-NUL UL BWP configuration for CG-SDT on NUL carrier. If a UE is a RedCap UE and if the *initialUplinkBWP-RedCap* is configured in *uplinkConfigCommon* in *SIB1*, this field is configured for *initialUplinkBWP-RedCap*, otherwise it is configured for *initialUplinkBWP* for NUL.
cg-SDT-ConfigInitialBWP-SUL UL BWP configuration for CG-SDT on SUL carrier configured for the *initialUplinkBWP* for SUL.
cg-SDT-CS-RNTI The CS-RNTI value for CG-SDT as specified in TS 38.321 [3].
cg-SDT-RSRP-ThresholdSSB An RSRP threshold configured for SSB selection for CG-SDT as specified in TS 38.321 [3].
cg-SDT-TA-ValidationConfig Configuration for the RSRP based TA validation. If this field is not configured, then the UE does not perform RSRP based TA validation.
cg-SDT-timeAlignmentTimer TAT value for CG-SDT as specified in TS 38.321 [3]. The network always configures this field when *sdt-MAC-PHY-CG-Config* is configured.

***CG-SDT-ConfigLCH-Restriction* field descriptions**
allowedCG-List
This restriction applies only when the UL grant is a configured grant for CG-SDT. If present, UL MAC SDUs from this logical channel can only be mapped to the indicated CG-SDT configured grant configuration. If the size of the sequence is zero, then UL MAC SDUs from this logical channel cannot be mapped to any CG-SDT configured grant configurations. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any CG-SDT configured grant configurations. If the field *configuredGrantType1Allowed* is present, only those CG-SDT configured grant type 1 configurations indicated in this sequence are allowed for use by this logical channel; otherwise, this sequence shall not include any CG-SDT configured grant type 1 configuration. Corresponds to "*allowedCG-List*" as specified in TS 38.321 [3].
configuredGrantType1Allowed
If present, or if the capability *lcp-Restriction* as specified in TS 38.306 [26] is not supported, UL MAC SDUs from this logical channel can be transmitted on a configured grant type 1 for CG-SDT. Otherwise, UL MAC SDUs from this logical channel cannot be transmitted on a configured grant type 1 for CG-SDT. Corresponds to "*configuredGrantType1Allowed*" in TS 38.321 [3].
logicalChannelIdentity
ID used commonly for the MAC logical channel and for the RLC bearer associated with a *servedRadioBearer* configured for SDT.

***CG-SDT-TA-ValidationConfig* field descriptions**
cg-SDT-RSRP-ChangeThreshold
The RSRP threshold for TA validation for CG-SDT as specified in TS 38.321 [3]. Value *dB2* corresponds to 2 dB, value *dB4* corresponds to 4 dB and so on.

***SRS-PosRRC-InactiveConfig* field descriptions**
bwp-NUL
BWP configuration for SRS for Positioning during the RRC_INACTIVE state in Normal Uplink Carrier. If the field is absent UE is configured with an SRS for Positioning associated with the initial UL BWP and transmitted, during the RRC_INACTIVE state, inside the initial UL BWP with the same CP and SCS as configured for initial UL BWP.
bwp-SUL
BWP configuration for SRS for Positioning during the RRC_INACTIVE state in Supplementary Uplink Carrier. If the field is absent UE is configured with an SRS for Positioning associated with the initial UL BWP and transmitted, during the RRC_INACTIVE state, inside the initial UL BWP with the same CP and SCS as configured for initial UL BWP.
inactivePosSRS-RSRP-ChangeThreshold
RSRP threshold for the increase/decrease of RSRP for time alignment validation as specified in TS 38.321 [3].
inactivePosSRS-TimeAlignmentTimer
TAT value for SRS for positioning transmission during RRC_INACTIVE state as specified in TS 38.321 [3]. The network always configures this field when *srs-PosRRC-Inactive* is configured.
srs-PosConfigNUL
SRS for Positioning configuration in RRC_INACTIVE state in Normal Uplink Carrier.
srs-PosConfigSUL
SRS for Positioning configuration in RRC_INACTIVE state in Supplementary Uplink Carrier.

***SuspendConfig* field descriptions**
ncd-SSB-RedCapInitialBWP-SDT Indicates that the UE uses the RedCap-specific initial DL BWP associated with the NCD-SSB for SDT. The network configures this field if a RedCap UE is configured with SDT in the RedCap-specific initial DL BWP not associated with CD-SSB. If configured, the NCD-SSB indicated by this field can only be used during the SDT procedure for CG-SDT or RA-SDT.
ran-ExtendedPagingCycle The extended DRX (eDRX) cycle for RAN-initiated paging to be applied by the UE. Value *rf256* corresponds to 256 radio frames, value *rf512* corresponds to 512 radio frames and so on. Value of the field indicates an eDRX cycle which is shorter or equal to the IDLE mode eDRX cycle configured for the UE.
ran-NotificationAreaInfo Network ensures that the UE in RRC_INACTIVE always has a valid *ran-NotificationAreaInfo*.
ran-PagingCycle Refers to the UE specific cycle for RAN-initiated paging. Value *rf32* corresponds to 32 radio frames, value *rf64* corresponds to 64 radio frames and so on.
sl-UEIdentityRemote Indicates the C-RNTI to the L2 U2N Remote UE.
t380 Refers to the timer that triggers the periodic RNAU procedure in UE. Value *min5* corresponds to 5 minutes, value *min10* corresponds to 10 minutes and so on.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE's RNAU; otherwise it is absent.
RANPaging	This field is optionally present, Need R, if the UE is configured with IDLE eDRX, see TS 24.501 [23]; otherwise the field is not present.
Redirection2	The field is optionally present, Need R, if *redirectedCarrierInfo* is included; otherwise the field is not present.

– *RRCResume*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

***RRCResume* message**

```
-- ASN1START
-- TAG-RRCRESUME-START

RRCResume ::=                       SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcResume                           RRCResume-IEs,
        criticalExtensionsFuture            SEQUENCE {}
```

```
    }
}

RRCResume-IEs ::=                   SEQUENCE {
    radioBearerConfig                   RadioBearerConfig                                   OPTIONAL, -- Need M
    masterCellGroup                     OCTET STRING (CONTAINING CellGroupConfig)           OPTIONAL, -- Need M
    measConfig                          MeasConfig                                          OPTIONAL, -- Need M
    fullConfig                          ENUMERATED {true}                                   OPTIONAL, -- Need N
    lateNonCriticalExtension            OCTET STRING                                        OPTIONAL,
    nonCriticalExtension                RRCResume-v1560-IEs                                 OPTIONAL
}

RRCResume-v1560-IEs ::=             SEQUENCE {
    radioBearerConfig2                  OCTET STRING (CONTAINING RadioBearerConfig)         OPTIONAL, -- Need M
    sk-Counter                          SK-Counter                                          OPTIONAL, -- Need N
    nonCriticalExtension                RRCResume-v1610-IEs                                 OPTIONAL
}

RRCResume-v1610-IEs ::=             SEQUENCE {
    idleModeMeasurementReq-r16          ENUMERATED {true}                                   OPTIONAL, -- Need N
    restoreMCG-SCells-r16               ENUMERATED {true}                                   OPTIONAL, -- Need N
    restoreSCG-r16                      ENUMERATED {true}                                   OPTIONAL, -- Need N
    mrdc-SecondaryCellGroup-r16         CHOICE {
        nr-SCG-r16                          OCTET STRING (CONTAINING RRCReconfiguration),
        eutra-SCG-r16                       OCTET STRING
    }                                                                                       OPTIONAL, -- Cond RestoreSCG
    needForGapsConfigNR-r16             SetupRelease {NeedForGapsConfigNR-r16}              OPTIONAL, -- Need M
    nonCriticalExtension                RRCResume-v1700-IEs                                 OPTIONAL
}

RRCResume-v1700-IEs ::=             SEQUENCE {
    sl-ConfigDedicatedNR-r17            SetupRelease {SL-ConfigDedicatedNR-r16}             OPTIONAL, -- Cond L2RemoteUE
    sl-L2RemoteUE-Config-r17            SetupRelease {SL-L2RemoteUE-Config-r17}             OPTIONAL, -- Cond L2RemoteUE
    needForGapNCSG-ConfigNR-r17         SetupRelease {NeedForGapNCSG-ConfigNR-r17}          OPTIONAL, -- Need M
    needForGapNCSG-ConfigEUTRA-r17      SetupRelease {NeedForGapNCSG-ConfigEUTRA-r17}       OPTIONAL, -- Need M
    scg-State-r17                       ENUMERATED {deactivated}                            OPTIONAL, -- Need N
    appLayerMeasConfig-r17              AppLayerMeasConfig-r17                              OPTIONAL, -- Need M
    nonCriticalExtension                SEQUENCE {}                                         OPTIONAL
}

-- TAG-RRCRESUME-STOP
-- ASN1STOP
```

***RRCResume-IEs* field descriptions**
appLayerMeasConfig This field is used to configure application layer measurements. This field is absent when the UE is configured to operate with shared spectrum channel access.
idleModeMeasurementReq This field indicates that the UE shall report the idle/inactive measurements, if available, to the network in the *RRCResumeComplete* message
masterCellGroup Configuration of the master cell group.
mrdc-SecondaryCellGroup Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (*nr-SCG*), *mrdc-SecondaryCellGroup* contains the *RRCReconfiguration* message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields *secondaryCellGroup* (with at least *reconfigurationWithSync*), *otherConfig* and *measConfig*. For NE-DC (*eutra-SCG*), *mrdc-SecondaryCellGroup* includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message only include the field *scg-Configuration* with at least *mobilityControlInfoSCG*.
needForGapsConfigNR Configuration for the UE to report measurement gap requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
needForGapNCSG-ConfigEUTRA Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
needForGapNCSG-ConfigNR Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the *RRCReconfigurationComplete* and *RRCResumeComplete* message.
radioBearerConfig Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP.
radioBearerConfig2 Configuration of Radio Bearers (DRBs, SRBs) including SDAP/PDCP. This field can only be used if the UE supports NR-DC or NE-DC.
restoreMCG-SCells Indicates that the UE shall restore the MCG SCells from the UE Inactive AS Context, if stored.
restoreSCG Indicates that the UE shall restore the SCG configurations from the UE Inactive AS Context, if stored.
scg-State Indicates that the SCG is in deactivated state.
sk-Counter A counter used to derive S-K_{gNB} or S-K_{eNB} based on the newly derived K_{gNB} during RRC Resume. The field is only included when there is one or more RB with *keyToUse* set to *secondary or mrdc-SecondaryCellGroup* is included.
sl-ConfigDedicatedNR This field is used to provide the dedicated configurations for NR sidelink communication/discovery used by L2 U2N Remote UE.
sl-L2RemoteUE-Config Contains L2 U2N relay operation related configurations used by L2 U2N Remote UE. The field is absent if *appLayerMeasConfig* or SRB4 is configured/not released.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.
RestoreSCG	The field is mandatory present if *restoreSCG* is included. It is optionally present, Need M, otherwise.

– *RRCResumeComplete*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCResumeComplete message

```
-- ASN1START
-- TAG-RRCRESUMECOMPLETE-START

RRCResumeComplete ::=                   SEQUENCE {
    rrc-TransactionIdentifier               RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        rrcResumeComplete                       RRCResumeComplete-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

RRCResumeComplete-IEs ::=               SEQUENCE {
    dedicatedNAS-Message                    DedicatedNAS-Message                                    OPTIONAL,
    selectedPLMN-Identity                   INTEGER (1..maxPLMN)                                    OPTIONAL,
    uplinkTxDirectCurrentList               UplinkTxDirectCurrentList                               OPTIONAL,
    lateNonCriticalExtension                OCTET STRING                                            OPTIONAL,
    nonCriticalExtension                    RRCResumeComplete-v1610-IEs                             OPTIONAL
}

RRCResumeComplete-v1610-IEs ::=         SEQUENCE {
    idleMeasAvailable-r16                   ENUMERATED {true}                                       OPTIONAL,
    measResultIdleEUTRA-r16                 MeasResultIdleEUTRA-r16                                 OPTIONAL,
    measResultIdleNR-r16                    MeasResultIdleNR-r16                                    OPTIONAL,
    scg-Response-r16                        CHOICE {
        nr-SCG-Response                         OCTET STRING (CONTAINING RRCReconfigurationComplete),
        eutra-SCG-Response                      OCTET STRING
    }                                                                                               OPTIONAL,
    ue-MeasurementsAvailable-r16            UE-MeasurementsAvailable-r16                            OPTIONAL,
    mobilityHistoryAvail-r16                ENUMERATED {true}                                       OPTIONAL,
    mobilityState-r16                       ENUMERATED {normal, medium, high, spare}                OPTIONAL,
    needForGapsInfoNR-r16                   NeedForGapsInfoNR-r16                                   OPTIONAL,
    nonCriticalExtension                    RRCResumeComplete-v1640-IEs                             OPTIONAL
}

RRCResumeComplete-v1640-IEs ::=         SEQUENCE {
    uplinkTxDirectCurrentTwoCarrierList-r16 UplinkTxDirectCurrentTwoCarrierList-r16                 OPTIONAL,
    nonCriticalExtension                    RRCResumeComplete-v1700-IEs                             OPTIONAL
}
```

```
RRCResumeComplete-v1700-IEs ::=         SEQUENCE {
    needForGapNCSG-InfoNR-r17               NeedForGapNCSG-InfoNR-r17                                   OPTIONAL,
    needForGapNCSG-InfoEUTRA-r17            NeedForGapNCSG-InfoEUTRA-r17                                OPTIONAL,
    nonCriticalExtension                    RRCResumeComplete-v1720-IEs                                 OPTIONAL
}

RRCResumeComplete-v1720-IEs ::=         SEQUENCE {
    uplinkTxDirectCurrentMoreCarrierList-r17 UplinkTxDirectCurrentMoreCarrierList-r17                   OPTIONAL,
    nonCriticalExtension                     SEQUENCE {}                                                OPTIONAL
}

-- TAG-RRCRESUMECOMPLETE-STOP
-- ASN1STOP
```

***RRCResumeComplete-IEs* field descriptions**
idleMeasAvailable Indication that the UE has idle/inactive measurement report available.
measResultIdleEUTRA EUTRA measurement results performed during RRC_INACTIVE.
measResultIdleNR NR measurement results performed during RRC_INACTIVE.
needForGapsInfoNR This field is used to indicate the measurement gap requirement information of the UE for NR target bands.
needForGapNCSG-InfoEUTRA This field is used to indicate the measurement gap and NCSG requirement information of the UE for E-UTRA target bands
needForGapNCSG-InfoNR This field is used to indicate the measurement gap and NCSG requirement information of the UE for NR target bands
selectedPLMN-Identity Index of the PLMN selected by the UE from the *plmn-IdentityInfoList* or *npn-IdentityInfoList* fields included in *SIB1*.
uplinkTxDirectCurrentList The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see *reportUplinkTxDirectCurrent* in *CellGroupConfig*).
uplinkTxDirectCurrentMoreCarrierList The Tx Direct Current locations for the configured intra-band CA requested by *reportUplinkTxDirectCurrentMoreCarrier-r17*.
uplinkTxDirectCurrentTwoCarrierList The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see *reportUplinkTxDirectCurrentTwoCarrier-r16* in *CellGroupConfig*).

– *RRCResumeRequest*

The *RRCResumeRequest* message is used to request the resumption of a suspended RRC connection or perform an RNA update.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCResumeRequest message

```
-- ASN1START
-- TAG-RRCRESUMEREQUEST-START

RRCResumeRequest ::=            SEQUENCE {
        rrcResumeRequest            RRCResumeRequest-IEs
}

RRCResumeRequest-IEs ::=        SEQUENCE {
    resumeIdentity                  ShortI-RNTI-Value,
    resumeMAC-I                     BIT STRING (SIZE (16)),
    resumeCause                     ResumeCause,
    spare                           BIT STRING (SIZE (1))
}

-- TAG-RRCRESUMEREQUEST-STOP
-- ASN1STOP
```

RRCResumeRequest-IEs field descriptions
resumeCause   Provides the resume cause for the RRC connection resume request as provided by the upper layers or RRC. The network is not expected to reject an *RRCResumeRequest* due to unknown cause value being used by the UE.
resumeIdentity   UE identity to facilitate UE context retrieval at gNB.
resumeMAC-I   Authentication token to facilitate UE authentication at gNB. The 16 least significant bits of the MAC-I calculated using the AS security configuration as specified in 5.3.13.3.

– *RRCResumeRequest1*

The *RRCResumeRequest1* message is used to request the resumption of a suspended RRC connection or perform an RNA update.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH1

Direction: UE to Network

RRCResumeRequest1 message

```
-- ASN1START
-- TAG-RRCRESUMEREQUEST1-START

RRCResumeRequest1 ::=          SEQUENCE {
       rrcResumeRequest1           RRCResumeRequest1-IEs
}

RRCResumeRequest1-IEs ::=    SEQUENCE {
    resumeIdentity               I-RNTI-Value,
    resumeMAC-I                  BIT STRING (SIZE (16)),
    resumeCause                  ResumeCause,
    spare                        BIT STRING (SIZE (1))
}

-- TAG-RRCRESUMEREQUEST1-STOP
-- ASN1STOP
```

RRCResumeRequest1-IEs field descriptions
resumeCause Provides the resume cause for the *RRCResumeRequest1* as provided by the upper layers or RRC. A gNB is not expected to reject an *RRCResumeRequest1* due to unknown cause value being used by the UE.
resumeIdentity UE identity to facilitate UE context retrieval at gNB.
resumeMAC-I Authentication token to facilitate UE authentication at gNB. The 16 least significant bits of the MAC-I calculated using the AS security configuration as specified in 5.3.13.3.

– *RRCSetup*

The *RRCSetup* message is used to establish SRB1.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: Network to UE

RRCSetup message

```
-- ASN1START
-- TAG-RRCSETUP-START

RRCSetup ::=                        SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
```

```
    criticalExtensions                  CHOICE {
        rrcSetup                            RRCSetup-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCSetup-IEs ::=                    SEQUENCE {
    radioBearerConfig                   RadioBearerConfig,
    masterCellGroup                     OCTET STRING (CONTAINING CellGroupConfig),
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                RRCSetup-v1700-IEs                              OPTIONAL
}

RRCSetup-v1700-IEs ::=              SEQUENCE {
    sl-ConfigDedicatedNR-r17            SL-ConfigDedicatedNR-r16                OPTIONAL, -- Cond L2RemoteUE
    sl-L2RemoteUE-Config-r17            SL-L2RemoteUE-Config-r17                OPTIONAL, -- Cond L2RemoteUE
    nonCriticalExtension                SEQUENCE {}                             OPTIONAL
}

-- TAG-RRCSETUP-STOP
-- ASN1STOP
```

***RRCSetup-IEs* field descriptions**
masterCellGroup The network configures only the RLC bearer for the SRB1, *mac-CellGroupConfig*, *physicalCellGroupConfig* and *spCellConfig*.
radioBearerConfig Only SRB1 can be configured in RRC setup.
sl-ConfigDedicatedNR Contains dedicated configurations for NR sidelink communication. The network configures only the PC5 Relay RLC channel and *sl-PHY-MAC-RLC-Config* used for the SRB1.
sl-L2RemoteUE-Config Contains dedicated configurations used for L2 U2N relay related operation. The network configures only the SRAP configuration used for the SRB1 and local UE ID.

Conditional Presence	Explanation
L2RemoteUE	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.

– *RRCSetupComplete*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

RRCSetupComplete message

```
-- ASN1START
-- TAG-RRCSETUPCOMPLETE-START

RRCSetupComplete ::=                SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcSetupComplete                    RRCSetupComplete-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCSetupComplete-IEs ::=            SEQUENCE {
    selectedPLMN-Identity               INTEGER (1..maxPLMN),
    registeredAMF                       RegisteredAMF                                   OPTIONAL,
    guami-Type                          ENUMERATED {native, mapped}                     OPTIONAL,
    s-NSSAI-List                        SEQUENCE (SIZE (1..maxNrofS-NSSAI)) OF S-NSSAI  OPTIONAL,
    dedicatedNAS-Message                DedicatedNAS-Message,
    ng-5G-S-TMSI-Value                  CHOICE {
        ng-5G-S-TMSI                        NG-5G-S-TMSI,
        ng-5G-S-TMSI-Part2                  BIT STRING (SIZE (9))
    }                                                                                   OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                RRCSetupComplete-v1610-IEs                      OPTIONAL
}

RRCSetupComplete-v1610-IEs ::=      SEQUENCE {
    iab-NodeIndication-r16              ENUMERATED {true}                               OPTIONAL,
    idleMeasAvailable-r16               ENUMERATED {true}                               OPTIONAL,
    ue-MeasurementsAvailable-r16        UE-MeasurementsAvailable-r16                    OPTIONAL,
    mobilityHistoryAvail-r16            ENUMERATED {true}                               OPTIONAL,
    mobilityState-r16                   ENUMERATED {normal, medium, high, spare}        OPTIONAL,
    nonCriticalExtension                RRCSetupComplete-v1690-IEs                      OPTIONAL
}

RRCSetupComplete-v1690-IEs ::=      SEQUENCE {
    ul-RRC-Segmentation-r16             ENUMERATED {true}                               OPTIONAL,
    nonCriticalExtension                RRCSetupComplete-v1700-IEs                      OPTIONAL
}

RRCSetupComplete-v1700-IEs ::=      SEQUENCE {
    onboardingRequest-r17               ENUMERATED {true}                               OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

RegisteredAMF ::=                   SEQUENCE {
    plmn-Identity                       PLMN-Identity                                   OPTIONAL,
    amf-Identifier                      AMF-Identifier
}

-- TAG-RRCSETUPCOMPLETE-STOP
-- ASN1STOP
```

***RRCSetupComplete-IEs* field descriptions**
guami-Type This field is used to indicate whether the GUAMI included is native (derived from native 5G-GUTI) or mapped (from EPS, derived from EPS GUTI) as specified in TS 24.501 [23].
iab-NodeIndication This field is used to indicate that the connection is being established by an IAB-node as specified in TS 38.300 [2].
idleMeasAvailable Indication that the UE has idle/inactive measurement report available.
mobilityState This field indicates the UE mobility state (as defined in TS 38.304 [20], clause 5.2.4.3) just prior to UE going into RRC_CONNECTED state. The UE indicates the value of *medium* and *high* when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value *normal*.
ng-5G-S-TMSI-Part2 The leftmost 9 bits of 5G-S-TMSI.
onboardingRequest This field indicates that the connection is being established for UE onboarding in the selected onboarding SNPN, see TS 23.501 [32].
registeredAMF This field is used to transfer the GUAMI of the AMF where the UE is registered, as provided by upper layers, see TS 23.003 [21].
selectedPLMN-Identity Index of the PLMN or SNPN selected by the UE from the *plmn-IdentityInfoList* or *npn-IdentityInfoList* fields included in SIB1.
ul-RRC-Segmentation This field indicates the UE supports uplink RRC segmentation of *UECapabilityInformation.*

– *RRCSetupRequest*

The *RRCSetupRequest* message is used to request the establishment of an RRC connection.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

RRCSetupRequest message

```
-- ASN1START
-- TAG-RRCSETUPREQUEST-START

RRCSetupRequest ::=                 SEQUENCE {
    rrcSetupRequest                     RRCSetupRequest-IEs
}

RRCSetupRequest-IEs ::=             SEQUENCE {
    ue-Identity                         InitialUE-Identity,
    establishmentCause                  EstablishmentCause,
```

```
    spare                               BIT STRING (SIZE (1))
}

InitialUE-Identity ::=              CHOICE {
    ng-5G-S-TMSI-Part1                  BIT STRING (SIZE (39)),
    randomValue                         BIT STRING (SIZE (39))
}

EstablishmentCause ::=              ENUMERATED {
                                        emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                        mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, mps-PriorityAccess, mcs-PriorityAccess,
                                        spare6, spare5, spare4, spare3, spare2, spare1}

-- TAG-RRCSETUPREQUEST-STOP
-- ASN1STOP
```

***RRCSetupRequest-IEs* field descriptions**
establishmentCause Provides the establishment cause for the *RRCSetupRequest* in accordance with the information received from upper layers. gNB is not expected to reject an *RRCSetupRequest* due to unknown cause value being used by the UE.
ue-Identity UE identity included to facilitate contention resolution by lower layers.

***InitialUE-Identity* field descriptions**
ng-5G-S-TMSI-Part1 The rightmost 39 bits of 5G-S-TMSI.
randomValue Integer value in the range 0 to 2^{39} – 1.

– *RRCSystemInfoRequest*

The *RRCSystemInfoRequest* message is used to request SI message(s) required by the UE as specified in clause 5.2.2.3.3 and 5.2.2.3.3a.

Signalling radio bearer: SRB0

RLC-SAP: TM

Logical channel: CCCH

Direction: UE to Network

***RRCSystemInfoRequest* message**

```
-- ASN1START
-- TAG-RRCSYSTEMINFOREQUEST-START
```

```
RRCSystemInfoRequest ::=            SEQUENCE {
    criticalExtensions                  CHOICE {
        rrcSystemInfoRequest                RRCSystemInfoRequest-IEs,
        criticalExtensionsFuture-r16        CHOICE {
            rrcPosSystemInfoRequest-r16         RRC-PosSystemInfoRequest-r16-IEs,
            criticalExtensionsFuture            SEQUENCE {}
        }
    }
}

RRCSystemInfoRequest-IEs ::=    SEQUENCE {
    requested-SI-List                   BIT STRING (SIZE (maxSI-Message)),  --32bits
    spare                               BIT STRING (SIZE (12))
}

RRC-PosSystemInfoRequest-r16-IEs ::=  SEQUENCE {
    requestedPosSI-List                   BIT STRING (SIZE (maxSI-Message)),  --32bits
    spare                                 BIT STRING (SIZE (11))
}

-- TAG-RRCSYSTEMINFOREQUEST-STOP
-- ASN1STOP
```

***RRCSystemInfoRequest-IEs* field descriptions**
requested-SI-List Contains a list of requested SI messages which are configured by *schedulingInfoList* in *si-SchedulingInfo* and *schedulingInfoList2* in *si-SchedulingInfo-v1700* (if present) in SIB1. If *si-SchedulingInfo-v1700* is not present: - According to the order of entry in the list of SI messages configured by *schedulingInfoList* in *si-SchedulingInfo* in *SIB1*, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on. If *si-SchedulingInfo-v1700* is present: - The UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messages configured by *schedulingInfoList* in *si-SchedulingInfo*. - According to the order of entry in the list of concatenated SI messages, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.
requestedPosSI-List Contains a list of requested SI messages which are configured by *posSchedulingInfoList* in *posSI-SchedulingInfo* and *schedulingInfoList2* in *si-SchedulingInfo-v1700* (if present) in SIB1. If *si-SchedulingInfo-v1700* is not present: - According to the order of entry in the list of SI messages configured by *posSchedulingInfoList* in *posSI-SchedulingInfo* in *SIB1*, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on. If *si-SchedulingInfo-v1700* is present: - The UE creates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messages configured by *posSchedulingInfoList* in *posSI-SchedulingInfo*. - According to the order of entry in the list of concatenated SI messages, first bit corresponds to first/leftmost listed SI message, second bit corresponds to second listed SI message, and so on.

– *SCGFailureInformation*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SCGFailureInformation message

```
-- ASN1START
-- TAG-SCGFAILUREINFORMATION-START

SCGFailureInformation ::=                   SEQUENCE {
    criticalExtensions                           CHOICE {
        scgFailureInformation                        SCGFailureInformation-IEs,
        criticalExtensionsFuture                  SEQUENCE {}
    }
}

SCGFailureInformation-IEs ::=           SEQUENCE {
    failureReportSCG                        FailureReportSCG                    OPTIONAL,
    nonCriticalExtension                    SCGFailureInformation-v1590-IEs     OPTIONAL
}

SCGFailureInformation-v1590-IEs ::=      SEQUENCE {
    lateNonCriticalExtension              OCTET STRING                        OPTIONAL,
    nonCriticalExtension                  SEQUENCE {}                         OPTIONAL
}

FailureReportSCG ::=                        SEQUENCE {
    failureType                                 ENUMERATED {
                                                           t310-Expiry, randomAccessProblem,
                                                           rlc-MaxNumRetx,
                                                           synchReconfigFailureSCG, scg-ReconfigFailure,
                                                           srb3-IntegrityFailure, other-r16, spare1},
    measResultFreqList                          MeasResultFreqList                                              OPTIONAL,
    measResultSCG-Failure                     OCTET STRING (CONTAINING MeasResultSCG-Failure)              OPTIONAL,
    ...,
    [[
    locationInfo-r16                            LocationInfo-r16            OPTIONAL,
   failureType-v1610                          ENUMERATED {scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
                                                          t312-Expiry-r16, bh-RLF-r16, beamFailure-r17, spare3, spare2, spare1} OPTIONAL

    ]],
    [[
    previousPSCellId-r17              SEQUENCE {
        physCellId-r17                    PhysCellId,
        carrierFreq-r17                   ARFCN-ValueNR
```

```
    }                                                   OPTIONAL,
    failedPSCellId-r17              SEQUENCE {
        physCellId-r17                  PhysCellId,
        carrierFreq-r17                 ARFCN-ValueNR
     }                                                  OPTIONAL,
    timeSCGFailure-r17              INTEGER (0..1023)   OPTIONAL,
    perRAInfoList-r17               PerRAInfoList-r16     OPTIONAL
    ]]
}

MeasResultFreqList ::=                SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2NR


-- TAG-SCGFAILUREINFORMATION-STOP
-- ASN1STOP
```

SCGFailureInformation field descriptions
measResultFreqList The field contains available results of measurements on NR frequencies the UE is configured to measure by *measConfig*.
measResultSCG-Failure The field contains the *MeasResultSCG-Failure* IE which includes available results of measurements on NR frequencies the UE is configured to measure by the NR SCG *RRCReconfiguration* message.
previousPSCellId This field indicates the physical cell id and carrier frequency of the cell that is the source PSCell of the last PSCell change. In case of PSCell addition failure this field is absent.
failedPSCellId This field indicates the physical cell id and carrier frequency of the cell in which SCG failure is detected or the target PSCell of the failed PSCell change or failed PSCell addition.
timeSCGFailure This field is used to indicate the time elapsed since the last execution of *RRCReconfiguration* with *reconfigurationWithSync* for the SCG until the SCG failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.

– *SCGFailureInformationEUTRA*

The *SCGFailureInformationEUTRA* message is used to provide information regarding E-UTRA SCG failures detected by the UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***SCGFailureInformationEUTRA* message**

```
-- ASN1START
```

```
-- TAG-SCGFAILUREINFORMATIONEUTRA-START

SCGFailureInformationEUTRA ::=              SEQUENCE {
    criticalExtensions                             CHOICE {
        scgFailureInformationEUTRA                    SCGFailureInformationEUTRA-IEs,
        criticalExtensionsFuture                       SEQUENCE {}
    }
}

SCGFailureInformationEUTRA-IEs ::=          SEQUENCE {
    failureReportSCG-EUTRA                        FailureReportSCG-EUTRA                    OPTIONAL,
    nonCriticalExtension                           SCGFailureInformationEUTRA-v1590-IEs                                  OPTIONAL
}

SCGFailureInformationEUTRA-v1590-IEs ::=  SEQUENCE {
    lateNonCriticalExtension                OCTET STRING           OPTIONAL,
    nonCriticalExtension                            SEQUENCE {}                OPTIONAL
}

FailureReportSCG-EUTRA ::=                      SEQUENCE {
    failureType                                          ENUMERATED {
                                                                t313-Expiry, randomAccessProblem,rlc-MaxNumRetx,
                                                                   scg-ChangeFailure, spare4,
                                                                   spare3, spare2, spare1},
    measResultFreqListMRDC                          MeasResultFreqListFailMRDC                                          OPTIONAL,
    measResultSCG-FailureMRDC                      OCTET STRING                                                 OPTIONAL,
    ...,
    [[
    locationInfo-r16                                  LocationInfo-r16                                              OPTIONAL
    ]]
}

MeasResultFreqListFailMRDC ::=      SEQUENCE (SIZE (1.. maxFreq)) OF MeasResult2EUTRA

-- TAG-SCGFAILUREINFORMATIONEUTRA-STOP
-- ASN1STOP
```

SCGFailureInformationEUTRA field descriptions
measResultFreqListMRDC The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by *measConfig*.
measResultSCG-FailureMRDC Includes the E-UTRA *MeasResultSCG-FailureMRDC* IE as specified in TS 36.331 [10]. The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by the E-UTRA *RRCConnectionReconfiguration* message.

– *SecurityModeCommand*

The *SecurityModeCommand* message is used to command the activation of AS security.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

SecurityModeCommand message

```
-- ASN1START
-- TAG-SECURITYMODECOMMAND-START

SecurityModeCommand ::=             SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        securityModeCommand                 SecurityModeCommand-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

SecurityModeCommand-IEs ::=         SEQUENCE {
    securityConfigSMC                   SecurityConfigSMC,

    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

SecurityConfigSMC ::=               SEQUENCE {
    securityAlgorithmConfig             SecurityAlgorithmConfig,
    ...
}

-- TAG-SECURITYMODECOMMAND-STOP
-- ASN1STOP
```

– *SecurityModeComplete*

The *SecurityModeComplete* message is used to confirm the successful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SecurityModeComplete message

```
-- ASN1START
```

```
-- TAG-SECURITYMODECOMPLETE-START

SecurityModeComplete ::=            SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        securityModeComplete                SecurityModeComplete-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

SecurityModeComplete-IEs ::=        SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

-- TAG-SECURITYMODECOMPLETE-STOP
-- ASN1STOP
```

– *SecurityModeFailure*

The *SecurityModeFailure* message is used to indicate an unsuccessful completion of a security mode command.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

SecurityModeFailure message

```
-- ASN1START
-- TAG-SECURITYMODEFAILURE-START

SecurityModeFailure ::=             SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        securityModeFailure                 SecurityModeFailure-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

SecurityModeFailure-IEs ::=         SEQUENCE {
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

-- TAG-SECURITYMODEFAILURE-STOP
-- ASN1STOP
```

– *SIB1*

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

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

SIB1 message

```
-- ASN1START
-- TAG-SIB1-START

SIB1 ::=        SEQUENCE {
    cellSelectionInfo                   SEQUENCE {
        q-RxLevMin                          Q-RxLevMin,
        q-RxLevMinOffset                    INTEGER (1..8)                                  OPTIONAL,   -- Need S
        q-RxLevMinSUL                       Q-RxLevMin                                      OPTIONAL,   -- Need R
        q-QualMin                           Q-QualMin                                       OPTIONAL,   -- Need S
        q-QualMinOffset                     INTEGER (1..8)                                  OPTIONAL    -- Need S
    }                                                                                       OPTIONAL,   -- Cond Standalone
    cellAccessRelatedInfo               CellAccessRelatedInfo,
    connEstFailureControl               ConnEstFailureControl                           OPTIONAL,   -- Need R
    si-SchedulingInfo                   SI-SchedulingInfo                               OPTIONAL,   -- Need R
    servingCellConfigCommon             ServingCellConfigCommonSIB                      OPTIONAL,   -- Need R
    ims-EmergencySupport                ENUMERATED {true}                               OPTIONAL,   -- Need R
    eCallOverIMS-Support                ENUMERATED {true}                               OPTIONAL,   -- Need R
    ue-TimersAndConstants               UE-TimersAndConstants                           OPTIONAL,   -- Need R
    uac-BarringInfo                     SEQUENCE {
        uac-BarringForCommon                UAC-BarringPerCatList                           OPTIONAL,   -- Need S
        uac-BarringPerPLMN-List             UAC-BarringPerPLMN-List                         OPTIONAL,   -- Need S
        uac-BarringInfoSetList              UAC-BarringInfoSetList,
        uac-AccessCategory1-SelectionAssistanceInfo CHOICE {
            plmnCommon                          UAC-AccessCategory1-SelectionAssistanceInfo,
            individualPLMNList                  SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AccessCategory1-SelectionAssistanceInfo
        }                                                                                       OPTIONAL    -- Need S
    }                                                                                       OPTIONAL,   -- Need R
    useFullResumeID                     ENUMERATED {true}                               OPTIONAL,   -- Need R
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SIB1-v1610-IEs                                  OPTIONAL
}

SIB1-v1610-IEs ::=              SEQUENCE {
    idleModeMeasurementsEUTRA-r16    ENUMERATED{true}                                   OPTIONAL,  -- Need R
```

```
    idleModeMeasurementsNR-r16      ENUMERATED{true}                                    OPTIONAL,  -- Need R
    posSI-SchedulingInfo-r16        PosSI-SchedulingInfo-r16                            OPTIONAL,  -- Need R
    nonCriticalExtension            SIB1-v1630-IEs                                      OPTIONAL
}

SIB1-v1630-IEs ::=              SEQUENCE {
    uac-BarringInfo-v1630           SEQUENCE {
        uac-AC1-SelectAssistInfo-r16    SEQUENCE (SIZE (2..maxPLMN)) OF UAC-AC1-SelectAssistInfo-r16
    }                                                                                   OPTIONAL,  -- Need R
    nonCriticalExtension            SIB1-v1700-IEs                                      OPTIONAL
}

SIB1-v1700-IEs ::=              SEQUENCE {
    hsdn-Cell-r17                       ENUMERATED {true}                               OPTIONAL,  -- Need R
    uac-BarringInfo-v1700               SEQUENCE {
        uac-BarringInfoSetList-v1700        UAC-BarringInfoSetList-v1700
    }                                                                                   OPTIONAL,  -- Cond MINT
    sdt-ConfigCommon-r17                SDT-ConfigCommonSIB-r17                         OPTIONAL,  -- Need R
    redCap-ConfigCommon-r17             RedCap-ConfigCommonSIB-r17                      OPTIONAL,  -- Need R
    featurePriorities-r17           SEQUENCE {
        redCapPriority-r17              FeaturePriority-r17                             OPTIONAL,  -- Need R
        slicingPriority-r17             FeaturePriority-r17                             OPTIONAL,  -- Need R
        msg3-Repetitions-Priority-r17 FeaturePriority-r17                               OPTIONAL,  -- Need R
        sdt-Priority-r17                FeaturePriority-r17                             OPTIONAL   -- Need R
    }                                                                                   OPTIONAL,  -- Need R
    si-SchedulingInfo-v1700         SI-SchedulingInfo-v1700                             OPTIONAL,  -- Need R
    hyperSFN-r17                    BIT STRING (SIZE (10))                              OPTIONAL,  -- Need R
    eDRX-AllowedIdle-r17            ENUMERATED {true}                                   OPTIONAL,  -- Need R
    eDRX-AllowedInactive-r17        ENUMERATED {true}                                   OPTIONAL,  -- Cond EDRX-RC
    intraFreqReselectionRedCap-r17 ENUMERATED {allowed, notAllowed}                     OPTIONAL,  -- Need S
    cellBarredNTN-r17               ENUMERATED {barred, notBarred}                      OPTIONAL,  -- Need S
    nonCriticalExtension            SIB1-v1740-IEs                                      OPTIONAL
}

SIB1-v1740-IEs ::=              SEQUENCE {
    si-SchedulingInfo-v1740             SI-SchedulingInfo-v1740                         OPTIONAL,  -- Need R
    nonCriticalExtension                SEQUENCE {}                                     OPTIONAL
}

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

UAC-AC1-SelectAssistInfo-r16 ::=    ENUMERATED {a, b, c, notConfigured}

SDT-ConfigCommonSIB-r17 ::=         SEQUENCE {
    sdt-RSRP-Threshold-r17              RSRP-Range                                                  OPTIONAL, -- Need R
    sdt-LogicalChannelSR-DelayTimer-r17  ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}  OPTIONAL, -- Need R
    sdt-DataVolumeThreshold-r17          ENUMERATED {byte32, byte100, byte200, byte400, byte600, byte800, byte1000, byte2000, byte4000,
                                                     byte8000, byte9000, byte10000, byte12000, byte24000, byte48000, byte96000},
    t319a-r17                            ENUMERATED { ms100, ms200, ms300, ms400, ms600, ms1000, ms2000,
                                                      ms3000, ms4000, spare7, spare6, spare5, spare4, spare3, spare2, spare1}
}

RedCap-ConfigCommonSIB-r17 ::= SEQUENCE {
    halfDuplexRedCapAllowed-r17    ENUMERATED {true}                                    OPTIONAL,  -- Need R
```

```
    cellBarredRedCap-r17            SEQUENCE {
        cellBarredRedCap1Rx-r17         ENUMERATED {barred, notBarred},
        cellBarredRedCap2Rx-r17         ENUMERATED {barred, notBarred}
    }                                                                                   OPTIONAL,  -- Need R
    ...
}

FeaturePriority-r17 ::= INTEGER (0..7)

-- TAG-SIB1-STOP
-- ASN1STOP
```

***SIB1* field descriptions**
cellBarredNTN
Value *barred* means that the cell is barred for connectivity to NTN, as defined in TS 38.304 [20]. Value *notBarred* means that the cell is allowed for connectivity to NTN. If not present, the UE considers the cell is not allowed for connectivity to NTN, as defined in TS 38.304 [20]. This field is only applicable to NTN-capable UEs.
cellBarredRedCap1Rx
Value *barred* means that the cell is barred for a RedCap UE with 1 Rx branch, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs.
cellBarredRedCap2Rx
Value *barred* means that the cell is barred for a RedCap UE with 2 Rx branches, as defined in TS 38.304 [20]. This field is ignored by non-RedCap UEs.
cellSelectionInfo
Parameters for cell selection related to the serving cell.
eCallOverIMS-Support
Indicates whether the cell supports eCall over IMS services as defined in TS 23.501 [32]. If absent, eCall over IMS is not supported by the network in the cell.
eDRX-AllowedIdle
The presence of this field indicates that extended DRX for CN paging is allowed in the cell for UEs in RRC_IDLE or RRC_INACTIVE. The UE shall stop using extended DRX for CN paging in RRC_IDLE or RRC_INACTIVE if *eDRX-AllowedIdle* is not present.
eDRX-AllowedInactive
The presence of this field indicates that extended DRX for RAN paging is allowed in the cell for UEs in RRC_INACTIVE. The UE shall stop using extended DRX for RAN paging in RRC_INACTIVE if *eDRX-AllowedInactive* is not present.
featurePriorities
Indicates priorities for features, such as RedCap, Slicing, SDT and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which *FeatureCombinationPreambles* the UE shall use when a feature maps to more than one *FeatureCombinationPreambles*, as specified in TS 38.321 [3]. A lower value means a higher priority. The network does not signal the same priority for more than one feature. The network signals a priority for all feature that map to at least one *FeatureCombinationPreambles*.
halfDuplexRedCap-Allowed
The presence of this field indicates that the cell supports half-duplex FDD RedCap UEs.
hsdn-Cell
This field indicates this is a HSDN cell as specified in TS 38.304 [20].
hyperSFN
Indicates hyper SFN which increments by one when the SFN wraps around. This field is excluded when determining changes in system information, i.e. changes of hyper SFN should not result in system information change notifications.
idleModeMeasurementsEUTRA
This field indicates that a UE that is configured for EUTRA idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform EUTRA idle/inactive measurements.
idleModeMeasurementsNR
This field indicates that a UE that is configured for NR idle/inactive measurements shall perform the measurements while camping in this cell and report availability of these measurements when establishing or resuming a connection in this cell. If absent, a UE is not required to perform NR idle/inactive measurements.
ims-EmergencySupport
Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network in the cell for UEs in limited service mode.
intraFreqReselectionRedCap
Controls cell selection/reselection to intra-frequency cells for RedCap UEs when this cell is barred, or treated as barred by the RedCap UE, as specified in TS 38.304 [20]. If not present, a RedCap UE treats the cell as barred, i.e.,the UE considers that the cell does not support RedCap.
q-QualMin
Parameter "$Q_{qualmin}$" in TS 38.304 [20], applicable for serving cell. If the field is absent, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.
q-QualMinOffset
Parameter "$Q_{qualminoffset}$" in TS 38.304 [20]. Actual value $Q_{qualminoffset}$ = field value [dB]. If the field is absent, the UE applies the (default) value of 0 dB for $Q_{qualminoffset}$. Affects the minimum required quality level in the cell.

q-RxLevMin Parameter "$Q_{rxlevmin}$" in TS 38.304 [20], applicable for serving cell.
q-RxLevMinOffset Parameter "$Q_{rxlevminoffset}$" in TS 38.304 [20]. Actual value $Q_{rxlevminoffset}$ = field value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for $Q_{rxlevminoffset}$. Affects the minimum required Rx level in the cell.
q-RxLevMinSUL Parameter "$Q_{rxlevmin}$" in TS 38.304 [20], applicable for serving cell.
sdt-RSRP-Threshold RSRP threshold used to determine whether SDT procedure can be initiated, as specified in TS 38.321 [3].
sdt-DataVolumeThreshold Data volume threshold used to determine whether SDT can be initiated, as specified in TS 38.321 [3]. Value *byte32* corresponds to 32 bytes, value *byte100* corresponds to 100 bytes, and so on.
sdt-LogicalChannelSR-DelayTimer The value of *logicalChannelSR-DelayTimer* applied during SDT for logical channels configured with SDT, as specified in TS 38.321 [3]. Value in number of subframes. Value *sf20* corresponds to 20 subframes, *sf40* corresponds to 40 subframes, and so on. If this field is not configured, then logicalChannelSR-DelayTimer is not applied for SDT logical channels.
servingCellConfigCommon Configuration of the serving cell.
t319a Initial value of the timer T319a used for detection of SDT failure. Value *ms100* corresponds to 100 milliseconds, value *ms200* corresponds to 200 milliseconds and so on.
uac-AccessCategory1-SelectionAssistanceInfo Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. If *plmnCommon* is chosen, the *UAC-AccessCategory1-SelectionAssistanceInfo* is applicable to all the PLMNs and SNPNs in *plmn-IdentityInfoList* and *npn-IdentityInfoList*. If *individualPLMNList* is chosen, the 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList*, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList* and so on. If *uac-AC1-SelectAssistInfo-r16* is present, the UE shall ignore the *uac-AccessCategory1-SelectionAssistanceInfo*.
uac-AC1-SelectAssistInfo Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. The 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and *npn-IdentityInfoList*, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the *plmn-IdentityList* and the *npn-IdentityInfoList* and so on. Value *notConfigured* indicates that Access Category1 is not configured for the corresponding PLMN/SNPN.
uac-BarringForCommon Common access control parameters for each access category. Common values are used for all PLMNs/SNPNs, unless overwritten by the PLMN/SNPN specific configuration provided in *uac-BarringPerPLMN-List*. The parameters are specified by providing an index to the set of configurations (*uac-BarringInfoSetList*). UE behaviour upon absence of this field is specified in clause 5.3.14.2.
ue-TimersAndConstants Timer and constant values to be used by the UE. The cell operating as PCell always provides this field.
useFullResumeID Indicates which resume identifier and Resume request message should be used. UE uses *fullI-RNTI* and *RRCResumeRequest1* if the field is present, or *shortI-RNTI* and *RRCResumeRequest* if the field is absent.

Conditional Presence	Explanation
EDRX-RC	The field is optionally present, Need R, in a cell that enables *eDRX-AllowedIdle*, otherwise it is absent.
MINT	The field is optionally present, Need R, in a cell that provides a configuration for disaster roaming, otherwise it is absent, Need R.
Standalone	The field is mandatory present in a cell that supports standalone operation, otherwise it is absent.

– *SidelinkUEInformationNR*

The *SidelinkUEinformationNR* message is used for the indication of NR sidelink UE information to the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***SidelinkUEInformationNR* message**

```
-- ASN1START
-- TAG-SIDELINKUEINFORMATIONNR-START

SidelinkUEInformationNR-r16::=          SEQUENCE {
    criticalExtensions                   CHOICE {
        sidelinkUEInformationNR-r16          SidelinkUEInformationNR-r16-IEs,
        criticalExtensionsFuture             SEQUENCE {}
    }
}

SidelinkUEInformationNR-r16-IEs ::=     SEQUENCE {
    sl-RxInterestedFreqList-r16             SL-InterestedFreqList-r16           OPTIONAL,
    sl-TxResourceReqList-r16                SL-TxResourceReqList-r16            OPTIONAL,
    sl-FailureList-r16                      SL-FailureList-r16                  OPTIONAL,
    lateNonCriticalExtension                OCTET STRING                        OPTIONAL,
    nonCriticalExtension                    SidelinkUEInformationNR-v1700-IEs   OPTIONAL
}

SidelinkUEInformationNR-v1700-IEs ::=   SEQUENCE {
    sl-TxResourceReqList-v1700              SL-TxResourceReqList-v1700                                  OPTIONAL,
    sl-RxDRX-ReportList-v1700               SL-RxDRX-ReportList-v1700                                   OPTIONAL,
    sl-RxInterestedGC-BC-DestList-r17       SL-RxInterestedGC-BC-DestList-r17                           OPTIONAL,
    sl-RxInterestedFreqListDisc-r17         SL-InterestedFreqList-r16                                   OPTIONAL,
    sl-TxResourceReqListDisc-r17            SL-TxResourceReqListDisc-r17                                OPTIONAL,
    sl-TxResourceReqListCommRelay-r17       SL-TxResourceReqListCommRelay-r17                           OPTIONAL,
    ue-Type-r17                             ENUMERATED {relayUE, remoteUE}                              OPTIONAL,
    sl-SourceIdentityRemoteUE-r17           SL-SourceIdentity-r17                                       OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                                 OPTIONAL
}
```

```
SL-InterestedFreqList-r16 ::=          SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)

SL-TxResourceReqList-r16 ::=           SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReq-r16

SL-TxResourceReq-r16 ::=               SEQUENCE {
    sl-DestinationIdentity-r16             SL-DestinationIdentity-r16,
    sl-CastType-r16                        ENUMERATED {broadcast, groupcast, unicast, spare1},
    sl-RLC-ModeIndicationList-r16          SEQUENCE (SIZE (1.. maxNrofSLRB-r16)) OF SL-RLC-ModeIndication-r16         OPTIONAL,
    sl-QoS-InfoList-r16                    SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16          OPTIONAL,
    sl-TypeTxSyncList-r16                  SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16                OPTIONAL,
    sl-TxInterestedFreqList-r16            SL-TxInterestedFreqList-r16                                                OPTIONAL,
    sl-CapabilityInformationSidelink-r16   OCTET STRING                                                               OPTIONAL
}

SL-TxResourceReqList-v1700 ::=         SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReq-v1700

SL-RxDRX-ReportList-v1700 ::=          SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-RxDRX-Report-v1700

SL-TxResourceReq-v1700 ::=             SEQUENCE {
    sl-DRX-InfoFromRxList-r17              SEQUENCE (SIZE (1..maxNrofSL-RxInfoSet-r17)) OF SL-DRX-ConfigUC-SemiStatic-r17   OPTIONAL,
    sl-DRX-Indication-r17                  ENUMERATED {on, off}                                                             OPTIONAL,
    ...
}

SL-RxDRX-Report-v1700 ::=              SEQUENCE {
    sl-DRX-ConfigFromTx-r17                SL-DRX-ConfigUC-SemiStatic-r17,
    ...}

SL-RxInterestedGC-BC-DestList-r17 ::=  SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-RxInterestedGC-BC-Dest-r17

SL-RxInterestedGC-BC-Dest-r17 ::=      SEQUENCE {
    sl-RxInterestedQoS-InfoList-r17        SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16,
    sl-DestinationIdentity-r16             SL-DestinationIdentity-r16
}

SL-TxResourceReqListDisc-r17 ::=       SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqDisc-r17

SL-TxResourceReqDisc-r17 ::=           SEQUENCE {
    sl-DestinationIdentityDisc-r17         SL-DestinationIdentity-r16,
    sl-SourceIdentityRelayUE-r17           SL-SourceIdentity-r17                                                    OPTIONAL,
    sl-CastTypeDisc-r17                    ENUMERATED {broadcast, groupcast, unicast, spare1},
    sl-TxInterestedFreqListDisc-r17        SL-TxInterestedFreqList-r16,
    sl-TypeTxSyncListDisc-r17              SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16,
    sl-DiscoveryType-r17                   ENUMERATED {relay, non-Relay},
    ...
}

SL-TxResourceReqListCommRelay-r17 ::=  SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqCommRelayInfo-r17

SL-TxResourceReqCommRelayInfo-r17 ::=  SEQUENCE {
    sl-RelayDRXConfig-r17                 SL-TxResourceReq-v1700                                                  OPTIONAL,
    sl-TxResourceReqCommRelay-r17         SL-TxResourceReqCommRelay-r17
}
```

```
SL-TxResourceReqCommRelay-r17 ::=      CHOICE {
    sl-TxResourceReqL2U2N-Relay-r17        SL-TxResourceReqL2U2N-Relay-r17,
    sl-TxResourceReqL3U2N-Relay-r17        SL-TxResourceReq-r16
}

SL-TxResourceReqL2U2N-Relay-r17 ::=    SEQUENCE {
    sl-DestinationIdentityL2U2N-r17        SL-DestinationIdentity-r16                                  OPTIONAL,
    sl-TxInterestedFreqListL2U2N-r17       SL-TxInterestedFreqList-r16,
    sl-TypeTxSyncListL2U2N-r17             SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16,
    sl-LocalID-Request-r17                 ENUMERATED {true}                                           OPTIONAL,
    sl-PagingIdentityRemoteUE-r17          SL-PagingIdentityRemoteUE-r17                               OPTIONAL,
    sl-CapabilityInformationSidelink-r17   OCTET STRING                                                OPTIONAL,
    ...
}

SL-TxInterestedFreqList-r16 ::=        SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)

SL-QoS-Info-r16 ::=                    SEQUENCE {
    sl-QoS-FlowIdentity-r16               SL-QoS-FlowIdentity-r16,
    sl-QoS-Profile-r16                    SL-QoS-Profile-r16                                           OPTIONAL
}

SL-RLC-ModeIndication-r16 ::=          SEQUENCE {
    sl-Mode-r16                            CHOICE  {
        sl-AM-Mode-r16                         NULL,
        sl-UM-Mode-r16                         NULL
    },
    sl-QoS-InfoList-r16                SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16
}

SL-FailureList-r16 ::=                 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-Failure-r16

SL-Failure-r16 ::=                     SEQUENCE {
    sl-DestinationIdentity-r16             SL-DestinationIdentity-r16,
    sl-Failure-r16                         ENUMERATED {rlf,configFailure, drxReject-v1710, spare5, spare4, spare3, spare2, spare1}
}

-- TAG-SIDELINKUEINFORMATIONNR-STOP
-- ASN1STOP
```

***SidelinkUEinformationNR* field descriptions**
sl-RxDRX-ReportList Indicates the accepted DRX configuration that is received from the peer UE and reported to the network for NR sidelink unicast communication.
sl-RxInterestedFreqList Indicates the index of frequency on which the UE is interested to receive NR sidelink communication. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list.
sl-RxInterestedGC-BC-DestList Indicates the reported QoS profile and associated destination for which UE is interested in reception to the network for NR sidelink groupcast and broadcast communication, or for NR sidelink discovery or ProSe Direct Link Establishment Request as described in TS 24.554 [72], or for Direct Link Establishment Request (TS 24.587 [57]).
sl-SourceIdentityRemoteUE This field is used to indicate the Source Layer-2 ID to be used to establish PC5 link with the target L2 U2N Relay UE for path switch.
sl-TxResourceReq Parameters to request the transmission resources for NR sidelink communication to the network in the Sidelink UE Information report.
sl-TxResourceReqList List of parameters to request the transmission resources for NR sidelink communication for the associated destination. If *sl-TxResourceReqList-v1700* is present, it shall contain the same number of entries, listed in the same order as in *sl-TxResourceReqList-r16*.
ue-Type Indicates the UE is acting as U2N Relay UE or U2N Remote UE.

***SL-TxResourceReq* field descriptions**
sl-CapabilityInformationSidelink Includes the *UECapabilityInformationSidelink* message (which can be also included in *ueCapabilityInformationSidelink-r16* in *UECapabilityEnquirySidelink* from peer UE) received from the peer UE.
sl-CastType Indicates the cast type for the corresponding destination for which to request the resource.
sl-DestinationIdentity Indicates the destination for which the TX resource request and allocation from the network are concerned.
sl-DRX-Indication Indicates the sidelink DRX is applied (value *on*) or not applied (value *off*) for the associated destination. This field is only valid for NR sidelink groupcast communication.
sl-DRX-InfoFromRxList Indicates list of the sidelink DRX configurations as assistance information received from the peer UE for NR sidelink unicast communication.
sl-QoS-InfoList Includes the QoS profile of the sidelink QoS flow as specified in TS 23.287 [55].
sl-QoS-FlowIdentity This identity uniquely identifies one sidelink QoS flow between the UE and the network in the scope of UE, which is unique for different destination and cast type.
sl-RLC-ModeIndication This field indicates the RLC mode and optionally the related QoS profiles for the sidelink radio bearer, which has not been configured by the network and is initiated by another UE in unicast. The RLC mode for one sidelink radio bearer is aligned between UE and NW by the *sl-QoS-FlowIdentity*.
sl-TxInterestedFreqList Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList broadcast* in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.
sl-TypeTxSyncList A list of synchronization reference used by the UE. The UE shall include the same number of entries, listed in the same order, as in *sl-TxInterestedFreqList*, i.e. one for each carrier frequency included in *sl-TxInterestedFreqList*.

***SL-Failure* field descriptions**
sl-DestinationIdentity Indicates the destination for which the SL failure is reporting for unicast.
sl-Failure Indicates the sidelink cause for the sidelink RLF (value *rlf*), sidelink AS configuration failure (value *configFailure*) and the rejection of sidelink DRX configuration (value *drxReject-v1710*) for the associated destination for unicast.

***SL-RxDRX-Report* field descriptions**
sl-DRX-ConfigFromTx Indicates the sidelink DRX configuration received from the peer UE for NR sidelink unicast communication.

***SL-RxInterestedGC-BC-Dest* field descriptions**
sl-RxInterestedQoS-InfoList Indicates the QoS profile for which UE reports its interested service to which SL DRX is applied to the network, for NR sidelink groupcast or broadcast reception.

***SL-TxResourceReqDisc* field descriptions**
sl-CastTypeDisc Indicates the cast type for the NR sidelink discovery messages. Only value *broadcast* can be set in this release.
sl-DestinationIdentityDisc This field is used to indicate the destination L2 ID for which the TX resource request and allocation from the network are concerned for relay discovery and non-relay discovery.
sl-SourceIdentityRelayUE This field is used to indicate the source L2 ID of relay-related discovery transmission by L2 U2N Relay UE.
sl-TxInterestedFreqListDisc Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink discovery. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList broadcast* in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.

***SL-TxResourceReqCommRelayInfo* field descriptions**
sl-RelayDRXConfig This field is used to indicate the applied sidelink DRX configuration for the relay related communication.
sl-DestinationIdentityL2U2N This field is used to indicate the destination L2 ID for which the TX resource request and allocation from the network are concerned for the established PC5 link for relay by L2 U2N Relay UE.
sl-LocalID-Request This field is used to request local UE ID for the corresponding destination by the L2 U2N Relay UE.
sl-TxInterestedFreqListL2U2N Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication for established PC5 link for relay. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in SIB12, the value 2 corresponds to the frequency of second entry in *sl-FreqInfoList* broadcast in *SIB12* and so on. In this release, only value 1 can be included in the interested frequency list. In this release, only one entry can be included in the list.
sl-PagingIdentityRemoteUE This field is used to indicate the paging UE ID(s) for the corresponding destination(s) by the L2 U2N Relay UE.

– *SystemInformation*

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

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channels: BCCH

Direction: Network to UE

SystemInformation message

```
-- ASN1START
-- TAG-SYSTEMINFORMATION-START
```

```
SystemInformation ::=               SEQUENCE {
    criticalExtensions                  CHOICE {
        systemInformation                   SystemInformation-IEs,
        criticalExtensionsFuture-r16    CHOICE {
            posSystemInformation-r16        PosSystemInformation-r16-IEs,
            criticalExtensionsFuture        SEQUENCE {}
        }
    }
}

SystemInformation-IEs ::=           SEQUENCE {
    sib-TypeAndInfo                     SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
        sib2                                SIB2,
        sib3                                SIB3,
        sib4                                SIB4,
        sib5                                SIB5,
        sib6                                SIB6,
        sib7                                SIB7,
        sib8                                SIB8,
        sib9                                SIB9,
        ...,
        sib10-v1610                         SIB10-r16,
        sib11-v1610                         SIB11-r16,
        sib12-v1610                         SIB12-r16,
        sib13-v1610                         SIB13-r16,
        sib14-v1610                         SIB14-r16,
        sib15-v1700                         SIB15-r17,
        sib16-v1700                         SIB16-r17,
        sib17-v1700                         SIB17-r17,
        sib18-v1700                         SIB18-r17,
        sib19-v1700                         SIB19-r17,
        sib20-v1700                         SIB20-r17,
        sib21-v1700                         SIB21-r17
    },
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- TAG-SYSTEMINFORMATION-STOP
-- ASN1STOP
```

– *UEAssistanceInformation*

The *UEAssistanceInformation* message is used for the indication of UE assistance information to the network.

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

UEAssistanceInformation message

```
-- ASN1START
-- TAG-UEASSISTANCEINFORMATION-START

UEAssistanceInformation ::=         SEQUENCE {
    criticalExtensions                  CHOICE {
        ueAssistanceInformation             UEAssistanceInformation-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UEAssistanceInformation-IEs ::=     SEQUENCE {
    delayBudgetReport                   DelayBudgetReport                   OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                UEAssistanceInformation-v1540-IEs   OPTIONAL
}

DelayBudgetReport::=                CHOICE {
    type1                               ENUMERATED {
                                            msMinus1280, msMinus640, msMinus320, msMinus160,msMinus80, msMinus60, msMinus40,
                                            msMinus20, ms0, ms20,ms40, ms60, ms80, ms160, ms320, ms640, ms1280},
    ...
}

UEAssistanceInformation-v1540-IEs ::= SEQUENCE {
    overheatingAssistance               OverheatingAssistance               OPTIONAL,
    nonCriticalExtension                UEAssistanceInformation-v1610-IEs   OPTIONAL
}

OverheatingAssistance ::=           SEQUENCE {
    reducedMaxCCs                       ReducedMaxCCs-r16                   OPTIONAL,
    reducedMaxBW-FR1                    ReducedMaxBW-FRx-r16                OPTIONAL,
    reducedMaxBW-FR2                    ReducedMaxBW-FRx-r16                OPTIONAL,
    reducedMaxMIMO-LayersFR1            SEQUENCE {
        reducedMIMO-LayersFR1-DL            MIMO-LayersDL,
        reducedMIMO-LayersFR1-UL            MIMO-LayersUL
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2            SEQUENCE {
        reducedMIMO-LayersFR2-DL            MIMO-LayersDL,
        reducedMIMO-LayersFR2-UL            MIMO-LayersUL
    } OPTIONAL
}
OverheatingAssistance-r17 ::=       SEQUENCE {
    reducedMaxBW-FR2-2-r17              SEQUENCE {
        reducedBW-FR2-2-DL-r17              ReducedAggregatedBandwidth-r17,
        reducedBW-FR2-2-UL-r17              ReducedAggregatedBandwidth-r17
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2-2          SEQUENCE {
        reducedMIMO-LayersFR2-2-DL          MIMO-LayersDL,
        reducedMIMO-LayersFR2-2-UL          MIMO-LayersUL
```

```
    } OPTIONAL
}

ReducedAggregatedBandwidth ::= ENUMERATED {mhz0, mhz10, mhz20, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100, mhz200, mhz300, mhz400}

ReducedAggregatedBandwidth-r17 ::= ENUMERATED {mhz0, mhz100, mhz200, mhz400, mhz800, mhz1200, mhz1600, mhz2000}

UEAssistanceInformation-v1610-IEs ::= SEQUENCE {
    idc-Assistance-r16                  IDC-Assistance-r16                  OPTIONAL,
    drx-Preference-r16                  DRX-Preference-r16                  OPTIONAL,
    maxBW-Preference-r16                MaxBW-Preference-r16                OPTIONAL,
    maxCC-Preference-r16                MaxCC-Preference-r16                OPTIONAL,
    maxMIMO-LayerPreference-r16         MaxMIMO-LayerPreference-r16         OPTIONAL,
    minSchedulingOffsetPreference-r16   MinSchedulingOffsetPreference-r16   OPTIONAL,
    releasePreference-r16               ReleasePreference-r16               OPTIONAL,
    sl-UE-AssistanceInformationNR-r16   SL-UE-AssistanceInformationNR-r16   OPTIONAL,
    referenceTimeInfoPreference-r16     BOOLEAN                             OPTIONAL,
    nonCriticalExtension                UEAssistanceInformation-v1700-IEs   OPTIONAL
}

UEAssistanceInformation-v1700-IEs ::= SEQUENCE {
    ul-GapFR2-Preference-r17              UL-GapFR2-Preference-r17              OPTIONAL,
    musim-Assistance-r17                  MUSIM-Assistance-r17                  OPTIONAL,
    overheatingAssistance-r17             OverheatingAssistance-r17             OPTIONAL,
    maxBW-PreferenceFR2-2-r17             MaxBW-PreferenceFR2-2-r17             OPTIONAL,
    maxMIMO-LayerPreferenceFR2-2-r17      MaxMIMO-LayerPreferenceFR2-2-r17      OPTIONAL,
    minSchedulingOffsetPreferenceExt-r17  MinSchedulingOffsetPreferenceExt-r17  OPTIONAL,
    rlm-MeasRelaxationState-r17           BOOLEAN                               OPTIONAL,
    bfd-MeasRelaxationState-r17           BIT STRING (SIZE (1..maxNrofServingCells)) OPTIONAL,
    nonSDT-DataIndication-r17             SEQUENCE {
        resumeCause-r17                       ResumeCause                       OPTIONAL
    }                                                                           OPTIONAL,
    scg-DeactivationPreference-r17        ENUMERATED { scgDeactivationPreferred, noPreference }    OPTIONAL,
    uplinkData-r17                        ENUMERATED { true }                   OPTIONAL,
    rrm-MeasRelaxationFulfilment-r17      BOOLEAN                               OPTIONAL,
    propagationDelayDifference-r17        PropagationDelayDifference-r17        OPTIONAL,
    nonCriticalExtension                  SEQUENCE {}                           OPTIONAL
}

IDC-Assistance-r16 ::=                  SEQUENCE {
    affectedCarrierFreqList-r16             AffectedCarrierFreqList-r16             OPTIONAL,
    affectedCarrierFreqCombList-r16         AffectedCarrierFreqCombList-r16         OPTIONAL,
    ...
}

AffectedCarrierFreqList-r16 ::= SEQUENCE (SIZE (1.. maxFreqIDC-r16)) OF AffectedCarrierFreq-r16

AffectedCarrierFreq-r16 ::=     SEQUENCE {
    carrierFreq-r16                 ARFCN-ValueNR,
    interferenceDirection-r16       ENUMERATED {nr, other, both, spare}
}

AffectedCarrierFreqCombList-r16 ::= SEQUENCE (SIZE (1..maxCombIDC-r16)) OF AffectedCarrierFreqComb-r16
```

```
AffectedCarrierFreqComb-r16 ::=     SEQUENCE {
    affectedCarrierFreqComb-r16         SEQUENCE (SIZE (2..maxNrofServingCells)) OF  ARFCN-ValueNR    OPTIONAL,
    victimSystemType-r16                VictimSystemType-r16
}

VictimSystemType-r16 ::=    SEQUENCE {
    gps-r16                     ENUMERATED {true}        OPTIONAL,
    glonass-r16                 ENUMERATED {true}        OPTIONAL,
    bds-r16                     ENUMERATED {true}        OPTIONAL,
    galileo-r16                 ENUMERATED {true}        OPTIONAL,
    navIC-r16                   ENUMERATED {true}        OPTIONAL,
    wlan-r16                    ENUMERATED {true}        OPTIONAL,
    bluetooth-r16               ENUMERATED {true}        OPTIONAL,
    ...
}

DRX-Preference-r16 ::=              SEQUENCE {
    preferredDRX-InactivityTimer-r16    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} OPTIONAL,
    preferredDRX-LongCycle-r16          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 } OPTIONAL,
    preferredDRX-ShortCycle-r16         ENUMERATED {
                                            ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                            ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                            spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 } OPTIONAL,
    preferredDRX-ShortCycleTimer-r16    INTEGER (1..16)    OPTIONAL
}

MaxBW-Preference-r16 ::=            SEQUENCE {
    reducedMaxBW-FR1-r16                ReducedMaxBW-FRx-r16                    OPTIONAL,
    reducedMaxBW-FR2-r16                ReducedMaxBW-FRx-r16                    OPTIONAL
}

MaxBW-PreferenceFR2-2-r17 ::=       SEQUENCE {
    reducedMaxBW-FR2-2-r17              SEQUENCE {
        reducedBW-FR2-2-DL-r17              ReducedAggregatedBandwidth-r17      OPTIONAL,
        reducedBW-FR2-2-UL-r17              ReducedAggregatedBandwidth-r17      OPTIONAL
    } OPTIONAL
}

MaxCC-Preference-r16 ::=            SEQUENCE {
    reducedMaxCCs-r16                   ReducedMaxCCs-r16                       OPTIONAL
}

MaxMIMO-LayerPreference-r16 ::=     SEQUENCE {
    reducedMaxMIMO-LayersFR1-r16        SEQUENCE {
        reducedMIMO-LayersFR1-DL-r16        INTEGER (1..8),
        reducedMIMO-LayersFR1-UL-r16        INTEGER (1..4)
    } OPTIONAL,
    reducedMaxMIMO-LayersFR2-r16        SEQUENCE {
```

```
        reducedMIMO-LayersFR2-DL-r16        INTEGER (1..8),
        reducedMIMO-LayersFR2-UL-r16        INTEGER (1..4)
    } OPTIONAL
}

MaxMIMO-LayerPreferenceFR2-2-r17 ::=    SEQUENCE {
    reducedMaxMIMO-LayersFR2-2-r17          SEQUENCE {
        reducedMIMO-LayersFR2-2-DL-r17          INTEGER (1..8),
        reducedMIMO-LayersFR2-2-UL-r17          INTEGER (1..4)
    } OPTIONAL
}

MinSchedulingOffsetPreference-r16 ::= SEQUENCE {
    preferredK0-r16                         SEQUENCE {
        preferredK0-SCS-15kHz-r16               ENUMERATED {sl1, sl2, sl4, sl6}              OPTIONAL,
        preferredK0-SCS-30kHz-r16               ENUMERATED {sl1, sl2, sl4, sl6}              OPTIONAL,
        preferredK0-SCS-60kHz-r16               ENUMERATED {sl2, sl4, sl8, sl12}             OPTIONAL,
        preferredK0-SCS-120kHz-r16              ENUMERATED {sl2, sl4, sl8, sl12}             OPTIONAL
    }                                                                                       OPTIONAL,
    preferredK2-r16                         SEQUENCE {
        preferredK2-SCS-15kHz-r16               ENUMERATED {sl1, sl2, sl4, sl6}             OPTIONAL,
        preferredK2-SCS-30kHz-r16               ENUMERATED {sl1, sl2, sl4, sl6}             OPTIONAL,
        preferredK2-SCS-60kHz-r16               ENUMERATED {sl2, sl4, sl8, sl12}            OPTIONAL,
        preferredK2-SCS-120kHz-r16              ENUMERATED {sl2, sl4, sl8, sl12}            OPTIONAL
    }                                                                                     OPTIONAL
}

MinSchedulingOffsetPreferenceExt-r17 ::=  SEQUENCE {
    preferredK0-r17                             SEQUENCE {
        preferredK0-SCS-480kHz-r17                  ENUMERATED {sl8, sl16, sl32, sl48}      OPTIONAL,
        preferredK0-SCS-960kHz-r17                  ENUMERATED {sl8, sl16, sl32, sl48}      OPTIONAL
    }                                                                                       OPTIONAL,
    preferredK2-r17                             SEQUENCE {
        preferredK2-SCS-480kHz-r17                  ENUMERATED {sl8, sl16, sl32, sl48}      OPTIONAL,
        preferredK2-SCS-960kHz-r17                  ENUMERATED {sl8, sl16, sl32, sl48}      OPTIONAL
    }                                                                                       OPTIONAL
}

MUSIM-Assistance-r17 ::=              SEQUENCE {
    musim-PreferredRRC-State-r17            ENUMERATED {idle, inactive, outOfConnected}     OPTIONAL,
    musim-GapPreferenceList-r17             MUSIM-GapPreferenceList-r17                     OPTIONAL
}

MUSIM-GapPreferenceList-r17 ::= SEQUENCE (SIZE (1..4)) OF MUSIM-GapInfo-r17

ReleasePreference-r16 ::=           SEQUENCE {
    preferredRRC-State-r16              ENUMERATED {idle, inactive, connected, outOfConnected}
}

ReducedMaxBW-FRx-r16 ::=            SEQUENCE {
    reducedBW-DL-r16                    ReducedAggregatedBandwidth,
    reducedBW-UL-r16                    ReducedAggregatedBandwidth
}
```

```
ReducedMaxCCs-r16 ::=               SEQUENCE {
    reducedCCsDL-r16                    INTEGER (0..31),
    reducedCCsUL-r16                    INTEGER (0..31)
}

SL-UE-AssistanceInformationNR-r16 ::= SEQUENCE (SIZE (1..maxNrofTrafficPattern-r16)) OF SL-TrafficPatternInfo-r16

SL-TrafficPatternInfo-r16::=          SEQUENCE {
    trafficPeriodicity-r16              ENUMERATED {ms20, ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},
    timingOffset-r16                    INTEGER (0..10239),
    messageSize-r16                     BIT STRING (SIZE (8)),
    sl-QoS-FlowIdentity-r16             SL-QoS-FlowIdentity-r16
}

UL-GapFR2-Preference-r17::=           SEQUENCE {
    ul-GapFR2-PatternPreference-r17     INTEGER (0..3)                  OPTIONAL
}

PropagationDelayDifference-r17 ::=  SEQUENCE (SIZE (1..4)) OF INTEGER (-270..270)

-- TAG-UEASSISTANCEINFORMATION-STOP
-- ASN1STOP
```

***UEAssistanceInformation* field descriptions**
affectedCarrierFreqList Indicates a list of NR carrier frequencies that are affected by IDC problem.
affectedCarrierFreqCombList Indicates a list of NR carrier frequencie combinations that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from NR when configured with UL CA.
bfd-MeasRelaxationState Indicates the relaxation state of BFD measurements. Each bit corresponds to a serving cell of the cell group. A serving cell is mapped to the (*servCellIndex*+1)-th bit, starting from MSB. A bit that is set to 1 indicates that the UE is performing BFD measurements relaxation on the serving cell mapped on the bit. A bit that is set to 0 indicates that the UE is not performing BFD measurements relaxation on the serving cell mapped on the bit. If a serving cell is not configured to the UE, the corresponding bit is set to 0.
delayBudgetReport Indicates the UE-preferred adjustment to connected mode DRX.
interferenceDirection Indicates the direction of IDC interference. Value *nr* indicates that only NR is victim of IDC interference, value *other* indicates that only another radio is victim of IDC interference and value *both* indicates that both NR and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see TR 36.816 [44]).
minSchedulingOffsetPreference Indicates the UE's preferences on *minimumSchedulingOffset* of cross-slot scheduling for power saving.
minSchedulingOffsetPreferenceExt Indicates the UE's preferences on *minimumSchedulingOffset* of cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.
musim-GapPreferenceList Indicates the UE's MUSIM gap preference and related MUSIM gap configuration, as defined in TS 38.133 [14] clause 9.1.10.
musim-PreferredRRC-State Indicates the UE's preferred RRC state when leaving RRC_CONNECTED.
nonSDT-DataIndication Informs the network about the arrival of data and/or signaling mapped to radio bearers not configured for SDT while SDT procedure is ongoing.
preferredDRX-InactivityTimer Indicates the UE's preferred DRX inactivity timer length for power saving. Value in ms (milliSecond). *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the DRX inactivity timer. If secondary DRX group is configured, the *preferredDRX-InactivityTimer* only applies to the default DRX group.
preferredDRX-LongCycle Indicates the UE's preferred long DRX cycle length for power saving. Value in ms. *ms10* corresponds to 10ms, *ms20* corresponds to 20 ms, *ms32* corresponds to 32 ms, and so on. If *preferredDRX-ShortCycle* is provided, the value of *preferredDRX-LongCycle* shall be a multiple of the *preferredDRX-ShortCycle* value. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the long DRX cycle.
preferredDRX-ShortCycle Indicates the UE's preferred short DRX cycle length for power saving. Value in ms. *ms2* corresponds to 2ms, *ms3* corresponds to 3 ms, *ms4* corresponds to 4 ms, and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the short DRX cycle.
preferredDRX-ShortCycleTimer Indicates the UE's preferred short DRX cycle timer for power saving. Value in multiples of *preferredDRX-ShortCycle*. A value of 1 corresponds to *preferredDRX-ShortCycle*, a value of 2 corresponds to 2 * *preferredDRX-ShortCycle* and so on. If the field is absent from the *DRX-Preference* IE, it is interpreted as the UE having no preference for the short DRX cycle timer. A preference for the short DRX cycle is indicated when a preference for the short DRX cycle timer is indicated.
preferredK0 Indicates the UE's preferred value of *k0* (slot offset between DCI and its scheduled PDSCH - see TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k0* for cross-slot scheduling.

***UEAssistanceInformation* field descriptions**
preferredK2 Indicates the UE's preferred value of *k2* (slot offset between DCI and its scheduled PUSCH - see TS 38.214 [19], clause 6.1.2.1) for cross-slot scheduling for power saving. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on. If a value for a subcarrier spacing is absent, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling for that subcarrier spacing. If the field is absent from the *MinSchedulingOffsetPreference* IE, it is interpreted as the UE having no preference on *k2* for cross-slot scheduling.
preferredRRC-State Indicates the UE's preferred RRC state. The value *idle* is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_IDLE. The value *inactive* is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_INACTIVE. The value *connected* is indicated if the UE prefers to revert an earlier indication to leave RRC_CONNECTED state. The value *outOfConnected* is indicated if the UE prefers to be released from RRC_CONNECTED and has no preferred RRC state to transition to. The value *connected* can only be indicated if the UE is configured with *connectedReporting*.
propagationDelayDifference Indicates the one-way service link propagation delay difference between serving cell and each neighbour cell included in *neighCellInfoList,* defined as neighbour cell's service link propagation delay minus serving cell's service link propagation delay, in number of ms. First entry in *propagationDelayDifference* corresponds to first entry in *neighCellInfoList*, second entry in *propagationDelayDifference* corresponds to second entry in *neighCellInfoList*, and so on.
reducedMaxBW-FR1 Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR1. The aggregated bandwidth across all downlink carrier(s) of FR1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR1. The aggregated bandwidth across all uplink carrier(s) of FR1 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR1. If the field is absent from the *MaxBW-Preference* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR1. When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR1 of both the NR MCG and the SCG. This maximum aggregated bandwidth only includes carriers of FR1 of the SCG in (NG)EN-DC. Value *mhz0* is not used when indicated to address overheating. When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.
reducedMaxBW-FR2 Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-1, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-1. The aggregated bandwidth across all downlink carrier(s) of FR2-1 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-1. The aggregated bandwidth across all uplink carrier(s) of FR2-1 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-1. If the field is absent from the *MaxBW-Preference* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-1. When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2-1 of both the NR MCG and the NR SCG. This maximum aggregated bandwidth only includes carriers of FR2-1 of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-1 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.
reducedMaxBW-FR2-2 Indicates the UE's preference on reduced configuration corresponding to the maximum aggregated bandwidth across all downlink carrier(s) and across all uplink carrier(s) of FR2-2, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cell(s) operating on FR2-2. The aggregated bandwidth across all downlink carrier(s) of FR2-2 is the sum of bandwidth of active downlink BWP(s) across all activated downlink carrier(s) of FR2-2. The aggregated bandwidth across all uplink carrier(s) of FR2-2 is the sum of bandwidth of active uplink BWP(s) across all activated uplink carrier(s) of FR2-2. If the field is absent from the *MaxBW-PreferenceFR2-2* IE or the *OverheatingAssistance* IE, it is interpreted as the UE having no preference on the maximum aggregated bandwidth of FR2-2. When indicated to address overheating, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of both the NR MCG and the NR SCG. This maximum aggregated bandwidth only includes carriers of FR2-2 of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum aggregated bandwidth includes carrier(s) of FR2-2 of the cell group that this UE assistance information is associated with. The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.

***UEAssistanceInformation* field descriptions**
reducedCCsDL Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink SCells indicated by the field, to address overheating or power saving. When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of downlink SCells can only range up to the current active configuration when indicated to address power savings.
reducedCCsUL Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink SCells indicated by the field, to address overheating or power saving. When indicated to address overheating, this maximum number includes both SCells of the NR MCG and PSCell/SCells of the SCG. This maximum number only includes PSCell/SCells of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum number includes PSCell/SCells of the cell group that this UE assistance information is associated with. The maximum number of uplink SCells can only range up to the current active configuration when indicated to address power savings.
reducedMIMO-LayersFR1-DL Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR1 in the cell group when indicated to address power savings.
reducedMIMO-LayersFR1-UL Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving (see NOTE 1). This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR1 in the cell group when indicated to address power savings.
reducedMIMO-LayersFR2-DL Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-1 in the cell group when indicated to address power savings.
reducedMIMO-LayersFR2-UL Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-1 indicated by the field, to address overheating or power saving (see NOTE 1). This field is allowed to be reported only when UE is configured with serving cells operating on FR2-1. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-1 in the cell group when indicated to address power savings.
reducedMIMO-LayersFR2-2-DL Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of downlink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated downlink carrier(s) of FR2-2 in the cell group when indicated to address power savings.
reducedMIMO-LayersFR2-2-UL Indicates the UE's preference on reduced configuration corresponding to the maximum number of uplink MIMO layers of each serving cell operating on FR2-2 indicated by the field, to address overheating or power saving (see NOTE 1). This field is allowed to be reported only when UE is configured with serving cells operating on FR2-2. The maximum number of uplink MIMO layers can only range up to the maximum number of MIMO layers configured across all activated uplink carrier(s) of FR2-2 in the cell group when indicated to address power savings.
referenceTimeInfoPreference Indicates whether the UE prefers being provisioned with the timing information specified in the IE *ReferenceTimeInfo*.

***UEAssistanceInformation* field descriptions**
resumeCause Provides the resume cause based on the information received from the upper layers.
rlm-MeasRelaxationState Indicates the relaxation state of RLM measurements. Value *true* indicates that the UE is performing relaxation of RLM measurements, and value *false* indicates that the UE is not performing relaxation of RLM measurements.
rrm-MeasRelaxationFulfilment Indicates whether the UE fulfils the relaxed measurement criterion for stationary UE in 5.7.4.4. Value true indicates that the UE fulfils the criterion, and value false indicates that the UE does not fulfil the criterion.
sl-QoS-FlowIdentity This identity uniquely identifies one sidelink QoS flow between the UE and the network in the scope of UE, which is unique for different destination and cast type.
sl-UE-AssistanceInformationNR Indicates the traffic characteristic of sidelink logical channel(s), specified in the IE *SL-TrafficPatternInfo,* that are setup for NR sidelink communication.
type1 Indicates the preferred amount of increment/decrement to the long DRX cycle length with respect to the current configuration. Value in number of milliseconds. Value *ms40* corresponds to 40 milliseconds, *msMinus40* corresponds to -40 milliseconds and so on.
ul-GapFR2-PatternPreference Indicates the UE's preference on FR2 UL gap pattern as defined in TS 38.133 [14].
victimSystemType Indicate the list of victim system types to which IDC interference is caused from NR when configured with UL CA. Value *gps*, *glonass*, *bds*, *galileo* and *navIC* indicates the type of GNSS. Value *wlan* indicates WLAN and value *bluetooth* indicates Bluetooth.

NOTE 1: The field may also indicate the UE's preference on reduced configuration corresponding to the maximum number of SRS ports (i.e. *nrofSRS-Ports*) of each serving cell operating on the associated frequency range.

SL-TrafficPatternInfo field descriptions
messageSize Indicates the maximum TB size based on the observed traffic pattern. The value refers to the index of TS 38.321 [3], table 6.1.3.1-2.
timingOffset This field indicates the estimated timing for a packet arrival in a sidelink logical channel. Specifically, the value indicates the timing offset with respect to subframe#0 of SFN#0 in milliseconds.
trafficPeriodicity This field indicates the estimated data arrival periodicity in a sidelink logical channel. Value ms20 corresponds to 20 ms, ms50 corresponds to 50 ms and so on.

– *UECapabilityEnquiry*

The *UECapabilityEnquiry* message is used to request UE radio access capabilities for NR as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

UECapabilityEnquiry message

```
-- ASN1START
-- TAG-UECAPABILITYENQUIRY-START

UECapabilityEnquiry ::=             SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        ueCapabilityEnquiry                 UECapabilityEnquiry-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UECapabilityEnquiry-IEs ::=         SEQUENCE {
    ue-CapabilityRAT-RequestList        UE-CapabilityRAT-RequestList,
    lateNonCriticalExtension            OCTET STRING                                                OPTIONAL,
    ue-CapabilityEnquiryExt             OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)      OPTIONAL --  Need N
}

UECapabilityEnquiry-v1560-IEs ::=   SEQUENCE {
    capabilityRequestFilterCommon       UE-CapabilityRequestFilterCommon                            OPTIONAL, -- Need N
    nonCriticalExtension                UECapabilityEnquiry-v1610-IEs                               OPTIONAL
}

UECapabilityEnquiry-v1610-IEs ::=   SEQUENCE {
    rrc-SegAllowed-r16                  ENUMERATED {enabled}            OPTIONAL, -- Need N
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- TAG-UECAPABILITYENQUIRY-STOP
-- ASN1STOP
```

– *UECapabilityInformation*

The IE *UECapabilityInformation* message is used to transfer UE radio access capabilities requested by the network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***UECapabilityInformation* message**

```
-- ASN1START
-- TAG-UECAPABILITYINFORMATION-START

UECapabilityInformation ::=         SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        ueCapabilityInformation             UECapabilityInformation-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UECapabilityInformation-IEs ::=     SEQUENCE {
    ue-CapabilityRAT-ContainerList      UE-CapabilityRAT-ContainerList                  OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                SEQUENCE{}                                      OPTIONAL
}

-- TAG-UECAPABILITYINFORMATION-STOP
-- ASN1STOP
```

– *UEInformationRequest*

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

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: Network to UE

UEInformationRequest message

```
-- ASN1START
-- TAG-UEINFORMATIONREQUEST-START

UEInformationRequest-r16 ::=     SEQUENCE {
    rrc-TransactionIdentifier        RRC-TransactionIdentifier,
    criticalExtensions               CHOICE {
        ueInformationRequest-r16         UEInformationRequest-r16-IEs,
        criticalExtensionsFuture         SEQUENCE {}
    }
}

UEInformationRequest-r16-IEs ::= SEQUENCE {
    idleModeMeasurementReq-r16       ENUMERATED{true}                    OPTIONAL, -- Need N
    logMeasReportReq-r16             ENUMERATED {true}                   OPTIONAL, -- Need N
```

```
    connEstFailReportReq-r16         ENUMERATED {true}                    OPTIONAL, -- Need N
    ra-ReportReq-r16                 ENUMERATED {true}                    OPTIONAL, -- Need N
    rlf-ReportReq-r16                ENUMERATED {true}                    OPTIONAL, -- Need N
    mobilityHistoryReportReq-r16       ENUMERATED {true}                    OPTIONAL, -- Need N
    lateNonCriticalExtension         OCTET STRING                         OPTIONAL,
    nonCriticalExtension             UEInformationRequest-v1700-IEs       OPTIONAL
}

UEInformationRequest-v1700-IEs ::= SEQUENCE {
    successHO-ReportReq-r17          ENUMERATED {true}                    OPTIONAL, -- Need N
    coarseLocationRequest-r17        ENUMERATED {true}                    OPTIONAL, -- Need N
    nonCriticalExtension             SEQUENCE {}                          OPTIONAL
}

-- TAG-UEINFORMATIONREQUEST-STOP
-- ASN1STOP
```

***UEInformationRequest-IEs* field descriptions**
coarseLocationRequest This field is used to request UE to report coarse location information.
connEstFailReportReq This field is used to indicate whether the UE shall report information about the connection failure.
idleModeMeasurementReq This field indicates that the UE shall report the idle/inactive measurement information, if available, to the network in the *UEInformationResponse* message.
logMeasReportReq This field is used to indicate whether the UE shall report information about logged measurements.
mobilityHistoryReportReq This field is used to indicate whether the UE shall report information about mobility history information.
ra-ReportReq This field is used to indicate whether the UE shall report information about the random access procedure.
rlf-ReportReq This field is used to indicate whether the UE shall report information about the radio link failure.
successHO-ReportReq This field is used to indicate whether the UE shall report information about the successful handover report.

– *UEInformationResponse*

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

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

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

UEInformationResponse message

```
-- ASN1START
-- TAG-UEINFORMATIONRESPONSE-START

UEInformationResponse-r16 ::=       SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        ueInformationResponse-r16           UEInformationResponse-r16-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UEInformationResponse-r16-IEs ::=   SEQUENCE {
    measResultIdleEUTRA-r16             MeasResultIdleEUTRA-r16             OPTIONAL,
    measResultIdleNR-r16                MeasResultIdleNR-r16                OPTIONAL,
    logMeasReport-r16                   LogMeasReport-r16                   OPTIONAL,
    connEstFailReport-r16               ConnEstFailReport-r16               OPTIONAL,
    ra-ReportList-r16                   RA-ReportList-r16                   OPTIONAL,
    rlf-Report-r16                      RLF-Report-r16                      OPTIONAL,
    mobilityHistoryReport-r16           MobilityHistoryReport-r16           OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                UEInformationResponse-v1700-IEs     OPTIONAL
}

UEInformationResponse-v1700-IEs ::=   SEQUENCE {
    successHO-Report-r17                SuccessHO-Report-r17                OPTIONAL,
    connEstFailReportList-r17           ConnEstFailReportList-r17           OPTIONAL,
    coarseLocationInfo-r17              OCTET STRING                        OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

LogMeasReport-r16 ::=               SEQUENCE {
    absoluteTimeStamp-r16               AbsoluteTimeInfo-r16,
    traceReference-r16                  TraceReference-r16,
    traceRecordingSessionRef-r16        OCTET STRING (SIZE (2)),
    tce-Id-r16                          OCTET STRING (SIZE (1)),
    logMeasInfoList-r16                 LogMeasInfoList-r16,
    logMeasAvailable-r16                ENUMERATED {true}                   OPTIONAL,
    logMeasAvailableBT-r16              ENUMERATED {true}                   OPTIONAL,
    logMeasAvailableWLAN-r16            ENUMERATED {true}                   OPTIONAL,
    ...
}

LogMeasInfoList-r16 ::=             SEQUENCE (SIZE (1..maxLogMeasReport-r16)) OF LogMeasInfo-r16

LogMeasInfo-r16 ::=                 SEQUENCE {
    locationInfo-r16                    LocationInfo-r16                    OPTIONAL,
    relativeTimeStamp-r16               INTEGER (0..7200),
    servCellIdentity-r16                CGI-Info-Logging-r16                OPTIONAL,
    measResultServingCell-r16           MeasResultServingCell-r16           OPTIONAL,
    measResultNeighCells-r16            SEQUENCE {
        measResultNeighCellListNR           MeasResultListLogging2NR-r16    OPTIONAL,
        measResultNeighCellListEUTRA        MeasResultList2EUTRA-r16        OPTIONAL
```

```
    },
    anyCellSelectionDetected-r16        ENUMERATED {true}                   OPTIONAL,
    ...,
    [[
    inDeviceCoexDetected-r17            ENUMERATED {true}                   OPTIONAL
    ]]
}

ConnEstFailReport-r16 ::=           SEQUENCE {
    measResultFailedCell-r16            MeasResultFailedCell-r16,
    locationInfo-r16                    LocationInfo-r16                    OPTIONAL,
    measResultNeighCells-r16            SEQUENCE {
        measResultNeighCellListNR           MeasResultList2NR-r16               OPTIONAL,
        measResultNeighCellListEUTRA        MeasResultList2EUTRA-r16            OPTIONAL
    },
    numberOfConnFail-r16                INTEGER (1..8),
    perRAInfoList-r16                       PerRAInfoList-r16,
    timeSinceFailure-r16                TimeSinceFailure-r16,
    ...
}

ConnEstFailReportList-r17 ::= SEQUENCE (SIZE (1..maxCEFReport-r17)) OF ConnEstFailReport-r16

MeasResultServingCell-r16 ::=       SEQUENCE {
    resultsSSB-Cell                     MeasQuantityResults,
    resultsSSB                          SEQUENCE{
        best-ssb-Index                      SSB-Index,
        best-ssb-Results                    MeasQuantityResults,
        numberOfGoodSSB                     INTEGER (1..maxNrofSSBs-r16)
    }                                                                       OPTIONAL
}

MeasResultFailedCell-r16 ::=        SEQUENCE {
    cgi-Info                            CGI-Info-Logging-r16,
    measResult-r16                      SEQUENCE {
        cellResults-r16                     SEQUENCE{
            resultsSSB-Cell-r16                 MeasQuantityResults
        },
        rsIndexResults-r16                  SEQUENCE{
            resultsSSB-Indexes-r16              ResultsPerSSB-IndexList
        }
    }
}

RA-ReportList-r16 ::= SEQUENCE (SIZE (1..maxRAReport-r16)) OF RA-Report-r16

RA-Report-r16 ::=                   SEQUENCE {
    cellId-r16                          CHOICE {
        cellGlobalId-r16                    CGI-Info-Logging-r16,
        pci-arfcn-r16                       PCI-ARFCN-NR-r16
    },
    ra-InformationCommon-r16            RA-InformationCommon-r16                    OPTIONAL,
    raPurpose-r16                       ENUMERATED {accessRelated, beamFailureRecovery, reconfigurationWithSync, ulUnSynchronized,
                                                    schedulingRequestFailure, noPUCCHResourceAvailable, requestForOtherSI,
```

```
                                                msg3RequestForOtherSI-r17, spare8, spare7, spare6, spare5, spare4, spare3,
                                                spare2, spare1},
    ...,
    [[
    spCellID-r17                        CGI-Info-Logging-r16                        OPTIONAL
    ]]
}

RA-InformationCommon-r16 ::=        SEQUENCE {
    absoluteFrequencyPointA-r16         ARFCN-ValueNR,
    locationAndBandwidth-r16            INTEGER (0..37949),
    subcarrierSpacing-r16               SubcarrierSpacing,
    msg1-FrequencyStart-r16             INTEGER (0..maxNrofPhysicalResourceBlocks-1)     OPTIONAL,
    msg1-FrequencyStartCFRA-r16         INTEGER (0..maxNrofPhysicalResourceBlocks-1)     OPTIONAL,
    msg1-SubcarrierSpacing-r16          SubcarrierSpacing                                OPTIONAL,
    msg1-SubcarrierSpacingCFRA-r16      SubcarrierSpacing                                OPTIONAL,
    msg1-FDM-r16                        ENUMERATED {one, two, four, eight}               OPTIONAL,
    msg1-FDMCFRA-r16                    ENUMERATED {one, two, four, eight}               OPTIONAL,
    perRAInfoList-r16                   PerRAInfoList-r16,
    ...,
    [[
    perRAInfoList-v1660              PerRAInfoList-v1660                         OPTIONAL
    ]],
    [[
    msg1-SCS-From-prach-ConfigurationIndex-r16  ENUMERATED {kHz1dot25, kHz5, spare2, spare1}  OPTIONAL
    ]],
    [[
    msg1-SCS-From-prach-ConfigurationIndexCFRA-r16  ENUMERATED {kHz1dot25, kHz5, spare2, spare1} OPTIONAL
    ]],
    [[
    msgA-RO-FrequencyStart-r17          INTEGER (0..maxNrofPhysicalResourceBlocks-1)     OPTIONAL,
    msgA-RO-FrequencyStartCFRA-r17      INTEGER (0..maxNrofPhysicalResourceBlocks-1)     OPTIONAL,
    msgA-SubcarrierSpacing-r17          SubcarrierSpacing                                OPTIONAL,
    msgA-RO-FDM-r17                     ENUMERATED {one, two, four, eight}               OPTIONAL,
    msgA-RO-FDMCFRA-r17                 ENUMERATED {one, two, four, eight}               OPTIONAL,
    msgA-SCS-From-prach-ConfigurationIndex-r17  ENUMERATED {kHz1dot25, kHz5, spare2, spare1}  OPTIONAL,
    msgA-TransMax-r17                   ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}  OPTIONAL,
    msgA-MCS-r17                        INTEGER (0..15)                                   OPTIONAL,
    nrofPRBs-PerMsgA-PO-r17             INTEGER (1..32)                                  OPTIONAL,
    msgA-PUSCH-TimeDomainAllocation-r17  INTEGER (1..maxNrofUL-Allocations)              OPTIONAL,
    frequencyStartMsgA-PUSCH-r17        INTEGER (0..maxNrofPhysicalResourceBlocks-1)     OPTIONAL,
    nrofMsgA-PO-FDM-r17                 ENUMERATED {one, two, four, eight}               OPTIONAL,
    dlPathlossRSRP-r17                  RSRP-Range                                       OPTIONAL,
    intendedSIBs-r17                    SEQUENCE (SIZE (1..maxSIB)) OF SIB-Type-r17      OPTIONAL,
    ssbsForSI-Acquisition-r17           SEQUENCE (SIZE (1..maxNrofSSBs-r16)) OF SSB-Index    OPTIONAL,
    msgA-PUSCH-PayloadSize-r17          BIT STRING (SIZE (5))                            OPTIONAL,
    onDemandSISuccess-r17               ENUMERATED {true}                                OPTIONAL
    ]]
}

PerRAInfoList-r16 ::= SEQUENCE (SIZE (1..200)) OF PerRAInfo-r16

PerRAInfoList-v1660 ::= SEQUENCE (SIZE (1..200)) OF PerRACSI-RSInfo-v1660
```

```
PerRAInfo-r16 ::=                   CHOICE {
    perRASSBInfoList-r16                PerRASSBInfo-r16,
    perRACSI-RSInfoList-r16             PerRACSI-RSInfo-r16
}

PerRASSBInfo-r16 ::=                SEQUENCE {
    ssb-Index-r16                       SSB-Index,
    numberOfPreamblesSentOnSSB-r16      INTEGER (1..200),
    perRAAttemptInfoList-r16            PerRAAttemptInfoList-r16
}

PerRACSI-RSInfo-r16 ::=             SEQUENCE {
    csi-RS-Index-r16                    CSI-RS-Index,
    numberOfPreamblesSentOnCSI-RS-r16   INTEGER (1..200)
}

PerRACSI-RSInfo-v1660 ::=         SEQUENCE {
    csi-RS-Index-v1660                  INTEGER (1..96)                   OPTIONAL
}

PerRAAttemptInfoList-r16 ::=        SEQUENCE (SIZE (1..200)) OF PerRAAttemptInfo-r16

PerRAAttemptInfo-r16 ::=            SEQUENCE {
    contentionDetected-r16              BOOLEAN               OPTIONAL,
    dlRSRPAboveThreshold-r16            BOOLEAN               OPTIONAL,
    ...,
    [[
    fallbackToFourStepRA-r17            ENUMERATED {true}     OPTIONAL
    ]]
}

SIB-Type-r17 ::= ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType9, sibType10-v1610, sibType11-v1610, sibType12-v1610,
                             sibType13-v1610, sibType14-v1610, spare6, spare5, spare4, spare3, spare2, spare1}

RLF-Report-r16 ::=                  CHOICE {
    nr-RLF-Report-r16                   SEQUENCE {
        measResultLastServCell-r16          MeasResultRLFNR-r16,
        measResultNeighCells-r16            SEQUENCE {
            measResultListNR-r16                MeasResultList2NR-r16       OPTIONAL,
            measResultListEUTRA-r16             MeasResultList2EUTRA-r16    OPTIONAL
        }                                               OPTIONAL,
        c-RNTI-r16                          RNTI-Value,
        previousPCellId-r16                 CHOICE {
            nrPreviousCell-r16                  CGI-Info-Logging-r16,
            eutraPreviousCell-r16               CGI-InfoEUTRALogging
        }                                                               OPTIONAL,
        failedPCellId-r16                   CHOICE {
            nrFailedPCellId-r16                 CHOICE {
                cellGlobalId-r16                    CGI-Info-Logging-r16,
                pci-arfcn-r16                       PCI-ARFCN-NR-r16
            },
            eutraFailedPCellId-r16          CHOICE {
                cellGlobalId-r16                CGI-InfoEUTRALogging,
                pci-arfcn-r16                   PCI-ARFCN-EUTRA-r16
```

```
            }
        },
        reconnectCellId-r16                 CHOICE {
            nrReconnectCellId-r16               CGI-Info-Logging-r16,
            eutraReconnectCellId-r16            CGI-InfoEUTRALogging
        }                                                                   OPTIONAL,
        timeUntilReconnection-r16           TimeUntilReconnection-r16       OPTIONAL,
        reestablishmentCellId-r16           CGI-Info-Logging-r16            OPTIONAL,
        timeConnFailure-r16                 INTEGER (0..1023)               OPTIONAL,
        timeSinceFailure-r16                TimeSinceFailure-r16,
        connectionFailureType-r16           ENUMERATED {rlf, hof},
        rlf-Cause-r16                       ENUMERATED {t310-Expiry, randomAccessProblem, rlc-MaxNumRetx,
                                                        beamFailureRecoveryFailure, lbtFailure-r16,
                                                        bh-rlfRecoveryFailure, t312-expiry-r17, spare1},
        locationInfo-r16                    LocationInfo-r16                OPTIONAL,
        noSuitableCellFound-r16             ENUMERATED {true}               OPTIONAL,
        ra-InformationCommon-r16            RA-InformationCommon-r16        OPTIONAL,
        ...,
        [[
        csi-rsRLMConfigBitmap-v1650         BIT STRING (SIZE (96))          OPTIONAL
        ]],
        [[
        lastHO-Type-r17                     ENUMERATED {cho, daps, spare2, spare1}  OPTIONAL,
        timeConnSourceDAPS-Failure-r17      TimeConnSourceDAPS-Failure-r17  OPTIONAL,
        timeSinceCHO-Reconfig-r17           TimeSinceCHO-Reconfig-r17       OPTIONAL,
        choCellId-r17                       CHOICE {
            cellGlobalId-r17                    CGI-Info-Logging-r16,
            pci-arfcn-r17                       PCI-ARFCN-NR-r16
        }                                                                   OPTIONAL,
        choCandidateCellList-r17            ChoCandidateCellList-r17        OPTIONAL
        ]]
    },
    eutra-RLF-Report-r16                SEQUENCE {
        failedPCellId-EUTRA                 CGI-InfoEUTRALogging,
        measResult-RLF-Report-EUTRA-r16     OCTET STRING,
        ...,
        [[
        measResult-RLF-Report-EUTRA-v1690   OCTET STRING                    OPTIONAL
        ]]
    }
}

SuccessHO-Report-r17 ::=                SEQUENCE {
    sourceCellInfo-r17                      SEQUENCE {
        sourcePCellId-r17                       CGI-Info-Logging-r16,
        sourceCellMeas-r17                      MeasResultSuccessHONR-r17       OPTIONAL,
        rlf-InSourceDAPS-r17                    ENUMERATED {true}               OPTIONAL
    },
    targetCellInfo-r17                      SEQUENCE {
        targetPCellId-r17                       CGI-Info-Logging-r16,
        targetCellMeas-r17                      MeasResultSuccessHONR-r17       OPTIONAL
    },
    measResultNeighCells-r17                SEQUENCE {
        measResultListNR-r17                    MeasResultList2NR-r16           OPTIONAL,
```

```
        measResultListEUTRA-r17                 MeasResultList2EUTRA-r16                    OPTIONAL
    }                                                                                       OPTIONAL,
    locationInfo-r17                        LocationInfo-r16                                OPTIONAL,
    timeSinceCHO-Reconfig-r17               TimeSinceCHO-Reconfig-r17                       OPTIONAL,
    shr-Cause-r17                           SHR-Cause-r17                                   OPTIONAL,
    ra-InformationCommon-r17                RA-InformationCommon-r16                        OPTIONAL,
    upInterruptionTimeAtHO-r17              UPInterruptionTimeAtHO-r17                      OPTIONAL,
    c-RNTI-r17                              RNTI-Value                                      OPTIONAL,
    ...
}

MeasResultList2NR-r16 ::=           SEQUENCE(SIZE (1..maxFreq)) OF MeasResult2NR-r16
MeasResultList2EUTRA-r16 ::=        SEQUENCE(SIZE (1..maxFreq)) OF MeasResult2EUTRA-r16

MeasResult2NR-r16 ::=               SEQUENCE {
    ssbFrequency-r16                    ARFCN-ValueNR                                   OPTIONAL,
    refFreqCSI-RS-r16                   ARFCN-ValueNR                                   OPTIONAL,
    measResultList-r16                  MeasResultListNR
}

MeasResultListLogging2NR-r16 ::=    SEQUENCE(SIZE (1..maxFreq)) OF MeasResultLogging2NR-r16

MeasResultLogging2NR-r16 ::=        SEQUENCE {
    carrierFreq-r16                     ARFCN-ValueNR,
    measResultListLoggingNR-r16         MeasResultListLoggingNR-r16
}

MeasResultListLoggingNR-r16 ::=     SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultLoggingNR-r16

MeasResultLoggingNR-r16 ::=         SEQUENCE {
    physCellId-r16                      PhysCellId,
    resultsSSB-Cell-r16                 MeasQuantityResults,
    numberOfGoodSSB-r16                 INTEGER (1..maxNrofSSBs-r16) OPTIONAL
}

MeasResult2EUTRA-r16 ::=            SEQUENCE {
    carrierFreq-r16                     ARFCN-ValueEUTRA,
    measResultList-r16                  MeasResultListEUTRA
}

MeasResultRLFNR-r16 ::=             SEQUENCE {
    measResult-r16                      SEQUENCE {
        cellResults-r16                     SEQUENCE{
            resultsSSB-Cell-r16                 MeasQuantityResults                     OPTIONAL,
            resultsCSI-RS-Cell-r16              MeasQuantityResults                     OPTIONAL
        },
        rsIndexResults-r16                  SEQUENCE{
            resultsSSB-Indexes-r16              ResultsPerSSB-IndexList                 OPTIONAL,
            ssbRLMConfigBitmap-r16              BIT STRING (SIZE (64))                  OPTIONAL,
            resultsCSI-RS-Indexes-r16           ResultsPerCSI-RS-IndexList              OPTIONAL,
            csi-rsRLMConfigBitmap-r16           BIT STRING (SIZE (96))                  OPTIONAL
        }                                                                             OPTIONAL
    }
}
```

```
MeasResultSuccessHONR-r17::=        SEQUENCE {
    measResult-r17                      SEQUENCE {
        cellResults-r17                     SEQUENCE{
            resultsSSB-Cell-r17                 MeasQuantityResults                         OPTIONAL,
            resultsCSI-RS-Cell-r17              MeasQuantityResults                         OPTIONAL
        },
        rsIndexResults-r17                  SEQUENCE{
            resultsSSB-Indexes-r17              ResultsPerSSB-IndexList                     OPTIONAL,
            resultsCSI-RS-Indexes-r17           ResultsPerCSI-RS-IndexList                  OPTIONAL
        }
    }
}

ChoCandidateCellList-r17 ::=        SEQUENCE(SIZE (1..maxNrofCondCells-r16)) OF ChoCandidateCell-r17

ChoCandidateCell-r17 ::=            CHOICE {
    cellGlobalId-r17                    CGI-Info-Logging-r16,
    pci-arfcn-r17                       PCI-ARFCN-NR-r16
}

SHR-Cause-r17 ::=                   SEQUENCE {
    t304-cause-r17                      ENUMERATED {true}                                   OPTIONAL,
    t310-cause-r17                      ENUMERATED {true}                                   OPTIONAL,
    t312-cause-r17                      ENUMERATED {true}                                   OPTIONAL,
    sourceDAPS-Failure-r17              ENUMERATED {true}                                   OPTIONAL,
    ...
}

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

MobilityHistoryReport-r16 ::= VisitedCellInfoList-r16

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

TimeSinceCHO-Reconfig-r17 ::= INTEGER (0..1023)

TimeConnSourceDAPS-Failure-r17 ::= INTEGER (0..1023)

UPInterruptionTimeAtHO-r17 ::= INTEGER (0..1023)

-- TAG-UEINFORMATIONRESPONSE-STOP
-- ASN1STOP
```

***UEInformationResponse-IEs* 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.
connEstFailReport This field is used to provide connection establishment failure or connection resume failure information.
connEstFailReportList This field is used to provide the list of *connEstFailReport* that are stored by the UE for the past up to *maxCEFReport-r17.*
logMeasReport This field is used to provide the measurement results stored by the UE associated to logged MDT.
measResultIdleEUTRA EUTRA measurement results performed during RRC_INACTIVE or RRC_IDLE.
measResultIdleNR NR measurement results performed during RRC_INACTIVE or RRC_IDLE.
ra-ReportList This field is used to provide the list of RA reports that is stored by the UE for the past upto *maxRAReport-r16* number of successful random access procedures, or failed or successful completion of on-demand system information request procedure.
rlf-Report This field is used to indicate the RLF report related contents.
successHO-Report This field is used to provide the successful handover report if triggered based on the successful handover configuration.

***LogMeasReport* field descriptions**
absoluteTimeStamp Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by NR within *absoluteTimeInfo*.
anyCellSelectionDetected This field is used to indicate the detection of *any cell selection* state, as defined in TS 38.304 [20]. The UE sets this field when performing the logging of measurement results in RRC_IDLE or RRC_INACTIVE and there is no suitable cell or no acceptable cell.
inDeviceCoexDetected Indicates that measurement logging is suspended due to IDC problem detection.
measResultServingCell This field refers to the log measurement results taken in the Serving cell.
numberOfGoodSSB Indicates the number of good beams (beams that are above *absThreshSS-BlocksConsolidation,* if configured by the network) associated to the cells within the R value range (which is configured by network for cell reselection) of the highest ranked cell as part of the beam level measurements. If the UE has no SSB of a neighbour cell whose measurement quantity is above the *absThreshSS-BlocksConsolidation* or if the network has not configured the *absThreshSS-BlocksConsolidation*, then the UE does not include *numberOfGoodSSB* for the corresponding neighbour cell. If the UE has no SSB of the serving cell whose measurement quantity is above the *absThreshSS-BlocksConsolidation* or if the network has not configured the *absThreshSS-BlocksConsolidation*, then the UE shall set the *numberOfGoodSSB* for the serving cell to one.
relativeTimeStamp Indicates the time of logging measurement results, measured relative to the *absoluteTimeStamp*. Value in seconds.
tce-Id Parameter Trace Collection Entity Id: See TS 32.422 [52].
traceRecordingSessionRef Parameter Trace Recording Session Reference: See TS 32.422 [52].

***ConnEstFailReport* field descriptions**
measResultFailedCell This field refers to the last measurement results taken in the cell, where connection establishment failure or connection resume failure happened.
measResultNeighCells This field refers to the neighbour cell measurements when connection establishment failure or connection resume failure happened.
numberOfConnFail This field is used to indicate the latest number of consecutive failed RRCSetup or RRCResume procedures in the same cell independent of RRC state transition.
timeSinceFailure This field is used to indicate the time that elapsed since the connection (establishment or resume) failure. Value in seconds. The maximum value 172800 means 172800s or longer.

***RA-InformationCommon* field descriptions**
absoluteFrequencyPointA
This field indicates the absolute frequency position of the reference resource block (Common RB 0).
locationAndBandwidth
Frequency domain location and bandwidth of the bandwidth part associated to the random-access resources used by the UE.
perRAInfoList, perRAInfoList-v1660
This field provides detailed information about each of the random access attempts in the chronological order of the random access attempts. If *perRAInfoList-v1660* is present, it shall contain the same number of entries, listed in the same order as in *perRAInfoList-r16*.
subcarrierSpacing
Subcarrier spacing used in the BWP associated to the random-access resources used by the UE.

***RA-Report* field descriptions**
cellID This field indicates the CGI of the cell in which the associated random access procedure was performed.
contentionDetected This field is used to indicate that contention was detected for the transmitted preamble in the given random access attempt or not. This field is not included when the UE performs random access attempt is using contention free random-access resources or when the *raPurpose* is set to *requestForOtherSI* or when the RA attempt is a 2-step RA attempt and fallback to 4-step RA did not occur (i.e. *fallbackToFourStepRA* is not included).
csi-RS-Index, csi-RS-Index-v1660 This field is used to indicate the CSI-RS index corresponding to the random access attempt. If the random access procedure is for beam failure recovery, the field indicates the NZP-CSI-RS-ResourceId. For CSI-RS index larger than maxNrofCSI-RS-ResourcesRRM-1, the index value is the sum of csi-RS-Index (without suffix) and csi-RS-Index-v1660.
dlPathlossRSRP Measeured RSRP of the DL pathloss reference obtained at the time of *RA_Type* selection stage of the RA procedure as captured in TS 38.321 [3].
dlRSRPAboveThreshold In 4 step random access procedure, this field is used to indicate whether the DL beam (SSB) quality associated to the random access attempt was above or below the threshold *rsrp-ThresholdSSB* in *beamFailureRecoveryConfig* in UL BWP configuration of UL BWP selected for random access procedure initiated for beam failure recovery; Otherwise, *rsrp-ThresholdSSB* in *rach-ConfigCommon* in UL BWP configuration of UL BWP selected for random access procedure. In 2 step random access procedure, this field is used to indicate whether the DL beam (SSB) quality associated to the random access attempt was above or below the threshold *msgA-RSRP-ThresholdSSB* in *rach-ConfigCommonTwoStepRA* in UL BWP configuration of UL BWP selected for random access procedure.
fallbackToFourStepRA This field indicates if a fallback indication in MsgB is received (according to TS 38.321 [3]) for the 2-step random access attempt.
intendedSIBs This field indicates the SIB(s) the UE wanted to receive as a result of the on demand SI request (when the RA procedure is a used as a SI request) initiated by the UE. That is, it indicates the one(s) of the SIB(s) in the SI message(s) requested to be broadcast that the UE was interested in.
msg1-SCS-From-prach-ConfigurationIndex This field is set by the UE with the corresponding SCS for CBRA as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* when the *msg1-SubcarrierSpacing* is absent; otherwise, this field is absent.
msg1-SCS-From-prach-ConfigurationIndexCFRA This field is set by the UE with the corresponding SCS for CFRA as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* when the *msg1-SubcarrierSpacing* is absent; otherwise, this field is absent.
msgA-PUSCH-PayloadSize This field indicates the size of the overall payload available in the UE buffer at the time of initiating the 2 step RA procedure. The value refers to the index of TS 38.321 [3], table 6.1.3.1-1, corresponding to the UE buffer size.
msgA-RO-FDM This field indicates the number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance for the PRACH resources configured for 2-step CBRA..
msgA-RO-FDMCFRA This field indicates the number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance for the PRACH resources configured for 2-step CFRA.
msgA-RO-FrequencyStart This field indicates the lowest resource block of the contention based random-access resources for 2-step CBRA in the random-access procedure. The indication has the form of the offset of the lowest PRACH transmissions occasion with respect to PRB 0 in the frequency domain.
msgA-RO-FrequencyStartCFRA This field indicates the lowest resource block of the contention free random-access resources for the 2-step CFRA in the random-access procedure. The indication has the form of the offset of the lowest PRACH transmissions occasion with respect to PRB 0 in the frequency domain.

msgA-SCS-From-prach-ConfigurationIndex This field is set by the UE with the corresponding SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]) when the *msgA-SubcarrierSpacing* is absent and when only 2-step random-access resources are available in the UL BWP used in the random-access procedure; otherwise, this field is absent.
numberOfPreamblesSentOnCSI-RS This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding CSI-RS.
numberOfPreamblesSentOnSSB This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding SS/PBCH block.
onDemandSISuccess This field is set to *true* when the RA report entry is included because of either msg1 based on demand SI request or msg3 based on demand SI request and if the on-demand SI request is successful. Otherwise, the field is absent.
perRAAttemptInfoList This field provides detailed information about a random access attempt.
perRACSI-RSInfoList This field provides detailed information about the successive random access attempts associated to the same CSI-RS.
perRASSBInfoList This field provides detailed information about the successive random access attempts associated to the same SS/PBCH block.
ra-InformationCommon This field is used to provide information on random access attempts. This field is mandatory present.
raPurpose This field is used to indicate the RA scenario for which the RA report entry is triggered. The RA accesses associated to Initial access from RRC_IDLE, RRC re-establishment procedure, transition from RRC-INACTIVE. The indicator *beamFailureRecovery* is used in case of successful beam failure recovery related RA procedure in the SpCell [3]. The indicator *reconfigurationWithSync* is used if the UE executes a reconfiguration with sync. The indicator *ulUnSynchronized* is used if the random access procedure is initiated in a SpCell by DL or UL data arrival during RRC_CONNECTED when the timeAlignmentTimer is not running in the PTAG or if the RA procedure is initiated in a serving cell by a PDCCH order [3]. The indicator *schedulingRequestFailure* is used in case of SR failures [3]. The indicator *noPUCCHResourceAvailable* is used when the UE has no valid SR PUCCH resources configured [3]. The indicator *requestForOtherSI* is used for MSG1 based on demand SI request. The indicator *msg3RequestForOtherSI* is used in case of MSG3 based SI request. The field can also be used for the SCG-related RA-Report when the *raPurpose* is set to *beamFailureRecovery*, *reconfigurationWithSync*, *ulUnSynchronized*, *schedulingRequestFailure* and *noPUCCHResourceAvailable*.
spCellID This field is used to indicate the CGI of the SpCell of the cell group associated to the SCell in which the associated random access procedure was performed. If the UE performs RA procedure on a SCell associated to the MCG, then this field is set to the CGI of the PCell and if the UE performs RA procedure on a SCell associated to the SCG, then this field is set to the CGI of the PSCell. If the CGI of the PSCell is not available at the UE for the RA procedure performed on a SCell associated to the SCG or for the RA procedure on the PSCell, this field is set to the CGI of the PCell. Otherwise, the field is absent.
ssb-Index This field is used to indicate the SS/PBCH index of the SS/PBCH block corresponding to the random access attempt.
ssbsForSI-Acquisition This field indicates the SSB(s) (in the form of SSB index(es)) that the UE used to receive the requested SI message(s). The field is present if the purpose of the random access procedure was to request on-demand SI (i.e. if the *raPurpose* is set to *requestForOtherSI* or *msg3RequestForOtherSI*). Otherwise, the field is absent.

***RLF-Report* field descriptions**
choCandidateCellList This field is used to indicate the list of candidate target cells for conditional handover included in *condRRCReconfig* at the time of connection failure. The field does not include the candidate target cells included in *measResultNeighCells*.
choCellId This field is used to indicate the candidate target cell for conditional handover included in *condRRCReconfig* that the UE selected for CHO based recovery while T311 is running.
connectionFailureType This field is used to indicate whether the connection failure is due to radio link failure or handover failure.
csi-rsRLMConfigBitmap, csi-rsRLMConfigBitmap-v1650 These fields are used to indicate the CSI-RS indexes configured in the RLM configurations for the active BWP when the UE declares RLF or HOF. The UE first fills in the *csi-rsRLMConfigBitmap-r16* to indicate the first 96 CSI-RS indexes and then *csi-rsRLMConfigBitmap-v1650* to indicate the latter 96 CSI-RS indexes. The first/leftmost bit in *csi-rsRLMConfigBitmap-r16* corresponds to CSI-RS index 0, the second bit corresponds to CSI-RS index 1. The first/leftmost bit in *csi-rsRLMConfigBitmap-v1650* corresponds to CSI-RS index 96, the second bit corresponds to CSI-RS index 97. These fields are included only if the *RadioLinkMonitoringConfig* for the respective BWP is configured.
c-RNTI This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure.
failedPCellId This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. For intra-NR handover *nrFailedPCellId* is included and for the handover from NR to EUTRA *eutraFailedPCellId* is included. The UE sets the ARFCN according to the frequency band used for transmission/ reception when the failure occurred.
failedPCellId-EUTRA This field is used to indicate the PCell in which RLF is detected or the source PCell of the failed handover in an E-UTRA RLF report.
lastHO-Type This field is used to indicate the type of the last executed handover before the last detected connection failure. The field is set to *cho* if the last executed handover was initiated by a conditional reconfiguration execution. The field is set to *daps* if the last executed handover was a DAPS handover.
measResultListEUTRA This field refers to the last measurement results taken in the neighboring EUTRA Cells, when the radio link failure or handover failure happened.
measResultListNR This field refers to the last measurement results taken in the neighboring NR Cells, when the radio link failure or handover failure happened.
measResultLastServCell This field refers to the log measurement results taken in the PCell upon detecting radio link failure or the source PCell upon handover failure.
measResult-RLF-Report-EUTRA Includes the E-UTRA *RLF-Report-r9* IE as specified in TS 36.331 [10].
measResult-RLF-Report-EUTRA-v1690 Includes the E-UTRA *RLF-Report-v9e0* IE as specified in TS 36.331 [10].
noSuitableCellFound This field is set by the UE when the T311 expires.
previousPCellId This field is used to indicate the source PCell of the last handover (source PCell when the last executed *RRCReconfiguration* message including *reconfigurationWithSync* was received). For intra-NR handover *nrPreviousCell* is included and for the handover from EUTRA to NR *eutraPreviousCell* is included.
ra-InformationCommon This field is optionally included when c*onnectionFailureType* is set to 'hof' or when *connectionFailureType* is set to 'rlf' and the *rlf-Cause* equals to 'randomAccessProblem' or 'beamRecoveryFailure'; otherwise this field is absent.
reconnectCellId This field is used to indicate the cell in which the UE comes back to connected after connection failure and after failing to perform reestablishment. If the UE comes back to RRC CONNECTED in an NR cell then *nrReconnectCellID* is included and if the UE comes back to RRC CONNECTED in an LTE cell then *eutraReconnectCellID* is included

reestablishmentCellId If the UE was not configured with *conditionalReconfiguration* at the time of re-establishment attempt, or if the cell selected for the re-establishment attempt is not a candidate target cell for conditional reconfiguration, this field is used to indicate the cell in which the re-establishment attempt was made after connection failure.
rlf-Cause This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the *connectionFailureType* is set to '*hof*'), the UE is allowed to set this field to any value, except for the case in which a radio link failure was detected in the source PCell while performing a DAPS handover..
ssbRLMConfigBitmap This field is used to indicate the SS/PBCH block indexes configured in the RLM configurations for the active BWP when the UE declares RLF or HOF.The first/leftmost bit corresponds to SSB index 0, the second bit corresponds to SSB index 1. This field is included only if the *RadioLinkMonitoringConfig* for the respective BWP is configured.
timeConnFailure This field is used to indicate the time elapsed since the last HO execution until connection failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.
timeConnSourceDAPS-Failure This field is used to indicate the time that elapsed between the last DAPS handover execution and the radio link failure detected in the source cell while T304 is running. Value in milliseconds. The maximum value 1023 means 1023ms or longer.
timeSinceFailure This field is used to indicate the time that elapsed since the connection (radio link or handover) failure. Value in seconds. The maximum value 172800 means 172800s or longer. In the case of failure(s) (either at source or at target or at both) associated to DAPS handover, this field indicates the time elapsed since the latest connection (radio link or handover) failure.
timeSinceCHO-Reconfig In case of handover failure, this field is used to indicate the time elapsed between the initiation of the last handover execution towards the target cell and the reception of the latest conditional reconfiguration. In case of radio link failure, this field is used to indicate the time elapsed between the radio link failure and the reception of the latest conditional reconfiguration while connected to the source PCell. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.
timeUntilReconnection This field is used to indicate the time that elapsed between the connection (radio link or handover) failure and the next time the UE comes to RRC CONNECTED in an NR or EUTRA cell, after failing to perform reestablishment. Value in seconds. The maximum value 172800 means 172800s or longer.

***SuccessHO-Report* field descriptions**
c-RNTI This field indicates the C-RNTI assigned by the target PCell of the handover for which the successful HO report was generated.
measResultListNR This field refers to the last measurement results taken in the neighboring NR Cells when a successful handover is executed.
rlf-InSourceDAPS This field indicates whether a radio link failure occurred at the source cell while T304 was running.
shr-Cause This field is used to indicate the cause of the successful HO report.
sourceCellMeas This field refers to the last measurement results taken in the source PCell of a handover in which the successful handover triggers the *SuccessHO-Report*.
sourcePCellId This field is used to indicate the source PCell of a handover in which the successful handover triggers the *SuccessHO-Report*.
targetPCellId This field is used to indicate the target PCell of a handover in which the successful handover triggers the *SuccessHO-Report*.
targetCellMeas This field refers to the last measurement results taken in the target PCell of a handover in which the successful handover triggers the *SuccessHO-Report*.
timeSinceCHO-Reconfig This field is used to indicate the time elapsed between the initiation of the last conditional reconfiguration execution towards the target cell and the reception of the latest conditional reconfiguration for this target cell. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.
upInterruptionTimeAtHO This field is used to indicate the time elapsed between the time of arrival of the last PDCP PDU received from the source cell for any data radio bearer and the time of arrival of the first non-duplicate PDCP PDU received from the target cell for any data radio bearer, and it is measured at the time of arrival of the first non-duplicate PDCP PDU received from the target cell for any data radio bearer. The field is set only in case of DAPS handover. Value in milliseconds. The maximum value 1023 means 1023ms or longer.

– *UEPositioningAssistanceInfo*

The *UEPositioningAssistanceInfo* message is used to provide positioning assistance information as requested by the Network.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

UEPositioningAssistanceInfo message

```
-- ASN1START
-- TAG-UEPOSITIONINGASSISTANCEINFO-START

UEPositioningAssistanceInfo-r17 ::= SEQUENCE {
    criticalExtensions                CHOICE {
        uePositioningAssistanceInfo-r17     UEPositioningAssistanceInfo-r17-IEs,
```

```
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UEPositioningAssistanceInfo-r17-IEs ::= SEQUENCE {
    ue-TxTEG-AssociationList-r17            UE-TxTEG-AssociationList-r17          OPTIONAL,
    lateNonCriticalExtension                OCTET STRING                          OPTIONAL,
    nonCriticalExtension                    UEPositioningAssistanceInfo-v1720-IEs OPTIONAL
}

UEPositioningAssistanceInfo-v1720-IEs::=    SEQUENCE {
    ue-TxTEG-TimingErrorMarginValue-r17         ENUMERATED {tc0, tc2, tc4, tc6, tc8, tc12, tc16, tc20, tc24, tc32, tc40, tc48, tc56,
                                                            tc64, tc72, tc80}                                       OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                                                         OPTIONAL
}

UE-TxTEG-AssociationList-r17 ::= SEQUENCE (SIZE (1..maxNrOfTxTEGReport-r17)) OF UE-TxTEG-Association-r17

UE-TxTEG-Association-r17 ::=        SEQUENCE {
    ue-TxTEG-ID-r17                     INTEGER (0..maxNrOfTxTEG-ID-1-r17),
    nr-TimeStamp-r17                    NR-TimeStamp-r17,
    associatedSRS-PosResourceIdList-r17 SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16,
    servCellId-r17                      ServCellIndex                           OPTIONAL
}

NR-TimeStamp-r17 ::= SEQUENCE {
    nr-SFN-r17          INTEGER (0..1023),
    nr-Slot-r17         CHOICE {
        scs15-r17           INTEGER (0..9),
        scs30-r17           INTEGER (0..19),
        scs60-r17           INTEGER (0..39),
        scs120-r17          INTEGER (0..79)
    },
    ...
}

-- TAG-UEPOSITIONINGASSISTANCEINFO-STOP
-- ASN1STOP
```

***UEPositioningAssistanceInfo* field descriptions**
nr-TimeStamp This field specifies the latest time instance at which the association is valid prior to the reporting.
servCellID This field indicates the serving cell information of SRS for positioning resources associated to the UE Tx TEG report.
ue-TxTEG-ID Identifies the ID of UE Tx TEG.
ue-TxTEG-TimingErrorMarginValue This field specifies the UE Tx TEG timing error margin value of all the UE Tx TEGs within one *UEPositioningAssistanceInfo*. Value *tc0* corresponds to 0 Tc, *tc2* corresponds to 2 Tc and so on (see TS 37.355 [49]).

– *ULDedicatedMessageSegment*

The *ULDedicatedMessageSegment* message is used to transfer segments of the *UECapabilityInformation* or *MeasurementReportAppLayer* message. SRB1 is used at transfer of segments of *UECapabilityInformation* and SRB4 is used at transfer of segments of *MeasurementReportAppLayer*.

Signalling radio bearer: SRB1 or SRB4

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

ULDedicatedMessageSegment message

```
-- ASN1START
-- TAG-ULDEDICATEDMESSAGESEGMENT-START

ULDedicatedMessageSegment-r16 ::=       SEQUENCE {
    criticalExtensions                      CHOICE {
        ulDedicatedMessageSegment-r16           ULDedicatedMessageSegment-r16-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

ULDedicatedMessageSegment-r16-IEs ::=     SEQUENCE {
    segmentNumber-r16                       INTEGER (0..15),
    rrc-MessageSegmentContainer-r16         OCTET STRING,
    rrc-MessageSegmentType-r16              ENUMERATED {notLastSegment, lastSegment},
    lateNonCriticalExtension                OCTET STRING                                OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                 OPTIONAL
}

-- TAG-ULDEDICATEDMESSAGESEGMENT-STOP
-- ASN1STOP
```

***ULDedicatedMessageSegment* field descriptions**
segmentNumber Identifies the sequence number of a segment within the encoded UL DCCH message.
rrc-MessageSegmentContainer Includes a segment of the encoded UL DCCH message. The size of the included segment in this container should be small enough that the resulting encoded RRC message PDU is less than or equal to the PDCP SDU size limit.
rrc-MessageSegmentType Indicates whether the included UL DCCH message segment is the last segment or not.

– *ULInformationTransfer*

The *ULInformationTransfer* message is used for the uplink transfer of NAS or non-3GPP dedicated information, or IAB-DU specific F1-C related information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed. If only *dedicatedInfoF1c* is included, SRB2 is used.

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

ULInformationTransfer message

```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFER-START

ULInformationTransfer ::=           SEQUENCE {
    criticalExtensions                  CHOICE {
        ulInformationTransfer               ULInformationTransfer-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

ULInformationTransfer-IEs ::=       SEQUENCE {
    dedicatedNAS-Message                DedicatedNAS-Message                OPTIONAL,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    nonCriticalExtension                ULInformationTransfer-v1700-IEs     OPTIONAL
}

ULInformationTransfer-v1700-IEs ::=       SEQUENCE {
    dedicatedInfoF1c-r17                    DedicatedInfoF1c-r17                OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                         OPTIONAL
}

-- TAG-ULINFORMATIONTRANSFER-STOP
-- ASN1STOP
```

– *ULInformationTransferIRAT*

The *ULInformationTransferIRAT* message is used for the uplink transfer of information terminated at NR MCG but specified by another RAT. In this version of the specification, the message is used for V2X sidelink communication messages specified in TS 36.331 [10].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to network

ULInformationTransferIRAT message

```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFERIRAT-START

ULInformationTransferIRAT-r16 ::=             SEQUENCE {
    criticalExtensions                              CHOICE {
        c1                                                  CHOICE {
            ulInformationTransferIRAT-r16                   ULInformationTransferIRAT-r16-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

ULInformationTransferIRAT-r16-IEs ::=       SEQUENCE {
    ul-DCCH-MessageEUTRA-r16                        OCTET STRING            OPTIONAL,
    lateNonCriticalExtension                        OCTET STRING            OPTIONAL,
    nonCriticalExtension                             SEQUENCE {}             OPTIONAL
}

-- TAG-ULINFORMATIONTRANSFERIRAT-STOP
-- ASN1STOP
```

ULInformationTransferIRAT field descriptions
ul-DCCH-MessageEUTRA   Includes the *UL-DCCH-Message* as defined in TS 36.331 [10]. In this version of the specification, the field is only used to transfer the E-UTRA RRC *MeasurementReport*, E-UTRA RRC *SidelinkUEInformation* and the E-UTRA RRC *UEAssistanceInformation messages*.

– ULInformationTransferMRDC

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

Signalling radio bearer: SRB1, SRB3

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

ULInformationTransferMRDC message

```
-- ASN1START
-- TAG-ULINFORMATIONTRANSFERMRDC-START

ULInformationTransferMRDC ::=               SEQUENCE {
    criticalExtensions                          CHOICE {
        c1                                          CHOICE {
            ulInformationTransferMRDC                   ULInformationTransferMRDC-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

ULInformationTransferMRDC-IEs::=          SEQUENCE {
    ul-DCCH-MessageNR                           OCTET STRING                    OPTIONAL,
    ul-DCCH-MessageEUTRA                        OCTET STRING                    OPTIONAL,
    lateNonCriticalExtension                    OCTET STRING                    OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                     OPTIONAL
}

-- TAG-ULINFORMATIONTRANSFERMRDC-STOP
-- ASN1STOP
```

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

6.3 RRC information elements

6.3.0 Parameterized types

– *SetupRelease*

SetupRelease allows the *ElementTypeParam* to be used as the referenced data type for the setup and release entries. See A.3.8 for guidelines.

```
-- ASN1START
-- TAG-SETUPRELEASE-START
```

```
SetupRelease { ElementTypeParam } ::= CHOICE {
    release         NULL,
    setup           ElementTypeParam
}

-- TAG-SETUPRELEASE-STOP
-- ASN1STOP
```

6.3.1 System information blocks

– *SIB2*

SIB2 contains cell re-selection information common for intra-frequency, inter-frequency and/or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

SIB2 information element

```
-- ASN1START
-- TAG-SIB2-START

SIB2 ::=                            SEQUENCE {
    cellReselectionInfoCommon           SEQUENCE {
        nrofSS-BlocksToAverage              INTEGER (2..maxNrofSS-BlocksToAverage)          OPTIONAL,       -- Need S
        absThreshSS-BlocksConsolidation     ThresholdNR                                     OPTIONAL,       -- Need S
        rangeToBestCell                     RangeToBestCell                                 OPTIONAL,       -- Need R
        q-Hyst                              ENUMERATED {
                                                dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                                dB12, dB14, dB16, dB18, dB20, dB22, dB24},
        speedStateReselectionPars           SEQUENCE {
            mobilityStateParameters             MobilityStateParameters,
            q-HystSF                            SEQUENCE {
                sf-Medium                           ENUMERATED {dB-6, dB-4, dB-2, dB0},
                sf-High                             ENUMERATED {dB-6, dB-4, dB-2, dB0}
            }
        }                                                                                   OPTIONAL,       -- Need R
    ...
    },
    cellReselectionServingFreqInfo      SEQUENCE {
        s-NonIntraSearchP                   ReselectionThreshold                            OPTIONAL,       -- Need S
        s-NonIntraSearchQ                   ReselectionThresholdQ                           OPTIONAL,       -- Need S
        threshServingLowP                   ReselectionThreshold,
        threshServingLowQ                   ReselectionThresholdQ                           OPTIONAL,       -- Need R
        cellReselectionPriority             CellReselectionPriority,
        cellReselectionSubPriority          CellReselectionSubPriority                      OPTIONAL,       -- Need R
        ...
    },
    intraFreqCellReselectionInfo        SEQUENCE {
        q-RxLevMin                          Q-RxLevMin,
        q-RxLevMinSUL                       Q-RxLevMin                                      OPTIONAL,       -- Need R
```

```
        q-QualMin                           Q-QualMin                                       OPTIONAL,       -- Need S
        s-IntraSearchP                      ReselectionThreshold,
        s-IntraSearchQ                      ReselectionThresholdQ                           OPTIONAL,       -- Need S
        t-ReselectionNR                     T-Reselection,
        frequencyBandList                   MultiFrequencyBandListNR-SIB                    OPTIONAL,       -- Need S
        frequencyBandListSUL                MultiFrequencyBandListNR-SIB                    OPTIONAL,       -- Need R
        p-Max                               P-Max                                           OPTIONAL,       -- Need S
        smtc                                SSB-MTC                                         OPTIONAL,       -- Need S
        ss-RSSI-Measurement                 SS-RSSI-Measurement                             OPTIONAL,       -- Need R
        ssb-ToMeasure                       SSB-ToMeasure                                   OPTIONAL,       -- Need S
        deriveSSB-IndexFromCell             BOOLEAN,
        ...,
        [[
        t-ReselectionNR-SF                  SpeedStateScaleFactors                          OPTIONAL        -- Need N
        ]],
        [[
        smtc2-LP-r16                        SSB-MTC2-LP-r16                                 OPTIONAL,        -- Need R
        ssb-PositionQCL-Common-r16          SSB-PositionQCL-Relation-r16                    OPTIONAL         -- Cond SharedSpectrum
        ]],
        [[
        ssb-PositionQCL-Common-r17          SSB-PositionQCL-Relation-r17                    OPTIONAL         -- Cond SharedSpectrum2
        ]],
        [[
        smtc4list-r17                       SSB-MTC4List-r17                                OPTIONAL         -- Need R
        ]],
        [[
        frequencyBandList-v1760             MultiFrequencyBandListNR-SIB-v1760              OPTIONAL,       -- Need R
        frequencyBandListSUL-v1760          MultiFrequencyBandListNR-SIB-v1760              OPTIONAL        -- Need R
        ]]
    },
    ...,
    [[
    relaxedMeasurement-r16              SEQUENCE {
        lowMobilityEvaluation-r16           SEQUENCE {
            s-SearchDeltaP-r16                  ENUMERATED {
                                                    dB3, dB6, dB9, dB12, dB15,
                                                    spare3, spare2, spare1},
            t-SearchDeltaP-r16                  ENUMERATED {
                                                    s5, s10, s20, s30, s60, s120, s180,
                                                    s240, s300, spare7, spare6, spare5,
                                                    spare4, spare3, spare2, spare1}
        }                                                                                   OPTIONAL,       -- Need R
        cellEdgeEvaluation-r16              SEQUENCE {
            s-SearchThresholdP-r16              ReselectionThreshold,
            s-SearchThresholdQ-r16              ReselectionThresholdQ                       OPTIONAL        -- Need R
        }                                                                                   OPTIONAL,       -- Need R
        combineRelaxedMeasCondition-r16     ENUMERATED {true}                               OPTIONAL,       -- Need R
        highPriorityMeasRelax-r16           ENUMERATED {true}                               OPTIONAL        -- Need R
    }                                                                                       OPTIONAL        -- Need R
    ]],
    [[
    cellEquivalentSize-r17              INTEGER(2..16)                                      OPTIONAL,       -- Cond HSDN
    relaxedMeasurement-r17              SEQUENCE {
        stationaryMobilityEvaluation-r17    SEQUENCE {
```

```
            s-SearchDeltaP-Stationary-r17           ENUMERATED {dB2, dB3, dB6, dB9, dB12, dB15, spare2, spare1},
            t-SearchDeltaP-Stationary-r17           ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
                                                                spare4, spare3, spare2, spare1}

        },
        cellEdgeEvaluationWhileStationary-r17   SEQUENCE {
            s-SearchThresholdP2-r17                 ReselectionThreshold,
            s-SearchThresholdQ2-r17                 ReselectionThresholdQ                   OPTIONAL        -- Need R
        }                                                                                   OPTIONAL,       -- Need R
        combineRelaxedMeasCondition2-r17        ENUMERATED {true}                           OPTIONAL        -- Need R
    }                                                                                       OPTIONAL        -- Need R
    ]]
}

RangeToBestCell    ::= Q-OffsetRange

-- TAG-SIB2-STOP
-- ASN1STOP
```

***SIB2* field descriptions**
absThreshSS-BlocksConsolidation Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].
cellEdgeEvaluation Indicates the criteria for a UE to detect that it is not at cell edge, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.2).
cellEdgeEvaluationWhileStationary Indicates the criteria for a UE to detect that it is not at cell edge while stationary, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.4).
cellEquivalentSize The number of cell count used for mobility state estimation for this cell as specified in TS 38.304 [20].
cellReselectionInfoCommon Cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection.
cellReselectionServingFreqInfo Information common for non-intra-frequency cell re-selection i.e. cell re-selection to inter-frequency and inter-RAT cells.
combineRelaxedMeasCondition When both *lowMobilityEvalutation* and *cellEdgeEvalutation* criteria are present in SIB2, this parameter configures the UE to fulfil both criteria in order to relax measurement requirements for cell reselection. If the field is absent, the UE is allowed to relax measurement requirements for cell reselection when either or both of the criteria are met. (See TS 38.304 [20], clause 5.2.4.9.0)
combineRelaxedMeasCondition2 When both *stationaryMobilityEvaluation* and *cellEdgeEvaluationWhileStationary* criteria are present in SIB2, this parameter configures the UE to fulfil both criteria in order to relax measurement requirements for cell reselection. If the field is absent, the UE is allowed to relax measurement requirements for cell reselection when only the stationary criteria is met. (See TS 38.304 [20], clause 5.2.4.9.0)
deriveSSB-IndexFromCell This field indicates whether the UE can utilize serving cell timing to derive the index of SS block transmitted by neighbour cell. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the serving frequency as specified in TS 38.133 [14].
frequencyBandList Indicates the list of frequency bands for which the NR cell reselection parameters apply. The UE behaviour in case the field is absent is described in clause 5.2.2.4.3.
highPriorityMeasRelax Indicates whether measurements can be relaxed on high priority frequencies. If the field is absent, the UE shall not relax measurements on high priority frequencies beyond "$T_{higher\_priority\_search}$" unless both low mobility and not at cell edge criteria are fulfilled (see TS 38.133 [14], clauses 4.2.2.7, 4.2.2.10 and 4.2.2.11).
intraFreqCellReselectionInfo Cell re-selection information common for intra-frequency cells.
lowMobilityEvaluation Indicates the criteria for a UE to detect low mobility, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.1).
nrofSS-BlocksToAverage Number of SS blocks to average for cell measurement derivation. If the field is absent the UE uses the measurement quantity as specified in TS 38.304 [20].
p-Max Value in dBm applicable for the intra-frequency neighbouring NR cells. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell, TS 38.101-2 [39] in case of an FR2 cell or TS 38.101-5 [75] in case of an NTN cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].
q-Hyst Parameter "Q_{hyst}" in TS 38.304 [20], Value in dB. Value *dB1* corresponds to 1 dB, *dB2* corresponds to 2 dB and so on.
q-HystSF Parameter "Speed dependent ScalingFactor for Qhyst" in TS 38.304 [20]. The *sf-Medium* and *sf-High* concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to Qhyst as defined in TS 38.304 [20]. In dB. Value *dB-6* corresponds to -6dB, *dB-4* corresponds to -4dB and so on.

***SIB2* field descriptions**
q-QualMin Parameter "$Q_{qualmin}$" in TS 38.304 [20], applicable for intra-frequency neighbour cells. If the field is absent, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.
q-RxLevMin Parameter "$Q_{rxlevmin}$" in TS 38.304 [20], applicable for intra-frequency neighbour cells.
q-RxLevMinSUL Parameter "$Q_{rxlevmin}$" in TS 38.304 [20], applicable for intra-frequency neighbour cells.
rangeToBestCell Parameter "rangeToBestCell" in TS 38.304 [20]. The network configures only non-negative (in dB) values.
relaxedMeasurement Configuration to allow relaxation of RRM measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9). In NTN, this field is only applicable for GSO neighbour cells.
s-IntraSearchP Parameter "$S_{IntraSearchP}$" in TS 38.304 [20].
s-IntraSearchQ Parameter "$S_{IntraSearchQ}$" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for $S_{IntraSearchQ}$.
s-NonIntraSearchP Parameter "$S_{nonIntraSearchP}$" in TS 38.304 [20]. If this field is absent, the UE applies the (default) value of infinity for $S_{nonIntraSearchP}$.
s-NonIntraSearchQ Parameter "$S_{nonIntraSearchQ}$" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of 0 dB for $S_{nonIntraSearchQ}$.
s-SearchDeltaP Parameter "$S_{SearchDeltaP}$" in TS 38.304 [20]. Value dB3 corresponds to 3 dB, dB6 corresponds to 6 dB and so on.
s-SearchDeltaP-Stationary Parameter "$S_{SearchDeltaP\text{-}Stationary}$" in TS 38.304 [20]. Value *dB2* corresponds to 2 dB, *dB3* corresponds to 3 dB and so on.
s-SearchThresholdP, s-SearchThresholdP2 Parameters "$S_{SearchThresholdP}$" and "$S_{SearchThresholdP2}$" in TS 38.304 [20]. The network configures *s-SearchThresholdP* and *s-SearchThresholdP2* to be less than or equal to *s-IntraSearchP* and *s-NonIntraSearchP*.
s-SearchThresholdQ, s-SearchThresholdQ2 Parameters "$S_{SearchThresholdQ}$" and "$S_{SearchThresholdQ2}$" in TS 38.304 [20]. The network configures *s-SearchThresholdQ* and *s-SearchThresholdQ2* to be less than or equal to *s-IntraSearchQ* and *s-NonIntraSearchQ*.
smtc Measurement timing configuration for intra-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms for the intra-frequnecy cells. If the field is broadcast by an NTN cell, the *offset* (derived from parameter *periodicityAndOffset*) is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference.
smtc2-LP Measurement timing configuration for intra-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *intraFreqCellReselectionInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *intraFreqCellReselectionInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the intra-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no intra-frequency neighbour cells with a Long Periodicity.
smtc4list Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in *smtc4list* is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference. For a UE that supports less SMTCs than what is included in this list, it is up to the UE to select which SMTCs to consider.
ssb-PositionQCL-Common Indicates the QCL relation between SS/PBCH blocks for intra-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1.

***SIB2* field descriptions**
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks.
stationaryMobilityEvaluation Indicates the criteria for a UE to detect stationary mobility, in order to relax measurement requirements for cell reselection (see TS 38.304 [20], clause 5.2.4.9.0).
t-ReselectionNR Parameter "$T_{reselection_{NR}}$" in TS 38.304 [20].
t-ReselectionNR-SF Parameter "Speed dependent ScalingFactor for $T_{reselection_{NR}}$" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].
threshServingLowP Parameter "$Thresh_{Serving,\ LowP}$" in TS 38.304 [20].
threshServingLowQ Parameter "$Thresh_{Serving,\ LowQ}$" in TS 38.304 [20].
t-SearchDeltaP Parameter "$T_{SearchDeltaP}$" in TS 38.304 [20]. Value in seconds. Value *s5* means 5 seconds, value *s10* means 10 seconds and so on.
t-SearchDeltaP-Stationary Parameter "$T_{SearchDeltaP\text{-}Stationary}$" in TS 38.304 [20]. Value in seconds. Value *s5* means 5 seconds, value *s10* means 10 seconds and so on.

Conditional Presence	Explanation
HSDN	The field is optionally present, Need R, if *speedStateReselectionPars* is present; otherwise the field is not present.
SharedSpectrum	This field is mandatory present if this intra-frequency operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this intra-frequency operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.

– *SIB3*

SIB3 contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as exclude-listed cells.

***SIB3* information element**

```
-- ASN1START
-- TAG-SIB3-START

SIB3 ::=                            SEQUENCE {
    intraFreqNeighCellList              IntraFreqNeighCellList                                      OPTIONAL,   -- Need R
    intraFreqExcludedCellList           IntraFreqExcludedCellList                                   OPTIONAL,   -- Need R
    lateNonCriticalExtension            OCTET STRING                                                OPTIONAL,
    ...,
    [[
    intraFreqNeighCellList-v1610        IntraFreqNeighCellList-v1610                                OPTIONAL,   -- Need R
    intraFreqAllowedCellList-r16        IntraFreqAllowedCellList-r16                                OPTIONAL,   -- Cond SharedSpectrum2
    intraFreqCAG-CellList-r16           SEQUENCE (SIZE (1..maxPLMN)) OF IntraFreqCAG-CellListPerPLMN-r16    OPTIONAL    -- Need R
    ]],
```

```
    [[
    intraFreqNeighHSDN-CellList-r17     IntraFreqNeighHSDN-CellList-r17                                 OPTIONAL,    -- Need R
    intraFreqNeighCellList-v1710        IntraFreqNeighCellList-v1710                                    OPTIONAL     -- Need R
    ]],
    [[
    channelAccessMode2-r17              ENUMERATED {enabled}                                            OPTIONAL     -- Need R
    ]]
}

IntraFreqNeighCellList ::=          SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo

IntraFreqNeighCellList-v1610::=     SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo-v1610

IntraFreqNeighCellList-v1710 ::=     SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo-v1710

IntraFreqNeighCellInfo ::=          SEQUENCE {
    physCellId                          PhysCellId,
    q-OffsetCell                        Q-OffsetRange,
    q-RxLevMinOffsetCell                INTEGER (1..8)                                  OPTIONAL,    -- Need R
    q-RxLevMinOffsetCellSUL             INTEGER (1..8)                                  OPTIONAL,    -- Need R
    q-QualMinOffsetCell                 INTEGER (1..8)                                  OPTIONAL,    -- Need R
    ...
}

IntraFreqNeighCellInfo-v1610 ::=     SEQUENCE {
    ssb-PositionQCL-r16                 SSB-PositionQCL-Relation-r16                    OPTIONAL   -- Cond SharedSpectrum2
}

IntraFreqNeighCellInfo-v1710 ::=     SEQUENCE {
    ssb-PositionQCL-r17                 SSB-PositionQCL-Relation-r17                    OPTIONAL   -- Cond SharedSpectrum2
}

IntraFreqExcludedCellList ::=       SEQUENCE (SIZE (1..maxCellExcluded)) OF PCI-Range

IntraFreqAllowedCellList-r16 ::=    SEQUENCE (SIZE (1..maxCellAllowed)) OF PCI-Range

IntraFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {
    plmn-IdentityIndex-r16               INTEGER (1..maxPLMN),
    cag-CellList-r16                     SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range
}

IntraFreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellIntra)) OF PCI-Range

-- TAG-SIB3-STOP
-- ASN1STOP
```

***SIB3* field descriptions**
channelAccessMode2 If present, this field indicates that intra-frequency neighbor cells 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 intra-frequency neighbor cells do not apply any channel access procedure.
intraFreqAllowedCellList List of allow-listed intra-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.
intraFreqCAG-CellList List of intra-frequency neighbouring CAG cells (as defined in TS 38.304 [20]) per PLMN.
intraFreqExcludedCellList List of exclude-listed intra-frequency neighbouring cells.
intraFreqNeighCellList List of intra-frequency neighbouring cells with specific cell re-selection parameters. If *intraFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *intraFreqNeighCellList* (without suffix).
intraFreqNeighHSDN-CellList List of intra-frequency neighbouring HSDN cells as specified in TS 38.304 [20].
q-OffsetCell Parameter "$Qoffset_{s,n}$" in TS 38.304 [20].
q-QualMinOffsetCell Parameter "$Q_{qualminoffsetcell}$" in TS 38.304 [20]. Actual value $Q_{qualminoffsetcell}$ = field value [dB].
q-RxLevMinOffsetCell Parameter "$Q_{rxlevminoffsetcell}$" in TS 38.304 [20]. Actual value $Q_{rxlevminoffsetcell}$ = field value * 2 [dB].
q-RxLevMinOffsetCellSUL Parameter "$Q_{rxlevminoffsetcellSUL}$" in TS 38.304 [20]. Actual value $Q_{rxlevminoffsetcellSUL}$ = field value * 2 [dB].
ssb-PositionQCL Indicates the QCL relation between SS/PBCH blocks for a specific intra-frequency neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common* in *SIB2* for the indicated cell.

Conditional Presence	Explanation
SharedSpectrum2	The field is optional present, Need R, if this intra-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R.

– *SIB4*

SIB4 contains information relevant for inter-frequency cell re-selection (i.e. information about other NR frequencies and inter-frequency neighbouring cells relevant for cell re-selection), which can also be used for NR idle/inactive measurements. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

***SIB4* information element**

```
-- ASN1START
-- TAG-SIB4-START

SIB4 ::=                            SEQUENCE {
    interFreqCarrierFreqList            InterFreqCarrierFreqList,
```

```
    lateNonCriticalExtension            OCTET STRING                                OPTIONAL,
    ...,
    [[
    interFreqCarrierFreqList-v1610      InterFreqCarrierFreqList-v1610              OPTIONAL   -- Need R
    ]],
    [[
    interFreqCarrierFreqList-v1700      InterFreqCarrierFreqList-v1700              OPTIONAL   -- Need R
    ]],
    [[
    interFreqCarrierFreqList-v1720      InterFreqCarrierFreqList-v1720              OPTIONAL   -- Need R
    ]],
    [[
    interFreqCarrierFreqList-v1730      InterFreqCarrierFreqList-v1730              OPTIONAL   -- Need R
    ]],
    [[
    interFreqCarrierFreqList-v1760      InterFreqCarrierFreqList-v1760              OPTIONAL   -- Need R
    ]]
}

InterFreqCarrierFreqList ::=        SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo

InterFreqCarrierFreqList-v1610 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1610

InterFreqCarrierFreqList-v1700 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1700

InterFreqCarrierFreqList-v1720 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1720

InterFreqCarrierFreqList-v1730 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1730

InterFreqCarrierFreqList-v1760 ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1760

InterFreqCarrierFreqInfo ::=        SEQUENCE {
    dl-CarrierFreq                      ARFCN-ValueNR,
    frequencyBandList                   MultiFrequencyBandListNR-SIB                        OPTIONAL,   -- Cond Mandatory
    frequencyBandListSUL                MultiFrequencyBandListNR-SIB                        OPTIONAL,   -- Need R
    nrofSS-BlocksToAverage              INTEGER (2..maxNrofSS-BlocksToAverage)              OPTIONAL,   -- Need S
    absThreshSS-BlocksConsolidation     ThresholdNR                                         OPTIONAL,   -- Need S
    smtc                                SSB-MTC                                             OPTIONAL,   -- Need S
    ssbSubcarrierSpacing                SubcarrierSpacing,
    ssb-ToMeasure                       SSB-ToMeasure                                       OPTIONAL,   -- Need S
    deriveSSB-IndexFromCell             BOOLEAN,
    ss-RSSI-Measurement                 SS-RSSI-Measurement                                 OPTIONAL,   -- Need R
    q-RxLevMin                          Q-RxLevMin,
    q-RxLevMinSUL                       Q-RxLevMin                                          OPTIONAL,   -- Need R
    q-QualMin                           Q-QualMin                                           OPTIONAL,   -- Need S
    p-Max                               P-Max                                               OPTIONAL,   -- Need S
    t-ReselectionNR                     T-Reselection,
    t-ReselectionNR-SF                  SpeedStateScaleFactors                              OPTIONAL,   -- Need S
    threshX-HighP                       ReselectionThreshold,
    threshX-LowP                        ReselectionThreshold,
    threshX-Q                           SEQUENCE {
        threshX-HighQ                       ReselectionThresholdQ,
        threshX-LowQ                        ReselectionThresholdQ
    }                                                                                       OPTIONAL,   -- Cond RSRQ
```

```
    cellReselectionPriority             CellReselectionPriority                                 OPTIONAL,   -- Need R
    cellReselectionSubPriority          CellReselectionSubPriority                              OPTIONAL,   -- Need R
    q-OffsetFreq                        Q-OffsetRange                                           DEFAULT dB0,
    interFreqNeighCellList              InterFreqNeighCellList                                  OPTIONAL,   -- Need R
    interFreqExcludedCellList           InterFreqExcludedCellList                               OPTIONAL,   -- Need R
    ...
}

InterFreqCarrierFreqInfo-v1610 ::=  SEQUENCE {
    interFreqNeighCellList-v1610        InterFreqNeighCellList-v1610                            OPTIONAL,    -- Need R
    smtc2-LP-r16                        SSB-MTC2-LP-r16                                         OPTIONAL,    -- Need R
    interFreqAllowedCellList-r16        InterFreqAllowedCellList-r16                            OPTIONAL,    -- Cond SharedSpectrum2
    ssb-PositionQCL-Common-r16          SSB-PositionQCL-Relation-r16                            OPTIONAL,    -- Cond SharedSpectrum
    interFreqCAG-CellList-r16           SEQUENCE (SIZE (1..maxPLMN)) OF InterFreqCAG-CellListPerPLMN-r16   OPTIONAL     -- Need R
}

InterFreqCarrierFreqInfo-v1700 ::=  SEQUENCE {
    interFreqNeighHSDN-CellList-r17     InterFreqNeighHSDN-CellList-r17                         OPTIONAL,    -- Need R
    highSpeedMeasInterFreq-r17          ENUMERATED {true}                                       OPTIONAL,    -- Need R
    redCapAccessAllowed-r17             ENUMERATED {true}                                       OPTIONAL,    -- Need R
    ssb-PositionQCL-Common-r17          SSB-PositionQCL-Relation-r17                            OPTIONAL,    -- Cond SharedSpectrum
    interFreqNeighCellList-v1710        InterFreqNeighCellList-v1710                            OPTIONAL     -- Cond SharedSpectrum2
}

InterFreqCarrierFreqInfo-v1720 ::=  SEQUENCE {
    smtc4list-r17                       SSB-MTC4List-r17                                        OPTIONAL     -- Need R
}

InterFreqCarrierFreqInfo-v1730 ::=  SEQUENCE {
    channelAccessMode2-r17              ENUMERATED {enabled}                                    OPTIONAL     -- Need R
}

InterFreqCarrierFreqInfo-v1760 ::=  SEQUENCE {
    frequencyBandList-v1760             MultiFrequencyBandListNR-SIB-v1760                      OPTIONAL,    -- Need R
    frequencyBandListSUL-v1760          MultiFrequencyBandListNR-SIB-v1760                      OPTIONAL     -- Need R
}

InterFreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellInter)) OF PCI-Range

InterFreqNeighCellList ::=          SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellList-v1610 ::=    SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1610

InterFreqNeighCellList-v1710 ::=    SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo-v1710

InterFreqNeighCellInfo ::=          SEQUENCE {
    physCellId                          PhysCellId,
    q-OffsetCell                        Q-OffsetRange,
    q-RxLevMinOffsetCell                INTEGER (1..8)                                          OPTIONAL,   -- Need R
    q-RxLevMinOffsetCellSUL             INTEGER (1..8)                                          OPTIONAL,   -- Need R
    q-QualMinOffsetCell                 INTEGER (1..8)                                          OPTIONAL,   -- Need R
    ...
}
```

```
InterFreqNeighCellInfo-v1610 ::=    SEQUENCE {
    ssb-PositionQCL-r16                 SSB-PositionQCL-Relation-r16                                OPTIONAL    -- Cond SharedSpectrum2
}

InterFreqNeighCellInfo-v1710 ::=    SEQUENCE {
    ssb-PositionQCL-r17                 SSB-PositionQCL-Relation-r17                                OPTIONAL    -- Cond SharedSpectrum2
}

InterFreqExcludedCellList ::=       SEQUENCE (SIZE (1..maxCellExcluded)) OF PCI-Range

InterFreqAllowedCellList-r16 ::=    SEQUENCE (SIZE (1..maxCellAllowed)) OF PCI-Range

InterFreqCAG-CellListPerPLMN-r16 ::= SEQUENCE {
    plmn-IdentityIndex-r16              INTEGER (1..maxPLMN),
    cag-CellList-r16                    SEQUENCE (SIZE (1..maxCAG-Cell-r16)) OF PCI-Range
}

-- TAG-SIB4-STOP
-- ASN1STOP
```

***SIB4* field descriptions**
absThreshSS-BlocksConsolidation Threshold for consolidation of L1 measurements per RS index. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].
channelAccessMode2 If present, this field indicates that the neighbor cells on the inter-frequency 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 neighbor cells on the inter-frequency do not apply any channel access procedure.
deriveSSB-IndexFromCell This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14].
dl-CarrierFreq This field indicates center frequency of the SS block of the neighbour cells, where the frequency corresponds to a GSCN value as specified in TS 38.101-1 [15] or TS 38.101-5 [75].
frequencyBandList Indicates the list of frequency bands for which the NR cell reselection parameters apply.
highSpeedMeasInterFreq If the field is set to *true* and UE supports high speed inter-frequency IDLE/INACTIVE measurements, the UE shall apply the enhanced inter-frequency RRM requirements on the inter-frequency carrier to support high speed up to 500 km/h in RRC_IDLE/RRC_INACTIVE as specified in TS 38.133 [14].
interFreqAllowedCellList List of allow-listed inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.
interFreqCAG-CellList List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN.
interFreqCarrierFreqList List of neighbouring carrier frequencies and frequency specific cell re-selection information. If *interFreqCarrierFreqList-v1610, interFreqCarrierFreqList-v1700, interFreqCarrierFreqList-v1720*, *interFreqCarrierFreqList-v1730* or *interFreqCarrierFreqList-v1760* are present, they shall contain the same number of entries, listed in the same order as in *interFreqCarrierFreqList* (without suffix).
interFreqExcludedCellList List of exclude-listed inter-frequency neighbouring cells.
interFreqNeighCellList List of inter-frequency neighbouring cells with specific cell re-selection parameters. If *interFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqNeighCellList* (without suffix).
interFreqNeighHSDN-CellList List of inter-frequency neighbouring HSDN cells as specified in TS 38.304 [20].
nrofSS-BlocksToAverage Number of SS blocks to average for cell measurement derivation. If the field is absent, the UE uses the measurement quantity as specified in TS 38.304 [20].
p-Max Value in dBm applicable for the neighbouring NR cells on this carrier frequency. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell, TS 38.101-2 [39] in case of an FR2 cell or TS 38.101-5 [75] in case of an NTN cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].
q-OffsetCell Parameter "$Qoffset_{s,n}$" in TS 38.304 [20].
q-OffsetFreq Parameter "$Qoffset_{frequency}$" in TS 38.304 [20].
q-QualMin Parameter "$Q_{qualmin}$" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of negative infinity for $Q_{qualmin}$.

***SIB4* field descriptions**
q-QualMinOffsetCell Parameter "$Q_{qualminoffsetcell}$" in TS 38.304 [20]. Actual value $Q_{qualminoffsetcell}$ = field value [dB].
q-RxLevMin Parameter "$Q_{rxlevmin}$" in TS 38.304 [20].
q-RxLevMinOffsetCell Parameter "$Q_{rxlevminoffsetcell}$" in TS 38.304 [20]. Actual value $Q_{rxlevminoffsetcell}$ = field value * 2 [dB].
q-RxLevMinOffsetCellSUL Parameter "$Q_{rxlevminoffsetcellSUL}$" in TS 38.304 [20]. Actual value $Q_{rxlevminoffsetcellSUL}$ = field value * 2 [dB].
q-RxLevMinSUL Parameter "$Q_{rxlevmin}$" in TS 38.304 [20].
redCapAccessAllowed Indicates whether RedCap UEs are allowed to access the frequency.
smtc Measurement timing configuration for inter-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms in this frequency. If the field is broadcast by an NTN cell, the o*ffset* (derived from parameter *periodicityAndOffset*) is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual o*ffset* based on the actual propagation delay difference.
smtc2-LP Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *InterFreqCarrierFreqInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *InterFreqCarrierFreqInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity.
smtc4list Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in *smtc4list* is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference. For a UE that supports less SMTCs than what is included in this list, it is up to the UE to select which SMTCs to consider.
ssb-PositionQCL Indicates the QCL relation between SS/PBCH blocks for a specific neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the common value signalled by *ssb-PositionQCL-Common* in *SIB4* for the indicated cell.
ssb-PositionQCL-Common Indicates the QCL relation between SS/PBCH blocks for inter-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1.
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks.
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
threshX-HighP Parameter "$Thresh_{X, HighP}$" in TS 38.304 [20].
threshX-HighQ Parameter "$Thresh_{X, HighQ}$" in TS 38.304 [20].
threshX-LowP Parameter "$Thresh_{X, LowP}$" in TS 38.304 [20].

***SIB4* field descriptions**
threshX-LowQ Parameter "$Thresh_{X, LowQ}$" in TS 38.304 [20].
t-ReselectionNR Parameter "$Treselection_{NR}$" in TS 38.304 [20].
t-ReselectionNR-SF Parameter "Speed dependent ScalingFactor for $Treselection_{NR}$" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].

Conditional Presence	Explanation
Mandatory	The field is mandatory present in SIB4.
RSRQ	The field is mandatory present if *threshServingLowQ* is present in *SIB2*; otherwise it is absent.
SharedSpectrum	This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R.
SharedSpectrum2	The field is optional present, Need R, if this inter-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R.

– *SIB5*

SIB5 contains information relevant only for inter-RAT cell re-selection i.e. information about E-UTRA frequencies and E-UTRAs neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

***SIB5* information element**

```
-- ASN1START
-- TAG-SIB5-START

SIB5 ::=                            SEQUENCE {
    carrierFreqListEUTRA                CarrierFreqListEUTRA                    OPTIONAL,       -- Need R
    t-ReselectionEUTRA                  T-Reselection,
    t-ReselectionEUTRA-SF               SpeedStateScaleFactors                  OPTIONAL,       -- Need S
    lateNonCriticalExtension            OCTET STRING                            OPTIONAL,
    ...,
    [[
    carrierFreqListEUTRA-v1610      CarrierFreqListEUTRA-v1610                  OPTIONAL        -- Need R
    ]],
    [[
    carrierFreqListEUTRA-v1700      CarrierFreqListEUTRA-v1700                  OPTIONAL,       -- Need R
    idleModeMeasVoiceFallback-r17   ENUMERATED{true}                            OPTIONAL        -- Need R
    ]]
}

CarrierFreqListEUTRA ::=            SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA

CarrierFreqListEUTRA-v1610 ::=      SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1610

CarrierFreqListEUTRA-v1700 ::=      SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1700
```

```
CarrierFreqEUTRA ::=                SEQUENCE {
    carrierFreq                         ARFCN-ValueEUTRA,
    eutra-multiBandInfoList             EUTRA-MultiBandInfoList                 OPTIONAL,       -- Need R
    eutra-FreqNeighCellList             EUTRA-FreqNeighCellList                 OPTIONAL,       -- Need R
    eutra-ExcludedCellList              EUTRA-FreqExcludedCellList              OPTIONAL,       -- Need R
    allowedMeasBandwidth                EUTRA-AllowedMeasBandwidth,
    presenceAntennaPort1                EUTRA-PresenceAntennaPort1,
    cellReselectionPriority             CellReselectionPriority                 OPTIONAL,       -- Need R
    cellReselectionSubPriority          CellReselectionSubPriority              OPTIONAL,       -- Need R
    threshX-High                        ReselectionThreshold,
    threshX-Low                         ReselectionThreshold,
    q-RxLevMin                          INTEGER (-70..-22),
    q-QualMin                           INTEGER (-34..-3),
    p-MaxEUTRA                          INTEGER (-30..33),
    threshX-Q                           SEQUENCE {
        threshX-HighQ                       ReselectionThresholdQ,
        threshX-LowQ                        ReselectionThresholdQ
    }                                                                           OPTIONAL        -- Cond RSRQ
}

CarrierFreqEUTRA-v1610 ::= SEQUENCE {
    highSpeedEUTRACarrier-r16       ENUMERATED {true}                           OPTIONAL        -- Need R
}

CarrierFreqEUTRA-v1700 ::=          SEQUENCE {
    eutra-FreqNeighHSDN-CellList-r17    EUTRA-FreqNeighHSDN-CellList-r17        OPTIONAL        -- Need R
}

EUTRA-FreqNeighHSDN-CellList-r17 ::= SEQUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-PhysCellIdRange

EUTRA-FreqExcludedCellList ::=      SEQUENCE (SIZE (1..maxEUTRA-CellExcluded)) OF EUTRA-PhysCellIdRange

EUTRA-FreqNeighCellList ::=         SEQUENCE (SIZE (1..maxCellEUTRA)) OF EUTRA-FreqNeighCellInfo

EUTRA-FreqNeighCellInfo ::=         SEQUENCE {
    physCellId                          EUTRA-PhysCellId,
    dummy                               EUTRA-Q-OffsetRange,
    q-RxLevMinOffsetCell                INTEGER (1..8)                          OPTIONAL,       -- Need R
    q-QualMinOffsetCell                 INTEGER (1..8)                          OPTIONAL        -- Need R
}

-- TAG-SIB5-STOP
-- ASN1STOP
```

***SIB5* field descriptions**
carrierFreqListEUTRA List of carrier frequencies of E-UTRA. If the *carrierFreqListEUTRA-v1610/ carrierFreqListEUTRA-v1700* is present, it shall contain the same number of entries, listed in the same order as in the *carrierFreqListEUTRA* (without suffix).
dummy This field is not used in the specification. If received it shall be ignored by the UE.
eutra-ExcludedCellList List of exclude-listed E-UTRA neighbouring cells.
eutra-FreqNeighHSDN-CellList List of neighbouring EUTRA HSDN cells as specified in TS 36.304 [27].
eutra-multiBandInfoList Indicates the list of frequency bands in addition to the band represented by *carrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission* values, as defined in TS 36.101 [22], table 6.2.4-1, for the frequency bands in *eutra-multiBandInfoList*
highSpeedEUTRACarrier If the field is present, the UE shall apply the enhanced NR-EUTRA inter-RAT measurement requirements to support high speed up to 500 km/h as specified in TS 38.133 [14] to the E-UTRA carrier.
idleModeMeasVoiceFallback Indicates whether E-UTRA idle/inactive measurements and reporting for EPS fallback can be used.
p-MaxEUTRA The maximum allowed transmission power in dBm on the (uplink) carrier frequency, see TS 36.304 [27].
q-QualMin Parameter "$Q_{qualmin}$" in TS 36.304 [27]. Actual value $Q_{qualmin}$ = field value [dB].
q-QualMinOffsetCell Parameter "$Q_{qualminoffsetcell}$" in TS 36.304 [27]. Actual value $Q_{qualminoffsetcell}$ = field value [dB].
q-RxLevMin Parameter "$Q_{rxlevmin}$" in TS 36.304 [27]. Actual value $Q_{rxlevmin}$ = field value * 2 [dBm].
q-RxLevMinOffsetCell Parameter "$Q_{rxlevminoffsetcell}$" in TS 36.304 [27]. Actual value $Q_{rxlevminoffsetcell}$ = field value * 2 [dB].
t-ReselectionEUTRA Parameter "$Treselection_{EUTRA}$" in TS 38.304 [20].
threshX-High Parameter "$Thresh_{X, HighP}$" in TS 38.304 [20].
threshX-HighQ Parameter "$Thresh_{X, HighQ}$" in TS 38.304 [20].
threshX-Low Parameter "$Thresh_{X, LowP}$" in TS 38.304 [20].
threshX-LowQ Parameter "$Thresh_{X, LowQ}$" in TS 38.304 [20].
t-ReselectionEUTRA-SF Parameter "Speed dependent ScalingFactor for $Treselection_{EUTRA}$" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].

Conditional Presence	Explanation
RSRQ	The field is mandatory present if the *threshServingLowQ* is present in *SIB2*; otherwise it is absent.

– *SIB6*

SIB6 contains an ETWS primary notification.

SIB6 information element

```
-- ASN1START
-- TAG-SIB6-START

SIB6 ::=                            SEQUENCE {
    messageIdentifier                   BIT STRING (SIZE (16)),
    serialNumber                        BIT STRING (SIZE (16)),
    warningType                         OCTET STRING (SIZE (2)),
    lateNonCriticalExtension            OCTET STRING                                OPTIONAL,
    ...
}

-- TAG-SIB6-STOP
-- ASN1STOP
```

SIB6 field descriptions
messageIdentifier   Identifies the source and type of ETWS notification.
serialNumber   Identifies variations of an ETWS notification.
warningType   Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup.

– *SIB7*

SIB7 contains an ETWS secondary notification.

SIB7 information element

```
-- ASN1START
-- TAG-SIB7-START

SIB7 ::=                            SEQUENCE {
    messageIdentifier                   BIT STRING (SIZE (16)),
    serialNumber                        BIT STRING (SIZE (16)),
    warningMessageSegmentType           ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber         INTEGER (0..63),
    warningMessageSegment               OCTET STRING,
    dataCodingScheme                    OCTET STRING (SIZE (1))                     OPTIONAL,   -- Cond Segment1
    lateNonCriticalExtension            OCTET STRING                                OPTIONAL,
    ...
}
```

```
-- TAG-SIB7-STOP
-- ASN1STOP
```

***SIB7* field descriptions**
dataCodingScheme Identifies the alphabet/coding and the language applied variations of an ETWS notification.
messageIdentifier Identifies the source and type of ETWS notification.
serialNumber Identifies variations of an ETWS notification.
warningMessageSegment Carries a segment of the Warning Message Contents IE.
warningMessageSegmentNumber Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on.
warningMessageSegmentType Indicates whether the included ETWS warning message segment is the last segment or not.

Conditional Presence	Explanation
Segment1	The field is mandatory present in the first segment of *SIB7*, otherwise it is absent.

– *SIB8*

SIB8 contains a CMAS notification.

***SIB8* information element**

```
-- ASN1START
-- TAG-SIB8-START

SIB8 ::=                        SEQUENCE {
    messageIdentifier               BIT STRING (SIZE (16)),
    serialNumber                    BIT STRING (SIZE (16)),
    warningMessageSegmentType       ENUMERATED {notLastSegment, lastSegment},
    warningMessageSegmentNumber     INTEGER (0..63),
    warningMessageSegment           OCTET STRING,
    dataCodingScheme                OCTET STRING (SIZE (1))                     OPTIONAL,   -- Cond Segment1
    warningAreaCoordinatesSegment   OCTET STRING                                OPTIONAL,   -- Need R
    lateNonCriticalExtension        OCTET STRING                                OPTIONAL,
    ...
}

-- TAG-SIB8-STOP
-- ASN1STOP
```

***SIB8* field descriptions**
dataCodingScheme Identifies the alphabet/coding and the language applied variations of a CMAS notification.
messageIdentifier Identifies the source and type of CMAS notification.
serialNumber Identifies variations of a CMAS notification.
warningAreaCoordinatesSegment If present, carries a segment, with one or more octets, of the geographical area where the CMAS warning message is valid as defined in [28]. The first octet of the first *warningAreaCoordinatesSegment* is equivalent to the first octet of Warning Area Coordinates IE defined in and encoded according to TS 23.041 [29] and so on.
warningMessageSegment Carries a segment, with one or more octets, of the *Warning Message Contents* IE defined in TS 38.413 [42]. The first octet of the *Warning Message Contents* IE is equivalent to the first octet of the *CB data* IE defined in and encoded according to TS 23.041 [29], clause 9.4.2.2.5, and so on.
warningMessageSegmentNumber Segment number of the CMAS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on. If warning area coordinates are provided for the warning message, then this field applies to both warning message segment and warning area coordinates segment.
warningMessageSegmentType Indicates whether the included CMAS warning message segment is the last segment or not. If warning area coordinates are provided for the warning message, then this field applies to both warning message segment and warning area coordinates segment.

Conditional Presence	Explanation
Segment1	The field is mandatory present in the first segment of *SIB8*, otherwise it is absent.

– *SIB9*

SIB9 contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

NOTE: The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock.

***SIB9* information element**

```
-- ASN1START
-- TAG-SIB9-START

SIB9 ::=                            SEQUENCE {
    timeInfo                            SEQUENCE {
        timeInfoUTC                         INTEGER (0..549755813887),
        dayLightSavingTime                  BIT STRING (SIZE (2))               OPTIONAL,   -- Need R
        leapSeconds                         INTEGER (-127..128)                 OPTIONAL,   -- Need R
        localTimeOffset                     INTEGER (-63..64)                   OPTIONAL    -- Need R
    }                                                                           OPTIONAL,   -- Need R
```

```
    lateNonCriticalExtension            OCTET STRING                                OPTIONAL,
    ...,
     [[
    referenceTimeInfo-r16           ReferenceTimeInfo-r16                           OPTIONAL    -- Need R
    ]]
}

-- TAG-SIB9-STOP
-- ASN1STOP
```

***SIB9* field descriptions**
dayLightSavingTime Indicates if and how daylight-saving time (DST) is applied to obtain the local time. The semantics are the same as the semantics of the *Daylight Saving Time* IE in TS 24.501 [23] and TS 24.008 [38]. The first/leftmost bit of the bit string contains the b2 of octet 3 and the second bit of the bit string contains b1 of octet 3 in the value part of the *Daylight Saving Time* IE in TS 24.008 [38].
leapSeconds Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time -leapSeconds = UTC time.
localTimeOffset Offset between UTC and local time in units of 15 minutes. Actual value = field value * 15 minutes. Local time of the day is calculated as UTC time + localTimeOffset.
timeInfoUTC Coordinated Universal Time corresponding to the SFN boundary at or immediately after the ending boundary of the SI-window in which SIB9 is transmitted. In an NTN cell, the indicated time is referenced at the uplink time synchronization reference point (RP), i.e., UE should take into account the propagation delay between UE and RP when determining the UTC time at the UE. The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). See NOTE 1. This field is excluded when determining changes in system information, i.e. changes of *timeInfoUTC* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.

NOTE 1: The UE may use this field together with the *leapSeconds* field to obtain GPS time as follows: GPS Time (in seconds) = timeInfoUTC (in seconds) - 2,524,953,600 (seconds) + leapSeconds, where 2,524,953,600 is the number of seconds between 00:00:00 on Gregorian calendar date 1 January, 1900 and 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time).

– *SIB10*

SIB10 contains the HRNNs of the NPNs listed in SIB1.

***SIB10* information element**

```
-- ASN1START
-- TAG-SIB10-START

SIB10-r16 ::=               SEQUENCE {
    hrnn-List-r16               HRNN-List-r16                               OPTIONAL,   -- Need R
    lateNonCriticalExtension    OCTET STRING                                OPTIONAL,
    ...
}

HRNN-List-r16 ::=           SEQUENCE (SIZE (1..maxNPN-r16)) OF HRNN-r16
```

```
HRNN-r16 ::=                SEQUENCE {
    hrnn-r16                    OCTET STRING (SIZE(1.. maxHRNN-Len-r16))        OPTIONAL   -- Need R
}

-- TAG-SIB10-STOP
-- ASN1STOP
```

***SIB10* field descriptions**
HRNN-List   The same amount of HRNN (see TS 23.003 [21]) elements as the number of NPNs in SIB 1 are included. The n-th entry of *HRNN-List* contains the human readable network name of the n-th NPN of SIB1. The *hrnn* in the corresponding entry in *HRNN-List* is absent if there is no HRNN associated with the given NPN.

– *SIB11*

SIB11 contains information related to idle/inactive measurements.

SIB11 information element

```
-- ASN1START
-- TAG-SIB11-START

SIB11-r16 ::=                   SEQUENCE {
    measIdleConfigSIB-r16           MeasIdleConfigSIB-r16                   OPTIONAL, -- Need S
    lateNonCriticalExtension        OCTET STRING                            OPTIONAL,
    ...
}

-- TAG-SIB11-STOP
-- ASN1STOP
```

***SIB11* field descriptions**
measIdleConfigSIB   Indicates measurement configuration to be stored and used by the UE while in RRC_IDLE or RRC_INACTIVE.

– *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-ConfigGC-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.

– *SIB13*

SIB13 contains configurations of V2X sidelink communication defined in TS 36.331 [10].

SIB13 information element

```
-- ASN1START
-- TAG-SIB13-START

SIB13-r16 ::=                       SEQUENCE {
    sl-V2X-ConfigCommon-r16             OCTET STRING,
    dummy                               OCTET STRING,
    tdd-Config-r16                      OCTET STRING,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    ...
}

-- TAG-SIB13-STOP
-- ASN1STOP
```

***SIB13* field descriptions**
dummy This field is not used in the specification and the UE ignores the received value.
sl-V2X-ConfigCommon This field includes the E-UTRA *SystemInformationBlockType21* message as specified in TS 36.331 [10].
tdd-Config This field includes the *tdd-Config* in E-UTRA *SystemInformationBlockType1* message as specified in TS 36.331 [10].

– *SIB14*

SIB14 contains configurations of V2X sidelink communication defined in TS 36.331 [10], which can be used jointly with that included in *SIB13*.

SIB14 information element

```
-- ASN1START
-- TAG-SIB14-START

SIB14-r16 ::=                       SEQUENCE {
    sl-V2X-ConfigCommonExt-r16          OCTET STRING,
    lateNonCriticalExtension            OCTET STRING                        OPTIONAL,
    ...
}

-- TAG-SIB14-STOP
-- ASN1STOP
```

***SIB14* field descriptions**
sl-V2X-ConfigCommonExt This field includes the E-UTRA *SystemInformationBlockType26* message as specified in TS 36.331 [10].

– *SIB15*

SIB15 contains configurations of disaster roaming information.

SIB15 information element

```
-- ASN1START
-- TAG-SIB15-START

SIB15-r17 ::=                           SEQUENCE {
    commonPLMNsWithDisasterCondition-r17   SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity                  OPTIONAL,  -- Need R
    applicableDisasterInfoList-r17         SEQUENCE (SIZE (1..maxPLMN)) OF ApplicableDisasterInfo-r17     OPTIONAL,  -- Need R
    lateNonCriticalExtension               OCTET STRING                                                   OPTIONAL,
    ...
}

ApplicableDisasterInfo-r17    ::= CHOICE {
    noDisasterRoaming-r17             NULL,
    disasterRelatedIndication-r17     NULL,
    commonPLMNs-r17                   NULL,
    dedicatedPLMNs-r17                SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity
}

-- TAG-SIB15-STOP
-- ASN1STOP
```

SIB15 field descriptions
commonPLMNsWithDisasterCondition A list of PLMN(s) for which disaster condition applies and that disaster inbound roaming is accepted, which can be commonly applicable to the PLMNs sharing the cell.
applicableDisasterInfoList A list indicating the applicable disaster roaming information for the networks indicated in *plmn-IdentityInfoList* and *npn-IdentityInfoList-r16*. The network indicates in this list one entry for each entry of *plmn-IdentityInfoList*, followed by one entry for each entry of *npn-IdentityInfoList-r16*, meaning that this list will have as many entries as the number of entries of the combination of *plmn-IdentityInfoList* and *npn-IdentityInfoList-r16*. The first entry in this list indicates the disaster roaming information applicable for the network(s) in the first entry of *plmn-IdentityInfoList*/*npn-IdentityInfoList-r16*, the second entry in this list indicates the disaster roaming information applicable for the network(s) in the second entry of *plmn-IdentityInfoList*/*npn-IdentityInfoList-r16*, and so on. Each entry in this list can either be having the value *noDisasterRoaming*, *disasterRelatedIndication*, *commonPLMNs*, or *dedicatedPLMNs*. If an entry in this list takes the value *noDisasterRoaming*, disaster inbound roaming is not allowed in this network(s). If an entry in this list takes the value *disasterRelatedIndication*, the meaning of this field for this network(s) is as specified for "disaster related indication" in TS 23.122 [74], clause 4.4.3.1.1. If an entry in this list takes the value *commonPLMNs*, the PLMN(s) with disaster conditions indicated in the field *commonPLMNsWithDisasterCondition* apply for this network(s). If an entry in this list contains the value *dedicatedPLMNs*, the listed PLMN(s) are the PLMN(s) with disaster conditions that the network(s) corresponding to this entry accepts disaster inbound roamers from. For SNPNs, the network indicates the value *noDisasterRoaming*.

– *SIB16*

SIB16 contains configurations of slice-based cell reselection information.

SIB16 information element

```
-- ASN1START
-- TAG-SIB16-START

SIB16-r17 ::=                   SEQUENCE {
    freqPriorityListSlicing-r17     FreqPriorityListSlicing-r17             OPTIONAL,  -- Need R
    lateNonCriticalExtension        OCTET STRING                            OPTIONAL,
    ...
}

-- TAG-SIB16-STOP
-- ASN1STOP
```

***SIB16* field descriptions**
freqPriorityListSlicing This field indicates cell reselection priorities for slicing.

– *SIB17*

SIB17 contains configurations of TRS resources for idle/inactive UEs.

SIB17 information element

```
-- ASN1START
-- TAG-SIB17-START

SIB17-r17 ::=               SEQUENCE {
    segmentNumber-r17           INTEGER (0..63),
    segmentType-r17             ENUMERATED {notLastSegment, lastSegment},
    segmentContainer-r17        OCTET STRING
}

SIB17-IEs-r17 ::=           SEQUENCE {
    trs-ResourceSetConfig-r17   SEQUENCE (SIZE (1..maxNrofTRS-ResourceSets-r17)) OF TRS-ResourceSet-r17,
    validityDuration-r17        ENUMERATED {t1, t2, t4, t8, t16, t32, t64, t128, t256, t512, infinity, spare5, spare4, spare3, spare2,
                                            spare1}                                                         OPTIONAL,  -- Need S
    lateNonCriticalExtension    OCTET STRING                                                                OPTIONAL,
    ...
}

TRS-ResourceSet-r17 ::=             SEQUENCE {
    powerControlOffsetSS-r17            ENUMERATED {db-3, db0, db3, db6},
    scramblingID-Info-r17               CHOICE {
        scramblingIDforCommon-r17           ScramblingId,
        scramblingIDperResourceListWith2-r17    SEQUENCE (SIZE (2)) OF ScramblingId,
        scramblingIDperResourceListWith4-r17    SEQUENCE (SIZE (4)) OF ScramblingId,
    ...
    },
```

```
    firstOFDMSymbolInTimeDomain-r17           INTEGER (0..9),
    startingRB-r17                            INTEGER (0..maxNrofPhysicalResourceBlocks-1),
    nrofRBs-r17                               INTEGER (24..maxNrofPhysicalResourceBlocksPlus1),
    ssb-Index-r17                             SSB-Index,
    periodicityAndOffset-r17                  CHOICE {
        slots10                                   INTEGER (0..9),
        slots20                                   INTEGER (0..19),
        slots40                                   INTEGER (0..39),
        slots80                                   INTEGER (0..79)
    },
    frequencyDomainAllocation-r17             BIT STRING (SIZE (4)),
    indBitID-r17                              INTEGER (0..5),
    nrofResources-r17                         ENUMERATED {n2, n4}
}

-- TAG-SIB17-STOP
-- ASN1STOP
```

***SIB17* field descriptions**
segmentContainer This field includes a segment of the encoded *SIB17-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 *SIB17* is broadcast.
segmentNumber This field identifies the sequence number of a segment of *SIB17-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.
trs-ResourceSetConfig RS configuration of TRS occasion(s) for idle/inactive UE(s), in terms of a list of N>=1 NZP TRS resource set(s). The maximum number of TRS resource sets configured by higher layer is 64. If a TRS resource is configured, the L1 based availability indication is always enabled based on that configuration. A UE which acquired *SIB17* with a TRS configuration but did not yet receive an associated L1-based availability indication considers the configured TRS as unavailable. If SIB scheduling indicates that *SIB17* has changed, the UE considers its configured TRS(s) as unavailable until it receives the associated L1-based availability indication(s).
validityDuration The valid time duration for L1 availability indication, time unit is one default paging cycle. When the field is absent, UE assumes a default time duration to be 2 default paging cycles. The field is only valid while the UE has a valid *SIB17*.

***TRS-ResourceSet* field descriptions**
firstOFDMSymbolInTimeDomain The index of the first OFDM symbol in the PRB used for TRS in a slot. The field indicates the first symbol in a slot for the first TRS resource within the slot, and the symbol for the second TRS resource in the same slot can be derived implicitly with symbol index as *firstOFDMSymbolInTimeDomain*+4.
frequencyDomainAllocation Indicates the offset of the first RE to RE#0 in a RB in row1.
indBitID The index of the associated bit in TRS availability indication field in DCI. Each TRS resource set is configured with an ID i for the association with (i+1)-th indication bit in TRS availability indication field in DCI.
nrofRBs Number of PRBs across which corresponding TRS resource spans.
nrofResources The number of TRS resources for a TRS resource set.
periodicityAndOffset The periodicity and slot offset (slot) for periodic TRS. It is used to determine the location of the first slot of TRS resource set. The periodicity value *slots10* corresponds to 10 slots, value *slots20* corresponds to 20 slots, and so on.
powerControlOffsetSS Power offset (dB) of NZP CSI-RS RE to SSS RE.
scramblingID-Info One or more scrambling IDs are configured for a TRS resource set. If a common scrambling ID is configured, it applies to all the TRS resources within the TRS resource set. Otherwise, each TRS resource within the TRS resource set is provided with a scrambling ID. If the number of TRS resources for the TRS resource set is 2, *scramblingIDperResourceListWith2-r17* is configured, while *scramblingIDperResourceListWith4-r17* is configured for the case that the number of TRS resources for the TRS resource set is 4.
ssb-Index The index of reference SSB with which quasi-collocation information is provided as specified in TS 38.214 [19] clause 5.1.5.
startingRB The PRB index where corresponding TRS resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid.

– *SIB18*

SIB18 contains Group IDs for Network selection (GINs) to support access using credentials from a Credentials Holder or to support UE onboarding.

***SIB18* information element**

```
-- ASN1START
-- TAG-SIB18-START

SIB18-r17 ::=               SEQUENCE {
    gin-ElementList-r17         SEQUENCE (SIZE (1..maxGIN-r17)) OF GIN-Element-r17          OPTIONAL,   -- Need R
    gins-PerSNPN-List-r17       SEQUENCE (SIZE (1..maxNPN-r16)) OF GINs-PerSNPN-r17         OPTIONAL,   -- Need S
    lateNonCriticalExtension    OCTET STRING                                                OPTIONAL,
    ...
}

GIN-Element-r17 ::=         SEQUENCE {
    plmn-Identity-r17           PLMN-Identity,
```

```
    nid-List-r17                SEQUENCE (SIZE (1..maxGIN-r17)) OF NID-r16
}

GINs-PerSNPN-r17 ::=        SEQUENCE {
    supportedGINs-r17           BIT STRING (SIZE (1..maxGIN-r17))                   OPTIONAL    -- Need R
}
-- TAG-SIB18-STOP
-- ASN1STOP
```

***SIB18* field descriptions**
gin-ElementList
The *gin-ElementList* contains one or more GIN elements. Each GIN element contains either one GIN, which is identified by a PLMN ID and a NID, or multiple GINs that share the same PLMN ID. The total number of GINs indicated does not exceed maxGIN-r17. The GIN index *m* is defined as d1+d2+…+d(n-1)+i for the GIN included in the *n*-th entry of the *gin-ElementList* and the *i*-th entry of its corresponding *GIN-Element*, where *d(k)* is the number of GIN index values used in the *k*-th *gin-ElementList* entry.
gins-PerSNPN-List
Indicates the supported GINs for each SNPN. The network includes the same number of entries as the number of SNPNs in *snpn-AccessInfoList* in provided in SIB1, and the n-th entry in this list corresponds to the n-th SNPN listed in *snpn-AccessInfoList* provided in SIB1. The network configures this field only if the cell broadcasts more than one SNPN in *SIB1*. If this field is absent, as in case of a single SNPN broadcasted in *SIB1*, the UE shall associate all GINs in *gin-ElementList* to that SNPN.

***GINs-PerSNPN* field descriptions**
supportedGINs
Indicates the GINs which are supported by the given SNPN. The first/leftmost bit corresponds to the GIN with GIN index 1, the second bit corresponds to the GIN with GIN index 2 and so on. A bit set to 1 indicates that the GIN is supported by the SNPN. If the field is not present, then the corresponding SNPN does not support any GINs.

– *SIB19*

SIB19 contains satellite assistance information for NTN access.

SIB19 information element

```
-- ASN1START
-- TAG-SIB19-START

SIB19-r17 ::= SEQUENCE {
    ntn-Config-r17                      NTN-Config-r17                          OPTIONAL,       -- Need R
    t-Service-r17                       INTEGER (0..549755813887)               OPTIONAL,       -- Need R
    referenceLocation-r17               ReferenceLocation-r17                   OPTIONAL,       -- Need R
    distanceThresh-r17                  INTEGER(0..65525)                       OPTIONAL,       -- Need R
    ntn-NeighCellConfigList-r17         NTN-NeighCellConfigList-r17             OPTIONAL,       -- Need R
    lateNonCriticalExtension            OCTET STRING                            OPTIONAL,
    ...,
    [[
    ntn-NeighCellConfigListExt-v1720    NTN-NeighCellConfigList-r17             OPTIONAL        -- Need R
    ]]
}
```

```
NTN-NeighCellConfigList-r17 ::=         SEQUENCE (SIZE(1..maxCellNTN-r17))  OF NTN-NeighCellConfig-r17

NTN-NeighCellConfig-r17 ::=             SEQUENCE {
    ntn-Config-r17                          NTN-Config-r17                              OPTIONAL,       -- Need R
    carrierFreq-r17                         ARFCN-ValueNR                               OPTIONAL,       -- Need R
    physCellId-r17                          PhysCellId                                  OPTIONAL        -- Need R
}

-- TAG-SIB19-STOP
-- ASN1STOP
```

***SIB19* field descriptions**
distanceThresh   Distance from the serving cell reference location and is used in location-based measurement initiation in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20]. Each step represents 50m.
ntn-Config   Provides parameters needed for the UE to access NR via NTN access such as Ephemeris data, common TA parameters, k_offset, validity duration for UL sync information and epoch.
ntn-NeighCellConfigList, ntn-NeighCellConfigListExt   Provides a list of NTN neighbour cells including their *ntn-Config*, carrier frequency and *PhysCellId*. This set includes all elements of *ntn-NeighCellConfigList* and all elements of *ntn-NeighCellConfigListExt*. If *ntn-Config* is absent for an entry in *ntn-NeighCellConfigListExt*, the *ntn-Config* provided in the entry at the same position in *ntn-NeighCellConfigList* applies. Network provides *ntn-Config* for the first entry of *ntn-NeighCellConfigList.* If the *ntn-Config* is absent for any other entry in *ntn-NeighCellConfigList*, the *ntn-Config* provided in the previous entry in *ntn-NeighCellConfigList* applies.
referenceLocation   Reference location of the serving cell provided via NTN quasi-Earth fixed system and is used in location-based measurement initiation in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20].
t-Service   Indicates the time information on when a cell provided via NTN quasi-Earth fixed system is going to stop serving the area it is currently covering. The field indicates a time in multiples of 10 ms after 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900). The exact stop time is between the time indicated by the value of this field minus 1 and the time indicated by the value of this field. The reference point for *t-Service* is the uplink time synchronization reference point of the cell.

– *SIB20*

SIB20 contains the information required to acquire the MCCH/MTCH configuration for MBS broadcast.

***SIB20* information element**

```
-- ASN1START
-- TAG-SIB20-START

SIB20-r17 ::=   SEQUENCE {
    mcch-Config-r17                 MCCH-Config-r17,
    cfr-ConfigMCCH-MTCH-r17         CFR-ConfigMCCH-MTCH-r17 OPTIONAL,  -- Need S
    lateNonCriticalExtension        OCTET STRING            OPTIONAL,
    ...
```

```
}

MCCH-Config-r17 ::= SEQUENCE {
    mcch-RepetitionPeriodAndOffset-r17   MCCH-RepetitionPeriodAndOffset-r17,
    mcch-WindowStartSlot-r17             INTEGER (0..79),
    mcch-WindowDuration-r17              ENUMERATED {sl2, sl4, sl8, sl10, sl20, sl40,sl80, sl160}     OPTIONAL, -- Need S
    mcch-ModificationPeriod-r17          ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256,
                                         rf512, rf1024, rf2048, rf4096, rf8192, rf16384, rf32768, rf65536}
}

MCCH-RepetitionPeriodAndOffset-r17 ::= CHOICE {
    rf1-r17                                INTEGER(0),
    rf2-r17                                INTEGER(0..1),
    rf4-r17                                INTEGER(0..3),
    rf8-r17                                INTEGER(0..7),
    rf16-r17                               INTEGER(0..15),
    rf32-r17                               INTEGER(0..31),
    rf64-r17                               INTEGER(0..63),
    rf128-r17                              INTEGER(0..127),
    rf256-r17                              INTEGER(0..255)
}

-- TAG-SIB20-STOP
-- ASN1STOP
```

***SIB20* field descriptions**
cfr-ConfigMCCH-MTCH Common frequency resource used for MCCH and MTCH reception. If the field is absent, the CFR for broadcast has the same location and size as CORESET#0 and PDSCH configuration of MCCH is the same as PDSCH configuration provided in *initialDownlinkBWP* in *SIB1*.
mcch-WindowDuration Indicates, starting from the slot indicated by *mcch-WindowStartSlot*, the duration in slots during which MCCH may be scheduled. Absence of this field means that MCCH is only scheduled in the slot indicated by *mcch-WindowStartSlot*. The network always configures *mcch-WindowDuration* to be shorter or equal to the length of MCCH repetition period.
mcch-ModificationPeriod Defines periodically appearing boundaries, i.e. radio frames for which SFN mod *mcch-ModificationPeriod* = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary in-between them. Value rf2 corresponds to two radio frames, value rf4 corresponds to four radio frames and so on.
mcch-RepetitionPeriodAndOffset Defines the length and the offset of the MCCH repetition period. rf1 corresponds to a repetition period length of one radio frame, rf2 corresponds to a repetition period length of two radio frames and so on. The corresponding integer value indicates the offset of the repetition period in the number of radio frames. MCCH is scheduled in the MCCH transmission window starting from each radio frame for which: SFN mod repetition period length = offset of the repetition period.
mcch-WindowStartSlot Indicates the slot in which MCCH transmission window starts.

– *SIB21*

SIB21 contains the mapping between the current and/or neighbouring carrier frequencies and MBS Frequency Selection Area Identities (FSAI).

SIB21 information element

```
-- ASN1START
-- TAG-SIB21-START

SIB21-r17 ::= SEQUENCE {
    mbs-FSAI-IntraFreq-r17                  MBS-FSAI-List-r17               OPTIONAL,  -- Need R
    mbs-FSAI-InterFreqList-r17              MBS-FSAI-InterFreqList-r17      OPTIONAL,  -- Need R
    lateNonCriticalExtension                OCTET STRING                    OPTIONAL,
    ...
}

MBS-FSAI-List-r17 ::= SEQUENCE (SIZE (1..maxFSAI-MBS-r17)) OF MBS-FSAI-r17

MBS-FSAI-InterFreqList-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBS-FSAI-InterFreq-r17

MBS-FSAI-InterFreq-r17 ::= SEQUENCE {
    dl-CarrierFreq-r17          ARFCN-ValueNR,
    mbs-FSAI-List-r17           MBS-FSAI-List-r17
}

MBS-FSAI-r17 ::= OCTET STRING (SIZE (3))

-- TAG-SIB21-STOP
-- ASN1STOP
```

SIB21 field descriptions
mbs-FSAI-InterFreqList Contains a list of neighboring frequencies including additional bands, if any, that provide MBS services and the corresponding MBS FSAIs.
mbs-FSAI-IntraFreq Contains the list of MBS FSAIs for the current frequency. For MBS service continuity, the UE shall use all MBS FSAIs listed in *mbs-FSAI-IntraFreq* to derive the MBS frequencies of interest.

6.3.1a Positioning System information blocks

– *PosSystemInformation-r16-IEs*

```
-- ASN1START
-- TAG-POSSYSTEMINFORMATION-R16-IES-START

PosSystemInformation-r16-IEs ::= SEQUENCE {
    posSIB-TypeAndInfo-r16          SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
        posSib1-1-r16                   SIBpos-r16,
        posSib1-2-r16                   SIBpos-r16,
        posSib1-3-r16                   SIBpos-r16,
        posSib1-4-r16                   SIBpos-r16,
        posSib1-5-r16                   SIBpos-r16,
        posSib1-6-r16                   SIBpos-r16,
```

```
        posSib1-7-r16                   SIBpos-r16,
        posSib1-8-r16                   SIBpos-r16,
        posSib2-1-r16                   SIBpos-r16,
        posSib2-2-r16                   SIBpos-r16,
        posSib2-3-r16                   SIBpos-r16,
        posSib2-4-r16                   SIBpos-r16,
        posSib2-5-r16                   SIBpos-r16,
        posSib2-6-r16                   SIBpos-r16,
        posSib2-7-r16                   SIBpos-r16,
        posSib2-8-r16                   SIBpos-r16,
        posSib2-9-r16                   SIBpos-r16,
        posSib2-10-r16                  SIBpos-r16,
        posSib2-11-r16                  SIBpos-r16,
        posSib2-12-r16                  SIBpos-r16,
        posSib2-13-r16                  SIBpos-r16,
        posSib2-14-r16                  SIBpos-r16,
        posSib2-15-r16                  SIBpos-r16,
        posSib2-16-r16                  SIBpos-r16,
        posSib2-17-r16                  SIBpos-r16,
        posSib2-18-r16                  SIBpos-r16,
        posSib2-19-r16                  SIBpos-r16,
        posSib2-20-r16                  SIBpos-r16,
        posSib2-21-r16                  SIBpos-r16,
        posSib2-22-r16                  SIBpos-r16,
        posSib2-23-r16                  SIBpos-r16,
        posSib3-1-r16                   SIBpos-r16,
        posSib4-1-r16                   SIBpos-r16,
        posSib5-1-r16                   SIBpos-r16,
        posSib6-1-r16                   SIBpos-r16,
        posSib6-2-r16                   SIBpos-r16,
        posSib6-3-r16                   SIBpos-r16,
        ... ,
        posSib1-9-v1700                 SIBpos-r16,
        posSib1-10-v1700                SIBpos-r16,
        posSib2-24-v1700                SIBpos-r16,
        posSib2-25-v1700                SIBpos-r16,
        posSib6-4-v1700                 SIBpos-r16,
        posSib6-5-v1700                 SIBpos-r16,
        posSib6-6-v1700                 SIBpos-r16,
        posSib2-17a-v1770               SIBpos-r16,
        posSib2-18a-v1770               SIBpos-r16,
        posSib2-20a-v1770               SIBpos-r16
    },
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                     OPTIONAL
}

-- TAG-POSSYSTEMINFORMATION-R16-IES-STOP
-- ASN1STOP
```

– *PosSI-SchedulingInfo*

```
-- ASN1START
-- TAG-POSSI-SCHEDULINGINFO-START

PosSI-SchedulingInfo-r16 ::=              SEQUENCE {
    posSchedulingInfoList-r16                 SEQUENCE (SIZE (1..maxSI-Message)) OF PosSchedulingInfo-r16,
    posSI-RequestConfig-r16                       SI-RequestConfig                                OPTIONAL,  -- Cond MSG-1
    posSI-RequestConfigSUL-r16                    SI-RequestConfig                                OPTIONAL,  -- Cond SUL-MSG-1
    ...,
    [[
    posSI-RequestConfigRedCap-r17                 SI-RequestConfig                                OPTIONAL   -- Cond REDCAP-MSG-1
    ]]
}

PosSchedulingInfo-r16 ::= SEQUENCE {
    offsetToSI-Used-r16          ENUMERATED {true}                                              OPTIONAL,  -- Need R
    posSI-Periodicity-r16        ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    posSI-BroadcastStatus-r16    ENUMERATED {broadcasting, notBroadcasting},
    posSIB-MappingInfo-r16       PosSIB-MappingInfo-r16,
    ...
}

PosSIB-MappingInfo-r16 ::=   SEQUENCE (SIZE (1..maxSIB)) OF PosSIB-Type-r16

PosSIB-Type-r16 ::=          SEQUENCE {
    encrypted-r16                ENUMERATED { true }                                            OPTIONAL,  -- Need R
    gnss-id-r16                  GNSS-ID-r16                                                    OPTIONAL,  -- Need R
    sbas-id-r16                  SBAS-ID-r16                                                    OPTIONAL,  -- Cond GNSS-ID-SBAS
    posSibType-r16               ENUMERATED { posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,
                                              posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4,
                                              posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10,
                                              posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15,
                                              posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20,
                                              posSibType2-21, posSibType2-22, posSibType2-23, posSibType3-1, posSibType4-1,
                                              posSibType5-1,posSibType6-1, posSibType6-2, posSibType6-3,... },
    areaScope-r16                ENUMERATED {true}                                              OPTIONAL -- Need S
}

GNSS-ID-r16 ::= SEQUENCE {
    gnss-id-r16              ENUMERATED{gps, sbas, qzss, galileo, glonass, bds, ..., navic-v1760},
    ...
}

SBAS-ID-r16 ::= SEQUENCE {
    sbas-id-r16              ENUMERATED { waas, egnos, msas, gagan, ...},
    ...
}

-- TAG-POSSI-SCHEDULINGINFO-STOP
-- ASN1STOP
```

***PosSI-SchedulingInfo* field descriptions**
areaScope Indicates that a posSIB is area specific. If the field is absent, the posSIB is cell specific.
encrypted The presence of this field indicates that the *pos-sib-type* is encrypted as specified in TS 37.355 [49].
gnss-id The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49])
posSI-BroadcastStatus Indicates if the SI message is being broadcasted or not. Change of *posSI-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting*. If *si-SchedulingInfo-v1700* is present, the network ensures that the total number of SI messages with *posSI-BroadcastStatus* and *si-BroadcastStatus* set to *notBroadcasting* in the concatenated list of SI messages configured by *posSchedulingInfoList* in *posSI-SchedulingInfo* and SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* does not exceed the limit of *maxSI-Message* when *posSI-RequestConfig* or *posSI-RequestConfigRedCap* or *posSI-RequestConfigSUL* is configured.
posSI-RequestConfig Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to notBroadcasting.
posSI-RequestConfigRedCap Configuration of Msg1 resources for *initialUplinkBWP-RedCap* that the RedCap UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to *notBroadcasting*.
posSI-RequestConfigSUL Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *posSI-BroadcastStatus* is set to notBroadcasting.
posSIB-MappingInfo List of the posSIBs mapped to this *SystemInformation* message.
posSibType The positioning SIB type is defined in TS 37.355 [49].
posSI-Periodicity Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on. If the *offsetToSI-Used* is configured, the *posSI-Periodicity* of rf8 cannot be used.
offsetToSI-Used This field, if present indicates that all the SI messages in *posSchedulingInfoList* are scheduled with an offset of 8 radio frames compared to SI messages in *schedulingInfoList*. *offsetToSI-Used* may be present only if the shortest configured SI message periodicity for SI messages in *schedulingInfoList* is 80ms. If SI offset is used, this field is present in each of the SI messages in the *posSchedulingInfoList*.
sbas-id The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]).

Conditional presence	Explanation
GNSS-ID-SBAS	The field is mandatory present if *gnss-id* is set to *sbas*. It is absent otherwise.
MSG-1	The field is optionally present, Need R, if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise.
SUL-MSG-1	The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB,* and if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise.
REDCAP-MSG-1	The field is optionally present, Need R, if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB,* and if *posSI-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *posSchedulingInfoList* or if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message containing type2 SIB included in *schedulingInfoList2*. It is absent otherwise.

– *SIBpos*

The IE *SIBpos* contains positioning assistance data as defined in TS 37.355 [49].

ASN1START
TAG-SIPOS-START

SIBpos information element

```
-- ASN1START
-- TAG-SIPOS-START

SIBpos-r16 ::= SEQUENCE {
    assistanceDataSIB-Element-r16       OCTET STRING,
    lateNonCriticalExtension            OCTET STRING                    OPTIONAL,
    ...
}

-- TAG-SIPOS-STOP
-- ASN1STOP
```

***SIBpos* field descriptions**
assistanceDataSIB-Element
Parameter *AssistanceDataSIBelement* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

6.3.2 Radio resource control information elements

– *AdditionalSpectrumEmission*

The IE *AdditionalSpectrumEmission* is used to indicate emission requirements to be fulfilled by the UE (see TS 38.101-1 [15], clause 6.2.3/6.2A.3, TS 38.101-2 [39], clause 6.2.3/6.2A.3, and TS 38.101-5 [75], clause 6.2.3). If an extension is signalled using the extended value range (as defined by the IE *AdditionalSpectrumEmission-v1760)*, the corresponding original field, using the value range as defined by the IE *AdditionalSpectrumEmission* (without suffix) shall be set to value 7.

ASN1START
TAG-ADDITIONALSPECTRUMEMISSION-START

AdditionalSpectrumEmission information element

```
-- ASN1START
-- TAG-ADDITIONALSPECTRUMEMISSION-START

AdditionalSpectrumEmission ::=              INTEGER (0..7)

AdditionalSpectrumEmission-v1760 ::=        INTEGER (8..39)

-- TAG-ADDITIONALSPECTRUMEMISSION-STOP
-- ASN1STOP
```

– *Alpha*

The IE *Alpha* defines possible values of a the pathloss compensation coefficient for uplink power control. Value *alpha0* corresponds to the value 0, Value *alpha04* corresponds to the value 0.4, Value *alpha05* corresponds to the value 0.5 and so on. Value *alpha1* corresponds to value 1. See also clause 7.1 of TS 38.213 [13].

```
-- ASN1START
-- TAG-ALPHA-START

Alpha ::=                       ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}

-- TAG-ALPHA-STOP
-- ASN1STOP
```

– *AMF-Identifier*

The IE *AMF-Identifier* (AMFI) comprises of an AMF Region ID, an AMF Set ID and an AMF Pointer as specified in TS 23.003 [21], clause 2.10.1.

AMF-Identifier information element

```
-- ASN1START
-- TAG-AMF-IDENTIFIER-START

AMF-Identifier ::=                      BIT STRING (SIZE (24))

-- TAG-AMF-IDENTIFIER-STOP
-- ASN1STOP
```

– *ARFCN-ValueEUTRA*

The IE *ARFCN-ValueEUTRA* is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) E-UTRA carrier frequency, as defined in TS 36.101 [22].

ARFCN-ValueEUTRA information element

```
-- ASN1START
-- TAG-ARFCN-VALUEEUTRA-START

ARFCN-ValueEUTRA ::=                INTEGER (0..maxEARFCN)

-- TAG-ARFCN-VALUEEUTRA-STOP
-- ASN1STOP
```

– *ARFCN-ValueNR*

The IE *ARFCN-ValueNR* is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) NR global frequency raster, as defined in TS 38.101-1 [15], TS 38.101-2 [39] and TS 38.101-5 [75], clause 5.4.2.

```
-- ASN1START
-- TAG-ARFCN-VALUENR-START

ARFCN-ValueNR ::=               INTEGER (0..maxNARFCN)

-- TAG-ARFCN-VALUENR-STOP
-- ASN1STOP
```

– *ARFCN-ValueUTRA-FDD*

The IE *ARFCN-ValueUTRA-FDD* is used to indicate the ARFCN applicable for a downlink (Nd, FDD) UTRA-FDD carrier frequency, as defined in TS 25.331 [45].

ARFCN-ValueUTRA-FDD information element

```
-- ASN1START
-- TAG-ARFCN-ValueUTRA-FDD-START

ARFCN-ValueUTRA-FDD-r16 ::=               INTEGER (0..16383)

-- TAG-ARFCN-ValueUTRA-FDD-STOP
-- ASN1STOP
```

– *AvailabilityCombinationsPerCell*

The IE *AvailabilityCombinationsPerCell* is used to configure the *AvailabilityCombinations* applicable for a cell of the IAB DU (see TS 38.213 [13], clause 14). Note that the IE *AvailabilityCombinationsPerCellIndex* can only be configured up to 511.

AvailabilityCombinationsPerCell information element

```
-- ASN1START
-- TAG-AVAILABILITYCOMBINATIONSPERCELL-START

AvailabilityCombinationsPerCell-r16 ::=     SEQUENCE {
    availabilityCombinationsPerCellIndex-r16     AvailabilityCombinationsPerCellIndex-r16,
    iab-DU-CellIdentity-r16                      CellIdentity,
    positionInDCI-AI-r16                         INTEGER(0..maxAI-DCI-PayloadSize-1-r16)                              OPTIONAL, -- Need M
    availabilityCombinations-r16                 SEQUENCE (SIZE (1..maxNrofAvailabilityCombinationsPerSet-r16)) OF AvailabilityCombination-r16,
    ...,
    [[
    availabilityCombinationsRB-Groups-r17   SEQUENCE (SIZE (1..maxNrofAvailabilityCombinationsPerSet-r16)) OF AvailabilityCombinationRB-Groups-r17
OPTIONAL -- Need M
```

```
    ]],
    [[
    positionInDCI-AI-RBGroups-v1720             INTEGER(0..maxAI-DCI-PayloadSize-1-r16)                                 OPTIONAL -- Need M
    ]]
}

AvailabilityCombinationsPerCellIndex-r16 ::= INTEGER(0..maxNrofDUCells-r16)

AvailabilityCombination-r16 ::=         SEQUENCE {
    availabilityCombinationId-r16           AvailabilityCombinationId-r16,
    resourceAvailability-r16                SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7)
}

AvailabilityCombinationId-r16 ::=       INTEGER (0..maxNrofAvailabilityCombinationsPerSet-1-r16)

AvailabilityCombinationRB-Groups-r17 ::= SEQUENCE {
    availabilityCombinationId-r17    AvailabilityCombinationId-r16,
    rb-SetGroups-r17                  SEQUENCE (SIZE (1..maxNrofRB-SetGroups-r17)) OF RB-SetGroup-r17                       OPTIONAL, -- Need R
    resourceAvailability-r17         SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7)    OPTIONAL -- Need R
}

RB-SetGroup-r17 ::=       SEQUENCE {
    resourceAvailability-r17  SEQUENCE (SIZE (1..maxNrofResourceAvailabilityPerCombination-r16)) OF INTEGER (0..7) OPTIONAL, -- Need R
    rb-Sets-r17                SEQUENCE (SIZE (1..maxNrofRB-Sets-r17)) OF INTEGER (0..7)                            OPTIONAL  -- Need R
}

-- TAG-AVAILABILITYCOMBINATIONSPERCELL-STOP
-- ASN1STOP
```

***AvailabilityCombination* field descriptions**
availabilityCombinationId This ID is used in the DCI Format 2_5 payload to dynamically select this *AvailabilityCombination*, see TS 38.213 [13], clause 14.
resourceAvailability Indicates the resource availability of soft symbols for a set of consecutive slots in the time domain. The meaning of this field is described in TS 38.213 [13], Table 14.3. If included in *RB-SetGroup* within *AvailabilityCombinationRB-Groups-r17*, it indicates the availability of soft resources for an RB set group. If included in *AvailabilityCombinationRB-Groups-r17* when the *rb-SetGroups* is not configured, it indicates the availability of soft resources in one or multiple slots for all RB sets of a DU cell.

***AvailabilityCombinationsPerCell* field descriptions**
iab-DU-CellIdentity The ID of the IAB-DU cell for which the *availabilityCombinations* are applicable.
positionInDCI-AI The (starting) position (bit) of the *availabilityCombinationId* for the indicated IAB-DU cell (*iab-DU-CellIdentity*) within the DCI payload. If *positionInDCI-AI-RBGroups* is not configured, it applies to the *availabilityCombinationId* included in *availabilityCombinations* and in *availabilityCombinationsRB-Groups*. If *positionInDCI-AI-RBGroups* is configured, it applies to the *availabilityCombinationId* included in *availabilityCombinations*.
positionInDCI-AI-RBGroups The (starting) position (bit) of the *availabilityCombinationId* associated to the *availabilityCombinationsRB-Groups* for the indicated IAB-DU cell (*iab-DU-CellIdentity*) within the DCI payload.

***AvailabilityCombinationRB-Groups* field descriptions**
rb-SetGroups Indicates the RB set groups configured for the availability combination. Each group includes consecutive RB sets.
rb-Sets Indicates the one or more RB set indexes associated to one or more RB sets configured for one RB set group.

– *AvailabilityIndicator*

The IE *AvailabilityIndicator* is used to configure monitoring a PDCCH for Availability Indicators (AI).

***AvailabilityIndicator* information element**

```
-- ASN1START
-- TAG-AVAILABILITYINDICATOR-START

AvailabilityIndicator-r16 ::=    SEQUENCE {
    ai-RNTI-r16                      AI-RNTI-r16,
    dci-PayloadSizeAI-r16            INTEGER (1..maxAI-DCI-PayloadSize-r16),
    availableCombToAddModList-r16    SEQUENCE (SIZE(1..maxNrofDUCells-r16)) OF AvailabilityCombinationsPerCell-r16          OPTIONAL, -- Need N
    availableCombToReleaseList-r16   SEQUENCE (SIZE(1..maxNrofDUCells-r16)) OF AvailabilityCombinationsPerCellIndex-r16     OPTIONAL, -- Need N
    ...
}

AI-RNTI-r16 ::=                  RNTI-Value

-- TAG-AVAILABILITYINDICATOR-STOP
-- ASN1STOP
```

***AvailabilityIndicator* field descriptions**
ai-RNTI Used by an IAB-MT for detection of DCI format 2_5 indicating *AvailabilityCombinationId* for an IAB-DU's cells.
availableCombToAddModList A list of *availabilityCombinations* to add for the IAB-DU's cells. (see TS 38.213 [13], clause 14).
availableCombToReleaseList A list of *availabilityCombinations* to release for the IAB-DU's cells. (see TS 38.213 [13], clause 14).
dci-PayloadSizeAI Total length of the DCI payload scrambled with ai-RNTI (see TS 38.213 [13]).

– *BAP-RoutingID*

The IE *BAP-RoutingID* is used for IAB-node to configure the BAP Routing ID.

BAP-RoutingID information element

```
-- ASN1START
-- TAG-BAPROUTINGID-START

BAP-RoutingID-r16::=        SEQUENCE{
    bap-Address-r16             BIT STRING (SIZE (10)),
    bap-PathId-r16              BIT STRING (SIZE (10))
}

-- TAG-BAPROUTINGID-STOP
-- ASN1STOP
```

BAP-RoutingID field descriptions
bap-Address The ID of a destination IAB-node or IAB-donor-DU used in the BAP header.
bap-PathId The ID of a path used in the BAP header.

– *BeamFailureRecoveryConfig*

The IE *BeamFailureRecoveryConfig* is used to configure the UE with RACH resources and candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.1.1.

BeamFailureRecoveryConfig information element

```
-- ASN1START
-- TAG-BEAMFAILURERECOVERYCONFIG-START

BeamFailureRecoveryConfig ::=       SEQUENCE {
    rootSequenceIndex-BFR               INTEGER (0..137)                                                    OPTIONAL, -- Need M
    rach-ConfigBFR                      RACH-ConfigGeneric                                                  OPTIONAL, -- Need M
    rsrp-ThresholdSSB                   RSRP-Range                                                          OPTIONAL, -- Need M
    candidateBeamRSList                 SEQUENCE (SIZE(1..maxNrofCandidateBeams)) OF PRACH-ResourceDedicatedBFR   OPTIONAL, -- Need M
    ssb-perRACH-Occasion                ENUMERATED {oneEighth, oneFourth, oneHalf, one, two,
                                                    four, eight, sixteen}                                   OPTIONAL, -- Need M
    ra-ssb-OccasionMaskIndex            INTEGER (0..15)                                                     OPTIONAL, -- Need M
    recoverySearchSpaceId               SearchSpaceId                                                       OPTIONAL, -- Need R
    ra-Prioritization                   RA-Prioritization                                                   OPTIONAL, -- Need R
    beamFailureRecoveryTimer            ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, ms150, ms200}      OPTIONAL, -- Need M
    ...,
    [[
    msg1-SubcarrierSpacing              SubcarrierSpacing                                                   OPTIONAL  -- Need M
    ]],
    [[
    ra-PrioritizationTwoStep-r16        RA-Prioritization                                                   OPTIONAL, -- Need R
    candidateBeamRSListExt-v1610        SetupRelease{ CandidateBeamRSListExt-r16 }                          OPTIONAL  -- Need M
    ]],
```

```
    [[
    spCell-BFR-CBRA-r16                 ENUMERATED {true}                                                   OPTIONAL  -- Need R
    ]]
}

PRACH-ResourceDedicatedBFR ::=      CHOICE {
    ssb                                 BFR-SSB-Resource,
    csi-RS                              BFR-CSIRS-Resource
}

BFR-SSB-Resource ::=                SEQUENCE {
    ssb                                 SSB-Index,
    ra-PreambleIndex                    INTEGER (0..63),
    ...
}

BFR-CSIRS-Resource ::=              SEQUENCE {
    csi-RS                              NZP-CSI-RS-ResourceId,
    ra-OccasionList                     SEQUENCE (SIZE(1..maxRA-OccasionsPerCSIRS)) OF INTEGER (0..maxRA-Occasions-1)   OPTIONAL,   -- Need R
    ra-PreambleIndex                    INTEGER (0..63)                                                 OPTIONAL,   -- Need R
    ...
}

CandidateBeamRSListExt-r16::=       SEQUENCE (SIZE(1.. maxNrofCandidateBeamsExt-r16)) OF PRACH-ResourceDedicatedBFR

-- TAG-BEAMFAILURERECOVERYCONFIG-STOP
-- ASN1STOP
```

***BeamFailureRecoveryConfig* field descriptions**
beamFailureRecoveryTimer Timer for beam failure recovery timer. Upon expiration of the timer the UE does not use CFRA for BFR. Value in ms. Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms, and so on.
candidateBeamRSList, candidateBeamRSListExt-v1610 Set of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery and the associated RA parameters. This set includes all elements of *candidateBeamRSList* (without suffix) and all elements of *candidateBeamRSListExt-v1610*. The UE maintains *candidateBeamRSList* and *candidateBeamRSListExt-v1610* separately: Receiving *candidateBeamRSListExt-v1610* set to *release* releases only the entries that were configured by *candidateBeamRSListExt-v1610*, and receiving *candidateBeamRSListExt-v1610* set to *setup* replaces only the entries that were configured by *candidateBeamRSListExt-v1610* with the newly signalled entries. The network configures these reference signals to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided.
msg1-SubcarrierSpacing Subcarrier spacing for contention free beam failure recovery (see TS 38.211 [16], clause 5.3.2). Only the following values are applicable depending on the used frequency: FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz
rsrp-ThresholdSSB L1-RSRP threshold used for determining whether a candidate beam may be used by the UE to attempt contention free random access to recover from beam failure (see TS 38.213 [13], clause 6).
ra-prioritization Parameters which apply for prioritized random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).
ra-PrioritizationTwoStep Parameters which apply for prioritized 2-step random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).
ra-ssb-OccasionMaskIndex Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources.
rach-ConfigBFR Configuration of random access parameters for BFR.
recoverySearchSpaceId Search space to use for BFR RAR. The network configures this search space to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided. The CORESET associated with the recovery search space cannot be associated with another search space. Network always configures the UE with a value for this field when contention free random access resources for BFR are configured.
rootSequenceIndex-BFR PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1) for beam failure recovery.
spCell-BFR-CBRA Indicates that UE is configured to send MAC CE for SpCell BFR as specified in TS38.321 [3].
ssb-perRACH-Occasion Number of SSBs per RACH occasion for CF-BFR, see TS 38.213 [13], clause 8.1.

***BFR-CSIRS-Resource* field descriptions**
csi-RS The ID of a *NZP-CSI-RS-Resource* configured in the *CSI-MeasConfig* of this serving cell. This reference signal determines a candidate beam for beam failure recovery (BFR).
ra-OccasionList RA occasions that the UE shall use when performing BFR upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by *prach-ConfigurationIndex* and *msg1-FDM*. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots. If the field is absent the UE uses the RA occasion associated with the SSB that is QCLed with this CSI-RS.
ra-PreambleIndex The RA preamble index to use in the RA occasions associated with this CSI-RS. If the field is absent, the UE uses the preamble index associated with the SSB that is QCLed with this CSI-RS.

***BFR-SSB-Resource* field descriptions**
ra-PreambleIndex The preamble index that the UE shall use when performing BFR upon selecting the candidate beams identified by this SSB.
ssb The ID of an SSB transmitted by this serving cell. It determines a candidate beam for beam failure recovery (BFR).

– *BeamFailureRecoveryRSConfig*

The IE *BeamFailureRecoveryRSConfig* is used to configure the UE with candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.17.

***BeamFailureRecoveryRSConfig* information element**

```
-- ASN1START
-- TAG-BEAMFAILURERECOVERYRSCONFIG-START

BeamFailureRecoveryRSConfig-r16 ::= SEQUENCE {
    rsrp-ThresholdBFR-r16               RSRP-Range                                                      OPTIONAL, -- Need M
    candidateBeamRS-List-r16            SEQUENCE (SIZE(1..maxNrofCandidateBeams-r16)) OF CandidateBeamRS-r16     OPTIONAL, -- Need M
    ...,
    [[
    candidateBeamRS-List2-r17            SEQUENCE (SIZE(1..maxNrofCandidateBeams-r16)) OF CandidateBeamRS-r16     OPTIONAL  -- Need R
    ]]
}

-- TAG-BEAMFAILURERECOVERYRSCONFIG-STOP
-- ASN1STOP
```

***BeamFailureRecoveryRSConfig* field descriptions**
candidateBeamRS-List A list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery. The network always configures this parameter in every instance of this IE.
candidateBeamRS-List2 A list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery.
rsrp-ThresholdBFR L1-RSRP threshold used for determining whether a candidate beam may be included by the UE in MAC CE for BFR (see TS 38.321 [3] and TS 38.213 [13], clause 6). The network always configures this parameter in every instance of this IE.

– *BetaOffsets*

The IE *BetaOffsets* is used to configure beta-offset values, see TS 38.213 [13], clause 9.3.

***BetaOffsets* information element**

```
-- ASN1START
-- TAG-BETAOFFSETS-START

BetaOffsets ::=                     SEQUENCE {
    betaOffsetACK-Index1                INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetACK-Index2                INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetACK-Index3                INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetCSI-Part1-Index1          INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetCSI-Part1-Index2          INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetCSI-Part2-Index1          INTEGER(0..31)                                  OPTIONAL, -- Need S
    betaOffsetCSI-Part2-Index2          INTEGER(0..31)                                  OPTIONAL  -- Need S
}

-- TAG-BETAOFFSETS-STOP
-- ASN1STOP
```

***BetaOffsets* field descriptions**
betaOffsetACK-Index1 Up to 2 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.
betaOffsetACK-Index2 Up to 11 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.
betaOffsetACK-Index3 Above 11 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.
betaOffsetCSI-Part1-Index1 Up to 11 bits of CSI part 1 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.
betaOffsetCSI-Part1-Index2 Above 11 bits of CSI part 1 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.
betaOffsetCSI-Part2-Index1 Up to 11 bits of CSI part 2 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.
betaOffsetCSI-Part2-Index2 Above 11 bits of CSI part 2 bits (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 13.

– *BetaOffsetsCrossPri*

The IE *BetaOffsetsCrossPri* is used to configure beta-offset values for cross-priority HARQ-ACK multiplexing on PUSCH.

BetaOffsetsCrossPri information element

```
-- ASN1START
-- TAG-BETAOFFSETSCROSSPRI-START

BetaOffsetsCrossPri-r17 ::= SEQUENCE (SIZE(3)) OF INTEGER(0..31)

-- TAG-BETAOFFSETSCROSSPRI-STOP
-- ASN1STOP
```

– *BH-LogicalChannelIdentity*

The IE *BH-LogicalChannelIdentity* is used to identify a logical channel between an IAB-node and its parent IAB-node or IAB-donor-DU.

BH-LogicalChannelIdentity information element

```
-- ASN1START
-- TAG-BHLOGICALCHANNELIDENTITY-START

BH-LogicalChannelIdentity-r16 ::=    CHOICE {
    bh-LogicalChannelIdentity-r16        LogicalChannelIdentity,
    bh-LogicalChannelIdentityExt-r16     BH-LogicalChannelIdentity-Ext-r16
}

-- TAG-BHLOGICALCHANNELIDENTITY-STOP
```

```
-- ASN1STOP
```

***BH-LogicalChannelIdentity* field descriptions**
bh-LogicalChannelIdentity ID used for the MAC logical channel.
bh-LogicalChannelIdentityExt ID used for the MAC logical channel.

– *BH-LogicalChannelIdentity-Ext*

The IE *BH-LogicalChannelIdentity-Ext* is used to identify a logical channel between an IAB-node and its parent node.

BH-LogicalChannelIdentity-Ext information element

```
-- ASN1START
-- TAG-BHLOGICALCHANNELIDENTITYEXT-START

BH-LogicalChannelIdentity-Ext-r16 ::=   INTEGER (320.. maxLC-ID-Iab-r16)

-- TAG-BHLOGICALCHANNELIDENTITYEXT-STOP
-- ASN1STOP
```

– *BH-RLC-ChannelConfig*

The IE *BH-RLC-ChannelConfig* is used to configure an RLC entity, a corresponding logical channel in MAC for BH RLC channel between IAB-node and its parent node.

BH-RLC-ChannelConfig information element

```
-- ASN1START
-- TAG-BHRLCCHANNELCONFIG-START

BH-RLC-ChannelConfig-r16::=      SEQUENCE {
    bh-LogicalChannelIdentity-r16    BH-LogicalChannelIdentity-r16     OPTIONAL,   -- Cond LCH-SetupOnly
    bh-RLC-ChannelID-r16             BH-RLC-ChannelID-r16,
    reestablishRLC-r16               ENUMERATED {true}                 OPTIONAL,   -- Need N
    rlc-Config-r16                   RLC-Config                        OPTIONAL,   -- Cond LCH-Setup
    mac-LogicalChannelConfig-r16     LogicalChannelConfig              OPTIONAL,   -- Cond LCH-Setup
    ...
}

-- TAG-BHRLCCHANNELCONFIG-STOP
-- ASN1STOP
```

***BH-RLC-ChannelConfig* field descriptions**
bh-LogicalChannelIdentity Indicates the logical channel id for BH RLC channel of the IAB-node.
bh-RLC-ChannelID Indicates the BH RLC channel in the link between IAB-MT of the IAB-node and IAB-DU of the parent IAB-node or IAB-donor-DU.
reestablishRLC Indicates that RLC should be re-established.
rlc-Config Determines the RLC mode (UM, AM) and provides corresponding parameters.

Conditional Presence	Explanation
LCH-Setup	This field is mandatory present upon creation of a new logical channel for a BH RLC channel. It is optionally present, Need M, otherwise.
LCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a BH RLC channel. It is absent, Need M otherwise.

– *BH-RLC-ChannelID*

The IE *BH-RLC-ChannelID* is used to identify a BH RLC channel in the link between IAB-MT of the IAB-node and IAB-DU of the parent IAB-node or IAB-donor-DU.

BH-RLC-ChannelID information element

```
-- ASN1START
-- TAG-BHRLCCHANNELID-START

BH-RLC-ChannelID-r16 ::=    BIT STRING (SIZE (16))

-- TAG-BHRLCCHANNELID-STOP
-- ASN1STOP
```

– *BSR-Config*

The IE *BSR-Config* is used to configure buffer status reporting.

BSR-Config information element

```
-- ASN1START
-- TAG-BSR-CONFIG-START

BSR-Config ::=                      SEQUENCE {
    periodicBSR-Timer                   ENUMERATED { sf1, sf5, sf10, sf16, sf20, sf32, sf40, sf64,
                                                     sf80, sf128, sf160, sf320, sf640, sf1280, sf2560, infinity },
    retxBSR-Timer                       ENUMERATED { sf10, sf20, sf40, sf80, sf160, sf320, sf640, sf1280, sf2560,
                                                     sf5120, sf10240, spare5, spare4, spare3, spare2, spare1},
    logicalChannelSR-DelayTimer         ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}                OPTIONAL, -- Need R
    ...
```

```
}

-- TAG-BSR-CONFIG-STOP
-- ASN1STOP
```

***BSR-Config* field descriptions**
logicalChannelSR-DelayTimer Value in number of subframes. Value *sf20* corresponds to 20 subframes, *sf40* corresponds to 40 subframes, and so on.
periodicBSR-Timer Value in number of subframes. Value *sf1* corresponds to 1 subframe, value *sf5* corresponds to 5 subframes and so on.
retxBSR-Timer Value in number of subframes. Value *sf10* corresponds to 10 subframes, value *sf20* corresponds to 20 subframes and so on.

– *BWP*

The IE *BWP* is used to configure generic parameters of a bandwidth part as defined in TS 38.211 [16], clause 4.5, and TS 38.213 [13], clause 12.

For each serving cell the network configures at least an initial downlink bandwidth part and one (if the serving cell is configured with an uplink) or two (if using supplementary uplink (SUL)) initial uplink bandwidth parts. Furthermore, the network may configure additional uplink and downlink bandwidth parts for a serving cell.

The uplink and downlink bandwidth part configurations are divided into common and dedicated parameters.

***BWP* information element**

```
-- ASN1START
-- TAG-BWP-START

BWP ::=                             SEQUENCE {
    locationAndBandwidth                INTEGER (0..37949),
    subcarrierSpacing                   SubcarrierSpacing,
    cyclicPrefix                        ENUMERATED { extended }                                 OPTIONAL    -- Need R
}

-- TAG-BWP-STOP
-- ASN1STOP
```

***BWP* field descriptions**
cyclicPrefix Indicates whether to use the extended cyclic prefix for this bandwidth part. If not set, the UE uses the normal cyclic prefix. Normal CP is supported for all subcarrier spacings and slot formats. Extended CP is supported only for 60 kHz subcarrier spacing. (see TS 38.211 [16], clause 4.2). Except for SUL, the network ensures the same cyclic prefix length is used in active DL BWP and active UL BWP within a serving cell.
locationAndBandwidth Frequency domain location and bandwidth of this bandwidth part. The value of the field shall be interpreted as resource indicator value (RIV) as defined TS 38.214 [19] with assumptions as described in TS 38.213 [13], clause 12, i.e. setting N_{BWP}^{size}=275. The first PRB is a PRB determined by *subcarrierSpacing* of this BWP and *offsetToCarrier* (configured in *SCS-SpecificCarrier* contained within *FrequencyInfoDL* / *FrequencyInfoUL* / *FrequencyInfoUL-SIB* / *FrequencyInfoDL-SIB* within *ServingCellConfigCommon* / *ServingCellConfigCommonSIB*) corresponding to this subcarrier spacing. In case of TDD, a BWP-pair (UL BWP and DL BWP with the same *bwp-Id*) must have the same center frequency (see TS 38.213 [13], clause 12)
subcarrierSpacing Subcarrier spacing to be used in this BWP for all channels and reference signals unless explicitly configured elsewhere. Corresponds to subcarrier spacing according to TS 38.211 [16], table 4.2-1. The value *kHz15* corresponds to μ=0, value *kHz30* corresponds to μ=1, and so on. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz For the initial DL BWP and operation in licensed spectrum this field has the same value as the field *subCarrierSpacingCommon* in *MIB* of the same serving cell. Except for SUL, the network ensures the same subcarrier spacing is used in active DL BWP and active UL BWP within a serving cell. For the initial DL BWP and operation with shared spectrum channel access, the value of this field corresponds to the subcarrier spacing of the SSB associated to the initial DL BWP.

– *BWP-Downlink*

The IE *BWP-Downlink* is used to configure an additional downlink bandwidth part (not for the initial BWP).

***BWP-Downlink* information element**

```
-- ASN1START
-- TAG-BWP-DOWNLINK-START

BWP-Downlink ::=                    SEQUENCE {
    bwp-Id                              BWP-Id,
    bwp-Common                          BWP-DownlinkCommon                                  OPTIONAL,   -- Cond SetupOtherBWP
    bwp-Dedicated                       BWP-DownlinkDedicated                               OPTIONAL,   -- Cond SetupOtherBWP
    ...
}

-- TAG-BWP-DOWNLINK-STOP
-- ASN1STOP
```

***BWP-Downlink* field descriptions**
bwp-Id
An identifier for this bandwidth part. Other parts of the RRC configuration use the *BWP-Id* to associate themselves with a particular bandwidth part.
The network configures the BWPs with consecutive IDs from 1. The Network does not include the value 0, since value 0 is reserved for the initial BWP.

Conditional Presence	Explanation
SetupOtherBWP	The field is mandatory present upon configuration of a new DL BWP. The field is optionally present, Need M, otherwise.

– *BWP-DownlinkCommon*

The IE *BWP-DownlinkCommon* is used to configure the common parameters of a downlink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

BWP-DownlinkCommon information element

```
-- ASN1START
-- TAG-BWP-DOWNLINKCOMMON-START

BWP-DownlinkCommon ::=              SEQUENCE {
    genericParameters                   BWP,
    pdcch-ConfigCommon                  SetupRelease { PDCCH-ConfigCommon }                                 OPTIONAL,   -- Need M
    pdsch-ConfigCommon                  SetupRelease { PDSCH-ConfigCommon }                                 OPTIONAL,   -- Need M
    ...
}

-- TAG-BWP-DOWNLINKCOMMON-STOP
-- ASN1STOP
```

***BWP-DownlinkCommon* field descriptions**
pdcch-ConfigCommon
Cell specific parameters for the PDCCH of this BWP. This field is absent for a dormant BWP.
pdsch-ConfigCommon
Cell specific parameters for the PDSCH of this BWP.

– *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-NCD-SSB
    ]]
}

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 on SCells.
beamFailureRecoverySpCellConfig Configuration of candidate RS for beam failure recovery on the SpCell. This field can only be configured when *beamFailure-r17* is configured in *RadioLinkMonitoringConfig*.
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 If configured, the RedCap UE operating in this BWP uses this SSB for the purposes for which it would otherwise have used the CD-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-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 (e.g., including those used in measurement report triggering events), 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.* Network does not configure SPS in one BWP using this field and *sps-ConfigMulticastToAddModList-r17* simultaneously.
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.

– *BWP-Id*

The IE *BWP-Id* is used to refer to Bandwidth Parts (BWP). The initial BWP (including RedCap-specific initial BWP, if configured) is referred to by *BWP-Id* 0. The other BWPs are referred to by *BWP-Id* 1 to *maxNrofBWPs*.

BWP-Id information element

```
-- ASN1START
-- TAG-BWP-ID-START

BWP-Id ::=                          INTEGER (0..maxNrofBWPs)

-- TAG-BWP-ID-STOP
-- ASN1STOP
```

– *BWP-Uplink*

The IE *BWP-Uplink* is used to configure an additional uplink bandwidth part (not for the initial BWP).

BWP-Uplink information element

```
-- ASN1START
-- TAG-BWP-UPLINK-START
```

```
BWP-Uplink ::=                      SEQUENCE {
    bwp-Id                              BWP-Id,
    bwp-Common                          BWP-UplinkCommon                                    OPTIONAL,   -- Cond SetupOtherBWP
    bwp-Dedicated                       BWP-UplinkDedicated                                 OPTIONAL,   -- Cond SetupOtherBWP
    ...
}

-- TAG-BWP-UPLINK-STOP
-- ASN1STOP
```

***BWP-Uplink* field descriptions**
bwp-Id
An identifier for this bandwidth part. Other parts of the RRC configuration use the *BWP-Id* to associate themselves with a particular bandwidth part.
The network configures the BWPs with consecutive IDs from 1. The Network does not include the value 0, since value 0 is reserved for the initial BWP.

Conditional Presence	Explanation
SetupOtherBWP	The field is mandatory present upon configuration of a new UL BWP. The field is optionally present, Need M, otherwise.

– *BWP-UplinkCommon*

The IE *BWP-UplinkCommon* is used to configure the common parameters of an uplink BWP. They are "cell specific" and the network ensures the necessary alignment with corresponding parameters of other UEs. The common parameters of the initial bandwidth part of the PCell are also provided via system information. For all other serving cells, the network provides the common parameters via dedicated signalling.

***BWP-UplinkCommon* information element**

```
-- ASN1START
-- TAG-BWP-UPLINKCOMMON-START

BWP-UplinkCommon ::=                SEQUENCE {
    genericParameters                   BWP,
    rach-ConfigCommon                   SetupRelease { RACH-ConfigCommon }                      OPTIONAL,   -- Need M
    pusch-ConfigCommon                  SetupRelease { PUSCH-ConfigCommon }                     OPTIONAL,   -- Need M
    pucch-ConfigCommon                  SetupRelease { PUCCH-ConfigCommon }                     OPTIONAL,   -- Need M
    ...,
    [[
    rach-ConfigCommonIAB-r16            SetupRelease { RACH-ConfigCommon }                      OPTIONAL,   -- Need M
    useInterlacePUCCH-PUSCH-r16         ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    msgA-ConfigCommon-r16               SetupRelease { MsgA-ConfigCommon-r16 }                  OPTIONAL    -- Cond SpCellOnly2
    ]],
    [[
    enableRA-PrioritizationForSlicing-r17 BOOLEAN                                           OPTIONAL, -- Cond RA-PrioSliceAI
    additionalRACH-ConfigList-r17       SetupRelease { AdditionalRACH-ConfigList-r17 }      OPTIONAL, -- Cond SpCellOnly2
    rsrp-ThresholdMsg3-r17              RSRP-Range                                          OPTIONAL, -- Need R
    numberOfMsg3-RepetitionsList-r17    SEQUENCE (SIZE (4)) OF NumberOfMsg3-Repetitions-r17         OPTIONAL,  -- Cond Msg3Rep
    mcs-Msg3-Repetitions-r17            SEQUENCE (SIZE (8)) OF INTEGER (0..31)              OPTIONAL   -- Cond Msg3Rep
```

```
    ]]
}

AdditionalRACH-ConfigList-r17 ::=       SEQUENCE (SIZE(1..maxAdditionalRACH-r17)) OF AdditionalRACH-Config-r17

AdditionalRACH-Config-r17 ::=       SEQUENCE {
    rach-ConfigCommon-r17               RACH-ConfigCommon                                       OPTIONAL,   -- Need R
    msgA-ConfigCommon-r17               MsgA-ConfigCommon-r16                                   OPTIONAL,   -- Need R
    ...
}

NumberOfMsg3-Repetitions-r17::=         ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16}

-- TAG-BWP-UPLINKCOMMON-STOP
-- ASN1STOP
```

***BWP-UplinkCommon* field descriptions**
additionalRACH-ConfigList
List of feature or feature combination-specific RACH configurations, i.e. the RACH configurations configured in addition to the one configured by *rach-ConfigCommon* and by *msgA-ConfigCommon*. The network associates all possible preambles of an additional RACH configuration to one or more feature(s) or feature combination(s). The network does not configure this list to have more than 16 entries. If both *rach-ConfigCommon* and *msgA-ConfigCommon* are configured for a specific *FeatureCombination*, the network always provides them in the same *additionalRACH-Config*.
enableRA-PrioritizationForSlicing
Indicates whether or not the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* should override the *ra-PrioritizationForAccessIdentity*. The field is applicable only when the UE is configured by upper layers with both NSAG and Access Identity 1 or 2. If value *TRUE* is configured, the UE should only apply the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep*. If value *FALSE* is configured, the UE should only apply *ra-PrioritizationForAccessIdentity*. If the field is absent, whether to use *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* or *ra-PrioritizationForAccessIdentity* is up to UE implementation.
mcs-Msg3-Repetitions
Configuration of eight candidate MCS indexes for PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI. Only the first 4 configured or default MCS indexes are used for PUSCH transmission scheduled by RAR UL grant. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*, the UE shall apply the values {0, 1, 2, 3, 4, 5, 6, 7} (see TS 38.214 [19], clause 6.1.4).
msgA-ConfigCommon
Configuration of the cell specific PRACH and PUSCH resource parameters for transmission of MsgA in 2-step random access type procedure. The NW can configure *msgA-ConfigCommon* only for UL BWPs if the linked DL BWPs (same bwp-Id as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP.
numberOfMsg3-RepetitionsList
The number of repetitions for PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI. This field is only applicable when the UE selects Random Access resources indicating Msg3 repetition in this BWP. If this field is absent when the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*, the UE shall apply the values {n1, n2, n3, n4} (see TS 38.214 [19], clause 6.1.2.1).
pucch-ConfigCommon
Cell specific parameters for the PUCCH of this BWP.
pusch-ConfigCommon
Cell specific parameters for the PUSCH of this BWP.
rach-ConfigCommon
Configuration of cell specific random access parameters which the UE uses for contention based and contention free random access as well as for contention based beam failure recovery in this BWP. The NW configures SSB-based RA (and hence *RACH-ConfigCommon*) only for UL BWPs if the linked DL BWPs (same *bwp-Id* as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or for RedCap UEs DL BWPs associated with *nonCellDefiningSSB* or the RedCap-specific initial downlink BWP. The network configures *rach-ConfigCommon*, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery). For RedCap-specific initial uplink BWP, *rach-ConfigCommon* is always configured when *msgA-ConfigCommon* is configured in this BWP.
rach-ConfigCommonIAB
Configuration of cell specific random access parameters for the IAB-MT. The IAB specific IAB RACH configuration is used by IAB-MT, if configured.
rsrp-ThresholdMsg3
Threshold used by the UE for determining whether to select resources indicating Msg3 repetition in this BWP, as specified in TS 38.321 [3]. The field is mandatory if both set(s) of Random Access resources with MSG3 repetition indication and set(s) of Random Access resources without MSG3 repetition indication are configured in the BWP. It is absent otherwise.
useInterlacePUCCH-PUSCH
If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for cell-specific PUSCH, e.g., PUSCH scheduled by RAR UL grant (see TS 38.213 [13] clause 8.3 and TS 38.214 [19], clause 6.1.2.2) and uses interlaced PUCCH Format 0 and 1 for cell-specific PUCCH (see TS 38.213 [13], clause 9.2.1).

Conditional Presence	Explanation
Msg3Rep	This field is optionally present, Need S, if the set(s) of Random Access resources with MSG3 repetition indication are configured in the *BWP-UplinkCommon*. It is absent otherwise.
RA-PrioSliceAI	The field is optionally present in *SIB1*, Need R, if both parameters *ra-PrioritizationForAccessIdentity* and the *ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep* are present in *SIB1*. It is absent otherwise.
SpCellOnly2	The field is optionally present, Need M, in the *BWP-UplinkCommon* of an SpCell. It is absent otherwise.

– *BWP-UplinkDedicated*

The IE *BWP-UplinkDedicated* is used to configure the dedicated (UE specific) parameters of an uplink BWP.

***BWP-UplinkDedicated* information element**

```
-- ASN1START
-- TAG-BWP-UPLINKDEDICATED-START

BWP-UplinkDedicated ::=             SEQUENCE {
    pucch-Config                        SetupRelease { PUCCH-Config }                                                   OPTIONAL,   -- Need M
    pusch-Config                        SetupRelease { PUSCH-Config }                                                   OPTIONAL,   -- Need M
    configuredGrantConfig               SetupRelease { ConfiguredGrantConfig }                                          OPTIONAL,   -- Need M
    srs-Config                          SetupRelease { SRS-Config }                                                     OPTIONAL,   -- Need M
    beamFailureRecoveryConfig           SetupRelease { BeamFailureRecoveryConfig }                                      OPTIONAL,   -- Cond SpCellOnly
    ...,
    [[
    sl-PUCCH-Config-r16                 SetupRelease { PUCCH-Config }                                                   OPTIONAL,   -- Need M
    cp-ExtensionC2-r16                  INTEGER (1..28)                                                                 OPTIONAL,   -- Need R
    cp-ExtensionC3-r16                  INTEGER (1..28)                                                                 OPTIONAL,   -- Need R
    useInterlacePUCCH-PUSCH-r16         ENUMERATED {enabled}                                                            OPTIONAL,   -- Need R
    pucch-ConfigurationList-r16         SetupRelease { PUCCH-ConfigurationList-r16 }                                    OPTIONAL,   -- Need M
    lbt-FailureRecoveryConfig-r16       SetupRelease { LBT-FailureRecoveryConfig-r16 }                                  OPTIONAL,   -- Need M
    configuredGrantConfigToAddModList-r16               ConfiguredGrantConfigToAddModList-r16                           OPTIONAL,   -- Need N
    configuredGrantConfigToReleaseList-r16              ConfiguredGrantConfigToReleaseList-r16                          OPTIONAL,   -- Need N
    configuredGrantConfigType2DeactivationStateList-r16 ConfiguredGrantConfigType2DeactivationStateList-r16             OPTIONAL    -- Need R
    ]],
    [[
    ul-TCI-StateList-r17                CHOICE {
        explicitlist                        SEQUENCE {
            ul-TCI-ToAddModList-r17             SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF TCI-UL-State-r17          OPTIONAL,   -- Need N
            ul-TCI-ToReleaseList-r17            SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF TCI-UL-StateId-r17        OPTIONAL    -- Need N
        },
        unifiedTCI-StateRef-r17         ServingCellAndBWP-Id-r17
    }                                                                                                                   OPTIONAL,   -- Need R
    ul-powerControl-r17                Uplink-powerControlId-r17                                                        OPTIONAL,   -- Cond NoTCI-PC
    pucch-ConfigurationListMulticast1-r17  SetupRelease { PUCCH-ConfigurationList-r16 }                                 OPTIONAL,   -- Need M
    pucch-ConfigurationListMulticast2-r17  SetupRelease { PUCCH-ConfigurationList-r16 }                                 OPTIONAL    -- Need M
    ]],
    [[
    pucch-ConfigMulticast1-r17          SetupRelease { PUCCH-Config }                                                   OPTIONAL,   -- Need M
    pucch-ConfigMulticast2-r17          SetupRelease { PUCCH-Config }                                                   OPTIONAL    -- Need M
    ]],
```

```
    [[
    pathlossReferenceRSToAddModList-r17     SEQUENCE (SIZE (1..maxNrofPathlossReferenceRSs-r17)) OF PathlossReferenceRS-r17
                                                                                                    OPTIONAL, -- Need N
    pathlossReferenceRSToReleaseList-r17    SEQUENCE (SIZE (1..maxNrofPathlossReferenceRSs-r17)) OF PathlossReferenceRS-Id-r17
                                                                                                    OPTIONAL  -- Need N
    ]]
}

ConfiguredGrantConfigToAddModList-r16    ::= SEQUENCE (SIZE (1..maxNrofConfiguredGrantConfig-r16)) OF ConfiguredGrantConfig

ConfiguredGrantConfigToReleaseList-r16   ::= SEQUENCE (SIZE (1..maxNrofConfiguredGrantConfig-r16)) OF ConfiguredGrantConfigIndex-r16

ConfiguredGrantConfigType2DeactivationState-r16 ::= SEQUENCE (SIZE (1..maxNrofConfiguredGrantConfig-r16)) OF ConfiguredGrantConfigIndex-r16

ConfiguredGrantConfigType2DeactivationStateList-r16  ::=
                            SEQUENCE (SIZE (1..maxNrofCG-Type2DeactivationState)) OF ConfiguredGrantConfigType2DeactivationState-r16

-- TAG-BWP-UPLINKDEDICATED-STOP
-- ASN1STOP
```

***BWP-UplinkDedicated* field descriptions**
beamFailureRecoveryConfig
Configuration of beam failure recovery. If *supplementaryUplink* is present, the field is present only in one of the uplink carriers, either UL or SUL.
configuredGrantConfig
A *Configured-Grant* of *type1* or *type2*. It may be configured for UL or SUL but in case of *type1* not for both at a time. Except for reconfiguration with sync, the NW does not reconfigure *configuredGrantConfig* when there is an active configured uplink grant Type 2 (see TS 38.321 [3]). However, the NW may release the *configuredGrantConfig* at any time. Network can only configure configured grant in one BWP using either this field or *configuredGrantConfigToAddModList.*
configuredGrantConfigToAddModList
Indicates a list of one or more configured grant configurations to be added or modified for one BWP. Except for reconfiguration with sync, the NW does not reconfigure a Type 2 configured grant configuration when it is active (see TS 38.321 [3]). The network configures multiple CG configurations for one BWP with either all configurations or no configuration configured with *cg-RetransmissionTimer-r16*.
configuredGrantConfigToReleaseList
Indicates a list of one or more UL Configured Grant configurations to be released. The NW may release a configured grant configuration at any time.
configuredGrantConfigType2DeactivationStateList
Indicates a list of the deactivation states in which each state can be mapped to a single or multiple Configured Grant type 2 configurations to be deactivated when the corresponding deactivation DCI is received, see clause 7.3.1 in TS 38.212 [17] and clause 10.2 in TS 38.213 [13].
cp-ExtensionC2, cp-ExtensionC3
Configures the cyclic prefix (CP) extension (see TS 38.211 [16], clause 5.3.1). For 15 kHz SCS, {1..28} are valid for both *cp-ExtensionC2* and *cp-ExtensionC3*. For 30 kHz SCS, {1..28} are valid for *cp-ExtensionC2* and {2..28} are valid for *cp-ExtensionC3.* For 60 kHz SCS, {2..28} are valid for *cp-ExtensionC2* and {3..28} are valid for *cp-ExtensionC3*.
lbt-FailureRecoveryConfig
Configures parameters used for detection of consistent uplink LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].
pathlossReferenceRSToAddModList
A list of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for path loss estimation for PUSCH, PUCCH and SRS for unified TCI state operation. If *unifiedTCI-StateType* is not configured for the serving cell, no element in this list is configured.
pucch-Config
PUCCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL, the network configures PUCCH only on the BWPs of one of the uplinks (normal UL or SUL). The network configures *PUCCH-Config* at least on non-initial BWP(s) for SpCell and on all BWP(s) for PUCCH SCell. If supported by the UE, the network may configure at most one additional SCell of a cell group with *PUCCH-Config* (i.e. PUCCH SCell). If PUCCH cell switching is supported by the UE, the network may configure two TDD serving cells with *PUCCH-Config* within each PUCCH group. For supporting PUCCH cell switching in the PUCCH group with the SpCell, the TDD SpCell and one TDD SCell shall have *PUCCH-Config* on their normal UL. For supporting PUCCH cell switching in the PUCCH group with only SCells, two TDD SCells shall have *PUCCH-Config* on their normal UL. In (NG)EN-DC and NE-DC, the NW configures at most one serving cell per frequency range with PUCCH. In (NG)EN-DC and NE-DC, if two PUCCH groups are configured, the serving cells of the NR PUCCH group in FR2 use the same numerology. For NR-DC, the maximum number of PUCCH groups in each cell group is one, and only the same numerology is supported for the cell group with carriers only in FR2. The NW may configure PUCCH for a BWP when setting up the BWP. The network may also add/remove the *pucch-Config* in an *RRCReconfiguration* with *reconfigurationWithSync* (for SpCell or PUCCH SCell) or with SCell release and add (for PUCCH SCell) to move the PUCCH between the UL and SUL carrier of one serving cell. In other cases, only modifications of a previously configured *pucch-Config* are allowed. If one (S)UL BWP of a serving cell is configured with PUCCH, all other (S)UL BWPs must be configured with PUCCH, too.
pucch-ConfigurationList
PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks (see TS 38.213 [13], clause 9.1). Different PUCCH Resource IDs are configured in different *PUCCH-Config* within the *pucch-ConfigurationList* if configured.
pucch-ConfigurationListMulticast1
PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks for MBS multicast (see TS 38.213, clause 9).
pucch-ConfigurationListMulticast2
PUCCH configurations for two simultaneously constructed NACK-only feedback for MBS multicast (see TS 38.213, clause 9).

pusch-Config PUSCH configuration for one BWP of the normal UL or SUL of a serving cell. If the UE is configured with SUL and if it has a *PUSCH-Config* for both UL and SUL, an UL/SUL indicator field in DCI indicates which of the two to use. See TS 38.212 [17], clause 7.3.1.
pucch-ConfigMulticast1 PUCCH configuration for the HARQ-ACK codebook for MBS multicast when multicast feedback is not configured with a priority value (see TS 38.213 [13], clause 9). If the field is not configured, *pucch-Config* applies.
pucch-ConfigMulticast2 PUCCH configuration for the NACK-only feedback for MBS multicast when multicast feedback is not configured with a priority value (see TS 38.213 [13], clause 9). If the field is not configured, *pucch-Config* applies.
sl-PUCCH-Config Indicates the UE specific PUCCH configurations used for the HARQ-ACK feedback reporting for NR sidelink communication.
srs-Config Uplink sounding reference signal configuration.
ul-powerControl Configures power control parameters for PUCCH, PUSCH and SRS when UE is configured with *unifiedTCI-StateType* for this serving cell. For each serving cell, *ul-powerControl* is either configured in all *BWP-UplinkDedicated* or it is not configured in any *BWP-UplinkDedicated*. When *unifiedTCI-StateRef* in the *BWP-UplinkDedicated* or in the *PDSCH-Config* if the *unifiedTCI-StateType* is set to *joint,* of a serving cell refers to another serving cell, *ul-powerControl* is either configured in all *BWP-UplinkDedicated* of these two serving cells or it is not configured in any *BWP-UplinkDedicated* of these two serving cells.
ul-TCI-StateList Indicates the applicable UL TCI states for PUCCH, PUSCH and SRS.
ul-TCI-ToAddModList Indicates a list of UL TCI states.
unifiedTCI-StateRef Provides the serving cell and UL BWP where UL TCI states applicable to this UL BWP are defined. The value of *unifiedTCI-StateType* of current serving cell is the same in the serving cell indicated by *unifiedTCI-StateRef.*
useInterlacePUCCH-PUSCH If the field is present, the UE uses uplink frequency domain resource allocation Type 2 for PUSCH (see TS 38.213 [13], clause 8.3 and TS 38.214 [19], clause 6.1.2.2) and uses interlaced PUCCH Format 0, 1, 2, and 3 for PUCCH (see TS 38.213 [13], clause 9.2.1).

Conditional Presence	Explanation
NoTCI-PC	The field is optionally present, Need R, if *unifiedTCI-StateType* is configured for this serving cell and *ul-powerControl* is not configured for any UL TCI state or joint TCI state of this serving cell. Otherwise it is absent, Need R
SpCellOnly	The field is optionally present, Need M, in the *BWP-UplinkDedicated* of an SpCell. It is absent otherwise.

NOTE 1: In case of *RRCReconfiguration* with *reconfigurationWithSync*, the UE performs a MAC reset, which involves releasing the PUCCH-CSI/SRS/SR configuration in accordance with clause 5.3.12 and TS 38.321 [3], clauses 5.12 and 5.2. Hence, for these parts of the dedicated radio resource configuration, delta signalling is not supported in the message when *reconfigurationWithSync* is included.

– *CandidateBeamRS*

The IE *CandidateBeamRS* inlcudes candidate beams for beam failure recovery in case of beam failure detection. See also TS 38.321 [3], clause 5.17.

CandidateBeamRS information element

```
-- ASN1START
-- TAG-CANDIDATEBEAMRS-START


CandidateBeamRS-r16 ::=                 SEQUENCE {
    candidateBeamConfig-r16                 CHOICE {
        ssb-r16                                 SSB-Index,
        csi-RS-r16                              NZP-CSI-RS-ResourceId
    },
    servingCellId                           ServCellIndex                                   OPTIONAL  -- Need R
}

-- TAG-CANDIDATEBEAMRS-STOP
-- ASN1STOP
```

CandidateBeamRS field descriptions
candidateBeamConfig Indicates the resource (i.e. SSB or CSI-RS) defining this beam resource.
servingCellId If the field is absent, the RS belongs to the serving cell in which *BeamFailureRecoveryRSConfig* is configured.

– *CellAccessRelatedInfo*

The IE *CellAccessRelatedInfo* indicates cell access related information for this cell.

CellAccessRelatedInfo information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFO-START

CellAccessRelatedInfo   ::=         SEQUENCE {
    plmn-IdentityInfoList               PLMN-IdentityInfoList,
    cellReservedForOtherUse             ENUMERATED {true}             OPTIONAL,   -- Need R
    ...,
    [[
    cellReservedForFutureUse-r16        ENUMERATED {true}             OPTIONAL,   -- Need R
    npn-IdentityInfoList-r16            NPN-IdentityInfoList-r16      OPTIONAL    -- Need R
    ]],
    [[
    snpn-AccessInfoList-r17             SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-AccessInfo-r17    OPTIONAL    -- Need R
    ]]
}

SNPN-AccessInfo-r17 ::=         SEQUENCE {
    extCH-Supported-r17                 ENUMERATED {true}             OPTIONAL,   -- Need R
    extCH-WithoutConfigAllowed-r17      ENUMERATED {true}             OPTIONAL,   -- Need R
```

```
    onboardingEnabled-r17               ENUMERATED {true}           OPTIONAL,   -- Need R
    imsEmergencySupportForSNPN-r17      ENUMERATED {true}           OPTIONAL    -- Need R
}

-- TAG-CELLACCESSRELATEDINFO-STOP
-- ASN1STOP
```

***CellAccessRelatedInfo* field descriptions**
cellReservedForFutureUse Indicates whether the cell is reserved, as defined in 38.304 [20] for future use. The field is applicable to all PLMNs and NPNs. This field is ignored by IAB-MT.
cellReservedForOtherUse Indicates whether the cell is reserved, as defined in 38.304 [20]. The field is applicable to all PLMNs. This field is ignored by IAB-MT for cell barring determination, but still considered by NPN capable IAB-MT for determination of an NPN-only cell.

npn-IdentityInfoList
The *npn-IdentityInfoList* is used to configure a set of *NPN-IdentityInfo* elements. Each of those elements contains a list of one or more NPN Identities and additional information associated with those NPNs. The total number of PLMNs (identified by a PLMN identity in *plmn -IdentityList*), PNI-NPNs (identified by a PLMN identity and a CAG-ID), and SNPNs (identified by a PLMN identity and a NID) together in the *PLMN-IdentityInfoList* and *NPN-IdentityInfoList* does not exceed 12, except for the NPN-only cells. A PNI-NPN and SNPN can be included only once, and in only one entry of the *NPN-IdentityInfoList*. In case of NPN-only cells the *PLMN-IdentityList* contains a single element that does not count to the limit of 12 and the *cellIdentity* of the first entry of the *PLMN-IdentityInfoList* is set to the same value as the *cellIdentity-r16* of the first entry of the *NPN-IdentityInfoList*. The NPN index is defined as *B+c1+c2+…+c(n-1)+d1+d2+…+d(m-1)+e(i)* for the NPN identity included in the *n*-th entry of *NPN-IdentityInfoList* and in the *m*-th entry of *npn-Identitylist* within that *NPN-IdentityInfoList* entry, and the *i*-th entry of its corresponding *NPN-Identity*, where
- *B* is the index used for the last PLMN in the *PLMN-IdentittyInfoList*; in NPN-only cells *B* is considered 0;
- *c(j)* is the number of NPN index values used in the *j*-th *NPN-IdentityInfoList* entry;
- *d(k)* is the number of NPN index values used in the *k*-th *npn-IdentityList* entry within the *n*-th *NPN-IdentityInfoList* entry;
- e(i) is
  - *i* if the *n*-th entry of *NPN-IdentityInfoList* entry is for SNPN(s);
  - 1 if the *n*-th entry of *NPN-IdentityInfoList* entry is for PNI-NPN(s).

plmn-IdentityInfoList The *plmn-IdentityInfoList* is used to configure a set of *PLMN-IdentityInfo* elements. Each of those elements contains a list of one or more PLMN Identities and additional information associated with those PLMNs. A PLMN-identity can be included only once, and in only one entry of the *PLMN-IdentityInfoList*. The PLMN index is defined as *b1+b2+…+b(n-1)+i* for the PLMN included at the *n*-th entry of *PLMN-IdentityInfoList* and the *i*-th entry of its corresponding *PLMN-IdentityInfo*, where *b(j)* is the number of *PLMN-Identity* entries in each *PLMN-IdentityInfo*, respectively.
snpn-AccessInfoList This list provides access related information for each SNPN in *npn-IdentityInfoList*, see TS 23.501 [32]. The n-th entry of the list contains the access related information of the n-th SNPN in *npn-IdentityInfoList*.

***SNPN-AccessInfo* field descriptions**
extCH-Supported Indicates whether the SNPN supports access using credentials from a Credentials Holder as specified in TS 23.501 [32].
extCH-WithoutConfigAllowed Indicates whether the SNPN allows registration attempts with credentials from a Credentials Holder from UEs that are not explicitly configured to select the SNPN as specified in TS 23.501 [32].
imsEmergencySupportForSNPN Indicates whether the SNPN supports IMS emergency bearer services for UEs in limited service mode in the cell. If absent, IMS emergency call is not supported by the SNPN in the cell for UEs in limited service mode.
onboardingEnabled Indicates whether the onboarding SNPN allows registration for onboarding in the cell as specified in TS 23.501 [32].

– *CellAccessRelatedInfo-EUTRA-5GC*

The IE *CellAccessRelatedInfo-EUTRA-5GC* indicates cell access related information for an LTE cell connected to 5GC.

CellAccessRelatedInfo-EUTRA-5GC information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFOEUTRA-5GC-START

CellAccessRelatedInfo-EUTRA-5GC  ::=    SEQUENCE {
    plmn-IdentityList-eutra-5gc             PLMN-IdentityList-EUTRA-5GC,
    trackingAreaCode-eutra-5gc              TrackingAreaCode,
    ranac-5gc                               RAN-AreaCode                                OPTIONAL,
    cellIdentity-eutra-5gc                  CellIdentity-EUTRA-5GC
}

PLMN-IdentityList-EUTRA-5GC::=          SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity-EUTRA-5GC

PLMN-Identity-EUTRA-5GC ::=             CHOICE {
    plmn-Identity-EUTRA-5GC                 PLMN-Identity,
    plmn-index                              INTEGER (1..maxPLMN)
}

CellIdentity-EUTRA-5GC ::=              CHOICE {
    cellIdentity-EUTRA                      BIT STRING (SIZE (28)),
    cellId-index                            INTEGER (1..maxPLMN)
}

-- TAG-CELLACCESSRELATEDINFOEUTRA-5GC-STOP
-- ASN1STOP
```

– *CellAccessRelatedInfo-EUTRA-EPC*

The IE *CellAccessRelatedInfo-EUTRA-EPC* indicates cell access related information for an LTE cell connected to EPC.

CellAccessRelatedInfo-EUTRA-EPC information element

```
-- ASN1START
-- TAG-CELLACCESSRELATEDINFOEUTRA-EPC-START

CellAccessRelatedInfo-EUTRA-EPC  ::=    SEQUENCE {
    plmn-IdentityList-eutra-epc             PLMN-IdentityList-EUTRA-EPC,
    trackingAreaCode-eutra-epc              BIT STRING (SIZE (16)),
    cellIdentity-eutra-epc                  BIT STRING (SIZE (28))
}

PLMN-IdentityList-EUTRA-EPC::=          SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity

-- TAG-CELLACCESSRELATEDINFOEUTRA-EPC-STOP
-- ASN1STOP
```

– *CellGroupConfig*

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

CellGroupConfig information element

```
-- ASN1START
-- TAG-CELLGROUPCONFIG-START

-- Configuration of one Cell-Group:
CellGroupConfig ::=                     SEQUENCE {
    cellGroupId                             CellGroupId,
    rlc-BearerToAddModList                  SEQUENCE (SIZE(1..maxLC-ID)) OF RLC-BearerConfig                    OPTIONAL,   -- Need N
    rlc-BearerToReleaseList                 SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity              OPTIONAL,   -- Need N
    mac-CellGroupConfig                     MAC-CellGroupConfig                                                 OPTIONAL,   -- Need M
    physicalCellGroupConfig                 PhysicalCellGroupConfig                                             OPTIONAL,   -- Need M
    spCellConfig                            SpCellConfig                                                        OPTIONAL,   -- Need M
    sCellToAddModList                       SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig                   OPTIONAL,   -- Need N
    sCellToReleaseList                      SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex                    OPTIONAL,   -- Need N
    ...,
    [[
    reportUplinkTxDirectCurrent             ENUMERATED {true}                                                 OPTIONAL    -- Cond BWP-Reconfig
    ]],
    [[
    bap-Address-r16                         BIT STRING (SIZE (10))                                              OPTIONAL,   -- Need M
    bh-RLC-ChannelToAddModList-r16          SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelConfig-r16 OPTIONAL,   -- Need N
    bh-RLC-ChannelToReleaseList-r16         SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelID-r16 OPTIONAL,   -- Need N
    f1c-TransferPath-r16                    ENUMERATED {lte, nr, both}                                          OPTIONAL,   -- Need M
    simultaneousTCI-UpdateList1-r16         SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex    OPTIONAL,   -- Need R
    simultaneousTCI-UpdateList2-r16         SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex    OPTIONAL,   -- Need R
    simultaneousSpatial-UpdatedList1-r16    SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex    OPTIONAL,   -- Need R
    simultaneousSpatial-UpdatedList2-r16    SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex    OPTIONAL,   -- Need R
    uplinkTxSwitchingOption-r16             ENUMERATED {switchedUL, dualUL}                                     OPTIONAL,   -- Need R
```

```
    uplinkTxSwitchingPowerBoosting-r16         ENUMERATED {enabled}                                                 OPTIONAL    -- Need R
    ]],
    [[
    reportUplinkTxDirectCurrentTwoCarrier-r16  ENUMERATED {true}                                                    OPTIONAL    -- Need N
    ]],
    [[
    f1c-TransferPathNRDC-r17                   ENUMERATED {mcg, scg, both}                                          OPTIONAL,   -- Need M
    uplinkTxSwitching-2T-Mode-r17              ENUMERATED {enabled}                                                 OPTIONAL,   -- Cond 2Tx
    uplinkTxSwitching-DualUL-TxState-r17       ENUMERATED {oneT, twoT}                                              OPTIONAL,   -- Cond 2Tx
    uu-RelayRLC-ChannelToAddModList-r17        SEQUENCE (SIZE(1..maxUu-RelayRLC-ChannelID-r17)) OF Uu-RelayRLC-ChannelConfig-r17
                                                                                                                    OPTIONAL,   -- Need N
    uu-RelayRLC-ChannelToReleaseList-r17       SEQUENCE (SIZE(1..maxUu-RelayRLC-ChannelID-r17)) OF Uu-RelayRLC-ChannelID-r17
                                                                                                                    OPTIONAL,   -- Need N
    simultaneousU-TCI-UpdateList1-r17          SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex     OPTIONAL,   -- Need R
    simultaneousU-TCI-UpdateList2-r17          SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex     OPTIONAL,   -- Need R
    simultaneousU-TCI-UpdateList3-r17          SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex     OPTIONAL,   -- Need R
    simultaneousU-TCI-UpdateList4-r17          SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex     OPTIONAL,   -- Need R
    rlc-BearerToReleaseListExt-r17             SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentityExt-r17        OPTIONAL,   -- Need N
    iab-ResourceConfigToAddModList-r17  SEQUENCE (SIZE(1..maxNrofIABResourceConfig-r17)) OF IAB-ResourceConfig-r17   OPTIONAL, -- Need N
    iab-ResourceConfigToReleaseList-r17 SEQUENCE (SIZE(1..maxNrofIABResourceConfig-r17)) OF IAB-ResourceConfigID-r17 OPTIONAL  -- Need N
    ]],
    [[
    reportUplinkTxDirectCurrentMoreCarrier-r17 ReportUplinkTxDirectCurrentMoreCarrier-r17                           OPTIONAL  -- Need N
    ]],
    [[
    prioSCellPRACH-OverSP-PeriodicSRS-r17      ENUMERATED {enabled}                                                 OPTIONAL  -- Need R
    ]]
}

-- Serving cell specific MAC and PHY parameters for a SpCell:
SpCellConfig ::=                    SEQUENCE {
    servCellIndex                   ServCellIndex                                               OPTIONAL,   -- Cond SCG
    reconfigurationWithSync         ReconfigurationWithSync                                     OPTIONAL,   -- Cond ReconfWithSync
    rlf-TimersAndConstants          SetupRelease { RLF-TimersAndConstants }                     OPTIONAL,   -- Need M
    rlmInSyncOutOfSyncThreshold     ENUMERATED {n1}                                             OPTIONAL,   -- Need S
    spCellConfigDedicated           ServingCellConfig                                           OPTIONAL,   -- Need M
    ...,
    [[
    lowMobilityEvaluationConnected-r17  SEQUENCE {
        s-SearchDeltaP-Connected-r17        ENUMERATED {dB3, dB6, dB9, dB12, dB15, spare3, spare2, spare1},
        t-SearchDeltaP-Connected-r17        ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
                                                        spare4, spare3, spare2, spare1}
    }                                                                                           OPTIONAL,   -- Need R
    goodServingCellEvaluationRLM-r17    GoodServingCellEvaluation-r17                           OPTIONAL,   -- Need R
    goodServingCellEvaluationBFD-r17    GoodServingCellEvaluation-r17                           OPTIONAL,   -- Need R
    deactivatedSCG-Config-r17           SetupRelease { DeactivatedSCG-Config-r17 }              OPTIONAL    -- Cond SCG-Opt
    ]]
}

ReconfigurationWithSync ::=         SEQUENCE {
    spCellConfigCommon              ServingCellConfigCommon                                     OPTIONAL,   -- Need M
    newUE-Identity                  RNTI-Value,
    t304                            ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},
    rach-ConfigDedicated            CHOICE {
```

```
        uplink                              RACH-ConfigDedicated,
        supplementaryUplink                 RACH-ConfigDedicated
    }                                                                                   OPTIONAL,   -- Need N
    ...,
    [[
    smtc                                SSB-MTC                                         OPTIONAL    -- Need S
    ]],
    [[
    daps-UplinkPowerConfig-r16      DAPS-UplinkPowerConfig-r16                          OPTIONAL    -- Need N
    ]],
    [[
    sl-PathSwitchConfig-r17         SL-PathSwitchConfig-r17                             OPTIONAL    -- Cond DirectToIndirect-PathSwitch
    ]]
}

DAPS-UplinkPowerConfig-r16 ::=      SEQUENCE {
    p-DAPS-Source-r16                   P-Max,
    p-DAPS-Target-r16                   P-Max,
    uplinkPowerSharingDAPS-Mode-r16     ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }
}

SCellConfig ::=                     SEQUENCE {
    sCellIndex                          SCellIndex,
    sCellConfigCommon                   ServingCellConfigCommon                         OPTIONAL,   -- Cond SCellAdd
    sCellConfigDedicated                ServingCellConfig                               OPTIONAL,   -- Cond SCellAddMod
    ...,
    [[
    smtc                                SSB-MTC                                         OPTIONAL    -- Need S
    ]],
    [[
    sCellState-r16                  ENUMERATED {activated}                              OPTIONAL,   -- Cond SCellAddSync
    secondaryDRX-GroupConfig-r16    ENUMERATED {true}                                   OPTIONAL    -- Need S
    ]],
    [[
    preConfGapStatus-r17             BIT STRING (SIZE (maxNrofGapId-r17))               OPTIONAL,   -- Cond PreConfigMG
    goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17                      OPTIONAL,   -- Need R
    sCellSIB20-r17                   SetupRelease { SCellSIB20-r17 }                    OPTIONAL    -- Need M
    ]],
    [[
    plmn-IdentityInfoList-r17       SetupRelease {PLMN-IdentityInfoList}                OPTIONAL,   -- Cond SCellSIB20-Opt
    npn-IdentityInfoList-r17        SetupRelease {NPN-IdentityInfoList-r16}             OPTIONAL    -- Cond SCellSIB20-Opt
    ]]
}

SCellSIB20-r17 ::= OCTET STRING (CONTAINING SystemInformation)

DeactivatedSCG-Config-r17 ::=       SEQUENCE {
    bfd-and-RLM-r17                     BOOLEAN,
    ...
}

GoodServingCellEvaluation-r17 ::=       SEQUENCE {
    offset-r17                              ENUMERATED {db2, db4, db6, db8}             OPTIONAL    -- Need S
}
```

```
SL-PathSwitchConfig-r17 ::=         SEQUENCE {
    targetRelayUE-Identity-r17          SL-SourceIdentity-r17,
    t420-r17                            ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},
    ...
}

IAB-ResourceConfig-r17 ::=          SEQUENCE {
    iab-ResourceConfigID-r17            IAB-ResourceConfigID-r17,
    slotList-r17                        SEQUENCE (SIZE (1..5120)) OF INTEGER (0..5119)                          OPTIONAL,    -- Need M
    periodicitySlotList-r17             ENUMERATED {ms0p5, ms0p625, ms1, ms1p25, ms2, ms2p5, ms5, ms10, ms20, ms40, ms80, ms160}     OPTIONAL,    -
- Need M
    slotListSubcarrierSpacing-r17       SubcarrierSpacing                                                       OPTIONAL,    -- Need M
    ...
}
IAB-ResourceConfigID-r17 ::=        INTEGER(0..maxNrofIABResourceConfig-1-r17)

ReportUplinkTxDirectCurrentMoreCarrier-r17 ::= SEQUENCE (SIZE(1.. maxSimultaneousBands)) OF IntraBandCC-CombinationReqList-r17

IntraBandCC-CombinationReqList-r17::=   SEQUENCE {
    servCellIndexList-r17                   SEQUENCE (SIZE(1.. maxNrofServingCells)) OF ServCellIndex,
    cc-CombinationList-r17                  SEQUENCE (SIZE(1.. maxNrofReqComDC-Location-r17)) OF IntraBandCC-Combination-r17
}

IntraBandCC-Combination-r17::=      SEQUENCE (SIZE(1.. maxNrofServingCells)) OF CC-State-r17

CC-State-r17::=                     SEQUENCE {
    dlCarrier-r17                       CarrierState-r17                        OPTIONAL, -- Need N
    ulCarrier-r17                       CarrierState-r17                        OPTIONAL  -- Need N
}

CarrierState-r17::=                 CHOICE {
    deActivated-r17                     NULL,
    activeBWP-r17                       INTEGER (0..maxNrofBWPs)
}

-- TAG-CELLGROUPCONFIG-STOP
-- ASN1STOP
```

***CC-State* field descriptions**
dlCarrier Indicates DL carrier activation state for this carrier and the related active BWP Index, if activated.
ulCarrier Indicates UL carrier activation state for this carrier and the related active BWP Index, if activated.

***CellGroupConfig* field descriptions**
bap-Address BAP address of the parent node in cell group.
bh-RLC-ChannelToAddModList Configuration of the backhaul RLC entities and the corresponding MAC Logical Channels to be added and modified.
bh-RLC-ChannelToReleaseList List of the backhaul RLC entities and the corresponding MAC Logical Channels to be released.
f1c-TransferPath The F1-C transfer path that an EN-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *lte*, IAB-MT can only use LTE leg for F1-C transfer. If IAB-MT is configured with *nr*, IAB-MT can only use NR leg for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select an LTE leg or a NR leg for F1-C transfer. If the field is not configured, the IAB node uses the NR leg as the default one.
f1c-TransferPathNRDC The F1-C transfer path that an NR-DC IAB-MT should use for transferring F1-C packets to the IAB-donor-CU. If IAB-MT is configured with *mcg*, IAB-MT can only use the MCG for F1-C transfer. If IAB-MT is configured with *scg*, IAB-MT can only use the SCG for F1-C transfer. If IAB-MT is configured with *both*, it is up to IAB-MT to select the MCG or the SCG for F1-C transfer.
mac-CellGroupConfig MAC parameters applicable for the entire cell group.
npn-IdentityInfoList This field is used to transfer *npn-IdentityInfoList* in *SIB1* of the SCell. The UE uses this field to translate the *plmn-Index* in MCCH of SCell to SNPN Identity. If this field and *plmn-IdentityInfoList* are both absent, the UE uses the *npn-IdentityInfoList* in *SIB1* of the PCell.
plmn-IdentityInfoList This field is used to transfer *plmn-IdentityInfoList* in *SIB1* of the SCell. The UE uses this field to translate the *plmn-Index* in MCCH of SCell to PLMN Identity. If this field and *npn-IdentityInfoList* are both absent, the UE uses the *plmn-IdentityInfoList* in *SIB1* of the PCell.
prioSCellPRACH-OverSP-PeriodicSRS When configured, the UE applies UL power control prioritization by prioritizing PRACH transmission on SCell over semi-persistent and/or periodic SRS transmission as defined in clause 7.5 of TS 38.213 [13].
rlc-BearerToAddModList Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers.
reportUplinkTxDirectCurrent Enables reporting of uplink and supplementary uplink Direct Current location information upon BWP configuration and reconfiguration. This field is only present when the BWP configuration is modified or any serving cell is added or removed. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations.
reportUplinkTxDirectCurrentMoreCarrier Enables reporting of uplink Direct Current location information when the UE is configured with intra-band CA. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message. The UE only reports the uplink Direct Current location information that are related to the indicated *cc-CombinationList*. The network does not include carriers which locate in DL only spectrum described in TS 38.101-2 [39], clause 5.3A.4 and defined by Fsd according to Table 5.3A.4-3 in FR2 in the *IntraBandCC-CombinationReqList*. I.e. DL-only carrier in FR2 frequency spectrum is not used to calculate the default DC location.
reportUplinkTxDirectCurrentTwoCarrier Enables reporting of uplink Direct Current location information when the UE is configured with uplink intra-band CA with two carriers. This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message.
rlc-BearerToReleaseListExt List of the RLC entities and the corresponding MAC Logical Channels to be released for multicast MRBs.
rlmInSyncOutOfSyncThreshold BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. *n1* corresponds to the value 1. When the field is absent, the UE applies the value 0. Whenever this is reconfigured, UE resets N310 and N311, and stops T310, if running. Network does not include this field.

sCellSIB20 This field is used to transfer *SIB20* of the SCell in order to allow the UE for MBS broadcast reception on SCell. The network configures this field only for a single SCell at a time.
sCellToAddModList List of secondary serving cells (SCells) to be added or modified.
sCellToReleaseList List of secondary serving cells (SCells) to be released.
simultaneousSpatial-UpdatedList1, simultaneousSpatial-UpdatedList2 List of serving cells which can be updated simultaneously for spatial relation with a MAC CE. The *simultaneousSpatial-UpdatedList1* and *simultaneousSpatial-UpdatedList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists.
simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2 List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2* shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the *coresetPoolIndex* in these lists.
simultaneousU-TCI-UpdateList1, simultaneousU-TCI-UpdateList2, simultaneousU-TCI-UpdateList3, simultaneousU-TCI-UpdateList4 List of serving cells for which the Unified TCI States Activation/Deactivation MAC CE applies simultaneously, as specified in TS 38.321 [3] clause 6.1.3.47. The different lists shall not contain same serving cells. Network only configures in these lists serving cells that are configured with *unifiedTCI-StateType*.
spCellConfig Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).
uplinkTxSwitchingOption Indicates which option is configured for dynamic UL Tx switching for inter-band UL CA or (NG)EN-DC. The field is set to *switchedUL* if network configures option 1 as specified in TS 38.214 [19], or *dualUL* if network configures option 2 as specified in TS 38.214 [19]. Network always configures UE with a value for this field in inter-band UL CA case and (NG)EN-DC case where UE supports dynamic UL Tx switching.
uplinkTxSwitchingPowerBoosting Indicates whether the UE is allowed to enable 3dB boosting on the maximum output power for transmission on carrier2 under the operation state in which 2-port transmission can be supported on carrier2 for inter-band UL CA case with dynamic UL Tx switching as defined in TS 38.101-1 [15]. Network can only configure this field for dynamic UL Tx switching in inter-band UL CA case with power Class 3 as defined in TS 38.101-1 [15].
uplinkTxSwitching-2T-Mode Indicates 2Tx-2Tx switching mode is configured for inter-band UL CA or SUL, in which the switching gap duration for a triggered uplink switching (as specified in TS 38.214 [19]) is equal to the switching time capability value reported for the switching mode. If this field is absent and *uplinkTxSwitching* is configured, it is interpreted that 1Tx-2Tx UL Tx switching is configured as specified in TS 38.214 [19]. In this case, there is one uplink (or one uplink band in case of intra-band) configured with *uplinkTxSwitching*, on which the maximum number of antenna ports among all configured P-SRS/A-SRS and activated SP-SRS resources should be 1 and non-codebook based UL MIMO is not configured.
uplinkTxSwitching-DualUL-TxState Indicates the state of Tx chains if the state of Tx chains after the UL Tx switching is not unique (as specified in TS 38.214 [19]) in case of 2Tx-2Tx switching is configured and *uplinkTxSwitchingOption* is set to *dualUL*. Value *oneT* indicates 1Tx is assumed to be supported on the carriers on each band, value *twoT* indicates 2Tx is assumed to be supported on that carrier.
uu-RelayRLC-ChannelToAddModList List of the Uu RLC entities and the corresponding MAC Logical Channels to be added or modified.
uu-RelayRLC-ChannelToReleaseList List of the Uu RLC entities and the corresponding MAC Logical Channels to be released.

***DeactivatedSCG-Config* field descriptions**
bfd-and-RLM
If the field is set to *true*, the UE shall perform RLM and BFD on the PSCell when the SCG is deactivated and the network ensures that *beamFailure-r17* is not configured in the *radioLinkMonitoringConfig* of the DL BWP of the PSCell in which the UE performs BFD. If set to *false*, the UE is not required to perform RLM and BFD on the PSCell when the SCG is deactivated.

***DAPS-UplinkPowerConfig* field descriptions**
p-DAPS-Source
The maximum total transmit power to be used by the UE in the source cell group during DAPS handover.
p-DAPS-Target
The maximum total transmit power to be used by the UE in the target cell group during DAPS handover.
uplinkPowerSharingDAPS-Mode
Indicates the uplink power sharing mode that the UE uses in DAPS handover (see TS 38.213 [13]).

***GoodServingCellEvaluation* field descriptions**
offset
The parameter "X" (dB) for the good serving cell quality criterion in RRC_CONNECTED, for a cell operating in FR1 and FR2, respectively. If this field is absent, the UE applies the (default) value of 0 dB for "X".

***IAB-ResourceConfig* field descriptions**
iab-ResourceConfigID
This ID is used to indicate the specific resource configuration addressed by the MAC CEs specified in TS 38.321 [3].
periodicitySlotList
Indicates the periodicity in ms of the list of slot indexes indicated in *slotList*.
slotList
Indicates the list of slot indexes to which the information indicated in the specific MAC CE applies to, as specified in TS 38.321 [3]. The values of the entries in the *slotList* are strictly less than the value of the *periodicitySlotList*.
slotListSubcarrierSpacing
Subcarrier spacing used as reference for the *slotList* configuration. Only the following values are applicable depending on the used frequency: FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120 or 480 kHz

***ReconfigurationWithSync* field descriptions**
rach-ConfigDedicated Random access configuration to be used for the reconfiguration with sync (e.g. handover). The UE performs the RA according to these parameters in the *firstActiveUplinkBWP* (see *UplinkConfig*).
smtc The SSB periodicity/offset/duration configuration of target cell for NR PSCell change and NR PCell change. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *spCellConfigCommon* or sets to the same periodicity as *ssb-Periodicity-r17* in *nonCellDefiningSSB-r17* if the first active DL BWP included in this RRC message is configured with *nonCellDefiningSSB-r17* for RedCap. For case of NR PCell change, the *smtc* is based on the timing reference of (source) PCell. For case of NR PSCell change, it is based on the timing reference of source PSCell. If both this field and *targetCellSMTC-SCG* are absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. For a RedCap UE, if the first active DL BWP included in this RRC message is configured with *nonCellDefiningSSB-r17*, this field corresponds to the NCD-SSB indicated by *nonCellDefiningSSB-r17*, otherwise, this field corresponds to the CD-SSB indicated by *absoluteFrequencySSB* in *frequencyInfoDL*.

***ReportUplinkTxDirectCurrentMoreCarrier* field descriptions**
IntraBandCC-Combination Indicates the state of the carriers and BWPs indexes of the carriers in a CC combination, each carrier in this combination corresponds to an entry in *servCellIndexList* with same order. This IE shall have the same size as *servCellIndexList*.
IntraBandCC-CombinationReqList Indicates the list of the requested carriers/BWPs combinations for an intra-band CA component.
servCellIndexList indicates the list of cell index for an intra-band CA component.

***SCellConfig* field descriptions**
goodServingCellEvaluationBFD Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in an SCell in RRC_CONNECTED. This field is always configured when the network enables BFD relaxation for the UE in this SCell. This field is absent if *failureDetectionSetN* is present for the SCell.
preConfGapStatus Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with *preConfigInd*) are activated or deactivated while this SCell is deactivated. 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.
sCellState Indicates whether the SCell shall be considered to be in activated state upon SCell configuration. If the field is included for an SCell configured with TRS for fast activation of the SCell, such TRS is not used for the corresponding SCell.
secondaryDRX-GroupConfig The field is used to indicate whether the SCell belongs to the secondary DRX group. All serving cells in the secondary DRX group shall belong to one Frequency Range and all serving cells in the default DRX group shall belong to another Frequency Range. If *drx-ConfigSecondaryGroup* is configured, the field is optionally present. The network always includes the field if the field was previously configured for this SCell and the SCell remains in the secondary DRX group. Removal of an individual SCell from the secondary DRX group is supported by using an SCell release and addition. Otherwise, if *drx-ConfigSecondaryGroup* is not configured, the field is absent and the UE shall release the field. The UE shall also release the field if *drx-ConfigSecondaryGroup* is released without including *sCellToAddModList*.
smtc The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as *ssb-periodicityServingCell* in *sCellConfigCommon*. The *smtc* is based on the timing of the SpCell of associated cell group. In case of inter-RAT handover to NR, the timing reference is the NR PCell. In case of intra-NR PCell change (standalone NR) or NR PSCell change (EN-DC), the timing reference is the target SpCell. If the field is absent, the UE uses the SMTC in the *measObjectNR* having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message.

***SpCellConfig* field descriptions**
deactivatedSCG-Config
Configuration applicable when the SCG is deactivated. The network always configures this field before or when indicating that the SCG is deactivated in an *RRCReconfiguration*, *RRCResume*, E-UTRA *RRCConnectionReconfiguration* or E-UTRA *RRCConnectionResume* message.
goodServingCellEvaluationBFD
Indicates the criterion for a UE to detect the good serving cell quality for BFD relaxation in the SpCell in RRC_CONNECTED. The field is always configured when the network enables BFD relaxation for the UE in this SpCell. This field is absent if *failureDetectionSetN* is present for the SpCell.
goodServingCellEvaluationRLM
Indicates the criterion for a UE to detect the good serving cell quality for RLM relaxation in the SpCell in RRC_CONNECTED. The field is always configured when the network enables RLM relaxation for the UE in this SpCell.
lowMobilityEvaluationConnected
Indicates the criterion for a UE to detect low mobility in RRC_CONNECTED in an SpCell. The *s-SearchDeltaP-Connected* is the parameter "$S_{SearchDeltaP-connected}$". Value *dB*3 corresponds to 3 dB, *dB*6 corresponds to 6 dB and so on. The *t-SearchDeltaP-Connected* is the parameter "$T_{SearchDeltaP-Connected}$". Value *s5* means 5 seconds, value *s10* means 10 seconds and so on. Low mobility criterion is configured in NR PCell for the case of NR SA/ NR CA/ NE-DC/NR-DC, and in the NR PSCell for the case of EN-DC.
reconfigurationWithSync
Parameters for the synchronous reconfiguration to the target SpCell.
rlf-TimersAndConstants
Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, *rlf-TimersAndConstants* can only be set to *setup* and is always included at SCG addition.
servCellIndex
Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0.

***SL-PathSwitchConfig* field descriptions**
targetRelayUE-Identity
Indicates the L2 source ID of the target L2 U2N Relay UE during path switch.
t420
Indicates the timer value of *T420* to be used during path switch.

Conditional Presence	Explanation
2Tx	The field is optionally present, Need R, if *uplinkTxSwitching* is configured; otherwise it is absent, Need R.
BWP-Reconfig	The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is absent.
DirectToIndirect-PathSwitch	The field is mandatory present for the L2 U2N remote UE at path switch to the target L2 U2N Relay UE. 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 SCell belongs to and configured with *preConfigInd*. It is absent, Need R, otherwise.

ReconfWithSync	The field is mandatory present in the *RRCReconfiguration* message:
	- in each configured *CellGroupConfig* for which the SpCell changes,
	- in the *masterCellGroup:*
	  - at change of AS security key derived from K_{gNB},
	  - in an *RRCReconfiguration* message contained in a *DLInformationTransferMRDC* message,
	  - path switch of L2 U2N remote UE to the target PCell,
	  - path switch of L2 U2N remote UE to the target L2 U2N Relay UE,
	- in the *secondaryCellGroup* at:
	  - PSCell addition,
	  - SCG resume with NR-DC or (NG)EN-DC,
	  - update of required SI for PSCell,
	  - change of AS security key derived from S-K_{gNB} in NR-DC while the UE is configured with at least one radio bearer with *keyToUse* set to *secondary* and that is not released by this *RRCReconfiguration* message,
	  - MN handover in (NG)EN-DC.
	Otherwise, it is optionally present, need M. The field is absent in the *masterCellGroup* in *RRCResume* and *RRCSetup* messages and is absent in the *masterCellGroup* in *RRCReconfiguration* messages if source configuration is not released during DAPS handover.

SCellAdd	The field is mandatory present upon SCell addition; otherwise it is absent, Need M.
SCellAddMod	The field is mandatory present upon SCell addition; otherwise it is optionally present, need M.

SCellAddSync	The field is optionally present, Need N:
	- in the *masterCellGroup* at
	  - SCell addition,
	  - reconfiguration with sync,
	  - resume of an RRC connection.
	- in the *secondaryCellGroup*, when the SCG is not indicated as deactivated at:
	  - SCG activation while the SCG was previously deactivated,
	  - SCell addition,
	  - reconfiguration with sync.
	It is absent otherwise.

SCG	The field is mandatory present in an *SpCellConfig* for the PSCell. It is absent otherwise.
SCellSIB20-Opt	This field is optionally present, Need M, if the field sCellSIB20 is configured. It is absent otherwise.
SCG-Opt	The field is optionally present, Need M, in an SpCellConfig for the PSCell. It is absent otherwise.

NOTE: In case of change of AS security key derived from S-K_{gNB}/S-K_{eNB}, if *reconfigurationWithSync* is not included in the *masterCellGroup*, the network releases all existing MCG RLC bearers associated with a radio bearer with *keyToUse* set to *secondary*. In case of change of AS security key derived from K_{gNB}/K_{eNB}, if *reconfigurationWithSync* is not included in the *secondaryCellGroup*, the network releases all existing SCG RLC bearers associated with a radio bearer with *keyToUse* set to *primary*.

– *CellGroupId*

The IE *CellGroupId* is used to identify a cell group. Value 0 identifies the master cell group. Other values identify secondary cell groups. In this version of the specification only values 0 and 1 are supported.

CellGroupId information element

```
-- ASN1START
-- TAG-CELLGROUPID-START

CellGroupId ::=                             INTEGER (0.. maxSecondaryCellGroups)

-- TAG-CELLGROUPID-STOP
-- ASN1STOP
```

– *CellIdentity*

The IE *CellIdentity* is used to unambiguously identify a cell within a PLMN/SNPN.

CellIdentity information element

```
-- ASN1START
-- TAG-CELLIDENTITY-START

CellIdentity ::=                          BIT STRING (SIZE (36))

-- TAG-CELLIDENTITY-STOP
-- ASN1STOP
```

– *CellReselectionPriority*

The IE *CellReselectionPriority* concerns the absolute priority of the concerned carrier frequency, as used by the cell reselection procedure. Corresponds to parameter "priority" in TS 38.304 [20]. Value 0 means lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 38.304 [20].

CellReselectionPriority information element

```
-- ASN1START
```

```
-- TAG-CELLRESELECTIONPRIORITY-START

CellReselectionPriority ::=             INTEGER (0..7)

-- TAG-CELLRESELECTIONPRIORITY-STOP
-- ASN1STOP
```

– *CellReselectionSubPriority*

The IE *CellReselectionSubPriority* indicates a fractional value to be added to the value of *cellReselectionPriority* to obtain the absolute priority of the concerned carrier frequency for E-UTRA and NR. Value *oDot2* corresponds to 0.2, value *oDot4* corresponds to 0.4 and so on.

CellReselectionSubPriority information element

```
-- ASN1START
-- TAG-CELLRESELECTIONSUBPRIORITY-START

CellReselectionSubPriority ::=          ENUMERATED {oDot2, oDot4, oDot6, oDot8}

-- TAG-CELLRESELECTIONSUBPRIORITY-STOP
-- ASN1STOP
```

– *CFR-ConfigMulticast*

The IE *CFR-ConfigMulticast* indicates UE specific common frequency resource configuration for multicast for one dedicated BWP.

CFR-ConfigMulticast information element

```
-- ASN1START
-- TAG-CFR-CONFIGMULTICAST-START

CFR-ConfigMulticast-r17::= SEQUENCE {
    locationAndBandwidthMulticast-r17             INTEGER (0..37949)                    OPTIONAL,    -- Need S
    pdcch-ConfigMulticast-r17                     PDCCH-Config                          OPTIONAL,    -- Need M
    pdsch-ConfigMulticast-r17                     PDSCH-Config                          OPTIONAL,    -- Need M
    sps-ConfigMulticastToAddModList-r17           SPS-ConfigMulticastToAddModList-r17   OPTIONAL,    -- Need N
    sps-ConfigMulticastToReleaseList-r17          SPS-ConfigMulticastToReleaseList-r17  OPTIONAL     -- Need N
}

SPS-ConfigMulticastToAddModList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-Config

SPS-ConfigMulticastToReleaseList-r17 ::= SEQUENCE (SIZE (1..8)) OF SPS-ConfigIndex-r16

-- TAG-CFR-CONFIGMULTICAST-STOP
-- ASN1STOP
```

***CFR-ConfigMulticast* field descriptions**
locationAndBandwidthMulticast Frequency domain location and bandwidth for MBS multicast. The value of the field shall be interpreted as resource indicator value (RIV) as defined in TS 38.214 [19] with assumptions as described in TS 38.213 [13], clause 12, i.e. setting N^size_BWP=275. The first PRB is a PRB determined by *subcarrierSpacing* of the associated BWP and *offsetToCarrier* corresponding to this subcarrier spacing. If not configured, the UE applies the value of *locationAndBandwidth* of the DL BWP in which the *cfr-ConfigMulticast* is configured.
pdcch-ConfigMulticast UE specific group-common PDCCH configuration for MBS multicast for one CFR.
pdsch-ConfigMulticast UE specific group-common PDSCH configuration for MBS multicast for one CFR.
sps-ConfigMulticastToAddModList Indicates a list of one or more DL SPS configurations for MBS multicast.
sps-ConfigMulticastToReleaseList Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time.

– *CGI-InfoEUTRA*

The IE CGI-InfoEUTRA indicates EUTRA cell access related information, which is reported by the UE as part of E-UTRA report CGI procedure.

***CGI-InfoEUTRA* information element**

```
-- ASN1START
-- TAG-CGI-INFOEUTRA-START

CGI-InfoEUTRA ::=                       SEQUENCE {
    cgi-info-EPC                            SEQUENCE {
            cgi-info-EPC-legacy                 CellAccessRelatedInfo-EUTRA-EPC,
            cgi-info-EPC-list                   SEQUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-EPC          OPTIONAL
    }                                                                                                                    OPTIONAL,
    cgi-info-5GC                            SEQUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-5GC      OPTIONAL,
    freqBandIndicator                       FreqBandIndicatorEUTRA,
    multiBandInfoList                       MultiBandInfoListEUTRA                                               OPTIONAL,
    freqBandIndicatorPriority               ENUMERATED {true}                                                    OPTIONAL
}

-- TAG-CGI-INFOEUTRA-STOP
-- ASN1STOP
```

– *CGI-InfoEUTRALogging*

The IE CGI-InfoEUTRALogging indicates EUTRA cell related information, which is reported by the UE as part of RLF reporting procedure.

***CGI-InfoEUTRALogging* information element**

```
-- ASN1START
```

```
-- TAG-CGI-INFOEUTRALOGGING-START

CGI-InfoEUTRALogging ::=          SEQUENCE {
    plmn-Identity-eutra-5gc           PLMN-Identity                                 OPTIONAL,
    trackingAreaCode-eutra-5gc        TrackingAreaCode                              OPTIONAL,
    cellIdentity-eutra-5gc            BIT STRING (SIZE (28))                        OPTIONAL,
    plmn-Identity-eutra-epc           PLMN-Identity                                 OPTIONAL,
    trackingAreaCode-eutra-epc        BIT STRING (SIZE (16))                        OPTIONAL,
    cellIdentity-eutra-epc            BIT STRING (SIZE (28))                        OPTIONAL
}

-- TAG-CGI-INFOEUTRALOGGING-STOP
-- ASN1STOP
```

***CGI-InfoEUTRALogging* field descriptions**
cellIdentity-eutra-epc, cellIdentity-eutra-5GC Unambiguously identify a cell within the context of the PLMN. It belongs the first PLMN entry of *plmn-IdentityList* (when connected to EPC) or of *plmn-IdentityList-r15* (when connected to 5GC) in *SystemInformationBlockType1*.
plmn-Identity-eutra-epc, plmn-Identity-eutra-5GC Identifies the PLMN of the cell for the reported *cellIdentity*: the first PLMN entry of *plmn-IdentityList* (when connected to EPC) or of *plmn-IdentityList-r15* (when connected to 5GC) in *SystemInformationBlockType1* that contained the reported *cellIdentity*.
trackingAreaCode-eutra-epc, trackingAreaCode-eutra-5gc Indicates Tracking Area Code to which the cell indicated by *cellIdentity-eutra-epc, cellIdentity-eutra-5GC* belongs.

– *CGI-InfoNR*

The IE *CGI-InfoNR* indicates cell access related information, which is reported by the UE as part of report CGI procedure.

CGI-InfoNR information element

```
-- ASN1START
-- TAG-CGI-INFO-NR-START

CGI-InfoNR ::=                    SEQUENCE {
    plmn-IdentityInfoList             PLMN-IdentityInfoList             OPTIONAL,
    frequencyBandList                 MultiFrequencyBandListNR          OPTIONAL,
    noSIB1                            SEQUENCE {
        ssb-SubcarrierOffset              INTEGER (0..15),
        pdcch-ConfigSIB1                  PDCCH-ConfigSIB1
    }                                                                   OPTIONAL,
    ...,
    [[
    npn-IdentityInfoList-r16          NPN-IdentityInfoList-r16          OPTIONAL
    ]],
    [[
    cellReservedForOtherUse-r16       ENUMERATED {true}                 OPTIONAL
    ]]
}
```

```
-- TAG-CGI-INFO-NR-STOP
-- ASN1STOP
```

***CGI-InfoNR* field descriptions**
noSIB1 Contains *ssb-SubcarrierOffset* and *pdcch-ConfigSIB1* fields acquired by the UE from *MIB* of the cell for which report CGI procedure was requested by the network in case *SIB1* was not broadcast by the cell.
cellReservedForOtherUse Contains *cellReservedForOtherUse* field acquired by the UE that supports *nr-CGI-Reporting-NPN* from *SIB1* of the cell for which report CGI procedure was requested by the network.

– *CGI-Info-Logging*

The IE *CGI-Info-Logging* indicates the NR Cell Global Identifier (NCGI) for logging purposes (e.g. RLF report), the globally unique identity, and the TAC information of a cell in NR.

***CGI-Info-Logging* information element**

```
-- ASN1START
-- TAG-CGI-INFO-LOGGING-START

CGI-Info-Logging-r16 ::=     SEQUENCE {
    plmn-Identity-r16                   PLMN-Identity,
    cellIdentity-r16                    CellIdentity,
    trackingAreaCode-r16                TrackingAreaCode              OPTIONAL
}

-- TAG-CGI-INFO-LOGGING-STOP
-- ASN1STOP
```

***CGI-Info-Logging* field descriptions**
cellIdentity Unambiguously identify a cell within the context of the PLMN. It belongs the first *PLMN-IdentityInfo* IE of *PLMN-IdentityInfoList* in *SIB1*.
plmn-Identity Identifies the PLMN of the cell for the reported *cellIdentity*: the first PLMN entry of *plmn-IdentityList* (in SIB1) in the instance of *PLMN-IdentityInfoList* that contained the reported *cellIdentity*.
trackingAreaCode Indicates Tracking Area Code to which the cell indicated by cellIdentity field belongs.

– *CLI-RSSI-Range*

The IE *CLI-RSSI-Range* specifies the value range used in CLI-RSSI measurements and thresholds. The integer value for CLI-RSSI measurements is according to Table 10.1.22.2.2-1 in TS 38.133 [14].

CLI-RSSI-Range information element

```
-- ASN1START
-- TAG-CLI-RSSI-RANGE-START

CLI-RSSI-Range-r16 ::=                    INTEGER(0..76)

-- TAG-CLI-RSSI-RANGE-STOP
-- ASN1STOP
```

– *CodebookConfig*

The IE *CodebookConfig* is used to configure codebooks of Type-I and Type-II (see TS 38.214 [19], clause 5.2.2.2)

CodebookConfig information element

```
-- ASN1START
-- TAG-CODEBOOKCONFIG-START

CodebookConfig ::=                                  SEQUENCE {
    codebookType                                        CHOICE {
        type1                                               SEQUENCE {
            subType                                             CHOICE {
                typeI-SinglePanel                                   SEQUENCE {
                    nrOfAntennaPorts                                    CHOICE {
                        two                                                 SEQUENCE {
                            twoTX-CodebookSubsetRestriction                     BIT STRING (SIZE (6))
                        },
                        moreThanTwo                                         SEQUENCE {
                            n1-n2                                               CHOICE {
                                two-one-TypeI-SinglePanel-Restriction               BIT STRING (SIZE (8)),
                                two-two-TypeI-SinglePanel-Restriction               BIT STRING (SIZE (64)),
                                four-one-TypeI-SinglePanel-Restriction              BIT STRING (SIZE (16)),
                                three-two-TypeI-SinglePanel-Restriction             BIT STRING (SIZE (96)),
                                six-one-TypeI-SinglePanel-Restriction               BIT STRING (SIZE (24)),
                                four-two-TypeI-SinglePanel-Restriction              BIT STRING (SIZE (128)),
                                eight-one-TypeI-SinglePanel-Restriction             BIT STRING (SIZE (32)),
                                four-three-TypeI-SinglePanel-Restriction            BIT STRING (SIZE (192)),
                                six-two-TypeI-SinglePanel-Restriction               BIT STRING (SIZE (192)),
                                twelve-one-TypeI-SinglePanel-Restriction            BIT STRING (SIZE (48)),
                                four-four-TypeI-SinglePanel-Restriction             BIT STRING (SIZE (256)),
                                eight-two-TypeI-SinglePanel-Restriction             BIT STRING (SIZE (256)),
                                sixteen-one-TypeI-SinglePanel-Restriction           BIT STRING (SIZE (64))
                            },
```

```
                        typeI-SinglePanel-codebookSubsetRestriction-i2      BIT STRING (SIZE (16))        OPTIONAL    -- Need R
                    }
                },
                typeI-SinglePanel-ri-Restriction                    BIT STRING (SIZE (8))
            },
            typeI-MultiPanel                                    SEQUENCE {
                ng-n1-n2                                                CHOICE {
                    two-two-one-TypeI-MultiPanel-Restriction                BIT STRING (SIZE (8)),
                    two-four-one-TypeI-MultiPanel-Restriction               BIT STRING (SIZE (16)),
                    four-two-one-TypeI-MultiPanel-Restriction               BIT STRING (SIZE (8)),
                    two-two-two-TypeI-MultiPanel-Restriction                BIT STRING (SIZE (64)),
                    two-eight-one-TypeI-MultiPanel-Restriction              BIT STRING (SIZE (32)),
                    four-four-one-TypeI-MultiPanel-Restriction              BIT STRING (SIZE (16)),
                    two-four-two-TypeI-MultiPanel-Restriction               BIT STRING (SIZE (128)),
                    four-two-two-TypeI-MultiPanel-Restriction               BIT STRING (SIZE (64))
                },
                ri-Restriction                          BIT STRING (SIZE (4))
            }
        },
        codebookMode                                        INTEGER (1..2)

    },
    type2                                   SEQUENCE {
        subType                                 CHOICE {
            typeII                                  SEQUENCE {
                n1-n2-codebookSubsetRestriction         CHOICE {
                    two-one                                 BIT STRING (SIZE (16)),
                    two-two                                 BIT STRING (SIZE (43)),
                    four-one                                BIT STRING (SIZE (32)),
                    three-two                               BIT STRING (SIZE (59)),
                    six-one                                 BIT STRING (SIZE (48)),
                    four-two                                BIT STRING (SIZE (75)),
                    eight-one                               BIT STRING (SIZE (64)),
                    four-three                              BIT STRING (SIZE (107)),
                    six-two                                 BIT STRING (SIZE (107)),
                    twelve-one                              BIT STRING (SIZE (96)),
                    four-four                               BIT STRING (SIZE (139)),
                    eight-two                               BIT STRING (SIZE (139)),
                    sixteen-one                             BIT STRING (SIZE (128))
                },
                typeII-RI-Restriction                   BIT STRING (SIZE (2))
            },
            typeII-PortSelection                    SEQUENCE {
                portSelectionSamplingSize               ENUMERATED {n1, n2, n3, n4}                 OPTIONAL,       -- Need R
                typeII-PortSelectionRI-Restriction      BIT STRING (SIZE (2))
            }
        },
        phaseAlphabetSize                       ENUMERATED {n4, n8},
        subbandAmplitude                        BOOLEAN,
        numberOfBeams                           ENUMERATED {two, three, four}
    }
  }
}
```

```
CodebookConfig-r16  ::=               SEQUENCE  {
    codebookType                          CHOICE {
        type2                                 SEQUENCE {
            subType                               CHOICE {
                typeII-r16                                SEQUENCE  {
                    n1-n2-codebookSubsetRestriction-r16    CHOICE {
                        two-one                                BIT STRING (SIZE (16)),
                        two-two                                BIT STRING (SIZE (43)),
                        four-one                               BIT STRING (SIZE (32)),
                        three-two                              BIT STRING (SIZE (59)),
                        six-one                                BIT STRING (SIZE (48)),
                        four-two                               BIT STRING (SIZE (75)),
                        eight-one                              BIT STRING (SIZE (64)),
                        four-three                             BIT STRING (SIZE (107)),
                        six-two                                BIT STRING (SIZE (107)),
                        twelve-one                             BIT STRING (SIZE (96)),
                        four-four                              BIT STRING (SIZE (139)),
                        eight-two                              BIT STRING (SIZE (139)),
                        sixteen-one                            BIT STRING (SIZE (128))
                    },
                    typeII-RI-Restriction-r16              BIT STRING (SIZE(4))
                },
                typeII-PortSelection-r16  SEQUENCE {
                    portSelectionSamplingSize-r16          ENUMERATED {n1, n2, n3, n4},
                    typeII-PortSelectionRI-Restriction-r16 BIT STRING (SIZE (4))
                }
            },
        numberOfPMI-SubbandsPerCQI-Subband-r16 INTEGER (1..2),
        paramCombination-r16                   INTEGER (1..8)
        }
    }
}

CodebookConfig-r17  ::=              SEQUENCE  {
    codebookType                         CHOICE   {
        type1                                SEQUENCE  {
            typeI-SinglePanel-Group1-r17         SEQUENCE {
                nrOfAntennaPorts                     CHOICE {
                    two                                  SEQUENCE {
                        twoTX-CodebookSubsetRestriction1-r17  BIT STRING (SIZE (6))
                    },
                    moreThanTwo                          SEQUENCE {
                        n1-n2                                CHOICE {
                            two-one-TypeI-SinglePanel-Restriction1-r17       BIT STRING (SIZE (8)),
                            two-two-TypeI-SinglePanel-Restriction1-r17       BIT STRING (SIZE (64)),
                            four-one-TypeI-SinglePanel-Restriction1-r17      BIT STRING (SIZE (16)),
                            three-two-TypeI-SinglePanel-Restriction1-r17     BIT STRING (SIZE (96)),
                            six-one-TypeI-SinglePanel-Restriction1-r17       BIT STRING (SIZE (24)),
                            four-two-TypeI-SinglePanel-Restriction1-r17      BIT STRING (SIZE (128)),
                            eight-one-TypeI-SinglePanel-Restriction1-r17     BIT STRING (SIZE (32)),
                            four-three-TypeI-SinglePanel-Restriction1-r17    BIT STRING (SIZE (192)),
                            six-two-TypeI-SinglePanel-Restriction1-r17       BIT STRING (SIZE (192)),
                            twelve-one-TypeI-SinglePanel-Restriction1-r17    BIT STRING (SIZE (48)),
                            four-four-TypeI-SinglePanel-Restriction1-r17     BIT STRING (SIZE (256)),
```

```
                        eight-two-TypeI-SinglePanel-Restriction1-r17     BIT STRING (SIZE (256)),
                        sixteen-one-TypeI-SinglePanel-Restriction1-r17   BIT STRING (SIZE (64))
                    }
                }
            }
        }                                                                                   OPTIONAL,  -- Need R
        typeI-SinglePanel-Group2-r17          SEQUENCE {
            nrOfAntennaPorts                      CHOICE {
                two                                   SEQUENCE {
                    twoTX-CodebookSubsetRestriction2-r17   BIT STRING (SIZE (6))
                },
                moreThanTwo                           SEQUENCE {
                    n1-n2                                 CHOICE {
                        two-one-TypeI-SinglePanel-Restriction2-r17       BIT STRING (SIZE (8)),
                        two-two-TypeI-SinglePanel-Restriction2-r17       BIT STRING (SIZE (64)),
                        four-one-TypeI-SinglePanel-Restriction2-r17      BIT STRING (SIZE (16)),
                        three-two-TypeI-SinglePanel-Restriction2-r17     BIT STRING (SIZE (96)),
                        six-one-TypeI-SinglePanel-Restriction2-r17       BIT STRING (SIZE (24)),
                        four-two-TypeI-SinglePanel-Restriction2-r17      BIT STRING (SIZE (128)),
                        eight-one-TypeI-SinglePanel-Restriction2-r17     BIT STRING (SIZE (32)),
                        four-three-TypeI-SinglePanel-Restriction2-r17    BIT STRING (SIZE (192)),
                        six-two-TypeI-SinglePanel-Restriction2-r17       BIT STRING (SIZE (192)),
                        twelve-one-TypeI-SinglePanel-Restriction2-r17    BIT STRING (SIZE (48)),
                        four-four-TypeI-SinglePanel-Restriction2-r17     BIT STRING (SIZE (256)),
                        eight-two-TypeI-SinglePanel-Restriction2-r17     BIT STRING (SIZE (256)),
                        sixteen-one-TypeI-SinglePanel-Restriction2-r17   BIT STRING (SIZE (64))
                    }
                }
            }
        }                                                                                   OPTIONAL,  -- Need R
        typeI-SinglePanel-ri-RestrictionSTRP-r17                  BIT STRING (SIZE (8))     OPTIONAL,  -- Need R
        typeI-SinglePanel-ri-RestrictionSDM-r17                   BIT STRING (SIZE (4))     OPTIONAL   -- Need R
    },
    type2                                 SEQUENCE {
        typeII-PortSelection-r17              SEQUENCE {
            paramCombination-r17                  INTEGER (1..8),
            valueOfN-r17                          ENUMERATED {n2, n4}                       OPTIONAL,  -- Need R
            numberOfPMI-SubbandsPerCQI-Subband-r17 INTEGER(1..2)                            OPTIONAL,  -- Need R
            typeII-PortSelectionRI-Restriction-r17 BIT STRING (SIZE (4))
        }
    }
  }
}

CodebookConfig-v1730  ::=             SEQUENCE  {
    codebookType                          CHOICE   {
        type1                                 SEQUENCE  {
            codebookMode                          INTEGER (1..2)                            OPTIONAL   -- Need R
        }
    }
}

-- TAG-CODEBOOKCONFIG-STOP
-- ASN1STOP
```

***CodebookConfig* field descriptions**
codebookMode CodebookMode as specified in TS 38.214 [19], clause 5.2.2.2.2.
codebookType CodebookType including possibly sub-types and the corresponding parameters for each (see TS 38.214 [19], clause 5.2.2.2).
n1-n2-codebookSubsetRestriction Number of antenna ports in first (*n1*) and second (*n2*) dimension and codebook subset restriction (see TS 38.214 [19] clause 5.2.2.2.3). Number of bits for codebook subset restriction is CEIL(log2(nchoosek(O1*O2,4)))+8*n1*n2 where nchoosek(a,b) = a!/(b!(a-b)!).
n1-n2 Number of antenna ports in first (n1) and second (n2) dimension and codebook subset restriction (see TS 38.214 [19] clause 5.2.2.2.1).
ng-n1-n2 Codebook subset restriction for Type I Multi-panel codebook (see TS 38.214 [19], clause 5.2.2.2.2).
numberOfBeams Number of beams, L, used for linear combination.
numberOfPMI-SubbandsPerCQI-Subband Field indicates how PMI subbands are defined per CQI subband according to TS 38.214 [19], clause 5.2.2.2.5, and 5.2.2.2.7.
paramCombination Field describes supported parameter combination (*M, α, β*) as specified in TS 38.214 [19].
phaseAlphabetSize The size of the PSK alphabet, QPSK or 8-PSK.
portSelectionSamplingSize The size of the port selection codebook (parameter d), see TS 38.214 [19] clause 5.2.2.2.6.
ri-Restriction Restriction for RI for *TypeI-MultiPanel-RI-Restriction* (see TS 38.214 [19], clause 5.2.2.2.2).
subbandAmplitude If subband amplitude reporting is activated (*true*).
twoTX-CodebookSubsetRestriction Codebook subset restriction for 2TX codebook (see TS 38.214 [19] clause 5.2.2.2.1).
typeI-SinglePanel-codebookSubsetRestriction-i2 i2 codebook subset restriction for Type I Single-panel codebook used when *reportQuantity* is CRI/Ri/i1/CQI (see TS 38.214 [19] clause 5.2.2.2.1).
typeI-SinglePanel-ri-Restriction Restriction for RI for *TypeI-SinglePanel-RI-Restriction* (see TS 38.214 [19], clause 5.2.2.2.1).
typeI-SinglePanel-Group1, typeI-SinglePanel-Group2 Configures codebooks for CSI calculation when UE is configured with two CMR Groups with *CMRGroupingAndPairing* in the *NZP-CSI-RS-ResourceSet* associated with the *CSI-ReportConfig*. Network configures the same number of ports for both codebooks.
typeI-SinglePanel-ri-RestrictionSDM, typeI-SinglePanel-ri-RestrictionSTRP Restriction for RI for *N* Resource Pairs when two CMR Groups are configured with *CMRGroupingAndPairing* in the *NZP-CSI-RS-ResourceSet* associated with the *CSI-ReportConfig* (see TS 38.214 [19], clause 5.2.1.4.2).
typeII-PortSelectionRI-Restriction Restriction for RI for *TypeII-PortSelection-RI-Restriction* (see TS 38.214 [19], clauses 5.2.2.2.4 and 5.2.2.2.6).
typeII-RI-Restriction Restriction for RI for *TypeII-RI-Restriction* (see TS 38.214 [19], clauses 5.2.2.2.3 and 5.2.2.2.5).
valueOfN Field provides the value of parameter N as specified in TS 38.214 [19], clause 5.2.2.2.7. The field is present only when M=2 set by *paramCombination*, see TS 38.214 [19].

– *CommonLocationInfo*

The IE *CommonLocationInfo* is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

CommonLocationInfo information element

```
-- ASN1START
-- TAG-COMMONLOCATIONINFO-START

CommonLocationInfo-r16 ::= SEQUENCE {
    gnss-TOD-msec-r16          OCTET STRING     OPTIONAL,
    locationTimestamp-r16      OCTET STRING     OPTIONAL,
    locationCoordinate-r16     OCTET STRING     OPTIONAL,
    locationError-r16          OCTET STRING     OPTIONAL,
    locationSource-r16         OCTET STRING     OPTIONAL,
    velocityEstimate-r16       OCTET STRING     OPTIONAL
}

-- TAG-COMMONLOCATIONINFO-STOP
-- ASN1STOP
```

***CommonLocationInfo* field descriptions**
gnss-TOD-msec Parameter type *gnss-TOD-msec* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
locationTimeStamp Parameter type *DisplacementTimeStamp* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
locationCoordinate Parameter type *LocationCoordinates* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
locationError Parameter *LocationError* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
locationSource Parameter *LocationSource* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
velocityEstimate Parameter type *Velocity* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

– *CondReconfigId*

The IE *CondReconfigId* is used to identify a CHO, CPA or CPC configuration.

CondReconfigId information element

```
-- ASN1START
-- TAG-CONDRECONFIGID-START

CondReconfigId-r16 ::=                  INTEGER (1.. maxNrofCondCells-r16)
```

```
-- TAG-CONDRECONFIGID-STOP
-- ASN1STOP
```

– *CondReconfigToAddModList*

The IE *CondReconfigToAddModList* concerns a list of conditional reconfigurations to add or modify, with for each entry the *condReconfigId* and the associated *condExecutionCond/condExecutionCondSCG* and *condRRCReconfig*.

CondReconfigToAddModList information element

```
-- ASN1START
-- TAG-CONDRECONFIGTOADDMODLIST-START

CondReconfigToAddModList-r16 ::= SEQUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondReconfigToAddMod-r16

CondReconfigToAddMod-r16 ::=     SEQUENCE {
    condReconfigId-r16              CondReconfigId-r16,
    condExecutionCond-r16           SEQUENCE (SIZE (1..2)) OF MeasId                    OPTIONAL,    -- Need M
    condRRCReconfig-r16             OCTET STRING (CONTAINING RRCReconfiguration)        OPTIONAL,    -- Cond condReconfigAdd
    ...,
    [[
    condExecutionCondSCG-r17        OCTET STRING (CONTAINING CondReconfigExecCondSCG-r17) OPTIONAL     -- Need M
    ]]
}

CondReconfigExecCondSCG-r17 ::=  SEQUENCE (SIZE (1..2)) OF MeasId

-- TAG-CONDRECONFIGTOADDMODLIST-STOP
-- ASN1STOP
```

***CondReconfigToAddMod* field descriptions**
condExecutionCond
The execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for CHO, CPA, intra-SN CPC without MN involvement or MN initiated inter-SN CPC. When configuring 2 triggering events (Meas Ids) for a candidate cell, the network ensures that both refer to the same *measObject.* For CHO, if the network configures *condEventD1* or *condEventT1* for a candidate cell, the network configures a second triggering event *condEventA3, condEventA4* or *condEventA5* for the same candidate cell. The network does not configure both *condEventD1* and *condEventT1* for the same candidate cell. For CHO in terrestrial networks, the network does not indicate a *MeasId* associated with *condEventA4*. For CPA and for MN-initiated inter-SN CPC, the network only indicates *MeasId*(s) associated with *condEventA4*. For intra-SN CPC, the network only indicates *MeasId*(s) associated with *condEventA3* or *condEventA5*.
condExecutionCondSCG
Contains execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for SN initiated inter-SN CPC. The Meas Ids refer to the *measConfig* associated with the SCG. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same *measObject*. For each *condReconfigId*, the network always configures either *condExecutionCond* or *condExecutionCondSCG* (not both). The network only indicates *MeasId*(s) associated with *condEventA3* or *condEventA5*.
condRRCReconfig
The *RRCReconfiguration* message to be applied when the condition(s) are fulfilled. The *RRCReconfiguration* message contained in *condRRCReconfig* cannot contain the field *conditionalReconfiguration* or the field *daps-Config*.

Conditional Presence	Explanation
condReconfigAdd	The field is mandatory present when a *condReconfigId* is being added. Otherwise the field is optional, need M.

– *ConditionalReconfiguration*

The IE *ConditionalReconfiguration* is used to add, modify and release the configuration of conditional reconfiguration.

ConditionalReconfiguration information element

```
-- ASN1START
-- TAG-CONDITIONALRECONFIGURATION-START

ConditionalReconfiguration-r16 ::=   SEQUENCE {
    attemptCondReconfig-r16              ENUMERATED {true}              OPTIONAL,   -- Cond CHO
    condReconfigToRemoveList-r16         CondReconfigToRemoveList-r16   OPTIONAL,   -- Need N
    condReconfigToAddModList-r16         CondReconfigToAddModList-r16   OPTIONAL,   -- Need N
    ...
}

CondReconfigToRemoveList-r16 ::=     SEQUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondReconfigId-r16

-- TAG-CONDITIONALRECONFIGURATION-STOP
-- ASN1STOP
```

***ConditionalReconfiguration* field descriptions**
attemptCondReconfig If present, the UE shall perform conditional reconfiguration if selected cell is a target candidate cell and it is the first cell selection after failure as described in clause 5.3.7.3.
condReconfigToAddModList List of the configuration of candidate SpCells to be added or modified for CHO, CPA or CPC.
condReconfigToRemoveList List of the configuration of candidate SpCells to be removed.

Conditional Presence	Explanation
CHO	The field is optional present, Need R, if the UE is configured with at least a candidate SpCell for CHO. Otherwise the field is not present.

– *ConfiguredGrantConfig*

The IE *ConfiguredGrantConfig* is used to configure uplink transmission without dynamic grant according to two possible schemes. The actual uplink grant may either be configured via RRC (*type1*) or provided via the PDCCH (addressed to CS-RNTI) (*type2*). Multiple Configured Grant configurations may be configured in one BWP of a serving cell.

ConfiguredGrantConfig information element

```
-- ASN1START
-- TAG-CONFIGUREDGRANTCONFIG-START

ConfiguredGrantConfig ::=           SEQUENCE {
    frequencyHopping                    ENUMERATED {intraSlot, interSlot}                                       OPTIONAL,   -- Need S
    cg-DMRS-Configuration               DMRS-UplinkConfig,
    mcs-Table                           ENUMERATED {qam256, qam64LowSE}                                         OPTIONAL,   -- Need S
    mcs-TableTransformPrecoder          ENUMERATED {qam256, qam64LowSE}                                         OPTIONAL,   -- Need S
    uci-OnPUSCH                         SetupRelease { CG-UCI-OnPUSCH }                                         OPTIONAL,   -- Need M
    resourceAllocation                  ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch },
    rbg-Size                            ENUMERATED {config2}                                                    OPTIONAL,   -- Need S
    powerControlLoopToUse               ENUMERATED {n0, n1},
    p0-PUSCH-Alpha                      P0-PUSCH-AlphaSetId,
    transformPrecoder                   ENUMERATED {enabled, disabled}                                          OPTIONAL,   -- Need S
    nrofHARQ-Processes                  INTEGER(1..16),
    repK                                ENUMERATED {n1, n2, n4, n8},
    repK-RV                             ENUMERATED {s1-0231, s2-0303, s3-0000}                                  OPTIONAL,   -- Need R
    periodicity                         ENUMERATED {
                                            sym2, sym7, sym1x14, sym2x14, sym4x14, sym5x14, sym8x14, sym10x14, sym16x14, sym20x14,
                                            sym32x14, sym40x14, sym64x14, sym80x14, sym128x14, sym160x14, sym256x14, sym320x14, sym512x14,
                                            sym640x14, sym1024x14, sym1280x14, sym2560x14, sym5120x14,
                                            sym6, sym1x12, sym2x12, sym4x12, sym5x12, sym8x12, sym10x12, sym16x12, sym20x12, sym32x12,
                                            sym40x12, sym64x12, sym80x12, sym128x12, sym160x12, sym256x12, sym320x12, sym512x12, sym640x12,
                                            sym1280x12, sym2560x12
    },
    configuredGrantTimer                INTEGER (1..64)                                                         OPTIONAL,   -- Need R
    rrc-ConfiguredUplinkGrant           SEQUENCE {
        timeDomainOffset                    INTEGER (0..5119),
        timeDomainAllocation                INTEGER (0..15),
        frequencyDomainAllocation           BIT STRING (SIZE(18)),
        antennaPort                         INTEGER (0..31),
        dmrs-SeqInitialization              INTEGER (0..1)                                                          OPTIONAL,   -- Need R
        precodingAndNumberOfLayers          INTEGER (0..63),
        srs-ResourceIndicator               INTEGER (0..15)                                                         OPTIONAL,   -- Need R
        mcsAndTBS                           INTEGER (0..31),
        frequencyHoppingOffset              INTEGER (1.. maxNrofPhysicalResourceBlocks-1)                           OPTIONAL,   -- Need R
        pathlossReferenceIndex              INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1),
        ...,
        [[
        pusch-RepTypeIndicator-r16          ENUMERATED {pusch-RepTypeA,pusch-RepTypeB}                          OPTIONAL,   -- Need M
        frequencyHoppingPUSCH-RepTypeB-r16  ENUMERATED {interRepetition, interSlot}                             OPTIONAL,   -- Cond RepTypeB
        timeReferenceSFN-r16                ENUMERATED {sfn512}                                                 OPTIONAL    -- Need S
        ]],
        [[
        pathlossReferenceIndex2-r17         INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1)                    OPTIONAL,   -- Need R
        srs-ResourceIndicator2-r17          INTEGER (0..15)                                                     OPTIONAL,   -- Need R
        precodingAndNumberOfLayers2-r17     INTEGER (0..63)                                                     OPTIONAL,   -- Need R
        timeDomainAllocation-v1710          INTEGER (16..63)                                                    OPTIONAL,    -- Need M
        timeDomainOffset-r17                INTEGER (0..40959)                                                  OPTIONAL,   -- Need R
        cg-SDT-Configuration-r17            CG-SDT-Configuration-r17                                            OPTIONAL    -- Need M
        ]]
    }                                                                                                           OPTIONAL,   -- Need R
```

```
    ...,
    [[
    cg-RetransmissionTimer-r16              INTEGER (1..64)                                                 OPTIONAL,   -- Need R
    cg-minDFI-Delay-r16                     ENUMERATED
                                                {sym7, sym1x14, sym2x14, sym3x14, sym4x14, sym5x14, sym6x14, sym7x14, sym8x14,
                                                 sym9x14, sym10x14, sym11x14, sym12x14, sym13x14, sym14x14,sym15x14, sym16x14
                                                }                                                           OPTIONAL,   -- Need R
    cg-nrofPUSCH-InSlot-r16                 INTEGER (1..7)                                                  OPTIONAL,   -- Need R
    cg-nrofSlots-r16                        INTEGER (1..40)                                                 OPTIONAL,   -- Need R
    cg-StartingOffsets-r16                  CG-StartingOffsets-r16                                          OPTIONAL,   -- Need R
    cg-UCI-Multiplexing-r16                 ENUMERATED {enabled}                                            OPTIONAL,   -- Need R
    cg-COT-SharingOffset-r16                INTEGER (1..39)                                                 OPTIONAL,   -- Need R
    betaOffsetCG-UCI-r16                    INTEGER (0..31)                                                 OPTIONAL,   -- Need R
    cg-COT-SharingList-r16                  SEQUENCE (SIZE (1..1709)) OF CG-COT-Sharing-r16                 OPTIONAL,   -- Need R
    harq-ProcID-Offset-r16                  INTEGER (0..15)                                                 OPTIONAL,   -- Need M
    harq-ProcID-Offset2-r16                 INTEGER (0..15)                                                 OPTIONAL,   -- Need M
    configuredGrantConfigIndex-r16          ConfiguredGrantConfigIndex-r16                                  OPTIONAL,   -- Cond CG-List
    configuredGrantConfigIndexMAC-r16       ConfiguredGrantConfigIndexMAC-r16                               OPTIONAL,   -- Cond CG-IndexMAC
    periodicityExt-r16                      INTEGER (1..5120)                                               OPTIONAL,   -- Need R
    startingFromRV0-r16                     ENUMERATED {on, off}                                            OPTIONAL,   -- Need R
    phy-PriorityIndex-r16                   ENUMERATED {p0, p1}                                             OPTIONAL,   -- Need R
    autonomousTx-r16                        ENUMERATED {enabled}                                            OPTIONAL    -- Cond LCH-BasedPrioritization
    ]],
    [[
    cg-betaOffsetsCrossPri0-r17             SetupRelease { BetaOffsetsCrossPriSelCG-r17 }                   OPTIONAL,   -- Need M
    cg-betaOffsetsCrossPri1-r17             SetupRelease { BetaOffsetsCrossPriSelCG-r17 }                   OPTIONAL,   -- Need M
    mappingPattern-r17                      ENUMERATED {cyclicMapping, sequentialMapping}                   OPTIONAL,   -- Cond SRSsets
    sequenceOffsetForRV-r17                 INTEGER (0..3)                                                  OPTIONAL,   -- Need R
    p0-PUSCH-Alpha2-r17                     P0-PUSCH-AlphaSetId                                             OPTIONAL,   -- Need R
    powerControlLoopToUse2-r17              ENUMERATED {n0, n1}                                             OPTIONAL,   -- Need R
    cg-COT-SharingList-r17                  SEQUENCE (SIZE (1..50722)) OF CG-COT-Sharing-r17                 OPTIONAL,   -- Need R
    periodicityExt-r17                      INTEGER (1..40960)                                              OPTIONAL,   -- Need R
    repK-v1710                              ENUMERATED {n12, n16, n24, n32}                                 OPTIONAL,   -- Need R
    nrofHARQ-Processes-v1700                INTEGER(17..32)                                                 OPTIONAL,   -- Need M
    harq-ProcID-Offset2-v1700               INTEGER (16..31)                                                OPTIONAL,   -- Need R
    configuredGrantTimer-v1700              INTEGER(33..288)                                                OPTIONAL,   -- Need R
    cg-minDFI-Delay-v1710                   INTEGER (238..3584)                                             OPTIONAL    -- Need R
    ]],
    [[
    harq-ProcID-Offset-v1730                INTEGER (16..31)                                                OPTIONAL,   -- Need R
    cg-nrofSlots-r17                        INTEGER (1..320)                                                OPTIONAL    -- Need R
    ]]
}

CG-UCI-OnPUSCH ::= CHOICE {
    dynamic                                 SEQUENCE (SIZE (1..4)) OF BetaOffsets,
    semiStatic                              BetaOffsets
}

CG-COT-Sharing-r16 ::= CHOICE {
    noCOT-Sharing-r16                   NULL,
    cot-Sharing-r16                     SEQUENCE {
         duration-r16                       INTEGER (1..39),
         offset-r16                         INTEGER (1..39),
```

```
        channelAccessPriority-r16          INTEGER (1..4)
    }
}

CG-COT-Sharing-r17 ::=  CHOICE {
    noCOT-Sharing-r17                   NULL,
    cot-Sharing-r17                     SEQUENCE {
        duration-r17                        INTEGER (1..319),
        offset-r17                          INTEGER (1..319)
    }
}

CG-StartingOffsets-r16 ::= SEQUENCE {
    cg-StartingFullBW-InsideCOT-r16         SEQUENCE (SIZE (1..7)) OF INTEGER (0..6)            OPTIONAL,   -- Need R
    cg-StartingFullBW-OutsideCOT-r16        SEQUENCE (SIZE (1..7)) OF INTEGER (0..6)            OPTIONAL,   -- Need R
    cg-StartingPartialBW-InsideCOT-r16      INTEGER (0..6)                                      OPTIONAL,   -- Need R
    cg-StartingPartialBW-OutsideCOT-r16     INTEGER (0..6)                                      OPTIONAL    -- Need R
}

BetaOffsetsCrossPriSelCG-r17 ::= CHOICE {
    dynamic-r17         SEQUENCE (SIZE (1..4)) OF BetaOffsetsCrossPri-r17,
    semiStatic-r17      BetaOffsetsCrossPri-r17
}

CG-SDT-Configuration-r17 ::= SEQUENCE {
    cg-SDT-RetransmissionTimer   INTEGER (1..64)                                                OPTIONAL,   -- Need R
    sdt-SSB-Subset-r17       CHOICE {
        shortBitmap-r17          BIT STRING (SIZE (4)),
        mediumBitmap-r17         BIT STRING (SIZE (8)),
        longBitmap-r17           BIT STRING (SIZE (64))
    }                                                                                           OPTIONAL,   -- Need S
    sdt-SSB-PerCG-PUSCH-r17   ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen}  OPTIONAL,   -- Need M
    sdt-P0-PUSCH-r17         INTEGER (-16..15)                                                  OPTIONAL, -- Need M
    sdt-Alpha-r17            ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M
    sdt-DMRS-Ports-r17       CHOICE {
        dmrsType1-r17            BIT STRING (SIZE (8)),
        dmrsType2-r17            BIT STRING (SIZE (12))
    }                                                                                           OPTIONAL,   -- Need M
    sdt-NrofDMRS-Sequences-r17  INTEGER (1..2)                                                  OPTIONAL    -- Need M
}

-- TAG-CONFIGUREDGRANTCONFIG-STOP
-- ASN1STOP
```

***ConfiguredGrantConfig* field descriptions**
antennaPort Indicates the antenna port(s) to be used for this configuration, and the maximum bitwidth is 5. See TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1. The UE ignores this field in case of CG-SDT.
autonomousTx If this field is present, the Configured Grant configuration is configured with autonomous transmission, see TS 38.321 [3].
betaOffsetCG-UCI Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3
cg-betaOffsetsCrossPri0, cg-betaOffsetsCrossPri1 Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK in CG-PUSCH with different priorities. The field *cg-betaOffsetsCrossPri0* indicates multiplexing LP HARQ-ACK in HP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p1*. The field *cg-betaOffsetsCrossPri1* indicates multiplexing HP HARQ-ACK in LP CG-PUSCH. This field is configured only if *phy-PriorityIndex-r16* is configured with value *p0*.
cg-COT-SharingList Indicates a table for COT sharing combinations (see 37.213 [48], clause 4.1.3). One row of the table can be set to noCOT-Sharing to indicate that there is no channel occupancy sharing. If the *cg-RetransmissionTimer-r16* is configured and the UE operates as an initiating device in semi-static channel access mode (see TS 37.213 [48], clause 4.3), then c*g-COT-SharingList-r16* is configured.
cg-COT-SharingOffset Indicates the offset from the end of the slot where the COT sharing indication in UCI is enabled where the offset in symbols is equal to 14*n, where n is the signaled value for *cg-COT-SharingOffset*. Applicable when *ul-toDL-COT-SharingED-Threshold-r16* is not configured (see 37.213 [48], clause 4.1.3).
cg-DMRS-Configuration DMRS configuration (see TS 38.214 [19], clause 6.1.2.3).
cg-minDFI-Delay Indicates the minimum duration (in unit of symbols) from the ending symbol of the PUSCH to the starting symbol of the PDCCH containing the downlink feedback indication (DFI) carrying HARQ-ACK for this PUSCH. The HARQ-ACK received before this minimum duration is not considered as valid for this PUSCH (see TS 38.213 [13], clause 10.5). The following minimum duration values are supported, depending on the configured subcarrier spacing [symbols]: 15 kHz: 7, m*14, where m = {1, 2, 3, 4} 30 kHz: 7, m*14, where m = {1, 2, 3, 4, 5, 6, 7, 8} 60 kHz: 7, m*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16} 120 kHz: 7, m*14, where m = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32} 480 kHz: m*14, where m = {2, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120, 124, 128} 960 kHz: m*14, where m = {4, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200, 208, 216, 224, 232, 240, 248, 256}
cg-nrofPUSCH-InSlot Indicates the number of consecutive PUSCH configured to CG within a slot where the SLIV indicating the first PUSCH and additional PUSCH appended with the same length (see TS 38.214 [19], clause 6.1.2.3). The network can only configure this field if *cg-RetransmissionTimer* is configured.
cg-nrofSlots Indicates the number of allocated slots in a configured grant periodicity following the time instance of configured grant offset (see TS 38.214 [19], clause 6.1.2.3). *cg-nrofSlots-r17* is only applicable for operation with shared spectrum channel access in FR2-2. When *cg-nrofSlots-r17* is configured, the UE shall ignore *cg-nrofSlots-r16*. The network can only configure this field if *cg-RetransmissionTimer* is configured.
cg-RetransmissionTimer Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of *periodicity*. The value of *cg-RetransmissionTimer* is always less than or equal to the value of *configuredGrantTimer.* This field is always configured together with *harq-ProcID-Offset*. This field is not configured for operation in licensed spectrum or simultaneously with *harq-ProcID-Offset2.* The network does not configure this field for CG-SDT.
cg-StartingOffsets This field is not applicable for a UE which is allowed to operate as an initiating device in semi-static channel access mode, i.e., not applicable for a UE configured with UE FFP parameters (e.g. period, offset) regardless whether the UE would initiate its own COT or would share gNB's COT.

cg-UCI-Multiplexing If present, this field indicates that in the case of PUCCH overlapping with CG-PUSCH(s) within a PUCCH group, the CG-UCI and HARQ-ACK are jointly encoded (see TS 38.213 [13], clause 9).
configuredGrantConfigIndex Indicates the index of the Configured Grant configurations within the BWP.
configuredGrantConfigIndexMAC Indicates the index of the Configured Grant configurations within the MAC entity.
configuredGrantTimer Indicates the initial value of the configured grant timer (see TS 38.321 [3]) in multiples of periodicity. When *cg-RetransmissonTimer* is configured, if HARQ processes are shared among different configured grants on the same BWP, *configuredGrantTimer * periodicity* is set to the same value for the configurations that share HARQ processes on this BWP. The value of the extension *configuredGrantTimer* is 2 times the configured value.
dmrs-SeqInitialization The network configures this field if *transformPrecoder* is disabled or when the value of *sdt-NrofDMRS-Sequences* is set to 1. Otherwise, the field is absent.
frequencyDomainAllocation Indicates the frequency domain resource allocation, see TS 38.214 [19], clause 6.1.2, and TS 38.212 [17], clause 7.3.1).
frequencyHopping The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured. The field *frequencyHopping* applies to configured grant for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3.1).
frequencyHoppingOffset Frequency hopping offset used when frequency hopping is enabled (see TS 38.214 [19], clause 6.1.2 and clause 6.3).
frequencyHoppingPUSCH-RepTypeB Indicates the frequency hopping scheme for Type 1 CG when *pusch-RepTypeIndicator* is set to 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, the frequency hopping is not enabled for Type 1 CG.
harq-ProcID-Offset For operation with shared spectrum channel access configured with *cg-RetransmissionTimer-r16*, this configures the range of HARQ process IDs which can be used for this configured grant where the UE can select a HARQ process ID within [*harq-procID-offset, ..,* (*harq-procID-offset* + *nrofHARQ-Processes* – 1)]. *harq-ProcID-Offset-v1730* is only applicable for operation with shared spectrum channel access in FR2-2*.* If the field *harq-ProcID-Offset-v1730* is present, the UE shall ignore the *harq-ProcID-Offset-r16*. The network does not configure this field for CG-SDT.
harq-ProcID-Offset2 Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.4.1. This field is not configured together with *cg-RetransmissionTimer-r16*. If the field *harq-ProcID-Offset2-v1700* is present, the UE shall ignore the *harq-ProcID-Offset2-r16*.
mappingPattern Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' for PUSCH transmission with a Type 1 configured grant and/or a Type 2 configured grant as described in clause 6.1.2.3 of TS 38.214 [19]
mcs-Table Indicates the MCS table the UE shall use for PUSCH without transform precoding. If the field is absent the UE applies the value *qam64*.
mcs-TableTransformPrecoder Indicates the MCS table the UE shall use for PUSCH with transform precoding. If the field is absent the UE applies the value *qam64*.
mcsAndTBS The modulation order, target code rate and TB size (see TS 38.214 [19], clause 6.1.2). The NW does not configure the values 28~31 in this version of the specification.
nrofHARQ-Processes The number of HARQ processes configured. It applies for both Type 1 and Type 2. See TS 38.321 [3], clause 5.4.1. If the UE is configured with *nrofHARQ-Processes-v1700, the* UE shall ignore *nrofHARQ-Processes (without suffix)*.
pathlossReferenceIndex Indicates the reference signal index used as PUSCH pathloss reference (see TS 38.213 [13], clause 7.1.1). In case of CG-SDT, the UE does not use this field.

pathlossReferenceIndex2
Indicates the reference signal used as PUSCH pathloss reference for the second SRS resource set. When this field is present, pathlossReferenceIndex indicates the reference signal used as PUSCH pathloss reference for the first SRS resource set

p0-PUSCH-Alpha
Index of the *P0-PUSCH-AlphaSet* to be used for this configuration.

p0-PUSCH-Alpha2
Index of the *P0-PUSCH-AlphaSet* to be used for second SRS resource set. If this field is present, the *p0-PUSCH-Alpha* provides index for the P0-PUSCH-AlphaSet to be used for first SRS resource set.

periodicity
Periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2).
The following periodicities are supported depending on the configured subcarrier spacing [symbols]:

15 kHz:	2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 320, 640}
30 kHz:	2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 640, 1280}
60 kHz with normal CP	2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}
60 kHz with ECP:	2, 6, n*12, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1280, 2560}
120 kHz:	2, 7, n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}
480 and 960 kHz:	n*14, where n={1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 256, 320, 512, 640, 1024, 1280, 2560, 5120}

In case of SDT, the network does not configure periodicity values less than 5ms.

periodicityExt
This field is used to calculate the periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5.8.2). If this field is present, the UE shall ignore field *periodicity* (without suffix). Network does not configure *periodicityExt-r17* together with *periodicityExt-r16*.
The following periodicites are supported depending on the configured subcarrier spacing [symbols]:

15 kHz:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 640.
30 kHz:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 1280.
60 kHz with normal CP:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 2560.
60 kHz with ECP:	*periodicityExt**12, where *periodicityExt* has a value between 1 and 2560.
120 kHz:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 5120.
480 kHz:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 20480.
960 kHz:	*periodicityExt**14, where *periodicityExt* has a value between 1 and 40960.

In case of SDT, the network does not configure periodicity values less than 5ms.

phy-PriorityIndex
Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value *p0* indicates low priority and value *p1* indicates high priority. The network does not configure this for CG-SDT.

powerControlLoopToUse
Closed control loop to apply (see TS 38.213 [13], clause 7.1.1).

powerControlLoopToUse2
Closed control loop to apply to second SRS resource set (see TS 38.213 [13], clause 7.1.1). If this field is present, the *powerControlLoopToUse* applies to the first SRS resource set.

precodingAndNumberOfLayers
Indicates the precoding and number of layers (see TS 38.212 [17], clause 7.3.1.1.2, and TS 38.214 [19], clause 6.1.2.3). In case of CG-SDT, network sets this field to 1.

precodingAndNumberOfLayers2
Indicates the precoding and number of layers for the second SRS resource set. When this field is present, *precodingAndNumberOfLayers* indicated the precoding and number of layers for the first SRS resource set.

pusch-RepTypeIndicator Indicates whether UE follows the behavior for PUSCH repetition type A or the behavior for PUSCH repetition type B for each Type 1 configured grant configuration. The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B' (see TS 38.214 [19], clause 6.1.2.3). The value *pusch-RepTypeB* is not configured simultaneously with *cg-nrofPUSCH-InSlot-r16* and *cg-nrofSlots-r16*. The network does not configure this field if *cg-RetransmissionTimer-r16* is configured for CG operation with shared spectrum channel access.
rbg-Size Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent. Note: *rbg-Size* is used when the *transformPrecoder* parameter is disabled.
repK-RV The redundancy version (RV) sequence to use. See TS 38.214 [19], clause 6.1.2. The network configures this field if repetitions are used, i.e., if *repK* is set to *n2*, *n4* or *n8*. This field is not configured when *cg-RetransmissionTimer* is configured. Otherwise, the field is absent.
repK Number of repetitions K, see TS 38.214 [19]. If the field *repK-v1710* is present, the UE shall ignore the *repK* (without suffix).
resourceAllocation Configuration of resource allocation type 0 and resource allocation type 1. For Type 1 UL data transmission without grant, *resourceAllocation* should be *resourceAllocationType0* or *resourceAllocationType1*.
rrc-ConfiguredUplinkGrant Configuration for "configured grant" transmission with fully RRC-configured UL grant (Type1). If this field is absent the UE uses UL grant configured by DCI addressed to CS-RNTI (Type2).
sequenceOffsetForRV Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'.
srs-ResourceIndicator Indicates the SRS resource to be used. The network does not configure this for CG-SDT.
srs-ResourceIndicator2 Indicates the SRS resource to be used for the second SRS resource set. When this field is present, the srs-ResourceIndicator is used for the first SRS resource set.
startingFromRV0 This field is used to determine the initial transmission occasion of a transport block for a given RV sequence, see TS 38.214 [19], clause 6.1.2.3.1. The network does not configure this field if *cg-RetransmissionTimer-r16* is configured for CG operation.
timeDomainAllocation, timeDomainAllocation-v1710 Indicates a combination of start symbol and length and PUSCH mapping type, see TS 38.214 [19], clause 6.1.2 and TS 38.212 [17], clause 7.3.1. If the field *timeDomainAllocation-v1710* is present, the UE shall ignore *timeDomainAllocation* field (without suffix).
timeDomainOffset Offset related to the reference SFN indicated by *timeReferenceSFN*, see TS 38.321 [3], clause 5.8.2. *timeDomainOffset-r17* is only applicable to 480 kHz and 960 kHz. If *timeDomainOffset-r17* is present, the UE shall ignore *timeDomainOffset* (without suffix).
timeReferenceSFN Indicates SFN used for determination of the offset of a resource in time domain. The UE uses the closest SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2. If the field *timeReferenceSFN* is not present, the reference SFN is 0.
transformPrecoder Enables or disables transform precoding for *type1* and *type2*. If the field is absent, the UE enables or disables transform precoding in accordance with the field *msg3-transformPrecoder* in *RACH-ConfigCommon* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*), see TS 38.214 [19], clause 6.1.3.
uci-OnPUSCH Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, *uci-OnPUSCH* should be set to *semiStatic.* The network does not configure this for CG-SDT.

***CG-COT-Sharing* field descriptions**
channelAccessPriority Indicates the Channel Access Priority Class that the gNB can assume when sharing the UE initiated COT (see 37.213 [48], clause 4.1.3).
duration Indicates the number of DL transmission slots within UE initiated COT (see 37.213 [48], clause 4.1.3).
offset Indicates the number of DL transmission slots from the end of the slot where CG-UCI is detected after which COT sharing can be used (see 37.213 [48], clause 4.1.3).

***CG-StartingOffsets* field descriptions**
cg-StartingFullBW-InsideCOT A set of configured grant PUSCH transmission starting offsets (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3).
cg-StartingFullBW-OutsideCOT A set of configured grant PUSCH transmission starting offset indices (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation includes all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3).
cg-StartingPartialBW-InsideCOT A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is inside gNB COT (see TS 38.214 [19], clause 6.1.2.3).
cg-StartingPartialBW-OutsideCOT A set of configured grant PUSCH transmission starting offset index (see TS 38.211[16], Table 5.3.1-2) which indicates the length of a CP extension of the first symbol that is located before the configured resource when frequency domain resource allocation does not include all interlaces in the allocated RB set(s) and the CG PUSCH resource is outside gNB COT (see TS 38.214 [19], clause 6.1.2.3).

***CG-SDT-Configuration* field descriptions**
cg-SDT-RetransmissionTimer Indicates the initial value of the configured grant retransmission timer used for the initial transmission of CG-SDT with CCCH message (see TS 38.321 [3]) in multiples of *periodicity*.
sdt-DMRS-Ports Indicates the set of DMRS ports for SSB to PUSCH mapping (see TS 38.213 [13]). The first (left-most / most significant) bit corresponds to DMRS port 0, the second most significant bit corresponds to DMRS port 1, and so on. A bit set to 1 indicates that this DMRS port is used for mapping. In case of a RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB.
sdt-NrofDMRS-Sequences Indicates the number of DMRS sequences for SSB to PUSCH mapping (see TS 38.213 [13]). In case of a RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB.
sdt-SSB-Subset Indicates SSB subset for SSB to CG PUSCH mapping within one CG configuration. 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 included in the SSB subset for SSB to CG PUSCH mapping while value 1 indicates that the corresponding SS/PBCH block is included in SSB subset for SSB to CG PUSCH mapping. If this field is absent, UE assumes the SSB set includes all actually transmitted SSBs. In case of a RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB.
sdt-SSB-PerCG-PUSCH The number of SSBs per CG PUSCH (see TS 38.213 [13]). Value *one* corresponds to 1 SSBs per CG PUSCH, value *two* corresponds to 2 SSBs per CG PUSCH and so on. In case of a RedCap-specific initial downlink BWP that is associated with NCD-SSB, the SSB is the NCD-SSB. Otherwise, the SSB is the CD-SSB.
sdt-P0-PUSCH Indicates P0 value for PUSCH for CG SDT in steps of 1dB (see TS 38.213 [13]). When this field is configured, the UE ignores the *p0-PUSCH-Alpha*.
sdt-Alpha Indicates alpha value for PUSCH for CG SDT. *alpha0* indicates value 0 is used *alpha04* indicates value 4 is used and so on (see TS 38.213 [13]). When this field is configured, the UE ignores the *p0-PUSCH-Alpha*.

Conditional Presence	Explanation
LCH-BasedPrioritization	This field is optionally present, Need R, if *lch-BasedPrioritization* is configured in the MAC entity. It is absent otherwise.
RepTypeB	The field is optionally present if pusch-RepTypeIndicator is set to pusch-RepTypeB, Need S, and absent otherwise.
CG-List	The field is mandatory present when included in *configuredGrantConfigToAddModList-r16*, otherwise the field is absent.
CG-IndexMAC	The field is mandatory present if at least one configured grant is configured by *configuredGrantConfigToAddModList-r16* in any BWP of this MAC entity, otherwise it is optionally present, need R.
SRSsets	This field is mandatory present when UE is configured with two SRS sets configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage codebook or non-codebook. Otherwise it is absent, Need R

– *ConfiguredGrantConfigIndex*

The IE *ConfiguredGrantConfigIndex* is used to indicate the index of one of multiple UL Configured Grant configurations in one BWP.

***ConfiguredGrantConfigIndex* information element**

```
-- ASN1START
-- TAG-CONFIGUREDGRANTCONFIGINDEX-START
```

```
ConfiguredGrantConfigIndex-r16 ::= INTEGER (0.. maxNrofConfiguredGrantConfig-1-r16)

-- TAG-CONFIGUREDGRANTCONFIGINDEX-STOP
-- ASN1STOP
```

– *ConfiguredGrantConfigIndexMAC*

The IE *ConfiguredGrantConfigIndexMAC* is used to indicate the unique Configured Grant configurations index per MAC entity.

ConfiguredGrantConfigIndexMAC information element

```
-- ASN1START
-- TAG-CONFIGUREDGRANTCONFIGINDEXMAC-START

ConfiguredGrantConfigIndexMAC-r16 ::= INTEGER (0.. maxNrofConfiguredGrantConfigMAC-1-r16)

-- TAG-CONFIGUREDGRANTCONFIGINDEXMAC-STOP
-- ASN1STOP
```

– *ConnEstFailureControl*

The IE *ConnEstFailureControl* is used to configure parameters for connection establishment failure control.

ConnEstFailureControl information element

```
-- ASN1START
-- TAG-CONNESTFAILURECONTROL-START

ConnEstFailureControl ::=   SEQUENCE {
    connEstFailCount                    ENUMERATED {n1, n2, n3, n4},
    connEstFailOffsetValidity           ENUMERATED {s30, s60, s120, s240, s300, s420, s600, s900},
    connEstFailOffset                   INTEGER (0..15)                                                 OPTIONAL    -- Need S
}

-- TAG-CONNESTFAILURECONTROL-STOP
-- ASN1STOP
```

***ConnEstFailureControl* field descriptions**
connEstFailCount Number of times that the UE detects T300 expiry on the same cell before applying *connEstFailOffset*.
connEstFailOffset Parameter "$Qoffset_{temp}$" in TS 38.304 [20]. If the field is absent, the value of infinity shall be used for "$Qoffset_{temp}$".
connEstFailOffsetValidity Amount of time that the UE applies *connEstFailOffset* before removing the offset from evaluation of the cell. Value *s30* corresponds to 30 seconds, value *s60* corresponds to 60 seconds, and so on.

– *ControlResourceSet*

The IE *ControlResourceSet* is used to configure a time/frequency control resource set (CORESET) in which to search for downlink control information (see TS 38.213 [13], clause 10.1). For the UE not supporting *multipleCORESET* in FR1, in order to receive MBS multicast in CFR within the UE's active BWP, if a CORESET is not configured within the *PDCCH-ConfigMulticast*, the CORESET other than CORESET#0 configured within the UE's active BWP for scheduling unicast can be used for scheduling MBS multicast, and the CORESET is expected to be included completely within the CFR and the parameters configured in the CORESET are expected to be supported by the UE for MBS multicast.

***ControlResourceSet* information element**

```
-- ASN1START
-- TAG-CONTROLRESOURCESET-START

ControlResourceSet ::=              SEQUENCE {
    controlResourceSetId                ControlResourceSetId,
    frequencyDomainResources            BIT STRING (SIZE (45)),
    duration                            INTEGER (1..maxCoReSetDuration),
    cce-REG-MappingType                 CHOICE {
        interleaved                         SEQUENCE {
            reg-BundleSize                      ENUMERATED {n2, n3, n6},
            interleaverSize                     ENUMERATED {n2, n3, n6},
            shiftIndex                          INTEGER(0..maxNrofPhysicalResourceBlocks-1)       OPTIONAL -- Need S
        },
        nonInterleaved                      NULL
    },
    precoderGranularity                 ENUMERATED {sameAsREG-bundle, allContiguousRBs},
    tci-StatesPDCCH-ToAddList           SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB-initialBWP
    tci-StatesPDCCH-ToReleaseList       SEQUENCE(SIZE (1..maxNrofTCI-StatesPDCCH)) OF TCI-StateId OPTIONAL, -- Cond NotSIB-initialBWP
    tci-PresentInDCI                    ENUMERATED {enabled}                                      OPTIONAL, -- Need S
    pdcch-DMRS-ScramblingID             INTEGER (0..65535)                                        OPTIONAL, -- Need S
    ...,
    [[
    rb-Offset-r16                       INTEGER (0..5)                                            OPTIONAL, -- Need S
    tci-PresentDCI-1-2-r16              INTEGER (1..3)                                            OPTIONAL, -- Need S
    coresetPoolIndex-r16                INTEGER (0..1)                                            OPTIONAL, -- Need S
    controlResourceSetId-v1610          ControlResourceSetId-v1610                                OPTIONAL  -- Need S
    ]],
    [[
    followUnifiedTCI-State-r17           ENUMERATED {enabled}                                      OPTIONAL  -- Need R
```

```
    ]]
}

-- TAG-CONTROLRESOURCESET-STOP
-- ASN1STOP
```

***ControlResourceSet* field descriptions**
cce-REG-MappingType Mapping of Control Channel Elements (CCE) to Resource Element Groups (REG) (see TS 38.211 [16], clauses 7.3.2.2 and 7.4.1.3.2).
controlResourceSetId Identifies the instance of the *ControlResourceSet* IE. Value 0 identifies the common CORESET configured in *MIB* and in *ServingCellConfigCommon* (*controlResourceSetZero*) and is hence not used here in the *ControlResourceSet* IE. Other values identify CORESETs configured by dedicated signalling or in *SIB1* or *SIB20*. The *controlResourceSetId* is unique among the BWPs of a serving cell. If the field *controlResourceSetId-v1610* is present, the UE shall ignore the *controlResourceSetId* field (without suffix).
coresetPoolIndex The index of the CORESET pool for this CORESET as specified in TS 38.213 [13] (clauses 9 and 10) and TS 38.214 [19] (clauses 5.1 and 6.1). If the field is absent, the UE applies the value 0.
duration Contiguous time duration of the CORESET in number of symbols (see TS 38.211 [16], clause 7.3.2.2).
followUnifiedTCI-State When set to enabled, for PDCCH reception on this CORESET, the UE applies the "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5.
frequencyDomainResources Frequency domain resources for the CORESET. Each bit corresponds a group of 6 RBs, with grouping starting from the first RB group in the BWP or MBS CFR where the CORESET is configured. When at least one search space is configured with *freqMonitorLocation-r16*, only the first $N_{\mathrm{RBG,set0}}^{\mathrm{size}}$ bits are valid (see TS 38.213 [13], clause 10.1). The first (left-most / most significant) bit corresponds to the first RB group in the BWP or MBS CFR where the CORESET is configured, and so on. A bit that is set to 1 indicates that this RB group belongs to the frequency domain resource of this CORESET. Bits corresponding to a group of RBs not fully contained in the bandwidth part within which the CORESET is configured are set to zero (see TS 38.211 [16], clause 7.3.2.2).
interleaverSize Interleaver-size (see TS 38.211 [16], clause 7.3.2.2).
pdcch-DMRS-ScramblingID PDCCH DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.3.1). When the field is absent the UE applies the value of the *physCellId* configured for this serving cell.
precoderGranularity Precoder granularity in frequency domain (see TS 38.211 [16], clauses 7.3.2.2 and 7.4.1.3.2).
rb-Offset Indicates the RB level offset in units of RB from the first RB of the first 6RB group to the first RB of BWP (see 38.213 [13], clause 10.1).
reg-BundleSize Resource Element Groups (REGs) can be bundled to create REG bundles. This parameter defines the size of such bundles (see TS 38.211 [16], clause 7.3.2.2).
shiftIndex When the field is absent the UE applies the value of the *physCellId*configured for this serving cell (see TS 38.211 [16], clause 7.3.2.2).
tci-PresentInDCI This field indicates if TCI field is present or absent in DCI format 1_1 and DCI format 4_2. When the field is absent the UE considers the TCI to be absent/disabled. In case of cross carrier scheduling, the network sets this field to enabled for the *ControlResourceSet* used for cross carrier scheduling in DCI format 1_1 in the scheduling cell if *enableDefaultBeamForCCS* is not configured (see TS 38.214 [19], clause 5.1.5).
tci-PresentDCI-1-2 Configures the number of bits for "Transmission configuration indicator" in DCI format 1_2. When the field is absent the UE applies the value of 0 bit for the "Transmission configuration indicator" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.5). In case of cross carrier scheduling, the network configures this field for the *ControlResourceSet* used for cross carrier scheduling in DCI format 1_2 in the scheduling cell if *enableDefaultBeamForCCS* is not configured (see TS 38.214 [19], clause 5.1.5).

tci-StatesPDCCH-ToAddList
A subset of the TCI states defined in *pdsch-Config,* either with *tci-StatesToAddModList* or *dl-OrJointTCI-StateList,* included in the *BWP-DownlinkDedicated* corresponding to the serving cell and to the DL BWP to which the *ControlResourceSet* belong to. They are used for providing QCL relationships between the DL RS(s) in one RS Set (TCI-State) and the PDCCH DMRS ports (see TS 38.213 [13], clause 6.). The network configures at most *maxNrofTCI-StatesPDCCH* entries. The QCL relationships defined herein do not apply to MBS broadcast.

Conditional Presence	Explanation
NotSIB-initialBWP	The field is absent in *SIB1/SIB20* and in the *PDCCH-ConfigCommon* of the initial BWP in *ServingCellConfigCommon*, if *SIB1/SIB20* is broadcasted. Otherwise, it is optionally present, Need N.

– *ControlResourceSetId*

The *ControlResourceSetId* IE concerns a short identity, used to identify a control resource set within a serving cell. The *ControlResourceSetId* = 0 identifies the ControlResourceSet#0 configured via PBCH (*MIB*) and in *controlResourceSetZero* (*ServingCellConfigCommon*). The ID space is used across the BWPs and MBS CFRs of a Serving Cell.

ControlResourceSetId information element

```
-- ASN1START
-- TAG-CONTROLRESOURCESETID-START

ControlResourceSetId ::=                INTEGER (0..maxNrofControlResourceSets-1)

ControlResourceSetId-r16 ::=            INTEGER (0..maxNrofControlResourceSets-1-r16)

ControlResourceSetId-v1610 ::=          INTEGER (maxNrofControlResourceSets..maxNrofControlResourceSets-1-r16)

-- TAG-CONTROLRESOURCESETID-STOP
-- ASN1STOP
```

– *ControlResourceSetZero*

The IE *ControlResourceSetZero* is used to configure CORESET#0 of the initial BWP (see TS 38.213 [13], clause 13).

ControlResourceSetZero information element

```
-- ASN1START
-- TAG-CONTROLRESOURCESETZERO-START

ControlResourceSetZero ::=                  INTEGER (0..15)

-- TAG-CONTROLRESOURCESETZERO-STOP
-- ASN1STOP
```

– *CrossCarrierSchedulingConfig*

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

CrossCarrierSchedulingConfig information element

```
-- ASN1START
-- TAG-CROSSCARRIERSCHEDULINGCONFIG-START

CrossCarrierSchedulingConfig ::=        SEQUENCE {
    schedulingCellInfo                      CHOICE {
        own                                     SEQUENCE {                  -- Cross carrier scheduling: scheduling cell
            cif-Presence                            BOOLEAN
        },
        other                                   SEQUENCE {                  -- Cross carrier scheduling: scheduled cell
            schedulingCellId                        ServCellIndex,
            cif-InSchedulingCell                    INTEGER (1..7)
        }
    },
    ...,
    [[
    carrierIndicatorSize-r16            SEQUENCE {
        carrierIndicatorSizeDCI-1-2-r16         INTEGER (0..3),
        carrierIndicatorSizeDCI-0-2-r16         INTEGER (0..3)
    }                                                                       OPTIONAL,  -- Cond CIF-PRESENCE
    enableDefaultBeamForCCS-r16         ENUMERATED {enabled}                OPTIONAL  -- Need S
    ]],
    [[
    ccs-BlindDetectionSplit-r17         ENUMERATED {oneSeventh, threeFourteenth, twoSeventh, threeSeventh,
                                            oneHalf, fourSeventh, fiveSeventh, spare1}      OPTIONAL  -- Need R
    ]]
}

-- TAG-CROSSCARRIERSCHEDULINGCONFIG-STOP
-- ASN1STOP
```

***CrossCarrierSchedulingConfig* field descriptions**
carrierIndicatorSizeDCI-0-2, carrierIndicatorSizeDCI-1-2
Configures the number of bits for the field of carrier indicator in PDCCH DCI format 0_2/1_2. The field *carrierIndicatorSizeDCI-0-2* refers to DCI format 0_2 and the field *carrierIndicatorSizeDCI-1-2* refers to DCI format 1_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1).
ccs-BlindDetectionSplit
Indicates the share of blind detection candidates and non-overlapping CCEs for PDCCH monitoring on an SpCell and an SCell when cross-carrier scheduling is configured from the SCell for the SpCell (see TS 38.213 [13], clause 10.1.1). The network only configures this field when it sets the field *other* for an SpCell, i.e., when it configures cross-carrier scheduling of the SpCell by a PDCCH on an Scell.
cif-Presence
The field is used to indicate whether carrier indicator field is present (value *true*) or not (value *false*) in PDCCH DCI formats, see TS 38.213 [13]. If *cif-Presence* is set to *true*, the CIF value indicating a grant or assignment for this cell is 0.
cif-InSchedulingCell
The field indicates the CIF value used in the scheduling cell to indicate a grant or assignment applicable for this cell, see TS 38.213 [13]. If configured for an SpCell, the non-fallback DCI formats on the SpCell include same number of CIF bits as the corresponding non-fallback DCI formats on the scheduling cell, and the CIF bits are considered reserved.
enableDefaultBeamForCCS
This field indicates whether default beam selection for cross-carrier scheduled PDSCH or aperiodic CSI-RS is enabled, see TS 38.214 [19]. If not present, the default beam selection behaviour is not applied, i.e. Rel-15 behaviour is applied. This field can only be configured in the cross-scheduled SCell or SpCell.
other
Parameters for cross-carrier scheduling. If configured for an SpCell, the SpCell can be scheduled by the PDCCH on another SCell as well as by the PDCCH on the SpCell. If configured for an SCell, the SCell is scheduled by a PDDCH on another cell.
own
Parameters for self-scheduling, i.e., a serving cell is scheduled by its own PDCCH.
schedulingCellId
If configured for an SpCell, this field indicates which SCell, in addition to the SpCell, signals the downlink allocations and uplink grants, if applicable, for the concerned SpCell. If configured for an Scell, this field indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell. In case the UE is configured with two PUCCH groups, the scheduling cell and the scheduled cell are within the same PUCCH group. If *drx-ConfigSecondaryGroup* is configured in the *MAC-CellGroupConfig* associated with this serving cell, the scheduling cell and the scheduled cell belong to the same Frequency Range. In addition, the serving cell with an aperiodic CSI trigger and the PUSCH resource scheduled for the report are on the same carrier and serving cell, but the cell for which CSI is reported may belong to the same or a different Frequency Range. The network should not trigger a CSI request for a serving cell in the other Frequency Range when that serving cell is outside Active Time.

Conditional Presence	Explanation
CIF-PRESENCE	The field is mandatory present if the *cif-Presence* is set to *true*. The field is absent otherwise.

– *CSI-AperiodicTriggerStateList*

The *CSI-AperiodicTriggerStateList* IE is used to configure the UE with a list of aperiodic trigger states. Each codepoint of the DCI field "CSI request" is associated with one trigger state (see TS 38.321 [3], clause 6.1.3.13). Upon reception of the value associated with a trigger state, the UE will perform measurement of CSI-RS, CSI-IM and/or SSB (reference signals) and aperiodic reporting on L1 according to all entries in the *associatedReportConfigInfoList* for that trigger state.

***CSI-AperiodicTriggerStateList* information element**

```
-- ASN1START
```

```
-- TAG-CSI-APERIODICTRIGGERSTATELIST-START

CSI-AperiodicTriggerStateList ::=   SEQUENCE (SIZE (1..maxNrOfCSI-AperiodicTriggers)) OF CSI-AperiodicTriggerState

CSI-AperiodicTriggerState ::=       SEQUENCE {
    associatedReportConfigInfoList      SEQUENCE (SIZE(1..maxNrofReportConfigPerAperiodicTrigger)) OF CSI-AssociatedReportConfigInfo,
    ...,
    [[
    ap-CSI-MultiplexingMode-r17         ENUMERATED {enabled}                                        OPTIONAL  -- Need R
    ]]
}

CSI-AssociatedReportConfigInfo ::=  SEQUENCE {
    reportConfigId                      CSI-ReportConfigId,
    resourcesForChannel                 CHOICE {
        nzp-CSI-RS                          SEQUENCE {
            resourceSet                         INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),
            qcl-info                            SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId
                                                                                                    OPTIONAL  -- Cond Aperiodic
        },
        csi-SSB-ResourceSet                 INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfig)
    },
    csi-IM-ResourcesForInterference     INTEGER(1..maxNrofCSI-IM-ResourceSetsPerConfig)             OPTIONAL, -- Cond CSI-IM-ForInterference
    nzp-CSI-RS-ResourcesForInterference INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig)        OPTIONAL, -- Cond NZP-CSI-RS-ForInterference
    ...,
    [[
    resourcesForChannel2-r17        CHOICE {
        nzp-CSI-RS2-r17                 SEQUENCE {
            resourceSet2-r17                INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),
            qcl-info2-r17                   SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF TCI-StateId
                                                                                                    OPTIONAL   -- Cond Aperiodic
        },
        csi-SSB-ResourceSet2-r17        INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt)
    }                                                                                               OPTIONAL,  -- Cond NoUnifiedTCI
    csi-SSB-ResourceSetExt          INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt)            OPTIONAL   -- Need R
    ]]
}

-- TAG-CSI-APERIODICTRIGGERSTATELIST-STOP
-- ASN1STOP
```

***CSI-AssociatedReportConfigInfo* field descriptions**
ap-CSI-MultiplexingMode Indicates if the behavior of transmitting aperiodic CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage '*codebook*' or '*noncodebook*' is enabled or not.
csi-IM-ResourcesForInterference *CSI-IM-ResourceSet* for interference measurement. Entry number in csi-IM-ResourceSetList in the CSI-ResourceConfig indicated by *csi-IM-ResourcesForInterference* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on). The indicated *CSI-IM-ResourceSet* should have exactly the same number of resources like the *NZP-CSI-RS-ResourceSet* indicated in *resourceSet* within *nzp-CSI-RS*.
csi-SSB-ResourceSet, csi-SSB-ResourceSet2 CSI-SSB-ResourceSet for channel measurements. Entry number in *csi-SSB-ResourceSetList* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).
nzp-CSI-RS-ResourcesForInterference *NZP-CSI-RS-ResourceSet* for interference measurement. Entry number in *nzp-CSI-RS-ResourceSetList* in the *CSI-ResourceConfig* indicated by *nzp-CSI-RS-ResourcesForInterference* in the *CSI-ReportConfig* indicated by *reportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).
qcl-info, qcl-info2 List of references to TCI-States for providing the QCL source and QCL type for each *NZP-CSI-RS-Resource* listed in *nzp-CSI-RS-Resources* of the *NZP-CSI-RS-ResourceSet* indicated by *resourceSet* within *nzp-CSI-RS*. Each *TCI-StateId* refers to the *TCI-State* which has this value for *tci-StateId* and is defined in *tci-StatesToAddModList* or in *dl-OrJointTCI-StateList* in the *PDSCH-Config* included in the *BWP-Downlink* corresponding to the serving cell and to the DL BWP to which the *resourcesForChannelMeasurement* (in the *CSI-ReportConfig* indicated by *reportConfigId* above) belong to. First entry in *qcl-info* corresponds to first entry in *nzp-CSI-RS-Resources* of that *NZP-CSI-RS-ResourceSet*, second entry in *qcl-info* corresponds to second entry in *nzp-CSI-RS-Resources*, and so on (see TS 38.214 [19], clause 5.2.1.5.1). When this field is absent for aperiodic CSI RS, the UE shall use QCL information included in the "indicated" DL only/Joint TCI state as specified in TS 38.214
reportConfigId The *reportConfigId* of one of the *CSI-ReportConfigToAddMod* configured in *CSI-MeasConfig*
resourcesForChannel2 Configures reference signals for channel measurement corresponding to the second resource set for L1-RSRP measurement as configured in IE *CSI-ResourceConfig* when *nrofReportedGroups-r17* is configured in IE *CSI-ReportConfig*. If this is present, network configures csi-SSB-ResourceSetExt instead of csi-SSB-ResourceSet and the UE ignores csi-SSB-ResourceSet in resourcesForChannel, and the *resourcesForChannel* configures the reference signals for channel measurement corresponding to the first resource set for L1-RSRP measurement (see TS 38.214 [19], clause 5.2.1.4).
resourceSet *NZP-CSI-RS-ResourceSet* for channel measurements. Entry number in *nzp-CSI-RS-ResourceSetList* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement* in the *CSI-ReportConfig* indicated by r*eportConfigId* above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).

Conditional Presence	Explanation
Aperiodic	The field is mandatory present if the *NZP-CSI-RS-Resources* in the associated *resourceSet* have the resourceType aperiodic and *unifiedTCI-StateType* is not configured. The field is optionally present, Need R, if the *NZP-CSI-RS-Resources* in the associated *resourceSet* have the *resourceType* aperiodic and *unifiedTCI-StateType* is configured. The field is absent otherwise.
CSI-IM-ForInterference	This field is mandatory present if the *CSI-ReportConfig* identified by *reportConfigId* is configured with *csi-IM-ResourcesForInterference*; otherwise it is absent.
NZP-CSI-RS-ForInterference	This field is mandatory present if the *CSI-ReportConfig* identified by *reportConfigId* is configured with *nzp-CSI-RS-ResourcesForInterference*; otherwise it is absent.
NoUnifiedTCI	This field is absent, Need R, if *unifiedTCI-StateType* is configured for the serving cell in which the *CSI-AperiodicTriggerStateList* is included. It is optionally present, Need R, otherwise.

– *CSI-FrequencyOccupation*

The IE *CSI-FrequencyOccupation* is used to configure the frequency domain occupation of a channel state information measurement resource (e.g. *NZP-CSI-RS-Resource*, *CSI-IM-Resource*).

CSI-FrequencyOccupation information element

```
-- ASN1START
-- TAG-CSI-FREQUENCYOCCUPATION-START

CSI-FrequencyOccupation ::=         SEQUENCE {
    startingRB                          INTEGER (0..maxNrofPhysicalResourceBlocks-1),
    nrofRBs                             INTEGER (24..maxNrofPhysicalResourceBlocksPlus1),
    ...
}

-- TAG-CSI-FREQUENCYOCCUPATION-STOP
-- ASN1STOP
```

CSI-FrequencyOccupation field descriptions
nrofRBs   Number of PRBs across which this CSI resource spans. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 24 and the width of the associated BWP. If the configured value is larger than the width of the corresponding BWP, the UE shall assume that the actual CSI-RS bandwidth is equal to the width of the BWP.
startingRB   PRB where this CSI resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid. Only multiples of 4 are allowed (0, 4, ...)

– *CSI-IM-Resource*

The IE *CSI-IM-Resource* is used to configure one CSI Interference Management (IM) resource.

CSI-IM-Resource information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCE-START

CSI-IM-Resource ::=                 SEQUENCE {
    csi-IM-ResourceId                   CSI-IM-ResourceId,
    csi-IM-ResourceElementPattern           CHOICE {
        pattern0                                SEQUENCE {
            subcarrierLocation-p0                   ENUMERATED { s0, s2, s4, s6, s8, s10 },
            symbolLocation-p0                       INTEGER (0..12)
        },
        pattern1                                SEQUENCE {
            subcarrierLocation-p1                   ENUMERATED { s0, s4, s8 },
            symbolLocation-p1                       INTEGER (0..13)
        }
```

```
    }                                                                   OPTIONAL,   -- Need M
    freqBand                        CSI-FrequencyOccupation             OPTIONAL,   -- Need M
    periodicityAndOffset            CSI-ResourcePeriodicityAndOffset    OPTIONAL,   -- Cond PeriodicOrSemiPersistent
    ...
}

-- TAG-CSI-IM-RESOURCE-STOP
-- ASN1STOP
```

***CSI-IM-Resource* field descriptions**
csi-IM-ResourceElementPattern The resource element pattern (Pattern0 (2,2) or Pattern1 (4,1)) with corresponding parameters (see TS 38.214 [19], clause 5.2.2.4)
freqBand Frequency-occupancy of CSI-IM (see TS 38.214 [19], clause 5.2.2.4)
periodicityAndOffset Periodicity and slot offset for periodic/semi-persistent CSI-IM. Network always configures the UE with a value for this field for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-ResourceConfig). A change of configuration between periodic or semi-persistent and aperiodic for a CSI-IM-Resource is not supported without a release and add.
subcarrierLocation-p0 OFDM subcarrier occupancy of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4)
subcarrierLocation-p1 OFDM subcarrier occupancy of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4)
symbolLocation-p0 OFDM symbol location of the CSI-IM resource for Pattern0 (see TS 38.214 [19], clause 5.2.2.4)
symbolLocation-p1 OFDM symbol location of the CSI-IM resource for Pattern1 (see TS 38.214 [19], clause 5.2.2.4)

Conditional Presence	Explanation
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent CSI-IM-Resources (as indicated in CSI-ResourceConfig). The field is absent otherwise.

– *CSI-IM-ResourceId*

The IE *CSI-IM-ResourceId* is used to identify one *CSI-IM-Resource*.

***CSI-IM-ResourceId* information element**

```
-- ASN1START
-- TAG-CSI-IM-RESOURCEID-START

CSI-IM-ResourceId ::=               INTEGER (0..maxNrofCSI-IM-Resources-1)

-- TAG-CSI-IM-RESOURCEID-STOP
-- ASN1STOP
```

– *CSI-IM-ResourceSet*

The IE *CSI-IM-ResourceSet* is used to configure a set of one or more CSI Interference Management (IM) resources (their IDs) and set-specific parameters.

CSI-IM-ResourceSet information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCESET-START

CSI-IM-ResourceSet ::=              SEQUENCE {
    csi-IM-ResourceSetId                CSI-IM-ResourceSetId,
    csi-IM-Resources                    SEQUENCE (SIZE(1..maxNrofCSI-IM-ResourcesPerSet)) OF CSI-IM-ResourceId,
    ...
}
-- TAG-CSI-IM-RESOURCESET-STOP
-- ASN1STOP
```

***CSI-IM-ResourceSet* field descriptions**
csi-IM-Resources *CSI-IM-Resources* associated with this *CSI-IM-ResourceSet* (see TS 38.214 [19], clause 5.2).

– *CSI-IM-ResourceSetId*

The IE *CSI-IM-ResourceSetId* is used to identify *CSI-IM-ResourceSet*s.

CSI-IM-ResourceSetId information element

```
-- ASN1START
-- TAG-CSI-IM-RESOURCESETID-START

CSI-IM-ResourceSetId ::=            INTEGER (0..maxNrofCSI-IM-ResourceSets-1)

-- TAG-CSI-IM-RESOURCESETID-STOP
-- ASN1STOP
```

– *CSI-MeasConfig*

The IE *CSI-MeasConfig* is used to configure CSI-RS (reference signals) belonging to the serving cell in which *CSI-MeasConfig* is included, channel state information reports to be transmitted on PUCCH on the serving cell in which *CSI-MeasConfig* is included and channel state information reports on PUSCH triggered by DCI received on the serving cell in which *CSI-MeasConfig* is included. See also TS 38.214 [19], clause 5.2.

CSI-MeasConfig information element

```
-- ASN1START
```

```
-- TAG-CSI-MEASCONFIG-START

CSI-MeasConfig ::=                  SEQUENCE {
    nzp-CSI-RS-ResourceToAddModList     SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-Resource   OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceToReleaseList    SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-ResourceId OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceSetToAddModList  SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSet
                                                                                                                  OPTIONAL, -- Need N
    nzp-CSI-RS-ResourceSetToReleaseList SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSetId
                                                                                                                  OPTIONAL, -- Need N
    csi-IM-ResourceToAddModList         SEQUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-Resource           OPTIONAL, -- Need N
    csi-IM-ResourceToReleaseList        SEQUENCE (SIZE (1..maxNrofCSI-IM-Resources)) OF CSI-IM-ResourceId         OPTIONAL, -- Need N
    csi-IM-ResourceSetToAddModList      SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSet     OPTIONAL, -- Need N
    csi-IM-ResourceSetToReleaseList     SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSets)) OF CSI-IM-ResourceSetId   OPTIONAL, -- Need N
    csi-SSB-ResourceSetToAddModList     SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSet   OPTIONAL, -- Need N
    csi-SSB-ResourceSetToReleaseList    SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSets)) OF CSI-SSB-ResourceSetId OPTIONAL, -- Need N
    csi-ResourceConfigToAddModList      SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfig
                                                                                                                  OPTIONAL, -- Need N
    csi-ResourceConfigToReleaseList     SEQUENCE (SIZE (1..maxNrofCSI-ResourceConfigurations)) OF CSI-ResourceConfigId
                                                                                                                  OPTIONAL, -- Need N
    csi-ReportConfigToAddModList        SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfig  OPTIONAL, -- Need N
    csi-ReportConfigToReleaseList       SEQUENCE (SIZE (1..maxNrofCSI-ReportConfigurations)) OF CSI-ReportConfigId
                                                                                                                  OPTIONAL, -- Need N
    reportTriggerSize                   INTEGER (0..6)                                                            OPTIONAL, -- Need M
    aperiodicTriggerStateList           SetupRelease { CSI-AperiodicTriggerStateList }                            OPTIONAL, -- Need M
    semiPersistentOnPUSCH-TriggerStateList    SetupRelease { CSI-SemiPersistentOnPUSCH-TriggerStateList }         OPTIONAL, -- Need M
    ...,
    [[
    reportTriggerSizeDCI-0-2-r16        INTEGER (0..6)                                                            OPTIONAL -- Need R
    ]],
    [[
    sCellActivationRS-ConfigToAddModList-r17  SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-Config-r17   OPTIONAL, -- Need N
    sCellActivationRS-ConfigToReleaseList-r17 SEQUENCE (SIZE (1..maxNrofSCellActRS-r17)) OF SCellActivationRS-ConfigId-r17 OPTIONAL  -- Need N
    ]]
}

-- TAG-CSI-MEASCONFIG-STOP
-- ASN1STOP
```

***CSI-MeasConfig* field descriptions**
aperiodicTriggerStateList Contains trigger states for dynamically selecting one or more aperiodic and semi-persistent reporting configurations and/or triggering one or more aperiodic CSI-RS resource sets for channel and/or interference measurement (see TS 38.214 [19], clause 5.2.1).
csi-IM-ResourceSetToAddModList Pool of *CSI-IM-ResourceSet* which can be referred to from *CSI-ResourceConfig* or from MAC CEs.
csi-IM-ResourceToAddModList Pool of *CSI-IM-Resource* which can be referred to from *CSI-IM-ResourceSet*.
csi-ReportConfigToAddModList Configured CSI report settings as specified in TS 38.214 [19] clause 5.2.1.1.
csi-ResourceConfigToAddModList Configured CSI resource settings as specified in TS 38.214 [19] clause 5.2.1.2.
csi-SSB-ResourceSetToAddModList Pool of CSI-SSB-ResourceSet which can be referred to from *CSI-ResourceConfig*.
nzp-CSI-RS-ResourceSetToAddModList Pool of *NZP-CSI-RS-ResourceSet* which can be referred to from *CSI-ResourceConfig* or from MAC CEs.
nzp-CSI-RS-ResourceToAddModList Pool of *NZP-CSI-RS-Resource* which can be referred to from *NZP-CSI-RS-ResourceSet*.
reportTriggerSize, reportTriggerSizeDCI-0-2 Size of CSI request field in DCI (bits) (see TS 38.214 [19], clause 5.2.1.5.1). The field *reportTriggerSize* applies to DCI format 0_1 and the field *reportTriggerSizeDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 5.2.1.5.1).
scellActivationRS-ConfigToAddModList Configured RS for fast SCell activation as specified in TS 38.214 [19] clause 5.2.1.5.3.

– *CSI-ReportConfig*

The IE *CSI-ReportConfig* is used to configure a periodic or semi-persistent report sent on PUCCH on the cell in which the *CSI-ReportConfig* is included, or to configure a semi-persistent or aperiodic report sent on PUSCH triggered by DCI received on the cell in which the *CSI-ReportConfig* is included (in this case, the cell on which the report is sent is determined by the received DCI). See TS 38.214 [19], clause 5.2.1.

***CSI-ReportConfig* information element**

```
-- ASN1START
-- TAG-CSI-REPORTCONFIG-START

CSI-ReportConfig ::=                SEQUENCE {
    reportConfigId                          CSI-ReportConfigId,
    carrier                                 ServCellIndex                   OPTIONAL,   -- Need S
    resourcesForChannelMeasurement          CSI-ResourceConfigId,
    csi-IM-ResourcesForInterference         CSI-ResourceConfigId            OPTIONAL,   -- Need R
    nzp-CSI-RS-ResourcesForInterference     CSI-ResourceConfigId            OPTIONAL,   -- Need R
    reportConfigType                        CHOICE {
        periodic                                SEQUENCE {
            reportSlotConfig                        CSI-ReportPeriodicityAndOffset,
            pucch-CSI-ResourceList                  SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
        },
```

```
        semiPersistentOnPUCCH                   SEQUENCE {
            reportSlotConfig                        CSI-ReportPeriodicityAndOffset,
            pucch-CSI-ResourceList                  SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
        },
        semiPersistentOnPUSCH                   SEQUENCE {
            reportSlotConfig                        ENUMERATED {sl5, sl10, sl20, sl40, sl80, sl160, sl320},
            reportSlotOffsetList                SEQUENCE (SIZE (1.. maxNrofUL-Allocations)) OF INTEGER(0..32),
            p0alpha                                 P0-PUSCH-AlphaSetId
        },
        aperiodic                               SEQUENCE {
            reportSlotOffsetList                SEQUENCE (SIZE (1..maxNrofUL-Allocations)) OF INTEGER(0..32)
        }
    },
    reportQuantity                          CHOICE {
        none                                    NULL,
        cri-RI-PMI-CQI                          NULL,
        cri-RI-i1                               NULL,
        cri-RI-i1-CQI                           SEQUENCE {
            pdsch-BundleSizeForCSI                  ENUMERATED {n2, n4}                                 OPTIONAL    -- Need S
        },
        cri-RI-CQI                              NULL,
        cri-RSRP                                NULL,
        ssb-Index-RSRP                          NULL,
        cri-RI-LI-PMI-CQI                       NULL
    },
    reportFreqConfiguration                 SEQUENCE {
        cqi-FormatIndicator                     ENUMERATED { widebandCQI, subbandCQI }              OPTIONAL,   -- Need R
        pmi-FormatIndicator                     ENUMERATED { widebandPMI, subbandPMI }              OPTIONAL,   -- Need R
        csi-ReportingBand                       CHOICE {
            subbands3                               BIT STRING(SIZE(3)),
            subbands4                               BIT STRING(SIZE(4)),
            subbands5                               BIT STRING(SIZE(5)),
            subbands6                               BIT STRING(SIZE(6)),
            subbands7                               BIT STRING(SIZE(7)),
            subbands8                               BIT STRING(SIZE(8)),
            subbands9                               BIT STRING(SIZE(9)),
            subbands10                              BIT STRING(SIZE(10)),
            subbands11                              BIT STRING(SIZE(11)),
            subbands12                              BIT STRING(SIZE(12)),
            subbands13                              BIT STRING(SIZE(13)),
            subbands14                              BIT STRING(SIZE(14)),
            subbands15                              BIT STRING(SIZE(15)),
            subbands16                              BIT STRING(SIZE(16)),
            subbands17                              BIT STRING(SIZE(17)),
            subbands18                              BIT STRING(SIZE(18)),
            ...,
            subbands19-v1530                        BIT STRING(SIZE(19))
        }   OPTIONAL    -- Need S

    }                                                                                               OPTIONAL,   -- Need R
    timeRestrictionForChannelMeasurements       ENUMERATED {configured, notConfigured},
    timeRestrictionForInterferenceMeasurements  ENUMERATED {configured, notConfigured},
    codebookConfig                              CodebookConfig                                      OPTIONAL,   -- Need R
    dummy                                       ENUMERATED {n1, n2}                                 OPTIONAL,   -- Need R
```

```
    groupBasedBeamReporting                 CHOICE {
        enabled                                 NULL,
        disabled                                SEQUENCE {
            nrofReportedRS                          ENUMERATED {n1, n2, n3, n4}                                 OPTIONAL    -- Need S
        }
    },
    cqi-Table                   ENUMERATED {table1, table2, table3, table4-r17}                                     OPTIONAL,   -- Need R
    subbandSize                 ENUMERATED {value1, value2},
    non-PMI-PortIndication      SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks OPTIONAL,   -- Need R
    ...,
    [[
    semiPersistentOnPUSCH-v1530         SEQUENCE {
        reportSlotConfig-v1530              ENUMERATED {sl4, sl8, sl16}
    }                                                                                                               OPTIONAL    -- Need R
    ]],
    [[
    semiPersistentOnPUSCH-v1610         SEQUENCE {
        reportSlotOffsetListDCI-0-2-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)   OPTIONAL,    -- Need R
        reportSlotOffsetListDCI-0-1-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)   OPTIONAL     -- Need R
    }                                                                                                               OPTIONAL,   -- Need R
    aperiodic-v1610                     SEQUENCE {
        reportSlotOffsetListDCI-0-2-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)   OPTIONAL,    -- Need R
        reportSlotOffsetListDCI-0-1-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)   OPTIONAL     -- Need R
    }                                                                                                               OPTIONAL,   -- Need R
    reportQuantity-r16                  CHOICE {
       cri-SINR-r16                         NULL,
       ssb-Index-SINR-r16                   NULL
    }                                                                                                               OPTIONAL,   -- Need R
    codebookConfig-r16                      CodebookConfig-r16                                                      OPTIONAL    -- Need R
    ]],
    [[
    cqi-BitsPerSubband-r17              ENUMERATED {bits4}                                                          OPTIONAL,   -- Need R
    groupBasedBeamReporting-v1710       SEQUENCE {
        nrofReportedGroups-r17              ENUMERATED {n1, n2, n3, n4}
    }                                                                                                               OPTIONAL,   -- Need R
    codebookConfig-r17                  CodebookConfig-r17                                                          OPTIONAL,   -- Need R
    sharedCMR-r17                       ENUMERATED {enable}                                                         OPTIONAL,   -- Need R
    csi-ReportMode-r17                  ENUMERATED {mode1, mode2}                                                   OPTIONAL,   -- Need R
    numberOfSingleTRP-CSI-Mode1-r17     ENUMERATED {n0, n1, n2}                                                     OPTIONAL,   -- Need R
    reportQuantity-r17                  CHOICE {
        cri-RSRP-Index-r17                  NULL,
        ssb-Index-RSRP-Index-r17            NULL,
        cri-SINR-Index-r17                  NULL,
        ssb-Index-SINR-Index-r17            NULL
    }                                                                                                               OPTIONAL    -- Need R
    ]],
    [[
    semiPersistentOnPUSCH-v1720         SEQUENCE {
        reportSlotOffsetList-r17            SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL,   -- Need R
        reportSlotOffsetListDCI-0-2-r17     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL,   -- Need R
        reportSlotOffsetListDCI-0-1-r17     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL    -- Need R
    }                                                                                                               OPTIONAL,   -- Need R
    aperiodic-v1720                     SEQUENCE {
        reportSlotOffsetList-r17            SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL,   -- Need R
```

```
        reportSlotOffsetListDCI-0-2-r17     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL,   -- Need R
        reportSlotOffsetListDCI-0-1-r17     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..128)  OPTIONAL    -- Need R
    }                                                                                                           OPTIONAL    -- Need R
    ]],
    [[
    codebookConfig-v1730                CodebookConfig-v1730                                                    OPTIONAL    -- Need R
    ]]
}

CSI-ReportPperiodicityAndOffset ::=  CHOICE {
    slots4                              INTEGER(0..3),
    slots5                              INTEGER(0..4),
    slots8                              INTEGER(0..7),
    slots10                             INTEGER(0..9),
    slots16                             INTEGER(0..15),
    slots20                             INTEGER(0..19),
    slots40                             INTEGER(0..39),
    slots80                             INTEGER(0..79),
    slots160                            INTEGER(0..159),
    slots320                            INTEGER(0..319)
}

PUCCH-CSI-Resource ::=              SEQUENCE {
    uplinkBandwidthPartId               BWP-Id,
    pucch-Resource                      PUCCH-ResourceId
}

PortIndexFor8Ranks ::=              CHOICE {
    portIndex8                          SEQUENCE{
        rank1-8                             PortIndex8                                      OPTIONAL,   -- Need R
        rank2-8                             SEQUENCE(SIZE(2)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank3-8                             SEQUENCE(SIZE(3)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank4-8                             SEQUENCE(SIZE(4)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank5-8                             SEQUENCE(SIZE(5)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank6-8                             SEQUENCE(SIZE(6)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank7-8                             SEQUENCE(SIZE(7)) OF PortIndex8                 OPTIONAL,   -- Need R
        rank8-8                             SEQUENCE(SIZE(8)) OF PortIndex8                 OPTIONAL    -- Need R
    },
    portIndex4                          SEQUENCE{
        rank1-4                             PortIndex4                                      OPTIONAL,   -- Need R
        rank2-4                             SEQUENCE(SIZE(2)) OF PortIndex4                 OPTIONAL,   -- Need R
        rank3-4                             SEQUENCE(SIZE(3)) OF PortIndex4                 OPTIONAL,   -- Need R
        rank4-4                             SEQUENCE(SIZE(4)) OF PortIndex4                 OPTIONAL    -- Need R
    },
    portIndex2                          SEQUENCE{
        rank1-2                             PortIndex2                                      OPTIONAL,   -- Need R
        rank2-2                             SEQUENCE(SIZE(2)) OF PortIndex2                 OPTIONAL    -- Need R
    },
    portIndex1                          NULL
}

PortIndex8::=                       INTEGER (0..7)
PortIndex4::=                       INTEGER (0..3)
PortIndex2::=                       INTEGER (0..1)
```

```
-- TAG-CSI-REPORTCONFIG-STOP
-- ASN1STOP
```

***CSI-ReportConfig* field descriptions**
carrier Indicates in which serving cell the *CSI-ResourceConfig* indicated below are to be found. If the field is absent, the resources are on the same serving cell as this report configuration.
codebookConfig Codebook configuration for Type-1 or Type-2 including codebook subset restriction. Network can only configure one of *codebookConfig*, *codebookConfig-r16* or *codebookConfig-r17* to a UE. The network includes *codebookConfig-v1730* only if *codebookConfig-r17* is configured.
cqi-BitsPerSubband This field can only be present if *cqi-FormatIndicator* is set to *subbandCQI*. If the field is configured with *bits4*, the UE uses 4-bit sub-band CQI. If the field is not present and *cqi-FormatIndicator* is set to *subbandCQI*, the UE uses 2-bit sub-band differential CQI.
cqi-FormatIndicator Indicates whether the UE shall report a single (wideband) or multiple (subband) CQI (see TS 38.214 [19], clause 5.2.1.4).
cqi-Table Which CQI table to use for CQI calculation (see TS 38.214 [19], clause 5.2.2.1). For a RedCap UE, CQI table 2 is only supported if the UE indicates support of 256QAM for PDSCH.
csi-IM-ResourcesForInterference CSI IM resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only CSI-IM resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*.
csi-ReportingBand Indicates a contiguous or non-contiguous subset of subbands in the bandwidth part which CSI shall be reported for. Each bit in the bit-string represents one subband. The right-most bit in the bit string represents the lowest subband in the BWP. The choice determines the number of subbands (subbands3 for 3 subbands, subbands4 for 4 subbands, and so on) (see TS 38.214 [19], clause 5.2.1.4). This field is absent if there are less than 24 PRBs (no sub band) and present otherwise (see TS 38.214 [19], clause 5.2.1.4).
csi-ReportMode Configures the CSI report modes Mode1 or Mode 2 (see TS 38.214 [19], clause 5.2.1.4.2)
dummy This field is not used in the specification. If received it shall be ignored by the UE.
groupBasedBeamReporting Turning on/off group beam based reporting (see TS 38.214 [19], clause 5.2.1.4). If *groupBasedBeamReporting* (without suffix) is set to disabled, *groupBasedBeamReporting-v1710* is absent.
non-PMI-PortIndication Port indication for RI/CQI calculation. For each CSI-RS resource in the linked ResourceConfig for channel measurement, a port indication for each rank R, indicating which R ports to use. Applicable only for non-PMI feedback (see TS 38.214 [19], clause 5.2.1.4.2). The first entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the *CSI-ResourceConfig* whose *CSI-ResourceConfigId* is indicated in a CSI-MeasId together with the above *CSI-ReportConfigId*; the second entry in *non-PMI-PortIndication* corresponds to the NZP-CSI-RS-Resource indicated by the second entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*, and so on until the NZP-CSI-RS-Resource indicated by the last entry in *nzp-CSI-RS-Resources* in the in the *NZP-CSI-RS-ResourceSet* indicated in the first entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig*. Then the next entry corresponds to the NZP-CSI-RS-Resource indicated by the first entry in *nzp-CSI-RS-Resources* in the *NZP-CSI-RS-ResourceSet* indicated in the second entry of *nzp-CSI-RS-ResourceSetList* of the same *CSI-ResourceConfig* and so on.
nrofReportedGroups Number of reported resource groups per CSI-report. Value *n1* means one resource group, *n2* means 2 resource groups, and so on. If *nrofReportedGroups* is configured, the UE ignores groupBasedBeamReporting (without suffix).

nrofReportedRS The number (N) of measured RS resources to be reported per report setting in a non-group-based report. N <= N_max, where N_max is either 2 or 4 depending on UE capability. (see TS 38.214 [19], clause 5.2.1.4) When the field is absent the UE applies the value 1.
numberOfSingleTRP-CSI-Mode1 Configures the number of reported X CSIs when *csi-ReportMode* is set to 'Mode 1' as described in TS 38.214 [19], clause 5.2.1.4.2. The field is present only if csi-ReportMode configures Mode 1.
nzp-CSI-RS-ResourcesForInterference NZP CSI RS resources for interference measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources. The *bwp-Id* in that *CSI-ResourceConfig* is the same value as the *bwp-Id* in the *CSI-ResourceConfig* indicated by *resourcesForChannelMeasurement*.
p0alpha Index of the p0-alpha set determining the power control for this CSI report transmission (see TS 38.214 [19], clause 6.2.1.2).
pdsch-BundleSizeForCSI PRB bundling size to assume for CQI calculation when *reportQuantity* is CRI/RI/i1/CQI. If the field is absent, the UE assumes that no PRB bundling is applied (see TS 38.214 [19], clause 5.2.1.4.2).
pmi-FormatIndicator Indicates whether the UE shall report a single (wideband) or multiple (subband) PMI. (see TS 38.214 [19], clause 5.2.1.4).
pucch-CSI-ResourceList Indicates which PUCCH resource to use for reporting on PUCCH.
reportConfigType Time domain behavior of reporting configuration.
reportFreqConfiguration Reporting configuration in the frequency domain. (see TS 38.214 [19], clause 5.2.1.4).
reportQuantity The CSI related quantities to report. see TS 38.214 [19], clause 5.2.1. If the field *reportQuantity-r16* or *reportQuantity-r17* is present, UE shall ignore *reportQuantity* (without suffix). Network does not configure *reportQuantity-r17* together with *reportQuantity-r16.*
reportSlotConfig Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4). If the field *reportSlotConfig-v1530* is present, the UE shall ignore the value provided in *reportSlotConfig* (without suffix).
reportSlotOffsetList, reportSlotOffsetListDCI-0-1, ***reportSlotOffsetListDCI-0-2*** Timing offset Y for semi persistent reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on. The first report is transmitted in slot n+Y, second report in n+Y+P, where P is the configured periodicity. Timing offset Y for aperiodic reporting using PUSCH. This field lists the allowed offset values. This list must have the same number of entries as the *pusch-TimeDomainAllocationList* in *PUSCH-Config*. A particular value is indicated in DCI. The network indicates in the DCI field of the UL grant, which of the configured report slot offsets the UE shall apply. The DCI value 0 corresponds to the first report slot offset in this list, the DCI value 1 corresponds to the second report slot offset in this list, and so on (see TS 38.214 [19], clause 6.1.2.1). The field *reportSlotOffsetListDCI-0-1* applies to DCI format 0_1 and the field *reportSlotOffsetListDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1). The fields *reportSlotOffsetList-r17*, *reportSlotOffsetListDCI-0-1-r17* and *reportSlotOffsetListDCI-0-2-r17* are only applicable for SCS 480 kHz and 960 kHz and if they are configured, the UE shall ignore the fields *reportSlotOffsetList* (without suffix), *reportSlotOffsetListDCI-0-1* (without suffix) and *reportSlotOffsetListDCI-0-2* (without suffix) for SCS 480 kHz and 960 kHz.
resourcesForChannelMeasurement Resources for channel measurement. *csi-ResourceConfigId* of a *CSI-ResourceConfig* included in the configuration of the serving cell indicated with the field "carrier" above. The *CSI-ResourceConfig* indicated here contains only NZP-CSI-RS resources and/or SSB resources. This *CSI-ReportConfig* is associated with the DL BWP indicated by *bwp-Id* in that *CSI-ResourceConfig*.

sharedCMR Enables sharing of channel measurement resources between different CSI measurement hypotheses when (1) *csi-ReportMode* is set to 'Mode1' and *numberOfSingleTRP-CSI-Mode1* is set to 1 or 2; or (2) *csi-ReportMode* is set to 'Mode2' (see TS 38.214 [19], clause 5.2.1.4.2).
subbandSize Indicates one out of two possible BWP-dependent values for the subband size as indicated in TS 38.214 [19], table 5.2.1.4-2 . If *csi-ReportingBand* is absent, the UE shall ignore this field.
timeRestrictionForChannelMeasurements Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1).
timeRestrictionForInterferenceMeasurements Time domain measurement restriction for interference measurements (see TS 38.214 [19], clause 5.2.1.1).

***PortIndexFor8Ranks* field descriptions**
portIndex8 Port-Index configuration for up to rank 8. If present, the network configures port indexes for at least one of the ranks.
portIndex4 Port-Index configuration for up to rank 4. If present, the network configures port indexes for at least one of the ranks.
portIndex2 Port-Index configuration for up to rank 2. If present, the network configures port indexes for at least one of the ranks.
portIndex1 Port-Index configuration for rank 1.

***PUCCH-CSI-Resource* field descriptions**
pucch-Resource PUCCH resource for the associated uplink BWP. Only PUCCH-Resource of format 2, 3 and 4 is supported. The actual PUCCH-Resource is configured in *PUCCH-Config* and referred to by its ID. When two *PUCCH-Config* are configured within *PUCCH-ConfigurationList*, *PUCCH-ResourceId* in a *PUCCH-CSI-Resource* refers to a PUCCH-Resource in the *PUCCH-Config* used for HARQ-ACK with low priority.

– *CSI-ReportConfigId*

The IE *CSI-ReportConfigId* is used to identify one *CSI-ReportConfig*.

***CSI-ReportConfigId* information element**

```
-- ASN1START
-- TAG-CSI-REPORTCONFIGID-START

CSI-ReportConfigId ::=              INTEGER (0..maxNrofCSI-ReportConfigurations-1)

-- TAG-CSI-REPORTCONFIGID-STOP
-- ASN1STOP
```

– *CSI-ResourceConfig*

The IE *CSI-ResourceConfig* defines a group of one or more *NZP-CSI-RS-ResourceSet*, *CSI-IM-ResourceSet* and/or *CSI-SSB-ResourceSet*.

CSI-ResourceConfig information element

```
-- ASN1START
-- TAG-CSI-RESOURCECONFIG-START

CSI-ResourceConfig ::=      SEQUENCE {
    csi-ResourceConfigId        CSI-ResourceConfigId,
    csi-RS-ResourceSetList      CHOICE {
        nzp-CSI-RS-SSB              SEQUENCE {
            nzp-CSI-RS-ResourceSetList  SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig)) OF NZP-CSI-RS-ResourceSetId
                                                                                                        OPTIONAL, -- Need R
            csi-SSB-ResourceSetList     SEQUENCE (SIZE (1..maxNrofCSI-SSB-ResourceSetsPerConfig)) OF CSI-SSB-ResourceSetId  OPTIONAL  -- Need R
        },
        csi-IM-ResourceSetList      SEQUENCE (SIZE (1..maxNrofCSI-IM-ResourceSetsPerConfig)) OF CSI-IM-ResourceSetId
    },

    bwp-Id                      BWP-Id,
    resourceType                ENUMERATED { aperiodic, semiPersistent, periodic },
    ...,
    [[
    csi-SSB-ResourceSetListExt-r17      CSI-SSB-ResourceSetId                                   OPTIONAL  -- Need R
    ]]
}

-- TAG-CSI-RESOURCECONFIG-STOP
-- ASN1STOP
```

***CSI-ResourceConfig* field descriptions**
bwp-Id The DL BWP which the CSI-RS associated with this *CSI-ResourceConfig* are located in (see TS 38.214 [19], clause 5.2.1.2.
csi-IM-ResourceSetList List of references to CSI-IM resources used for CSI measurement and reporting in a CSI-RS resource set. Contains up to *maxNrofCSI-IM-ResourceSetsPerConfig* resource sets if *resourceType* is 'aperiodic' and 1 otherwise (see TS 38.214 [19], clause 5.2.1.2).
csi-ResourceConfigId Used in *CSI-ReportConfig* to refer to an instance of *CSI-ResourceConfig.*
csi-SSB-ResourceSetList, csi-SSB-ResourceSetListExt List of references to SSB resources used for CSI measurement and reporting in a CSI-RS resource set (see TS 38.214 [19], clause 5.2.1.2). The *csi-SSB-ResourceSetListExt* provides additional references and can only be configured if *csi-SSB-ResourceSetList* is configured and *groupBasedBeamReporting-v1710* is configured in the *CSI-ReportConfig* that indicates this *CSI-ResourceConfig* as *resourcesForChannelMeasurement*. If *groupBasedBeamReporting-v1710* is configured in the IE *CSI-ReportConfig* that indicates this *CSI-ResourceConfig* as *resourceForChannelMeasurement*, the network configures 2 resource sets, which may be two CSI SSB resource sets (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1.
nzp-CSI-RS-ResourceSetList List of references to NZP CSI-RS resources used for beam measurement and reporting in a CSI-RS resource set. If *resourceType* is set to 'aperiodic', the network configures up to *maxNrofNZP-CSI-RS-ResourceSetsPerConfig* resource sets. If *resourceType* is is set to 'periodic' or 'semiPersistent' and *groupBasedBeamReporting-v1710* is not configured in IE *CSI-ReportConfig*, the network configures 1 resource set. If *resourceType* is set to 'periodic' or 'semiPersistent' and *groupBasedBeamReporting-v1710* is configured, the network configures 2 resource sets, which may be two NZP CSI-RS resource sets (see TS 38.214 [19], clause 5.2.1.2 and 5.2.1.4.2). In this case, in TS 38.212 [17] Table 6.3.1.1.2-8B, the first resource set is indicated by a resource set indicator set to 0 and the second resource set by a resource set indicator set to 1.
resourceType Time domain behavior of resource configuration (see TS 38.214 [19], clause 5.2.1.2). It does not apply to resources provided in the *csi-SSB-ResourceSetList*.

– *CSI-ResourceConfigId*

The IE *CSI-ResourceConfigId* is used to identify a *CSI-ResourceConfig*.

CSI-ResourceConfigId information element

```
-- ASN1START
-- TAG-CSI-RESOURCECONFIGID-START

CSI-ResourceConfigId ::=            INTEGER (0..maxNrofCSI-ResourceConfigurations-1)

-- TAG-CSI-RESOURCECONFIGID-STOP
-- ASN1STOP
```

– *CSI-ResourcePeriodicityAndOffset*

The IE *CSI-ResourcePeriodicityAndOffset* is used to configure a periodicity and a corresponding offset for periodic and semi-persistent CSI resources, and for periodic and semi-persistent reporting on PUCCH. both, the periodicity and the offset are given in number of slots. The periodicity value *slots4* corresponds to 4 slots, value *slots5* corresponds to 5 slots, and so on.

CSI-ResourcePeriodicityAndOffset information element

```
-- ASN1START
-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-START

CSI-ResourcePeriodicityAndOffset ::=    CHOICE {
    slots4                                  INTEGER (0..3),
    slots5                                  INTEGER (0..4),
    slots8                                  INTEGER (0..7),
    slots10                                 INTEGER (0..9),
    slots16                                 INTEGER (0..15),
    slots20                                 INTEGER (0..19),
    slots32                                 INTEGER (0..31),
    slots40                                 INTEGER (0..39),
    slots64                                 INTEGER (0..63),
    slots80                                 INTEGER (0..79),
    slots160                                INTEGER (0..159),
    slots320                                INTEGER (0..319),
    slots640                                INTEGER (0..639)
}

-- TAG-CSI-RESOURCEPERIODICITYANDOFFSET-STOP
-- ASN1STOP
```

– *CSI-RS-ResourceConfigMobility*

The IE *CSI-RS-ResourceConfigMobility* is used to configure CSI-RS based RRM measurements.

CSI-RS-ResourceConfigMobility information element

```
-- ASN1START
-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-START

CSI-RS-ResourceConfigMobility ::=   SEQUENCE {
    subcarrierSpacing                   SubcarrierSpacing,
    csi-RS-CellList-Mobility            SEQUENCE (SIZE (1..maxNrofCSI-RS-CellsRRM)) OF CSI-RS-CellMobility,
    ...,
    [[
    refServCellIndex                    ServCellIndex                                                   OPTIONAL    -- Need S
    ]]


}

CSI-RS-CellMobility ::=             SEQUENCE {
    cellId                              PhysCellId,
    csi-rs-MeasurementBW                SEQUENCE {
        nrofPRBs                            ENUMERATED { size24, size48, size96, size192, size264},
        startPRB                            INTEGER(0..2169)
    },
    density                             ENUMERATED {d1,d3}                                              OPTIONAL,   -- Need R
```

```
    csi-rs-ResourceList-Mobility        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesRRM)) OF CSI-RS-Resource-Mobility
}

CSI-RS-Resource-Mobility ::=        SEQUENCE {
    csi-RS-Index                        CSI-RS-Index,
    slotConfig                          CHOICE {
        ms4                                 INTEGER (0..31),
        ms5                                 INTEGER (0..39),
        ms10                                INTEGER (0..79),
        ms20                                INTEGER (0..159),
        ms40                                INTEGER (0..319)
    },
    associatedSSB                       SEQUENCE {
        ssb-Index                           SSB-Index,
        isQuasiColocated                    BOOLEAN
    }                                                                                   OPTIONAL, -- Need R
    frequencyDomainAllocation           CHOICE {
        row1                                BIT STRING (SIZE (4)),
        row2                                BIT STRING (SIZE (12))
    },
    firstOFDMSymbolInTimeDomain         INTEGER (0..13),
    sequenceGenerationConfig            INTEGER (0..1023),
    ...,
    [[
    slotConfig-r17                      CHOICE {
        ms4                                 INTEGER (0..255),
        ms5                                 INTEGER (0..319),
        ms10                                INTEGER (0..639),
        ms20                                INTEGER (0..1279),
        ms40                                INTEGER (0..2559)
    }                                                                                   OPTIONAL  -- Need R
    ]]
}

CSI-RS-Index ::=                    INTEGER (0..maxNrofCSI-RS-ResourcesRRM-1)

-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-STOP
-- ASN1STOP
```

***CSI-RS-CellMobility* field descriptions**
csi-rs-ResourceList-Mobility List of CSI-RS resources for mobility. The maximum number of CSI-RS resources that can be configured per *measObjectNR* depends on the configuration of *associatedSSB* and the support of *increasedNumberofCSIRSPerMO* capability (see TS 38.214 [19], clause 5.1.6.1.3).
density Frequency domain density for the 1-port CSI-RS for L3 mobility. See TS 38.211 [16], clause 7.4.1.
nrofPRBs Allowed size of the measurement BW in PRBs. See TS 38.211 [16], clause 7.4.1.
startPRB Starting PRB index of the measurement bandwidth. See TS 38.211 [16], clause 7.4.1.

***CSI-RS-ResourceConfigMobility* field descriptions**
csi-RS-CellList-Mobility List of cells for CSI-RS based RRM measurements.
refServCellIndex Indicates the serving cell providing the timing reference for CSI-RS resources without *associatedSSB*. The field may be present only if there is at least one CSI-RS resource configured without *associatedSSB*. If this field is absent, the UE shall use the timing of the PCell for measurements on the CSI-RS resources without *associatedSSB*. The CSI-RS resources and the serving cell indicated by *refServCellIndex* for timing reference should be located in the same band.
subcarrierSpacing Subcarrier spacing of CSI-RS. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

***CSI-RS-Resource-Mobility* field descriptions**
associatedSSB If this field is present, the UE may base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the cell indicated by the *cellId* in the *CSI-RS-CellMobility*. In this case, the UE is not required to monitor that CSI-RS resource if the UE cannot detect the SS/PBCH block indicated by this *associatedSSB* and *cellId*. If this field is absent, the UE shall base the timing of the CSI-RS resource indicated in *CSI-RS-Resource-Mobility* on the timing of the serving cell indicated by *refServCellIndex*. In this case, the UE is required to measure the CSI-RS resource even if SS/PBCH block(s) with *cellId* in the *CSI-RS-CellMobility* are not detected. CSI-RS resources with and without *associatedSSB* may be configured in accordance with the rules in TS 38.214 [19], clause 5.1.6.1.3.
csi-RS-Index CSI-RS resource index associated to the CSI-RS resource to be measured (and used for reporting).
firstOFDMSymbolInTimeDomain Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS, see TS 38.211 [16], clause 7.4.1.5.3.
frequencyDomainAllocation Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3 including table 7.4.1.5.2-1. The number of bits that may be set to one depend on the chosen row in that table.
isQuasiColocated Indicates that the CSI-RS resource is quasi co-located with the associated SS/PBCH block, see TS 38.214 [19], clause 5.1.6.1.3.
sequenceGenerationConfig Scrambling ID for CSI-RS (see TS 38.211 [16], clause 7.4.1.5.2).
slotConfig Indicates the CSI-RS periodicity (in milliseconds) and for each periodicity the offset (in number of slots). When *subcarrierSpacing* is set to *kHz15*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 3/4/9/19/39 slots. When *subcarrierSpacing* is set to *kHz30*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 7/9/19/39/79 slots. When *subcarrierSpacing* is set to *kHz60*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 15/19/39/79/159 slots. When *subcarrierSpacing* is set *kHz120*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 31/39/79/159/319 slots. When *subcarrierSpacing* is set to *kHz480*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 127/159/319/639/1279 slots. When *subcarrierSpacing* is set to *kHz960*, the maximum offset values for periodicities *ms4/ms5/ms10/ms20/ms40* are 255/319/639/1279/2559 slots. If *slotConfig-r17* is present, UE shall ignore the *slotConfig* (without suffix).

– *CSI-RS-ResourceMapping*

The IE *CSI-RS-ResourceMapping* is used to configure the resource element mapping of a CSI-RS resource in time- and frequency domain.

CSI-RS-ResourceMapping information element

```
-- ASN1START
-- TAG-CSI-RS-RESOURCEMAPPING-START

CSI-RS-ResourceMapping ::=          SEQUENCE {
    frequencyDomainAllocation           CHOICE {
        row1                                BIT STRING (SIZE (4)),
        row2                                BIT STRING (SIZE (12)),
        row4                                BIT STRING (SIZE (3)),
        other                               BIT STRING (SIZE (6))
    },
    nrofPorts                           ENUMERATED {p1,p2,p4,p8,p12,p16,p24,p32},
    firstOFDMSymbolInTimeDomain         INTEGER (0..13),
    firstOFDMSymbolInTimeDomain2        INTEGER (2..12)                                 OPTIONAL,   -- Need R
    cdm-Type                            ENUMERATED {noCDM, fd-CDM2, cdm4-FD2-TD2, cdm8-FD2-TD4},
    density                             CHOICE {
        dot5                                ENUMERATED {evenPRBs, oddPRBs},
        one                                 NULL,
        three                               NULL,
        spare                               NULL
    },
    freqBand                            CSI-FrequencyOccupation,
    ...
}

-- TAG-CSI-RS-RESOURCEMAPPING-STOP
-- ASN1STOP
```

***CSI-RS-ResourceMapping* field descriptions**
cdm-Type CDM type (see TS 38.214 [19], clause 5.2.2.3.1).
density Density of CSI-RS resource measured in RE/port/PRB (see TS 38.211 [16], clause 7.4.1.5.3). Values 0.5 (*dot5*), 1 (*one*) and 3 (*three*) are allowed for X=1, values 0.5 (*dot5*) and 1 (*one*) are allowed for X=2, 16, 24 and 32, value 1 (*one*) is allowed for X=4, 8, 12. For density = 1/2, includes 1-bit indication for RB level comb offset indicating whether odd or even RBs are occupied by CSI-RS.
firstOFDMSymbolInTimeDomain2 Time domain allocation within a physical resource block. See TS 38.211 [16], clause 7.4.1.5.3.
firstOFDMSymbolInTimeDomain Time domain allocation within a physical resource block. The field indicates the first OFDM symbol in the PRB used for CSI-RS. See TS 38.211 [16], clause 7.4.1.5.3.
freqBand Wideband or partial band CSI-RS, (see TS 38.214 [19], clause 5.2.2.3.1).
frequencyDomainAllocation Frequency domain allocation within a physical resource block in accordance with TS 38.211 [16], clause 7.4.1.5.3. The applicable row number in table 7.4.1.5.3-1 is determined by the *frequencyDomainAllocation* for rows 1, 2 and 4, and for other rows by matching the values in the column Ports, Density and CDMtype in table 7.4.1.5.3-1 with the values of *nrofPorts*, *cdm-Type* and density below and, when more than one row has the 3 values matching, by selecting the row where the column (k bar, l bar) in table 7.4.1.5.3-1 has indexes for k ranging from 0 to 2*n-1 where n is the number of bits set to 1 in *frequencyDomainAllocation*.
nrofPorts Number of ports (see TS 38.214 [19], clause 5.2.2.3.1).

– *CSI-SemiPersistentOnPUSCH-TriggerStateList*

The *CSI-SemiPersistentOnPUSCH-TriggerStateList* IE is used to configure the UE with list of trigger states for semi-persistent reporting of channel state information on L1. See also TS 38.214 [19], clause 5.2.

***CSI-SemiPersistentOnPUSCH-TriggerStateList* information element**

```
-- ASN1START
-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-START

CSI-SemiPersistentOnPUSCH-TriggerStateList ::= SEQUENCE(SIZE (1..maxNrOfSemiPersistentPUSCH-Triggers)) OF CSI-SemiPersistentOnPUSCH-TriggerState

CSI-SemiPersistentOnPUSCH-TriggerState ::=     SEQUENCE {
    associatedReportConfigInfo                    CSI-ReportConfigId,
    ...,
    [[
    sp-CSI-MultiplexingMode-r17                ENUMERATED {enabled}                                    OPTIONAL   -- Need R
    ]]
}

-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-STOP
-- ASN1STOP
```

CSI-SemiPersistentOnPUSCH-TriggerStateList field descriptions
sp-CSI-MultiplexingMode
Indicates if the behavior of transmitting SP-CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' is enabled or not.

– *CSI-SSB-ResourceSet*

The IE *CSI-SSB-ResourceSet* is used to configure one SS/PBCH block resource set which refers to SS/PBCH as indicated in *ServingCellConfigCommon* and *ServingCellConfig*.

CSI-SSB-ResourceSet information element

```
-- ASN1START
-- TAG-CSI-SSB-RESOURCESET-START

CSI-SSB-ResourceSet ::=             SEQUENCE {
    csi-SSB-ResourceSetId               CSI-SSB-ResourceSetId,
    csi-SSB-ResourceList                SEQUENCE (SIZE(1..maxNrofCSI-SSB-ResourcePerSet)) OF SSB-Index,
    ...,
    [[
    servingAdditionalPCIList-r17        SEQUENCE (SIZE(1..maxNrofCSI-SSB-ResourcePerSet)) OF ServingAdditionalPCIIndex-r17  OPTIONAL  -- Need R
    ]]
}

ServingAdditionalPCIIndex-r17  ::=  INTEGER(0..maxNrofAdditionalPCI-r17)

-- TAG-CSI-SSB-RESOURCESET-STOP
-- ASN1STOP
```

CSI-SSB-ResourceSet field descriptions
servingAdditionalPCIList
Indicates the physical cell IDs (PCI) of the SSBs in the *csi-SSB-ResourceList*. If present, the list has the same number of entries as *csi-SSB-ResourceList*. The first entry of the list indicates the value of the PCI for the first entry of *csi-SSB-ResourceList*, the second entry of this list indicates the value of the PCI for the second entry of *csi-SSB-ResourceList*, and so on. For each entry, the following applies: - If the value is zero, the PCI is the PCI of the serving cell in which this *CSI-SSB-ResourceSet* is defined; - otherwise, the value is *additionalPCIIndex-r17* of an *SSB-MTC-AdditionalPCI-r17* configured using the *additionalPCI-ToAddModList-r17* in *ServingCellConfig*, and the PCI is the *additionalPCI-r17* in this *SSB-MTC-AdditionalPCI-r17*.

– *CSI-SSB-ResourceSetId*

The IE *CSI-SSB-ResourceSetId* is used to identify one SS/PBCH block resource set.

CSI-SSB-ResourceId information element

```
-- ASN1START
```

```
-- TAG-CSI-SSB-RESOURCESETID-START

CSI-SSB-ResourceSetId ::=           INTEGER (0..maxNrofCSI-SSB-ResourceSets-1)

-- TAG-CSI-SSB-RESOURCESETID-STOP
-- ASN1STOP
```

– *DedicatedNAS-Message*

The IE *DedicatedNAS-Message* is used to transfer UE specific NAS layer information between the 5GC CN and the UE. The RRC layer is transparent for this information.

DedicatedNAS-Message information element

```
-- ASN1START
-- TAG-DEDICATED-NAS-MESSAGE-START

DedicatedNAS-Message ::=        OCTET STRING

-- TAG-DEDICATED-NAS-MESSAGE-STOP
-- ASN1STOP
```

– *DL-PPW-PreConfig*

The IE *DL-PPW-PreConfig* provides configuration for a measurement window where a UE is expected to measure the DL PRS, if it is inside the active DL BWP and with the same numerology as the active DL BWP. Based upon the indication received in the configuration, the UE identifies whether the DL PRS priority is higher than that of the other DL signals or channels and accordingly determines, for example, the UE is expected to measure the DL PRS and is not expected to receive other DL signals and channels.

DL-PPW-PreConfig information element

```
-- ASN1START
-- TAG-DL-PPW-PRECONFIG-START

DL-PPW-PreConfig-r17 ::= SEQUENCE {
    dl-PPW-ID-r17           DL-PPW-ID-r17,
    dl-PPW-PeriodicityAndStartSlot-r17     DL-PPW-PeriodicityAndStartSlot-r17,
    length-r17                               INTEGER (1..160),
    type-r17                                 ENUMERATED {type1A, type1B, type2}                    OPTIONAL, -- Cond MultiType
    priority-r17                             ENUMERATED {st1, st2, st3}                            OPTIONAL  -- Cond MultiState
}

DL-PPW-ID-r17 ::= INTEGER  (0..maxNrofPPW-ID-1-r17)

DL-PPW-PeriodicityAndStartSlot-r17 ::= CHOICE {
    scs15                                    CHOICE {
                        n4                       INTEGER (0..3),
                        n5                       INTEGER (0..4),
                        n8                       INTEGER (0..7),
```

```
                    n10                     INTEGER (0..9),
                    n16                     INTEGER (0..15),
                    n20                     INTEGER (0..19),
                    n32                     INTEGER (0..31),
                    n40                     INTEGER (0..39),
                    n64                     INTEGER (0..63),
                    n80                     INTEGER (0..79),
                    n160                    INTEGER (0..159),
                    n320                    INTEGER (0..319),
                    n640                    INTEGER (0..639),
                    n1280                   INTEGER (0..1279),
                    n2560                   INTEGER (0..2559),
                    n5120                   INTEGER (0..5119),
                    n10240                  INTEGER (0..10239),
                   ...
    },
    scs30                               CHOICE {
                    n8                      INTEGER (0..7),
                    n10                     INTEGER (0..9),
                    n16                     INTEGER (0..15),
                    n20                     INTEGER (0..19),
                    n32                     INTEGER (0..31),
                    n40                     INTEGER (0..39),
                    n64                     INTEGER (0..63),
                    n80                     INTEGER (0..79),
                    n128                    INTEGER (0..127),
                    n160                    INTEGER (0..159),
                    n320                    INTEGER (0..319),
                    n640                    INTEGER (0..639),
                    n1280                   INTEGER (0..1279),
                    n2560                   INTEGER (0..2559),
                    n5120                   INTEGER (0..5119),
                    n10240                  INTEGER (0..10239),
                    n20480                  INTEGER (0..20479),
                    ...
    },
    scs60                               CHOICE {
                    n16                     INTEGER (0..15),
                    n20                     INTEGER (0..19),
                    n32                     INTEGER (0..31),
                    n40                     INTEGER (0..39),
                    n64                     INTEGER (0..63),
                    n80                     INTEGER (0..79),
                    n128                    INTEGER (0..127),
                    n160                    INTEGER (0..159),
                    n256                    INTEGER (0..255),
                    n320                    INTEGER (0..319),
                    n640                    INTEGER (0..639),
                    n1280                   INTEGER (0..1279),
                    n2560                   INTEGER (0..2559),
                    n5120                   INTEGER (0..5119),
                    n10240                  INTEGER (0..10239),
                    n20480                  INTEGER (0..20479),
                    n40960                  INTEGER (0..40959),
```

```
                    ...
    },
    scs120                                  CHOICE {
                    n32                         INTEGER (0..31),
                    n40                         INTEGER (0..39),
                    n64                         INTEGER (0..63),
                    n80                         INTEGER (0..79),
                    n128                        INTEGER (0..127),
                    n160                        INTEGER (0..159),
                    n256                        INTEGER (0..255),
                    n320                        INTEGER (0..319),
                    n512                        INTEGER (0..511),
                    n640                        INTEGER (0..639),
                    n1280                       INTEGER (0..1279),
                    n2560                       INTEGER (0..2559),
                    n5120                       INTEGER (0..5119),
                    n10240                      INTEGER (0..10239),
                    n20480                      INTEGER (0..20479),
                    n40960                      INTEGER (0..40959),
                    n81920                      INTEGER (0..81919),
                   ...
    },
    ...
}

-- TAG-DL-PPW-PRECONFIG-STOP
-- ASN1STOP
```

***DL-PPW-PreConfig* field descriptions**
dl-PPW-ID Indicates the pre-configured ID for DL-PRS processing window configuration.
dl-PPW-PeriodicityAndStartSlot Indicates the periodicity in slots and the offset of the starting slot with respect to SFN #0 slot #0 of the serving cell where the DL-PRS processing window is configured.
length Indicates the length of DL-PRS processing window in slots. Value 1 indicates *length* of one slot, value 2 indicates *length* of two slots and so on.
priority Indicates the priority between PDCCH/PDSCH/CSI-RS and PRS as specified in TS 38.214 [19].
type Indicates the DL-PRS processing window type as specified in TS 38.214 [19].

Conditional Presence	Explanation
MultiType	The field is mandatory present when the UE reports its capability on supporting multiple processing types, otherwise it is absent.
MultiState	The field is mandatory present when the UE reports its capability on supporting option 1 or option 2 for the configured type, otherwise it is absent.

– *DMRS-BundlingPUCCH-Config*

The IE *DMRS-BundlingPUCCH-Config-r17* is used to configure DMRS bundling for PUCCH.

DMRS-BundlingPUCCH-Config information element

```
-- ASN1START
-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-START

DMRS-BundlingPUCCH-Config-r17 ::=         SEQUENCE {
    pucch-DMRS-Bundling-r17                   ENUMERATED {enabled}                                  OPTIONAL,   -- Need R
    pucch-TimeDomainWindowLength-r17          INTEGER (2..8)                                        OPTIONAL,   -- Need S
    pucch-WindowRestart-r17                   ENUMERATED {enabled}                                  OPTIONAL,   -- Need R
    pucch-FrequencyHoppingInterval-r17        ENUMERATED {s2, s4, s5, s10}                          OPTIONAL,   -- Need S
    ...
}

-- TAG-DMRS-BUNDLINGPUCCH-CONFIG-STOP
-- ASN1STOP
```

***DMRS-BundlingPUCCH-Config* field descriptions**
pucch-DMRS-Bundling Indicates whether DMRS bundling and time domain window for PUCCH are jointly enabled.
pucch-FrequencyHoppingInterval Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUCCH. When both inter-frequency hopping and DMRS bundling are enabled for PUCCH repetitions, the UE is expected to be configured with at least one *pucch-FrequencyHoppingInterval-r17* and *pucch-TimeDomainWindowLength-r17*. When DMRS bundling for PUCCH is enabled by *pucch-DMRS-Bundling-r17,* PUCCH frequency hopping interval is only determined by the configuration of PUCCH hopping interval if PUCCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUCCH frequency hopping is indicated by *pucch-TimeDomainWindowLength-r17.*
pucch-TimeDomainWindowLength Configures the length of a nominal time domain window in slots for DMRS bundling for PUCCH. The value shall not exceed the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26]. If this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUCCH repetitions and the maximum duration for DMRS bundling for PUCCH as specified in TS 38.306 [26].
pucch-WindowRestart Indicates whether UE bundles PUCCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7). NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded.

– *DMRS-BundlingPUSCH-Config*

The IE *DMRS-BundlingPUSCH-Config-r17* is used to configure DMRS bundling for PUSCH.

DMRS-BundlingPUSCH-Config information element

```
-- ASN1START
-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-START

DMRS-BundlingPUSCH-Config-r17 ::=          SEQUENCE {
    pusch-DMRS-Bundling-r17                    ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    pusch-TimeDomainWindowLength-r17           INTEGER (2..32)                                         OPTIONAL,   -- Need S
    pusch-WindowRestart-r17                    ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    pusch-FrequencyHoppingInterval-r17         ENUMERATED {s2, s4, s5, s6, s8, s10, s12, s14, s16, s20}  OPTIONAL,   -- Need S
    ...
}

-- TAG-DMRS-BUNDLINGPUSCH-CONFIG-STOP
-- ASN1STOP
```

DMRS-BundlingPUSCH-Config field descriptions
pusch-DMRS-Bundling Indicates whether DMRS bundling and time domain window for PUSCH are jointly enabled.
pusch-FrequencyHoppingInterval Configures the number of consecutive slots for the UE to perform inter-slot frequency hopping with inter-slot bundling for PUSCH. When both inter-frequency hopping and DMRS bundling are enabled for PUSCH repetitions, the UE is expected to be configured with at least one *pusch-FrequencyHoppingInterval-r17* and *pusch-TimeDomainWindowLength-r17*. This parameter is shared for both DG-PUSCH and CG-PUSCH. When DMRS bundling for PUSCH is enabled by *pusch-DMRS-Bundling-r17,* PUSCH frequency hopping interval is only determined by the configuration of PUSCH hopping interval if PUSCH hopping interval is configured. If the field is absent, the number of consecutive slots for the UE to perform inter-slot PUSCH frequency hopping is indicated by *pusch-TimeDomainWindowLength-r17.* Note: For unpaired spectrum, the UE is not expected to be configured the value of s6, s8, s12, s14 and s16.
pusch-TimeDomainWindowLength Configures the length of a nominal time domain window in number of consecutive slots for DMRS bundling for PUSCH. The value shall not exceed the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For PUSCH repetition type A/B, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the time duration for the transmission of all PUSCH repetitions and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26]. For TBoMS, if this field is absent, the UE shall apply the default value that is the minimum value in the unit of consecutive slots of the duration of TBoMS transmission (including repetition of TBoMS) and the maximum duration for DMRS bundling for PUSCH as specified in TS 38.306 [26].
pusch-WindowRestart Indicates whether UE bundles PUSCH DMRS remaining in a nominal time domain window after event(s) triggered by DCI or MAC CE that violate power consistency and phase continuity requirements is enabled (see TS 38.214 [19], clause 6.1.7). NOTE: Events, which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in clause 6.1.7 of TS 38.214 [19], are excluded.

– *DMRS-DownlinkConfig*

The IE *DMRS-DownlinkConfig* is used to configure downlink demodulation reference signals for PDSCH.

DMRS-DownlinkConfig information element

```
-- ASN1START
-- TAG-DMRS-DOWNLINKCONFIG-START
```

```
DMRS-DownlinkConfig ::=             SEQUENCE {
    dmrs-Type                           ENUMERATED {type2}                                  OPTIONAL,   -- Need S
    dmrs-AdditionalPosition             ENUMERATED {pos0, pos1, pos3}                       OPTIONAL,   -- Need S
    maxLength                           ENUMERATED {len2}                                   OPTIONAL,   -- Need S
    scramblingID0                       INTEGER (0..65535)                                  OPTIONAL,   -- Need S
    scramblingID1                       INTEGER (0..65535)                                  OPTIONAL,   -- Need S
    phaseTrackingRS                     SetupRelease { PTRS-DownlinkConfig  }               OPTIONAL,   -- Need M
    ...,
    [[
    dmrs-Downlink-r16               ENUMERATED {enabled}                                    OPTIONAL    -- Need R
    ]]

}

-- TAG-DMRS-DOWNLINKCONFIG-STOP
-- ASN1STOP
```

***DMRS-DownlinkConfig* field descriptions**
dmrs-AdditionalPosition Position for additional DM-RS in DL, see Tables 7.4.1.1.2-3 and 7.4.1.1.2-4 in TS 38.211 [16]. If the field is absent, the UE applies the value pos2. See also clause 7.4.1.1.2 for additional constraints on how the network may set this field depending on the setting of other fields.
dmrs-Downlink This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 7.4.1.1.1.
dmrs-Type Selection of the DMRS type to be used for DL (see TS 38.211 [16], clause 7.4.1.1.1). If the field is absent, the UE uses DMRS type 1.
maxLength The maximum number of OFDM symbols for DL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 7.4.1.1.2).
phaseTrackingRS Configures downlink PTRS. If the field is not configured, the UE assumes that downlink PTRS are absent. See TS 38.214 [19] clause 5.1.6.3.
scramblingID0 DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell.
scramblingID1 DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell.

– *DMRS-UplinkConfig*

The IE *DMRS-UplinkConfig* is used to configure uplink demodulation reference signals for PUSCH.

***DMRS-UplinkConfig* information element**

```
-- ASN1START
-- TAG-DMRS-UPLINKCONFIG-START

DMRS-UplinkConfig ::=               SEQUENCE {
    dmrs-Type                           ENUMERATED {type2}                                  OPTIONAL,   -- Need S
```

```
    dmrs-AdditionalPosition             ENUMERATED {pos0, pos1, pos3}                                   OPTIONAL,   -- Need S
    phaseTrackingRS                     SetupRelease { PTRS-UplinkConfig }                              OPTIONAL,   -- Need M
    maxLength                           ENUMERATED {len2}                                               OPTIONAL,   -- Need S
    transformPrecodingDisabled          SEQUENCE {
        scramblingID0                       INTEGER (0..65535)                                          OPTIONAL,   -- Need S
        scramblingID1                       INTEGER (0..65535)                                          OPTIONAL,   -- Need S
        ...,
        [[
        dmrs-Uplink-r16                     ENUMERATED {enabled}                                        OPTIONAL    -- Need R
        ]]
    }                                                                                                   OPTIONAL,   -- Need R
    transformPrecodingEnabled           SEQUENCE {
        nPUSCH-Identity                     INTEGER(0..1007)                                            OPTIONAL,   -- Need S
        sequenceGroupHopping                ENUMERATED {disabled}                                       OPTIONAL,   -- Need S
        sequenceHopping                     ENUMERATED {enabled}                                        OPTIONAL,   -- Need S
        ...,
        [[
        dmrs-UplinkTransformPrecoding-r16   SetupRelease {DMRS-UplinkTransformPrecoding-r16}            OPTIONAL    -- Need M
        ]]
    }                                                                                                   OPTIONAL,   -- Need R
    ...
}

DMRS-UplinkTransformPrecoding-r16  ::=  SEQUENCE {
    pi2BPSK-ScramblingID0               INTEGER(0..65535)                                               OPTIONAL,   -- Need S
    pi2BPSK-ScramblingID1               INTEGER(0..65535)                                               OPTIONAL    -- Need S
}

-- TAG-DMRS-UPLINKCONFIG-STOP
-- ASN1STOP
```

***DMRS-UplinkConfig* field descriptions**
dmrs-AdditionalPosition Position for additional DM-RS in UL (see TS 38.211 [16], clause 6.4.1.1.3). If the field is absent, the UE applies the value pos2. See also clause 6.4.1.1.3 for additional constraints on how the network may set this field depending on the setting of other fields.
dmrs-Type Selection of the DMRS type to be used for UL (see TS 38.211 [16], clause 6.4.1.1.3) If the field is absent, the UE uses DMRS type 1.
dmrs-Uplink This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 6.4.1.1.1.1.
dmrs-UplinkTransformPrecoding This field indicates whether low PAPR DMRS is used for PUSCH with pi/2 BPSK modulation, as specified in TS38.211 [16], clause 6.4.1.1.1.2. The network configures this field only if *tp-pi2BPSK* is configured in *PUSCH-Config*.
maxLength The maximum number of OFDM symbols for UL front loaded DMRS. *len1* corresponds to value 1. *len2* corresponds to value 2. If the field is absent, the UE applies value *len1*. If set to *len2*, the UE determines the actual number of DM-RS symbols by the associated DCI. (see TS 38.211 [16], clause 6.4.1.1.3).
nPUSCH-Identity Parameter: N_ID^(PUSCH) for DFT-s-OFDM DMRS. If the value is absent or released, the UE uses the value Physical cell ID (*physCellId*). See TS 38.211 [16].
phaseTrackingRS Configures uplink PTRS (see TS 38.211 [16]).
pi2BPSK-ScramblingID0, pi2BPSK-ScramblingID1 UL DMRS scrambling initialization for pi/2 BPSK DMRS for PUSCH (see TS 38.211 [16], Clause 6.4.1.1.2). When the field is absent the UE applies the value Physical cell ID (physCellId) of the serving cell.
scramblingID0 UL DMRS scrambling initialization for CP-OFDM (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (*physCellId*).
scramblingID1 UL DMRS scrambling initialization for CP-OFDM. (see TS 38.211 [16], clause 6.4.1.1.1.1). When the field is absent the UE applies the value Physical cell ID (*physCellId*).
sequenceGroupHopping For DMRS transmission with transform precoder the NW may configure group hopping by the cell-specific parameter *groupHoppingEnabledTransformPrecoding* in *PUSCH-ConfigCommon*. In this case, the NW may include this UE specific field to disable group hopping for PUSCH transmission except for Msg3, i.e., to override the configuration in *PUSCH-ConfigCommon* (see TS 38.211 [16]). If the field is absent, the UE uses the same hopping mode as for Msg3.
sequenceHopping Determines if sequence hopping is enabled for DMRS transmission with transform precoder for PUSCH transmission other than Msg3 (sequence hopping is always disabled for Msg3). If the field is absent, the UE uses the same hopping mode as for msg3. The network does not configure simultaneous group hopping and sequence hopping. See TS 38.211 [16], clause 6.4.1.1.1.2.
transformPrecodingDisabled DMRS related parameters for Cyclic Prefix OFDM.
transformPrecodingEnabled DMRS related parameters for DFT-s-OFDM (Transform Precoding).

– *DownlinkConfigCommon*

The IE *DownlinkConfigCommon* provides common downlink parameters of a cell.

***DownlinkConfigCommon* information element**

```
-- ASN1START
```

```
-- TAG-DOWNLINKCONFIGCOMMON-START

DownlinkConfigCommon ::=        SEQUENCE {
    frequencyInfoDL                 FrequencyInfoDL                                 OPTIONAL,   -- Cond InterFreqHOAndServCellAdd
    initialDownlinkBWP              BWP-DownlinkCommon                              OPTIONAL,   -- Cond ServCellAdd
    ...,
    [[
    initialDownlinkBWP-RedCap-r17   BWP-DownlinkCommon                              OPTIONAL    -- Need R

    ]]
}

-- TAG-DOWNLINKCONFIGCOMMON-STOP
-- ASN1STOP
```

***DownlinkConfigCommon* field descriptions**
frequencyInfoDL Basic parameters of a downlink carrier and transmission thereon.
initialDownlinkBWP The initial downlink BWP configuration for a serving cell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain.
initialDownlinkBWP-RedCap If present, RedCap UEs use this DL BWP instead of *initialDownlinkBWP*. If absent, RedCap UEs use *initialDownlinkBWP* provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Conditional Presence	Explanation
InterFreqHOAndServCellAdd	This field is mandatory present for inter-frequency handover, and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally present, Need M.
ServCellAdd	This field is mandatory present upon serving cell addition (for PSCell and SCell) and upon handover from E-UTRA to NR. It is optionally present, Need M otherwise.

– *DownlinkConfigCommonSIB*

The IE *DownlinkConfigCommonSIB* provides common downlink parameters of a cell.

ASN1START
TAG-DOWNLINKCONFIGCOMMONSIB-START

***DownlinkConfigCommonSIB* information element**

```
-- ASN1START
-- TAG-DOWNLINKCONFIGCOMMONSIB-START

DownlinkConfigCommonSIB ::=     SEQUENCE {
    frequencyInfoDL                 FrequencyInfoDL-SIB,
    initialDownlinkBWP              BWP-DownlinkCommon,
    bcch-Config                     BCCH-Config,
    pcch-Config                     PCCH-Config,
    ...,
```

```
    [[
    pei-Config-r17                  PEI-Config-r17                      OPTIONAL,      -- Need R
    initialDownlinkBWP-RedCap-r17   BWP-DownlinkCommon                  OPTIONAL       -- Need R
    ]]
}

DownlinkConfigCommonSIB-v1760 ::=   SEQUENCE {
    frequencyInfoDL-v1760               FrequencyInfoDL-SIB-v1760
}

BCCH-Config ::=                 SEQUENCE {
    modificationPeriodCoeff         ENUMERATED {n2, n4, n8, n16},
    ...
}


PCCH-Config ::=             SEQUENCE {
    defaultPagingCycle                  PagingCycle,
    nAndPagingFrameOffset               CHOICE {
        oneT                                NULL,
        halfT                               INTEGER (0..1),
        quarterT                            INTEGER (0..3),
        oneEighthT                          INTEGER (0..7),
        oneSixteenthT                       INTEGER (0..15)
    },
    ns                                  ENUMERATED {four, two, one},
    firstPDCCH-MonitoringOccasionOfPO   CHOICE {
        sCS15KHZoneT                                                                    SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),
        sCS30KHZoneT-SCS15KHZhalfT                                                      SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),
        sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT                                     SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),
        sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT                 SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),
        sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT        SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),
        sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT        SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),
        sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT                        SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),
        sCS480KHZquarterT-SCS120KHZoneSixteenthT                                        SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)
    }       OPTIONAL,           -- Need R
    ...,
    [[
    nrofPDCCH-MonitoringOccasionPerSSB-InPO-r16         INTEGER (2..4)              OPTIONAL  -- Cond SharedSpectrum2
    ]],
    [[
    ranPagingInIdlePO-r17                               ENUMERATED {true}           OPTIONAL,  -- Need R

    firstPDCCH-MonitoringOccasionOfPO-v1710  CHOICE {
       sCS480KHZoneEighthT          SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
       sCS480KHZoneSixteenthT       SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
}                                                                                   OPTIONAL  -- Need R
    ]]
}

PEI-Config-r17 ::=                      SEQUENCE {
    po-NumPerPEI-r17                        ENUMERATED {po1, po2, po4, po8},
    payloadSizeDCI-2-7-r17                  INTEGER (1..maxDCI-2-7-Size-r17),
    pei-FrameOffset-r17                     INTEGER (0..16),
```

```
    subgroupConfig-r17                      SubgroupConfig-r17,
    lastUsedCellOnly-r17                    ENUMERATED {true}                                   OPTIONAL,  -- Need R
    ...
}

SubgroupConfig-r17 ::=     SEQUENCE {
    subgroupsNumPerPO-r17       INTEGER (1.. maxNrofPagingSubgroups-r17),
    subgroupsNumForUEID-r17     INTEGER (1.. maxNrofPagingSubgroups-r17)                        OPTIONAL,  -- Need S
    ...
}

-- TAG-DOWNLINKCONFIGCOMMONSIB-STOP
-- ASN1STOP
```

***DownlinkConfigCommonSIB* field descriptions**
bcch-Config The modification period related configuration.
frequencyInfoDL-SIB Basic parameters of a downlink carrier and transmission thereon.
initialDownlinkBWP The initial downlink BWP configuration for a PCell. The network configures the *locationAndBandwidth* so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. The UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup*/*RRCResume/RRCReestablishment*.
initialDownlinkBWP-RedCap If present, RedCap UEs use this DL BWP instead of *initialDownlinkBWP*. If the *locationAndBandwidth* of this BWP contains the entire CORESET#0, the UE applies the *locationAndBandwidth* upon reception of this field (e.g. to determine the frequency position of signals described in relation to this *locationAndBandwidth*) but it keeps CORESET#0 until after reception of *RRCSetup*/*RRCResume/RRCReestablishment*. Otherwise, i.e., if the *locationAndBandwidth* of this BWP does not contain the entire CORESET#0, the UE uses this BWP for receiving DL messages during initial access (Msg2, MsgB, Msg4) and after initial access. If absent, RedCap UEs use *initialDownlinkBWP* provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).
lastUsedCellOnly When present, the field indicates that the UE monitors PEI only if the latest received *RRCRelease* without *noLastCellUpdate* is from this cell. A PEI-capable UE stores its last used cell information.
nrofPDCCH-MonitoringOccasionPerSSB-InPO The number of PDCCH monitoring occasions corresponding to an SSB within a Paging Occasion, see TS 38.304 [20], clause 7.1.
pcch-Config The paging related configuration.
pei-Config The PEI related configuration.
subgroupConfig The paging subgroup related configuration.

***BCCH-Config* field descriptions**
modificationPeriodCoeff Actual modification period, expressed in number of radio frames m = *modificationPeriodCoeff * defaultPagingCycle*, see clause 5.2.2.2.2. *n2* corresponds to value 2, *n4* corresponds to value 4, and so on.

***PCCH-Config* field descriptions**
defaultPagingCycle Default paging cycle, used to derive 'T' in TS 38.304 [20]. Value *rf32* corresponds to 32 radio frames, value *rf64* corresponds to 64 radio frames and so on.
firstPDCCH-MonitoringOccasionOfPO Points out the first PDCCH monitoring occasion for paging of each PO of the PF, see TS 38.304 [20].
nAndPagingFrameOffset Used to derive the number of total paging frames in T (corresponding to parameter N in TS 38.304 [20]) and paging frame offset (corresponding to parameter PF_offset in TS 38.304 [20]). A value of *oneSixteenthT* corresponds to T / 16, a value of oneEighthT corresponds to T / 8, and so on. If *pagingSearchSpace* is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 2 or 3 (as specified in TS 38.213 [13]): - for *ssb-periodicityServingCell* of 5 or 10 ms, N can be set to one of {*oneT, halfT, quarterT, oneEighthT, oneSixteenthT*} - for *ssb-periodicityServingCell* of 20 ms, N can be set to one of {*halfT, quarterT, oneEighthT, oneSixteenthT*} - for *ssb-periodicityServingCell* of 40 ms, N can be set to one of {*quarterT, oneEighthT, oneSixteenthT*} - for *ssb-periodicityServingCell* of 80 ms, N can be set to one of {*oneEighthT, oneSixteenthT*} - for *ssb-periodicityServingCell* of 160 ms, N can be set to *oneSixteenthT* If *pagingSearchSpace* is set to zero and if SS/PBCH block and CORESET multiplexing pattern is 1 (as specified in TS 38.213 [13]), N can be set to one of {*halfT, quarterT, oneEighthT, oneSixteenthT*} If *pagingSearchSpace* is not set to zero, N can be configured to one of {*oneT, halfT, quarterT, oneEighthT, oneSixteenthT*}
ns Number of paging occasions per paging frame.
ranPagingInIdlePO Indicates that the network supports to send RAN paging in PO that corresponds to the i_s as determined by UE in RRC_IDLE state, see TS38.304 [20].

***PEI-Config* field descriptions**
payloadSizeDCI-2-7 Payload size of PEI DCI, i.e., DCI format 2_7. The size is no larger than the payload size of paging DCI which has maximum of 41 bits and 43 bits for licensed and unlicensed spectrums, respectively.
pei-FrameOffset Offset, in number of frames from the start of a reference frame for PEI-O to the start of a first paging frame of the paging frames associated with the PEI-O, see TS 38.213 [13], clause 10.4A.
po-NumPerPEI The number of PO(s) associated with one PEI monitoring occasion. It is a factor of the total PO number in a paging cycle, i.e N x Ns, as specified in TS 38.304 [20]. The maximum number of PF associated with one PEI monitoring occasion is 2. The number of PO mapping to one PEI should be multiple of Ns when *po-NumPerPEI* is larger than Ns.

***SubgroupConfig* field descriptions**
subgroupsNumPerPO Total number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling. The field represents the sum of CN-assigned and UEID-based subgroups supported by the network. When *PEI-Config* is configured, there is always at least one subgroup (UEID-based subgroup or CN-assigned subgroup) configured.
subgroupsNumForUEID Number of subgroups per Paging Occasion (PO) for UE to read subgroups indication from physical-layer signaling, for UEID-based subgrouping method. When present, the field is set to an integer smaller than or equal to *subgroupsNumPerPO. subgroupsNumPerPO* equals to *subgroupsNumForUEID* when the network does not configure CN-assigned subgrouping. When *pei-Config* is configured, the field is absent when the network only configures CN-assigned subgrouping. Both this field and *subgroupsNumPerPO* are equal to 1 when the network does not configure subgrouping. When *pei-Config* is configured, if the field is absent, the UE uses subgrouping according to TS 38.304 [20], clause 7.3.0.

Conditional Presence	Explanation
SharedSpectrum2	The field is optional present, Need R, if this cell operates with shared spectrum channel access. Otherwise, it is absent, Need R.

– *DownlinkPreemption*

The IE *DownlinkPreemption* is used to configure the UE to monitor PDCCH for the INT-RNTI (interruption).

***DownlinkPreemption* information element**

```
-- ASN1START
-- TAG-DOWNLINKPREEMPTION-START

DownlinkPreemption ::=              SEQUENCE {
    int-RNTI                            RNTI-Value,
    timeFrequencySet                    ENUMERATED {set0, set1},
    dci-PayloadSize                     INTEGER (0..maxINT-DCI-PayloadSize),
    int-ConfigurationPerServingCell     SEQUENCE (SIZE (1..maxNrofServingCells)) OF INT-ConfigurationPerServingCell,
    ...
}

INT-ConfigurationPerServingCell ::= SEQUENCE {
    servingCellId                       ServCellIndex,
    positionInDCI                       INTEGER (0..maxINT-DCI-PayloadSize-1)
}

-- TAG-DOWNLINKPREEMPTION-STOP
-- ASN1STOP
```

***DownlinkPreemption* field descriptions**
dci-PayloadSize Total length of the DCI payload scrambled with INT-RNTI (see TS 38.213 [13], clause 11.2).
int-ConfigurationPerServingCell Indicates (per serving cell) the position of the 14 bit INT values inside the DCI payload (see TS 38.213 [13], clause 11.2).
int-RNTI RNTI used for indication pre-emption in DL (see TS 38.213 [13], clause 10).
timeFrequencySet Set selection for DL-preemption indication (see TS 38.213 [13], clause 11.2) The set determines how the UE interprets the DL preemption DCI payload.

***INT-ConfigurationPerServingCell* field descriptions**
positionInDCI Starting position (in number of bit) of the 14 bit INT value applicable for this serving cell (*servingCellId*) within the DCI payload (see TS 38.213 [13], clause 11.2). Must be multiples of 14 (bit).

– *DRB-Identity*

The IE *DRB-Identity* is used to identify a DRB used by a UE.

DRB-Identity information element

```
-- ASN1START
-- TAG-DRB-IDENTITY-START

DRB-Identity ::=                    INTEGER (1..32)

-- TAG-DRB-IDENTITY-STOP
-- ASN1STOP
```

– *DRX-Config*

The IE *DRX-Config* is used to configure DRX related parameters.

DRX-Config information element

```
-- ASN1START
-- TAG-DRX-CONFIG-START

DRX-Config ::=                      SEQUENCE {
    drx-onDurationTimer                 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 }
                                    },
    drx-InactivityTimer             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},
    drx-HARQ-RTT-TimerDL            INTEGER (0..56),
    drx-HARQ-RTT-TimerUL            INTEGER (0..56),
    drx-RetransmissionTimerDL       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},
    drx-RetransmissionTimerUL       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 },
    drx-LongCycleStartOffset        CHOICE {
        ms10                            INTEGER(0..9),
        ms20                            INTEGER(0..19),
        ms32                            INTEGER(0..31),
        ms40                            INTEGER(0..39),
        ms60                            INTEGER(0..59),
        ms64                            INTEGER(0..63),
        ms70                            INTEGER(0..69),
        ms80                            INTEGER(0..79),
        ms128                           INTEGER(0..127),
        ms160                           INTEGER(0..159),
        ms256                           INTEGER(0..255),
        ms320                           INTEGER(0..319),
        ms512                           INTEGER(0..511),
        ms640                           INTEGER(0..639),
        ms1024                          INTEGER(0..1023),
        ms1280                          INTEGER(0..1279),
        ms2048                          INTEGER(0..2047),
        ms2560                          INTEGER(0..2559),
        ms5120                          INTEGER(0..5119),
        ms10240                         INTEGER(0..10239)
    },
    shortDRX                        SEQUENCE {
        drx-ShortCycle                  ENUMERATED  {
                                            ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                            ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                            spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 },
        drx-ShortCycleTimer             INTEGER (1..16)
    }                                                                                   OPTIONAL,   -- Need R
    drx-SlotOffset                  INTEGER (0..31)
}

DRX-ConfigExt-v1700 ::=             SEQUENCE {
    drx-HARQ-RTT-TimerDL-r17            INTEGER (0..448),
    drx-HARQ-RTT-TimerUL-r17            INTEGER (0..448)
}

-- TAG-DRX-CONFIG-STOP
```

```
-- ASN1STOP
```

***DRX-Config* field descriptions**
drx-HARQ-RTT-TimerDL Value in number of symbols of the BWP where the transport block was received. *drx-HARQ-RTT-TimerDL-r17* is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore *drx-HARQ-RTT-TimerDL* (without suffix) for SCS 480 kHz and 960 kHz.
drx-HARQ-RTT-TimerUL Value in number of symbols of the BWP where the transport block was transmitted. *drx-HARQ-RTT-TimerUL-r17* is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore *drx-HARQ-RTT-TimerUL* (without suffix) for SCS 480 kHz and 960 kHz.
drx-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.
drx-LongCycleStartOffset *drx-LongCycle* in ms and *drx-StartOffset* in multiples of 1 ms. If *drx-ShortCycle* is configured, the value of *drx-LongCycle* shall be a multiple of the *drx-ShortCycle* value.
drx-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.
drx-RetransmissionTimerDL 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.
drx-RetransmissionTimerUL Value in number of slot lengths of the BWP where the transport block was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on.
drx-ShortCycleTimer Value in multiples of *drx-ShortCycle*. A value of 1 corresponds to *drx-ShortCycle*, a value of 2 corresponds to 2 * *drx-ShortCycle* and so on.
drx-ShortCycle Value in ms. *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on.
drx-SlotOffset Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

– *DRX-ConfigSecondaryGroup*

The IE *DRX-ConfigSecondaryGroup* is used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3].

***DRX-ConfigSecondaryGroup* information element**

```
-- ASN1START
-- TAG-DRX-CONFIGSECONDARYGROUP-START

DRX-ConfigSecondaryGroup-r16 ::=   SEQUENCE {
    drx-onDurationTimer-r16            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 }
                                           },
```

```
    drx-InactivityTimer-r16            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}
}

-- TAG-DRX-CONFIGSECONDARYGROUP-STOP
-- ASN1STOP
```

***DRX-ConfigSecondaryGroup* field descriptions**
drx-InactivityTimer
Value in multiple integers of 1 ms. *ms0* corresponds to 0 ms, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a *drx-InactivityTimer* value for the second DRX group that is smaller than the *drx-InactivityTimer* configured for the default DRX group in IE *DRX-Config*.
drx-onDurationTimer
Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSeconds). For the latter, value *ms1* corresponds to 1 ms, value *ms2* corresponds to 2 ms, and so on, as specified in TS 38.321 [3]. The network configures a *drx-onDurationTimer* value for the second DRX group that is smaller than the *drx-onDurationTimer* configured for the default DRX group in IE *DRX-Config*.

– *DRX-ConfigSL*

The IE *DRX-ConfigSL* is used to configure additional DRX parameters for the UE performing sidelink operation with resource allocation mode 1, as specified in TS 38.321 [3].

***DRX-ConfigSL* information element**

```
-- ASN1START
-- TAG-DRX-CONFIGSL-START

DRX-ConfigSL-r17 ::=            SEQUENCE {
    drx-HARQ-RTT-TimerSL-r17        INTEGER (0..56),
    drx-RetransmissionTimerSL-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-DRX-CONFIGSL-STOP
-- ASN1STOP
```

***DRX-ConfigSL* field descriptions**
drx-HARQ-RTT-TimerSL
For sidelink configured grant Type 1, value in number of symbols of the activated DL BWP of PCell. For other cases, value in number of symbols of the BWP where the PDCCH was transmitted. Value 0 is used in case *sl-PUCCH-Config* is not configured and the corresponding resource pool is not configured with PSFCH.
drx-RetransmissionTimerSL
For sidelink configured grant Type 1, value in number of slot lengths of the activated DL BWP of PCell. For other cases, value in number of slot lengths of the BWP where the PDCCH was transmitted. *sl0* corresponds to 0 slots, *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, and so on.

– *EphemerisInfo*

The IE *EphemerisInfo* provides satellite ephemeris. Ephemeris may be expressed either in format of position and velocity state vector in ECEF or in format of orbital parameters in ECI. Note: The ECI and ECEF coincide at *epochTime*, i.e., x,y,z axis in ECEF are aligned with x,y,z axis in ECI at *epochTime*.

EphemerisInfo information element

```
-- ASN1START
-- TAG-EPHEMERISINFO-START

EphemerisInfo-r17 ::=           CHOICE {
    positionVelocity-r17            PositionVelocity-r17,
    orbital-r17                     Orbital-r17
}

PositionVelocity-r17 ::=        SEQUENCE {
    positionX-r17                   PositionStateVector-r17,
    positionY-r17                   PositionStateVector-r17,
    positionZ-r17                   PositionStateVector-r17,
    velocityVX-r17                  VelocityStateVector-r17,
    velocityVY-r17                  VelocityStateVector-r17,
    velocityVZ-r17                  VelocityStateVector-r17
}

Orbital-r17 ::=                 SEQUENCE {
    semiMajorAxis-r17               INTEGER (0..8589934591),
    eccentricity-r17                INTEGER (0..1048575),
    periapsis-r17                   INTEGER (0..268435455),
    longitude-r17                   INTEGER (0..268435455),
    inclination-r17                 INTEGER (-67108864..67108863),
    meanAnomaly-r17                 INTEGER (0..268435455)
}

PositionStateVector-r17 ::= INTEGER (-33554432..33554431)

VelocityStateVector-r17 ::= INTEGER (-131072..131071)

-- TAG-EPHEMERISINFO-STOP
-- ASN1STOP
```

***EphemerisInfo* field descriptions**
eccentricity Satellite orbital parameter: eccentricity e, see NIMA TR 8350.2 [71]. Unit is radian. Step of 1.431 * 10^{-8}. Actual value = field value * (1.431 * 10^{-8}).
inclination Satellite orbital parameter: inclination i, see NIMA TR 8350.2 [71]. Unit is radian. Step of 2.341* 10^{-8} rad. Actual value = field value * (2.341* 10^{-8}).
longitude Satellite orbital parameter: longitude of ascending node Ω, see NIMA TR 8350.2 [71]. Unit is radian. Step of 2.341* 10^{-8} rad. Actual value = field value * (2.341* 10^{-8}).
meanAnomaly Satellite orbital parameter: Mean anomaly M at epoch time, see NIMA TR 8350.2 [71]. Unit is radian. Step of 2.341* 10^{-8} rad. Actual value = field value * (2.341* 10^{-8}).
periapsis Satellite orbital parameter: argument of periapsis ω, see NIMA TR 8350.2 [71]. Unit is radian. Step of 2.341* 10^{-8} rad. Actual value = field value * (2.341* 10^{-8}).
positionX, positionY, positionZ X, Y, Z coordinate of satellite position state vector in ECEF. Unit is meter. Step of 1.3 m. Actual value = field value * 1.3.
semiMajorAxis Satellite orbital parameter: semi major axis α, see NIMA TR 8350.2 [71]. Unit is meter. Step of 4.249 * 10^{-3} m. Actual value = 6500000 + field value * (4.249 * 10^{-3}).
velocityVX, velocityVY, velocityVZ X, Y, Z coordinate of satellite velocity state vector in ECEF. Unit is meter/second. Step of 0.06 m/s. Actual value = field value * 0.06.

– *FeatureCombination*

The IE *FeatureCombination* indicates a feature or a combination of features to be associated with a set of Random Access resources (i.e. an instance of *FeatureCombinationPreambles*).

***FeatureCombination* information element**

```
-- ASN1START
-- TAG-FEATURECOMBINATION-START

FeatureCombination-r17 ::= SEQUENCE {
    redCap-r17                  ENUMERATED {true}                       OPTIONAL,   -- Need R
    smallData-r17               ENUMERATED {true}                       OPTIONAL,   -- Need R
    nsag-r17                    NSAG-List-r17                           OPTIONAL,   -- Need R
    msg3-Repetitions-r17        ENUMERATED {true}                       OPTIONAL,   -- Need R
    spare4                      ENUMERATED {true}                       OPTIONAL,   -- Need R
    spare3                      ENUMERATED {true}                       OPTIONAL,   -- Need R
    spare2                      ENUMERATED {true}                       OPTIONAL,   -- Need R
    spare1                      ENUMERATED {true}                       OPTIONAL    -- Need R
}
```

```
NSAG-List-r17 ::= SEQUENCE (SIZE (1.. maxSliceInfo-r17)) OF NSAG-ID-r17

-- TAG-FEATURECOMBINATION-STOP
-- ASN1STOP
```

***FeatureCombination* field descriptions**
msg3-Repetitions If present, this field indicates that signalling of msg3 repetition is part of this feature combination. This field is not configured in a set of preambles that is configured with 2-step random-access type.
nsag If present, this field indicates NSAG(s) that are part of this feature combination.
redCap If present, this field indicates that RedCap is part of this feature combination.
smallData If present, this field indicates that Small Data is part of this feature combination.

– *FeatureCombinationPreambles*

The IE *FeatureCombinationPreambles* associates a set of preambles with a feature combination. For parameters which can be provided in this IE, the UE applies this field value when performing Random Access using a preamble in this featureCombinationPreambles, otherwise the UE applies the corresponding value as determined by applicable Need Code, e.g. Need S. On a specific BWP, there can be at most one set of preambles associated with a given feature combination per RA Type (i.e. 4-step RACH or 2-step RACH).

***FeatureCombinationPreambles* information element**

```
-- ASN1START
-- TAG-FEATURECOMBINATIONPREAMBLES-START

FeatureCombinationPreambles-r17 ::=   SEQUENCE {
    featureCombination-r17                FeatureCombination-r17,
    startPreambleForThisPartition-r17     INTEGER (0..63),
    numberOfPreamblesPerSSB-ForThisPartition-r17 INTEGER (1..64),
    ssb-SharedRO-MaskIndex-r17            INTEGER (1..15)                                          OPTIONAL, -- Need S
    groupBconfigured-r17                  SEQUENCE {
        ra-SizeGroupA-r17                     ENUMERATED {b56, b144, b208, b256, b282, b480, b640,
                                                          b800, b1000, b72, spare6, spare5,spare4, spare3, spare2, spare1},
        messagePowerOffsetGroupB-r17          ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
        numberOfRA-PreamblesGroupA-r17        INTEGER (1..64)
    }                                                                                              OPTIONAL, -- Need R
    separateMsgA-PUSCH-Config-r17         MsgA-PUSCH-Config-r16                                    OPTIONAL, -- Cond MsgAConfigCommon
    msgA-RSRP-Threshold-r17               RSRP-Range                                               OPTIONAL, -- Need R
    rsrp-ThresholdSSB-r17                 RSRP-Range                                               OPTIONAL, -- Need R
    deltaPreamble-r17                     INTEGER (-1..6)                                          OPTIONAL, -- Need R
    ...
}

-- TAG-FEATURECOMBINATIONPREAMBLES-STOP
```

```
-- ASN1STOP
```

***FeatureCombinationPreambles* field descriptions**
deltaPreamble Power offset between msg3 or msgA-PUSCH and RACH preamble transmission. If configured, this parameter overrides *msg3-DeltaPreamble* or *msgA-DeltaPreamble*, Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1). If *msgA-DeltaPreamble* is configured in *separateMsgA-PUSCH-Config-r17*, this field is absent.
featureCombination Indicates which combination of features that the preambles indicated by this IE are associated with. The UE ignores a RACH resource defined by this *FeatureCombinationPreambles* if any feature within the *featureCombination* is not supported by the UE or if any of the spare fields within the *featureCombination* is set to *true*.
messagePowerOffsetGroupB Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on (see TS 38.321 [3], clause 5.1.2).
msgA-RSRP-Threshold The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the concerned feature combination in the BWP. If configured, this parameter overrides *msgA-RSRP-Threshold-r16*. If absent, the UE applies *msgA-RSRP-Threshold-r16*, if configured
numberOfPreamblesPerSSB-ForThisPartition It determines how many consecutive preambles are associated to the Feature Combination starting from the starting preamble(s) per SSB.
numberOfRA-PreamblesGroupA It determines how many consecutive preambles per SSB are associated to Group A starting from the starting preamble(s). The remaining preambles associated to the Feature Combination are associated to Group B
ra-SizeGroupA Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2). If this feature combination preambles are associated to a *RACH-ConfigCommon-twostepRA*, this field correspond to *ra-MsgA-SizeGroupA*, otherwise it corresponds to *ra-Msg3SizeGroupA*.
rsrp-ThresholdSSB UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]). If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommonTwoStepRA*, it corresponds to *msgA-RSRP-ThresholdSSB*, as defined in TS 38.321 [3]. If this parameter is included in *FeatureCombinationPreambles* which is included in *RACH-ConfigCommon*, it it corresponds to *rsrp-ThresholdSSB*, as defined in TS 38.321 [3].
separateMsgA-PUSCH-Config If present it specifies how the 2-step RACH preambles identified by this *FeatureCombinationPreambles* are mapped to a PUSCH slot separate from the one defined in MsgA-ConfigCommon-r16. If the field is absent, the UE should apply the corresponding parameter in the *RACH-ConfigCommonTwoStepRA* of the BWP which includes the *FeatureCombinationPreambles IE*.
ssb-SharedRO-MaskIndex Mask index (see TS 38.321 [3]). Indicates a subset of ROs where preambles are allocated for this feature combination. If this field is configured within *FeatureCombinationPreambles* which is included in *RACH-ConfigCommonTwoStepRA*: - in case of separate ROs are configured for 4-step and 2-step random access, this field indicates a subset of ROs configured within this *RACH-ConfigCommonTwoStepRA*; - in case shared ROs are used for 4-step and 2-step random access, it indicates the subset of ROs configured within *RACH-ConfigCommon*, which are the subset of ROs configured for 2-step random access. This field is configured when there is more than one RO per SSB. If the field is absent, all ROs configured in *RACH-ConfigCommon* or *RACH-ConfigCommonTwoStepRA* containing this *FeatureCombinationPreambles* are shared.
startPreambleForThisPartition It defines the first preamble associated with the Feature Combination. If the UE is provided with a number N of SSB block indexes associated with one PRACH occasion, and N<1, the first preamble in each PRACH occasion is the one having the same index as indicated by this field. If N>=1, N blocks of preambles associated with the Feature Combination are defined, each having start index $n \cdot N_{cb}^{preamblePerSSB} / N$ + *startPreambleForThisPartition*, where n refers to SSB block index (see TS 38.213 [13], clause 8.1).

Conditional Presence	Explanation
MsgAConfigCommon	The field is optionally present, Need S, if *FeatureCombinationPreambles* is included in *RACH-ConfigCommonTwoStepRA*. Otherwise, it is absent. If the field is absent in *FeatureCombinationPreambles* included in *RACH-ConfigCommonTwoStepRA*, the UE applies *MsgA-PUSCH-Config* included in the corresponding *MsgA-ConfigCommon*.

– *FilterCoefficient*

The IE *FilterCoefficient* specifies the measurement filtering coefficient. Value *fc0* corresponds to k = 0, *fc1* corresponds to k = 1, and so on.

FilterCoefficient information element

```
-- ASN1START
-- TAG-FILTERCOEFFICIENT-START

FilterCoefficient ::=       ENUMERATED { fc0, fc1, fc2, fc3, fc4, fc5, fc6, fc7, fc8, fc9, fc11, fc13, fc15, fc17, fc19, spare1, ...}

-- TAG-FILTERCOEFFICIENT-STOP
-- ASN1STOP
```

– *FreqBandIndicatorNR*

The IE *FreqBandIndicatorNR* is used to convey an NR frequency band number as defined in TS 38.101-1 [15], TS 38.101-2 [39] and TS 38.101-5 [75].

FreqBandIndicatorNR information element

```
-- ASN1START
-- TAG-FREQBANDINDICATORNR-START

FreqBandIndicatorNR ::=             INTEGER (1..1024)

-- TAG-FREQBANDINDICATORNR-STOP
-- ASN1STOP
```

– *FreqPriorityListDedicatedSlicing*

The IE *FreqPriorityListDedicatedSlicing* provides dedicated cell reselection priorities for slicing in *RRCRelease*.

FreqPriorityListDedicatedSlicing information element

```
-- ASN1START
-- TAG-FREQPRIORITYLISTDEDICATEDSLICING-START
```

```
FreqPriorityListDedicatedSlicing-r17 ::= SEQUENCE (SIZE (1.. maxFreq)) OF FreqPriorityDedicatedSlicing-r17

FreqPriorityDedicatedSlicing-r17 ::=     SEQUENCE {
     dl-ExplicitCarrierFreq-r17              ARFCN-ValueNR,
    sliceInfoListDedicated-r17              SliceInfoListDedicated-r17                                  OPTIONAL  -- Cond Mandatory
}

SliceInfoListDedicated-r17 ::=           SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfoDedicated-r17

SliceInfoDedicated-r17 ::=               SEQUENCE {
    nsag-IdentityInfo-r17                   NSAG-IdentityInfo-r17,
    nsag-CellReselectionPriority-r17        CellReselectionPriority                                     OPTIONAL,  -- Need R
    nsag-CellReselectionSubPriority-r17     CellReselectionSubPriority                                  OPTIONAL   -- Need R
}

-- TAG-FREQPRIORITYLISTDEDICATEDSLICING-STOP
-- ASN1STOP
```

***FreqPriorityDedicatedSlicing* field descriptions**
dl-ExplicitCarrierFreq   Indicates the downlink carrier frequency to which *SliceInfoListDedicated* is associated.

Conditional Presence	Explanation
Mandatory	The field is mandatory present.

– *FreqPriorityListSlicing*

The IE *FreqPriorityListSlicing* indicates cell reselection priorities for slicing in SIB16.

***FreqPriorityListSlicing* information element**

```
-- ASN1START
-- TAG-FREQPRIORITYLISTSLICING-START

FreqPriorityListSlicing-r17 ::= SEQUENCE (SIZE (1..maxFreqPlus1)) OF FreqPrioritySlicing-r17

FreqPrioritySlicing-r17 ::=     SEQUENCE {
     dl-ImplicitCarrierFreq-r17            INTEGER (0..maxFreq),
    sliceInfoList-r17                     SliceInfoList-r17                                    OPTIONAL  -- Cond Mandatory
}

SliceInfoList-r17 ::=            SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF SliceInfo-r17

SliceInfo-r17 ::=                SEQUENCE {
    nsag-IdentityInfo-r17            NSAG-IdentityInfo-r17,
    nsag-CellReselectionPriority-r17  CellReselectionPriority                                     OPTIONAL,  -- Need R
```

```
    nsag-CellReselectionSubPriority-r17 CellReselectionSubPriority                  OPTIONAL,  -- Need R
    sliceCellListNR-r17                 CHOICE {
        sliceAllowedCellListNR-r17          SliceCellListNR-r17,
        sliceExcludedCellListNR-r17         SliceCellListNR-r17
    }                                                                               OPTIONAL  -- Need R
}

SliceCellListNR-r17 ::=           SEQUENCE (SIZE (1..maxCellSlice-r17)) OF PCI-Range

-- TAG-FREQPRIORITYLISTSLICING-STOP
-- ASN1STOP
```

***FreqPriorityListSlicing* field descriptions**
dl-ImplicitCarrierFreq Indicates the downlink carrier frequency to which *sliceInfoList* is associated with. The frequency is signalled implicitly, value 0 corresponds to the serving frequency, value 1 corresponds to the first frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and value 2 corresponds to the second frequency indicated by the *InterFreqCarrierFreqList* in SIB4, and so on.

***SliceInfo* field descriptions**
sliceAllowedCellListNR List of allow-listed cells for slicing. If present, the cells listed in this list support the corresponding nsag-frequency pair, and the cells not listed in this list do not support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11.
sliceCellListNR Contains either the list of allow-listed or exclude-listed cells for slicing. If absent, it implies all the cells support the corresponding nsag-frequency pair, according to 38.304 [20], clause 5.2.4.11.
sliceExcludedCellListNR List of exclude-listed cells for slicing. If present, the cells listed in this list do not support the corresponding nsag-frequency pair, and the cells not listed in this list support the corresponding nsag-frequency pair, according to TS 38.304 [20], clause 5.2.4.11.

Conditional Presence	Explanation
Mandatory	The field is mandatory present.

– *FrequencyInfoDL*

The IE *FrequencyInfoDL* provides basic parameters of a downlink carrier and transmission thereon.

***FrequencyInfoDL* information element**

```
-- ASN1START
-- TAG-FREQUENCYINFODL-START

FrequencyInfoDL ::=               SEQUENCE {
    absoluteFrequencySSB              ARFCN-ValueNR                                 OPTIONAL,   -- Cond SpCellAdd
    frequencyBandList                 MultiFrequencyBandListNR,
```

```
    absoluteFrequencyPointA             ARFCN-ValueNR,
    scs-SpecificCarrierList             SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    ...
}

-- TAG-FREQUENCYINFODL-STOP
-- ASN1STOP
```

***FrequencyInfoDL* field descriptions**
absoluteFrequencyPointA Absolute frequency position of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A (see TS 38.211 [16], clause 4.4.4.2). Note that the lower edge of the actual carrier is not defined by this field but rather in the *scs-SpecificCarrierList*.
absoluteFrequencySSB Frequency of the SSB to be used for this serving cell. SSB related parameters (e.g. SSB index) provided for a serving cell refer to this SSB frequency unless mentioned otherwise. The CD-SSB of the PCell is always on the sync raster. Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15] or TS 38.101-5 [75]). If the field is absent, the SSB related parameters should be absent, e.g. *ssb-PositionsInBurst*, *ssb-periodicityServingCell* and *subcarrierSpacing* in *ServingCellConfigCommon* IE. If the field is absent, the UE obtains timing reference from the SpCell or an SCell if applicable as described in TS 38.213 [13], clause 4.1. This is only supported in case the SCell for which the UE obtains the timing reference is in the same frequency band as the cell (i.e. the SpCell or the SCell, respectively) from which the UE obtains the timing reference. For cells supporting RedCap, this field corresponds to the CD-SSB.
frequencyBandList List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.
scs-SpecificCarrierList A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a *scs-SpecificCarrier* at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).

Conditional Presence	Explanation
SpCellAdd	The field is mandatory present if this *FrequencyInfoDL* is for SpCell. Otherwise the field is optionally present, Need S.

– *FrequencyInfoDL-SIB*

The IE *FrequencyInfoDL-SIB* provides basic parameters of a downlink carrier and transmission thereon.

***FrequencyInfoDL-SIB* information element**

```
-- ASN1START
-- TAG-FREQUENCYINFODL-SIB-START

FrequencyInfoDL-SIB ::=             SEQUENCE {
    frequencyBandList                   MultiFrequencyBandListNR-SIB,
    offsetToPointA                      INTEGER (0..2199),
    scs-SpecificCarrierList             SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier
}

FrequencyInfoDL-SIB-v1760 ::=       SEQUENCE {
```

```
    frequencyBandList-v1760             MultiFrequencyBandListNR-SIB-v1760
}

-- TAG-FREQUENCYINFODL-SIB-STOP
-- ASN1STOP
```

***FrequencyInfoDL-SIB* field descriptions**
offsetToPointA Represents the offset to Point A as defined in TS 38.211 [16], clause 4.4.4.2.
frequencyBandList List of one or multiple frequency bands to which this carrier(s) belongs. If *frequencyBandList-v1760* is present, it shall contain the same number of entries, listed in the same order as in *frequencyBandList* (without suffix).
scs-SpecificCarrierList A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A (see TS 38.211 [16], clause 5.3). The network configures this for all SCSs that are used in DL BWPs in this serving cell.

– *FrequencyInfoUL*

The IE *FrequencyInfoUL* provides basic parameters of an uplink carrier and transmission thereon.

***FrequencyInfoUL* information element**

```
-- ASN1START
-- TAG-FREQUENCYINFOUL-START

FrequencyInfoUL ::=                 SEQUENCE {
    frequencyBandList                   MultiFrequencyBandListNR                                OPTIONAL,   -- Cond FDD-OrSUL
    absoluteFrequencyPointA             ARFCN-ValueNR                                           OPTIONAL,   -- Cond FDD-OrSUL
    scs-SpecificCarrierList             SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    additionalSpectrumEmission          AdditionalSpectrumEmission                              OPTIONAL,   -- Need S
    p-Max                               P-Max                                                   OPTIONAL,   -- Need S
    frequencyShift7p5khz                ENUMERATED {true}                                       OPTIONAL,   -- Cond FDD-TDD-OrSUL-Optional
    ...,
    [[
    additionalSpectrumEmission-v1760    AdditionalSpectrumEmission-v1760                        OPTIONAL    -- Need S
    ]]
}

-- TAG-FREQUENCYINFOUL-STOP
-- ASN1STOP
```

***FrequencyInfoUL* field descriptions**
absoluteFrequencyPointA
Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A. Note that the lower edge of the actual carrier is not defined by this field but rather in the *scs-SpecificCarrierList* (see TS 38.211 [16], clause 4.4.4.2).
additionalSpectrumEmission
The additional spectrum emission requirements to be applied by the UE on this uplink. If both *additionalSpectrumEmission* (without suffix) and *additionalSpectrumEmission-v1760* are absent, the UE uses value 0 for the *additionalSpectrumEmission* (see TS 38.101-1 [15], tables 6.2.3.1-1A, 6.2A.3.1.1-2 and 6.2A.3.1.2-2, TS 38.101-2 [39], tables 6.2.3.1-2 and 6.2A.3.1-2, and TS 38.101-5 [75], table 6.2.3.1-1A). Network configures the same value in *additionalSpectrumEmission* for all uplink carrier(s) of the same band with UL configured and if signalled, the same vaue in *additionalSpectrumEmission-v1760* for all uplink carrier(s) of the same band with UL configured, except for *additionalSpectrumEmission* value corresponding to NS_55/NS_57. If NS_55/NS_57 (see TS 38.101-1 [15], table 6.2.3.1-1) is applicable for at least one uplink carrier, the network may configure either NS_55/NS_57 or NS_01 for these uplink carriers, and NS_01 for the remaining uplink carrier(s) of band n77. The *additionalSpectrumEmission* is applicable for all uplink carriers of the same band with UL configured.
frequencyBandList
List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.
frequencyShift7p5khz
Enable the NR UL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.
p-Max
Maximum transmit power allowed in this serving cell. The maximum transmit power that the UE may use on this serving cell may be additionally limited by *p-NR-FR1* (configured for the cell group) and by *p-UE-FR1* (configured total for all serving cells operating on FR1). If absent, the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell, TS 38.101-2 [39] in case of an FR2 cell or TS 38.101-5 [75] in case of an NTN cell. In this release of the specification, if p-Max is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. Value in dBm. This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].
scs-SpecificCarrierList
A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a *scs-SpecificCarrier* at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).

Conditional Presence	Explanation
FDD-OrSUL	The field is mandatory present if this *FrequencyInfoUL* is for the paired UL for a DL (defined in a *FrequencyInfoDL*) or if this *FrequencyInfoUL* is for a supplementary uplink (SUL). It is absent, Need R, otherwise (if this *FrequencyInfoUL* is for an unpaired UL (TDD).
FDD-TDD-OrSUL-Optional	The field is optionally present, Need R, if this *FrequencyInfoUL* is for the paired UL for a DL (defined in a *FrequencyInfoDL*), or if this *FrequencyInfoUL* is for an unpaired UL (TDD) in certain bands (as defined in clause 5.4.2.1 of TS 38.101-1 and in clause 5.4.2.1 of TS 38.104 [12]), or if this *FrequencyInfoUL* is for a supplementary uplink (SUL). It is absent, Need R, otherwise.

– *FrequencyInfoUL-SIB*

The IE *FrequencyInfoUL-SIB* provides basic parameters of an uplink carrier and transmission thereon.

***FrequencyInfoUL-SIB* information element**

```
-- ASN1START
-- TAG-FREQUENCYINFOUL-SIB-START
```

```
FrequencyInfoUL-SIB ::=             SEQUENCE {
    frequencyBandList                   MultiFrequencyBandListNR-SIB                            OPTIONAL,   -- Cond FDD-OrSUL
    absoluteFrequencyPointA             ARFCN-ValueNR                                           OPTIONAL,   -- Cond FDD-OrSUL
    scs-SpecificCarrierList             SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    p-Max                               P-Max                                                   OPTIONAL,   -- Need S
    frequencyShift7p5khz                ENUMERATED {true}                                       OPTIONAL,   -- Cond FDD-TDD-OrSUL-Optional
    ...
}

FrequencyInfoUL-SIB-v1760 ::=       SEQUENCE {
    frequencyBandList-v1760             MultiFrequencyBandListNR-SIB-v1760
}

-- TAG-FREQUENCYINFOUL-SIB-STOP
-- ASN1STOP
```

***FrequencyInfoUL-SIB* field descriptions**
absoluteFrequencyPointA Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A. Note that the lower edge of the actual carrier is not defined by this field but rather in the *scs-SpecificCarrierList* (see TS 38.211 [16], clause 4.4.4.2).
frequencyBandList Provides the frequency band indicator and a list of *additionalPmax* and *additionalSpectrumEmission* values as defined in TS 38.101-1 [15], table 6.2.3.1-1, TS 38.101-2 [39], table 6.2.3.1-2, and TS 38.101-5 [75], table 6.2.3.1-1. The UE shall apply the first listed band which it supports in the *frequencyBandList* field. If *frequencyBandList-v1760* is present, it shall contain the same number of entries, listed in the same order as in *frequencyBandList* (without suffix).
frequencyShift7p5khz Enable the NR UL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.
p-Max Value in dBm applicable for the cell. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell, TS 38.101-2 [39] in case of an FR2 cell or TS 38.101-5 [75] in case of an NTN cell. In this release of the specification, if p-Max is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63].
scs-SpecificCarrierList A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A (see TS 38.211 [16], clause 5.3). The network configures this for all SCSs that are used in UL BWPs configured in this serving cell.

Conditional Presence	Explanation
FDD-OrSUL	The field is mandatory present if this *FrequencyInfoUL-SIB* is for the paired UL for a DL (defined in a *FrequencyInfoDL-SIB*) or if this *FrequencyInfoUL-SIB* is for a supplementary uplink (SUL). It is absent otherwise (if this *FrequencyInfoUL-SIB* is for an unpaired UL (TDD).
FDD-TDD-OrSUL-Optional	The field is optionally present, Need R, if this *FrequencyInfoUL-SIB* is for the paired UL for a DL (defined in a *FrequencyInfoDL-SIB*), or if this *FrequencyInfoUL-SIB* is for an unpaired UL (TDD) in certain bands (as defined in clause 5.4.2.1 of TS 38.101-1 and in clause 5.4.2.1 of TS 38.104 [12]), or if this *FrequencyInfoUL-SIB* is for a supplementary uplink (SUL). It is absent otherwise.

– *GapPriority*

The IE *GapPriority* is used to identify the priority of a gap configuration.

GapPriority information element

```
-- ASN1START
-- TAG-GAPPRIORITY-START

GapPriority-r17 ::=                     INTEGER (1..maxNrOfGapPri-r17)

-- TAG-GAPPRIORITY-STOP
-- ASN1STOP
```

– *HighSpeedConfig*

The IE *HighSpeedConfig* is used to configure parameters for high speed scenarios.

HighSpeedConfig information element

```
-- ASN1START
-- TAG-HIGHSPEEDCONFIG-START

HighSpeedConfig-r16 ::=  SEQUENCE {
    highSpeedMeasFlag-r16    ENUMERATED {true}        OPTIONAL,   -- Cond SpCellOnly
    highSpeedDemodFlag-r16   ENUMERATED {true}        OPTIONAL,   -- Need R
    ...
}

HighSpeedConfig-v1700 ::=  SEQUENCE {
    highSpeedMeasCA-Scell-r17    ENUMERATED {true}        OPTIONAL,   -- Cond SCellOnly
    highSpeedMeasInterFreq-r17   ENUMERATED {true}        OPTIONAL,   -- Cond SpCellOnly2
    highSpeedDemodCA-Scell-r17   ENUMERATED {true}        OPTIONAL,   -- Need R
    ...
}

HighSpeedConfigFR2-r17 ::=  SEQUENCE {
    highSpeedMeasFlagFR2-r17                  ENUMERATED {set1, set2}                     OPTIONAL,   -- Need R
    highSpeedDeploymentTypeFR2-r17            ENUMERATED {unidirectional, bidirectional}  OPTIONAL,   -- Need R
    highSpeedLargeOneStepUL-TimingFR2-r17     ENUMERATED {true}                           OPTIONAL,   -- Need R
    ...
}

-- TAG-HIGHSPEEDCONFIG-STOP
-- ASN1STOP
```

***HighSpeedConfig* field descriptions**
HighSpeedDemodCA-Scell If the field is present and UE supports *demodulationEnhancementCA-r17*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SCell.
highSpeedDemodFlag If the field is present and UE supports *demodulationEnhancement-r16*, the UE shall apply the enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h as specified in TS 38.101-4 [59]. This parameter only applies to SpCell.
highSpeedDeploymentTypeFR2 If the field is present, and field value is *unidirectional*, the UE shall assume uni-directional deployment or if field value is *birectional* the UE shall assume bidirectional deployment for FR2 up to 350km/h as specified in TS 38.133 [14].
highSpeedLargeOneStepUL-TimingFR2 If the field is present, large one step UE autonomous uplink transmit timing adjustment for FR2 up to 350km/h as specified in TS 38.133 [14] is enabled.
highSpeedMeasCA-Scell If the field is present and UE supports *measurementEnhancementCA-r17*, the UE shall apply the enhanced RRM requirements to the serving frequency of SCell for carrier aggregation to support high speed up to 500 km/h as specified in TS 38.133 [14].
highSpeedMeasFlag If the field is present and UE supports *measurementEnhancement-r16*, the UE shall apply the enhanced intra-NR and inter-RAT EUTRAN RRM requirements to support high speed up to 500 km/h as specified in TS 38.133 [14]. If the field is present and UE supports *intraNR-MeasurementEnhancement-r16*, the UE shall apply enhanced intra-NR RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14]. If the field is present and UE supports *interRAT-MeasurementEnhancement-r16*, the UE shall apply enhanced inter-RAT EUTRAN RRM requirement to support high speed up to 500 km/h as specified in TS 38.133 [14]. This parameter only applies to the serving frequency of SpCell.
highSpeedMeasFlagFR2 If the field is present, the UE shall apply enhanced intra-NR RRM requirement set one to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14], if the field value is set1 or RRM requirement set two if the field value is set2.
highSpeedMeasInterFreq If the field is present and UE supports *measurementEnhancementInterFreq-r17*, the UE shall apply the enhanced RRM requirements for inter-frequency measurement in RRC_CONNECTED to support high speed up to 500 km/h as specified in TS 38.133 [14].

Conditional Presence	Explanation
SCellOnly	The field is optionally present, Need R, in *ServingCellConfigCommon* of an SCell. It is absent otherwise.
SpCellOnly	The field is optionally present, Need R, in *ServingCellConfigCommonSIB* or in the *ServingCellConfigCommon* of an SpCell. It is absent otherwise.
SpCellOnly2	The field is optionally present, Need R, in *ServingCellConfigCommon* of an SpCell. It is absent otherwise.

– *Hysteresis*

The IE *Hysteresis* is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is field value * 0.5 dB.

***Hysteresis* information element**

```
-- ASN1START
```

```
-- TAG-HYSTERESIS-START

Hysteresis ::=                      INTEGER (0..30)

-- TAG-HYSTERESIS-STOP
-- ASN1STOP
```

– *HysteresisLocation*

The IE *HysteresisLocation* is a parameter used within entry and leave condition of a location based event triggered reporting condition. The actual value is field value * 10 meters.

HysteresisLocation information element

```
-- ASN1START
-- TAG-HYSTERESISLOCATION-START

HysteresisLocation-r17 ::=          INTEGER (0..32768)

-- TAG-HYSTERESISLOCATION-STOP
-- ASN1STOP
```

– *InvalidSymbolPattern*

The IE *InvalidSymbolPattern* is used to configure one invalid symbol pattern for PUSCH transmission repetition type B applicable for both DCI format 0_1 and 0_2, see TS 38.214 [19], clause 6.1.

InvalidSymbolPattern information element

```
-- ASN1START
-- TAG-INVALIDSYMBOLPATTERN-START

InvalidSymbolPattern-r16 ::=     SEQUENCE {
    symbols-r16                      CHOICE {
        oneSlot                          BIT STRING (SIZE (14)),
        twoSlots                         BIT STRING (SIZE (28))
    },
    periodicityAndPattern-r16        CHOICE {
        n2                               BIT STRING (SIZE (2)),
        n4                               BIT STRING (SIZE (4)),
        n5                               BIT STRING (SIZE (5)),
        n8                               BIT STRING (SIZE (8)),
        n10                              BIT STRING (SIZE (10)),
        n20                              BIT STRING (SIZE (20)),
        n40                              BIT STRING (SIZE (40))
    }                                                           OPTIONAL,   -- Need M
    ...
```

```
}

-- TAG-INVALIDSYMBOLPATTERN-STOP
-- ASN1STOP
```

***InvalidSymbolPattern* field descriptions**
periodicityAndPattern A time domain repetition pattern at which the pattern defined by *symbols* recurs. This slot pattern repeats itself continuously. When the field is not configured, the UE uses the value n1 (see TS 38.214 [19], clause 6.1).
symbols A symbol level bitmap in time domain (see TS 38.214[19], clause 6.1). For *oneSlot*, if ECP is configured, the first 12 bits represent the symbols within the slot and the last two bits within the bitstring are ignored by the UE; Otherwise, the 14 bits represent the symbols within the slot. For *twoSlots*, if ECP is configured, the first 12 bits represent the symbols within the first slot and the next 12 bits represent the symbols in the second slot and the last four bits within the bit string are ignored by the UE; Otherwise, the first 14 bits represent the symbols within the first slot and the next 14 bits represent the symbols in the second slot. For the bits representing symbols in a slot, the most significant bit of the bit string represents the first symbol in the slot and the second most significant bit represents the second symbol in the slot and so on. This pattern recurs (in time domain) with the configured *periodicityAndPattern*.

– *I-RNTI-Value*

The IE *I-RNTI-Value* is used to identify the suspended UE context of a UE in RRC_INACTIVE.

I-RNTI-Value information element

```
-- ASN1START
-- TAG-I-RNTI-VALUE-START

I-RNTI-Value ::=                    BIT STRING (SIZE(40))

-- TAG-I-RNTI-VALUE-STOP
-- ASN1STOP
```

– *LBT-FailureRecoveryConfig*

The IE *LBT-FailureRecoveryConfig-r16* is used to configure the parameters used for detection of consistent uplink LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].

LBT-FailureRecoveryConfig information element

```
-- ASN1START
-- TAG-LBT-FAILURERECOVERYCONFIG-START

LBT-FailureRecoveryConfig-r16 ::=    SEQUENCE {
```

```
    lbt-FailureInstanceMaxCount-r16      ENUMERATED {n4, n8, n16, n32, n64, n128},
    lbt-FailureDetectionTimer-r16        ENUMERATED {ms10, ms20, ms40, ms80, ms160, ms320},
    ...
}

-- TAG-LBT-FAILURERECOVERYCONFIG-STOP
-- ASN1STOP
```

***LBT-FailureRecoveryConfig* field descriptions**
lbt-FailureDetectionTimer Timer for consistent uplink LBT failure detection (see TS 38.321 [3]). Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms, and so on.
lbt-FailureInstanceMaxCount This field determines after how many LBT failure indications received from the physical layer the UE triggers uplink LBT failure recovery (see TS 38.321 [3]). Value *n4* corresponds to 4, value *n8* corresponds to 8, and so on.

– *LocationInfo*

The IE *LocationInfo* is used to transfer available detailed location information, Bluetooth, WLAN and sensor available measurement results at the UE.

LocationInfo information element

```
-- ASN1START
-- TAG-LOCATIONINFO-START

LocationInfo-r16 ::=      SEQUENCE {
    commonLocationInfo-r16    CommonLocationInfo-r16          OPTIONAL,
    bt-LocationInfo-r16       LogMeasResultListBT-r16         OPTIONAL,
    wlan-LocationInfo-r16     LogMeasResultListWLAN-r16       OPTIONAL,
    sensor-LocationInfo-r16   Sensor-LocationInfo-r16         OPTIONAL,
    ...
}

-- TAG-LOCATIONINFO-STOP
-- ASN1STOP
```

– *LocationMeasurementInfo*

The IE *LocationMeasurementInfo* defines the information sent by the UE to the network to assist with the configuration of measurement gaps for location related measurements.

LocationMeasurementInfo information element

```
-- ASN1START
-- TAG-LOCATIONMEASUREMENTINFO-START

LocationMeasurementInfo ::=     CHOICE {
```

```
    eutra-RSTD                  EUTRA-RSTD-InfoList,
    ...,
    eutra-FineTimingDetection   NULL,
    nr-PRS-Measurement-r16      NR-PRS-MeasurementInfoList-r16
}

EUTRA-RSTD-InfoList ::= SEQUENCE (SIZE (1..maxInterRAT-RSTD-Freq)) OF EUTRA-RSTD-Info

EUTRA-RSTD-Info ::= SEQUENCE {
    carrierFreq                 ARFCN-ValueEUTRA,
    measPRS-Offset              INTEGER (0..39),
    ...
}

NR-PRS-MeasurementInfoList-r16 ::= SEQUENCE (SIZE (1..maxFreqLayers)) OF NR-PRS-MeasurementInfo-r16

NR-PRS-MeasurementInfo-r16 ::=      SEQUENCE {
    dl-PRS-PointA-r16                   ARFCN-ValueNR,
    nr-MeasPRS-RepetitionAndOffset-r16  CHOICE {
        ms20-r16                            INTEGER (0..19),
        ms40-r16                            INTEGER (0..39),
        ms80-r16                            INTEGER (0..79),
        ms160-r16                           INTEGER (0..159),
        ...
    },
    nr-MeasPRS-length-r16               ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},
    ...
}

-- TAG-LOCATIONMEASUREMENTINFO-STOP
-- ASN1STOP
```

***LocationMeasurementInfo* field descriptions**
carrierFreq The EARFCN value of the carrier received from upper layers for which the UE needs to perform the inter-RAT RSTD measurements.
measPRS-Offset Indicates the requested gap offset for performing RSTD measurements towards E-UTRA. It is the smallest subframe offset from the beginning of subframe 0 of SFN=0 of the serving cell of the requested gap for measuring PRS positioning occasions in the carrier frequency *carrierFreq* for which the UE needs to perform the inter-RAT RSTD measurements. The PRS positioning occasion information is received from upper layers. The value of *measPRS-Offset* is obtained by mapping the starting subframe of the PRS positioning occasion in the measured cell onto the corresponding subframe in the serving cell and is calculated as the serving cell's number of subframes from SFN=0 mod 40. The UE shall take into account any additional time required by the UE to start PRS measurements on the other carrier when it does this mapping for determining the *measPRS-Offset*. NOTE: Figure 6.2.2-1 in TS 36.331[10] illustrates the *measPRS-Offset* field.
dl-PRS-PointA The ARFCN value of the carrier received from upper layers for which the UE needs to perform the NR DL-PRS measurements.
nr-MeasPRS-RepetitionAndOffset Indicates the gap periodicity in ms and offset in number of subframes of the requested measurement gap for performing NR DL-PRS measurements.
nr-MeasPRS-length Indicates measurement gap length in ms of the requested measurement gap for performing NR DL-PRS measurements. The measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14].

– *LogicalChannelConfig*

The IE *LogicalChannelConfig* is used to configure the logical channel parameters.

***LogicalChannelConfig* information element**

```
-- ASN1START
-- TAG-LOGICALCHANNELCONFIG-START

LogicalChannelConfig ::=            SEQUENCE {
    ul-SpecificParameters               SEQUENCE {
        priority                            INTEGER (1..16),
        prioritisedBitRate                  ENUMERATED {kBps0, kBps8, kBps16, kBps32, kBps64, kBps128, kBps256, kBps512,
                                            kBps1024, kBps2048, kBps4096, kBps8192, kBps16384, kBps32768, kBps65536, infinity},
        bucketSizeDuration                  ENUMERATED {ms5, ms10, ms20, ms50, ms100, ms150, ms300, ms500, ms1000,
                                                        spare7, spare6, spare5, spare4, spare3,spare2, spare1},
        allowedServingCells                 SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF ServCellIndex
                                                                                                    OPTIONAL,   -- Cond PDCP-CADuplication
        allowedSCS-List                     SEQUENCE (SIZE (1..maxSCSs)) OF SubcarrierSpacing           OPTIONAL,   -- Need R
        maxPUSCH-Duration                   ENUMERATED {ms0p02, ms0p04, ms0p0625, ms0p125, ms0p25, ms0p5, ms0p01-v1700, spare1}
                                                                                                        OPTIONAL,   -- Need R
        configuredGrantType1Allowed         ENUMERATED {true}                                           OPTIONAL,   -- Need R
        logicalChannelGroup                 INTEGER (0..maxLCG-ID)                                      OPTIONAL,   -- Need R
        schedulingRequestID                 SchedulingRequestId                                         OPTIONAL,   -- Need R
        logicalChannelSR-Mask               BOOLEAN,
        logicalChannelSR-DelayTimerApplied  BOOLEAN,
        ...,
        bitRateQueryProhibitTimer       ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}       OPTIONAL,    -- Need R
```

```
        [[
        allowedCG-List-r16                SEQUENCE (SIZE (0.. maxNrofConfiguredGrantConfigMAC-1-r16)) OF ConfiguredGrantConfigIndexMAC-r16
                                                                                                          OPTIONAL,   -- Need S
        allowedPHY-PriorityIndex-r16      ENUMERATED {p0, p1}                                             OPTIONAL    -- Need S
        ]],
        [[
        logicalChannelGroupIAB-Ext-r17    INTEGER (0..maxLCG-ID-IAB-r17)                                  OPTIONAL,   -- Need R
        allowedHARQ-mode-r17              ENUMERATED {harqModeA, harqModeB}                               OPTIONAL    -- Need R
        ]]
    }                                                                                                     OPTIONAL,   -- Cond UL
    ...,
    [[
    channelAccessPriority-r16         INTEGER (1..4)                                                    OPTIONAL,   -- Need R
    bitRateMultiplier-r16             ENUMERATED {x40, x70, x100, x200}                                 OPTIONAL    -- Need R
    ]]
}

-- TAG-LOGICALCHANNELCONFIG-STOP
-- ASN1STOP
```

***LogicalChannelConfig* field descriptions**
allowedCG-List This restriction applies only when the UL grant is a configured grant. If present, UL MAC SDUs from this logical channel can only be mapped to the indicated configured grant configuration. If the size of the sequence is zero, then UL MAC SDUs from this logical channel cannot be mapped to any configured grant configurations. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any configured grant configurations. If the field configuredGrantType1Allowed is present, only those configured grant type 1 configuration indicated in this sequence are allowed for use by this logical channel; otherwise, this sequence shall not include any configured grant type 1 configuration. Corresponds to "allowedCG-List" as specified in TS 38.321 [3]. This field is ignored when SDT procedure is ongoing.
allowedHARQ-mode Indicates the allowed HARQ mode of a HARQ process mapped to this logical channel. If the parameter is absent, there is no restriction for HARQ mode for the mapping. This field applies to SRB1, SRB2 and DRBs.
allowedPHY-PriorityIndex This restriction applies only when the UL grant is a dynamic grant. If the field is present and the dynamic grant has a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to the dynamic grants indicating PHY-priority index equal to the values configured by this field. If the field is present and the dynamic grant does not have a PHY-priority index, UL MAC SDUs from this logical channel can only be mapped to this dynamic grant if the value of the field is *p0*, see TS 38.213 [13], clause 9. If the field is not present, UL MAC SDUs from this logical channel can be mapped to any dynamic grants. Corresponds to "allowedPHY-PriorityIndex" as specified in TS 38.321 [3].
allowedSCS-List If present, UL MAC SDUs from this logical channel can only be mapped to the indicated numerology. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured numerology. Corresponds to *'allowedSCS-List'* as specified in TS 38.321 [3]. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz
allowedServingCells If present, UL MAC SDUs from this logical channel can only be mapped to the serving cells indicated in this list. Otherwise, UL MAC SDUs from this logical channel can be mapped to any configured serving cell of this cell group. Corresponds to 'allowedServingCells' in TS 38.321 [3].
bitRateMultiplier Bit rate multiplier for recommended bit rate MAC CE as specified in TS 38.321 [3]. Value *x40* indicates bit rate multiplier 40, value *x70* indicates bit rate multiplier 70 and so on.
bitRateQueryProhibitTimer The timer is used for bit rate recommendation query in TS 38.321 [3], in seconds. Value *s0* means 0 s, *s0dot4* means 0.4 s and so on.
bucketSizeDuration Value in ms. *ms5* corresponds to 5 ms, value *ms10* corresponds to 10 ms, and so on.
channelAccessPriority Indicates the Channel Access Priority Class (CAPC), as specified in TS 38.300 [2], to be used on uplink transmissions for operation with shared spectrum channel access in FR1. The network configures this field only for SRB2 and DRBs.
configuredGrantType1Allowed If present, or if the capability *lcp-Restriction* as specified in TS 38.306 [26] is not supported, UL MAC SDUs from this logical channel can be transmitted on a configured grant type 1. Otherwise, UL MAC SDUs from this logical channel cannot be transmitted on a configured grant type 1. Corresponds to 'configuredGrantType1Allowed' in TS 38.321 [3]. This field is ignored when SDT procedure is ongoing.
logicalChannelGroup, logicalChannelGroupIAB-Ext ID of the logical channel group, as specified in TS 38.321 [3], which the logical channel belongs to. The *logicalChannelGroupIAB-Ext* is only applicable to the IAB-MT. When *logicalChannelGroupIAB-Ext* is configured, *logicalChannelGroup* shall be ignored.
logicalChannelSR-Mask Controls SR triggering when a configured uplink grant of *type1* or *type2* is configured. *true* indicates that SR masking is configured for this logical channel as specified in TS 38.321 [3].
logicalChannelSR-DelayTimerApplied Indicates whether to apply the delay timer for SR transmission for this logical channel. Set to *false* if *logicalChannelSR-DelayTimer* is not included in *BSR-Config*.

maxPUSCH-Duration If present, UL MAC SDUs from this logical channel can only be transmitted using uplink grants that result in a PUSCH duration shorter than or equal to the duration indicated by this field. Otherwise, UL MAC SDUs from this logical channel can be transmitted using an uplink grant resulting in any PUSCH duration. Corresponds to "maxPUSCH-Duration" in TS 38.321 [3]. The PUSCH duration is calculated based on the same length of all symbols, and the shortest length applies if the symbol lengths are different.
priority Logical channel priority, as specified in TS 38.321 [3].
prioritisedBitRate Value in kiloBytes/s. Value *kBps0* corresponds to 0 kiloBytes/s, value *kBps8* corresponds to 8 kiloBytes/s, value *kBps16* corresponds to 16 kiloBytes/s, and so on. For SRBs, the value can only be set to *infinity*.
schedulingRequestId If present, it indicates the scheduling request configuration applicable for this logical channel, as specified in TS 38.321 [3].

Conditional Presence	Explanation
PDCP-CADuplication	The field is mandatory present if the DRB/SRB associated with this logical channel is configured with PDCP CA duplication in UL in the cell group in which this IE is included (i.e. the PDCP entity is associated with multiple RLC entities belonging to this cell group). Otherwise the field is optionally present, need R.
UL	The field is mandatory present for a logical channel with uplink if it serves DRB or multicast MRB. It is optionally present, Need R, for a logical channel with uplink if it serves an SRB. Otherwise it is absent.

– *LogicalChannelIdentity*

The IE *LogicalChannelIdentity* is used to identify one logical channel (*LogicalChannelConfig*) and the corresponding RLC bearer (*RLC-BearerConfig*) or BH RLC channel (*BH-RLC-ChannelConfig*) or Uu Relay RLC channel (*Uu-RelayRLC-ChannelConfig*) or PC5 Relay RLC channel (*SL-RLC-ChannelConfig*).

LogicalChannelIdentity information element

```
-- ASN1START
-- TAG-LOGICALCHANNELIDENTITY-START

LogicalChannelIdentity ::=          INTEGER (1..maxLC-ID)

-- TAG-LOGICALCHANNELIDENTITY-STOP
-- ASN1STOP
```

– *LTE-NeighCellsCRS-AssistInfoList*

The IE *LTE-NeighCellsCRS-AssistInfoList-r17* is used to provide configuration information of neighbour LTE cells to assist the UE to perform CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR.

LTE-NeighCellsCRS-AssistInfoList information element

```
-- ASN1START
-- TAG-LTE-NEIGHCELLSCRS-ASSISTINFOLIST-START
```

```
LTE-NeighCellsCRS-AssistInfoList-r17 ::= SEQUENCE (SIZE (1..maxNrofCRS-IM-InterfCell-r17)) OF LTE-NeighCellsCRS-AssistInfo-r17

LTE-NeighCellsCRS-AssistInfo-r17 ::=     SEQUENCE {
    neighCarrierBandwidthDL-r17             ENUMERATED {n6, n15, n25, n50, n75, n100, spare2, spare1}   OPTIONAL,   -- Cond CRS-IM
    neighCarrierFreqDL-r17                  INTEGER (0..16383)                                          OPTIONAL,   -- Need S
    neighCellId-r17                         EUTRA-PhysCellId                                            OPTIONAL,   -- Need S
    neighCRS-muting-r17                     ENUMERATED {enabled}                                        OPTIONAL,   -- Need R
    neighMBSFN-SubframeConfigList-r17       EUTRA-MBSFN-SubframeConfigList                              OPTIONAL,   -- Need S
    neighNrofCRS-Ports-r17                  ENUMERATED {n1, n2, n4}                                     OPTIONAL,   -- Need S
    neighV-Shift-r17                        ENUMERATED {n0, n1, n2, n3, n4, n5}                         OPTIONAL    -- Cond NotCellID
}

-- TAG-LTE-NEIGHCELLSCRS-ASSISTINFOLIST-STOP
-- ASN1STOP
```

***LTE-NeighCellsCRS-AssistInfo* field descriptions**
neighCarrierBandwidthDL Indicates the channel bandwidth of the neighbour LTE cell in number of PRBs. If the field is absent, the UE applies the value of *carrierBandwidthDL* indicated in *RateMatchPatternLTE-CRS* for this serving cell, if configured.
neighCarrierFreqDL Indicates the downlink centre frequency of the neighbour LTE cell. If the field is absent, the UE applies the value of *carrierFreqDL* indicated in *RateMatchPatternLTE-CRS* for this serving cell, if configured.
neighCellId Indicates the physical cell ID of the neighbour LTE cell for which the other fields within the same *LTE-NeighCellsCRS-AssistInfo* apply. If the IE *LTE-NeighCellsCRS-AssistInfoList* contains multiple list entries, either this field or *neighV-Shift* is included in each instance. If the IE *LTE-NeighCellsCRS-AssistInfoList* contains multiple list entries, the entry with *neighV-Shift* is only used for neighbour LTE cells for which *neighCellId* is not provided (i.e. the entry with *neighCellId* takes precedence over the entry with *neighV-Shift*, if provided). If the IE *LTE-NeighCellsCRS-AssistInfoList* contains one list entry with neither this field nor *neighV-Shift*, the information within the entry applies to all neighbour LTE cells.
neighCRS-muting Indicates whether the CRS interference mitigation is enabled in the neighbour LTE cell, as specified in TS 36.133 [40], clause 3.6.1.1.
neighMBSFN-SubframeConfigList Indicates the MBSFN subframe configuration of the neighbour LTE cell. If *RateMatchPatternLTE-CRS* is configured for this serving cell and the field is absent, the UE applies the value of *mbsfn-SubframeConfigList* indicated in *RateMatchPatternLTE-CRS* for this serving cell if configured; otherwise, if the field is absent, the UE assumes MBSFN is not configured in the neighbour LTE cell.
neighNrofCRS-Ports Indicates the CRS antenna ports number of the neighbour LTE cell. If the field is absent, the UE applies the value of *nrofCRS-Ports* indicated in *RateMatchPatternLTE-CRS* for this serving cell, if configured. If *RateMatchPatternLTE-CRS* is not configured for this serving cell and the field is absent, the UE applies the default value n4.
neighV-Shift Indicates the shifting value v-shift of neighbour LTE cells for which the other fields within the same *LTE-NeighCellsCRS-AssistInfo* apply.

Conditional Presence	Explanation
CRS-IM	For the serving cell with 15kHz SCS, this field is mandatory present for the UE supporting the capability of *crs-IM-nonDSS-NWA-15kHzSCS-r17*, but not supporting *crs-IM-nonDSS-15kHzSCS-r17*, if *RateMatchPatternLTE-CRS* is not configured for this serving cell. Otherwise it is optionally present, Need S if *RateMatchPatternLTE-CRS* is configured for this serving cell; Need M otherwise. For the serving cell with 30kHz SCS, this field is mandatory present for the UE supporting the capability of *crs-IM-nonDSS-NWA-30kHzSCS-r17*, but not supporting *crs-IM-nonDSS-30kHzSCS-r17*, if *RateMatchPatternLTE-CRS* is not configured for this serving cell. Otherwise it is optionally present, Need S if *RateMatchPatternLTE-CRS* is configured for this serving cell; Need M otherwise.
NotCellID	If the field *neighCellId* is present, this field shall be absent; otherwise, it is optionally present if the IE *LTE-NeighCellsCRS-AssistInfoList* contains one list entry, Need S, or it is mandatory present if the IE *LTE-NeighCellsCRS-AssistInfoList* contains multiple list entries.

– *MAC-CellGroupConfig*

The IE *MAC-CellGroupConfig* is used to configure MAC parameters for a cell group, including DRX.

MAC-CellGroupConfig information element

```
-- ASN1START
-- TAG-MAC-CELLGROUPCONFIG-START

MAC-CellGroupConfig ::=             SEQUENCE {
    drx-Config                          SetupRelease { DRX-Config }                                 OPTIONAL,   -- Need M
    schedulingRequestConfig             SchedulingRequestConfig                                     OPTIONAL,   -- Need M
    bsr-Config                          BSR-Config                                                  OPTIONAL,   -- Need M
    tag-Config                          TAG-Config                                                  OPTIONAL,   -- Need M
    phr-Config                          SetupRelease { PHR-Config }                                 OPTIONAL,   -- Need M
    skipUplinkTxDynamic                 BOOLEAN,
    ...,
    [[
    csi-Mask                            BOOLEAN                                                     OPTIONAL,   -- Need M
    dataInactivityTimer                 SetupRelease { DataInactivityTimer }                        OPTIONAL    -- Cond MCG-Only
    ]],
    [[
    usePreBSR-r16                       ENUMERATED {true}                                           OPTIONAL,   -- Need R
    schedulingRequestID-LBT-SCell-r16   SchedulingRequestId                                         OPTIONAL,   -- Need R
    lch-BasedPrioritization-r16         ENUMERATED {enabled}                                        OPTIONAL,   -- Need R
    schedulingRequestID-BFR-SCell-r16   SchedulingRequestId                                         OPTIONAL,   -- Need R
    drx-ConfigSecondaryGroup-r16        SetupRelease { DRX-ConfigSecondaryGroup-r16 }               OPTIONAL    -- Need M
    ]],
    [[
    enhancedSkipUplinkTxDynamic-r16     ENUMERATED {true}                                           OPTIONAL,   -- Need R
    enhancedSkipUplinkTxConfigured-r16  ENUMERATED {true}                                           OPTIONAL    -- Need R
    ]],
    [[
    intraCG-Prioritization-r17          ENUMERATED {enabled}                    OPTIONAL,   -- Cond LCH-PrioWithReTxTimer
    drx-ConfigSL-r17                    SetupRelease { DRX-ConfigSL-r17 }       OPTIONAL,   -- Need M
    drx-ConfigExt-v1700                 SetupRelease { DRX-ConfigExt-v1700 }    OPTIONAL,   -- Need M
```

```
    schedulingRequestID-BFR-r17         SchedulingRequestId                         OPTIONAL,    -- Need R
    schedulingRequestID-BFR2-r17        SchedulingRequestId                         OPTIONAL,    -- Need R
    schedulingRequestConfig-v1700       SchedulingRequestConfig-v1700               OPTIONAL,    -- Need M
    tar-Config-r17                      SetupRelease { TAR-Config-r17  }                                 OPTIONAL,    -- Need M
    g-RNTI-ConfigToAddModList-r17       SEQUENCE (SIZE (1..maxG-RNTI-r17)) OF MBS-RNTI-SpecificConfig-r17       OPTIONAL,    -- Need N
    g-RNTI-ConfigToReleaseList-r17      SEQUENCE (SIZE (1..maxG-RNTI-r17)) OF MBS-RNTI-SpecificConfigId-r17     OPTIONAL,    -- Need N
    g-CS-RNTI-ConfigToAddModList-r17    SEQUENCE (SIZE (1..maxG-CS-RNTI-r17)) OF MBS-RNTI-SpecificConfig-r17    OPTIONAL,    -- Need N
    g-CS-RNTI-ConfigToReleaseList-r17   SEQUENCE (SIZE (1..maxG-CS-RNTI-r17)) OF MBS-RNTI-SpecificConfigId-r17  OPTIONAL,    -- Need N
    allowCSI-SRS-Tx-MulticastDRX-Active-r17   BOOLEAN                                                            OPTIONAL     -- Need M
    ]],
    [[
    schedulingRequestID-PosMG-Request-r17 SchedulingRequestId                                                    OPTIONAL,    -- Need R
    drx-LastTransmissionUL-r17          ENUMERATED {enabled}                                                     OPTIONAL     -- Need R
    ]],
    [[
    posMG-Request-r17                   ENUMERATED {enabled}                                                     OPTIONAL     -- Need R
    ]]
}

DataInactivityTimer ::=         ENUMERATED {s1, s2, s3, s5, s7, s10, s15, s20, s40, s50, s60, s80, s100, s120, s150, s180}

MBS-RNTI-SpecificConfig-r17 ::=        SEQUENCE {
    mbs-RNTI-SpecificConfigId-r17          MBS-RNTI-SpecificConfigId-r17,
    groupCommon-RNTI-r17                   CHOICE {
        g-RNTI                                 RNTI-Value,
        g-CS-RNTI                              RNTI-Value
    },
    drx-ConfigPTM-r17                      SetupRelease { DRX-ConfigPTM-r17 }                    OPTIONAL,    -- Need M
    harq-FeedbackEnablerMulticast-r17      ENUMERATED {dci-enabler, enabled}                     OPTIONAL,    -- Need S
    harq-FeedbackOptionMulticast-r17       ENUMERATED {ack-nack, nack-only}                      OPTIONAL,    -- Cond HARQFeedback
    pdsch-AggregationFactor-r17            ENUMERATED {n2, n4, n8}                               OPTIONAL     -- Cond G-RNTI
}

MBS-RNTI-SpecificConfigId-r17 ::= INTEGER (0..maxG-RNTI-1-r17)

-- TAG-MAC-CELLGROUPCONFIG-STOP
-- ASN1STOP
```

***MAC-CellGroupConfig* field descriptions**
allowCSI-SRS-Tx-MulticastDRX-Active Used to control the CSI/SRS transmission during MBS multicast DRX ActiveTime, see TS 38.321 [3].
csi-Mask If set to true, the UE limits CSI reports to the on-duration period of the DRX cycle, see TS 38.321 [3].
dataInactivityTimer Releases the RRC connection upon data inactivity as specified in clause 5.3.8.5 and in TS 38.321 [3]. Value *s1* corresponds to 1 second, value s2 corresponds to 2 seconds, and so on.
drx-Config, drx-ConfigExt Used to configure DRX as specified in TS 38.321 [3]. Network only configures *drx-ConfigExt* when *drx-Config* is configured.
drx-ConfigSecondaryGroup Used to configure DRX related parameters for the second DRX group as specified in TS 38.321 [3]. The network does not configure secondary DRX group with DCP simultaneously nor secondary DRX group with a dormant BWP simultaneously.
drx-ConfigSL Used to configure additional DRX parameters for the UE performing sidelink operation with resource allocation mode 1, as specified in TS 38.321 [3]. Network only configures this field if *sl-ScheduledConfig* is configured and *drx-Config* is configured.
drx-LastTransmissionUL If this field is present, the start of the *drx-HARQ-RTT-TimerUL* is after the last transmission within a bundle, see TS 38.321 [3].
g-RNTI-ConfigToAddModList List of G-RNTI configurations to add or modify. Up to 8 G-RNTIs can be configured in total in this release based on the UE capability.
g-RNTI-ConfigToReleaseList List of G-RNTI configurations to release.
g-CS-RNTI-ConfigToAddModList List of G-CS-RNTI configurations to add or modify. Up to 8 G-CS-RNTIs can be configured in total in this release based on the UE capability.
g-CS-RNTI-ConfigToReleaseList List of G-CS-RNTI configurations to release.
intraCG-Prioritization Used to enable HARQ process ID selection based on LCH-priority for one CG as specified in TS 38.321 [3].
lch-BasedPrioritization If this field is present, the corresponding MAC entity of the UE is configured with prioritization between overlapping grants and between scheduling request and overlapping grants based on LCH priority, see TS 38.321 [3]. The network does not configure *lch-BasedPrioritization* with *enhancedSkipUplinkTxDynamic* simultaneously nor *lch-BasedPrioritization* with *enhancedSkipUplinkTxConfigured* simultaneously.
posMG-Request Indicates whether UE is configured to send UL MAC CE for Positioning Measurement Gap Activation/Deactivation Request, as specified in TS 38.321 [3].
schedulingRequestID-BFR-SCell Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3].
schedulingRequestID-BFR Indicates the scheduling request configuration (SchedulingRequestConfig) that the UE shall use upon detecting a beam failure on the detection resources configured in *failureDetectionSet1* of a serving cell while beam failure is not detected on resources configured in *failureDetectionSet2* of the same serving cell.
schedulingRequestID-BFR2 Indicates the scheduling request configuration (SchedulingRequestConfig) that the UE shall use upon detecting a beam failure on the detection resources configured in *failureDetectionSet2* of a serving cell while beam failure is not detected on resources configured in *failureDetectionSet1* of the same serving cell.
schedulingRequestID-LBT-SCell Indicates the scheduling request configuration applicable for consistent uplink LBT recovery on SCell, as specified in TS 38.321 [3].
schedulingRequestID-PosMG-Request Indicates the scheduling request configuration applicable for Positioning Measurement Gap Activation/Deactivation Request, as specified in TS 38.321 [3].

skipUplinkTxDynamic, enhancedSkipUplinkTxDynamic, enhancedSkipUplinkTxConfigured If set to *true*, the UE skips UL transmissions as described in TS 38.321 [3]. If the UE is configured with *enhancedSkipUplinkTxDynamic* or *enhancedSkipUplinkTxConfigured* with value *true*, REPETITION_NUMBER (as specified in TS 38.321 [3], clause 5.4.2.1) of the corresponding PUSCH transmission of the uplink grant shall be equal to 1.
tag-Config The field is used to configure parameters for a time-alignment group. The field is not present if any DAPS bearer is configured.
usePreBSR If set to true, the MAC entity of the IAB-MT may use the Pre-emptive BSR, see TS 38.321 [3].

***MBS-RNTI-SpecificConfig* field descriptions**
drx-ConfigPTM Used to configure DRX for PTM transmission as specified in TS 38.321 [3].
g-CS-RNTI Used to scramble the SPS group-common PDSCH and activation/deactivation of SPS group-common PDSCH for one or more MBS multicast services.
g-RNTI Used to scramble the scheduling and transmission of PTM for one or more MBS multicast services.
groupCommon-RNTI Used to configure g-RNTI or g-CS-RNTI.
harq-FeedbackEnablerMulticast Indicates whether the UE shall provide HARQ feedback for MBS multicast. Value *dci-enabler* means that whether the UE shall provide HARQ feedback for MBS multicast is indicated by DCI as specified in TS 38.213 [13]. Value *enabled* means the UE shall always provide HARQ feedback for MBS multicast. When the field is absent, the UE behavior is specified in TS 38.213 [13].
harq-FeedbackOptionMulticast Indicates the feedback mode for MBS multicast dynamically scheduled PDSCH or SPS PDSCH.
mbs-RNTI-SpecificConfigId An identifier of the RNTI specific configuration for MBS multicast.
pdsch-AggregationFactor Number of repetitions for dynamically scheduled MBS multicast data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent and *groupCommon-RNTI* is set to *g-RNTI*, the UE applies the value 1.

Conditional Presence	Explanation
G-RNTI	This field is optionally present, Need S, if *groupCommon-RNTI* is set to *g-RNTI*. The field is absent when *groupCommon-RNTI* is set to *g-CS-RNTI*.
HARQFeedback	The field is mandatory present when *harq-FeedbackEnablerMulticast* is present. It is absent otherwise.
MCG-Only	This field is optionally present, Need M, for the *MAC-CellGroupConfig* of the MCG. It is absent otherwise.
LCH-PrioWithReTxTimer	This field is optionally present, Need R, if lch-BasedPrioritization-r16 is configured in this MAC entity and cg-RetransmissionTimer-r16 is configured for any configured grant configuration associated with this MAC entity. It is absent otherwise, Need R.

– *MeasConfig*

The IE *MeasConfig* specifies measurements to be performed by the UE, and covers intra-frequency, inter-frequency and inter-RAT mobility as well as configuration of measurement gaps.

MeasConfig information element

```
-- ASN1START
-- TAG-MEASCONFIG-START

MeasConfig ::=                      SEQUENCE {
    measObjectToRemoveList              MeasObjectToRemoveList                                  OPTIONAL,   -- Need N
    measObjectToAddModList              MeasObjectToAddModList                                  OPTIONAL,   -- Need N
    reportConfigToRemoveList            ReportConfigToRemoveList                                OPTIONAL,   -- Need N
    reportConfigToAddModList            ReportConfigToAddModList                                OPTIONAL,   -- Need N
    measIdToRemoveList                  MeasIdToRemoveList                                      OPTIONAL,   -- Need N
    measIdToAddModList                  MeasIdToAddModList                                      OPTIONAL,   -- Need N
    s-MeasureConfig                     CHOICE {
        ssb-RSRP                            RSRP-Range,
        csi-RSRP                            RSRP-Range
    }                                                                                           OPTIONAL,   -- Need M
    quantityConfig                      QuantityConfig                                          OPTIONAL,   -- Need M
    measGapConfig                       MeasGapConfig                                           OPTIONAL,   -- Need M
    measGapSharingConfig                MeasGapSharingConfig                                    OPTIONAL,   -- Need M
    ...,
    [[
    interFrequencyConfig-NoGap-r16      ENUMERATED {true}                                       OPTIONAL    -- Need R
    ]]
}

MeasObjectToRemoveList ::=              SEQUENCE (SIZE (1..maxNrofObjectId)) OF MeasObjectId

MeasIdToRemoveList ::=                  SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasId

ReportConfigToRemoveList ::=            SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId

-- TAG-MEASCONFIG-STOP
-- ASN1STOP
```

***MeasConfig* field descriptions**
interFrequencyConfig-NoGap-r16 If the field is set to true, UE is configured to perform SSB based inter-frequency measurement without measurement gaps when the inter-frequency SSB is completely contained in the active DL BWP of the UE, as specified in TS 38.133 [14], clause 9.3. Otherwise, the SSB based inter-frequency measurement is performed within measurement gaps. In NR-DC, the field can only be configured in the *measConfig* associated with MCG, and when configured, it applies to all the inter-frequency measurements configured by MN and SN.
measGapConfig Used to setup and release measurement gaps in NR.
measIdToAddModList List of measurement identities to add and/or modify.
measIdToRemoveList List of measurement identities to remove.
measObjectToAddModList List of measurement objects to add and/or modify.
measObjectToRemoveList List of measurement objects to remove.
reportConfigToAddModList List of measurement reporting configurations to add and/or modify.
reportConfigToRemoveList List of measurement reporting configurations to remove.
s-MeasureConfig Threshold for NR SpCell RSRP measurement controlling when the UE is required to perform measurements on non-serving cells. Choice of *ssb-RSRP* corresponds to cell RSRP based on SS/PBCH block and choice of *csi-RSRP* corresponds to cell RSRP of CSI-RS.
measGapSharingConfig Specifies the measurement gap sharing scheme and controls setup/ release of measurement gap sharing.

– *MeasGapConfig*

The IE *MeasGapConfig* specifies the measurement gap configuration and controls setup/release of measurement gaps.

***MeasGapConfig* information element**

```
-- ASN1START
-- TAG-MEASGAPCONFIG-START

MeasGapConfig ::=                   SEQUENCE {
    gapFR2                              SetupRelease { GapConfig }                                          OPTIONAL,   -- Need M
    ...,
    [[
    gapFR1                              SetupRelease { GapConfig }                                          OPTIONAL,   -- Need M
    gapUE                               SetupRelease { GapConfig }                                          OPTIONAL    -- Need M
    ]],
    [[
    gapToAddModList-r17           SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF GapConfig-r17                OPTIONAL,   -- Need N
    gapToReleaseList-r17          SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF MeasGapId-r17                OPTIONAL,   -- Need N
    posMeasGapPreConfigToAddModList-r17      PosMeasGapPreConfigToAddModList-r17                            OPTIONAL,   -- Need N
    posMeasGapPreConfigToReleaseList-r17     PosMeasGapPreConfigToReleaseList-r17                           OPTIONAL    -- Need N
```

```
    ]]

}

GapConfig ::=                       SEQUENCE {
    gapOffset                           INTEGER (0..159),
    mgl                                 ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},
    mgrp                                ENUMERATED {ms20, ms40, ms80, ms160},
    mgta                                ENUMERATED {ms0, ms0dot25, ms0dot5},
    ...,
    [[
    refServCellIndicator                ENUMERATED {pCell, pSCell, mcg-FR2}                             OPTIONAL   -- Cond NEDCorNRDC
    ]],
    [[
    refFR2ServCellAsyncCA-r16           ServCellIndex                                                   OPTIONAL,   -- Cond AsyncCA
    mgl-r16                             ENUMERATED {ms10, ms20}                                         OPTIONAL    -- Cond PRS
    ]]
}

GapConfig-r17 ::=                   SEQUENCE {
    measGapId-r17                       MeasGapId-r17,
    gapType-r17                         ENUMERATED {perUE, perFR1, perFR2},
    gapOffset-r17                       INTEGER (0..159),
    mgl-r17                             ENUMERATED {ms1, ms1dot5, ms2, ms3, ms3dot5, ms4, ms5, ms5dot5, ms6, ms10, ms20},
    mgrp-r17                            ENUMERATED {ms20, ms40, ms80, ms160},
    mgta-r17                            ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot75},
    refServCellIndicator-r17            ENUMERATED {pCell, pSCell, mcg-FR2}                             OPTIONAL,   -- Cond NEDCorNRDC
    refFR2-ServCellAsyncCA-r17          ServCellIndex                                                   OPTIONAL,   -- Cond AsyncCA
    preConfigInd-r17                    ENUMERATED {true}                                               OPTIONAL,   -- Need R
    ncsgInd-r17                         ENUMERATED {true}                                               OPTIONAL,   -- Need R
    gapAssociationPRS-r17               ENUMERATED {true}                                               OPTIONAL,   -- Need R
    gapSharing-r17                      MeasGapSharingScheme                                            OPTIONAL,   -- Need R
    gapPriority-r17                     GapPriority-r17                                                 OPTIONAL,   -- Need R
    ...
}

PosMeasGapPreConfigToAddModList-r17 ::= SEQUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF PosGapConfig-r17

PosMeasGapPreConfigToReleaseList-r17 ::= SEQUENCE (SIZE (1..maxNrofPreConfigPosGapId-r17)) OF MeasPosPreConfigGapId-r17

PosGapConfig-r17 ::=                SEQUENCE {
    measPosPreConfigGapId-r17           MeasPosPreConfigGapId-r17,
    gapOffset-r17                       INTEGER (0..159),
    mgl-r17                             ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},
    mgrp-r17                            ENUMERATED {ms20, ms40, ms80, ms160},
    mgta-r17                            ENUMERATED {ms0, ms0dot25, ms0dot5},
    gapType-r17                         ENUMERATED {perUE, perFR1, perFR2},
    ...
}

MeasPosPreConfigGapId-r17 ::= INTEGER (1..maxNrofPreConfigPosGapId-r17)

-- TAG-MEASGAPCONFIG-STOP
-- ASN1STOP
```

***MeasGapConfig* field descriptions**
gapAssociationPRS Indicates that PRS measurement is associated with this measurement gap. The network only includes this field for one per-UE gap or for one per-FR gap. If concurrent gap (i.e. one of the gap combination as defined in Table 9.1.8-1 in TS 38.133 [14]) is configured and no gap is configured with this field, the PRS measurement is associated with the gap configured via *GapConfig* (without suffix), if available. If both per-UE gap and per-FR gap are configured via *GapConfig* and/or *GapConfig-r17*, the PRS measurement is always associated with the per-UE gap.
gapFR1 Indicates measurement gap configuration that applies to FR1 only. In (NG)EN-DC, *gapFR1* cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 measurement gap). In NE-DC, *gapFR1* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap). In NR-DC, *gapFR1* can only be set up in the *measConfig* associated with MCG. *gapFR1* can not be configured together with *gapUE*. The applicability of the FR1 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].
gapFR2 Indicates measurement gap configuration applies to FR2 only. In (NG)EN-DC or NE-DC, *gapFR2* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap). In NR-DC, *gapFR2* can only be set up in the *measConfig* associated with MCG. *gapFR2* cannot be configured together with *gapUE*. The applicability of the FR2 measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].
gapOffset Value *gapOffset* is the gap offset of the gap pattern with MGRP indicated in the field *mgrp*. The value range is from 0 to *mgrp*-1. If *ncsgInd-r17* is present, this offset value refers to the starting point of VIL1 (the visible interruption length before the ML).
gapPriority Indicates the priority of this measurement gap (see TS 38.133 [14], clause 9.1.8.3). Value *1* indicates highest priority, value 2 indicates second level priority, and so on.
gapSharing Indicates the measurement gap sharing scheme that applies to this *GapConfig*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.
gapToAddModList A list of of measurement gap configuration to be added or modified. If more than one measurement gap is configured (i.e. concurrent measurement gap as specified in TS 38.133[14], clause 9.1.8), the maximum number of configured measurement gap is limited by the gap combinations defined in Table 9.1.8-1 in TS 38.133 [14]. The network configures at most one NCSG or pre-configured measurement gap for a given gap type. In this version of the specification, the network configures this field only in NR standalone. This field is used only for a UE that supports pre-configured measurement gap, concurrent measurement gap, or NCSG. In this version of the specification, the network does not configure concurrent measurement gap together with MUSIM gap or preconfigured measurement gap for positioning.
gapToReleaseList A list of measurement gap configuration to be released.
gapType Indicates the type of this measurement gap. Value *perUE* indicates that it is a per UE measurement gap, value *perFR1* indicates that it is an FR1 measurement gap, and value *perFR2* indicates that it is an FR2 measurement gap.
gapUE Indicates measurement gap configuration that applies to all frequencies (FR1 and FR2). In (NG)EN-DC, *gapUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE measurement gap). In NE-DC, *gapUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap). In NR-DC, *gapUE* can only be set up in the *measConfig* associated with MCG. If *gapUE* is configured, then neither *gapFR1* nor *gapFR2* can be configured. The applicability of the per UE measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14].
measGapId The ID of this measurement gap configuration.
mgl Value *mgl* is the measurement gap length in ms of the measurement gap. If *ncsgInd-r17* is not present, the measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14]. If *ncsgInd-r17* is present, this field indicates the measurement length (ML) in NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14]. Value *ms1dot5* corresponds to 1.5 ms, *ms3* corresponds to 3 ms and so on. If *mgl-r16* is present, UE shall ignore the *mgl* (without suffix). Value *ms1*, *ms2*, and *ms5* can only be configured if *ncsgInd* is present.

mgrp If *ncsgInd-r17* is not present, the *mgrp* field indicates the measurement gap repetition period in (ms) of the measurement gap according to Table 9.1.2-1 in TS 38.133 [14]. If *ncsgInd-r17* is present, the *mgrp* field indicates the Visible Interruption Repetition Period (VIRP) of NCSG pattern and is configured according to Table 9.1.9.3-1 in TS 38.133 [14].
mgta Value *mgta* is the measurement gap timing advance in ms. The applicability of the measurement gap timing advance is according to clause 9.1.2 of TS 38.133 [14], or according to clause 9.1.9 of TS 38.133 [14] if *ncsgInd* is present. Value *ms0* corresponds to 0 ms, *ms0dot25* corresponds to 0.25 ms, *ms0dot5* corresponds to 0.5 ms and *ms0dot75* corresponds to 0.75 ms. For FR2, the network only configures 0 ms and 0.25 ms if *ncsgInd* is not present. If *ncsgInd* is present, the network only configures 0ms for per-UE NCSG and FR1 NCSG and only configures 0ms or 0.75ms for FR2 NCSG. Value *ms0dot75* can only be configured if *ncsgInd* is present.
ncsgInd Indicates that the measurement gap is a NCSG as specified in 38.133 [14].
posMeasGapPreConfigToAddModList List of preconfigured measurement gap for positioning to add and/or modify. All the gaps configured are associated with the measurement of PRS for RSTD, UE-RxTx Time Difference, PRS-RSRP and PRS-RSRPP as defined in TS 38.215 [9]. In this version of the specification, the network does not configure preconfigured measurement gap for positioning together with concurrent measurement gap or MUSIM gap.
posMeasGapPreConfigToReleaseList List of preconfigured measurement gap for positioning to release.
preConfigInd Indicates whether the measurement gap is a pre-configured measurement gap.
refFR2ServCellAsyncCA Indicates the FR2 serving cell identifier whose SFN and subframe is used for FR2 gap calculation for this gap pattern with asynchronous CA involving FR2 carrier(s).
refServCellIndicator Indicates the serving cell whose SFN and subframe are used for gap calculation for this gap pattern. Value pCell corresponds to the PCell, pSCell corresponds to the PSCell, and mcg-FR2 corresponds to a serving cell on FR2 frequency in MCG.

Conditional Presence	Explanation
AsyncCA	This field is mandatory present when configuring and reconfiguring FR2 gap pattern to UE in: - (NG)EN-DC or NR SA with asynchronous CA involving FR2 carrier(s); - NE-DC or NR-DC with asynchronous CA involving FR2 carrier(s), if the field *refServCellIndicator* is set to *mcg-FR2*. Otherwise, it is absent, Need R.
NEDCorNRDC	This field is mandatory present when configuring and reconfiguring gap pattern to UE in NE-DC or NR-DC. Otherwise, it is absent, Need R.
PRS	This field is optionally present, Need R, when configuring gap pattern to UE for measurements of DL-PRS configured via LPP (TS 37.355 [49]). Otherwise, it is absent.

– *MeasGapId*

The IE *MeasGapId* used to identify a per UE or per FR measurement gap configuration.

MeasGapId information element

```
-- ASN1START
-- TAG-MEASGAPID-START
```

```
MeasGapId-r17 ::=                   INTEGER (1..maxNrofGapId-r17)

-- TAG-MEASGAPID-STOP
-- ASN1STOP
```

– *MeasGapSharingConfig*

The IE *MeasGapSharingConfig* specifies the measurement gap sharing scheme and controls setup/ release of measurement gap sharing.

MeasGapSharingConfig information element

```
-- ASN1START
-- TAG-MEASGAPSHARINGCONFIG-START

MeasGapSharingConfig ::=        SEQUENCE {
    gapSharingFR2                   SetupRelease { MeasGapSharingScheme }       OPTIONAL,   -- Need M
    ...,
    [[
    gapSharingFR1                   SetupRelease { MeasGapSharingScheme }       OPTIONAL,   --Need M
    gapSharingUE                    SetupRelease { MeasGapSharingScheme }       OPTIONAL    --Need M
    ]]
}

MeasGapSharingScheme::=         ENUMERATED {scheme00, scheme01, scheme10, scheme11}

-- TAG-MEASGAPSHARINGCONFIG-STOP
-- ASN1STOP
```

MeasGapSharingConfig field descriptions
gapSharingFR1   Indicates the measurement gap sharing scheme that applies to the gap set via *gapFR1*. In (NG)EN-DC, *gapSharingFR1* cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 gap sharing). In NE-DC, *gapSharingFR1* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap sharing). In NR-DC, *gapSharingFR1* can only be set up in the *measConfig* associated with MCG. *gapSharingFR1* can not be configured together with *gapSharingUE*. For the applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.
gapSharingFR2   Indicates the measurement gap sharing scheme that applies to the gap set via *gapFR2*. In (NG)EN-DC or NE-DC, *gapSharingFR2* can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap sharing). In NR-DC, *gapSharingFR2* can only be set up by MCG in the *measConfig* associated with MCG. *gapSharingFR2* cannot be configured together with *gapSharingUE*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.
gapSharingUE   Indicates the measurement gap sharing scheme that applies to the gap set via *gapUE*. In (NG)EN-DC, *gapSharingUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE gap sharing). In NE-DC, *gapSharingUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap sharing). In NR-DC, *gapSharingUE* can only be set up in the *measConfig* associated with MCG. If *gapSharingUE* is configured, then neither *gapSharingFR1* nor *gapSharingFR2* can be configured. For the applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on.

– *MeasId*

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

MeasId information element

```
-- ASN1START
-- TAG-MEASID-START

MeasId ::=                          INTEGER (1..maxNrofMeasId)

-- TAG-MEASID-STOP
-- ASN1STOP
```

– *MeasIdleConfig*

The IE *MeasIdleConfig* is used to convey information to UE about measurements requested to be done while in RRC_IDLE or RRC_INACTIVE.

MeasIdleConfig information element

```
-- ASN1START
-- TAG-MEASIDLECONFIG-START

MeasIdleConfigSIB-r16 ::= SEQUENCE {
    measIdleCarrierListNR-r16       SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16          OPTIONAL,     -- Need S
    measIdleCarrierListEUTRA-r16    SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16       OPTIONAL,     -- Need S
    ...
}

MeasIdleConfigDedicated-r16 ::= SEQUENCE {
    measIdleCarrierListNR-r16       SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16          OPTIONAL,     -- Need N
    measIdleCarrierListEUTRA-r16    SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16       OPTIONAL,     -- Need N
    measIdleDuration-r16            ENUMERATED{sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},
    validityAreaList-r16            ValidityAreaList-r16                                                   OPTIONAL,     -- Need N
    ...
}

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

ValidityArea-r16 ::=            SEQUENCE {
    carrierFreq-r16                 ARFCN-ValueNR,
    validityCellList-r16            ValidityCellList                                                   OPTIONAL   -- Need N
}

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

MeasIdleCarrierNR-r16 ::=       SEQUENCE {
    carrierFreq-r16                 ARFCN-ValueNR,
    ssbSubcarrierSpacing-r16        SubcarrierSpacing,
    frequencyBandList               MultiFrequencyBandListNR                                           OPTIONAL,  -- Need R
```

```
    measCellListNR-r16              CellListNR-r16                                                  OPTIONAL,  -- Need R
    reportQuantities-r16            ENUMERATED {rsrp, rsrq, both},
    qualityThreshold-r16            SEQUENCE {
        idleRSRP-Threshold-NR-r16       RSRP-Range                                                      OPTIONAL,  -- Need R
        idleRSRQ-Threshold-NR-r16       RSRQ-Range                                                      OPTIONAL   -- Need R
    }                                                                                               OPTIONAL,  -- Need R
    ssb-MeasConfig-r16              SEQUENCE {
        nrofSS-BlocksToAverage-r16          INTEGER (2..maxNrofSS-BlocksToAverage)                      OPTIONAL,   -- Need S
        absThreshSS-BlocksConsolidation-r16 ThresholdNR                                                 OPTIONAL,   -- Need S
        smtc-r16                            SSB-MTC                                                     OPTIONAL,   -- Need S
        ssb-ToMeasure-r16                   SSB-ToMeasure                                               OPTIONAL,   -- Need S
        deriveSSB-IndexFromCell-r16         BOOLEAN,
        ss-RSSI-Measurement-r16             SS-RSSI-Measurement                                         OPTIONAL    -- Need S
    }                                                                                               OPTIONAL,  -- Need S
    beamMeasConfigIdle-r16          BeamMeasConfigIdle-NR-r16                                       OPTIONAL,  -- Need R
    ...
}

MeasIdleCarrierEUTRA-r16 ::=    SEQUENCE {
    carrierFreqEUTRA-r16            ARFCN-ValueEUTRA,
    allowedMeasBandwidth-r16        EUTRA-AllowedMeasBandwidth,
    measCellListEUTRA-r16           CellListEUTRA-r16                                               OPTIONAL,  -- Need R
    reportQuantitiesEUTRA-r16       ENUMERATED {rsrp, rsrq, both},
    qualityThresholdEUTRA-r16       SEQUENCE {
        idleRSRP-Threshold-EUTRA-r16    RSRP-RangeEUTRA                                                 OPTIONAL,  -- Need R
        idleRSRQ-Threshold-EUTRA-r16    RSRQ-RangeEUTRA-r16                                             OPTIONAL   -- Need R
    }                                                                                               OPTIONAL,  -- Need S
    ...
}

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

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

BeamMeasConfigIdle-NR-r16  ::=  SEQUENCE {
    reportQuantityRS-Indexes-r16    ENUMERATED {rsrp, rsrq, both},
    maxNrofRS-IndexesToReport-r16   INTEGER (1.. maxNrofIndexesToReport),
    includeBeamMeasurements-r16     BOOLEAN
}

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

-- TAG-MEASIDLECONFIG-STOP
-- ASN1STOP
```

***MeasIdleConfig* field descriptions**
absThreshSS-BlocksConsolidation Threshold for consolidation of L1 measurements per RS index.
beamMeasConfigIdle Indicates the beam level measurement configuration.
carrierFreq Indicates the NR carrier frequency to be used for measurements during RRC_IDLE or RRC_INACTIVE.
carrierFreqEUTRA Indicates the E-UTRA carrier frequency to be used for measurements during RRC_IDLE or RRC_INACTIVE.
deriveSSB-IndexFromCell This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to true, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14].
frequencyBandList Indicates the list of frequency bands for which the NR idle/inactive measurement parameters apply. The UE shall select the first listed band which it supports in the frequencyBandList field to represent the NR neighbour carrier frequency.
includeBeamMeasurements Indicates whether or not the UE shall include beam measurements in the NR idle/inactive measurement results.
maxNrofRS-IndexesToReport Max number of beam indices to include in the idle/inactive measurement result.
measCellListEUTRA Indicates the list of E-UTRA cells which the UE is requested to measure and report for idle/inactive measurements.
measCellListNR Indicates the list of NR cells which the UE is requested to measure and report for idle/inactive measurements.
measIdleCarrierListEUTRA Indicates the E-UTRA carriers to be measured during RRC_IDLE or RRC_INACTIVE.
measIdleCarrierListNR Indicates the NR carriers to be measured during RRC_IDLE or RRC_INACTIVE.
measIdleDuration Indicates the duration for performing idle/inactive measurements while in RRC_IDLE or RRC_INACTIVE. Value sec10 correspond to 10 seconds, value sec30 to 30 seconds and so on.
nrofSS-BlocksToAverage Number of SS blocks to average for cell measurement derivation.
qualityThreshold Indicates the quality thresholds for reporting the measured cells for idle/inactive NR measurements.
qualityThresholdEUTRA Indicates the quality thresholds for reporting the measured cells for idle/inactive E-UTRA measurements.
reportQuantities Indicates which measurement quantities UE is requested to report in the idle/inactive measurement report.
reportQuantitiesEUTRA Indicates which E-UTRA measurement quantities the UE is requested to report in the idle/inactive measurement report.
reportQuantityRS-Indexes Indicates which measurement information per beam index the UE shall include in the NR idle/inactive measurement results.
smtc Indicates the measurement timing configuration for inter-frequency measurement. If this field is absent in *VarMeasIdleConfig*, the UE assumes that SSB periodicity is 5 ms in this frequency.

ssbSubcarrierSpacing Indicates 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
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent in *VarMeasIdleConfig*, the UE measures on all SS-blocks.
ss-RSSI-Measurement Indicates the SSB-based RSSI measurement configuration. If the field is absent in *VarMeasIdleConfig*, the UE behaviour is defined in TS 38.215 [89], clause 5.1.3.
validityAreaList Indicates the list of frequencies and optionally, for each frequency, a list of cells within which the UE is required to perform measurements while in RRC_IDLE and RRC_INACTIVE.

– *MeasIdToAddModList*

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the measId, the associated *measObjectId* and the associated *reportConfigId*.

MeasIdToAddModList information element

```
-- ASN1START
-- TAG-MEASIDTOADDMODLIST-START

MeasIdToAddModList ::=              SEQUENCE (SIZE (1..maxNrofMeasId)) OF MeasIdToAddMod

MeasIdToAddMod ::=                  SEQUENCE {
    measId                              MeasId,
    measObjectId                        MeasObjectId,
    reportConfigId                      ReportConfigId
}

-- TAG-MEASIDTOADDMODLIST-STOP
-- ASN1STOP
```

– *MeasObjectCLI*

The IE *MeasObjectCLI* specifies information applicable for SRS-RSRP measurements and/or CLI-RSSI measurements.

MeasObjectCLI information element

```
-- ASN1START
-- TAG-MEASOBJECTCLI-START
```

```
MeasObjectCLI-r16 ::=                SEQUENCE {
     cli-ResourceConfig-r16             CLI-ResourceConfig-r16,
    ...
}

CLI-ResourceConfig-r16 ::=          SEQUENCE {
    srs-ResourceConfig-r16              SetupRelease { SRS-ResourceListConfigCLI-r16 }              OPTIONAL,   -- Need M
    rssi-ResourceConfig-r16             SetupRelease { RSSI-ResourceListConfigCLI-r16 }             OPTIONAL    -- Need M
}

SRS-ResourceListConfigCLI-r16 ::=   SEQUENCE (SIZE (1.. maxNrofCLI-SRS-Resources-r16)) OF SRS-ResourceConfigCLI-r16

RSSI-ResourceListConfigCLI-r16 ::=  SEQUENCE (SIZE (1.. maxNrofCLI-RSSI-Resources-r16)) OF RSSI-ResourceConfigCLI-r16

SRS-ResourceConfigCLI-r16 ::=       SEQUENCE {
    srs-Resource-r16                    SRS-Resource,
    srs-SCS-r16                         SubcarrierSpacing,
    refServCellIndex-r16                ServCellIndex                                               OPTIONAL,   -- Need S
    refBWP-r16                          BWP-Id,
    ...
}

RSSI-ResourceConfigCLI-r16 ::=      SEQUENCE {
    rssi-ResourceId-r16                 RSSI-ResourceId-r16,
    rssi-SCS-r16                        SubcarrierSpacing,
    startPRB-r16                        INTEGER (0..2169),
    nrofPRBs-r16                        INTEGER (4..maxNrofPhysicalResourceBlocksPlus1),
    startPosition-r16                   INTEGER (0..13),
    nrofSymbols-r16                     INTEGER (1..14),
    rssi-PeriodicityAndOffset-r16       RSSI-PeriodicityAndOffset-r16,
    refServCellIndex-r16                ServCellIndex                                               OPTIONAL,   -- Need S
    ...
}

RSSI-ResourceId-r16 ::=             INTEGER (0.. maxNrofCLI-RSSI-Resources-1-r16)

RSSI-PeriodicityAndOffset-r16 ::=   CHOICE {
    sl10                                INTEGER(0..9),
    sl20                                INTEGER(0..19),
    sl40                                INTEGER(0..39),
    sl80                                INTEGER(0..79),
    sl160                               INTEGER(0..159),
    sl320                               INTEGER(0..319),
    s1640                               INTEGER(0..639),
    ...
}

-- TAG-MEASOBJECTCLI-STOP
-- ASN1STOP
```

***CLI-ResourceConfig* field descriptions**
srs-ResourceConfig SRS resources to be used for CLI measurements.
rssi-ResourceConfig CLI-RSSI resources to be used for CLI measurements.

***MeasObjectCLI* field descriptions**
cli-ResourceConfig SRS and/or CLI-RSSI resource configuration for CLI measurement.

***SRS-ResourceConfigCLI* field descriptions**
refBWP DL BWP id that is used to derive the reference point of the SRS resource (see TS 38.211[16], clause 6.4.1.4.3)
refServCellIndex The index of the reference serving cell that the *refBWP* belongs to. If this field is absent, the reference serving cell is PCell.
srs-SCS Subcarrier spacing for SRS. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

***RSSI-ResourceConfigCLI* field descriptions**
nrofPRBs Allowed size of the measurement BW. Only multiples of 4 are allowed. The smallest configurable number is the minimum of 4 and the width of the active DL BWP. If the configured value is larger than the width of the active DL BWP, the UE shall assume that the actual CLI-RSSI resource bandwidth is within the active DL BWP.
nrofSymbols Within a slot that is configured for CLI-RSSI measurement (see slotConfiguration), the UE measures the RSSI from *startPosition* to *startPosition* + *nrofSymbols* - 1. The configured CLI-RSSI resource does not exceed the slot boundary of the reference SCS. If the SCS of configured DL BWP(s) is larger than the reference SCS, network configures *startPosition* and *nrofSymbols* such that the configured CLI-RSSI resource not to exceed the slot boundary corresponding to the configured BWP SCS. If the reference SCS is larger than SCS of configured DL BWP(s), network ensures *startPosition* and *nrofSymbols* are integer multiple of reference SCS divided by configured BWP SCS.
refServCellIndex The index of the reference serving cell. Frequency reference point of the RSSI resource is subcarrier 0 of CRB0 of the reference serving cell. If this field is absent, the reference serving cell is PCell.
rssi-PeriodicityAndOffset Periodicity and slot offset for this CLI-RSSI resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots.
rssi-SCS Reference subcarrier spacing for CLI-RSSI measurement. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz UE performs CLI-RSSI measurement with the SCS of the active bandwidth part within the configured CLI-RSSI resource in the active BWP regardless of the reference SCS of the measurement resource.
startPosition OFDM symbol location of the CLI-RSSI resource within a slot.
startPRB Starting PRB index of the measurement bandwidth. For the case where the reference subcarrier spacing is smaller than subcarrier spacing of active DL BWP(s), network configures startPRB and nrofPRBs are as a multiple of active BW SCS divided by reference SCS.

– *MeasObjectEUTRA*

The IE *MeasObjectEUTRA* specifies information applicable for E-UTRA cells.

***MeasObjectEUTRA* information element**

```
-- ASN1START
-- TAG-MEASOBJECTEUTRA-START

MeasObjectEUTRA::=                  SEQUENCE {
    carrierFreq                         ARFCN-ValueEUTRA,
    allowedMeasBandwidth                EUTRA-AllowedMeasBandwidth,
    cellsToRemoveListEUTRAN             EUTRA-CellIndexList                                         OPTIONAL,    -- Need N
    cellsToAddModListEUTRAN             SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-Cell         OPTIONAL,    -- Need N
    excludedCellsToRemoveListEUTRAN     EUTRA-CellIndexList                                         OPTIONAL,    -- Need N
    excludedCellsToAddModListEUTRAN     SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-ExcludedCell    OPTIONAL,    -- Need N
```

```
    eutra-PresenceAntennaPort1          EUTRA-PresenceAntennaPort1,
    eutra-Q-OffsetRange                 EUTRA-Q-OffsetRange                 OPTIONAL,    -- Need R
    widebandRSRQ-Meas                   BOOLEAN,
    ...,
    [[
    associatedMeasGap-r17               MeasGapId-r17                       OPTIONAL     -- Need R
    ]]
}

EUTRA-CellIndexList ::=             SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-CellIndex

EUTRA-CellIndex ::=                 INTEGER (1..maxCellMeasEUTRA)


EUTRA-Cell ::=                      SEQUENCE {
    cellIndexEUTRA                      EUTRA-CellIndex,
    physCellId                          EUTRA-PhysCellId,
    cellIndividualOffset                EUTRA-Q-OffsetRange
}


EUTRA-ExcludedCell ::=              SEQUENCE {
    cellIndexEUTRA                      EUTRA-CellIndex,
    physCellIdRange                     EUTRA-PhysCellIdRange
}

-- TAG-MEASOBJECTEUTRA-STOP
-- ASN1STOP
```

***EUTRAN-ExcludedCell* field descriptions**
cellIndexEUTRA Entry index in the cell list.
physicalCellIdRange Physical cell identity or a range of physical cell identities.

***EUTRAN-Cell* field descriptions**
physicalCellId Physical cell identity of a cell in the cell list.
cellIndividualOffset Cell individual offset applicable to a specific cell. Value *dB-24* corresponds to -24 dB, *dB-22* corresponds to -22 dB and so on.

***MeasObjectEUTRA* field descriptions**
allowedMeasBandwidth The maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" TS 36.104 [33].
associatedMeasGap Indicates the associated measurement gap for measuring this EUTRA frequency. If this field is absent, the associated meaurment gap is the gap configured via *gapFR1* or *gapUE*.
carrierFreq Identifies E-UTRA carrier frequency for which this configuration is valid. Network does not configure more than one *MeasObjectEUTRA* for the same physical frequency, regardless of the E-ARFCN used to indicate this.
cellsToAddModListEUTRAN List of cells to add/ modify in the cell list.
cellsToRemoveListEUTRAN List of cells to remove from the cell list.
eutra-PresenceAntennaPort1 When set to *true*, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.
eutra-Q-OffsetRange Used to indicate a cell, or frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB. Value *dB-24* corresponds to -24 dB, value *dB-22* corresponds to -22 dB and so on.
excludedCellsToAddModListEUTRAN List of cells to add/ modify in the exclude-list of cells.
excludedCellsToRemoveListEUTRAN List of cells to remove from the exclude-list of cells.
widebandRSRQ-Meas If set to *true*, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [40]. The network may set the field to *true* if the measurement bandwidth indicated by *allowedMeasBandwidth* is 50 resource blocks or larger; otherwise the network sets this field to *false*.

– *MeasObjectId*

The IE *MeasObjectId* used to identify a measurement object configuration.

MeasObjectId information element

```
-- ASN1START
-- TAG-MEASOBJECTID-START

MeasObjectId ::=                    INTEGER (1..maxNrofObjectId)

-- TAG-MEASOBJECTID-STOP
-- ASN1STOP
```

– *MeasObjectNR*

The IE *MeasObjectNR* specifies information applicable for SS/PBCH block(s) intra/inter-frequency measurements and/or CSI-RS intra/inter-frequency measurements.

MeasObjectNR information element

```
-- ASN1START
-- TAG-MEASOBJECTNR-START

MeasObjectNR ::=                    SEQUENCE {
    ssbFrequency                        ARFCN-ValueNR                                                   OPTIONAL,   -- Cond SSBorAssociatedSSB
    ssbSubcarrierSpacing                SubcarrierSpacing                                               OPTIONAL,   -- Cond SSBorAssociatedSSB
    smtc1                               SSB-MTC                                                         OPTIONAL,   -- Cond SSBorAssociatedSSB
    smtc2                               SSB-MTC2                                                        OPTIONAL,   -- Cond IntraFreqConnected
    refFreqCSI-RS                       ARFCN-ValueNR                                                   OPTIONAL,   -- Cond CSI-RS
    referenceSignalConfig               ReferenceSignalConfig,
    absThreshSS-BlocksConsolidation     ThresholdNR                                                     OPTIONAL,   -- Need R
    absThreshCSI-RS-Consolidation       ThresholdNR                                                     OPTIONAL,   -- Need R
    nrofSS-BlocksToAverage              INTEGER (2..maxNrofSS-BlocksToAverage)                          OPTIONAL,   -- Need R
    nrofCSI-RS-ResourcesToAverage       INTEGER (2..maxNrofCSI-RS-ResourcesToAverage)                   OPTIONAL,   -- Need R
    quantityConfigIndex                 INTEGER (1..maxNrofQuantityConfig),
    offsetMO                            Q-OffsetRangeList,
    cellsToRemoveList                   PCI-List                                                        OPTIONAL,   -- Need N
    cellsToAddModList                   CellsToAddModList                                               OPTIONAL,   -- Need N
    excludedCellsToRemoveList           PCI-RangeIndexList                                              OPTIONAL,   -- Need N
    excludedCellsToAddModList           SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement      OPTIONAL,   -- Need N
    allowedCellsToRemoveList            PCI-RangeIndexList                                              OPTIONAL,   -- Need N
    allowedCellsToAddModList            SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeElement      OPTIONAL,   -- Need N
    ...,
    [[
    freqBandIndicatorNR                 FreqBandIndicatorNR                                             OPTIONAL,   -- Need R
    measCycleSCell                      ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280}  OPTIONAL    -- Need R
    ]],
    [[
    smtc3list-r16                       SSB-MTC3List-r16                                                OPTIONAL,   -- Need R
    rmtc-Config-r16                     SetupRelease {RMTC-Config-r16}                                  OPTIONAL,   -- Need M
    t312-r16                            SetupRelease { T312-r16 }                                       OPTIONAL    -- Need M
    ]],
    [[
    associatedMeasGapSSB-r17            MeasGapId-r17                                                   OPTIONAL,   -- Need R
    associatedMeasGapCSIRS-r17          MeasGapId-r17                                                   OPTIONAL,   -- Need R
    smtc4list-r17                       SSB-MTC4List-r17                                                OPTIONAL,    -- Need R
    measCyclePSCell-r17                 ENUMERATED {ms160, ms256, ms320, ms512, ms640, ms1024, ms1280, spare1}
                                                                                                        OPTIONAL,   -- Cond SCG
    cellsToAddModListExt-v1710          CellsToAddModListExt-v1710                                      OPTIONAL    -- Need N
   ]],
   [[
    associatedMeasGapSSB2-v1720         MeasGapId-r17                                           OPTIONAL, -- Cond AssociatedGapSSB
    associatedMeasGapCSIRS2-v1720       MeasGapId-r17                                           OPTIONAL  -- Cond AssociatedGapCSIRS
   ]]
}

SSB-MTC3List-r16::=                 SEQUENCE (SIZE(1..4)) OF SSB-MTC3-r16

SSB-MTC4List-r17::=                 SEQUENCE (SIZE(1..3)) OF SSB-MTC4-r17

T312-r16 ::=                        ENUMERATED { ms0, ms50, ms100, ms200, ms300, ms400, ms500, ms1000}
```

```
ReferenceSignalConfig::=            SEQUENCE {
    ssb-ConfigMobility                  SSB-ConfigMobility                                          OPTIONAL,   -- Need M
    csi-rs-ResourceConfigMobility       SetupRelease { CSI-RS-ResourceConfigMobility }              OPTIONAL    -- Need M
}

SSB-ConfigMobility::=               SEQUENCE {
    ssb-ToMeasure                       SetupRelease { SSB-ToMeasure }                              OPTIONAL,   -- Need M
    deriveSSB-IndexFromCell             BOOLEAN,
    ss-RSSI-Measurement                 SS-RSSI-Measurement                                         OPTIONAL,   -- Need M
    ...,
    [[
    ssb-PositionQCL-Common-r16              SSB-PositionQCL-Relation-r16                            OPTIONAL,   -- Cond SharedSpectrum
    ssb-PositionQCL-CellsToAddModList-r16   SSB-PositionQCL-CellsToAddModList-r16                   OPTIONAL,   -- Need N
    ssb-PositionQCL-CellsToRemoveList-r16   PCI-List                                                OPTIONAL    -- Need N
    ]],
    [[
    deriveSSB-IndexFromCellInter-r17    ServCellIndex                                               OPTIONAL,   -- Need R
    ssb-PositionQCL-Common-r17          SSB-PositionQCL-Relation-r17                              OPTIONAL,   -- Cond SharedSpectrum2
    ssb-PositionQCL-Cells-r17           SetupRelease {SSB-PositionQCL-CellList-r17}                 OPTIONAL    -- Need M
    ]],
    [[
    cca-CellsToAddModList-r17           PCI-List                                                    OPTIONAL,   -- Need N
    cca-CellsToRemoveList-r17           PCI-List                                                    OPTIONAL    -- Need N
    ]]
}

Q-OffsetRangeList ::=               SEQUENCE {
    rsrpOffsetSSB                       Q-OffsetRange               DEFAULT dB0,
    rsrqOffsetSSB                       Q-OffsetRange               DEFAULT dB0,
    sinrOffsetSSB                       Q-OffsetRange               DEFAULT dB0,
    rsrpOffsetCSI-RS                    Q-OffsetRange               DEFAULT dB0,
    rsrqOffsetCSI-RS                    Q-OffsetRange               DEFAULT dB0,
    sinrOffsetCSI-RS                    Q-OffsetRange               DEFAULT dB0
}


ThresholdNR ::=                     SEQUENCE{
    thresholdRSRP                       RSRP-Range                                                  OPTIONAL,   -- Need R
    thresholdRSRQ                       RSRQ-Range                                                  OPTIONAL,   -- Need R
    thresholdSINR                       SINR-Range                                                  OPTIONAL    -- Need R
}

CellsToAddModList ::=               SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddMod

CellsToAddModListExt-v1710 ::=      SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddModExt-v1710

CellsToAddMod ::=                   SEQUENCE {
    physCellId                          PhysCellId,
    cellIndividualOffset                Q-OffsetRangeList
}

CellsToAddModExt-v1710 ::=          SEQUENCE {
    ntn-PolarizationDL-r17              ENUMERATED {rhcp,lhcp,linear}                               OPTIONAL,   -- Need R
    ntn-PolarizationUL-r17              ENUMERATED {rhcp,lhcp,linear}                               OPTIONAL    -- Need R
```

```
}

RMTC-Config-r16 ::=                 SEQUENCE {
    rmtc-Periodicity-r16                ENUMERATED {ms40, ms80, ms160, ms320, ms640},
    rmtc-SubframeOffset-r16             INTEGER(0..639)                                                 OPTIONAL,   -- Need M
    measDurationSymbols-r16             ENUMERATED {sym1, sym14or12, sym28or24, sym42or36, sym70or60},
    rmtc-Frequency-r16                  ARFCN-ValueNR,
    ref-SCS-CP-r16                      ENUMERATED {kHz15, kHz30, kHz60-NCP, kHz60-ECP},
    ...,
    [[
    rmtc-Bandwidth-r17                  ENUMERATED {mhz100, mhz400, mhz800, mhz1600, mhz2000}           OPTIONAL,   -- Need R
    measDurationSymbols-v1700           ENUMERATED {sym140, sym560, sym1120}                            OPTIONAL,   -- Need R
    ref-SCS-CP-v1700                    ENUMERATED {kHz120, kHz480, kHz960}                             OPTIONAL,   -- Need R
    tci-StateInfo-r17                 SEQUENCE {
        tci-StateId-r17                  TCI-StateId,
        ref-ServCellId-r17               ServCellIndex                                                  OPTIONAL   -- Need R
    } OPTIONAL -- Need R
    ]],
    [[
    ref-BWPId-r17                     BWP-Id                                                            OPTIONAL   -- Need R
    ]]
}

SSB-PositionQCL-CellsToAddModList-r16 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-CellsToAddMod-r16

SSB-PositionQCL-CellsToAddMod-r16 ::= SEQUENCE {
    physCellId-r16                      PhysCellId,
    ssb-PositionQCL-r16                 SSB-PositionQCL-Relation-r16
}

SSB-PositionQCL-CellList-r17 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF SSB-PositionQCL-Cell-r17

SSB-PositionQCL-Cell-r17         ::= SEQUENCE {
    physCellId-r17                      PhysCellId,
    ssb-PositionQCL-r17                 SSB-PositionQCL-Relation-r17
}

-- TAG-MEASOBJECTNR-STOP
-- ASN1STOP
```

***CellsToAddMod* field descriptions**
cellIndividualOffset Cell individual offsets applicable to a specific cell.
physCellId Physical cell identity of a cell in the cell list.

***MeasObjectNR* field descriptions**
absThreshCSI-RS-Consolidation Absolute threshold for the consolidation of measurement results per CSI-RS resource(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per CSI-RS resource as described in 5.5.5.2.
absThreshSS-BlocksConsolidation Absolute threshold for the consolidation of measurement results per SS/PBCH block(s) from L1 filter(s). The field is used for the derivation of cell measurement results as described in 5.5.3.3 and the reporting of beam measurement information per SS/PBCH block index as described in 5.5.5.2.
allowedCellsToAddModList List of cells to add/modify in the allow-list of cells. It applies only to SSB resources.
allowedCellsToRemoveList List of cells to remove from the allow-list of cells.
associatedMeasGapSSB Indicates the associated measurement gap for SSB measuring identified by *ssb-ConfigMobility* in this measurement object. When multiple *MeasObjectNR* with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each *MeasObjectNR*. If this field is absent, the associated measurement gap is the gap configured via *gapFR1*, *gapFR2*, or *gapUE*.
associatedMeasGapSSB2 Indicates the associated additional measurement gap for SSB measuring identified by *ssb-ConfigMobility* in this measurement object for NTN deployments. When multiple *MeasObjectNR* with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each *MeasObjectNR*. If this field is absent, the associated measurement gap is the gap indicated by *associatedMeasGapSSB*.
associatedMeasGapCSIRS Indicates the associated measurement gap for CSI-RS measuring identified by *csi-rs-ResourceConfigMobility* in this measurement object. If this field is absent, the associated measurement gap is the gap configured via *gapFR1*, *gapFR2*, or *gapUE*.
associatedMeasGapCSIRS2 Indicates the associated additional measurement gap for CSI-RS measuring identified by *csi-rs-ResourceConfigMobility* in this measurement object for NTN deployments. If this field is absent, the associated measurement gap is the gap indicated by *associatedMeasGapCSIRS.* In this release of the specification, this field is not configured for NTN deployments.
cellsToAddModList List of cells to add/modify in the cell list.
cellsToRemoveList List of cells to remove from the cell list.
excludedCellsToAddModList List of cells to add/modify in the exclude-list of cells. It applies only to SSB resources.
excludedCellsToRemoveList List of cells to remove from the exclude-list of cells.
freqBandIndicatorNR The frequency band in which the SSB and/or CSI-RS indicated in this *MeasObjectNR* are located and according to which the UE shall perform the RRM measurements. This field is always provided when the network configures measurements with this *MeasObjectNR*.
measCyclePSCell The parameter is used only when the PSCell is configured on the frequency indicated by the *measObjectNR* and the SCG is deactivated, see TS 38.133 [14]. The field may also be configured when the PSCell is not configured on that frequency. The network always configures *measCyclePSCell* for the *measObjectNR* associated with the PSCell if *bfd-and-RLM* is set to *true* and the SCG is deactivated. Value ms*160* corresponds to 160 ms, value *ms256* corresponds to 256 ms and so on.
measCycleSCell The parameter is used only when an SCell is configured on the frequency indicated by the measObjectNR and is in deactivated state, see TS 38.133 [14]. gNB configures the parameter whenever an SCell is configured on the frequency indicated by the *measObjectNR*, but the field may also be signalled when an SCell is not configured. Value *sf160* corresponds to 160 sub-frames, value *sf256* corresponds to 256 sub-frames and so on.

nrofCSInrofCSI-RS-ResourcesToAverage Indicates the maximum number of measurement results per beam based on CSI-RS resources to be averaged. The same value applies for each detected cell associated with this *MeasObjectNR*.
nrofSS-BlocksToAverage Indicates the maximum number of measurement results per beam based on SS/PBCH blocks to be averaged. The same value applies for each detected cell associated with this *MeasObject*.
ntn-PolarizationDL If present, this parameter indicates polarization information for downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization.
ntn-PolarizationUL If present, this parameter indicates polarization information for uplink transmission on service link. If not present and *ntn-PolarizationDL* is present, UE assumes the same polarization for UL and DL.
offsetMO Offset values applicable to all measured cells with reference signal(s) indicated in this *MeasObjectNR*.
quantityConfigIndex Indicates the n-*th* element of *quantityConfigNR-List* provided in *MeasConfig*.
referenceSignalConfig RS configuration for SS/PBCH block and CSI-RS.
refFreqCSI-RS Point A which is used for mapping of CSI-RS to physical resources according to TS 38.211 [16] clause 7.4.1.5.3.
smtc1 Primary measurement timing configuration. (see clause 5.5.2.10).
smtc2 Secondary measurement timing configuration for SS corresponding to this *MeasObjectNR* with PCI listed in *pci-List*. For these SS, the periodicity is indicated by *periodicity* in *smtc2* and the timing offset is equal to the offset indicated in *periodicityAndOffset* modulo *periodicity*. *periodicity* in smtc2 can only be set to a value strictly shorter than the periodicity indicated by *periodicityAndOffset* in *smtc1* (e.g. if *periodicityAndOffset* indicates *sf10*, *periodicity* can only be set of *sf5*, if *periodicityAndOffset* indicates *sf5*, *smtc2* cannot be configured).
smtc3list Measurement timing configuration list for SS corresponding to IAB-MT. This is used for the IAB-node's discovery of other IAB-nodes and the IAB-Donor-DUs.
smtc4list Measurement timing configuration list for NTN deployments, see clause 5.5.2.10.
ssbFrequency Indicates the frequency of the SS associated to this *MeasObjectNR*. For operation with shared spectrum channel access, this field is a k*30 kHz shift from the sync raster where k = 0,1,2, and so on if the *reportType* within the corresponding *ReportConfigNR* is set to reportCGI (see TS 38.211 [16], clause 7.4.3.1). Frequencies are considered to be on the sync raster if they are also identifiable with a GSCN value (see TS 38.101-1 [15], or TS 38.101-5 [75]).
ssb-PositionQCL-Common Indicates the QCL relationship between SS/PBCH blocks for all measured cells as specified in TS 38.213 [13], clause 4.1.
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
t312 The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.

***ReferenceSignalConfig* field descriptions**
csi-rs-ResourceConfigMobility CSI-RS resources to be used for CSI-RS based RRM measurements.
ssb-ConfigMobility SSB configuration for mobility (nominal SSBs, timing configuration).

***RMTC-Config* field descriptions**
measDurationSymbols Number of consecutive symbols for which the Physical Layer reports samples of RSSI (see TS 38.215 [9], clause 5.1.21). Value *sym1* corresponds to one symbol, *sym14or12* corresponds to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, and so on. If *measDurationSymbols-v1700* is signalled, the UE ignores *measDurationSymbols-r16*.
ref-BWPId Indicates the reference BWP for the TCI state indicated in *tci-StateInfo.* Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2.
ref-SCS-CP Indicates a reference subcarrier spacing and cyclic prefix to be used for RSSI measurements (see TS 38.215 [9]). Value kHz15 corresponds to 15kHz, kHz30 corresponds to 30 kHz, value kHz60-NCP corresponds to 60 kHz using normal cyclic prefix (NCP), and kHz60-ECP corresponds to 60 kHz using extended cyclic prefix (ECP). If *ref-SCS-CP-v1700* is signalled, the UE ignores *ref-SCS-CP-r16*.
ref-ServCellId Indicates the FR2-2 reference serving cell index for the TCI state. Network includes this field if *tci-StateInfo* is present. This field is only applicable for operation with shared spectrum channel access in FR2-2 and network does not configure this if the UE does not have any serving cells in FR2-2.
rmtc-Bandwidth Indicates the bandwidth for the RSSI measurement (see TS 38. 215 [9], clause 5.1.21).
rmtc-Frequency Indicates the center frequency of the measured bandwidth for a frequency which operates with shared spectrum channel access (see TS 38. 215 [9], clause 5.1.21).
rmtc-Periodicity Indicates the RSSI measurement timing configuration (RMTC) periodicity (see TS 38.215 [9], clause 5.1.21).
rmtc-SubframeOffset Indicates the RSSI measurement timing configuration (RMTC) subframe offset for this frequency (see TS 38.215 [9], clause 5.1.21). For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as *rmtc-SubframeOffset* for *measDurationSymbols* which shall be selected to be between 0 and the configured *rmtc-Periodicity* with equal probability.
tci-StateId Indicates the TCI state to be used for RSSI measurements. This field is only applicable for shared spectrum channel access in FR2-2. Network does not configure this if the UE does not have any serving cells in FR2-2 and in such a case, it is up to UE implementation how to determine the spatial domain filter for the inter-frequency RSSI measurement in FR2-2.

***SSB-ConfigMobility* field descriptions**
cca-CellsToAddModList, cca-CellsToRemoveList Lists of cells to be added or removed from the list of neighbor cells that 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.
deriveSSB-IndexFromCell If this field is set to *true*, UE assumes SFN and frame boundary alignment across cells on the same frequency carrier as specified in TS 38.133 [14]. Hence, if the UE is configured with a serving cell for which (*absoluteFrequencySSB*, *subcarrierSpacing*) in *ServingCellConfigCommon* is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, this field indicates whether the UE can utilize the timing of this serving cell to derive the index of SS block transmitted by neighbour cell. Otherwise, this field indicates whether the UE may use the timing of any detected cell on that target frequency to derive the SSB index of all neighbour cells on that frequency.
deriveSSB-IndexFromCellInter If this field is present, UE assumes SFN and frame boundary alignment between the reference serving cell indicated by *ServCellIndex* and all neighbour cells in this *MeasObjectNR* as specified in TS 38.133 [14]. This field also indicates that the UE can utilize the timing of the reference serving cell indicated by *ServCellIndex* to derive the index of SS block transmitted by all inter-frequency neighbour cells on the frequency indicated by the *MeasObjectNR*. When this field is included, the network should set *deriveSSB-IndexFromCell* to *true*.
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration. 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 to be measured while value 1 indicates that the corresponding SS/PBCH block is to be measured (see TS 38.215 [9]). When the field is not configured the UE measures on all SS blocks. Regardless of the value of this field, SS/PBCH blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1.

***SSB-PositionQCL-CellsToAddMod* field descriptions**
physCellId Physical cell identity of a cell in the cell list.
ssb-PositionQCL Indicates the QCL relation between SS/PBCH blocks for a specific cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the value signalled by *ssb-PositionQCL-Common*.

Conditional Presence	Explanation
AssociatedGapCSIRS	This field is optionally present, Need R if *associatedMeasGapCSIRS* is configured, otherwise, it is absent.
AssociatedGapSSB	This field is optionally present, Need R if *associatedMeasGapSSB* is configured, otherwise, it is absent.
CSI-RS	This field is mandatory present if *csi-rs-ResourceConfigMobility* is configured, otherwise, it is absent.
IntraFreqConnected	This field is optionally present, Need R if the UE is configured with a serving cell for which (absoluteFrequencySSB, subcarrierSpacing) in ServingCellConfigCommon is equal to (*ssbFrequency*, *ssbSubcarrierSpacing*) in this *MeasObjectNR*, otherwise, it is absent.
SCG	This field is optionallly present, Need R, in the *measConfig* associated with the SCG. It is absent in the *measConfig* associated with the MCG.
SharedSpectrum	This field is mandatory present if this *MeasObject* is for a frequency which operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
SharedSpectrum2	This field is optionally present if this *MeasObject* is for a frequency which operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.
SSBorAssociatedSSB	This field is mandatory present if ssb-ConfigMobility is configured or associatedSSB is configured in at least one cell. Otherwise, it is absent, Need R.

– *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
```

– *MeasObjectRxTxDiff*

The IE *MeasObjectRxTxDiff* is used to configure the measurement object for UE Rx-Tx time difference measurement.

MeasObjectRxTxDiff information element

```
-- ASN1START
-- TAG-MEASOBJECTRXTXDIFF-START


MeasObjectRxTxDiff-r17 ::=      SEQUENCE {
    dl-Ref-r17      CHOICE {
        prs-Ref-r17             NULL,
        csi-RS-Ref-r17          NULL,
        ...
    }                               OPTIONAL,   -- Need R
    ...
}

-- TAG-MEASOBJECTRXTXDIFF-STOP
-- ASN1STOP
```

MeasObjectRxTxDiff field descriptions
dl-Ref
configures the DL references signals to measure Rx-Tx time difference. *prs-Ref-r17* indicates PRS is chosen, and *csi-RS-Ref-r17* indicates that CSI-RS for tracking is chosen. Only one PRS resource set is configured by the network. Only one *NZP-CSI-RS-ResourceSet* can be configured with *pdc-Info-r17* set to *true* and it is used for UE Rx-Tx time difference measurement. Only reference signals from the PCell of the MCG can be configured by the network.

– *MeasObjectToAddModList*

The IE *MeasObjectToAddModList* concerns a list of measurement objects to add or modify.

MeasObjectToAddModList information element

```
-- ASN1START
-- TAG-MEASOBJECTTOADDMODLIST-START

MeasObjectToAddModList ::=                SEQUENCE (SIZE (1..maxNrofObjectId)) OF MeasObjectToAddMod

MeasObjectToAddMod ::=                    SEQUENCE {
    measObjectId                              MeasObjectId,
    measObject                                CHOICE {
        measObjectNR                              MeasObjectNR,
        ...,
        measObjectEUTRA                           MeasObjectEUTRA,
        measObjectUTRA-FDD-r16                    MeasObjectUTRA-FDD-r16,
        measObjectNR-SL-r16                       MeasObjectNR-SL-r16,
        measObjectCLI-r16                         MeasObjectCLI-r16,
        measObjectRxTxDiff-r17                    MeasObjectRxTxDiff-r17,
        measObjectRelay-r17                       SL-MeasObject-r16
    }
}

-- TAG-MEASOBJECTTOADDMODLIST-STOP
-- ASN1STOP
```

– *MeasObjectUTRA-FDD*

The IE *MeasObjectUTRA-FDD* specifies information applicable for inter-RAT UTRA-FDD neighbouring cells.

MeasObjectUTRA-FDD information element

```
-- ASN1START
-- TAG-MEASOBJECTUTRA-FDD-START

MeasObjectUTRA-FDD-r16 ::=                SEQUENCE {
    carrierFreq-r16                           ARFCN-ValueUTRA-FDD-r16,
    utra-FDD-Q-OffsetRange-r16                UTRA-FDD-Q-OffsetRange-r16          OPTIONAL,       -- Need R
    cellsToRemoveList-r16                     UTRA-FDD-CellIndexList-r16          OPTIONAL,       -- Need N
```

```
    cellsToAddModList-r16                   CellsToAddModListUTRA-FDD-r16          OPTIONAL,        -- Need N
    ...
}

CellsToAddModListUTRA-FDD-r16 ::=           SEQUENCE (SIZE (1..maxCellMeasUTRA-FDD-r16)) OF CellsToAddModUTRA-FDD-r16

CellsToAddModUTRA-FDD-r16 ::=               SEQUENCE {
    cellIndexUTRA-FDD-r16                       UTRA-FDD-CellIndex-r16,
    physCellId-r16                              PhysCellIdUTRA-FDD-r16
}

UTRA-FDD-CellIndexList-r16 ::=              SEQUENCE (SIZE (1..maxCellMeasUTRA-FDD-r16)) OF UTRA-FDD-CellIndex-r16

UTRA-FDD-CellIndex-r16 ::=                  INTEGER (1..maxCellMeasUTRA-FDD-r16)

-- TAG-MEASOBJECTUTRA-FDD-STOP
-- ASN1STOP
```

***MeasObjectUTRA-FDD* field descriptions**
carrierFreq Identifies UTRA-FDD carrier frequency for which this configuration is valid. NR does not configure more than one measurement object for the same physical frequency regardless of the ARFCN used to indicate this.
cellIndexUTRA-FDD Entry index in the neighbouring cell list.
cellsToAddModList List of UTRA-FDD cells to add/modify in the neighbouring cell list.
cellsToRemoveList List of cells to remove from the neighbouring cell list.
utra-FDD-Q-OffsetRange Used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB.

– *MeasResultCellListSFTD-NR*

The IE *MeasResultCellListSFTD-NR* consists of SFN and radio frame boundary difference between the PCell and an NR cell as specified in TS 38.215 [9] and TS 38.133 [14].

MeasResultCellListSFTD-NR information element

```
-- ASN1START
-- TAG-MEASRESULTCELLLISTSFTD-NR-START

MeasResultCellListSFTD-NR ::=           SEQUENCE (SIZE (1..maxCellSFTD)) OF MeasResultCellSFTD-NR

MeasResultCellSFTD-NR ::=               SEQUENCE {
    physCellId                              PhysCellId,
    sfn-OffsetResult                        INTEGER (0..1023),
    frameBoundaryOffsetResult               INTEGER (-30720..30719),
    rsrp-Result                             RSRP-Range                      OPTIONAL
}
```

```
-- TAG-MEASRESULTCELLLISTSFTD-NR-STOP
-- ASN1STOP
```

***MeasResultCellSFTD-NR* field descriptions**
sfn-OffsetResult Indicates the SFN difference between the PCell and the NR cell as an integer value according to TS 38.215 [9].
frameBoundaryOffsetResult Indicates the frame boundary difference between the PCell and the NR cell as an integer value according to TS 38.215 [9].

– *MeasResultCellListSFTD-EUTRA*

The IE *MeasResultCellListSFTD-EUTRA* consists of SFN and radio frame boundary difference between the PCell and an E-UTRA PSCell.

***MeasResultCellListSFTD-EUTRA* information element**

```
-- ASN1START
-- TAG-MEASRESULTCELLLISTSFTD-EUTRA-START

MeasResultCellListSFTD-EUTRA ::=          SEQUENCE (SIZE (1..maxCellSFTD)) OF MeasResultSFTD-EUTRA

MeasResultSFTD-EUTRA ::=            SEQUENCE {
    eutra-PhysCellId                    EUTRA-PhysCellId,
    sfn-OffsetResult                    INTEGER (0..1023),
    frameBoundaryOffsetResult           INTEGER (-30720..30719),
    rsrp-Result                         RSRP-Range                      OPTIONAL
}

-- TAG-MEASRESULTCELLLISTSFTD-EUTRA-STOP
-- ASN1STOP
```

***MeasResultSFTD-EUTRA* field descriptions**
eutra-PhysCellId Identifies the physical cell identity of the E-UTRA cell for which the reporting is being performed.
sfn-OffsetResult Indicates the SFN difference between the PCell and the E-UTRA cell as an integer value according to TS 38.215 [9].
frameBoundaryOffsetResult Indicates the frame boundary difference between the PCell and the E-UTRA cell as an integer value according to TS 38.215 [9].

– *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 This field indicates the coarse location information reported by the UE. This field is coded as the *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.

***MeasResults* field descriptions**
coarseLocationInfo This field indicates the coarse location information reported by the UE. This field is coded as the *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.
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-MeasResultServingRelay Measurement result of serving L2 U2N relay UE.

– *MeasResult2EUTRA*

The IE *MeasResult2EUTRA* contains measurements on E-UTRA frequencies.

***MeasResult2EUTRA* information element**

```
-- ASN1START
-- TAG-MEASRESULT2EUTRA-START

MeasResult2EUTRA ::=       SEQUENCE {
    carrierFreq                     ARFCN-ValueEUTRA,
    measResultServingCell           MeasResultEUTRA                 OPTIONAL,
    measResultBestNeighCell         MeasResultEUTRA                 OPTIONAL,
    ...
}

-- TAG-MEASRESULT2EUTRA-STOP
-- ASN1STOP
```

– *MeasResult2NR*

The IE *MeasResult2NR* contains measurements on NR frequencies.

***MeasResult2NR* information element**

```
-- ASN1START
-- TAG-MEASRESULT2NR-START
```

```
MeasResult2NR ::=                   SEQUENCE {
    ssbFrequency                        ARFCN-ValueNR                       OPTIONAL,
    refFreqCSI-RS                       ARFCN-ValueNR                       OPTIONAL,
    measResultServingCell               MeasResultNR                        OPTIONAL,
    measResultNeighCellListNR           MeasResultListNR                    OPTIONAL,
    ...
}

-- TAG-MEASRESULT2NR-STOP
-- ASN1STOP
```

– *MeasResultIdleEUTRA*

The IE *MeasResultIdleEUTRA* covers the E-UTRA measurement results performed in RRC_IDLE and RRC_INACTIVE.

MeasResultIdleEUTRA information element

```
-- ASN1START
-- TAG-MEASRESULTIDLEEUTRA-START

MeasResultIdleEUTRA-r16 ::= SEQUENCE {
    measResultsPerCarrierListIdleEUTRA-r16   SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleEUTRA-r16,
    ...
}

MeasResultsPerCarrierIdleEUTRA-r16 ::=  SEQUENCE {
    carrierFreqEUTRA-r16                    ARFCN-ValueEUTRA,
    measResultsPerCellListIdleEUTRA-r16     SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleEUTRA-r16,
    ...
}

MeasResultsPerCellIdleEUTRA-r16 ::=     SEQUENCE {
    eutra-PhysCellId-r16                    EUTRA-PhysCellId,
    measIdleResultEUTRA-r16                 SEQUENCE {
       rsrp-ResultEUTRA-r16                     RSRP-RangeEUTRA                                    OPTIONAL,
       rsrq-ResultEUTRA-r16                     RSRQ-RangeEUTRA-r16                                OPTIONAL
    },
    ...
}

-- TAG-MEASRESULTIDLEEUTRA-STOP
-- ASN1STOP
```

MeasResultIdleEUTRA field descriptions
carrierFreqEUTRA Indicates the E-UTRA carrier frequency.
eutra-PhysCellId Indicates the physical cell identity of an E-UTRA cell.
measIdleResultEUTRA Idle/inactive measurement results for an E-UTRA cell.
measResultsPerCarrierListIdleEUTRA List of idle/inactive measured results for the maximum number of reported E-UTRA carriers.
measResultsPerCellListIdleEUTRA List of idle/inactive measured results for the maximum number of reported best cells for a given E-UTRA carrier.

– *MeasResultIdleNR*

The IE *MeasResultIdleNR* covers the NR measurement results performed in RRC_IDLE and RRC_INACTIVE.

***MeasResultIdleNR* information element**

```
-- ASN1START
-- TAG-MEASRESULTIDLENR-START

MeasResultIdleNR-r16 ::=  SEQUENCE {
    measResultServingCell-r16 SEQUENCE {
        rsrp-Result-r16           RSRP-Range                                                    OPTIONAL,
        rsrq-Result-r16           RSRQ-Range                                                    OPTIONAL,
        resultsSSB-Indexes-r16    ResultsPerSSB-IndexList-r16                                   OPTIONAL
    },
    measResultsPerCarrierListIdleNR-r16 SEQUENCE (SIZE (1.. maxFreqIdle-r16)) OF MeasResultsPerCarrierIdleNR-r16    OPTIONAL,
    ...
}

MeasResultsPerCarrierIdleNR-r16 ::=   SEQUENCE {
    carrierFreq-r16                   ARFCN-ValueNR,
    measResultsPerCellListIdleNR-r16      SEQUENCE (SIZE (1..maxCellMeasIdle-r16)) OF MeasResultsPerCellIdleNR-r16,
    ...
}

MeasResultsPerCellIdleNR-r16 ::=  SEQUENCE {
    physCellId-r16                    PhysCellId,
    measIdleResultNR-r16              SEQUENCE {
        rsrp-Result-r16                   RSRP-Range                                        OPTIONAL,
        rsrq-Result-r16                   RSRQ-Range                                        OPTIONAL,
        resultsSSB-Indexes-r16            ResultsPerSSB-IndexList-r16                       OPTIONAL
    },
    ...
}

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

```
ResultsPerSSB-IndexIdle-r16 ::=   SEQUENCE {
    ssb-Index-r16                     SSB-Index,
    ssb-Results-r16                   SEQUENCE {
        ssb-RSRP-Result-r16               RSRP-Range                                  OPTIONAL,
        ssb-RSRQ-Result-r16               RSRQ-Range                                  OPTIONAL
    }                                                                                 OPTIONAL
}

-- TAG-MEASRESULTIDLENR-STOP
-- ASN1STOP
```

***MeasResultIdleNR* field descriptions**
carrierFreq Indicates the NR carrier frequency.
measIdleResultNR Idle/inactive measurement results for an NR cell (optionally including beam level measurements).
measResultServingCell Measured results of the serving cell (i.e., PCell) from idle/inactive measurements.
measResultsPerCellListIdleNR List of idle/inactive measured results for the maximum number of reported best cells for a given NR carrier.
resultsSSB-Indexes Beam level measurement results (indexes and optionally, beam measurements).

– *MeasResultRxTxTimeDiff*

The IE *MeasResultRxTxTimeDiff* is used to provide Rx-Tx time difference measurement result.

***MeasResultRxTxTimeDiff* information element**

```
-- ASN1START
-- TAG-MEASRESULTRXTXTIMEDIFF-START

MeasResultRxTxTimeDiff-r17 ::= SEQUENCE {
    rxTxTimeDiff-ue-r17           RxTxTimeDiff-r17      OPTIONAL,
    ...
}

-- TAG-MEASRESULTRXTXTIMEDIFF-STOP
-- ASN1STOP
```

MeasResultRxTxTimeDiff field descriptions
rxTxTimeDiff-ue indicates the Rx-Tx Time difference measurement at the UE (see clause 5.1.30, TS 38.215 [9]).

– *MeasResultSCG-Failure*

The IE *MeasResultSCG-Failure* is used to provide information regarding failures detected by the UE in (NG)EN-DC and NR-DC.

MeasResultSCG-Failure information element

```
-- ASN1START
-- TAG-MEASRESULTSCG-FAILURE-START

MeasResultSCG-Failure ::=           SEQUENCE {
    measResultPerMOList                 MeasResultList2NR,
    ...,
    [[
    locationInfo-r16                    LocationInfo-r16            OPTIONAL
    ]]
}

MeasResultList2NR ::=               SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2NR

-- TAG-MEASRESULTSCG-FAILURE-STOP
-- ASN1STOP
```

– *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.

– *MeasTriggerQuantityEUTRA*

The IE *MeasTriggerQuantityEUTRA* is used to configure the trigger quantity and reporting range for E-UTRA measurements. The RSRP, RSRQ and SINR ranges correspond to *RSRP-Range*, *RSRQ-Range* and *RS-SINR-Range* in TS 36.331 [10], respectively.

***MeasTriggerQuantityEUTRA* information element**

```
-- ASN1START
-- TAG-MEASTRIGGERQUANTITYEUTRA-START

MeasTriggerQuantityEUTRA::=                CHOICE {
    rsrp                                       RSRP-RangeEUTRA,
    rsrq                                       RSRQ-RangeEUTRA,
    sinr                                       SINR-RangeEUTRA
}

RSRP-RangeEUTRA ::=                INTEGER (0..97)

RSRQ-RangeEUTRA ::=                INTEGER (0..34)

SINR-RangeEUTRA ::=                INTEGER (0..127)

-- TAG-MEASTRIGGERQUANTITYEUTRA-STOP
-- ASN1STOP
```

– *MobilityStateParameters*

The IE *MobilityStateParameters* contains parameters to determine UE mobility state.

MobilityStateParameters information element

```
-- ASN1START
-- TAG-MOBILITYSTATEPARAMETERS-START

MobilityStateParameters ::=         SEQUENCE{
    t-Evaluation                        ENUMERATED {
                                            s30, s60, s120, s180, s240, spare3, spare2, spare1},
    t-HystNormal                        ENUMERATED {
                                            s30, s60, s120, s180, s240, spare3, spare2, spare1},
    n-CellChangeMedium                  INTEGER (1..16),
    n-CellChangeHigh                    INTEGER (1..16)
}

-- TAG-MOBILITYSTATEPARAMETERS-STOP
-- ASN1STOP
```

MobilityStateParameters field descriptions
n-CellChangeHigh The number of cell changes to enter high mobility state. Corresponds to N_{CR_H} in TS 38.304 [20].
n-CellChangeMedium The number of cell changes to enter medium mobility state. Corresponds to N_{CR_M} in TS 38.304 [20].
t-Evaluation The duration for evaluating criteria to enter mobility states. Corresponds to T_{CRmax} in TS 38.304 [20]. Value in seconds, *s30* corresponds to 30 s and so on.
t-HystNormal The additional duration for evaluating criteria to enter normal mobility state. Corresponds to $T_{CRmaxHyst}$ in TS 38.304 [20]. Value in seconds, value *s30* corresponds to 30 seconds and so on.

– *MRB-Identity*

The IE *MRB-Identity* is used to identify a multicast MRB used by a UE.

MRB-Identity information element

```
-- ASN1START
-- TAG-MRB-IDENTITY-START

MRB-Identity-r17 ::=                INTEGER (1..512)

-- TAG-MRB-IDENTITY-STOP
-- ASN1STOP
```

– *MsgA-ConfigCommon*

The IE *MsgA-ConfigCommon* is used to configure the PRACH and PUSCH resource for transmission of MsgA in 2-step random access type procedure.

```
-- ASN1START
-- TAG-MSGACONFIGCOMMON-START

MsgA-ConfigCommon-r16 ::=           SEQUENCE {
    rach-ConfigCommonTwoStepRA-r16      RACH-ConfigCommonTwoStepRA-r16,
    msgA-PUSCH-Config-r16               MsgA-PUSCH-Config-r16                                   OPTIONAL --Cond InitialBWPConfig
}

-- TAG-MSGACONFIGCOMMON-STOP
-- ASN1STOP
```

***MsgA-ConfigCommon* field descriptions**
msgA-PUSCH-Config Configuration of cell-specific MsgA PUSCH parameters which the UE uses for contention-based MsgA PUSCH transmission of this BWP. If the field is not configured for the selected UL BWP, the UE shall use the MsgA PUSCH configuration of initial UL BWP.
rach-ConfigCommonTwoStepRA Configuration of cell specific random access parameters which the UE uses for contention based and contention free 2-step random access type procedure as well as for 2-step RA type contention based beam failure recovery in this BWP.

Conditional Presence	Explanation
InitialBWPConfig	The field is mandatory present when *MsgA-ConfigCommon* is configured for the initial uplink BWP, or when *MsgA-ConfigCommon* is configured for a non-initial uplink BWP and *MsgA-ConfigCommon* is not configured for the initial uplink BWP, otherwise the field is optionally present, Need S.

– *MsgA-PUSCH-Config*

The IE *MsgA-PUSCH-Config* is used to specify the PUSCH allocation for MsgA in 2-step random access type procedure.

***MsgA-PUSCH-Config* information element**

```
-- ASN1START
-- TAG-MSGA-PUSCH-CONFIG-START

MsgA-PUSCH-Config-r16 ::=                   SEQUENCE {
    msgA-PUSCH-ResourceGroupA-r16               MsgA-PUSCH-Resource-r16                         OPTIONAL, -- Cond InitialBWPConfig
    msgA-PUSCH-ResourceGroupB-r16               MsgA-PUSCH-Resource-r16                         OPTIONAL, -- Cond GroupBConfigured
    msgA-TransformPrecoder-r16                 ENUMERATED {enabled, disabled}                   OPTIONAL, -- Need R
    msgA-DataScramblingIndex-r16                INTEGER (0..1023)                               OPTIONAL, -- Need S
    msgA-DeltaPreamble-r16                      INTEGER (-1..6)                                 OPTIONAL  -- Need R
}

MsgA-PUSCH-Resource-r16 ::=                 SEQUENCE {
    msgA-MCS-r16                                INTEGER (0..15),
    nrofSlotsMsgA-PUSCH-r16                     INTEGER (1..4),
    nrofMsgA-PO-PerSlot-r16                     ENUMERATED {one, two, three, six},
    msgA-PUSCH-TimeDomainOffset-r16             INTEGER (1..32),
```

```
    msgA-PUSCH-TimeDomainAllocation-r16          INTEGER (1..maxNrofUL-Allocations)                  OPTIONAL, -- Need S
    startSymbolAndLengthMsgA-PO-r16              INTEGER (0..127)                                    OPTIONAL, -- Need S
    mappingTypeMsgA-PUSCH-r16                    ENUMERATED {typeA, typeB}                           OPTIONAL, -- Need S
    guardPeriodMsgA-PUSCH-r16                    INTEGER (0..3)                                      OPTIONAL, -- Need R
    guardBandMsgA-PUSCH-r16                      INTEGER (0..1),
    frequencyStartMsgA-PUSCH-r16                 INTEGER (0..maxNrofPhysicalResourceBlocks-1),
    nrofPRBs-PerMsgA-PO-r16                      INTEGER (1..32),
    nrofMsgA-PO-FDM-r16                          ENUMERATED {one, two, four, eight},
    msgA-IntraSlotFrequencyHopping-r16           ENUMERATED {enabled}                                OPTIONAL, -- Need R
    msgA-HoppingBits-r16                         BIT STRING (SIZE(2))                                OPTIONAL, -- Cond
FreqHopConfigured
    msgA-DMRS-Config-r16                         MsgA-DMRS-Config-r16,
    nrofDMRS-Sequences-r16                       INTEGER (1..2),
    msgA-Alpha-r16                               ENUMERATED {alpha0, alpha04, alpha05, alpha06,
                                                             alpha07, alpha08, alpha09, alpha1}      OPTIONAL, -- Need S
    interlaceIndexFirstPO-MsgA-PUSCH-r16         INTEGER (1..10)                                     OPTIONAL, -- Need R
    nrofInterlacesPerMsgA-PO-r16                 INTEGER (1..10)                                     OPTIONAL, -- Need R
    ...
}

MsgA-DMRS-Config-r16 ::=                    SEQUENCE {
    msgA-DMRS-AdditionalPosition-r16             ENUMERATED {pos0, pos1, pos3}                       OPTIONAL, -- Need S
    msgA-MaxLength-r16                           ENUMERATED {len2}                                   OPTIONAL, -- Need S
    msgA-PUSCH-DMRS-CDM-Group-r16                INTEGER (0..1)                                      OPTIONAL, -- Need S
    msgA-PUSCH-NrofPorts-r16                     INTEGER (0..1)                                      OPTIONAL, -- Need S
    msgA-ScramblingID0-r16                       INTEGER (0..65535)                                  OPTIONAL, -- Need S
    msgA-ScramblingID1-r16                       INTEGER (0..65535)                                  OPTIONAL  -- Need S
}

-- TAG-MSGA-PUSCH-CONFIG-STOP
-- ASN1STOP
```

***MsgA-PUSCH-Config* field descriptions**
msgA-DataScramblingIndex Identifier used to initiate data scrambling (c_init) for msgA PUSCH. If the field is absent the UE applies the value Physical cell ID (*physCellID*).
msgA-DeltaPreamble Power offset of msgA PUSCH relative to the preamble received target power. Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1).
msgA-PUSCH-ResourceGroupA MsgA PUSCH resources that the UE shall use when performing MsgA transmission using preambles group A. If field is not configured for the selected UL BWP, the UE shall use the MsgA PUSCH configuration for group A of initial UL BWP or RedCap-specific initial UL BWP (if configured) for RedCap UEs.
msgA-PUSCH-ResourceGroupB MsgA PUSCH resources that the UE shall use when performing MsgA transmission using preambles group B.
msgA-TransformPrecoder Enables or disables the transform precoder for MsgA transmission (see clause 6.1.3 of TS 38.214 [19]).

***MsgA-PUSCH-Resource* field descriptions**
guardBandMsgA-PUSCH PRB-level guard band between FDMed PUSCH occasions (see TS 38.213 [13], clause 8.1A). If interlaced PUSCH is configured, value 0 is applied.
guardPeriodMsgA-PUSCH Guard period between PUSCH occasions in the unit of symbols (see TS 38.213 [13], clause 8.1A).
frequencyStartMsgA-PUSCH Offset of lowest PUSCH occasion in frequency domain with respect to PRB 0 (see TS 38.213 [13], clause 8.1A).
interlaceIndexFirstPO-MsgA-PUSCH Interlace index of the first PUSCH occasion in frequency domain if interlaced PUSCH is configured. For 30kHz SCS only the integers 1, 2, 3, 4, 5 are applicable (see TS 38.213 [13], clause 8.1A).
mappingTypeMsgA-PUSCH PUSCH mapping type A or B. If the field is absent, the UE shall use the parameter *msgA-PUSCH-TimeDomainAllocation* (see TS 38.213 [13], clause 8.1A).
msgA-Alpha Dedicated alpha value for MsgA PUSCH. If the field is absent, the UE shall use the value of *msg3-Alpha* if configured, else UE applies value 1 (see TS 38.213 [13], clause 7.1.1).
msgA-DMRS-Config DMRS configuration for msgA PUSCH (see TS 38.213 [13], clause 8.1A and TS 38.214 [19] clause 6.2.2).
msgA-HoppingBits Value of hopping bits to indicate which frequency offset to be used for second hop. See Table 8.3-1 in TS 38.213 [13].
msgA-IntraSlotFrequencyHopping Intra-slot frequency hopping per PUSCH occasion (see TS 38.213 [13], clause 8.1A).
msgA-MCS Indicates the MCS index for msgA PUSCH from the Table 6.1.4.1-1 for DFT-s-OFDM and Table 5.1.3.1-1 for CP-OFDM in TS 38.214 [19].
msgA-PUSCH-TimeDomainAllocation Indicates a combination of start symbol and length and PUSCH mapping type from the TDRA table (*PUSCH-TimeDomainResourceAllocationList* if provided in *PUSCH-ConfigCommon*, or else the default Table 6.1.2.1.1-2 in 38.214 [19] is used if *pusch-TimeDomainAllocationList* is not provided in PUSCH-ConfigCommon). The parameter K2 in the table is not used for msgA PUSCH. The network configures one of *msgA-PUSCH-TimeDomainAllocation* and *startSymbolAndLengthMsgA-PO,* but not both. If the field is absent, the UE shall use the value of startSymbolAndLenghtMsgA-PO.
msgA-PUSCH-TimeDomainOffset A single time offset with respect to the start of each PRACH slot (with at least one valid RO), counted as the number of slots (based on the numerology of active UL BWP). See TS 38.213 [13], clause 8.1A.
nrofDMRS-Sequences Number of DMRS sequences for MsgA PUSCH for CP-OFDM. In case of single PUSCH configuration or if the DMRS symbols of multiple configurations are not overlapped, if the DMRS resources configured in one PUSCH occasion is no larger than 8 (for *len2*) or 4 (for *len1*), then only DMRS port is configured.
nrofInterlacesPerMsgA-PO Number of consecutive interlaces per PUSCH occasion if interlaced PUSCH is configured. For 30kHz SCS only the integers 1, 2, 3, 4, 5 are applicable (see TS 38.213 [13], clause 8.1A).
nrofMsgA-PO-FDM The number of msgA PUSCH occasions FDMed in one time instance (see TS 38.213 [13], clause 8.1A).
nrofMsgA-PO-PerSlot Number of time domain PUSCH occasions in each slot. PUSCH occasions including guard period are contiguous in time domain within a slot (see TS 38.213 [13], clause 8.1A).
nrofPRBs-PerMsgA-PO Number of PRBs per PUSCH occasion (see TS 38.213 [13], clause 8.1A).

nrofSlotsMsgA-PUSCH Number of slots (in active UL BWP numerology) containing one or multiple PUSCH occasions, each slot has the same time domain resource allocation (see TS 38.213 [13], clause 8.1A).
startSymbolAndLengthMsgA-PO An index giving valid combinations of start symbol, length and mapping type as start and length indicator (SLIV) for the first msgA PUSCH occasion, for RRC_CONNECTED UEs in non-initial BWP as described in TS 38.214 [19] clause 6.1.2. The network configures the field so that the allocation does not cross the slot boundary. The number of occupied symbols excludes the guard period. If the field is absent, the UE shall use the value in *msgA-PUSCH-TimeDomainAllocation* (see TS 38.213 [13], clause 8.1A). The network configures one of *msgA-PUSCH-TimeDomainAllocation* and *startSymbolAndLengthMsgA-PO,* but not both. If the field is absent, the UE shall use the value of *msgA-PUSCH-TimeDomainAllocation.*

***MsgA-DMRS-Config* field descriptions**
msgA-DMRS-AdditionalPosition Indicates the position for additional DM-RS. If the field is absent, the UE applies value *pos2*.
msgA-MaxLength indicates single-symbol or double-symbol DMRS. If the field is absent, the UE applies value *len1*.
msgA-PUSCH-DMRS-CDM-Group 1-bit indication of indices of CDM group(s). If the field is absent, then both CDM groups are used.
msgA-PUSCH-NrofPorts 0 indicates 1 port per CDM group, 1 indicates 2 ports per CDM group. If the field is absent then 4 ports per CDM group are used (see TS 38.213 [13], clause 8.1A).
msgA-ScramblingID0 UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (*physCellID*).
msgA-ScramblingID1 UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (*physCellID*).

Conditional Presence	Explanation
FreqHopConfigured	This field is mandatory present when the field *msgA-IntraSlotFrequencyHopping* is configured. Otherwise, the field is absent.
GroupBConfigured	The field is mandatory present if *groupB-ConfiguredTwoStepRA* is configured in *RACH-ConfigCommonTwoStepRA*, otherwise the field is absent.
InitialBWPConfig	The field is mandatory present when *MsgA-ConfigCommon* is configured for the initial uplink BWP, or when *MsgA-ConfigCommon* is configured for a non-initial uplink BWP and *MsgA-ConfigCommon* is not configured for the initial uplink BWP, otherwise the field is optionally present, Need S.

– *MultiFrequencyBandListNR*

The IE *MultiFrequencyBandListNR* is used to configure a list of one or multiple NR frequency bands.

***MultiFrequencyBandListNR* information element**

```
-- ASN1START
-- TAG-MULTIFREQUENCYBANDLISTNR-START

MultiFrequencyBandListNR ::=        SEQUENCE (SIZE (1..maxNrofMultiBands)) OF FreqBandIndicatorNR
```

```
-- TAG-MULTIFREQUENCYBANDLISTNR-STOP
-- ASN1STOP
```

– *MultiFrequencyBandListNR-SIB*

The IE *MultiFrequencyBandListNR-SIB* indicates the list of frequency bands, for which cell (re-)selection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission.*

MultiFrequencyBandListNR-SIB information element

```
-- ASN1START
-- TAG-MULTIFREQUENCYBANDLISTNR-SIB-START

MultiFrequencyBandListNR-SIB ::=            SEQUENCE (SIZE (1.. maxNrofMultiBands)) OF NR-MultiBandInfo

NR-MultiBandInfo ::=                        SEQUENCE {
    freqBandIndicatorNR                         FreqBandIndicatorNR         OPTIONAL,   -- Cond OptULNotSIB2
    nr-NS-PmaxList                              NR-NS-PmaxList              OPTIONAL    -- Need S
}

MultiFrequencyBandListNR-SIB-v1760 ::=      SEQUENCE (SIZE (1.. maxNrofMultiBands)) OF NR-MultiBandInfo-v1760

NR-MultiBandInfo-v1760 ::=                  SEQUENCE {
    nr-NS-PmaxList-v1760                        NR-NS-PmaxList-v1760        OPTIONAL    -- Need S
}

-- TAG-MULTIFREQUENCYBANDLISTNR-SIB-STOP
-- ASN1STOP
```

***NR-MultiBandInfo* field descriptions**
freqBandIndicatorNR Provides an NR frequency band number as defined in TS 38.101-1 [15], TS 38.101-2 [39], table 5.2-1, and TS 38.101-5 [75], table 5.2.2-1.
nr-NS-PmaxList Provides a list of *additionalPmax* and *additionalSpectrumEmission* values. If the field is absent the UE uses value 0 for the *additionalSpectrumEmission* (see TS 38.101-1 [15] table 6.2.3.1-1A, TS 38.101-2 [39], table 6.2.3.1-2, and TS 38.101-5 [75], table 6.2.3.1-1A). This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. If *nr-NS-PmaxList-v1760* is present, it shall contain the same number of entries, listed in the same order as in *nr-NS-PmaxList* (without suffix).

Conditional Presence	Explanation
OptULNotSIB2	The field is absent for *SIB2* and is mandatory present in *SIB4* and *frequencyInfoDL-SIB*. Otherwise, if the field is absent in *frequencyInfoUL-SIB* in *UplinkConfigCommonSIB*, the UE will use the frequency band indicated in *frequencyInfoDL-SIB* in *DownlinkConfigCommonSIB*.

– *MUSIM-GapConfig*

The IE *MUSIM-GapConfig* specifies the MUSIM gap configuration and controls setup/release of MUSIM gaps.

MUSIM-GapConfig information element

```
-- ASN1START
-- TAG-MUSIM-GAPCONFIG-START

MUSIM-GapConfig-r17 ::=                 SEQUENCE {
    musim-GapToReleaseList-r17      SEQUENCE (SIZE (1..3)) OF MUSIM-GapId-r17             OPTIONAL, -- Need N
    musim-GapToAddModList-r17       SEQUENCE (SIZE (1..3)) OF MUSIM-Gap-r17           OPTIONAL, -- Need N
    musim-AperiodicGap-r17          MUSIM-GapInfo-r17               OPTIONAL, -- Need N
   ...
}
MUSIM-Gap-r17 ::=           SEQUENCE {
    musim-GapId-r17                     MUSIM-GapId-r17,
    musim-GapInfo-r17                   MUSIM-GapInfo-r17

}

-- TAG-MUSIM-GAPCONFIG-STOP
-- ASN1STOP
```

***MUSIM-GapConfig* field descriptions**
musim-AperiodicGap Indicates the MUSIM aperiodic gap as specified in TS 38.133 [14] clause 9.1.10. If UE indicates the *musim-Starting-SFN-AndSubframe* when requesting aperiodic gap the network can only configure the aperiodic gap with the same start point or no aperiodic gap. If the field *musim-Starting-SFN-AndSubframe* is absent for aperiodic gap, network can configure any timing as the starting point for aperiodic gap or configure no aperiodic gap.
musim-GapInfo Indicates the values for *musim-GapLength* and *musim-GapRepetitionAndOffset*. When network provides periodic gap, network always signals the *musim-GapLength* and *musim-GapRepetitionAndOffset* as indicated by the UE's preferred MUSIM gap configuration.
musim-GapToAddModList List of MUSIM periodic gap patterns to add or modify.
musim-GapToReleaseList List of MUSIM periodic gap patterns to release.

– *MUSIM-GapId*

The IE *MUSIM-GapId* is used to identify UE periodic MUSIM gap(s) to add, modify or release.

MUSIM-GapId information element

```
-- ASN1START
-- TAG-MUSIM-GAPID-START
```

```
MUSIM-GapId-r17 ::=                 INTEGER (0..2)

-- TAG-MUSIM-GAPID-STOP
-- ASN1STOP
```

– *MUSIM-GapInfo*

The IE *MUSIM-GapInfo* is used to indicate MUSIM gap parameters.

MUSIM-GapInfo information element

```
-- ASN1START
-- TAG-MUSIM-GAPINFO-START

MUSIM-GapInfo-r17 ::=               SEQUENCE {
    musim-Starting-SFN-AndSubframe-r17  MUSIM-Starting-SFN-AndSubframe-r17            OPTIONAL, -- Cond aperiodic
    musim-GapLength-r17                 ENUMERATED {ms3, ms4, ms6, ms10, ms20}        OPTIONAL, -- Cond gapSetup
    musim-GapRepetitionAndOffset-r17    CHOICE {
        ms20-r17                            INTEGER (0..19),
        ms40-r17                            INTEGER (0..39),
        ms80-r17                            INTEGER (0..79),
        ms160-r17                           INTEGER (0..159),
        ms320-r17                           INTEGER (0..319),
        ms640-r17                           INTEGER (0..639),
        ms1280-r17                          INTEGER (0..1279),
        ms2560-r17                          INTEGER (0..2559),
        ms5120-r17                          INTEGER (0..5119),
        ...
    }                                                                                 OPTIONAL -- Cond periodic
}

MUSIM-Starting-SFN-AndSubframe-r17 ::= SEQUENCE {
    starting-SFN-r17                    INTEGER (0..1023),
    startingSubframe-r17                INTEGER (0..9)
}

-- TAG-MUSIM-GAPINFO-STOP
-- ASN1STOP
```

***MUSIM-GapInfo* field descriptions**
musim-GapLength Indicates the length of the UE's MUSIM gap as specified in TS 38.133 [14] clause 9.1.10. This field is mandatory present for both periodic gap and aperiodic gap preference indication.
musim-GapRepetitionAndOffset Indicates the gap repetition period in ms and gap offset in number of subframes for the periodic MUSIM gap as specified in TS 38.133 [14] clause 9.1.10. This field is mandatory present for the periodic MUSIM gap preference indication.
musim-Starting-SFN-AndSubframe Indicates gap starting position for the aperiodic MUSIM gap. This field is optionally present for the aperiodic MUSIM gap preference indication.
starting-SFN Indicates gap starting SFN number for the aperiodic MUSIM gap.
startingSubframe Indicates gap starting subframe number for the aperiodic MUSIM gap.

Conditional Presence	Explanation
aperiodic	This field is mandatory present in case of aperiodic MUSIM gap configuration. Otherwise it is absent.
gapSetup	The field is mandatory present upon configuration of a new MUSIM gap. The field is optionally present, Need M, otherwise.
periodic	This field is mandatory present in case of periodic MUSIM gap configuration. Otherwise it is absent.

– *NeedForGapsConfigNR*

The IE *NeedForGapsConfigNR* contains configuration related to the reporting of measurement gap requirement information.

***NeedForGapsConfigNR* information element**

```
-- ASN1START
-- TAG-NeedForGapsConfigNR-START

NeedForGapsConfigNR-r16 ::=        SEQUENCE {
    requestedTargetBandFilterNR-r16       SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR              OPTIONAL          -- Need R
}

-- TAG-NeedForGapsConfigNR-STOP
-- ASN1STOP
```

NeedForGapsConfigNR field descriptions
requestedTargetBandFilterNR Indicates the target NR bands that the UE is requested to report the gap requirement information.

– *NeedForGapsInfoNR*

The IE *NeedForGapsInfoNR* indicates whether measurement gap is required for the UE to perform SSB based measurements on an NR target band while NR-DC or NE-DC is not configured.

NeedForGapsInfoNR information element

```
-- ASN1START
-- TAG-NeedForGapsInfoNR-START

NeedForGapsInfoNR-r16 ::=        SEQUENCE {
    intraFreq-needForGap-r16      NeedForGapsIntraFreqList-r16,
    interFreq-needForGap-r16      NeedForGapsBandListNR-r16
}

NeedForGapsIntraFreqList-r16 ::=          SEQUENCE (SIZE (1.. maxNrofServingCells)) OF NeedForGapsIntraFreq-r16

NeedForGapsBandListNR-r16 ::=             SEQUENCE (SIZE (1..maxBands)) OF NeedForGapsNR-r16

NeedForGapsIntraFreq-r16  ::=                 SEQUENCE {
    servCellId-r16                               ServCellIndex,
    gapIndicationIntra-r16                       ENUMERATED {gap, no-gap}
}

NeedForGapsNR-r16  ::=                        SEQUENCE {
    bandNR-r16                                   FreqBandIndicatorNR,
    gapIndication-r16                            ENUMERATED {gap, no-gap}
}

-- TAG-NeedForGapsInfoNR-STOP
-- ASN1STOP
```

***NeedForGapsInfoNR* field descriptions**
intraFreq-needForGap Indicates the measurement gap requirement information for NR intra-frequency measurement.
interFreq-needForGap Indicates the measurement gap requirement information for NR inter-frequency measurement.

NeedForGapsIntraFreq field descriptions
servCellId Indicates the serving cell which contains the target SSB (associated with the initial DL BWP) to be measured.
gapIndicationIntra Indicates whether measurement gap is required for the UE to perform intra-frequency SSB based measurements on the concerned serving cell. Value *gap* indicates that a measurement gap is needed if any of the UE configured BWPs (except the BWP(s) configured with *servingCellMO* associated with NCD-SSB) do not contain the frequency domain resources of the SSB associated to the initial DL BWP (CD-SSB). Value *no-gap* indicates a measurement gap is not needed to measure the SSB associated to the initial DL BWP (CD-SSB) for all configured BWPs (except the BWP(s) configured with *servingCellMO* associated with NCD-SSB), no matter the SSB is within the configured BWP or not.

***NeedForGapsNR* field descriptions**
bandNR Indicates the NR target band to be measured.
gapIndication Indicates whether measurement gap is required for the UE to perform SSB based measurements on the concerned NR target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *no-gap* indicates a measurement gap is not needed.

– *NeedForGapNCSG-ConfigEUTRA*

The IE *NeedForGapNCSG-ConfigEUTRA* contains configuration related to the reporting of measurement gap and NCSG requirement information.

***NeedForGapNCSG-ConfigEUTRA* information element**

```
-- ASN1START
-- TAG-NeedForGapNCSG-ConfigEUTRA-START

NeedForGapNCSG-ConfigEUTRA-r17 ::=        SEQUENCE {
    requestedTargetBandFilterNCSG-EUTRA-r17   SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA     OPTIONAL    -- Need R
}

-- TAG-NeedForGapNCSG-ConfigEUTRA-STOP
-- ASN1STOP
```

***NeedForGapNCSG-ConfigEUTRA* field descriptions**
requestedTargetBandFilterNCSG-EUTRA Indicates the target E-UTRA bands that the UE is requested to report the measurement gap and NCSG requirement information.

– *NeedForGapNCSG-ConfigNR*

The IE *NeedForGapNCSG-ConfigNR* contains configuration related to the reporting of measurement gap and NCSG requirement information.

NeedForGapNCSG-ConfigNR information element

```
-- ASN1START
-- TAG-NEEDFORGAPNCSG-CONFIGNR-START

NeedForGapNCSG-ConfigNR-r17 ::=        SEQUENCE {
    requestedTargetBandFilterNCSG-NR-r17   SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR          OPTIONAL          -- Need R
}

-- TAG-NEEDFORGAPNCSG-CONFIGNR-STOP
-- ASN1STOP
```

NeedForGapNCSG-ConfigNR field descriptions
requestedTargetBandFilterNCSG-NR Indicates the target NR bands that the UE is requested to report the measurement gap and NCSG requirement information.

– *NeedForGapNCSG-InfoEUTRA*

The IE *NeedForGapNCSG-InfoEUTRA* indicates whether measurement gap or NCSG is required for the UE to perform measurements on an E-UTRA target band while NR-DC or NE-DC is not configured.

NeedForGapNCSG-InfoEUTRA information element

```
-- ASN1START
-- TAG-NEEDFORGAPNCSG-INFOEUTRA-START

NeedForGapNCSG-InfoEUTRA-r17 ::=   SEQUENCE {
    needForNCSG-EUTRA-r17              SEQUENCE (SIZE (1..maxBandsEUTRA)) OF NeedForNCSG-EUTRA-r17
}

NeedForNCSG-EUTRA-r17  ::=         SEQUENCE {
    bandEUTRA-r17                      FreqBandIndicatorEUTRA,
    gapIndication-r17                  ENUMERATED {gap, ncsg, nogap-noncsg}
}

-- TAG-NEEDFORGAPNCSG-INFOEUTRA-STOP
-- ASN1STOP
```

NeedForGapNCSG-InfoEUTRA field descriptions
needForNCSG-EUTRA Indicates the measurement gap and NCSG requirement information for E-UTRA measurement.

***NeedForNCSG-EUTRA* field descriptions**
bandEUTRA Indicates the E-UTRA target band to be measured.
gapIndication Indicates whether measurement gap or NCSG is required for the UE to perform measurements on the concerned E-UTRA target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* message or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *ncsg* indicates that NCSG is needed, value *nogap-noncsg* indicates neither a measurement gap nor a NCSG is needed. Value *nogap-noncsg* also indicates interruption is not needed.

– *NeedForGapNCSG-InfoNR*

The IE *NeedForGapNCSG-InfoNR* indicates whether measurement gap or NCSG is required for the UE to perform SSB based measurements on an NR target band while NR-DC or NE-DC is not configured.

***NeedForGapNCSG-InfoNR* information element**

```
-- ASN1START
-- TAG-NEEDFORGAPNCSG-INFONR-START

NeedForGapNCSG-InfoNR-r17 ::=     SEQUENCE {
    intraFreq-needForNCSG-r17         NeedForNCSG-IntraFreqList-r17,
    interFreq-needForNCSG-r17         NeedForNCSG-BandListNR-r17
}

NeedForNCSG-IntraFreqList-r17 ::= SEQUENCE (SIZE (1.. maxNrofServingCells)) OF NeedForNCSG-IntraFreq-r17

NeedForNCSG-BandListNR-r17 ::=    SEQUENCE (SIZE (1..maxBands)) OF NeedForNCSG-NR-r17

NeedForNCSG-IntraFreq-r17  ::=    SEQUENCE {
    servCellId-r17                    ServCellIndex,
    gapIndicationIntra-r17            ENUMERATED {gap, ncsg, nogap-noncsg}
}

NeedForNCSG-NR-r17  ::=           SEQUENCE {
    bandNR-r17                        FreqBandIndicatorNR,
    gapIndication-r17                 ENUMERATED {gap, ncsg, nogap-noncsg}
}

-- TAG-NEEDFORGAPNCSG-INFONR-STOP
-- ASN1STOP
```

***NeedForGapNCSG-InfoNR* field descriptions**
intraFreq-needForNCSG Indicates the measurement gap and NCSG requirement information for NR intra-frequency measurement.
interFreq-needForNCSG Indicates the measurement gap and NCSG requirement information for NR inter-frequency measurement.

***NeedForNCSG-IntraFreq* field descriptions**
servCellId Indicates the serving cell which contains the target SSB (associated with the initial DL BWP) to be measured.
gapIndicationIntra Indicates whether measurement gap or NCSG is required for the UE to perform intra-frequency SSB based measurements on the concerned serving cell. Value *gap* indicates that a measurement gap is needed if any of the UE configured BWPs (except the BWP(s) configured with *servingCellMO* associated with NCD-SSB) do not contain the frequency domain resources of the SSB associated to the initial DL BWP (CD-SSB). Value *ncsg* indicates that a NCSG is needed if any of the UE configured BWPs do not contain the frequency domain resources of the SSB associated to the initial DL BWP. Value *nogap-noncsg* indicates that neither a measurement gap nor a NCSG is needed to measure the SSB associated to the initial DL BWP (CD-SSB) for all configured BWPs (except the BWP(s) configured with *servingCellMO* associated with NCD-SSB), no matter the SSB is within the configured BWP or not. Value *nogap-noncsg* also indicates interruption is not needed.

***NeedForNCSG-NR* field descriptions**
bandNR Indicates the NR target band to be measured.
gapIndication Indicates whether measurement gap or NCSG is required for the UE to perform SSB based measurements on the concerned NR target band while NR-DC or NE-DC is not configured. The UE determines this information based on the resultant configuration of the *RRCReconfiguration* or *RRCResume* message that triggers this response. Value *gap* indicates that a measurement gap is needed, value *ncsg* indicates that a NCSG is needed, and value *nogap-noncsg* indicates neither a measurement gap nor a NCSG is needed. Value *nogap-noncsg* also indicates interruption is not needed.

– *NextHopChainingCount*

The IE *NextHopChainingCount* is used to update the K_{gNB} key and corresponds to parameter NCC: See TS 33.501 [11].

NextHopChainingCount information element

```
-- ASN1START
-- TAG-NEXTHOPCHAININGCOUNT-START

NextHopChainingCount ::=                    INTEGER (0..7)

-- TAG-NEXTHOPCHAININGCOUNT-STOP
-- ASN1STOP
```

– *NG-5G-S-TMSI*

The IE *NG-5G-S-TMSI* contains a 5G S-Temporary Mobile Subscription Identifier (5G-S-TMSI), a temporary UE identity provided by the 5GC which uniquely identifies the UE within the tracking area, see TS 23.003 [21].

NG-5G-S-TMSI information element

```
-- ASN1START
-- TAG-NG-5G-S-TMSI-START
```

```
NG-5G-S-TMSI ::=                        BIT STRING (SIZE (48))

-- TAG-NG-5G-S-TMSI-STOP
-- ASN1STOP
```

– *NonCellDefiningSSB*

The IE *NonCellDefiningSSB* is used to configure a NCD-SSB to be used while the UE operates in a RedCap-specific initial BWP or dedicated BWP.

NonCellDefiningSSB information element

```
-- ASN1START
-- TAG-NONCELLDEFININGSSB-START

NonCellDefiningSSB-r17 ::=      SEQUENCE {
    absoluteFrequencySSB-r17        ARFCN-ValueNR,
    ssb-Periodicity-r17             ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 }       OPTIONAL,   -- Need S
    ssb-TimeOffset-r17              ENUMERATED { ms5, ms10, ms15, ms20, ms40, ms80, spare2, spare1 }      OPTIONAL,   -- Need S
    ...
}

-- TAG-NONCELLDEFININGSSB-STOP
-- ASN1STOP
```

***NonCellDefiningSSB* field descriptions**
absoluteFrequencySSB Frequency of the NCD-SSB. The network configures this field so that the SSB is within the bandwidth of the BWP configured in *BWP-DownlinkCommon*.
ssb-Periodicity The periodicity of this NCD-SSB. The network configures only periodicities that are larger than the periodicity of serving cell's CD-SSB. If the field is absent, the UE applies the SSB periodicity of the CD-SSB (*ssb-periodicityServingCell* configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*).
ssb-TimeOffset The time offset between CD-SSB of the serving cell and this NCD-SSB. Value *ms5* means the first burst of NCD-SSB is transmitted 5ms later than the first burst of CD-SSB transmitted after the first symbol of SFN=0 of the serving cell, value *ms10* means the first burst of NCD-SSB is transmitted 10ms later than the first burst of CD-SSB transmitted after the first symbol in SFN=0 of the serving cell, and so on. If the field is absent, RedCap UE considers that the time offset between the first burst of CD-SSB transmitted in the serving cell and the first burst of this NCD-SSB transmitted is zero. For RedCap UEs in TDD cells, the network configures this time offset to be an integer multiple of the periodicity of the serving cell's CD-SSB.

– *NPN-Identity*

The IE *NPN-Identity* includes either a list of CAG-IDs or a list of NIDs per PLMN Identity. Further information regarding how to set the IE is specified in TS 23.003 [21].

NPN-Identity information element

```
-- ASN1START
-- TAG-NPN-IDENTITY-START

NPN-Identity-r16 ::=            CHOICE {
    pni-npn-r16                     SEQUENCE {
        plmn-Identity-r16               PLMN-Identity,
        cag-IdentityList-r16            SEQUENCE (SIZE (1..maxNPN-r16)) OF CAG-IdentityInfo-r16
    },
    snpn-r16                        SEQUENCE {
        plmn-Identity-r16               PLMN-Identity,
        nid-List-r16                    SEQUENCE (SIZE (1..maxNPN-r16)) OF NID-r16
    }
}

CAG-IdentityInfo-r16 ::=        SEQUENCE {
    cag-Identity-r16                BIT STRING (SIZE (32)),
    manualCAGselectionAllowed-r16   ENUMERATED {true}                       OPTIONAL   -- Need R
}

NID-r16 ::=                     BIT STRING (SIZE (44))

-- TAG-NPN-IDENTITY-STOP
-- ASN1STOP
```

NPN-Identity field descriptions
cag-Identity A CAG-ID as specified in TS 23.003 [21]. The PLMN ID and a CAG ID in the *NPN-Identity* identifies a PNI-NPN.
cag-IdentityList The *cag-IdentityList* contains one or more CAG IDs. All CAG IDs associated to the same PLMN ID are listed in the same *cag-IdentityList* entry.
manualCAGselectionAllowed The *manualCAGselectionAllowed* indicates that the CAG ID can be selected manually even if it is outside the UE's allowed CAG list.
NID A NID as specified in TS 23.003 [21]. The PLMN ID and a NID in the *NPN-Identity* identifies a SNPN.
nid-List The *nid-List* contains one or more *NID*.

– *NPN-IdentityInfoList*

The IE *NPN-IdentityInfoList* includes a list of NPN identity information.

NPN-IdentityInfoList information element

```
-- ASN1START
-- TAG-NPN-IDENTITYINFOLIST-START
```

```
NPN-IdentityInfoList-r16 ::=     SEQUENCE (SIZE (1..maxNPN-r16)) OF NPN-IdentityInfo-r16


NPN-IdentityInfo-r16 ::=         SEQUENCE {
    npn-IdentityList-r16             SEQUENCE (SIZE (1..maxNPN-r16)) OF NPN-Identity-r16,
    trackingAreaCode-r16             TrackingAreaCode,
    ranac-r16                        RAN-AreaCode                                        OPTIONAL,       -- Need R
    cellIdentity-r16                 CellIdentity,
    cellReservedForOperatorUse-r16   ENUMERATED {reserved, notReserved},
    iab-Support-r16                  ENUMERATED {true}                                   OPTIONAL,       -- Need S
    ...,
    [[
    gNB-ID-Length-r17                INTEGER (22..32)                                    OPTIONAL        -- Need R
    ]]
}

-- TAG-NPN-IDENTITYINFOLIST-STOP
-- ASN1STOP
```

***NPN-IdentityInfoList* field descriptions**
iab-Support   This field combines both the support of IAB and the cell status for IAB. If the field is present, the cell supports IAB and the cell is also considered as a candidate for cell (re)selection for IAB-nodes; if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.
gNB-ID-Length   Indicates the length of the gNB ID out of the 36-bit long *cellIdentity*.
NPN-IdentityInfo   The *NPN-IdentityInfo* contains one or more NPN identities and additional information associated with those NPNs. Only the same type of NPNs (either SNPNs or PNI-NPNs) can be listed in a *NPN-IdentityInfo* element.
npn-IdentityList   The *npn-IdentityList* contains one or more NPN Identity elements.
trackingAreaCode   Indicates the Tracking Area Code to which the cell indicated by cellIdentity field belongs.
ranac   Indicates the RAN Area Code to which the cell indicated by cellIdentity field belongs.
cellReservedForOperatorUse   Indicates whether the cell is reserved for operator use (for the NPN(s) identified in the *npn-IdentityList*) as defined in TS 38.304 [20]. This field is ignored by NPN capable IAB-MT.

– *NR-DL-PRS-PDC-Info*

The IE *NR-DL-PRS-PDC-Info* defines downlink PRS configuration for PDC.

***NR-DL-PRS-PDC-Info* information element**

```
-- ASN1START
-- TAG-NR-DL-PRS-PDC-INFO-START
```

```
NR-DL-PRS-PDC-Info-r17 ::=    SEQUENCE {
    nr-DL-PRS-PDC-ResourceSet-r17          NR-DL-PRS-PDC-ResourceSet-r17                    OPTIONAL, -- Need R
    ...
}

NR-DL-PRS-PDC-ResourceSet-r17 ::=    SEQUENCE {
    periodicityAndOffset-r17     NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17,
    numSymbols-r17               ENUMERATED {n2, n4, n6, n12, spare4, spare3, spare2, spare1},
    dl-PRS-ResourceBandwidth-r17        INTEGER (1..63),
    dl-PRS-StartPRB-r17                 INTEGER (0..2176),
    resourceList-r17             SEQUENCE (SIZE (1..maxNrofPRS-ResourcesPerSet-r17)) OF NR-DL-PRS-Resource-r17,
    repFactorAndTimeGap-r17      RepFactorAndTimeGap-r17                                  OPTIONAL,   -- Need S
    ...
}

NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset-r17 ::= CHOICE {
    scs15-r17       CHOICE {
                        n4-r17                  INTEGER (0..3),
                        n5-r17                  INTEGER (0..4),
                        n8-r17                  INTEGER (0..7),
                        n10-r17                 INTEGER (0..9),
                        n16-r17                 INTEGER (0..15),
                        n20-r17                 INTEGER (0..19),
                        n32-r17                 INTEGER (0..31),
                        n40-r17                 INTEGER (0..39),
                        n64-r17                 INTEGER (0..63),
                        n80-r17                 INTEGER (0..79),
                        n160-r17                INTEGER (0..159),
                        n320-r17                INTEGER (0..319),
                        n640-r17                INTEGER (0..639),
                        n1280-r17               INTEGER (0..1279),
                        n2560-r17               INTEGER (0..2559),
                        n5120-r17               INTEGER (0..5119),
                        n10240-r17              INTEGER (0..10239),
                        ...
    },
    scs30-r17       CHOICE {
                        n8-r17                  INTEGER (0..7),
                        n10-r17                 INTEGER (0..9),
                        n16-r17                 INTEGER (0..15),
                        n20-r17                 INTEGER (0..19),
                        n32-r17                 INTEGER (0..31),
                        n40-r17                 INTEGER (0..39),
                        n64-r17                 INTEGER (0..63),
                        n80-r17                 INTEGER (0..79),
                        n128-r17                INTEGER (0..127),
                        n160-r17                INTEGER (0..159),
                        n320-r17                INTEGER (0..319),
                        n640-r17                INTEGER (0..639),
                        n1280-r17               INTEGER (0..1279),
                        n2560-r17               INTEGER (0..2559),
                        n5120-r17               INTEGER (0..5119),
                        n10240-r17              INTEGER (0..10239),
                        n20480-r17              INTEGER (0..20479),
```

```
                    ...
    },
    scs60-r17       CHOICE {
                        n16-r17                 INTEGER (0..15),
                        n20-r17                 INTEGER (0..19),
                        n32-r17                 INTEGER (0..31),
                        n40-r17                 INTEGER (0..39),
                        n64-r17                 INTEGER (0..63),
                        n80-r17                 INTEGER (0..79),
                        n128-r17                INTEGER (0..127),
                        n160-r17                INTEGER (0..159),
                        n256-r17                INTEGER (0..255),
                        n320-r17                INTEGER (0..319),
                        n640-r17                INTEGER (0..639),
                        n1280-r17               INTEGER (0..1279),
                        n2560-r17               INTEGER (0..2559),
                        n5120-r17               INTEGER (0..5119),
                        n10240-r17              INTEGER (0..10239),
                        n20480-r17              INTEGER (0..20479),
                        n40960-r17              INTEGER (0..40959),
                        ...
    },
    scs120-r17      CHOICE {
                        n32-r17                 INTEGER (0..31),
                        n40-r17                 INTEGER (0..39),
                        n64-r17                 INTEGER (0..63),
                        n80-r17                 INTEGER (0..79),
                        n128-r17                INTEGER (0..127),
                        n160-r17                INTEGER (0..159),
                        n256-r17                INTEGER (0..255),
                        n320-r17                INTEGER (0..319),
                        n512-r17                INTEGER (0..511),
                        n640-r17                INTEGER (0..639),
                        n1280-r17               INTEGER (0..1279),
                        n2560-r17               INTEGER (0..2559),
                        n5120-r17               INTEGER (0..5119),
                        n10240-r17              INTEGER (0..10239),
                        n20480-r17              INTEGER (0..20479),
                        n40960-r17              INTEGER (0..40959),
                        n81920-r17              INTEGER (0..81919),
                        ...
    },
    ...
}

NR-DL-PRS-Resource-r17 ::= SEQUENCE {
    nr-DL-PRS-ResourceID-r17            NR-DL-PRS-ResourceID-r17,
    dl-PRS-SequenceID-r17               INTEGER (0..4095),
    dl-PRS-CombSizeN-AndReOffset-r17    CHOICE {
            n2-r17                          INTEGER (0..1),
            n4-r17                          INTEGER (0..3),
            n6-r17                          INTEGER (0..5),
            n12-r17                         INTEGER (0..11),
            ...
```

```
    },
    dl-PRS-ResourceSlotOffset-r17       INTEGER (0..maxNrofPRS-ResourceOffsetValue-1-r17),
    dl-PRS-ResourceSymbolOffset-r17     INTEGER (0..12),
    dl-PRS-QCL-Info-r17                 DL-PRS-QCL-Info-r17                     OPTIONAL, -- Need N
    ...
}

DL-PRS-QCL-Info-r17 ::= CHOICE {
    ssb-r17                     SEQUENCE {
        ssb-Index-r17                   INTEGER (0..63),
        rs-Type-r17                     ENUMERATED {typeC, typeD, typeC-plus-typeD},
        ...
    },
    dl-PRS-r17                  SEQUENCE {
        qcl-DL-PRS-ResourceID-r17       NR-DL-PRS-ResourceID-r17,
        ...
    },
    ...
}

NR-DL-PRS-ResourceID-r17 ::= INTEGER (0..maxNrofPRS-ResourcesPerSet-1-r17)

RepFactorAndTimeGap-r17 ::=  SEQUENCE {
    repetitionFactor-r17         ENUMERATED {n2, n4, n6, n8, n16, n32, spare2, spare1},
    timeGap-r17                  ENUMERATED {s1, s2, s4, s8, s16, s32, spare2, spare1}
}

-- TAG-NR-DL-PRS-PDC-INFO-STOP
-- ASN1STOP
```

***NR-DL-PRS-PDC-ResourceSet* field descriptions**
dl-PRS-ResourceBandwidth This field specifies the number of PRBs allocated for all the DL-PRS Resource (allocated DL-PRS bandwidth) in multiples of 4 PRBs in this resource set. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same bandwidth. Integer value 1 corresponds to 24 PRBs, value 2 corresponds to 28 PRBs, value 3 corresponds to 32 PRBs and so on.
dl-PRS-StartPRB This field specifies the start PRB index defined as offset with respect to subcarrier 0 in common resource block 0 for the DL-PRS Resource. All DL-PRS Resources of the DL-PRS-PDC Resource Set have the same value of dl-PRS-StartPRB.
numSymbols This field specifies the number of symbols per DL-PRS Resource within a slot.
periodicityAndOffset This field specifies the periodicity of DL-PRS allocation in slots and the slot offset with respect to SFN #0 slot #0 in the PCell where the DL-PRS-PDC Resource Set is configured (i.e., slot where the first DL-PRS Resource of DL-PRS-PDC Resource Set occurs).
repFactorAndTimeGap If this field is absent, the value for r*epetitionFactor* is 1 (i.e., no resource repetition).

***RepFactorAndTimeGap* field descriptions**
repetitionFactor This field specifies how many times each DL-PRS Resource is repeated for a single instance of the DL-PRS Resource Set. It is applied to all resources of the DL-PRS Resource Set. Enumerated values n2, n4, n6, n8, n16, n32 correspond to 2, 4, 6, 8, 16, 32 resource repetitions, respectively.
timeGap This field specifies the offset in units of slots between two repeated instances of a DL-PRS Resource corresponding to the same DL-PRS Resource ID within a single instance of the DL-PRS Resource Set. The time duration spanned by one DL-PRS Resource Set containing repeated DL-PRS Resources should not exceed the periodicity configured by *periodicityAndOffset*.

– *NR-NS-PmaxList*

The IE *NR-NS-PmaxList* is used to configure a list of *additionalPmax* and *additionalSpectrumEmission*, as defined in TS 38.101-1 [15], table 6.2.3.1-1A, TS 38.101-2 [39], table 6.2.3.1-2, and TS 38.101-5 [75], table 6.2.3.1-1A for a given frequency band.

NR-NS-PmaxList information element

```
-- ASN1START
-- TAG-NR-NS-PMAXLIST-START

NR-NS-PmaxList ::=                      SEQUENCE (SIZE (1..maxNR-NS-Pmax)) OF NR-NS-PmaxValue

NR-NS-PmaxValue ::=                     SEQUENCE {
    additionalPmax                          P-Max                               OPTIONAL,   -- Need N
    additionalSpectrumEmission              AdditionalSpectrumEmission
}

NR-NS-PmaxList-v1760 ::=                SEQUENCE (SIZE (1.. maxNR-NS-Pmax)) OF NR-NS-PmaxValue-v1760

NR-NS-PmaxValue-v1760 ::=               SEQUENCE {
    additionalSpectrumEmission-v1760        AdditionalSpectrumEmission-v1760    OPTIONAL   -- Need N
}

-- TAG-NR-NS-PMAXLIST-STOP
-- ASN1STOP
```

– *NSAG-ID*

The IE *NSAG-ID* is used to identify an NSAG (TS 23.501 [32]) for slice-based cell reselection or slice-based random access.

NSAG-ID information element

```
-- ASN1START
-- TAG-NSAG-ID-START

NSAG-ID-r17 ::=                     BIT STRING (SIZE (8))
```

```
-- TAG-NSAG-ID-STOP
-- ASN1STOP
```

– NSAG-IdentityInfo

The IE *NSAG-IdentityInfo* is used to identify an NSAG (TS 23.501 [32]) for slice-based cell reselection.

NSAG-IdentityInfo information element

```
-- ASN1START
-- TAG-NSAG-IDENTITYINFO-START

NSAG-IdentityInfo-r17 ::=           SEQUENCE {
    nsag-ID-r17                         NSAG-ID-r17,
    trackingAreaCode-r17                TrackingAreaCode              OPTIONAL      -- Need R
}

-- TAG-NSAG-IDENTITYINFO-STOP
-- ASN1STOP
```

***NSAG-IdentityInfo* field descriptions**
trackingAreaCode   If absent, UE assumes the *trackingAreaCode* of the serving cell.

– NTN-Config

The IE *NTN-Config* provides parameters needed for the UE to access NR via NTN access.

NTN-Config information element

```
-- ASN1START
-- TAG-NTN-CONFIG-START

NTN-Config-r17 ::=              SEQUENCE {
    epochTime-r17                   EpochTime-r17                                                                   OPTIONAL,  -- Need R
    ntn-UlSyncValidityDuration-r17 ENUMERATED{ s5, s10, s15, s20, s25, s30, s35,
                                               s40, s45, s50, s55, s60, s120, s180, s240, s900}                     OPTIONAL,  -- Cond SIB19
    cellSpecificKoffset-r17         INTEGER(1..1023)                                                            OPTIONAL,  -- Need R
    kmac-r17                        INTEGER(1..512)                                                             OPTIONAL,  -- Need R
    ta-Info-r17                     TA-Info-r17                                                                 OPTIONAL,  -- Need R
    ntn-PolarizationDL-r17          ENUMERATED {rhcp,lhcp,linear}                                               OPTIONAL,  -- Need R
    ntn-PolarizationUL-r17          ENUMERATED {rhcp,lhcp,linear}                                               OPTIONAL,  -- Need R
    ephemerisInfo-r17               EphemerisInfo-r17                                                           OPTIONAL,  -- Need R
    ta-Report-r17                   ENUMERATED {enabled}                                                        OPTIONAL,  -- Need R
    ...
```

```
}

EpochTime-r17 ::=               SEQUENCE {
    sfn-r17                         INTEGER(0..1023),
    subFrameNR-r17                  INTEGER(0..9)
}

TA-Info-r17 ::=                  SEQUENCE  {
    ta-Common-r17                   INTEGER(0..66485757),
    ta-CommonDrift-r17              INTEGER(-257303..257303)                    OPTIONAL,  -- Need R
    ta-CommonDriftVariant-r17       INTEGER(0..28949)                           OPTIONAL   -- Need R
}

-- TAG-NTN-CONFIG-STOP
-- ASN1STOP
```

***NTN-Config* field descriptions**
EphemerisInfo
This field provides satellite ephemeris either in format of position and velocity state vector or in format of orbital parameters. This field is excluded when determining changes in system information, i.e. changes to ephemerisInfo should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.
epochTime
Indicate the epoch time for the NTN assistance information. When explicitly provided through SIB, or through dedicated signaling, the *EpochTime* is the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information. For serving cell, the field *sfn* indicates the current SFN or the next upcoming SFN after the frame where the message indicating the *epochTime* is received. For neighbour cell, the *sfn* indicates the SFN nearest to the frame where the message indicating the *epochTime* is received. The reference point for epoch time of the serving or neighbour NTN payload ephemeris and Common TA parameters is the uplink time synchronization reference point. If this field is absent for the serving cell, the epoch time is the end of SI window where this SIB19 is scheduled. This field is mandatory present when *ntn-Config* is provided in dedicated configuration. If this field is absent in *ntn-Config* provided via *NTN-NeighCellConfig* the UE uses epoch time of the serving cell, otherwise the field is based on the timing of the serving cell, i.e. the SFN and sub-frame number indicated in this field refers to the SFN and sub-frame of the serving cell. In case of handover or conditional handover, this field is based on the timing of the target cell, i.e. the SFN and sub-frame number indicated in this field refers to the SFN and sub-frame of the target cell. For the target cell the UE considers epoch time, indicated by the SFN and sub-frame number in this field, to be the frame nearest to the frame in which the message indicating the epoch time is received. This field is excluded when determining changes in system information, i.e. changes to *epochTime* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*.
cellSpecificKoffset
Scheduling offset used for the timing relationships that are modified for NTN (see TS 38.213 [13]). The unit of the field K_offset is number of slots for a given subcarrier spacing of 15 kHz. If the field is absent UE assumes value 0.
kmac
Scheduling offset provided by network if downlink and uplink frame timing are not aligned at gNB. If the field is absent UE assumes value 0. In FR1, the unit of *kmac* is number of slots for a given subcarrier spacing of 15 kHz.
ntn-PolarizationDL
If present, this parameter indicates polarization information for downlink transmission on service link: including Right hand, Left hand circular polarizations (RHCP, LHCP) and Linear polarization.
ntn-PolarizationUL
If present, this parameter indicates Polarization information for uplink service link. If not present and ntn-PolarizationDL is present, UE assumes the same polarization for UL and DL.
ntn-UlSyncValidityDuration
A validity duration configured by the network for assistance information (i.e. Serving and/or neighbour satellite ephemeris and Common TA parameters) which indicates the maximum time duration (from *epochTime*) during which the UE can apply assistance information without having acquired new assistance information. The unit of *ntn-UlSyncValidityDuration* is second. Value *s5* corresponds to 5 s, value *s10* indicate 10 s and so on. This parameter applies to both connected and idle mode UEs. If this field is absent in *ntn-Config* provided via *NTN-NeighCellConfig,* the UE uses validity duration from the serving cell assistance information. This field is excluded when determining changes in system information, i.e. changes of *ntn-UlSyncValidityDuration* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*. *ntn-UlSyncValidityDuration* is only updated when at least one of *epochTime*, *ta-Info*, *ephemerisInfo* is updated.
ta-Common
Network-controlled common timing advanced value and it may include any timing offset considered necessary by the network. *ta-Common* with value of 0 is supported. The granularity of *ta-Common* is 4.072 × 10^(-3) µs. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of *ta-Common* should neither result in system information change notifications nor in a modification of *valueTag* in SIB1.
ta-CommonDrift
Indicate drift rate of the common TA. The granularity of ta-CommonDrift is 0.2 × 10^(-3) µs⁄s. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of *ta-CommonDrift* should neither result in system information change notifications nor in a modification of *valueTag* in SIB1.
ta-CommonDriftVariant
Indicate drift rate variation of the common TA. The granularity of *ta-CommonDriftVariant* is 0.2×10^(-4) µs⁄s^2. Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of *ta-CommonDriftVariant* should neither result in system information change notifications nor in a modification of *valueTag* in SIB1.

ta-Report When this field is included in SIB19, it indicates reporting of timing advanced is enabled during Random Access due to RRC connection establishment or RRC connection resume, and during RRC connection reestablishment. When this field is included in *ServingCellConfigCommon* within dedicated signalling, it indicates TA reporting is enabled during Random Access due to reconfiguration with sync (see TS 38.321 [3], clause 5.4.8).

Conditional Presence	Explanation
SIB19	The field is mandatory present for the serving cell in SIB19. The field is optionally present, Need R, otherwise.

– *NZP-CSI-RS-Resource*

The IE *NZP-CSI-RS-Resource* is used to configure Non-Zero-Power (NZP) CSI-RS transmitted in the cell where the IE is included, which the UE may be configured to measure on (see TS 38.214 [19], clause 5.2.2.3.1). A change of configuration between periodic, semi-persistent or aperiodic for an *NZP-CSI-RS-Resource* is not supported without a release and add.

NZP-CSI-RS-Resource **information element**

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCE-START

NZP-CSI-RS-Resource ::=             SEQUENCE {
    nzp-CSI-RS-ResourceId               NZP-CSI-RS-ResourceId,
    resourceMapping                     CSI-RS-ResourceMapping,
    powerControlOffset                  INTEGER (-8..15),
    powerControlOffsetSS                ENUMERATED{db-3, db0, db3, db6}             OPTIONAL,   -- Need R
    scramblingID                        ScramblingId,
    periodicityAndOffset                CSI-ResourcePeriodicityAndOffset            OPTIONAL,   -- Cond PeriodicOrSemiPersistent
    qcl-InfoPeriodicCSI-RS              TCI-StateId                                 OPTIONAL,   -- Cond Periodic
    ...
}

-- TAG-NZP-CSI-RS-RESOURCE-STOP
-- ASN1STOP
```

***NZP-CSI-RS-Resource* field descriptions**
periodicityAndOffset Periodicity and slot offset *sl1* corresponds to a periodicity of 1 slot, *sl2* to a periodicity of two slots, and so on. The corresponding offset is also given in number of slots (see TS 38.214 [19], clause 5.2.2.3.1). Network always configures the UE with a value for this field for periodic and semi-persistent NZP-CSI-RS-Resource (as indicated in *CSI-ResourceConfig*).
powerControlOffset Power offset of PDSCH RE to NZP CSI-RS RE. Value in dB (see TS 38.214 [19], clauses 5.2.2.3.1 and 4.1).
powerControlOffsetSS Power offset of NZP CSI-RS RE to SSS RE. Value in dB (see TS 38.214 [19], clause 5.2.2.3.1).
qcl-InfoPeriodicCSI-RS For a target periodic CSI-RS, contains a reference to one *TCI-State* in TCI-States for providing the QCL source and QCL type. For periodic CSI-RS, the source can be SSB or another periodic-CSI-RS. Refers to the *TCI-State* or *dl-OrJoint-TCI-State* which has this value for *tci-StateId* and is defined in *tci-StatesToAddModList* or in *dl-OrJointTCI-StateList* in the *PDSCH-Config* included in the *BWP-Downlink* corresponding to the serving cell and to the DL BWP to which the resource belongs to (see TS 38.214 [19], clause 5.2.2.3.1).
resourceMapping OFDM symbol location(s) in a slot and subcarrier occupancy in a PRB of the CSI-RS resource.
scramblingID Scrambling ID (see TS 38.214 [19], clause 5.2.2.3.1).

Conditional Presence	Explanation
Periodic	The field is optionally present, Need M, for periodic *NZP-CSI-RS-Resources* (as indicated in *CSI-ResourceConfig*). The field is absent otherwise.
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent *NZP-CSI-RS-Resources* (as indicated in *CSI-ResourceConfig*). The field is absent otherwise.

– *NZP-CSI-RS-ResourceId*

The IE *NZP-CSI-RS-ResourceId* is used to identify one NZP-CSI-RS-Resource.

NZP-CSI-RS-ResourceId information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCEID-START

NZP-CSI-RS-ResourceId ::=           INTEGER (0..maxNrofNZP-CSI-RS-Resources-1)

-- TAG-NZP-CSI-RS-RESOURCEID-STOP
-- ASN1STOP
```

– *NZP-CSI-RS-ResourceSet*

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

NZP-CSI-RS-ResourceSet information element

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCESET-START

NZP-CSI-RS-ResourceSet ::=          SEQUENCE {
    nzp-CSI-ResourceSetId               NZP-CSI-RS-ResourceSetId,
    nzp-CSI-RS-Resources                SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerSet)) OF NZP-CSI-RS-ResourceId,
    repetition                          ENUMERATED { on, off }                                          OPTIONAL,   -- Need S
    aperiodicTriggeringOffset           INTEGER(0..6)                                                   OPTIONAL,   -- Need S
    trs-Info                            ENUMERATED {true}                                               OPTIONAL,   -- Need R
    ...,
    [[
    aperiodicTriggeringOffset-r16       INTEGER(0..31)                                                  OPTIONAL   -- Need S
    ]],
    [[
    pdc-Info-r17                        ENUMERATED {true}                                               OPTIONAL,  -- Need R
    cmrGroupingAndPairing-r17           CMRGroupingAndPairing-r17                                       OPTIONAL,  -- Need R
    aperiodicTriggeringOffset-r17       INTEGER (0..124)                                                OPTIONAL,  -- Need S
    aperiodicTriggeringOffsetL2-r17     INTEGER(0..31)                                                  OPTIONAL   -- Need R
    ]]
}

CMRGroupingAndPairing-r17 ::=       SEQUENCE {
    nrofResourcesGroup1-r17             INTEGER (1..7),
    pair1OfNZP-CSI-RS-r17               NZP-CSI-RS-Pairing-r17                                          OPTIONAL,  -- Need R
    pair2OfNZP-CSI-RS-r17               NZP-CSI-RS-Pairing-r17                                          OPTIONAL   -- Need R
}

NZP-CSI-RS-Pairing-r17  ::=         SEQUENCE {
    nzp-CSI-RS-ResourceId1-r17          INTEGER (1..7),
    nzp-CSI-RS-ResourceId2-r17          INTEGER (1..7)
}

-- TAG-NZP-CSI-RS-RESOURCESET-STOP
-- ASN1STOP
```

***NZP-CSI-RS-ResourceSet* field descriptions**
aperiodicTriggeringOffset, aperiodicTriggeringOffset-r16, aperiodicTriggeringOffset-r17 Offset X between the slot containing the DCI that triggers a set of aperiodic NZP CSI-RS resources and the slot in which the CSI-RS resource set is transmitted. For *aperiodicTriggeringOffset*, the value 0 corresponds to 0 slots, value 1 corresponds to 1 slot, value 2 corresponds to 2 slots, value 3 corresponds to 3 slots, value 4 corresponds to 4 slots, value 5 corresponds to 16 slots, value 6 corresponds to 24 slots. For *aperiodicTriggeringOffset-r16* and *aperiodicTriggeringOffset-r17*, the value indicates the number of slots. *aperiodicTriggeringOffset-r17* is applicable to SCS 480 kHz and 960 kHz, and only the values of integer multiples of 4 are valid, i.e. 0, 4, 8, and so on. The network configures only one of the fields. When neither field is included, the UE applies the value 0.
aperiodicTriggeringOffsetL2 Indicates triggering offset of aperiodic NZP CSI-RS resources used for fast activation of the SCell (see clause 5.2.1.5.3 of TS 38.214 [19]), when the NZP CSI-RS resources are activated by the MAC CE (see clause 5.9 of TS 38.321 [3]). The value indicates the number of slots.
cmrGroupingAndPairing Configures CMR groups and pairs. The first *nrofResourcesGroup1* resources in the NZP-CSI-RS resource set belong to Group 1 and the remaining resources in the NZP-CSI-RS resource set belong to Group 2. *nrofResourcesGroup1* is K_1 and the number of remaining resources in the NZP-CSI-RS resource set belonging to Group 2 is K_2 as specified in TS 38.214 clause 5.2.1.4.1. Maximum total number in Group 1 and Group 2 is 8 (see TS 38.214 [19], clauses 5.2.1.4.1 and 5.2.1.4.2).
pair1OfNZP-CSI-RS, pair2OfNZP-CSI-RS A pair of NZP CSI-RS resources. In one pair, one resource shall belong to group 1 and the other resource shall belong to group 2 (see TS 38.214 [19], clause 5.2.1.4.1).
nzp-CSI-RS-Resources NZP-CSI-RS-Resources associated with this NZP-CSI-RS resource set (see TS 38.214 [19], clause 5.2). For CSI, there are at most 8 NZP CSI RS resources per resource set.
nzp-CSI-RS-ResourceId1, nzp-CSI-RS-ResourceId2 The *nzp-CSI-RS-ResourceId1-r17* represents the index of the NZP CSI-RS resource in Resource Group 1, and *nzp-CSI-RS-ResourceId2-r17* represents the index of the NZP CSI-RS resource in Resource Group 2.
pdc-Info Indicates that this NZP-CSI-RS-ResourceSet, if configured also with *trs-Info,* is used for propagation delay compensation. The field can be present only if *trs-info* is present. The field can be present in only one *NZP-CSI-RS-ResourceSet*. If network configures this field for an *NZP-CSI-RS-ResourceSet*, the UE measures the UE Rx-Tx time difference based on resources configured in this resource set.
repetition Indicates whether repetition is on/off. If the field is set to *off* or if the field is absent, the UE may not assume that the NZP-CSI-RS resources within the resource set are transmitted with the same downlink spatial domain transmission filter (see TS 38.214 [19], clauses 5.2.2.3.1 and 5.1.6.1.2). It can only be configured for CSI-RS resource sets which are associated with *CSI-ReportConfig* with report of L1 RSRP, L1 SINR or "no report".
trs-Info Indicates that the antenna port for all NZP-CSI-RS resources in the CSI-RS resource set is same. If the field is absent or released the UE applies the value *false* (see TS 38.214 [19], clause 5.2.2.3.1).

– *NZP-CSI-RS-ResourceSetId*

The IE *NZP-CSI-RS-ResourceSetId* is used to identify one *NZP-CSI-RS-ResourceSet*.

***NZP-CSI-RS-ResourceSetId* information element**

```
-- ASN1START
-- TAG-NZP-CSI-RS-RESOURCESETID-START

NZP-CSI-RS-ResourceSetId ::=        INTEGER (0..maxNrofNZP-CSI-RS-ResourceSets-1)

-- TAG-NZP-CSI-RS-RESOURCESETID-STOP
-- ASN1STOP
```

– *P-Max*

The IE *P-Max* is used to limit the UE's uplink transmission power on a carrier frequency, in TS 38.101-1 [15] and in TS 38.101-5 [75], and is used to calculate the parameter *Pcompensation* defined in TS 38.304 [20].

P-Max information element

```
-- ASN1START
-- TAG-P-MAX-START

P-Max ::=                           INTEGER (-30..33)

-- TAG-P-MAX-STOP
-- ASN1STOP
```

– *PathlossReferenceRS*

The IE *PathlossReferenceRS* is used to configure a Reference Signal (e.g. a CSI-RS config or a SS block) to be used for path loss estimation for PUSCH, PUCCH and SRS for unified TCI state operation.

PathlossReferenceRS information element

```
-- ASN1START
-- TAG-PATHLOSSREFERENCERS-START

PathlossReferenceRS-r17 ::=   SEQUENCE {
    pathlossReferenceRS-Id-r17          PathlossReferenceRS-Id-r17,
    referenceSignal-r17                 CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId
    },
    additionalPCI-r17                   AdditionalPCIIndex-r17                                  OPTIONAL  -- Cond RS-SSB
}


-- TAG-PATHLOSSREFERENCERS-STOP
-- ASN1STOP
```

***PathlossReferenceRS* field descriptions**
additionalPCI
Indicates the physical cell ID (PCI) of the SSB for the referenceSignal.

Conditional Presence	Explanation
RS-SSB	The field is optionally present, Need R, if *ssb-Index* is configured for *referenceSignal*. Otherwise it is absent, Need R.

– *PathlossReferenceRS-Id*

The IE *PathlossReferenceRS-Id* is an ID for a reference signal (RS) configured as PUSCH, PUCCH and SRS pathloss reference RS for unified TCI state operation.

PathlossReferenceRS-Id information element

```
-- ASN1START
-- TAG-PATHLOSSREFERENCERS-ID-START

PathlossReferenceRS-Id-r17 ::= INTEGER (0..maxNrofPathlossReferenceRSs-1-r17)

-- TAG-PATHLOSSREFERENCERS-ID-STOP
-- ASN1STOP
```

– *PCI-ARFCN-EUTRA*

The IE *PCI-ARFCN-EUTRA* is used to encode EUTRA PCI and ARFCN.

PCI-ARFCN-EUTRA information element

```
-- ASN1START
-- TAG-PCIARFCNEUTRA-START

PCI-ARFCN-EUTRA-r16 ::=             SEQUENCE {
    physCellId-r16                      EUTRA-PhysCellId,
    carrierFreq-r16                     ARFCN-ValueEUTRA
}

-- TAG-PCIARFCNEUTRA-STOP
-- ASN1STOP
```

– *PCI-ARFCN-NR*

The IE *PCI-ARFCN-NR* is used to encode NR PCI and ARFCN.

PCI-ARFCN-NR information element

```
-- ASN1START
-- TAG-PCIARFCNNR-START

PCI-ARFCN-NR-r16 ::=                SEQUENCE {
```

```
    physCellId-r16                  PhysCellId,
    carrierFreq-r16                 ARFCN-ValueNR
}

-- TAG-PCIARFCNNR-STOP
-- ASN1STOP
```

– *PCI-List*

The IE *PCI-List* concerns a list of physical cell identities, which may be used for different purposes.

PCI-List information element

```
-- ASN1START
-- TAG-PCI-LIST-START

PCI-List ::=                    SEQUENCE (SIZE (1..maxNrofCellMeas)) OF PhysCellId

-- TAG-PCI-LIST-STOP
-- ASN1STOP
```

– *PCI-Range*

The IE *PCI-Range* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *PCI-Range*, the Network may configure overlapping ranges of physical cell identities.

PCI-Range information element

```
-- ASN1START
-- TAG-PCI-RANGE-START

PCI-Range ::=                   SEQUENCE {
    start                           PhysCellId,
    range                           ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64, n84,
                                                n96, n128, n168, n252, n504, n1008,spare1}          OPTIONAL    -- Need S
}

-- TAG-PCI-RANGE-STOP
-- ASN1STOP
```

***PCI-Range* field descriptions**
range Indicates the number of physical cell identities in the range (including *start*). Value *n4* corresponds with 4, value *n8* corresponds with 8 and so on. The UE shall apply value 1 in case the field is absent, in which case only the physical cell identity value indicated by *start* applies.
start Indicates the lowest physical cell identity in the range.

– *PCI-RangeElement*

The IE *PCI-RangeElement* is used to define a PCI-Range as part of a list (e.g. AddMod list).

PCI-RangeElement information element

```
-- ASN1START
-- TAG-PCI-RANGEELEMENT-START

PCI-RangeElement ::=                SEQUENCE {
    pci-RangeIndex                      PCI-RangeIndex,
    pci-Range                           PCI-Range
}

-- TAG-PCI-RANGEELEMENT-STOP
-- ASN1STOP
```

***PCI-RangeElement* field descriptions**
pci-Range Physical cell identity or a range of physical cell identities.

– *PCI-RangeIndex*

The IE PCI-RangeIndex identifies a physical cell id range, which may be used for different purposes.

PCI-RangeIndex information element

```
-- ASN1START
-- TAG-PCI-RANGEINDEX-START

PCI-RangeIndex ::=                  INTEGER (1..maxNrofPCI-Ranges)

-- TAG-PCI-RANGEINDEX-STOP
-- ASN1STOP
```

– *PCI-RangeIndexList*

The IE *PCI-RangeIndexList* concerns a list of indexes of physical cell id ranges, which may be used for different purposes.

PCI-RangeIndexList information element

```
-- ASN1START
-- TAG-PCI-RANGEINDEXLIST-START

PCI-RangeIndexList ::=              SEQUENCE (SIZE (1..maxNrofPCI-Ranges)) OF PCI-RangeIndex

-- TAG-PCI-RANGEINDEXLIST-STOP
-- ASN1STOP
```

– *PDCCH-Config*

The IE *PDCCH-Config* is used to configure UE specific PDCCH parameters or MBS multicast PDCCH parameters such as control resource sets (CORESET), search spaces and additional parameters for acquiring the PDCCH. If this IE is used for the scheduled SCell in case of cross carrier scheduling, the fields other than *searchSpacesToAddModList* and *searchSpacesToReleaseList* are absent. If the IE is used for a dormant BWP, the fields other than *controlResourceSetToAddModList* and *controlResourceSetToReleaseList* are absent. If this IE is used for MBS CFR, the field *downlinkPreemptiom,tpc-PUSCH, tpc-SRS, uplinkCancellation, monitoringCapabilityConfig*, and *searchSpaceSwitchConfig* are absent.

PDCCH-Config information element

```
-- ASN1START
-- TAG-PDCCH-CONFIG-START

PDCCH-Config ::=                    SEQUENCE {
    controlResourceSetToAddModList      SEQUENCE(SIZE (1..3)) OF ControlResourceSet                    OPTIONAL,   -- Need N
    controlResourceSetToReleaseList     SEQUENCE(SIZE (1..3)) OF ControlResourceSetId                  OPTIONAL,   -- Need N
    searchSpacesToAddModList            SEQUENCE(SIZE (1..10)) OF SearchSpace                          OPTIONAL,   -- Need N
    searchSpacesToReleaseList           SEQUENCE(SIZE (1..10)) OF SearchSpaceId                        OPTIONAL,   -- Need N
    downlinkPreemption                  SetupRelease { DownlinkPreemption }                            OPTIONAL,   -- Need M
    tpc-PUSCH                           SetupRelease { PUSCH-TPC-CommandConfig }                       OPTIONAL,   -- Need M
    tpc-PUCCH                           SetupRelease { PUCCH-TPC-CommandConfig }                       OPTIONAL,   -- Need M
    tpc-SRS                             SetupRelease { SRS-TPC-CommandConfig}                          OPTIONAL,   -- Need M
    ...,
    [[
    controlResourceSetToAddModListSizeExt-v1610 SEQUENCE (SIZE (1..2)) OF ControlResourceSet           OPTIONAL,   -- Need N
    controlResourceSetToReleaseListSizeExt-r16 SEQUENCE (SIZE (1..5)) OF ControlResourceSetId-r16      OPTIONAL,   -- Need N
    searchSpacesToAddModListExt-r16     SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-r16                   OPTIONAL,   -- Need N
    uplinkCancellation-r16              SetupRelease { UplinkCancellation-r16 }                        OPTIONAL,   -- Need M
    monitoringCapabilityConfig-r16      ENUMERATED { r15monitoringcapability,r16monitoringcapability } OPTIONAL,   -- Need M
    searchSpaceSwitchConfig-r16         SearchSpaceSwitchConfig-r16                                    OPTIONAL    -- Need R
    ]],
    [[
    searchSpacesToAddModListExt-v1700   SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-v1700                 OPTIONAL,   -- Need N
    monitoringCapabilityConfig-v1710    ENUMERATED { r17monitoringcapability }                         OPTIONAL,   -- Need M
    searchSpaceSwitchConfig-r17         SearchSpaceSwitchConfig-r17                                    OPTIONAL,   -- Need R
```

```
    pdcch-SkippingDurationList-r17      SEQUENCE(SIZE (1..3)) OF SCS-SpecificDuration-r17              OPTIONAL    -- Need R
    ]]
}

SearchSpaceSwitchConfig-r16 ::=     SEQUENCE {
    cellGroupsForSwitchList-r16         SEQUENCE(SIZE (1..4)) OF CellGroupForSwitch-r16             OPTIONAL,   -- Need R
    searchSpaceSwitchDelay-r16          INTEGER (10..52)                                            OPTIONAL    -- Need R
}

SearchSpaceSwitchConfig-r17 ::=     SEQUENCE {
    searchSpaceSwitchTimer-r17          SCS-SpecificDuration-r17                                    OPTIONAL,   -- Need R
    searchSpaceSwitchDelay-r17          INTEGER (10..52)                                            OPTIONAL    -- Need R
}

CellGroupForSwitch-r16 ::=          SEQUENCE(SIZE (1..16)) OF ServCellIndex

SCS-SpecificDuration-r17   ::=      INTEGER (1..166)

-- TAG-PDCCH-CONFIG-STOP
-- ASN1STOP
```

***PDCCH-Config* field descriptions**
controlResourceSetToAddModList, controlResourceSetToAddModListSizeExt
List of UE specifically configured Control Resource Sets (CORESETs) to be used by the UE. The network restrictions on configuration of CORESETs per DL BWP are specified in TS 38.213 [13], clause 10.1 and TS 38.306 [26]. The UE shall consider entries in *controlResourceSetToAddModList* and in *controlResourceSetToAddModListSizeExt* as a single list, i.e. an entry created using *controlResourceSetToAddModList* can be modified using *controlResourceSetToAddModListSizeExt* (or deleted using *controlResourceSetToReleaseListSizeExt*) and vice-versa. In case network reconfigures control resource set with the same *ControlResourceSetId* as used for *commonControlResourceSet* or *commonControlResourceSetExt* configured via *PDCCH-ConfigCommon* or via *SIB20*, the configuration from *PDCCH-Config* always takes precedence and should not be updated by the UE based on *servingCellConfigCommon* or based on *SIB20*.
controlResourceSetToReleaseList, controlResourceSetToReleaseListSizeExt
List of UE specifically configured Control Resource Sets (CORESETs) to be released by the UE. This field only applies to CORESETs configured by *controlResourceSetToAddModList* or *controlResourceSetToAddModListSizeExt* and does not release the field *commonControlResourceSet* configured by *PDCCH-ConfigCommon* and *commonControlResourceSetExt* configured by *SIB20*.
downlinkPreemption
Configuration of downlink preemption indications to be monitored in this cell (see TS 38.213 [13], clause 11.2).
monitoringCapabilityConfig
Configures either Rel-15 PDCCH monitoring capability, Rel-16 PDCCH monitoring capability or Rel-17 PDCCH monitoring capability for PDCCH monitoring on a serving cell (see TS 38.213 [13], clause 10.1). Value *r15monitoringcapability* enables the Rel-15 monitoring capability, and value *r16monitoringcapability* enables the Rel-16 PDCCH monitoring capability. *r17monitoringcapability* enables the Rel-17 PDCCH multi-slot monitoring capability. For 480 and 960 kHz SCS, only value *r17monitoringcapability* is applicable.
pdcch-SkippingDurationList
Provides one or more values to derive the skipping duration in unit of slots, as specified in TS 38.213 [13], clause 10.4. The DCI which schedules data indicates which of the values is to be applied (see TS 38.213 [13], clause 10.4). For the 15kHz SCS, for each entry, only the first 26 values are valid and correspond to {1, 2, 3, …, 20, 30, 40, 50, 60, 80, 100}. For the 30kHz SCS, for each entry, only the first 46 values are valid and correspond to {1, 2, 3, …, 40, 60, 80, 100, 120, 160, 200}. For the 60kHz SCS, for each entry, only the first 86 values are valid and correspond to {1, 2, 3, …, 80, 120, 160, 200, 240, 320, 400}. For the 120kHz SCS, for each entry, the 166 values correspond to {1, 2, 3, …, 160, 240, 320, 400, 480, 640, 800}. For the 480kHz SCS, for each entry, the 166 values correspond to {4, 8, 12, …, 640, 960, 1280, 1600, 1920, 2560, 3200}. For the 960kHz SCS, for each entry, the 166 values correspond to {8, 16, 24, …, 1280, 1920, 2560, 3200, 3840, 5120, 6400}.
searchSpacesToAddModList, searchSpacesToAddModListExt
List of UE specifically configured Search Spaces or MBS multicast Search Spaces. The network configures at most 10 Search Spaces per BWP per cell (including UE-specific and common Search Spaces). If the network includes *searchSpacesToAddModListExt*, it includes the same number of entries, and listed in the same order, as in *searchSpacesToAddModList* in each of them.
searchSpaceSwitchConfig
Configuration to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213 [13]. The network only configures either *searchSpaceSwitchConfig-r16* or *searchSpaceSwitchConfig-r17* for a UE.
tpc-PUCCH
Enable and configure reception of group TPC commands for PUCCH.
tpc-PUSCH
Enable and configure reception of group TPC commands for PUSCH.
tpc-SRS
Enable and configure reception of group TPC commands for SRS.
uplinkCancellation
Configuration of uplink cancellation indications to be monitored in this cell (see TS 38.213 [13], clause 11.2A).

***SearchSpaceSwitchConfig* field descriptions**
cellGroupsForSwitchList The list of serving cells which are bundled for the search space group switching purpose (see TS 38.213 [13], clause 10.4). A serving cell can belong to only one *CellGroupForSwitch*. The network configures the same list for all BWPs of serving cells in the same *CellGroupForSwitch.*
searchSpaceSwitchDelay Indicates the value to be applied by a UE for Search Space Set Group switching; corresponds to the P value in TS 38.213 [13], clause 10.4. The network configures the same value for all BWPs of serving cells in the same *CellGroupForSwitch.* For 120/480/960 kHz SCS, only values 40,41, ... 52 are valid and the actual value = field value * SCS/120 kHz i.e. field value 40 corresponds to 40 with 120 kHz SCS, 160 with 480 kHz SCS and 320 with 960 kHz SCS, and so on.
searchSpaceSwitchTimer Timer (in unit of slots) to control the UE behavior to switch from search space group X back to search space group 0, as specified in clause 10 of TS 38.213 [13]. For the 15kHz SCS, only the first 26 values are valid and correspond to {1, 2, 3, …, 20, 30, 40, 50, 60, 80, 100}. For the 30kHz SCS, only the first 46 values are valid and correspond to {1, 2, 3, …, 40, 60, 80, 100, 120, 160, 200}. For the 60kHz SCS, only the first 86 values are valid and correspond to {1, 2, 3, …, 80, 120, 160, 200, 240, 320, 400}. For the 120kHz SCS, the 166 values correspond to {1, 2, 3, …, 160, 240, 320, 400, 480, 640, 800}. For the 480kHz SCS, the 166 values correspond to {4, 8, 12, …, 640, 960, 1280, 1600, 1920, 2560, 3200}. For the 960kHz SCS, the 166 values correspond to {8, 16, 24, …, 1280, 1920, 2560, 3200, 3840, 5120, 6400}.

– *PDCCH-ConfigCommon*

The IE *PDCCH-ConfigCommon* is used to configure cell specific PDCCH parameters provided in SIB as well as in dedicated signalling.

***PDCCH-ConfigCommon* information element**

```
-- ASN1START
-- TAG-PDCCH-CONFIGCOMMON-START

PDCCH-ConfigCommon ::=              SEQUENCE {
    controlResourceSetZero              ControlResourceSetZero                                  OPTIONAL,   -- Cond InitialBWP-Only
    commonControlResourceSet            ControlResourceSet                                      OPTIONAL,   -- Need R
    searchSpaceZero                     SearchSpaceZero                                         OPTIONAL,   -- Cond InitialBWP-Only
    commonSearchSpaceList               SEQUENCE (SIZE(1..4)) OF SearchSpace                    OPTIONAL,   -- Need R
    searchSpaceSIB1                     SearchSpaceId                                           OPTIONAL,   -- Need S
    searchSpaceOtherSystemInformation   SearchSpaceId                                           OPTIONAL,   -- Need S
    pagingSearchSpace                   SearchSpaceId                                           OPTIONAL,   -- Need S
    ra-SearchSpace                      SearchSpaceId                                           OPTIONAL,   -- Need S
    ...,
    [[
    firstPDCCH-MonitoringOccasionOfPO   CHOICE {
        sCS15KHZoneT                                                        SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),
        sCS30KHZoneT-SCS15KHZhalfT                                          SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),
        sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT                         SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),
        sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT     SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),
        sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),
        sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT          SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),
        sCS120KHZoneEighthT-SCS60KHZoneSixteenthT                           SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),
        sCS120KHZoneSixteenthT                                              SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..17919)
    }                                                                       OPTIONAL    -- Cond OtherBWP
    ]],
    [[
    commonSearchSpaceListExt-r16                                SEQUENCE (SIZE(1..4)) OF SearchSpaceExt-r16     OPTIONAL  -- Need R
    ]],
```

```
    [[
    sdt-SearchSpace-r17                 CHOICE {
        newSearchSpace                      SearchSpace,
        existingSearchSpace                 SearchSpaceId
    }                                                                                   OPTIONAL,   -- Need R
    searchSpaceMCCH-r17                 SearchSpaceId                                   OPTIONAL,   -- Need R
    searchSpaceMTCH-r17                 SearchSpaceId                                   OPTIONAL,   -- Need S
    commonSearchSpaceListExt2-r17       SEQUENCE (SIZE(1..4)) OF SearchSpaceExt-v1700   OPTIONAL,   -- Need R
    firstPDCCH-MonitoringOccasionOfPO-v1710 CHOICE {
       sCS480KHZoneEighthT                      SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
       sCS480KHZoneSixteenthT                   SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
    }                                                                                   OPTIONAL,   -- Need R
    pei-ConfigBWP-r17      SEQUENCE {
        pei-SearchSpace-r17                 SearchSpaceId,
        firstPDCCH-MonitoringOccasionOfPEI-O-r17  CHOICE {
            sCS15KHZoneT                                                    SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..139),
            sCS30KHZoneT-SCS15KHZhalfT                                      SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..279),
            sCS60KHZoneT-SCS30KHZhalfT-SCS15KHZquarterT                     SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..559),
            sCS120KHZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZoneEighthT  SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..1119),
            sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZoneEighthT-SCS15KHZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..2239),
            sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..4479),
            sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT        SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..8959),
            sCS480KHZquarterT-SCS120KHZoneSixteenthT                        SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..17919),
            sCS480KHZoneEighthT                                           SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..35839),
            sCS480KHZoneSixteenthT                                        SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..71679)
        }
    }                                                                                   OPTIONAL     -- Cond InitialBWP-Paging
    ]],
    [[
    followUnifiedTCI-State-v1720          ENUMERATED {enabled}                           OPTIONAL     -- Need R
    ]]
}

-- TAG-PDCCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

***PDCCH-ConfigCommon* field descriptions**
commonControlResourceSet
An additional common control resource set which may be configured and used for any common or UE-specific search space. If the network configures this field, it uses a *ControlResourceSetId* other than 0 for this *ControlResourceSet*. The network configures the *commonControlResourceSet* in *SIB1* so that it is contained in the bandwidth of CORESET#0. If the RedCap-specific initial downlink BWP does not contain the entire CORESET#0, the network configures the *commonControlResourceSet* in the RedCap-specific initial downlink BWP in *SIB1* for RedCap such that it does not have to be contained in the bandwidth of CORESET#0.
commonSearchSpaceList, commonSearchSpaceListExt, commonSearchSpaceListExt2
A list of additional common search spaces. If the network configures this field, it uses the *SearchSpaceId*s other than 0. If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the *SearchSpace* entries is considered to be newly created and the conditions and Need codes for setup of the entry apply. If the network includes *commonSearchSpaceListExt/commonSearchSpaceListExt2*, it includes the same number of entries, and listed in the same order, as in *commonSearchSpaceList*.
controlResourceSetZero
Parameters of the common CORESET#0 which can be used in any common or UE-specific search spaces. The values are interpreted like the corresponding bits in *MIB pdcch-ConfigSIB1*. Even though this field is only configured in the initial BWP (BWP#0) *controlResourceSetZero* can be used in search spaces configured in other DL BWP(s) than the initial DL BWP if the conditions defined in TS 38.213 [13], clause 10 are satisfied.
firstPDCCH-MonitoringOccasionOfPEI-O
Offset, in number of symbols, from the start of the reference frame for PEI-O to the start of the first PDCCH monitoring occasion of PEI-O on this BWP, see TS 38.213 [13], clause 10.4A. For the case *po-NumPerPEI* is smaller than Ns, UE applies the (floor(i_s/po-NumPerPEI)+1)-th value out of (N_s/po-NumPerPEI) configured values in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset. When *po-NumPerPEI* is one or multiple of Ns, UE applies the first configured value in *firstPDCCH-MonitoringOccasionOfPEI-O* for the symbol-level offset.
firstPDCCH-MonitoringOccasionOfPO
Indicates the first PDCCH monitoring occasion of each PO of the PF on this BWP, see TS 38.304 [20]. The field *sCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT*, *sCS120KHZoneEighthT-SCS60KHZoneSixteenthT* and *sCS120KHZoneSixteenthT* can be applied for SCS 480kHz, corresponding to *sCS480KHZoneT-SCS120KHZquarterT-SCS60KHZoneEighthT-SCS30KHZoneSixteenthT*, *sCS480KHZhalfT-SCS120KHZoneEighthT-SCS60KHZoneSixteenthT* and *sCS480KHZquarterT-SCS120KHZoneSixteenthT* in IE *DownlinkConfigCommonSIB* respectively.
followUnifiedTCI-State
When set to enabled, for PDCCH reception in CORESET #0, the UE applies the "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5.
pagingSearchSpace
ID of the search space for paging (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive paging in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0. In that case, a RedCap UE in RRC_IDLE or RRC_INACTIVE while SDT procedure is not ongoing, shall monitor paging in the initial DL BWP that includes CORESET#0.
pei-ConfigBWP
Provides the configuration for PEI reception in this BWP. If the field is absent, the UE does not receive PEI in this BWP. For the *initialDownlinkBWP-RedCap* not including CD-SSB and the entire CORESET#0, a RedCap UE in RRC_IDLE or RRC_INACTIVE while SDT procedure is not ongoing monitors PEI in the *initialDownlinkBWP* that includes CORESET#0, if the *initialDownlinkBWP* is configured with *pei-ConfigBWP.*
pei-SearchSpace
ID of dedicated search space for PEI. It can be configured to one of up to 4 common SS sets configured by *commonSearchSpaceList* with *SearchSpaceId* > 0. The CCE aggregation levels and maximum number of PDCCH candidates per CCE aggregation level follows Table 10.1-1 of TS38.213 [13]. *SearchSpaceId* = 0 can be configured for the case of SS/PBCH block and CORESET multiplexing pattern 2 or 3.
ra-SearchSpace
ID of the Search space for random access procedure (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive RAR in this BWP. This field is mandatory present in the DL BWP(s) if the conditions described in TS 38.321 [3], clause 5.15 are met.
sdt-SearchSpace
Common search space for CG-SDT and RA-SDT (see TS 38.213 [13]). If an *existingSearchSpace* is used, the network only signals the search space ID of the *ra-SearchSpace*.

searchSpaceMCCH ID of the search space for MCCH. If the field is absent, the UE does not receive MCCH in this BWP (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0.
searchSpaceMTCH ID of the search space for MTCH of MBS broadcast. If the field is absent, the UE applies *searchSpaceMCCH* also for MTCH, (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial downlink BWP, if it does not include CD-SSB and the entire CORESET#0.
searchSpaceOtherSystemInformation ID of the Search space for other system information, i.e., *SIB2* and beyond (see TS 38.213 [13], clause 10.1). If the field is absent, the UE does not receive other system information in this BWP. This field is absent for the RedCap-specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0. In that case, a RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor PDCCH to receive other system information using *searchSpaceOtherSystemInformation* in the initial DL BWP that includes CD-SSB and the entire CORESET#0.
searchSpaceSIB1 ID of the search space for *SIB1* message. In the initial DL BWP of the UE's PCell, the network sets this field to 0. If the field is absent, the UE does not receive *SIB1* in this BWP. (see TS 38.213 [13], clause 10). This field is absent for the RedCap-specific initial DL BWP, if it does not include CD-SSB and the entire CORESET#0. In that case, a RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor PDCCH to receive SIB1 using *searchSpaceSIB1* in the initial DL BWP that includes CD-SSB and the entire CORESET#0.
searchSpaceZero Parameters of the common SearchSpace#0. The values are interpreted like the corresponding bits in *MIB pdcch-ConfigSIB1*. Even though this field is only configured in the initial BWP (BWP#0), *searchSpaceZero* can be used in search spaces configured in other DL BWP(s) than the initial DL BWP if the conditions described in TS 38.213 [13], clause 10, are satisfied.

Conditional Presence	Explanation
InitialBWP-Only	If *SIB1* is broadcast the field is mandatory present in the *PDCCH-ConfigCommon* of the initial BWP (BWP#0) in *ServingCellConfigCommon* except it is the RedCap-specific initial BWP not including CD-SSB and the entire CORESET#0; it is absent in other BWPs and when sent in system information. If SIB1 is not broadcast and there is an SSB associated to the cell, the field is optionally present, Need M, in the *PDCCH-ConfigCommon* of the initial BWP (BWP#0) in *ServingCellConfigCommon* (still with the same setting for all UEs). In other cases, the field is absent.
OtherBWP	This field is optionally present, Need R, if this BWP is not the *initialDownlinkBWP* and *pagingSearchSpace* is configured in this BWP. Otherwise this field is absent.
InitialBWP-Paging	This field is optionally present, Need R, if this BWP is the *initialDownlinkBWP* or *initialDownlinkBWP-RedCap* including CD-SSB and the entire CORESET#0, and *pei-Config* is configured in *DownlinkConfigCommonSIB*. Otherwise, this field is absent.

– *PDCCH-ConfigSIB1*

The IE *PDCCH-ConfigSIB1* is used to configure CORESET#0 and search space#0.

***PDCCH-ConfigSIB1* information element**

```
-- ASN1START
-- TAG-PDCCH-CONFIGSIB1-START

PDCCH-ConfigSIB1 ::=               SEQUENCE {
    controlResourceSetZero             ControlResourceSetZero,
    searchSpaceZero                    SearchSpaceZero
}
```

```
-- TAG-PDCCH-CONFIGSIB1-STOP
-- ASN1STOP
```

***PDCCH-ConfigSIB1* field descriptions**
controlResourceSetZero Determines a common ControlResourceSet (CORESET) with ID #0, see TS 38.213 [13], clause 13.
searchSpaceZero Determines a common search space with ID #0, see TS 38.213 [13], clause 13.

– *PDCCH-ServingCellConfig*

The IE *PDCCH-ServingCellConfig* is used to configure UE specific PDCCH parameters applicable across all bandwidth parts of a serving cell.

***PDCCH-ServingCellConfig* information element**

```
-- ASN1START
-- TAG-PDCCH-SERVINGCELLCONFIG-START

PDCCH-ServingCellConfig ::=         SEQUENCE {
    slotFormatIndicator                 SetupRelease { SlotFormatIndicator }                        OPTIONAL,   -- Need M
    ...,
    [[
    availabilityIndicator-r16           SetupRelease {AvailabilityIndicator-r16}                    OPTIONAL,   -- Need M
    searchSpaceSwitchTimer-r16          INTEGER (1..80)                                             OPTIONAL    -- Need R
    ]],
    [[
    searchSpaceSwitchTimer-v1710        INTEGER (81..1280)                                          OPTIONAL    -- Need R
    ]]
}

-- TAG-PDCCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

***PDCCH-ServingCellConfig* field descriptions**
availabilityIndicator Use to configure monitoring a PDCCH for Availability Indicators (AI).
searchSpaceSwitchTimer The value of the timer in slots for monitoring PDCCH in the active DL BWP of the serving cell before moving to the default search space group (see TS 38.213 [13], clause 10.4). For 15 kHz SCS, {1..20} are valid. For 30 kHz SCS, {1..40} are valid. For 60kHz SCS, {1..80} are valid. For 120 kHz SCS, {1..160} are valid. For 480 kHz SCS, {1..640} are valid. For 960 kHz SCS, {1..1280} are valid. The network configures the same value for all serving cells in the same *CellGroupForSwitch*.
slotFormatIndicator Configuration of Slot-Format-Indicators to be monitored in the correspondingly configured PDCCHs of this serving cell.

– *PDCP-Config*

The IE *PDCP-Config* is used to set the configurable PDCP parameters for signalling, MBS multicast and data radio bearers.

***PDCP-Config* information element**

```
-- ASN1START
-- TAG-PDCP-CONFIG-START

PDCP-Config ::=         SEQUENCE {
    drb                     SEQUENCE {
        discardTimer            ENUMERATED {ms10, ms20, ms30, ms40, ms50, ms60, ms75, ms100, ms150, ms200,
                                            ms250, ms300, ms500, ms750, ms1500, infinity}       OPTIONAL, -- Cond Setup
        pdcp-SN-SizeUL          ENUMERATED {len12bits, len18bits}                               OPTIONAL, -- Cond Setup1
        pdcp-SN-SizeDL          ENUMERATED {len12bits, len18bits}                               OPTIONAL, -- Cond Setup2
        headerCompression       CHOICE {
            notUsed                 NULL,
            rohc                    SEQUENCE {
                maxCID                  INTEGER (1..16383)                                      DEFAULT 15,
                profiles                SEQUENCE {
                    profile0x0001           BOOLEAN,
                    profile0x0002           BOOLEAN,
                    profile0x0003           BOOLEAN,
                    profile0x0004           BOOLEAN,
                    profile0x0006           BOOLEAN,
                    profile0x0101           BOOLEAN,
                    profile0x0102           BOOLEAN,
                    profile0x0103           BOOLEAN,
                    profile0x0104           BOOLEAN
                },
                drb-ContinueROHC        ENUMERATED { true }                                     OPTIONAL    -- Need N
            },
            uplinkOnlyROHC          SEQUENCE {
```

```
                maxCID                  INTEGER (1..16383)                                  DEFAULT 15,
                profiles                SEQUENCE {
                    profile0x0006           BOOLEAN
                },
                drb-ContinueROHC            ENUMERATED { true }                         OPTIONAL    -- Need N
            },
            ...
        },
        integrityProtection     ENUMERATED { enabled }                                  OPTIONAL,   -- Cond ConnectedTo5GC1
        statusReportRequired    ENUMERATED { true }                                     OPTIONAL,   -- Cond Rlc-AM-UM
        outOfOrderDelivery      ENUMERATED { true }                                     OPTIONAL    -- Need R
    }                                                                                   OPTIONAL,   -- Cond DRB
    moreThanOneRLC          SEQUENCE {
        primaryPath             SEQUENCE {
            cellGroup               CellGroupId                                         OPTIONAL,   -- Need R
            logicalChannel          LogicalChannelIdentity                              OPTIONAL    -- Need R
        },
        ul-DataSplitThreshold   UL-DataSplitThreshold                                   OPTIONAL,   -- Cond SplitBearer
        pdcp-Duplication            BOOLEAN                                             OPTIONAL    -- Need R
    }                                                                                   OPTIONAL,   -- Cond MoreThanOneRLC

    t-Reordering                ENUMERATED {
                                    ms0, ms1, ms2, ms4, ms5, ms8, ms10, ms15, ms20, ms30, ms40,
                                    ms50, ms60, ms80, ms100, ms120, ms140, ms160, ms180, ms200, ms220,
                                    ms240, ms260, ms280, ms300, ms500, ms750, ms1000, ms1250,
                                    ms1500, ms1750, ms2000, ms2250, ms2500, ms2750,
                                    ms3000, spare28, spare27, spare26, spare25, spare24,
                                    spare23, spare22, spare21, spare20,
                                    spare19, spare18, spare17, spare16, spare15, spare14,
                                    spare13, spare12, spare11, spare10, spare09,
                                    spare08, spare07, spare06, spare05, spare04, spare03,
                                    spare02, spare01 }                                  OPTIONAL, -- Need S
    ...,
    [[
    cipheringDisabled       ENUMERATED {true}                                           OPTIONAL    -- Cond ConnectedTo5GC
    ]],
    [[
    discardTimerExt-r16     SetupRelease { DiscardTimerExt-r16 }                        OPTIONAL,    -- Cond DRB2
    moreThanTwoRLC-DRB-r16  SEQUENCE {
        splitSecondaryPath-r16  LogicalChannelIdentity                                  OPTIONAL,   -- Cond SplitBearer2
        duplicationState-r16    SEQUENCE (SIZE (3)) OF BOOLEAN                          OPTIONAL    -- Need S
    }                                                                                   OPTIONAL,   -- Cond MoreThanTwoRLC-DRB
    ethernetHeaderCompression-r16  SetupRelease { EthernetHeaderCompression-r16 }       OPTIONAL    -- Need M
    ]],
    [[
    survivalTimeStateSupport-r17   ENUMERATED {true}                                    OPTIONAL,   -- Cond Drb-Duplication
    uplinkDataCompression-r17      SetupRelease { UplinkDataCompression-r17 }           OPTIONAL,   -- Cond Rlc-AM
    discardTimerExt2-r17           SetupRelease { DiscardTimerExt2-r17 }                OPTIONAL,   -- Need M
    initialRX-DELIV-r17            BIT STRING (SIZE (32))                               OPTIONAL    -- Cond MRB-Initialization
    ]]
}

EthernetHeaderCompression-r16 ::=  SEQUENCE {
    ehc-Common-r16                  SEQUENCE {
```

```
        ehc-CID-Length-r16                ENUMERATED { bits7, bits15 },
         ...
    },
    ehc-Downlink-r16              SEQUENCE {
        drb-ContinueEHC-DL-r16        ENUMERATED { true }                                 OPTIONAL,   -- Need N
        ...
    }                                                                                     OPTIONAL,   -- Need M
    ehc-Uplink-r16                SEQUENCE {
        maxCID-EHC-UL-r16             INTEGER (1..32767),
        drb-ContinueEHC-UL-r16        ENUMERATED { true }                                 OPTIONAL,   -- Need N
        ...
    }                                                                                     OPTIONAL    -- Need M
}

UL-DataSplitThreshold ::= ENUMERATED {
                                        b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800, b25600, b51200, b102400, b204800,
                                        b409600, b819200, b1228800, b1638400, b2457600, b3276800, b4096000, b4915200, b5734400,
                                        b6553600, infinity, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1}

DiscardTimerExt-r16 ::= ENUMERATED {ms0dot5, ms1, ms2, ms4, ms6, ms8, spare2, spare1}

DiscardTimerExt2-r17 ::= ENUMERATED {ms2000, spare3, spare2, spare1}

UplinkDataCompression-r17 ::= CHOICE {
    newSetup                      SEQUENCE {
        bufferSize-r17                ENUMERATED {kbyte2, kbyte4, kbyte8, spare1},
        dictionary-r17                ENUMERATED {sip-SDP, operator}                    OPTIONAL    -- Need N
    },
    drb-ContinueUDC           NULL
}

-- TAG-PDCP-CONFIG-STOP
-- ASN1STOP
```

***PDCP-Config* field descriptions**
cipheringDisabled If included, ciphering is disabled for this DRB regardless of which ciphering algorithm is configured for the SRB/DRBs. The field may only be included if the UE is connected to 5GC. Otherwise the field is absent. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up.
discardTimer Value in ms of *discardTimer* specified in TS 38.323 [5]. Value *ms10* corresponds to 10 ms, value *ms20* corresponds to 20 ms and so on. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.
discardTimerExt Value in ms of *discardTimer* specified in TS 38.323 [5]. Value *ms0dot5* corresponds to 0.5 ms, value *ms1* corresponds to 1ms and so on. If this field is present, the field *discardTimer* is ignored and *discardTimerExt* is used instead.
discardTimerExt2 Value in ms of *discardTimerExt* specified in TS 38.323 [5]. Value *ms2000* corresponds to 2000 ms. If this field is present, the field *discardTimer* and *discardTimerExt* are ignored and *discardTimerExt2* is used instead.
drb-ContinueROHC Indicates whether the PDCP entity continues or resets the ROHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. This field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated. The network does not include the field if the bearer is configured as DAPS bearer. This field can be configured for both DRB and multicast MRB.
duplicationState This field indicates the uplink PDCP duplication state for the associated RLC entities at the time of receiving this IE. If set to *true,* the PDCP duplication state is activated for the associated RLC entity. The index for the indication is determined by ascending order of logical channel ID of all RLC entities other than the primary RLC entity indicated by *primaryPath* in the order of MCG and SCG, as in clause 6.1.3.32 of TS 38.321 [3]. If the number of associated RLC entities other than the primary RLC entity is two, UE ignores the value in the largest index of this field. If the field is absent, the PDCP duplication states are deactivated for all associated RLC entities.
ethernetHeaderCompression This fields configures Ethernet Header Compression. This field can only be configured for a bi-directional DRB or a bi-directional multicast MRB. The network reconfigures *ethernetHeaderCompression* only upon reconfiguration involving PDCP re-establishment and with neither *drb-ContinueEHC-DL* nor *drb-ContinueEHC-UL* configured. Network only configures this field when *uplinkDataCompression* is not configured.
headerCompression If rohc is configured, the UE shall apply the configured ROHC profile(s) in both uplink and downlink. If *uplinkOnlyROHC* is configured, the UE shall apply the configured ROHC profile(s) in uplink (there is no header compression in downlink). ROHC can be configured for any bearer type. ROHC and EHC can be both configured simultaneously for a DRB or a multicast MRB. The network reconfigures *headerCompression* only upon reconfiguration involving PDCP re-establishment or involving PDCP entity reconfiguration to configure DAPS bearer(s), and without any *drb-ContinueROHC*. Network configures *headerCompression* to *notUsed* when *outOfOrderDelivery* is configured. Network only configures this field when *uplinkDataCompression* is not configured.
initialRX-DELIV Indicates the initial value of RX_DELIV during PDCP window initialization for multicast MRB as specified in TS 38.323 [5].
integrityProtection Indicates whether or not integrity protection is configured for this radio bearer. The network configures all DRBs with the same PDU-session ID with same value for this field. The value for this field cannot be changed after the DRB is set up.
maxCID Indicates the value of the MAX_CID parameter as specified in TS 38.323 [5]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of *maxNumberROHC-ContextSessions* parameter as indicated by the UE.
moreThanOneRLC This field configures UL data transmission when more than one RLC entity is associated with the PDCP entity. This field is not present if the bearer is configured as DAPS bearer.
moreThanTwoRLC-DRB This field configures UL data transmission when more than two RLC entities are associated with the PDCP entity for DRBs.

***PDCP-Config* field descriptions**
outOfOrderDelivery Indicates whether or not *outOfOrderDelivery* specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established.
pdcp-Duplication Indicates whether or not uplink duplication status at the time of receiving this IE is configured and activated as specified in TS 38.323 [5]. The presence of this field indicates that duplication is configured. PDCP duplication is not configured for CA packet duplication of LTE RLC bearer. The value of this field, when the field is present, indicates the state of the duplication at the time of receiving this IE. If set to *true*, duplication is activated. The value of this field is always *true*, when configured for a SRB. For PDCP entity with more than two associated RLC entities for UL transmission, this field is always present. If the field *moreThanTwoRLC-DRB* is present, the value of this field is ignored and the state of the duplication is indicated by *duplicationState*. For PDCP entity with more than two associated RLC entities, only NR RLC bearer is supported.
pdcp-SN-SizeDL PDCP sequence number size for downlink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.
pdcp-SN-SizeUL PDCP sequence number size for uplink, 12 or 18 bits, as specified in TS 38.323 [5]. For SRBs only the value *len12bits* is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.
primaryPath Indicates the cell group ID and LCID of the primary RLC entity as specified in TS 38.323 [5], clause 5.2.1 for UL data transmission when more than one RLC entity is associated with the PDCP entity. In this version of the specification, only cell group ID corresponding to MCG is supported for SRBs, except for the split SRB2 of the IAB-MT, and except when the UE is required to set the *primaryPath* to refer to the SCG as specified in clause 5.7.3b.4. In this last case, if the network sends an *RRCReconfiguration* message (in NR-DC) or an EUTRA *RRCConnectionReconfiguration* message (in (NG)EN-DC) keeping SRB1 as split SRB, the network explicitly configures the *primaryPath* for the PDCP entity of SRB1 to refer to the MCG. In this version of the specification, only cell group ID corresponding to MCG is supported for DRBs when the SCG is deactivated. The NW indicates *cellGroup* for split bearers using logical channels in different cell groups. The NW always indicates *logicalChannel* if CA based PDCP duplication is configured in the cell group indicated by *cellGroup* of this field.
splitSecondaryPath Indicates the LCID of the split secondary RLC entity as specified in TS 38.323 [5] for fallback to split bearer operation when UL data transmission with more than two RLC entities is associated with the PDCP entity. This RLC entity belongs to a cell group that is different from the cell group indicated by *cellGroup* in the field *primaryPath.*
statusReportRequired For AM DRBs, AM MRBs and DAPS UM DRBs, indicates whether the DRB or the multicast MRB is configured to send a PDCP status report in the uplink, as specified in TS 38.323 [5]. For DAPS AM DRBs, it also indicates whether the DRB is configured to send a second PDCP status report in the uplink, as specified in TS 38.323 [5].
survivalTimeStateSupport Indicates whether the DRB associated with this PDCP entity has survival time state support. If this field is configured to be true, all associated RLC entities are activated for PDCP duplication upon reception of a retransmission grant addressed to CS-RNTI, as specified in TS 38.321 [3].
t-Reordering Value in ms of t-Reordering specified in TS 38.323 [5]. Value *ms0* corresponds to 0 ms, value *ms20* corresponds to 20 ms, value *ms40* corresponds to 40 ms, and so on. When the field is absent the UE applies the value *infinity*. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.
ul-DataSplitThreshold Parameter specified in TS 38.323 [5]. Value *b0* corresponds to 0 bytes, value *b100* corresponds to 100 bytes, value *b200* corresponds to 200 bytes, and so on. The network sets this field to *infinity* for UEs not supporting *splitDRB-withUL-Both-MCG-SCG* and when the SCG is deactivated. If the field is absent when the split bearer is configured for the radio bearer first time, then the default value *infinity* is applied.
uplinkDataCompression Indicates the UDC configuration that the UE shall apply. Network does not configure *uplinkDataCompression* for a DRB, if *headerCompression* or *ethernetHeaderCompression* is already configured or *outOfOrderDelivery* or DAPS is configured for the DRB. The maximum number of DRBs where *uplinkDataCompression* can be applied is two. The network reconfigures *uplinkDataCompression* only upon reconfiguration involving PDCP re-establishment. If the field is set to *drb-ContinueUDC*, the PDCP entity continues the uplink data compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is set to *drb-ContinueUDC* only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.

EthernetHeaderCompression field descriptions
drb-ContinueEHC-DL Indicates whether the PDCP entity continues or resets the downlink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.
drb-ContinueEHC-UL Indicates whether the PDCP entity continues or resets the uplink EHC header compression protocol during PDCP re-establishment, as specified in TS 38.323 [5]. The field is configured only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the *fullConfig* is not indicated.
ehc-CID-Length Indicates the length of the CID field for EHC packet. The value *bits7* indicates the length is 7 bits, and the value *bits15* indicates the length is 15 bits. Once the field *ethernetHeaderCompression-r16* is configured for a DRB or a multicast MRB, the value of the field *ehc-CID-Length* for this DRB or multicast MRB is not reconfigured to a different value.
ehc-Common Indicates the configurations that apply for both downlink and uplink.
ehc-Downlink Indicates the configurations that apply for only downlink. If the field is configured, then Ethernet header compression is configured for downlink. Otherwise, it is not configured for downlink.
ehc-Uplink Indicates the configurations that apply for only uplink. If the field is configured, then Ethernet header compression is configured for uplnik. Otherwise, it is not configured for uplink.
maxCID-EHC-UL Indicates the value of the MAX_CID_EHC_UL parameter as specified in TS 38.323 [5]. The total value of MAX_CID_EHC_UL across all bearers for the UE should be less than or equal to the value of *maxNumberEHC-Contexts* parameter as indicated by the UE.

UplinkDataCompression field descriptions
bufferSize This field indicates the buffer size applied for UDC as specified in TS 38.323 [5]. Value *kbyte2* means 2048 bytes, *kbyte4* means 4096 bytes and so on.
dictionary This field indicates which pre-defined dictionary is used for UDC as specified in TS 38.323 [5]. The value *sip-SDP* means that UE shall prefill the buffer with standard dictionary for SIP and SDP defined in TS 38.323 [5], and the value *operator* means that UE shall prefill the buffer with operator-defined dictionary.

Conditional presence	Explanation
DRB	This field is mandatory present when the corresponding DRB/multicast MRB is being set up, absent for SRBs. Otherwise this field is optionally present, need M.
DRB2	This field is optionally present in case of DRB, need M. Otherwise, it is absent for SRBs and MRBs.
Drb-Duplication	For SRBs, this field is absent. For DRBs, this field is absent if duplication is not configured. Otherwise, this field is optional, need R.
MoreThanOneRLC	This field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer (except for multicast MRB) with more than one associated logical channel and upon RRC reconfiguration with the association of additional logical channels to the PDCP entity. The field is also mandatory present in case the field *moreThanTwoRLC-DRB* is included in *PDCP-Config*. Upon RRC reconfiguration when a PDCP entity is associated with multiple logical channels, this field is optionally present need M. Otherwise, this field is absent. Need R.
MoreThanTwoRLC-DRB	For SRBs, this field is absent. For DRBs, this field is mandatory present upon RRC reconfiguration with setup of a PDCP entity for a radio bearer with more than two associated logical channels and upon RRC reconfiguration with the association of one or more additional logical channel(s) to the PDCP entity so that the PDCP entity has more than two associated logical channels. Upon RRC reconfiguration when a PDCP entity is associated with more than two logical channels, this field is optionally present, Need M. Otherwise, the field is absent, Need R.
Rlc-AM	For RLC AM, the field is optionally present, need M. Otherwise, the field is absent.
Rlc-AM-UM	In case of DRB, for RLC UM (if the UE supports DAPS handover) or RLC AM, the field is optionally present, need R. In case of multicast MRB, if multicast MRB is associated with at least one RLC AM entity, the field is optionally present, need R. Otherwise, the field is absent.
Setup	The field is mandatory present in case of DRB setup. Otherwise the field is optionally present, need M.
SplitBearer	The field is absent for SRBs. Otherwise, the field is optional present, need M, in case of radio bearer with more than one associated RLC mapped to different cell groups.
SplitBearer2	The field is mandatory present, in case of a split bearer. Otherwise the field is absent.
ConnectedTo5GC	The field is optionally present, need R, if the UE is connected to 5GC. Otherwise the field is absent.
ConnectedTo5GC1	The field is optionally present, need R, if the UE is connected to NR/5GC or if the UE supports user plane integrity protection when connected to E-UTRA/EPC (as specified in TS 33.401 [30]). Otherwise the field is absent.
Setup1	This field is mandatory present in case of DRB setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
Setup2	This field is mandatory present in case for radio bearer setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
MRB-Initialization	This field is mandatory present in case of multicast MRB setup. In case of PDCP re-establishment for multicast MRB, this field is optionally present, Need N. Otherwise, this field is absent, Need N.

– *PDSCH-Config*

The *PDSCH-Config* IE is used to configure the UE specific PDSCH parameters. If this IE is used for MBS CFR, the following fields shall be absent: *tci-StatesToAddModList*, *tci-StatesToReleaseList*, *zp-CSI-RS-ResourceToAddModList*, *minimumSchedulingOffsetK0*, *antennaPortsFieldPresenceDCI-1-2*, *aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2*, *aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2*, *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2*, *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2*, *dmrs-SequenceInitializationDCI-1-2*, *harq-ProcessNumberSizeDCI-1-2*, *mcs-TableDCI-1-2*, *numberOfBitsForRV-DCI-1-2*, *pdsch-AggregationFactor*, *pdsch-TimeDomainAllocationListDCI-1-2*, *prb-BundlingTypeDCI-1-2*, *priorityIndicatorDCI-1-2*, *rateMatchPatternGroup1DCI-1-2*, *rateMatchPatternGroup2DCI-1-2*, *resourceAllocationType1GranularityDCI-1-2*, *vrb-ToPRB-InterleaverDCI-1-2*, *referenceOfSLIVDCI-1-2*, *resourceAllocationDCI-1-2*, *dataScramblingIdentityPDSCH2-r16*, *repetitionSchemeConfig*.

PDSCH-Config information element

```
-- ASN1START
-- TAG-PDSCH-CONFIG-START

PDSCH-Config ::=                        SEQUENCE {
    dataScramblingIdentityPDSCH             INTEGER (0..1023)                                                   OPTIONAL,   -- Need S
    dmrs-DownlinkForPDSCH-MappingTypeA      SetupRelease { DMRS-DownlinkConfig }                                OPTIONAL,   -- Need M
    dmrs-DownlinkForPDSCH-MappingTypeB      SetupRelease { DMRS-DownlinkConfig }                                OPTIONAL,   -- Need M

    tci-StatesToAddModList                  SEQUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-State                  OPTIONAL,   -- Need N
    tci-StatesToReleaseList                 SEQUENCE (SIZE(1..maxNrofTCI-States)) OF TCI-StateId                OPTIONAL,   -- Need N
    vrb-ToPRB-Interleaver                   ENUMERATED {n2, n4}                                                 OPTIONAL,   -- Need S
    resourceAllocation                      ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},
    pdsch-TimeDomainAllocationList          SetupRelease { PDSCH-TimeDomainResourceAllocationList }             OPTIONAL,   -- Need M
    pdsch-AggregationFactor                 ENUMERATED { n2, n4, n8 }                                           OPTIONAL,   -- Need S
    rateMatchPatternToAddModList            SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern   OPTIONAL,   -- Need N
    rateMatchPatternToReleaseList           SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL,   -- Need N
    rateMatchPatternGroup1                  RateMatchPatternGroup                                               OPTIONAL,   -- Need R
    rateMatchPatternGroup2                  RateMatchPatternGroup                                               OPTIONAL,   -- Need R

    rbg-Size                                ENUMERATED {config1, config2},
    mcs-Table                               ENUMERATED {qam256, qam64LowSE}                                     OPTIONAL,   -- Need S
    maxNrofCodeWordsScheduledByDCI          ENUMERATED {n1, n2}                                                 OPTIONAL,   -- Need R

    prb-BundlingType                        CHOICE {
        staticBundling                          SEQUENCE {
            bundleSize                              ENUMERATED { n4, wideband }                                 OPTIONAL    -- Need S
        },
        dynamicBundling                     SEQUENCE {
            bundleSizeSet1                      ENUMERATED { n4, wideband, n2-wideband, n4-wideband }           OPTIONAL,   -- Need S
            bundleSizeSet2                      ENUMERATED { n4, wideband }                                     OPTIONAL    -- Need S
        }
    },
    zp-CSI-RS-ResourceToAddModList              SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-Resource
                                                                                                                OPTIONAL,   -- Need N
    zp-CSI-RS-ResourceToReleaseList             SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-Resources)) OF ZP-CSI-RS-ResourceId
                                                                                                                OPTIONAL,   -- Need N
    aperiodic-ZP-CSI-RS-ResourceSetsToAddModList    SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL,   -- Need N
    aperiodic-ZP-CSI-RS-ResourceSetsToReleaseList SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                                OPTIONAL,   -- Need N
    sp-ZP-CSI-RS-ResourceSetsToAddModList   SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                OPTIONAL,   -- Need N
    sp-ZP-CSI-RS-ResourceSetsToReleaseList  SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                                OPTIONAL,   -- Need N
    p-ZP-CSI-RS-ResourceSet                 SetupRelease { ZP-CSI-RS-ResourceSet }
                                                                                                                OPTIONAL,   -- Need M
    ...,
    [[
    maxMIMO-Layers-r16                      SetupRelease { MaxMIMO-LayersDL-r16 }                               OPTIONAL,   -- Need M
    minimumSchedulingOffsetK0-r16           SetupRelease { MinSchedulingOffsetK0-Values-r16 }                   OPTIONAL,   -- Need M

    -- Start of the parameters for DCI format 1_2 introduced in V16.1.0
```

```
    antennaPortsFieldPresenceDCI-1-2-r16            ENUMERATED {enabled}                                                OPTIONAL,   -- Need S
    aperiodicZP-CSI-RS-ResourceSetsToAddModListDCI-1-2-r16  SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSet
                                                                                                                        OPTIONAL,   -- Need N
    aperiodicZP-CSI-RS-ResourceSetsToReleaseListDCI-1-2-r16 SEQUENCE (SIZE (1..maxNrofZP-CSI-RS-ResourceSets)) OF ZP-CSI-RS-ResourceSetId
                                                                                                                        OPTIONAL,   -- Need N
    dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2-r16  SetupRelease { DMRS-DownlinkConfig }                                OPTIONAL,   -- Need M
    dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2-r16  SetupRelease { DMRS-DownlinkConfig }                                OPTIONAL,   -- Need M
    dmrs-SequenceInitializationDCI-1-2-r16          ENUMERATED {enabled}                                                OPTIONAL,   -- Need S
    harq-ProcessNumberSizeDCI-1-2-r16               INTEGER (0..4)                                                      OPTIONAL,   -- Need R
    mcs-TableDCI-1-2-r16                            ENUMERATED {qam256, qam64LowSE}                                     OPTIONAL,   -- Need S
    numberOfBitsForRV-DCI-1-2-r16                   INTEGER (0..2)                                                      OPTIONAL,   -- Need R
    pdsch-TimeDomainAllocationListDCI-1-2-r16       SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                                        OPTIONAL,   -- Need M
    prb-BundlingTypeDCI-1-2-r16             CHOICE {
        staticBundling-r16                      SEQUENCE {
            bundleSize-r16                          ENUMERATED { n4, wideband }                                     OPTIONAL    -- Need S
        },
        dynamicBundling-r16                     SEQUENCE {
            bundleSizeSet1-r16                      ENUMERATED { n4, wideband, n2-wideband, n4-wideband }           OPTIONAL,   -- Need S
            bundleSizeSet2-r16                      ENUMERATED { n4, wideband }                                     OPTIONAL    -- Need S
        }
    }                                                                                                                   OPTIONAL,   -- Need R
    priorityIndicatorDCI-1-2-r16                ENUMERATED {enabled}                                                    OPTIONAL,   -- Need S
    rateMatchPatternGroup1DCI-1-2-r16           RateMatchPatternGroup                                                   OPTIONAL,   -- Need R
    rateMatchPatternGroup2DCI-1-2-r16           RateMatchPatternGroup                                                   OPTIONAL,   -- Need R
    resourceAllocationType1GranularityDCI-1-2-r16  ENUMERATED {n2,n4,n8,n16}                                            OPTIONAL,   -- Need S
    vrb-ToPRB-InterleaverDCI-1-2-r16            ENUMERATED {n2, n4}                                                     OPTIONAL,   -- Need S
    referenceOfSLIVDCI-1-2-r16                  ENUMERATED {enabled}                                                    OPTIONAL,   -- Need S
    resourceAllocationDCI-1-2-r16               ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                                                                                                        OPTIONAL,   -- Need M
    -- End of the parameters for DCI format 1_2 introduced in V16.1.0

    priorityIndicatorDCI-1-1-r16            ENUMERATED {enabled}                                                        OPTIONAL,   -- Need S
    dataScramblingIdentityPDSCH2-r16        INTEGER (0..1023)                                                           OPTIONAL,   -- Need R
    pdsch-TimeDomainAllocationList-r16      SetupRelease { PDSCH-TimeDomainResourceAllocationList-r16 }                 OPTIONAL,   -- Need M
    repetitionSchemeConfig-r16              SetupRelease { RepetitionSchemeConfig-r16}                                  OPTIONAL    -- Need M
    ]],
    [[
    repetitionSchemeConfig-v1630            SetupRelease { RepetitionSchemeConfig-v1630}                                OPTIONAL    -- Need M
    ]],
    [[
    pdsch-HARQ-ACK-OneShotFeedbackDCI-1-2-r17   ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-EnhType3DCI-1-2-r17          ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-EnhType3DCI-Field-1-2-r17    ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-RetxDCI-1-2-r17              ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    pucch-sSCellDynDCI-1-2-r17                  ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    dl-OrJointTCI-StateList-r17                 CHOICE {
        explicitlist                                SEQUENCE {
            dl-OrJointTCI-StateToAddModList-r17       SEQUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-State
                                                                                                                        OPTIONAL,   -- Need N
            dl-OrJointTCI-StateToReleaseList-r17      SEQUENCE (SIZE (1..maxNrofTCI-States)) OF TCI-StateId
                                                                                                                        OPTIONAL    -- Need N
        },
        unifiedTCI-StateRef-r17                 ServingCellAndBWP-Id-r17
```

```
    }                                                                                                        OPTIONAL,   -- Need R
    beamAppTime-r17                             ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336, spare2,
                                                           spare1}                                           OPTIONAL,   -- Need R
    dummy                                       SetupRelease { Dummy-TDRA-List }                                  OPTIONAL,   -- Need M
    dmrs-FD-OCC-DisabledForRank1-PDSCH-r17         ENUMERATED {true}                                         OPTIONAL,   -- Need R
    minimumSchedulingOffsetK0-r17                  SetupRelease { MinSchedulingOffsetK0-Values-r17 }         OPTIONAL,   -- Need M
    harq-ProcessNumberSizeDCI-1-2-v1700         INTEGER (0..5)                                               OPTIONAL,   -- Need R
    harq-ProcessNumberSizeDCI-1-1-r17           INTEGER (5)                                                  OPTIONAL,   -- Need R
    mcs-Table-r17                               ENUMERATED {qam1024}                                         OPTIONAL,   -- Need R
    mcs-TableDCI-1-2-r17                        ENUMERATED {qam1024}                                         OPTIONAL,   -- Need R
    xOverheadMulticast-r17                      ENUMERATED {xOh6, xOh12, xOh18}                              OPTIONAL,   -- Need S
    priorityIndicatorDCI-4-2-r17                ENUMERATED {enabled}                                         OPTIONAL,   -- Need S
    sizeDCI-4-2-r17                             INTEGER (20..maxDCI-4-2-Size-r17)                            OPTIONAL    -- Need R
    ]],
    [[
    pdsch-TimeDomainAllocationListForMultiPDSCH-r17 SetupRelease { MultiPDSCH-TDRA-List-r17 }                OPTIONAL    -- Need M
    ]]
}

RateMatchPatternGroup ::=               SEQUENCE (SIZE (1..maxNrofRateMatchPatternsPerGroup)) OF CHOICE {
    cellLevel                               RateMatchPatternId,
    bwpLevel                                RateMatchPatternId
}

MinSchedulingOffsetK0-Values-r16 ::=    SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r16)

MinSchedulingOffsetK0-Values-r17 ::=    SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK0-SchedulingOffset-r17)

MaxMIMO-LayersDL-r16 ::=                INTEGER (1..8)

-- TAG-PDSCH-CONFIG-STOP
-- ASN1STOP
```

***PDSCH-Config* field descriptions**
antennaPortsFieldPresenceDCI-1-2
Configure the presence of "Antenna ports" field in DCI format 1_2. When the field is configured, then the "Antenna ports" field is present in DCI format 1_2. Otherwise, the field size is set to 0 for DCI format 1_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* nor *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* is configured, this field is absent.
aperiodic-ZP-CSI-RS-ResourceSetsToAddModList, aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2
AddMod/Release lists for configuring aperiodically triggered zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*). The network configures the UE with at most 3 aperiodic *ZP-CSI-RS-ResourceSets* and it uses only the *ZP-CSI-RS-ResourceSetId* 1 to 3. The network triggers a set by indicating its *ZP-CSI-RS-ResourceSetId* in the DCI payload. The DCI codepoint '01' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 1, the DCI codepoint '10' triggers the resource set with *ZP-CSI-RS-ResourceSetId 2*, and the DCI codepoint '11' triggers the resource set with *ZP-CSI-RS-ResourceSetId* 3 (see TS 38.214 [19], clause 5.1.4.2). The field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModList* applies to DCI format 1_1 and the field *aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2* applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.2 and TS 38.212 [17] clause 7.3.1).
beamAppTime
Indicates the first slot to apply the unified TCI indicated by DCI as specified in TS 38.214 Clause 5.1.5. The value n1 means 1 symbol, n2 two symbols and so on. The first slot is at least Y symbols indicated by beamAppTime parameter after the last symbol of the acknowledgment of the joint or separate DL/UL beam indication. The same value shall be configured for all serving cells in any one of the *simultaneousU-TCI-UpdateListN* configured in IE *CellGroupConfig* based on the smallest SCS of the active BWP.
dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2
Identifier(s) used to initialize data scrambling (c_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. The *dataScramblingIdentityPDSCH2* is configured if *coresetPoolIndex* is configured with 1 for at least one CORESET in the same BWP.
dl-OrJointTCI-StateToAddModList
A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports, PDCCH DMRS ports, and CSI-RS, and in case of join mode, also the PUSCH, PUCCH and SRS (see TS 38.214 [19], clause 5.1.5).
dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2
DMRS configuration for PDSCH transmissions using PDSCH mapping type A (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeA* applies to DCI format 1_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).
dmrs-DownlinkForPDSCH-MappingTypeB, dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2
DMRS configuration for PDSCH transmissions using PDSCH mapping type B (chosen dynamically via *PDSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-DownlinkForPDSCH-MappingTypeB* applies to DCI format 1_1 and the field *dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).
dmrs-FD-OCC-DisabledForRank1-PDSCH
If configured, the UE may assume that the set of remaining orthogonal antenna ports, which are within the same code division multiplexing (CDM) group and have different frequency domain orthogonal cover codes (FD-OCC), are not associated with the PDSCH of another UE (see TS 38.214 [19], clause 5.1.6.2). It is applicable for PDSCH SCS of 480 and 960 kHz when rank 1 PDSCH with type-1 or type-2 DMRS is scheduled.
dmrs-SequenceInitializationDCI-1_2
Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 1_2 If the field is absent, then the UE applies the value of 0 bit for the field "DMRS Sequence Initialization" in DCI format 1_2. If the field is present, then the UE applies the value of 1 bit as in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).
dummy
This field is not used in the specification. If received it shall be ignored by the UE.
harq-ProcessNumberSizeDCI-1-2
Configure the number of bits for the field "HARQ process number" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).

maxMIMO-Layers Indicates the maximum number of MIMO layers to be used for PDSCH in this DL BWP. If not configured, the UE uses the *maxMIMO-Layers* configuration in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs, when the UE operates in this BWP. The value of *maxMIMO-Layers* for a DL BWP shall be smaller than or equal to the value of *maxMIMO-Layers* configured in IE *PDSCH-ServingCellConfig* of the serving cell to which this BWP belongs. For MBS multicast, indicates the maximum number of MIMO layers to be used for group-common PDSCH of MBS multicast in this CFR. If not configured for CFR, the UE applies value 1. The value of *maxMIMO-Layers* for a CFR shall be smaller than or equal to the value of *maxMIMO-Layers* configured in *PDSCH-ServingCellConfig* IE of the serving cell to which this CFR belongs.
maxNrofCodeWordsScheduledByDCI Maximum number of code words that a single DCI may schedule. This changes the number of MCS/RV/NDI bits in the DCI message from 1 to 2.
mcs-Table Indicates which MCS table the UE shall use for PDSCH for DCI formats 1_0 and 1_1 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-Table-r17* is present for DCI format 1_1, the network does not configure the field *mcs-Table* (without suffix). For a RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.
mcs-TableDCI-1-2 Indicates which MCS table the UE shall use for PDSCH for DCI format 1_2 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field *mcs-TableDCI-1-2-r17* is present, the network does not configure the field *mcs-TableDCI-1-2-r16*. For a RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.
minimumSchedulingOffsetK0 List of minimum K0 values. Minimum K0 parameter denotes minimum applicable value(s) for the TDRA table for PDSCH and for A-CSI RS triggering Offset(s) (see TS 38.214 [19], clause 5.3.1).
numberOfBitsForRV-DCI-1-2 Configures the number of bits for "Redundancy version" in the DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1).
pdsch-AggregationFactor Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent in *PDSCH-Config* which is not used for MBS CFR, the UE applies the value 1.
pdsch-HARQ-ACK-EnhType3DCI-1-2 When configured, enhanced Type 3 HARQ-ACK codebook triggering by DCI format 1_2 is enabled.
pdsch-HARQ-ACK-EnhType3DCI-Field-1-2 Enables the enhanced Type 3 codebook through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in DCI format 1_2 if the more than one enhanced Type 3 HARQ-ACK codebook is configured for the primary PUCCH cell group.
pdsch-HARQ-ACK-OneShotFeedbackDCI-1-2 When configured, DCI format 1_2 can request the UE to report A/N for all HARQ processes and all component carriers configured in the PUCCH group (see TS 38.212 [17], clause 7.3.1).
pdsch-HARQ-ACK-RetxDCI-1-2 When configured, DCI format 1_2 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource (see TS 38.213 [13], clause 9.1.5).
pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH List of time-domain configurations for timing of DL assignment to DL data. The field *pdsch-TimeDomainAllocationList* (with or without suffix) applies to DCI format 1_0 and DCI format 1_1 (see table 5.1.2.1.1-1 in TS 38.214 [19]), and if the field *pdsch-TimeDomainAllocationListDCI-1-2* is not configured, to DCI format 1_2. If the field *pdsch-TimeDomainAllocationListDCI-1-2* is configured, it applies to DCI format 1_2 (see table 5.1.2.1.1-1A in TS 38.214 [19]). The field *pdsch-TimeDomainAllocationListForMultiPDSCH* applies to DCI format 1_1. The network does not configure the *pdsch-TimeDomainAllocationList-r16* simultaneously with the *pdsch-TimeDomainAllocationList* (without suffix) in the same *PDSCH-Config*.
prb-BundlingType, prb-BundlingTypeDCI-1-2 Indicates the PRB bundle type and bundle size(s) (see TS 38.214 [19], clause 5.1.2.3). If *dynamic* is chosen, the actual *bundleSizeSet1 or bundleSizeSet2* to use is indicated via DCI. Constraints on *bundleSize(Set)* setting depending on *vrb-ToPRB-Interleaver* and *rbg-Size* settings are described in TS 38.214 [19], clause 5.1.2.3. If a *bundleSize(Set)* value is absent, the UE applies the value *n2*. The field *prb-BundlingType* applies to DCI format 1_1, and the field *prb-BundlingTypeDCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.3).

priorityIndicatorDCI-1-1, priorityIndicatorDCI-1-2, priorityIndicatorDCI-4-2 Configure the presence of "priority indicator" in DCI format 1_1/1_2/4_2. When the field is absent in the IE, then 0 bit for "priority indicator" in DCI format 1_1/1_2/4_2. The field *priorityIndicatorDCI-1-1* applies to DCI format 1_1, the field *priorityIndicatorDCI-1-2* applies to DCI format 1_2 and the field *priorityIndicatorDCI-4-2* applies to DCI format 4_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9).
pucch-sSCellDynDCI-1-2 When configured, PUCCH cell switching based on dynamic indication in DCI format 1_2 is enabled (see TS 38.213 [13], clause 9.A).
p-ZP-CSI-RS-ResourceSet A set of periodically occurring ZP-CSI-RS-Resources (the actual resources are defined in the zp-CSI-RS-ResourceToAddModList). The network uses the ZP-CSI-RS-ResourceSetId=0 for this set. If *p-ZP-CSI-RS-ResourceSet* is configured in both *PDSCH-Config* for MBS CFR and *PDSCH-Config* for the assoicated BWP, it is subject to UE capability whether the *p-ZP-CSI-RS-ResourceSet* configured in *PDSCH-Config* for MBS CFR can be different from the *p-ZP-CSI-RS-ResourceSet* configured in *PDSCH-Config* for the assoicated BWP.
rateMatchPatternGroup1, rateMatchPatternGroup1DCI-1-2 The IDs of a first group of *RateMatchPatterns* defined in *PDSCH-Config->rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup1* applies to DCI format 1_1, and the field *rateMatchPatternGroup1DCI-1-2* applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.1).
rateMatchPatternGroup2, rateMatchPatternGroup2DCI-1-2 The IDs of a second group of *RateMatchPatterns* defined in *PDSCH-Config->rateMatchPatternToAddModList* (BWP level) or in *ServingCellConfig* ->*rateMatchPatternToAddModLis*t (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field *rateMatchPatternGroup2* applies to DCI format 1_1, and the field *rateMatchPatternGroup2DCI-1-2* applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.1).
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 (see TS 38.214 [19], clause 5.1.4.1). If a *RateMatchPattern* with the same *RateMatchPatternId* is configured in both MBS CFR and its associated BWP, the entire *RateMatchPattern* configuration, including the set of RBs/REs indicated by the patterns for the rate matching around, 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].
rbg-Size Selection between config 1 and config 2 for RBG size for PDSCH. The UE ignores this field if *resourceAllocation* is set to *resourceAllocationType1* (see TS 38.214 [19], clause 5.1.2.2.1).
referenceOfSLIVDCI-1-2 Enable using the starting symbol of the PDCCH monitoring occasion in which the DL assignment is detected as the reference of the SLIV for DCI format 1_2. When the RRC parameter enables the utilization of the new reference, the new reference is applied for TDRA entries with K0=0. For other entries (if any) in the same TDRA table, the reference is slot boundary as in Rel-15. PDSCH mapping type A is not supported with the new reference. The new reference of SLIV is not configured for a serving cell configured to be scheduled by cross-carrier scheduling on a scheduling cell with different numerology (see TS 38.212 [17] clause 7.3.1 and TS 38.214 [19] clause 5.1.2.1).
repetitionSchemeConfig Configure the UE with repetition schemes. The network does not configure *repetitionSchemeConfig-r16* and *repetitionSchemeConfig-v1630* simultaneously to *setup* in the same *PDSCH-Config*. The network does not configure this parameter and *sfnSchemePDSCH* in *MIMOParam-r17* simultaneously in the same serving cell.
resourceAllocation, resourceAllocationDCI-1-2 Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 5.1.2.2). The field *resourceAllocation* applies to DCI format 1_1, and the field *resourceAllocationDCI-1-2* applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.2.2).
resourceAllocationType1GranularityDCI-1-2 Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2).
sizeDCI-4-2 Indicates the size of DCI format 4-2 (see TS 38.213 [13], clause 10.1).
sp-ZP-CSI-RS-ResourceSetsToAddModList AddMod/Release lists for configuring semi-persistent zero-power CSI-RS resource sets. Each set contains a *ZP-CSI-RS-ResourceSetId* and the IDs of one or more *ZP-CSI-RS-Resources* (the actual resources are defined in the *zp-CSI-RS-ResourceToAddModList*) (see TS 38.214 [19], clause 5.1.4.2).

tci-StatesToAddModList A list of Transmission Configuration Indicator (TCI) states indicating a transmission configuration which includes QCL-relationships between the DL RSs in one RS set and the PDSCH DMRS ports (see TS 38.214 [19], clause 5.1.5). If *unifiedTCI-StateType* is configured for the serving cell, no element in this list is configured.
unifiedTCI-StateRef Provides the serving cell and BWP where the configuration for *dl-OrJointTCI-StateToAddModList-r17* are defined. When this field is present, *dl-OrJointTCI-StateToAddModList* and *dl-OrJointTCI-StateToReleaseList* are not present. The value of *unifiedTCI-StateType* of current serving cell is the same in the serving cell indicated by *unifiedTCI-StateRef.*
vrb-ToPRB-Interleaver, vrb-ToPRB-InterleaverDCI-1-2 Interleaving unit configurable between 2 and 4 PRBs (see TS 38.211 [16], clause 7.3.1.6). When the field is absent, the UE performs non-interleaved VRB-to-PRB mapping.
xOverheadMulticast Accounts for an overhead from CSI-RS, CORESET etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19]).
zp-CSI-RS-ResourceToAddModList A list of Zero-Power (ZP) CSI-RS resources used for PDSCH rate-matching. Each resource in this list may be referred to from only one type of resource set, i.e., aperiodic, semi-persistent or periodic (see TS 38.214 [19]).

– *PDSCH-ConfigCommon*

The IE *PDSCH-ConfigCommon* is used to configure cell specific PDSCH parameters.

PDSCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PDSCH-CONFIGCOMMON-START

PDSCH-ConfigCommon ::=                  SEQUENCE {
    pdsch-TimeDomainAllocationList                  PDSCH-TimeDomainResourceAllocationList          OPTIONAL,   -- Need R
    ...
}

-- TAG-PDSCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

***PDSCH-ConfigCommon* field descriptions**
pdsch-TimeDomainAllocationList List of time-domain configurations for timing of DL assignment to DL data (see table 5.1.2.1.1-1 in TS 38.214 [19]).

– *PDSCH-ServingCellConfig*

The IE *PDSCH-ServingCellConfig* is used to configure UE specific PDSCH parameters that are common across the UE's BWPs of one serving cell.

PDSCH-ServingCellConfig information element

```
-- ASN1START
```

```
-- TAG-PDSCH-SERVINGCELLCONFIG-START

PDSCH-ServingCellConfig ::=             SEQUENCE {
    codeBlockGroupTransmission              SetupRelease { PDSCH-CodeBlockGroupTransmission }           OPTIONAL,   -- Need M
    xOverhead                               ENUMERATED { xOh6, xOh12, xOh18 }                           OPTIONAL,   -- Need S
    nrofHARQ-ProcessesForPDSCH              ENUMERATED {n2, n4, n6, n10, n12, n16}                      OPTIONAL,   -- Need S
    pucch-Cell                              ServCellIndex                                               OPTIONAL,   -- Cond SCellAddOnly
    ...,
    [[
    maxMIMO-Layers                          INTEGER (1..8)                                              OPTIONAL,   -- Need M
    processingType2Enabled                  BOOLEAN                                                     OPTIONAL    -- Need M
    ]],
    [[
    pdsch-CodeBlockGroupTransmissionList-r16 SetupRelease { PDSCH-CodeBlockGroupTransmissionList-r16 }  OPTIONAL    -- Need M
    ]],
    [[
    downlinkHARQ-FeedbackDisabled-r17       SetupRelease { DownlinkHARQ-FeedbackDisabled-r17 }           OPTIONAL,   -- Need M
    nrofHARQ-ProcessesForPDSCH-v1700        ENUMERATED {n32}                                            OPTIONAL    -- Need R
    ]]
}

PDSCH-CodeBlockGroupTransmission ::=    SEQUENCE {
    maxCodeBlockGroupsPerTransportBlock     ENUMERATED {n2, n4, n6, n8},
    codeBlockGroupFlushIndicator            BOOLEAN,
    ...
}

PDSCH-CodeBlockGroupTransmissionList-r16 ::=    SEQUENCE (SIZE (1..2)) OF PDSCH-CodeBlockGroupTransmission

DownlinkHARQ-FeedbackDisabled-r17 ::= BIT STRING (SIZE (32))

-- TAG-PDSCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

***PDSCH-CodeBlockGroupTransmission* field descriptions**
codeBlockGroupFlushIndicator Indicates whether CBGFI for CBG based (re)transmission in DL is enabled (true). (see TS 38.212 [17], clause 7.3.1.2.2).
maxCodeBlockGroupsPerTransportBlock Maximum number of code-block-groups (CBGs) per TB. In case of multiple CW, the maximum CBG is 4 (see TS 38.213 [13], clause 9.1.1).

***PDSCH-ServingCellConfig* field descriptions**
codeBlockGroupTransmission Enables and configures code-block-group (CBG) based transmission (see TS 38.213 [13], clause 9.1.1). Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group. The network does not configure this field if - the SCS of at least one DL BWP configured in the cell is 480 or 960 kHz - Type-1 HARQ-ACK codebook is configured and *pdsch-TimeDomainAllocationListForMultiPDSCH-r17* for this serving cell contains pdsch-AllocationList with multiple entries (multiple PDSCH) - Type-2 HARQ-ACK codebook is configured and *pdsch-TimeDomainAllocationListForMultiPDSCH-r17* for any cell in the same PUCCH cell group associated with this serving cell contains pdsch-AllocationList with multiple entries (multiple PDSCH)
downlinkHARQ-FeedbackDisabled Used to disable the DL HARQ feedback, sent in the uplink, per HARQ process ID. The first/leftmost bit corresponds to HARQ process ID 0, the next bit to HARQ process ID 1 and so on. Bits corresponding to HARQ process IDs that are not configured shall be ignored. The bit(s) set to one identify HARQ processes with disabled DL HARQ feedback and the bit(s) set to zero identify HARQ processes with enabled DL HARQ feedback.
maxMIMO-Layers Indicates the maximum number of MIMO layers to be used for PDSCH in all BWPs of this serving cell. (see TS 38.212 [17], clause 5.4.2.1).
nrofHARQ-ProcessesForPDSCH The number of HARQ processes to be used on the PDSCH of a serving cell. Value *n2* corresponds to 2 HARQ processes, value *n4* to 4 HARQ processes, and so on. If both *nrofHARQ-ProcessesForPDSCH* and *nrofHARQ-ProcessesForPDSCH-v1700* are absent, the UE uses 8 HARQ processes (see TS 38.214 [19], clause 5.1).
pdsch-CodeBlockGroupTransmissionList A list of configurations for up to two simultaneously constructed HARQ-ACK codebooks (see TS 38.213 [13], clause 9.3).
processingType2Enabled Enables configuration of advanced processing time capability 2 for PDSCH (see 38.214 [19], clause 5.3).
pucch-Cell The ID of the serving cell (of the same cell group) to use for PUCCH. If the field is absent, the UE sends the HARQ feedback on the PUCCH of the SpCell of this cell group, or on this serving cell if it is a PUCCH SCell.
xOverhead Accounts for overhead from CSI-RS, CORESET, etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19], clause 5.1.3.2).

Conditional Presence	Explanation
SCellAddOnly	It is optionally present, Need S, for (non-PUCCH) SCells when adding a new SCell. The field is absent, Need M, when reconfiguring SCells. The field is also absent for the SpCells as well as for a PUCCH SCell.

– *PDSCH-TimeDomainResourceAllocationList*

The IE *PDSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PDSCH. The *PDSCH-TimeDomainResourceAllocationList* contains one or more of such *PDSCH-TimeDomainResourceAllocations*. The network indicates in the DL assignment which of the configured time domain allocations the UE shall apply for that DL assignment. The UE determines the bit width of the DCI field based on the number of entries in the *PDSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

***PDSCH-TimeDomainResourceAllocationList* information element**

```
-- ASN1START
-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START
```

```
PDSCH-TimeDomainResourceAllocationList ::=  SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation

PDSCH-TimeDomainResourceAllocation ::=   SEQUENCE {
    k0                                      INTEGER(0..32)                                          OPTIONAL,   -- Need S
    mappingType                             ENUMERATED {typeA, typeB},
    startSymbolAndLength                    INTEGER (0..127)
}

PDSCH-TimeDomainResourceAllocationList-r16 ::=  SEQUENCE (SIZE(1..maxNrofDL-Allocations)) OF PDSCH-TimeDomainResourceAllocation-r16

PDSCH-TimeDomainResourceAllocation-r16 ::=  SEQUENCE {
    k0-r16                                  INTEGER(0..32)                                          OPTIONAL,   -- Need S
    mappingType-r16                         ENUMERATED {typeA, typeB},
    startSymbolAndLength-r16                INTEGER (0..127),
    repetitionNumber-r16                    ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16} OPTIONAL, -- Cond Formats1-0_1-1_4-0_4-1_4-2
    ...,
    [[
    k0-v1710                                INTEGER(33..128)                                        OPTIONAL    -- Need S
    ]],
    [[
    repetitionNumber-v1730                  ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}            OPTIONAL   -- Cond Format1-2
    ]]
}

Dummy-TDRA-List ::= SEQUENCE (SIZE(1.. maxNrofDL-Allocations)) OF MultiPDSCH-TDRA-r17

MultiPDSCH-TDRA-List-r17 ::= SEQUENCE (SIZE(1.. maxNrofDL-AllocationsExt-r17)) OF MultiPDSCH-TDRA-r17

MultiPDSCH-TDRA-r17 ::= SEQUENCE {
    pdsch-TDRA-List-r17                 SEQUENCE (SIZE(1..maxNrofMultiplePDSCHs-r17)) OF PDSCH-TimeDomainResourceAllocation-r16,
    ...
}

-- TAG-PDSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP
-- ASN1STOP
```

***PDSCH-TimeDomainResourceAllocation* field descriptions**
k0 Slot offset between DCI and its scheduled PDSCH (see TS 38.214 [19], clause 5.1.2.1). *k0-v1710* is only applicable for PDSCH SCS of 480 kHz and 960 kHz. If multiple PDSCHs are configured per PDCCH, the network always configures this field. Otherwise, when the field is absent and only one PDSCH is configured per PDCCH, the UE applies the value 0.
mappingType PDSCH mapping type (see TS 38.214 [19], clause 5.3).
repetitionNumber Indicates the number of PDSCH transmission occasions for slot-based repetition scheme in IE *RepetitionSchemeConfig.* The parameter is used as specified in 38.214 [19].
startSymbolAndLength An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary (see TS 38.214 [19], clause 5.1.2.1).

***MultiPDSCH-TimeDomainResourceAllocation* field descriptions**
pdsch-TDRA-List
One or multiple PDSCHs which can be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 5.1.2.1).

Conditional Presence	Explanation
Format1-2	In *pdsch-TimeDomainAllocationListDCI-1-2*, this field is optionally present, Need R. It is absent, Need R, otherwise.
Formats1-0_1-1_4-0_4-1_4-2	In *pdsch-TimeDomainAllocationListDCI-1-2*, *pdsch-TimeDomainAllocationListForMultiPDSCH*, and *SIB20*, this field is absent. Otherwise, in *pdsch-TimeDomainResourceAllocationList-r16*, this field is optionally present, Need R.

– *PHR-Config*

The IE *PHR-Config* is used to configure parameters for power headroom reporting.

PHR-Config information element

```
-- ASN1START
-- TAG-PHR-CONFIG-START

PHR-Config ::=                      SEQUENCE {
    phr-PeriodicTimer                   ENUMERATED {sf10, sf20, sf50, sf100, sf200,sf500, sf1000, infinity},
    phr-ProhibitTimer                   ENUMERATED {sf0, sf10, sf20, sf50, sf100,sf200, sf500, sf1000},
    phr-Tx-PowerFactorChange            ENUMERATED {dB1, dB3, dB6, infinity},
    multiplePHR                         BOOLEAN,
    dummy                               BOOLEAN,
    phr-Type2OtherCell                  BOOLEAN,
    phr-ModeOtherCG                     ENUMERATED {real, virtual},
    ...,
    [[
    mpe-Reporting-FR2-r16               SetupRelease { MPE-Config-FR2-r16 }                     OPTIONAL     -- Need M
    ]],
    [[
    mpe-Reporting-FR2-r17               SetupRelease { MPE-Config-FR2-r17 }                     OPTIONAL,    -- Need M
    twoPHRMode-r17                      ENUMERATED {enabled}                                    OPTIONAL     -- Need R
    ]]
}

MPE-Config-FR2-r16 ::=              SEQUENCE {
    mpe-ProhibitTimer-r16               ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
    mpe-Threshold-r16                   ENUMERATED {dB3, dB6, dB9, dB12}
}

MPE-Config-FR2-r17 ::=              SEQUENCE {
    mpe-ProhibitTimer-r17               ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
    mpe-Threshold-r17                   ENUMERATED {dB3, dB6, dB9, dB12},
    numberOfN-r17                       INTEGER(1..4),
    ...
}
```

```
-- TAG-PHR-CONFIG-STOP
-- ASN1STOP
```

***PHR-Config* field descriptions**
dummy This field is not used in this version of the specification and the UE ignores the received value.
mpe-ProhibitTimer Value in number of subframes for MPE reporting, as specified in TS 38.321 [3]. Value sf10 corresponds to 10 subframes, and so on.
mpe-Reporting-FR2 Indicates whether the UE shall report MPE P-MPR in the PHR MAC control element, as specified in TS 38.321 [3].
mpe-Threshold Value of the P-MPR threshold in dB for reporting MPE P-MPR when FR2 is configured, as specified in TS 38.321 [3]. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).
multiplePHR Indicates if power headroom shall be reported using the Single Entry PHR MAC control element or Multiple Entry PHR MAC control element defined in TS 38.321 [3]. True means to use Multiple Entry PHR MAC control element and False means to use the Single Entry PHR MAC control element defined in TS 38.321 [3]. The network configures this field to *true* for MR-DC and UL CA for NR, and to *false* in all other cases.
numberOfN Number of reported P-MPR values in a PHR MAC CE.
phr-ModeOtherCG Indicates the mode (i.e. real or virtual) used for the PHR of the activated cells that are part of the other Cell Group (i.e. MCG or SCG), when DC is configured. If the UE is configured with only one cell group (no DC), it ignores the field.
phr-PeriodicTimer Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value *sf10* corresponds to 10 subframes, value *sf20* corresponds to 20 subframes, and so on.
phr-ProhibitTimer Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value *sf0* corresponds to 0 subframe, value *sf10* corresponds to 10 subframes, value *sf20* corresponds to 20 subframes, and so on.
phr-Tx-PowerFactorChange Value in dB for PHR reporting as specified in TS 38.321 [3]. Value *dB1* corresponds to 1 dB, *dB3* corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).
phr-Type2OtherCell If set to true, the UE shall report a PHR type 2 for the SpCell of the other MAC entity. See TS 38.321 [3], clause 5.4.6. Network sets this field to *false* if the UE is not configured with an E-UTRA MAC entity.
twoPHRMode Indicates if the power headroom shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.

– *PhysCellId*

The *PhysCellId* identifies the physical cell identity (PCI).

***PhysCellId* information element**

```
-- ASN1START
```

```
-- TAG-PHYSCELLID-START

PhysCellId ::=                      INTEGER (0..1007)

-- TAG-PHYSCELLID-STOP
-- ASN1STOP
```

– *PhysicalCellGroupConfig*

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

***PhysicalCellGroupConfig* information element**

```
-- ASN1START
-- TAG-PHYSICALCELLGROUPCONFIG-START

PhysicalCellGroupConfig ::=         SEQUENCE {
    harq-ACK-SpatialBundlingPUCCH       ENUMERATED {true}                                                   OPTIONAL,   -- Need S
    harq-ACK-SpatialBundlingPUSCH       ENUMERATED {true}                                                   OPTIONAL,   -- Need S
    p-NR-FR1                            P-Max                                                               OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-Codebook             ENUMERATED {semiStatic, dynamic},
    tpc-SRS-RNTI                        RNTI-Value                                                          OPTIONAL,   -- Need R
    tpc-PUCCH-RNTI                      RNTI-Value                                                          OPTIONAL,   -- Need R
    tpc-PUSCH-RNTI                      RNTI-Value                                                          OPTIONAL,   -- Need R
    sp-CSI-RNTI                         RNTI-Value                                                          OPTIONAL,   -- Need R
    cs-RNTI                             SetupRelease { RNTI-Value }                                         OPTIONAL,   -- Need M
    ...,
    [[
    mcs-C-RNTI                          RNTI-Value                                                          OPTIONAL,   -- Need R
    p-UE-FR1                            P-Max                                                               OPTIONAL    -- Cond MCG-Only
    ]],
    [[
    xScale                              ENUMERATED {dB0, dB6, spare2, spare1}                               OPTIONAL    -- Cond SCG-Only
    ]],
    [[
    pdcch-BlindDetection                SetupRelease { PDCCH-BlindDetection }                               OPTIONAL    -- Need M
    ]],
    [[
    dcp-Config-r16                      SetupRelease { DCP-Config-r16 }                                     OPTIONAL,   -- Need M
    harq-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup-r16    ENUMERATED {enabled, disabled}                 OPTIONAL,   -- Cond twoPUCCHgroup
    harq-ACK-SpatialBundlingPUSCH-secondaryPUCCHgroup-r16    ENUMERATED {enabled, disabled}                 OPTIONAL,   -- Cond twoPUCCHgroup
    pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16          ENUMERATED {semiStatic, dynamic}               OPTIONAL,   -- Cond twoPUCCHgroup
    p-NR-FR2-r16                                              P-Max                                         OPTIONAL,   -- Need R
    p-UE-FR2-r16                                              P-Max                                         OPTIONAL,   -- Cond MCG-Only
    nrdc-PCmode-FR1-r16                ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic}           OPTIONAL,   -- Cond MCG-Only
    nrdc-PCmode-FR2-r16                ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic}           OPTIONAL,   -- Cond MCG-Only
    pdsch-HARQ-ACK-Codebook-r16            ENUMERATED {enhancedDynamic}                                     OPTIONAL,   -- Need R
    nfi-TotalDAI-Included-r16              ENUMERATED {true}                                                OPTIONAL,   -- Need R
    ul-TotalDAI-Included-r16               ENUMERATED {true}                                                OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-OneShotFeedback-r16     ENUMERATED {true}                                                OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-OneShotFeedbackNDI-r16  ENUMERATED {true}                                                OPTIONAL,   -- Need R
```

```
    pdsch-HARQ-ACK-OneShotFeedbackCBG-r16  ENUMERATED {true}                                    OPTIONAL,   -- Need R
    downlinkAssignmentIndexDCI-0-2-r16     ENUMERATED { enabled }                               OPTIONAL,   -- Need S
    downlinkAssignmentIndexDCI-1-2-r16     ENUMERATED {n1, n2, n4}                              OPTIONAL,   -- Need S
    pdsch-HARQ-ACK-CodebookList-r16        SetupRelease {PDSCH-HARQ-ACK-CodebookList-r16}       OPTIONAL,   -- Need M
    ackNackFeedbackMode-r16                ENUMERATED {joint, separate}                         OPTIONAL,   -- Need R
    pdcch-BlindDetectionCA-CombIndicator-r16 SetupRelease { PDCCH-BlindDetectionCA-CombIndicator-r16 }  OPTIONAL,   -- Need M
    pdcch-BlindDetection2-r16                SetupRelease { PDCCH-BlindDetection2-r16 }         OPTIONAL,   -- Need M
    pdcch-BlindDetection3-r16                SetupRelease { PDCCH-BlindDetection3-r16 }         OPTIONAL,   -- Need M
    bdFactorR-r16                          ENUMERATED {n1}                                      OPTIONAL    -- Need R
    ]],
    [[
    -- start of enhanced Type3 feedback
    pdsch-HARQ-ACK-EnhType3ToAddModList-r17   SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3-r17
                                                                                               OPTIONAL,   -- Need N
    pdsch-HARQ-ACK-EnhType3ToReleaseList-r17  SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3Index-r17
                                                                                               OPTIONAL,    -- Need N
    pdsch-HARQ-ACK-EnhType3SecondaryToAddModList-r17   SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3-r17
                                                                                               OPTIONAL,    -- Need N
    pdsch-HARQ-ACK-EnhType3SecondaryToReleaseList-r17  SEQUENCE (SIZE(1..maxNrofEnhType3HARQ-ACK-r17)) OF PDSCH-HARQ-ACK-EnhType3Index-r17
                                                                                               OPTIONAL,    -- Need N
    pdsch-HARQ-ACK-EnhType3DCI-FieldSecondaryPUCCHgroup-r17 ENUMERATED {enabled}               OPTIONAL,   -- Cond twoPUCCHgroup
    pdsch-HARQ-ACK-EnhType3DCI-Field-r17               ENUMERATED {enabled}                    OPTIONAL,   -- Need R
    -- end of enhanced Type3 feedback

    -- start of triggering of HARQ-ACK re-transmission on a PUCCH resource
    pdsch-HARQ-ACK-Retx-r17                 ENUMERATED {enabled}                               OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-RetxSecondaryPUCCHgroup-r17  ENUMERATED {enabled}                           OPTIONAL,   -- Cond twoPUCCHgroup
    -- end of triggering of HARQ-ACK re-transmission on a PUCCH resource

    -- start of PUCCH Cell switching
    pucch-sSCell-r17                        SCellIndex                                            OPTIONAL,   -- Need R
    pucch-sSCellSecondaryPUCCHgroup-r17     SCellIndex                                            OPTIONAL,   -- Cond twoPUCCHgroup
    pucch-sSCellDyn-r17                     ENUMERATED {enabled}                               OPTIONAL,   -- Need R
    pucch-sSCellDynSecondaryPUCCHgroup-r17  ENUMERATED {enabled}                               OPTIONAL,   -- Cond twoPUCCHgroup
    pucch-sSCellPattern-r17                    SEQUENCE (SIZE(1..maxNrofSlots)) OF INTEGER (0..1)     OPTIONAL,   -- Need R
    pucch-sSCellPatternSecondaryPUCCHgroup-r17   SEQUENCE (SIZE(1..maxNrofSlots)) OF INTEGER (0..1)     OPTIONAL,   -- Cond twoPUCCHgroup
    -- end of PUCCH Cell switching

    uci-MuxWithDiffPrio-r17           ENUMERATED {enabled}                                 OPTIONAL,   -- Need R
    uci-MuxWithDiffPrioSecondaryPUCCHgroup-r17     ENUMERATED {enabled}                    OPTIONAL,   -- Cond twoPUCCHgroup
    simultaneousPUCCH-PUSCH-r17       ENUMERATED {enabled}                                 OPTIONAL,   -- Need R
    simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup-r17       ENUMERATED {enabled}             OPTIONAL,   -- Cond twoPUCCHgroup

    prioLowDG-HighCG-r17              ENUMERATED {enabled}                                 OPTIONAL,   -- Need R
    prioHighDG-LowCG-r17              ENUMERATED {enabled}                                 OPTIONAL,   -- Need R
    twoQCLTypeDforPDCCHRepetition-r17 ENUMERATED {enabled}                                 OPTIONAL,   -- Need R
    multicastConfig-r17               SetupRelease { MulticastConfig-r17 }                 OPTIONAL,   -- Need M
    pdcch-BlindDetectionCA-CombIndicator-r17 SetupRelease { PDCCH-BlindDetectionCA-CombIndicator-r17 }  OPTIONAL   -- Need M
    ]],
    [[
    simultaneousSR-PUSCH-diffPUCCH-Groups-r17      ENUMERATED {enabled}                    OPTIONAL    -- Cond twoPUCCHgroup
    ]],
    [[
    intraBandNC-PRACH-simulTx-r17     ENUMERATED {enabled}                                 OPTIONAL    -- Need R
```

```
    ]],
    [[
    pdcch-BlindDetection4-r17         SetupRelease { PDCCH-BlindDetection4-r17 }               OPTIONAL    -- Need M
    ]],
    [[
    simultaneousPUCCH-PUSCH-SamePriority-r17       ENUMERATED {enabled}                       OPTIONAL,   -- Need R
    simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup-r17       ENUMERATED {enabled}    OPTIONAL    -- Cond twoPUCCHgroup
    ]]
}


PDSCH-HARQ-ACK-EnhType3-r17 ::=         SEQUENCE {
    pdsch-HARQ-ACK-EnhType3Index-r17    PDSCH-HARQ-ACK-EnhType3Index-r17,
    applicable-r17   CHOICE {
        perCC                           SEQUENCE (SIZE (1..maxNrofServingCells)) OF INTEGER (0..1),
        perHARQ                         SEQUENCE (SIZE (1..maxNrofServingCells)) OF BIT STRING (SIZE (16))
    },
    pdsch-HARQ-ACK-EnhType3NDI-r17        ENUMERATED {true}                                     OPTIONAL,   -- Need R
    pdsch-HARQ-ACK-EnhType3CBG-r17        ENUMERATED {true}                                     OPTIONAL,   -- Need S
    ...,
    [[
    perHARQ-Ext-r17                     SEQUENCE (SIZE (1..maxNrofServingCells)) OF BIT STRING (SIZE (32)) OPTIONAL -- Need R
    ]]
}

PDSCH-HARQ-ACK-EnhType3Index-r17 ::=    INTEGER (0..maxNrofEnhType3HARQ-ACK-1-r17)

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

DCP-Config-r16 ::=                  SEQUENCE {
    ps-RNTI-r16                         RNTI-Value,
    ps-Offset-r16                       INTEGER (1..120),
    sizeDCI-2-6-r16                     INTEGER (1..maxDCI-2-6-Size-r16),
    ps-PositionDCI-2-6-r16              INTEGER (0..maxDCI-2-6-Size-1-r16),
    ps-WakeUp-r16                       ENUMERATED {true}                                     OPTIONAL,   -- Need S
    ps-TransmitPeriodicL1-RSRP-r16      ENUMERATED {true}                                     OPTIONAL,   -- Need S
    ps-TransmitOtherPeriodicCSI-r16     ENUMERATED {true}                                     OPTIONAL    -- Need S
}

PDSCH-HARQ-ACK-CodebookList-r16 ::=     SEQUENCE (SIZE (1..2)) OF ENUMERATED {semiStatic, dynamic}

PDCCH-BlindDetectionCA-CombIndicator-r16 ::= SEQUENCE {
    pdcch-BlindDetectionCA1-r16             INTEGER (1..15),
    pdcch-BlindDetectionCA2-r16             INTEGER (1..15)
}

PDCCH-BlindDetection2-r16 ::=               INTEGER (1..15)

PDCCH-BlindDetection3-r16 ::=               INTEGER (1..15)

PDCCH-BlindDetection4-r17 ::=               INTEGER (1..15)

MulticastConfig-r17 ::=                 SEQUENCE {
    pdsch-HARQ-ACK-CodebookListMulticast-r17    SetupRelease { PDSCH-HARQ-ACK-CodebookList-r16}    OPTIONAL,   -- Need M
```

```
    type1CodebookGenerationMode-r17             ENUMERATED { mode1, mode2}                      OPTIONAL    -- Need M
}

PDCCH-BlindDetectionCA-CombIndicator-r17 ::= SEQUENCE {
    pdcch-BlindDetectionCA1-r17                 INTEGER (1..15)                                 OPTIONAL,   -- Need R
    pdcch-BlindDetectionCA2-r17                 INTEGER (1..15)                                 OPTIONAL,   -- Need R
    pdcch-BlindDetectionCA3-r17                 INTEGER (1..15)
}

-- TAG-PHYSICALCELLGROUPCONFIG-STOP
-- ASN1STOP
```

***PhysicalCellGroupConfig* field descriptions**
ackNackFeedbackMode
Indicates which among the joint and separate ACK/NACK feedback modes to use within a slot as specified in TS 38.213 [13] (clause 9).
bdFactorR
Parameter for determining and distributing the maximum numbers of BD/CCE for mPDCCH based mPDSCH transmission as specified in TS 38.213 [13] Clause 10.1.
cs-RNTI
RNTI value for downlink SPS (see *SPS-Config*) and uplink configured grant (see *ConfiguredGrantConfig*).
downlinkAssignmentIndexDCI-0-2
Indicates if "Downlink assignment index" is present or absent in DCI format 0_2. If the field "*downlinkAssignmentIndexDCI-0-2*" is absent, then 0 bit for "Downlink assignment index" in DCI format 0_2. If the field "*downlinkAssignmentIndexDCI-0-2*" is present, then the bitwidth of "Downlink assignment index" in DCI format 0_2 is defined in the same was as that in DCI format 0_1 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).
downlinkAssignmentIndexDCI-1-2
Configures the number of bits for "Downlink assignment index" in DCI format 1_2. If the field is absent, then 0 bit is applied for "Downlink assignment index" in DCI format 1_2. Note that 1 bit and 2 bits are applied if only one serving cell is configured in the DL and *pdsch-HARQ-ACK-Codebook* is set to *dynamic*. 4 bits is applied if more than one serving cell are configured in the DL and *pdsch-HARQ-ACK-Codebook* is set to *dynamic* (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).
harq-ACK-SpatialBundlingPUCCH
Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUCCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling of PUCCH HARQ ACKs for the primary PUCCH group is disabled (see TS 38.213 [13], clause 9.1.2.1). If the field *harq-ACK SpatialBundlingPUCCH-secondaryPUCCHgroup* is present, *harq-ACK-SpatialBundlingPUCCH* is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.
harq-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup
Indicates whether spatial bundling of PUCCH HARQ ACKs for the secondary PUCCH group is enabled or disabled. The field is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clause 9.1.2.1). When the field is absent, the use of spatial bundling of PUCCH HARQ ACKs for the secondary PUCCH group is indicated by *harq-ACK-SpatialBundlingPUCCH*. See TS 38.213 [13], clause 9.1.2.1. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.
harq-ACK-SpatialBundlingPUSCH
Enables spatial bundling of HARQ ACKs. It is configured per cell group (i.e. for all the cells within the cell group) for PUSCH reporting of HARQ-ACK. It is only applicable when more than 4 layers are possible to schedule. When the field is absent, the spatial bundling of PUSCH HARQ ACKs for the primary PUCCH group is disabled (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). If the field *harq-ACK SpatialBundlingPUSCH-secondaryPUCCHgroup* is present, *harq-ACK-SpatialBundlingPUSCH* is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.
harq-ACK-SpatialBundlingPUSCH-secondaryPUCCHgroup
Indicates whether spatial bundling of PUSCH HARQ ACKs for the secondary PUCCH group is enabled or disabled. The field is only applicable when more than 4 layers are possible to schedule (see TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2). When the field is absent, the use of spatial bundling of PUSCH HARQ ACKs for the secondary PUCCH group is indicated by *harq-ACK-SpatialBundlingPUSCH*. See TS 38.213 [13], clauses 9.1.2.2 and 9.1.3.2. Network does not configure for a UE both spatial bundling of HARQ ACKs and *codeBlockGroupTransmission* within the same cell group.
intraBandNC-PRACH-simulTx
Enables parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA (see TS 38.213 [13], clause 8.1 and TS 38.214 [19], clause 6.2.1). This field is absent in the IE *CellGroupConfig* when provided as part of *RRCSetup* message.
mcs-C-RNTI
RNTI to indicate use of *qam64LowSE* for grant-based transmissions. When the *mcs-C-RNTI* is configured, RNTI scrambling of DCI CRC is used to choose the corresponding MCS table.
nfi-TotalDAI-Included
Indicates whether the NFI and total DAI fields of the non-scheduled PDSCH group is included in the non-fallback DL grant DCI (see TS 38.212 [17], clause 7.3.1). The network configures this only when enhanced dynamic codebook is configured (*pdsch-HARQ-ACK-Codebook* is set to *enhancedDynamic*).
nrdc-PCmode-FR1
Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 1 (FR1) (see TS 38.213 [13], clause 7.6).

nrdc-PCmode-FR2

Indicates the uplink power sharing mode that the UE uses in NR-DC in frequency range 2 (FR2) (see TS 38.213 [13], clause 7.6).

pdcch-BlindDetection, pdcch-BlindDetection2, pdcch-BlindDetection3, pdcch-BlindDetection4
Indicates the reference number of cells for PDCCH blind detection for the CG. Network configures the field for each CG when the UE is in NR DC and sets the value in accordance with the constraints specified in TS 38.213 [13]. The network configures *pdcch-BlindDetection* only if the UE is in NR-DC. The network configures *pdcch-BlindDetection2* only if the UE is in NR-DC with at least one downlink cell using Rel-16 PDCCH monitoring capability. The network configures *pdcch-BlindDetection3* only if the UE is in NR-DC with at least one downlink cell using Rel-15 PDCCH monitoring capability. The network configures *pdcch-BlindDetection4* only if the UE is in NR-DC with at least one downlink cell using Rel-17 PDCCH monitoring capability.

pdcch-BlindDetectionCA-CombIndicator
Configure one combination of *pdcch-BlindDetectionCA1* (for R15) and *pdcch-BlindDetectionCA2* (for R16) for UE to use for scaling PDCCH monitoring capability if the number of serving cells configured to a UE is larger than the reported capability, and if UE reports more than one combination of *pdcch-BlindDetectionCA1* and *pdcch-BlindDetectionCA2* as UE capability. The combination of *pdcch-BlindDetectionCA1* and *pdcch-BlindDetectionCA2* configured by *pdcch-BlindDetectionCA-CombIndicator* is from the more than one combination of *pdcch-BlindDetectionCA1* and *pdcch-BlindDetectionCA2* reported by UE (see TS 38.213 [13], clause 10).
pdcch-BlindDetectionCA-CombIndicator-r17 is used to configure one combination of *pdcch-BlindDetectionCA1* (for R15), *pdcch-BlindDetectionCA2* (for R16) and *pdcch-BlindDetectionCA3* (for R17) for UE to use for scaling PDCCH monitoring capability if the number of serving cells configured to a UE is larger than the reported capability, and if UE reports more than one combination of *pdcch-BlindDetectionCA1*, *pdcch-BlindDetectionCA2* and *pdcch-BlindDetectionCA3* as UE capability. The combination of *pdcch-BlindDetectionCA1*, *pdcch-BlindDetectionCA2* and *pdcch-BlindDetectionCA3* configured by *pdcch-BlindDetectionCA-CombIndicator-r17* is from the more than one combination of *pdcch-BlindDetectionCA1*, *pdcch-BlindDetectionCA2* and *pdcch-BlindDetectionCA3* reported by UE (see TS 38.213 [13], clause 10).
pdcch-BlindDetectionCA-CombIndicator-r16 and *pdcch-BlindDetectionCA-CombIndicator-r17* are not configured simultaneously.

p-NR-FR1
The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 1 (FR1). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR1* (configured total for all serving cells operating on FR1).

p-NR-FR2
The maximum total transmit power to be used by the UE in this NR cell group across all serving cells in frequency range 2 (FR2). The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-UE-FR2* (configured total for all serving cells operating on FR2). This field is only used in NR-DC. A UE does not expect to be configured with this parameter in this release of the specification.

prioLowDG-HighCG
Enable PHY prioritization for the case where low-priority dynamic grant-PUSCH collides with high-priority configured grant-PUSCH on a BWP of a serving cell (see TS 38.213 [13], clause 9), when the UE has generated transport blocks for both DG-PUSCH and CG-PUSCH as described in TS 38.321 [3].

prioHighDG-LowCG
Enable PHY prioritization for the case where high-priority dynamic grant PUSCH collides with low-priority configured grant PUSCH on a BWP of a serving cell (see TS 38.213 [13], clause 9), when the UE has generated transport blocks for both DG-PUSCH and CG-PUSCH as described in TS 38.321 [3].

ps-RNTI
RNTI value for scrambling CRC of DCI format 2-6 used for power saving (see TS 38.213 [13], clause 10.1).

ps-Offset
The start of the search-time of DCI format 2-6 with CRC scrambled by PS-RNTI relative to the start of the *drx-onDurationTimer* of Long DRX (see TS 38.213 [13], clause 10.3). Value in multiples of 0.125ms (milliseconds). 1 corresponds to 0.125 ms, 2 corresponds to 0.25 ms, 3 corresponds to 0.375 ms and so on.

ps-WakeUp
Indicates the UE to wake-up if DCI format 2-6 is not detected outside active time (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not wake-up if DCI format 2-6 is not detected outside active time.

ps-PositionDCI-2-6
Starting position of UE wakeup and SCell dormancy indication in DCI format 2-6 (see TS 38.213 [13], clause 10.3).

ps-TransmitPeriodicL1-RSRP
Indicates the UE to transmit periodic L1-RSRP report(s) when the *drx-onDurationTimer* does not start (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not transmit periodic L1-RSRP report(s) when the *drx-onDurationTimer* does not start.

ps-TransmitOtherPeriodicCSI Indicates the UE to transmit periodic CSI report(s) other than L1-RSRP reports when the *drx-onDurationTimer* does not start (see TS 38.321 [3], clause 5.7). If the field is absent, the UE does not transmit periodic CSI report(s) other than L1-RSRP reports when the *drx-onDurationTimer* does not start.
p-UE-FR1 The maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by *p-NR-FR1* (configured for the cell group).
p-UE-FR2 The maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2) across all cell groups. The maximum transmit power that the UE may use may be additionally limited by *p-Max* (configured in *FrequencyInfoUL*) and by p-NR-FR2 (configured for the cell group). A UE does not expect to be configured with this parameter in this release of the specification.
pdsch-HARQ-ACK-Codebook The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to both CA and non-CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). If *pdsch-HARQ-ACK-Codebook-r16* is signalled, UE shall ignore the *pdsch-HARQ-ACK-Codebook* (without suffix). For the HARQ-ACK for sidelink, if *pdsch-HARQ-ACK-Codebook-r16* is signalled, the UE uses *pdsch-HARQ-ACK-Codebook* (without suffix) and ignores *pdsch-HARQ-ACK-Codebook-r16*. If the field *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup* is present, *pdsch-HARQ-ACK-Codebook* is applied to primary PUCCH group. Otherwise, this field is applied to the cell group (i.e. for all the cells within the cell group). For the HARQ-ACK for sidelink, if the field *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup* is present, *pdsch-HARQ-ACK-Codebook* is applied to primary and secondary PUCCH group and the UE ignores *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup*.
pdsch-HARQ-ACK-CodebookList A list of configurations for one or two HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured). For the HARQ-ACK for sidelink, the UE uses *pdsch-HARQ-ACK-Codebook* and ignores *pdsch-HARQ-ACK-CodebookList* if this field is present.
pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup The PDSCH HARQ-ACK codebook is either semi-static or dynamic. This is applicable to CA operation (see TS 38.213 [13], clauses 9.1.2 and 9.1.3). It is configured for secondary PUCCH group.
pdsch-HARQ-ACK-EnhType3DCI-Field, pdsch-HARQ-ACK-EnhType3DCI-FieldSecondaryPUCCHgroup Indicates the enhanced Type 3 codebook through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in the primary PUCCH group if the more than one enhanced Type 3 HARQ-ACK codebook is configured for the primary PUCCH group, or in the secondary PUCCH group if the more than one enhanced Type 3 HARQ-ACK code is configured for the secondary PUCCH group, respectively.
pdsch-HARQ-ACK-EnhType3ToAddModList, pdsch-HARQ-ACK-EnhType3SecondaryToAddModList Configure the list of enhanced Type 3 HARQ-ACK codebooks for the primary PUCCH group and the secondary PUCCH group, respectively. When configured, DCI format 1_1 can request the UE to report A/N for one of the configured enhanced Type 3 HARQ-ACK codebooks in the corresponding PUCCH group (see TS 38.213 [13], clause 9.1.4). The network can configure *pdsch-HARQ-ACK-EnhType3SecondaryToAddModList* only if secondary PUCCH group is configured.
pdsch-HARQ-ACK-OneShotFeedback When configured, the DCI format 1_1 can request the UE to report A/N for all HARQ processes and all CCs configured in the PUCCH group (see TS 38.212 [17], clause 7.3.1).
pdsch-HARQ-ACK-OneShotFeedbackCBG When configured, the DCI format 1_1 can request the UE to include CBG level A/N for each CC with CBG level transmission configured. When not configured, the UE will report TB level A/N even if CBG level transmission is configured for a CC. The network configures this only when *pdsch-HARQ-ACK-OneShotFeedback* is configured.
pdsch-HARQ-ACK-OneShotFeedbackNDI When configured, the DCI format 1_1 can request the UE to include NDI for each A/N reported. The network configures this only when *pdsch-HARQ-ACK-OneShotFeedback* is configured.
pdsch-HARQ-ACK-Retx, pdsch-HARQ-ACK-RetxSecondaryPUCCHgroup When configured, the DCI format 1_1 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource in the primary PUCCH group and the secondary PUCCH group, respectively (see TS 38.213 [13], clause 9.1.5).

pucch-sSCell, pucch-sSCellSecondaryPUCCHgroup indictates the alternative PUCCH cells for PUCCH cell switching in the primary and the secondary PUCCH group, respectively. For the primary PUCCH group, it is configured for cells on top of SpCell. For the secondary PUCCH group, it is configured for cell on top of the PUCCH SCell.
pucch-sSCellDyn, pucch-sSCellDynsecondaryPUCCHgroup When configured, PUCCH cell switching based on dynamic indication in DCI format 1_1 is enabled (see TS 38.213 [13], clause 9.A, clause 9.1.5), respectively for the primary PUCCH group and the secondary PUCCH group.
pucch-sSCellPattern, pucch-sSCellPatternSecondaryPUCCHgroup When configured, the UE applies the semi-static PUCCH cell switching (see TS 38.213 [13], clause 9.A) using the time domain pattern of applicable PUCCH cells indicated by this field, respectively for the primary PUCCH group and the secondary PUCCH group.
simultaneousPUCCH-PUSCH, simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup Enables simultaneous PUCCH and PUSCH transmissions with different priorities for the primary PUCCH group and the secondary PUCCH group, respectively.
simultaneousPUCCH-PUSCH-SamePriority, simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup Enables simultaneous PUCCH and PUSCH transmissions on different cells in different bands with same prioritiy for the primary PUCCH group and the secondary PUCCH group, respectively, as specified in clause 9 of TS 38.213 [13].
simultaneousSR-PUSCH-diffPUCCH-Groups Enables simultaneous SR and PUSCH transmissions in different PUCCH groups (see TS 38.321 [3], clause 5.4.1, clause 5.4.4).
sizeDCI-2-6 Size of DCI format 2-6 (see TS 38.213 [13], clause 10.3).
sp-CSI-RNTI RNTI for Semi-Persistent CSI reporting on PUSCH (see *CSI-ReportConfig*) (see TS 38.214 [19], clause 5.2.1.5.2). Network always configures the UE with a value for this field when at least one *CSI-ReportConfig* with *reportConfigType* set to *semiPersistentOnPUSCH* is configured.
tpc-PUCCH-RNTI RNTI used for PUCCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).
tpc-PUSCH-RNTI RNTI used for PUSCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).
tpc-SRS-RNTI RNTI used for SRS TPC commands on DCI (see TS 38.213 [13], clause 10.1).
twoQCLTypeDforPDCCHRepetition Indicates whether a UE is expected UE to identify and monitor two QCL-TypeD properties for multiple overlapping CORESETs in the case of PDCCH repetition.
uci-MuxWithDiffPrio, uci-MuxWithDiffPrio-secondaryPUCCHgroup When configured, enables multiplexing a high-priority (HP) HARQ-ACK UCI and a low-priority (LP) HARQ-ACK UCI into a PUCCH or PUSCH for the primary PUCCH group and the secondary PUCCH group, respectively.
ul-TotalDAI-Included Indicates whether the total DAI fields of the additional PDSCH group is included in the non-fallback UL grant DCI (see TS 38.212 [17], clause 7.3.1). The network configures this only when enhanced dynamic codebook is configured (*pdsch-HARQ-ACK-Codebook* is set to *enhancedDynamic*).
xScale The UE is allowed to drop NR only if the power scaling applied to NR results in a difference between scaled and unscaled NR UL of more than *xScale* dB (see TS 38.213 [13]). If the value is not configured for dynamic power sharing, the UE assumes default value of 6 dB.

***MulticastConfig* field descriptions**
pdsch-HARQ-ACK-CodebookListMulticast A list of configurations for one or two HARQ-ACK codebooks for MBS multicast. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured).
type1CodebookGenerationMode Indicates the mode of Type-1 HARQ-ACK codebook generation, as specified in TS 38.213 [13]. Mode 1 is based on the k1 values that are in the intersection of K1 set for unicast and K1 set for multicast. Mode 2 is based on the k1 values that are in the union of K1 set for unicast and K1 set for multicast.

***PDSCH-HARQ-ACK-EnhType3* field descriptions**
pdsch-HARQ-ACK-EnhType3CBG When configured, the DCI format 1_1 or DCI format 1_2 can request the UE to include CBG level A/N for each CC with CBG level transmission configured of the enhanced Type 3 HARQ-ACK codebook. When not configured, the UE will report TB level A/N even if CBG level transmission is configured for a CC.
pdsch-HARQ-ACK-EnhType3NDI When configured, the DCI format 1_1 or DCI format 1_2 can request the UE to include NDI for each A/N reported of the enhanced Type 3 HARQ-ACK codebook.
perCC Configures enhanced Type 3 HARQ-ACK codebook using per CC configuration.
perHARQ, perHARQ-Ext Configures enhanced Type 3 HARQ-ACK codebook using per HARQ process and CC configuration. *perHARQ-Ext* is present only when *nrofHARQ-ProcessesForPDSCH-v1700* is present in *pdsch-ServingCellConfig* of at least one serving cell in the PUCCH group. If *perHARQ-Ext* is present, the UE ignores *perHARQ*.

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

– *PLMN-Identity*

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE is specified in TS 23.003 [21].

***PLMN-Identity* information element**

```
-- ASN1START
-- TAG-PLMN-IDENTITY-START

PLMN-Identity ::=                   SEQUENCE {
    mcc                                 MCC                 OPTIONAL,                   -- Cond MCC
    mnc                                 MNC
}

MCC ::=                             SEQUENCE (SIZE (3)) OF MCC-MNC-Digit

MNC ::=                             SEQUENCE (SIZE (2..3)) OF MCC-MNC-Digit
```

```
MCC-MNC-Digit ::=                   INTEGER (0..9)

-- TAG-PLMN-IDENTITY-STOP
-- ASN1STOP
```

***PLMN-Identity* field descriptions**
mcc The first element contains the first MCC digit, the second element the second MCC digit and so on. If the field is absent, it takes the same value as the *mcc* of the immediately preceding IE PLMN-Identity. See TS 23.003 [21].
mnc The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [21].

Conditional Presence	Explanation
MCC	This field is mandatory present when PLMN-Identity is not used in a list or if it is the first entry of PLMN-Identity in a list. Otherwise it is optionally present, Need S.

– *PLMN-IdentityInfoList*

The IE *PLMN-IdentityInfoList* includes a list of PLMN identity information.

***PLMN-IdentityInfoList* information element**

```
-- ASN1START
-- TAG-PLMN-IDENTITYINFOLIST-START

PLMN-IdentityInfoList ::=               SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::=                   SEQUENCE {
    plmn-IdentityList                       SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity,
    trackingAreaCode                        TrackingAreaCode                                    OPTIONAL,       -- Need R
    ranac                                   RAN-AreaCode                                        OPTIONAL,       -- Need R
    cellIdentity                            CellIdentity,
    cellReservedForOperatorUse              ENUMERATED {reserved, notReserved},
    ...,
    [[
    iab-Support-r16                     ENUMERATED {true}                                       OPTIONAL        -- Need S
    ]],
    [[
    trackingAreaList-r17                SEQUENCE (SIZE (1..maxTAC-r17)) OF TrackingAreaCode     OPTIONAL,       -- Need R
    gNB-ID-Length-r17                   INTEGER (22..32)                                        OPTIONAL        -- Need R
    ]]
}
-- TAG-PLMN-IDENTITYINFOLIST-STOP
-- ASN1STOP
```

***PLMN-IdentityInfo* field descriptions**
cellReservedForOperatorUse Indicates whether the cell is reserved for operator use (per PLMN), as defined in TS 38.304 [20]. This field is ignored by IAB-MT.
gNB-ID-Length Indicates the length of the gNB ID out of the 36-bit long *cellIdentity*.
iab-Support This field combines both the support of IAB and the cell status for IAB. If the field is present, the cell supports IAB and the cell is also considered as a candidate for cell (re)selection for IAB-node; if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.
trackingAreaCode Indicates Tracking Area Code to which the cell indicated by *cellIdentity* field belongs. The absence of the field indicates that the cell only supports PSCell/SCell functionality (per PLMN) or is an NTN cell.
trackingAreaList List of Tracking Areas to which the cell indicated by *cellIdentity* field belongs. If this field is present, network does not configure *trackingAreaCode.* Total number of different TACs across different *PLMN-IdentityInfo*s shall not exceed *maxTAC*. This field is only present in an NTN cell.

– *PLMN-IdentityList2*

Includes a list of PLMN identities.

PLMN-IdentityList2 information element

```
-- ASN1START
-- TAG-PLMNIDENTITYLIST2-START

PLMN-IdentityList2-r16 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity

-- TAG-PLMNIDENTITYLIST2-STOP
-- ASN1STOP
```

– *PRB-Id*

The IE *PRB-Id* identifies a Physical Resource Block (PRB) position within a carrier.

PRB-Id information element

```
-- ASN1START
-- TAG-PRB-ID-START

PRB-Id ::=                          INTEGER (0..maxNrofPhysicalResourceBlocks-1)

-- TAG-PRB-ID-STOP
-- ASN1STOP
```

– *PTRS-DownlinkConfig*

The IE *PTRS-DownlinkConfig* is used to configure downlink phase tracking reference signals (PTRS) (see TS 38.214 [19] clause 5.1.6.3)

PTRS-DownlinkConfig information element

```
-- ASN1START
-- TAG-PTRS-DOWNLINKCONFIG-START

PTRS-DownlinkConfig ::=             SEQUENCE {
    frequencyDensity                    SEQUENCE (SIZE (2)) OF INTEGER (1..276)                         OPTIONAL,   -- Need S
    timeDensity                         SEQUENCE (SIZE (3)) OF INTEGER (0..29)                          OPTIONAL,   -- Need S
    epre-Ratio                          INTEGER (0..3)                                                  OPTIONAL,   -- Need S
    resourceElementOffset               ENUMERATED { offset01, offset10, offset11 }                     OPTIONAL,   -- Need S
    ...,
    [[
    maxNrofPorts-r16                    ENUMERATED {n1, n2}                                             OPTIONAL    -- Need R
    ]]

}

-- TAG-PTRS-DOWNLINKCONFIG-STOP
-- ASN1STOP
```

PTRS-DownlinkConfig field descriptions
epre-Ratio   EPRE ratio between PTRS and PDSCH. Value 0 corresponds to the codepoint "00" in table 4.1-2. Value 1 corresponds to codepoint "01", and so on. If the field is not provided, the UE applies value 0 (see TS 38.214 [19], clause 4.1).
frequencyDensity   Presence and frequency density of DL PT-RS as a function of Scheduled BW. If the field is absent, the UE uses K_PT-RS = 2 (see TS 38.214 [19], clause 5.1.6.3, table 5.1.6.3-2).
maxNrofPorts   The maximum number of DL PTRS ports specified in TS 38.214 [19] (clause 5.1.6.3). 2 PT-RS ports can only be configured for a DL BWP that is configured, as specified in TS 38.214 [19] clause 5.1, with a mode where a single PDSCH has association between the DM-RS ports and the TCI states as defined in TS 38.214 [19] clause 5.1.6.2.
resourceElementOffset   Indicates the subcarrier offset for DL PTRS. If the field is absent, the UE applies the value offset00 (see TS 38.211 [16], clause 7.4.1.2.2).
timeDensity   Presence and time density of DL PT-RS as a function of MCS. The value 29 is only applicable for MCS Table 5.1.3.1-1 (TS 38.214 [19]). If the field is absent, the UE uses L_PT-RS = 1 (see TS 38.214 [19], clause 5.1.6.3, table 5.1.6.3-1).

– *PTRS-UplinkConfig*

The IE *PTRS-UplinkConfig* is used to configure uplink Phase-Tracking-Reference-Signals (PTRS).

PTRS-UplinkConfig information element

```
-- ASN1START
-- TAG-PTRS-UPLINKCONFIG-START

PTRS-UplinkConfig ::=                 SEQUENCE {
    transformPrecoderDisabled             SEQUENCE {
        frequencyDensity                  SEQUENCE (SIZE (2)) OF INTEGER (1..276)             OPTIONAL,   -- Need S
        timeDensity                       SEQUENCE (SIZE (3)) OF INTEGER (0..29)              OPTIONAL,   -- Need S
        maxNrofPorts                      ENUMERATED {n1, n2},
        resourceElementOffset             ENUMERATED {offset01, offset10, offset11 }          OPTIONAL,   -- Need S
        ptrs-Power                        ENUMERATED {p00, p01, p10, p11}
    }                                                                                         OPTIONAL,   -- Need R
    transformPrecoderEnabled              SEQUENCE {
        sampleDensity                         SEQUENCE (SIZE (5)) OF INTEGER (1..276),
        timeDensityTransformPrecoding         ENUMERATED {d2}                                 OPTIONAL    -- Need S
    }                                                                                         OPTIONAL,   -- Need R
    ...
}

-- TAG-PTRS-UPLINKCONFIG-STOP
-- ASN1STOP
```

***PTRS-UplinkConfig* field descriptions**
frequencyDensity Presence and frequency density of UL PT-RS for CP-OFDM waveform as a function of scheduled BW If the field is absent, the UE uses K_PT-RS = 2 (see TS 38.214 [19], clause 6.1).
maxNrofPorts The maximum number of UL PTRS ports for CP-OFDM (see TS 38.214 [19], clause 6.2.3.1).
ptrs-Power UL PTRS power boosting factor per PTRS port (see TS 38.214 [19], clause 6.1, table 6.2.3.1.3).
resourceElementOffset Indicates the subcarrier offset for UL PTRS for CP-OFDM. If the field is absent, the UE applies the value offset00 (see TS 38.211 [16], clause 6.4.1.2.2).
sampleDensity Sample density of PT-RS for DFT-s-OFDM, pre-DFT, indicating a set of thresholds T={NRBn, n=0,1,2,3,4}, that indicates dependency between presence of PT-RS and scheduled BW and the values of X and K the UE should use depending on the scheduled BW, see TS 38.214 [19], clause 6.1, table 6.2.3.2-1.
timeDensity Presence and time density of UL PT-RS for CP-OFDM waveform as a function of MCS If the field is absent, the UE uses L_PT-RS = 1 (see TS 38.214 [19], clause 6.1).
timeDensityTransformPrecoding Time density (OFDM symbol level) of PT-RS for DFT-s-OFDM. If the field is absent, the UE applies value d1 (see TS 38.214 [19], clause 6.1).
transformPrecoderDisabled Configuration of UL PTRS without transform precoder (with CP-OFDM).
transformPrecoderEnabled Configuration of UL PTRS with transform precoder (DFT-S-OFDM).

– *PUCCH-Config*

The IE *PUCCH-Config* is used to configure UE specific PUCCH parameters (per BWP).

PUCCH-Config information element

```
-- ASN1START
-- TAG-PUCCH-CONFIG-START

PUCCH-Config ::=                        SEQUENCE {
    resourceSetToAddModList                 SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSet   OPTIONAL, -- Need N
    resourceSetToReleaseList                SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceSets)) OF PUCCH-ResourceSetId OPTIONAL, -- Need N
    resourceToAddModList                    SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-Resource         OPTIONAL, -- Need N
    resourceToReleaseList                   SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-ResourceId       OPTIONAL, -- Need N
    format1                                 SetupRelease { PUCCH-FormatConfig }                                   OPTIONAL, -- Need M
    format2                                 SetupRelease { PUCCH-FormatConfig }                                   OPTIONAL, -- Need M
    format3                                 SetupRelease { PUCCH-FormatConfig }                                   OPTIONAL, -- Need M
    format4                                 SetupRelease { PUCCH-FormatConfig }                                   OPTIONAL, -- Need M
    schedulingRequestResourceToAddModList   SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfig
                                                                                                                  OPTIONAL, -- Need N
    schedulingRequestResourceToReleaseList  SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceId
                                                                                                                  OPTIONAL, -- Need N
    multi-CSI-PUCCH-ResourceList            SEQUENCE (SIZE (1..2)) OF PUCCH-ResourceId                            OPTIONAL, -- Need M
    dl-DataToUL-ACK                         SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)                             OPTIONAL, -- Need M
    spatialRelationInfoToAddModList         SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfo
                                                                                                                  OPTIONAL, -- Need N
    spatialRelationInfoToReleaseList        SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos)) OF PUCCH-SpatialRelationInfoId
                                                                                                                  OPTIONAL, -- Need N
    pucch-PowerControl                      PUCCH-PowerControl                                                    OPTIONAL, -- Need M
    ...,
    [[
    resourceToAddModListExt-v1610           SEQUENCE (SIZE (1..maxNrofPUCCH-Resources)) OF PUCCH-ResourceExt-v1610  OPTIONAL, -- Need N
    dl-DataToUL-ACK-r16                     SetupRelease { DL-DataToUL-ACK-r16 }                                  OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-1-r16          SetupRelease { UL-AccessConfigListDCI-1-1-r16 }                       OPTIONAL, -- Need M
    subslotLengthForPUCCH-r16               CHOICE {
            normalCP-r16                        ENUMERATED {n2,n7},
            extendedCP-r16                      ENUMERATED {n2,n6}
    }                                                                                                             OPTIONAL, -- Need R
    dl-DataToUL-ACK-DCI-1-2-r16             SetupRelease { DL-DataToUL-ACK-DCI-1-2-r16}                           OPTIONAL, -- Need M
    numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2-r16  INTEGER (0..3)                                             OPTIONAL, -- Need R
    dmrs-UplinkTransformPrecodingPUCCH-r16  ENUMERATED {enabled}                                                  OPTIONAL,  -- Cond PI2-BPSK
    spatialRelationInfoToAddModListSizeExt-v1610    SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfo
                                                                                                                  OPTIONAL, -- Need N
    spatialRelationInfoToReleaseListSizeExt-v1610   SEQUENCE (SIZE (1..maxNrofSpatialRelationInfosDiff-r16)) OF PUCCH-SpatialRelationInfoId
                                                                                                                  OPTIONAL, -- Need N
    spatialRelationInfoToAddModListExt-v1610  SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF PUCCH-SpatialRelationInfoExt-r16
                                                                                                                  OPTIONAL, -- Need N
    spatialRelationInfoToReleaseListExt-v1610    SEQUENCE (SIZE (1..maxNrofSpatialRelationInfos-r16)) OF
                                                                        PUCCH-SpatialRelationInfoId-r16           OPTIONAL, -- Need N
    resourceGroupToAddModList-r16           SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroup-r16
                                                                                                                  OPTIONAL, -- Need N
    resourceGroupToReleaseList-r16          SEQUENCE (SIZE (1..maxNrofPUCCH-ResourceGroups-r16)) OF PUCCH-ResourceGroupId-r16
                                                                                                                  OPTIONAL, -- Need N
```

```
    sps-PUCCH-AN-List-r16                   SetupRelease { SPS-PUCCH-AN-List-r16 }                                  OPTIONAL,  -- Need M
    schedulingRequestResourceToAddModListExt-v1610   SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v1610
                                                                                                                    OPTIONAL -- Need N
    ]],
    [[
    format0-r17                             SetupRelease { PUCCH-FormatConfig }                                     OPTIONAL, -- Need M
    format2Ext-r17                          SetupRelease { PUCCH-FormatConfigExt-r17 }                              OPTIONAL, -- Need M
    format3Ext-r17                          SetupRelease { PUCCH-FormatConfigExt-r17 }                              OPTIONAL, -- Need M
    format4Ext-r17                          SetupRelease { PUCCH-FormatConfigExt-r17 }                              OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-2-r17          SetupRelease { UL-AccessConfigListDCI-1-2-r17 }                         OPTIONAL, -- Need M
    mappingPattern-r17                      ENUMERATED {cyclicMapping, sequentialMapping}                           OPTIONAL, -- Need R
    powerControlSetInfoToAddModList-r17     SEQUENCE (SIZE (1..maxNrofPowerControlSetInfos-r17)) OF PUCCH-PowerControlSetInfo-r17
                                                                                                                    OPTIONAL, -- Need N
    powerControlSetInfoToReleaseList-r17    SEQUENCE (SIZE (1..maxNrofPowerControlSetInfos-r17)) OF PUCCH-PowerControlSetInfoId-r17
                                                                                                                    OPTIONAL, -- Need N
    secondTPCFieldDCI-1-1-r17               ENUMERATED {enabled}                                                    OPTIONAL, -- Need R
    secondTPCFieldDCI-1-2-r17               ENUMERATED {enabled}                                                    OPTIONAL, -- Need R
    dl-DataToUL-ACK-r17                     SetupRelease { DL-DataToUL-ACK-r17 }                                    OPTIONAL, -- Need M
    dl-DataToUL-ACK-DCI-1-2-r17             SetupRelease { DL-DataToUL-ACK-DCI-1-2-r17}                             OPTIONAL, -- Need M
    ul-AccessConfigListDCI-1-1-r17          SetupRelease { UL-AccessConfigListDCI-1-1-r17 }                         OPTIONAL, -- Need M
    schedulingRequestResourceToAddModListExt-v1700 SEQUENCE (SIZE (1..maxNrofSR-Resources)) OF SchedulingRequestResourceConfigExt-v1700
                                                                                                                    OPTIONAL, -- Need N
    dmrs-BundlingPUCCH-Config-r17           SetupRelease { DMRS-BundlingPUCCH-Config-r17 }                          OPTIONAL, -- Need M
    dl-DataToUL-ACK-v1700                   SetupRelease { DL-DataToUL-ACK-v1700 }                                  OPTIONAL, -- Need M
    dl-DataToUL-ACK-MulticastDCI-Format4-1-r17 SetupRelease { DL-DataToUL-ACK-MulticastDCI-Format4-1-r17 }          OPTIONAL, -- Need M
    sps-PUCCH-AN-ListMulticast-r17          SetupRelease { SPS-PUCCH-AN-List-r16 }                                  OPTIONAL  -- Need M
    ]]
}

PUCCH-FormatConfig ::=                  SEQUENCE {
    interslotFrequencyHopping               ENUMERATED {enabled}                                                    OPTIONAL, -- Need R
    additionalDMRS                          ENUMERATED {true}                                                       OPTIONAL, -- Need R
    maxCodeRate                             PUCCH-MaxCodeRate                                                       OPTIONAL, -- Need R
    nrofSlots                               ENUMERATED {n2,n4,n8}                                                   OPTIONAL, -- Need S
    pi2BPSK                                 ENUMERATED {enabled}                                                    OPTIONAL, -- Need R
    simultaneousHARQ-ACK-CSI                ENUMERATED {true}                                                       OPTIONAL  -- Need R
}

PUCCH-FormatConfigExt-r17 ::=           SEQUENCE {
    maxCodeRateLP-r17                       PUCCH-MaxCodeRate                                                       OPTIONAL, -- Need R
    ...
}

PUCCH-MaxCodeRate ::=                   ENUMERATED {zeroDot08, zeroDot15, zeroDot25, zeroDot35, zeroDot45, zeroDot60, zeroDot80}

-- A set with one or more PUCCH resources
PUCCH-ResourceSet ::=                   SEQUENCE {
    pucch-ResourceSetId                     PUCCH-ResourceSetId,
    resourceList                            SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerSet)) OF PUCCH-ResourceId,
    maxPayloadSize                          INTEGER (4..256)                                                        OPTIONAL  -- Need R
}

PUCCH-ResourceSetId ::=                 INTEGER (0..maxNrofPUCCH-ResourceSets-1)
```

```
PUCCH-Resource ::=                  SEQUENCE {
    pucch-ResourceId                    PUCCH-ResourceId,
    startingPRB                         PRB-Id,
    intraSlotFrequencyHopping           ENUMERATED { enabled }                  OPTIONAL, -- Need R
    secondHopPRB                        PRB-Id                                  OPTIONAL, -- Need R
    format                              CHOICE {
        format0                             PUCCH-format0,
        format1                             PUCCH-format1,
        format2                             PUCCH-format2,
        format3                             PUCCH-format3,
        format4                             PUCCH-format4
    }
}

PUCCH-ResourceExt-v1610 ::=         SEQUENCE {
    interlaceAllocation-r16             SEQUENCE {
        rb-SetIndex-r16                     INTEGER (0..4),
        interlace0-r16                      CHOICE {
            scs15                               INTEGER (0..9),
            scs30                               INTEGER (0..4)
        }
    }                                                                           OPTIONAL,  --Need R
    format-v1610                        CHOICE {
        interlace1-v1610                        INTEGER (0..9),
        occ-v1610                               SEQUENCE {
            occ-Length-v1610                        ENUMERATED {n2,n4}          OPTIONAL, -- Need M
            occ-Index-v1610                         ENUMERATED {n0,n1,n2,n3}    OPTIONAL  -- Need M
        }
    }                                                                         OPTIONAL,  -- Need R
    ...,
    [[
    format-v1700                     SEQUENCE {
        nrofPRBs-r17                        INTEGER (1..16)
    }                                                                         OPTIONAL,  -- Need R
    pucch-RepetitionNrofSlots-r17       ENUMERATED { n1,n2,n4,n8 }              OPTIONAL   -- Need R
    ]]
}

PUCCH-ResourceId ::=                INTEGER (0..maxNrofPUCCH-Resources-1)


PUCCH-format0 ::=                       SEQUENCE {
    initialCyclicShift                      INTEGER(0..11),
    nrofSymbols                             INTEGER (1..2),
    startingSymbolIndex                     INTEGER(0..13)
}

PUCCH-format1 ::=                       SEQUENCE {
    initialCyclicShift                      INTEGER(0..11),
    nrofSymbols                             INTEGER (4..14),
    startingSymbolIndex                     INTEGER(0..10),
    timeDomainOCC                           INTEGER(0..6)
}
```

```
PUCCH-format2 ::=                           SEQUENCE {
    nrofPRBs                                    INTEGER (1..16),
    nrofSymbols                                 INTEGER (1..2),
    startingSymbolIndex                         INTEGER(0..13)
}

PUCCH-format3 ::=                           SEQUENCE {
    nrofPRBs                                    INTEGER (1..16),
    nrofSymbols                                 INTEGER (4..14),
    startingSymbolIndex                         INTEGER(0..10)
}

PUCCH-format4 ::=                           SEQUENCE {
    nrofSymbols                                 INTEGER (4..14),
    occ-Length                                  ENUMERATED {n2,n4},
    occ-Index                                   ENUMERATED {n0,n1,n2,n3},
    startingSymbolIndex                         INTEGER(0..10)
}

PUCCH-ResourceGroup-r16 ::=             SEQUENCE {
    pucch-ResourceGroupId-r16               PUCCH-ResourceGroupId-r16,
    resourcePerGroupList-r16                SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerGroup-r16)) OF PUCCH-ResourceId
}

PUCCH-ResourceGroupId-r16 ::=           INTEGER (0..maxNrofPUCCH-ResourceGroups-1-r16)

DL-DataToUL-ACK-r16 ::=                 SEQUENCE (SIZE (1..8)) OF INTEGER (-1..15)

DL-DataToUL-ACK-r17 ::=                 SEQUENCE (SIZE (1..8)) OF INTEGER (-1..127)

DL-DataToUL-ACK-v1700 ::=               SEQUENCE (SIZE (1..8)) OF INTEGER (16..31)

DL-DataToUL-ACK-DCI-1-2-r16 ::=         SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)

DL-DataToUL-ACK-DCI-1-2-r17 ::=         SEQUENCE (SIZE (1..8)) OF INTEGER (0..127)

UL-AccessConfigListDCI-1-1-r16 ::=      SEQUENCE (SIZE (1..16)) OF INTEGER (0..15)

UL-AccessConfigListDCI-1-2-r17 ::=      SEQUENCE (SIZE (1..16)) OF INTEGER (0..15)

UL-AccessConfigListDCI-1-1-r17 ::=      SEQUENCE (SIZE (1..3)) OF INTEGER (0..2)

DL-DataToUL-ACK-MulticastDCI-Format4-1-r17 ::= SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)

-- TAG-PUCCH-CONFIG-STOP
-- ASN1STOP
```

***PUCCH-Config* field descriptions**
dl-DataToUL-ACK, dl-DataToUL-ACK-DCI-1-2
List of timing for given PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK* applies to DCI format 1_1 and the field *dl-DataToUL-ACK-DCI-1-2* applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3). The *dl-DataToUL-ACK-v1700* is applicable for NTN and *dl-DataToUL-ACK-r17* is applicable for up to 71 GHz. If *dl-DataToUL-ACK-r16 or dl-DataToUL-ACK-r17* or *dl-DataToUL-ACK-v1700* is signalled, UE shall ignore the *dl-DataToUL-ACK* (without suffix). The value -1 corresponds to "inapplicable value" for the case where the A/N feedback timing is not explicitly included at the time of scheduling PDSCH. The fields *dl-DataToUL-ACK-r17* and *dl-DataToUL-ACK-DCI-1-2-r17* are only applicable for SCS of 480 kHz or 960 kHz.
dl-DataToUL-ACK-MulticastDCI-Format4-1
List of timing for given group-common PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field *dl-DataToUL-ACK-MulticastDciFormat4-1* applies to DCI format 4_1 for MBS multicast (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3).
dmrs-BundlingPUCCH-Config
Configuration of the parameters for DMRS bundling for PUCCH (see TS 38.214 [19], clause 6.1.7). DMRS bundling for PUCCH is not supported for PUCCH format 0/2. In this release, this is not applicable to FR2-2.
dmrs-UplinkTransformPrecodingPUCCH
This field is used for PUCCH formats 3 and 4 according to TS 38.211, Clause 6.4.1.3.3.1.
format0
Parameters that are common for all PUCCH resources of format 0.
format1
Parameters that are common for all PUCCH resources of format 1.
format2
Parameters that are common for all PUCCH resources of format 2.
format3
Parameters that are common for all PUCCH resources of format 3.
format4
Parameters that are common for all PUCCH resources of format 4.
mappingPattern
Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when a PUCCH resource used for repetitions of a PUCCH transmission includes first and second spatial settings for FR2, or first and second sets of power control parameters for FR1 (see TS 38.213 [13], clause 9.2.6).
numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2
Configuration of the number of bits for "PUCCH resource indicator" in DCI format 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.2.3).
powerControlSetInfoToAddModList
Configures power control sets for repetition of a PUCCH transmission in FR1. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included.
pucch-PowerControl
Configures power control parameters PUCCH transmission. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell.
resourceGroupToAddModList, resourceGroupToReleaseList
Lists for adding and releasing groups of PUCCH resources that can be updated simultaneously for spatial relations with a MAC CE.
resourceSetToAddModList, resourceSetToReleaseList
Lists for adding and releasing PUCCH resource sets (see TS 38.213 [13], clause 9.2).
resourceToAddModList, resourceToAddModListExt, resourceToReleaseList
Lists for adding and releasing PUCCH resources applicable for the UL BWP and serving cell in which the *PUCCH-Config* is defined. The resources defined herein are referred to from other parts of the configuration to determine which resource the UE shall use for which report. If the network includes of *resourceToAddModListExt*, it includes the same number of entries, and listed in the same order, as in *resourceToAddModList*.
secondTPCFieldDCI-1-1, secondTPCFieldDCI-1-2
A second TPC field can be configured via RRC for DCI-1-1 and DCI-1-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1.

spatialRelationInfoToAddModList, spatialRelationInfoToAddModListSizeExt , spatialRelationInfoToAddModListExt
Configuration of the spatial relation between a reference RS and PUCCH. Reference RS can be SSB/CSI-RS/SRS. If the list has more than one element, MAC-CE selects a single element (see TS 38.321 [3], clause 5.18.8 and TS 38.213 [13], clause 9.2.2). The UE shall consider entries in *spatialRelationInfoToAddModList* and in *spatialRelationInfoToAddModListSizeExt* as a single list, i.e. an entry created using *spatialRelationInfoToAddModList* can be modified using *spatialRelationInfoToAddModListSizeExt* (or deleted using *spatialRelationInfoToReleaseListSizeExt*) and vice-versa. If the network includes *spatialRelationInfoToAddModListExt*, it includes the same number of entries, and listed in the same order, as in the concatenation of *spatialRelationInfoToAddModList* and of *spatialRelationInfoToAddModListSizeExt*. If *unifiedTCI-StateType* is configured for the serving cell, no element in this list is configured.
spatialRelationInfoToReleaseList, spatialRelationInfoToReleaseListSizeExt, spatialRelationInfoToReleaseListExt
Lists of spatial relation configurations between a reference RS and PUCCH to be released by the UE.
sps-PUCCH-AN-List
Indicates a list of PUCCH resources for DL SPS HARQ ACK. The field *maxPayloadSize* is absent for the first and the last *SPS-PUCCH-AN* in the list. If configured, this overrides *n1PUCCH-AN* in *SPS-config.*
sps-PUCCH-AN-ListMulticast
The field is used to configure the list of PUCCH resources per HARQ ACK codebook for MBS multicast.
subslotLengthForPUCCH
Indicates the sub-slot length for sub-slot based PUCCH feedback in number of symbols (see TS 38.213 [13], clause 9). Value *n2* corresponds to 2 symbols, value *n6* corresponds to 6 symbols, value *n7* corresponds to 7 symbols. For normal CP, the value is either *n2* or *n7*. For extended CP, the value is either *n2* or *n6*.
ul-AccessConfigListDCI-1-1, ul-AccessConfigListDCI-1-2
List of the combinations of cyclic prefix extension and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable, respectively, to DCI format 1_1 and DCI format 1_2. The fields *ul-AccessConfigListDCI-1-1-r16* and *ul-AccessConfigListDCI-1-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.2.2-6). The field *ul-AccessConfigListDCI-1-1-r17* indicates a list which only contains UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.2.2-6A).

PUCCH-format3 **field descriptions**
nrofPRBs
The supported values are 1,2,3,4,5,6,8,9,10,12,15 and 16. The UE shall ignore this field when *format-v1610* is configured.

***PUCCH-FormatConfig, PUCCH-FormatConfigExt* field descriptions**
additionalDMRS
If the field is present, the UE enables 2 DMRS symbols per hop of a PUCCH Format 3 or 4 if both hops are more than X symbols when FH is enabled (X=4). And it enables 4 DMRS symbols for a PUCCH Format 3 or 4 with more than 2X+1 symbols when FH is disabled (X=4). The field is not applicable for format 0, 1 and 2. See TS 38.213 [13], clause 9.2.2.
interslotFrequencyHopping
If the field is present, the UE enables inter-slot frequency hopping when PUCCH Format 0, 1, 2, 3 or 4 is repeated over multiple slots. For a PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. See TS 38.213 [13], clause 9.2.6.
maxCodeRate
Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 0 and 1. See TS 38.213 [13], clause 9.2.5.
maxCodeRateLP
Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 0 and 1. This field configures additional max code rate in the second entry of *PUCCH-ConfigurationList-r16* for multiplexing low-priority (LP) HARQ-ACK and high-priority (HP) UCI in a PUCCH as described Clause 9.2.5.3 of TS 38.213 [13]. The field is absent for the first entry of *PUCCH-ConfigurationList-r16*.
nrofSlots
Number of slots with the same PUCCH. When the field is absent the UE applies the value *n1*. See TS 38.213 [13], clause 9.2.6.
pi2BPSK
If the field is present, the UE uses pi/2 BPSK for UCI symbols instead of QPSK for PUCCH. The field is not applicable for format 0, 1 and 2. See TS 38.213 [13], clause 9.2.5.
rb-SetIndex
Indicates the RB set where PUCCH resource is allocated.
simultaneousHARQ-ACK-CSI
If the field is present, the UE uses simultaneous transmission of CSI and HARQ-ACK feedback with or without SR with PUCCH Format 2, 3 or 4. See TS 38.213 [13], clause 9.2.5. When the field is absent the UE applies the value *off.* The field is not applicable for format 0 and 1.

***PUCCH-Resource, PUCCH-ResourceExt* field descriptions**
format Selection of the PUCCH format (format 0 – 4) and format-specific parameters, see TS 38.213 [13], clause 9.2. *format0* and *format1* are only allowed for a resource in a first PUCCH resource set. *format2*, *format3* and *format4* are only allowed for a resource in non-first PUCCH resource set. The network can only configure *format-v1610* when format is set to *format2* or *format3*. The network only configures *format-v1700* when format is set to *format0*, *format1* or *format4*.
interlace0 This is the only interlace of interlaced PUCCH Format 0 and 1 and the first interlace for interlaced PUCCH Format 2 and 3.
interlace1 A second interlace, in addition to interlace 0, as specified in TS 38.213 [13], clause 9.2.1. For 15kHz SCS, values {0..9} are applicable; for 30kHz SCS, values {0..4} are applicable. For 15kHz SCS, the values of *interlace1* shall satisfy *interlace1*=mod(*interlace0*+X,10) where X=1, -1, or 5.
intraSlotFrequencyHopping Enabling intra-slot frequency hopping, applicable for all types of PUCCH formats. For long PUCCH over multiple slots, the intra and inter slot frequency hopping cannot be enabled at the same time for a UE. See TS 38.213 [13], clause 9.2.1.
nrofPRBs Indicates the number of PRBs used per PUCCH resource for the PUCCH format, see TS 38.213 [13], clause 9.2.1. This field is applicable for PUCCH *format0*, *format1*, and *format4* in FR2-2. The supported values for *format4* are 1,2,3,4,5,6,8,9,10,12,15 and 16.
occ-Index Indicates the orthogonal cover code index (see TS 38.213 [13], clause 9.2.1). This field is applicable when *useInterlacePUCCH-PUSCH-16* is configured.
occ-Length Indicates the orthogonal cover code length (see TS 38.213 [13], clause 9.2.1). This field is applicable when *useInterlacePUCCH-PUSCH-16* is configured.
pucch-RepetitionNrofSlots Configuration of PUCCH repetition factor per PUCCH resource with associated scheduling DCI corresponding to Rel-17 dynamic PUCCH repetition. For a PUCCH resource, if both the field *pucch-RepetitionNrofSlots* and the field *nrofSlots* are present, the field *nrofSlots* is ignored and apply the value of *pucch-RepetitionNrofSlots* corresponding to Rel-17 dynamic PUCCH repetition. If this field is absent in a PUCCH resource with associated scheduling DCI, the UE applies the value of field *nrofSlots*.
pucch-ResourceId Identifier of the PUCCH resource.
secondHopPRB Index of first PRB after frequency hopping of PUCCH. This value is applicable for intra-slot frequency hopping (see TS 38.213 [13], clause 9.2.1) or inter-slot frequency hopping (see TS 38.213 [13], clause 9.2.6).

***PUCCH-ResourceSet* field descriptions**
maxPayloadSize Maximum number of UCI information bits that the UE may transmit using this PUCCH resource set (see TS 38.213 [13], clause 9.2.1). In a PUCCH occurrence, the UE chooses the first of its *PUCCH-ResourceSet* which supports the number of bits that the UE wants to transmit. The field is absent in the first set (Set0) and in the last configured set since the UE derives the maximum number of UCI information bits as specified in TS 38.213 [13], clause 9.2.1. This field can take integer values that are multiples of 4.
resourceList PUCCH resources of *format0* and *format1* are only allowed in the first PUCCH resource set, i.e., in a PUCCH-ResourceSet with *pucch-ResourceSetId* = 0. This set may contain between 1 and 32 resources. PUCCH resources of *format2*, *format3* and *format4* are only allowed in a *PUCCH-ResourceSet* with *pucch-ResourceSetId* > 0. If present, these sets contain between 1 and 8 resources each. The UE chooses a *PUCCH-Resource* from this list as specified in TS 38.213 [13], clause 9.2.3. Note that this list contains only a list of resource IDs. The actual resources are configured in *PUCCH-Config*.

Conditional Presence	Explanation
PI2-BPSK	The field is optionally present, Need R, if *format3* and/or *format4* are configured and *pi2BPSK* is configured in each of them. It is absent, Need R otherwise.

– *PUCCH-ConfigCommon*

The IE *PUCCH-ConfigCommon* is used to configure the cell specific PUCCH parameters.

PUCCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PUCCH-CONFIGCOMMON-START

PUCCH-ConfigCommon ::=              SEQUENCE {
    pucch-ResourceCommon                INTEGER (0..15)                                         OPTIONAL,   -- Cond InitialBWP-Only
    pucch-GroupHopping                  ENUMERATED { neither, enable, disable },
    hoppingId                           INTEGER (0..1023)                                       OPTIONAL,   -- Need R
    p0-nominal                          INTEGER (-202..24)                                      OPTIONAL,   -- Need R
    ...,
    [[
    nrofPRBs                            INTEGER (1..16)                                         OPTIONAL,   -- Need R
    intra-SlotFH-r17                    ENUMERATED {fromLowerEdge, fromUpperEdge}               OPTIONAL,   -- Cond InitialBWP-RedCapOnly
    pucch-ResourceCommonRedCap-r17     INTEGER (0..15)                                         OPTIONAL,   -- Cond InitialBWP-RedCap
    additionalPRBOffset-r17                 ENUMERATED {n2, n3, n4, n6, n8, n9, n10, n12}       OPTIONAL    -- Cond InitialBWP-RedCapOnly
    ]]
}

-- TAG-PUCCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

***PUCCH-ConfigCommon* field descriptions**
additionalPRBOffset
When intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is disabled, each common PUCCH resource is mapped to a single PRB on one side of the UL BWP. This parameter determines an additional PRB offset in the PRB mapping for the PUCCH resource. If the field is not configured, the UE shall assume an additional PRB offset of zero.
hoppingId
Cell-specific scrambling ID for group hopping and sequence hopping if enabled, see TS 38.211 [16], clause 6.3.2.2.
intra-SlotFH-r17
In case a separate initial UL BWP is configured for RedCap UEs, the presence of this parameter indicates whether intra-slot PUCCH frequency hopping within the separate initial UL BWP in the common PUCCH resource is enabled for RedCap UEs. If this field is absent, intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is enabled. If this field is present, intra-slot PUCCH frequency hopping within RedCap-specific initial UL BWP is disabled and each PUCCH resource is mapped to a single PRB on one side of the UL BWP and this parameter determines whether the PRB index in the PRB mapping is counted in increasing order from the lower edge or in decreasing order from the upper edge of the UL BWP.
nrofPRBs
Indicates the number of PRBs used per PUCCH resource for PUCCH format 0 and format 1 in FR2-2, see TS 38.213 [13], clause 9.2.1.
p0-nominal
Power control parameter P0 for PUCCH transmissions. Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.2).
pucch-GroupHopping
Configuration of group- and sequence hopping for all the PUCCH formats 0, 1, 3 and 4. Value *neither* implies neither group or sequence hopping is enabled. Value *enable* enables group hopping and disables sequence hopping. Value *disable* disables group hopping and enables sequence hopping (see TS 38.211 [16], clause 6.3.2.2).
pucch-ResourceCommon
An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters. The UE uses those PUCCH resources until it is provided with a dedicated *PUCCH-Config* (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated *PUCCH-Config* for that bandwidth part the UE applies that one instead of the one provided in this field (see TS 38.213 [13], clause 9.2).
pucch-ResourceCommonRedCap
An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters for RedCap UEs. The UE uses those PUCCH resources until it is provided with a dedicated *PUCCH-Config* (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated *PUCCH-Config* for that bandwidth part the UE applies that one instead of the one provided in this field (see TS 38.213 [13], clause 9.2).

Conditional Presence	Explanation
InitialBWP-Only	The field is mandatory present in the *PUCCH-ConfigCommon* of the initial BWP (BWP#0) in SIB1. It is absent in other BWPs including the RedCap-specific initial uplink BWP, if configured.
InitialBWP-RedCap	The field is mandatory present in the *PUCCH-ConfigCommon* of the RedCap-specific initial BWP. It is optional present, Need R, in the *PUCCH-ConfigCommon* of the initial BWP configured by *initialUplinkBWP*. It is absent in other BWPs.
InitialBWP-RedCapOnly	The field is optional present, Need S, in the PUCCH-ConfigCommon of the RedCap-specific initial BWP. It is absent in other BWPs.

– *PUCCH-ConfigurationList*

The IE *PUCCH-ConfigurationList* is used to configure UE specific PUCCH parameters (per BWP) for two simultaneously constructed HARQ-ACK codebooks. See TS 38.213 [13], clause 9.1.

PUCCH-ConfigurationList information element

```
-- ASN1START
-- TAG-PUCCH-CONFIGURATIONLIST-START

PUCCH-ConfigurationList-r16  ::=     SEQUENCE (SIZE (1..2)) OF PUCCH-Config

-- TAG-PUCCH-CONFIGURATIONLIST-STOP
-- ASN1STOP
```

– *PUCCH-PathlossReferenceRS-Id*

The IE *PUCCH-PathlossReferenceRS-Id* is an ID for a reference signal (RS) configured as PUCCH pathloss reference (see TS 38.213 [13], clause 7.2).

***PUCCH-PathlossReferenceRS-Id* information element**

```
-- ASN1START
-- TAG-PUCCH-PATHLOSSREFERENCERS-ID-START

PUCCH-PathlossReferenceRS-Id ::=            INTEGER (0..maxNrofPUCCH-PathlossReferenceRSs-1)

PUCCH-PathlossReferenceRS-Id-v1610 ::=      INTEGER (maxNrofPUCCH-PathlossReferenceRSs..maxNrofPUCCH-PathlossReferenceRSs-1-r16)

PUCCH-PathlossReferenceRS-Id-r17 ::=        INTEGER (0..maxNrofPUCCH-PathlossReferenceRSs-1-r17)

-- TAG-PUCCH-PATHLOSSREFERENCERS-ID-STOP
-- ASN1STOP
```

– *PUCCH-PowerControl*

The IE *PUCCH-PowerControl* is used to configure UE-specific parameters for the power control of PUCCH.

***PUCCH-PowerControl* information element**

```
-- ASN1START
-- TAG-PUCCH-POWERCONTROL-START
PUCCH-PowerControl ::=              SEQUENCE {
    deltaF-PUCCH-f0                     INTEGER (-16..15)                                                   OPTIONAL, -- Need R
    deltaF-PUCCH-f1                     INTEGER (-16..15)                                                   OPTIONAL, -- Need R
    deltaF-PUCCH-f2                     INTEGER (-16..15)                                                   OPTIONAL, -- Need R
    deltaF-PUCCH-f3                     INTEGER (-16..15)                                                   OPTIONAL, -- Need R
    deltaF-PUCCH-f4                     INTEGER (-16..15)                                                   OPTIONAL, -- Need R
    p0-Set                              SEQUENCE (SIZE (1..maxNrofPUCCH-P0-PerSet)) OF P0-PUCCH             OPTIONAL, -- Need M
    pathlossReferenceRSs                SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSs)) OF PUCCH-PathlossReferenceRS
                                                                                                            OPTIONAL, -- Need M
    twoPUCCH-PC-AdjustmentStates        ENUMERATED {twoStates}                                              OPTIONAL, -- Need S
    ...,
```

```
    [[
    pathlossReferenceRSs-v1610          SetupRelease { PathlossReferenceRSs-v1610 }                         OPTIONAL -- Need M
    ]]
}

P0-PUCCH ::=                            SEQUENCE {
    p0-PUCCH-Id                             P0-PUCCH-Id,
    p0-PUCCH-Value                          INTEGER (-16..15)
}

P0-PUCCH-Id ::=                         INTEGER (1..8)

PathlossReferenceRSs-v1610 ::=          SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSsDiff-r16)) OF PUCCH-PathlossReferenceRS-r16

PUCCH-PathlossReferenceRS ::=               SEQUENCE {
    pucch-PathlossReferenceRS-Id            PUCCH-PathlossReferenceRS-Id,
    referenceSignal                         CHOICE {
        ssb-Index                               SSB-Index,
        csi-RS-Index                            NZP-CSI-RS-ResourceId
    }
}

PUCCH-PathlossReferenceRS-r16 ::=               SEQUENCE {
    pucch-PathlossReferenceRS-Id-r16                PUCCH-PathlossReferenceRS-Id-v1610,
    referenceSignal-r16                             CHOICE {
        ssb-Index-r16                                   SSB-Index,
        csi-RS-Index-r16                                NZP-CSI-RS-ResourceId
    }
}

PUCCH-PowerControlSetInfo-r17 ::=       SEQUENCE {
    pucch-PowerControlSetInfoId-r17         PUCCH-PowerControlSetInfoId-r17,
    p0-PUCCH-Id-r17                         P0-PUCCH-Id,
    pucch-ClosedLoopIndex-r17               ENUMERATED { i0, i1 },
    pucch-PathlossReferenceRS-Id-r17        PUCCH-PathlossReferenceRS-Id-r17
}

PUCCH-PowerControlSetInfoId-r17 ::=     INTEGER (1.. maxNrofPowerControlSetInfos-r17)

-- TAG-PUCCH-POWERCONTROL-STOP
-- ASN1STOP
```

***P0-PUCCH* field descriptions**
p0-PUCCH-Value P0 value for PUCCH with 1dB step size.

***PUCCH-PowerControl* field descriptions**
deltaF-PUCCH-f0 deltaF for PUCCH format 0 with 1dB step size (see TS 38.213 [13], clause 7.2).
deltaF-PUCCH-f1 deltaF for PUCCH format 1 with 1dB step size (see TS 38.213 [13], clause 7.2).
deltaF-PUCCH-f2 deltaF for PUCCH format 2 with 1dB step size (see TS 38.213 [13], clause 7.2).
deltaF-PUCCH-f3 deltaF for PUCCH format 3 with 1dB step size (see TS 38.213 [13], clause 7.2).
deltaF-PUCCH-f4 deltaF for PUCCH format 4 with 1dB step size (see TS 38.213 [13], clause 7.2).
p0-Set A set with dedicated P0 values for PUCCH, i.e., {P01, P02,... } (see TS 38.213 [13], clause 7.2).
pathlossReferenceRSs, pathlossReferenceRSs-v1610 A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUCCH pathloss estimation. Up to *maxNrofPUCCH-PathlossReference-RSs* may be configured. If the field is not configured, the UE uses the SSB as reference signal (see TS 38.213 [13], clause 7.2). The set includes Reference Signals indicated in pathlossReferenceRSs (without suffix) and in pathlossReferenceRSs-v1610. The UE maintains *pathlossReferenceRSs* and *pathlossReferenceRSs-v1610* separately: Receiving *pathlossReferenceRSs-v1610* set to *release* releases only the entries that were configured by *pathlossReferenceRSs-v1610*, and receiving *pathlossReferenceRSs-v1610* set to *setup* replaces only the entries that were configured by *pathlossReferenceRSs-v1610* with the newly signalled entries.
twoPUCCH-PC-AdjustmentStates Number of PUCCH power control adjustment states maintained by the UE (i.e., g(i)). If the field is present (n2) the UE maintains two power control states (i.e., g(i,0) and g(i,1)). If the field is absent, it maintains one power control state (i.e., g(i,0)) (see TS 38.213 [13], clause 7.2).

– *PUCCH-SpatialRelationInfo*

The IE *PUCCH-SpatialRelationInfo* is used to configure the spatial setting for PUCCH transmission and the parameters for PUCCH power control, see TS 38.213, [13], clause 9.2.2.

***PUCCH-SpatialRelationInfo* information element**

```
-- ASN1START
-- TAG-PUCCH-SPATIALRELATIONINFO-START

PUCCH-SpatialRelationInfo ::=           SEQUENCE {
    pucch-SpatialRelationInfoId         PUCCH-SpatialRelationInfoId,
    servingCellId                           ServCellIndex                                   OPTIONAL,   -- Need S
    referenceSignal                         CHOICE {
        ssb-Index                               SSB-Index,
        csi-RS-Index                            NZP-CSI-RS-ResourceId,
        srs                                     PUCCH-SRS
    },
    pucch-PathlossReferenceRS-Id            PUCCH-PathlossReferenceRS-Id,
    p0-PUCCH-Id                             P0-PUCCH-Id,
    closedLoopIndex                         ENUMERATED { i0, i1 }
}

PUCCH-SpatialRelationInfoExt-r16 ::=        SEQUENCE {
```

```
    pucch-SpatialRelationInfoId-v1610         PUCCH-SpatialRelationInfoId-v1610                    OPTIONAL,   -- Need S
    pucch-PathlossReferenceRS-Id-v1610        PUCCH-PathlossReferenceRS-Id-v1610                   OPTIONAL,    --Need R
    ...
}

PUCCH-SRS ::=                       SEQUENCE {
    resource                            SRS-ResourceId,
    uplinkBWP                           BWP-Id
}

-- TAG-PUCCH-SPATIALRELATIONINFO-STOP
-- ASN1STOP
```

***PUCCH-SpatialRelationInfo* field descriptions**
pucch-PathLossReferenceRS-Id When *pucch-PathLossReferenceRS-Id-v1610* is configured, the UE shall ignore *pucch-PathLossReferenceRS-Id* (without suffix).
pucch-SpatialRelationInfoId When *pucch-SpatialRelationInfoId-v1610* is configured, the UE shall ignore *pucch-SpatialRelationInfoId* (without suffix). If *pucch-SpatialRelationInfoId-v1610 is* absent, the UE shall use the *pucch-SpatialRelationInfoId* (without suffix).
servingCellId If the field is absent, the UE applies the *ServCellId* of the serving cell in which this *PUCCH-SpatialRelationInfo* is configured

– *PUCCH-SpatialRelationInfo-Id*

The IE *PUCCH-SpatialRelationInfo-Id* is used to identify a *PUCCH-SpatialRelationInfo*

***PUCCH-SpatialRelationInfo-Id* information element**

```
-- ASN1START
-- TAG-PUCCH-SPATIALRELATIONINFO-START

PUCCH-SpatialRelationInfoId ::=         INTEGER (1..maxNrofSpatialRelationInfos)

PUCCH-SpatialRelationInfoId-r16 ::=     INTEGER (1..maxNrofSpatialRelationInfos-r16)

PUCCH-SpatialRelationInfoId-v1610::=    INTEGER (maxNrofSpatialRelationInfos-plus-1..maxNrofSpatialRelationInfos-r16)

-- TAG-PUCCH-SPATIALRELATIONINFO-STOP
-- ASN1STOP
```

– *PUCCH-TPC-CommandConfig*

The IE *PUCCH-TPC-CommandConfig* is used to configure the UE for extracting TPC commands for PUCCH from a group-TPC messages on DCI.

PUCCH-TPC-CommandConfig information element

```
-- ASN1START
-- TAG-PUCCH-TPC-COMMANDCONFIG-START

PUCCH-TPC-CommandConfig ::=             SEQUENCE {
    tpc-IndexPCell                          INTEGER (1..15)                         OPTIONAL,   -- Cond PDCCH-OfSpcell
    tpc-IndexPUCCH-SCell                    INTEGER (1..15)                         OPTIONAL,   -- Cond PDCCH-ofSpCellOrPUCCH-SCell
    ...,
    [[
    tpc-IndexPUCCH-sSCell-r17                               INTEGER (1..15)                     OPTIONAL,  -- Need R
    tpc-IndexPUCCH-sSCellSecondaryPUCCHgroup-r17            INTEGER (1..15)                     OPTIONAL   -- Cond twoPUCCHgroup
    ]]
}

-- TAG-PUCCH-TPC-COMMANDCONFIG-STOP
-- ASN1STOP
```

***PUCCH-TPC-CommandConfig* field descriptions**
tpc-IndexPCell An index determining the position of the first bit of TPC command (applicable to the SpCell) inside the DCI format 2-2 payload.
tpc-IndexPUCCH-SCell An index determining the position of the first bit of TPC command (applicable to the PUCCH SCell) inside the DCI format 2-2 payload.
tpc-IndexPUCCH-sSCell, tpc-IndexPUCCH-sSCellSecondaryPUCCHgroup An index determining the position of the first bit of TPC command (applicable to the alternative PUCCH cell for PUCCH cell switching) inside the DCI format 2-2 payload, for the primary PUCCH group and the secondary PUCCH group respectively.

Conditional Presence	Explanation
PDCCH-OfSpcell	The field is mandatory present if the *PUCCH-TPC-CommandConfig* is provided in the *PDCCH-Config* for the SpCell. Otherwise, the field is absent, Need R.
PDCCH-ofSpCellOrPUCCH-SCell	The field is mandatory present if the *PUCCH-TPC-CommandConfig* is provided in the *PDCCH-Config* for the PUCCH-SCell. The field is optionally present, need R, if the UE is configured with a PUCCH SCell in this cell group and if the *PUCCH-TPC-CommandConfig* is provided in the *PDCCH-Config* for the SpCell. Otherwise, the field is absent, Need R.
twoPUCCHgroup	This field is optionally present, Need R, if secondary PUCCH group is configured. It is absent otherwise.

– *PUSCH-Config*

The IE *PUSCH-Config* is used to configure the UE specific PUSCH parameters applicable to a particular BWP.

PUSCH-Config information element

```
-- ASN1START
-- TAG-PUSCH-CONFIG-START
```

```
PUSCH-Config ::=                        SEQUENCE {
    dataScramblingIdentityPUSCH             INTEGER (0..1023)                                                   OPTIONAL,   -- Need S
    txConfig                                ENUMERATED {codebook, nonCodebook}                                  OPTIONAL,   -- Need S
    dmrs-UplinkForPUSCH-MappingTypeA        SetupRelease { DMRS-UplinkConfig }                                  OPTIONAL,   -- Need M
    dmrs-UplinkForPUSCH-MappingTypeB        SetupRelease { DMRS-UplinkConfig }                                  OPTIONAL,   -- Need M
    pusch-PowerControl                      PUSCH-PowerControl                                                  OPTIONAL,   -- Need M
    frequencyHopping                        ENUMERATED {intraSlot, interSlot}                                   OPTIONAL,   -- Need S
    frequencyHoppingOffsetLists             SEQUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)
                                                                                                                OPTIONAL,   -- Need M
    resourceAllocation                      ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch},
    pusch-TimeDomainAllocationList          SetupRelease { PUSCH-TimeDomainResourceAllocationList }             OPTIONAL,   -- Need M
    pusch-AggregationFactor                 ENUMERATED { n2, n4, n8 }                                           OPTIONAL,   -- Need S
    mcs-Table                               ENUMERATED {qam256, qam64LowSE}                                     OPTIONAL,   -- Need S
    mcs-TableTransformPrecoder              ENUMERATED {qam256, qam64LowSE}                                     OPTIONAL,   -- Need S
    transformPrecoder                       ENUMERATED {enabled, disabled}                                      OPTIONAL,   -- Need S
    codebookSubset                          ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}
                                                                                                                OPTIONAL, -- Cond codebookBased
    maxRank                                 INTEGER (1..4)                                                      OPTIONAL, -- Cond codebookBased
    rbg-Size                                ENUMERATED { config2}                                               OPTIONAL, -- Need S
    uci-OnPUSCH                             SetupRelease { UCI-OnPUSCH}                                         OPTIONAL, -- Need M
    tp-pi2BPSK                              ENUMERATED {enabled}                                                OPTIONAL, -- Need S
    ...,
    [[
    minimumSchedulingOffsetK2-r16           SetupRelease { MinSchedulingOffsetK2-Values-r16 }                   OPTIONAL,  -- Need M
    ul-AccessConfigListDCI-0-1-r16          SetupRelease { UL-AccessConfigListDCI-0-1-r16 }                     OPTIONAL,  -- Need M
    -- Start of the parameters for DCI format 0_2 introduced in V16.1.0
    harq-ProcessNumberSizeDCI-0-2-r16                   INTEGER (0..4)                                          OPTIONAL,   -- Need R
    dmrs-SequenceInitializationDCI-0-2-r16              ENUMERATED {enabled}                                    OPTIONAL,   -- Need S
    numberOfBitsForRV-DCI-0-2-r16                       INTEGER (0..2)                                          OPTIONAL,   -- Need R
    antennaPortsFieldPresenceDCI-0-2-r16                ENUMERATED {enabled}                                    OPTIONAL,   -- Need S
    dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2-r16        SetupRelease { DMRS-UplinkConfig }                      OPTIONAL,   -- Need M
    dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2-r16        SetupRelease { DMRS-UplinkConfig }                      OPTIONAL,   -- Need M
    frequencyHoppingDCI-0-2-r16                         CHOICE {
        pusch-RepTypeA                                      ENUMERATED {intraSlot, interSlot},
        pusch-RepTypeB                                      ENUMERATED {interRepetition, interSlot}
    }                                                                                                           OPTIONAL,   -- Need S
    frequencyHoppingOffsetListsDCI-0-2-r16  SetupRelease { FrequencyHoppingOffsetListsDCI-0-2-r16}              OPTIONAL,  -- Need M
    codebookSubsetDCI-0-2-r16               ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent,nonCoherent}
                                                                                                                OPTIONAL,   -- Cond codebookBased
    invalidSymbolPatternIndicatorDCI-0-2-r16            ENUMERATED {enabled}                                    OPTIONAL,   -- Need S
    maxRankDCI-0-2-r16                                  INTEGER (1..4)                                          OPTIONAL,   -- Cond codebookBased
    mcs-TableDCI-0-2-r16                                ENUMERATED {qam256, qam64LowSE}                         OPTIONAL,   -- Need S
    mcs-TableTransformPrecoderDCI-0-2-r16               ENUMERATED {qam256, qam64LowSE}                         OPTIONAL,   -- Need S
    priorityIndicatorDCI-0-2-r16                        ENUMERATED {enabled}                                    OPTIONAL,   -- Need S
    pusch-RepTypeIndicatorDCI-0-2-r16                   ENUMERATED { pusch-RepTypeA, pusch-RepTypeB}            OPTIONAL,  -- Need R
    resourceAllocationDCI-0-2-r16                       ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                                                                                                OPTIONAL,   -- Need M
    resourceAllocationType1GranularityDCI-0-2-r16       ENUMERATED { n2,n4,n8,n16 }                             OPTIONAL,   -- Need S
    uci-OnPUSCH-ListDCI-0-2-r16                         SetupRelease { UCI-OnPUSCH-ListDCI-0-2-r16}             OPTIONAL,   -- Need M
    pusch-TimeDomainAllocationListDCI-0-2-r16           SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                                OPTIONAL,   -- Need M
    -- End of the parameters for DCI format 0_2 introduced in V16.1.0
    -- Start of the parameters for DCI format 0_1 introduced in V16.1.0
    pusch-TimeDomainAllocationListDCI-0-1-r16           SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
```

```
                                                                                                                    OPTIONAL,    -- Need M
    invalidSymbolPatternIndicatorDCI-0-1-r16          ENUMERATED {enabled}                                          OPTIONAL,    -- Need S
    priorityIndicatorDCI-0-1-r16                      ENUMERATED {enabled}                                          OPTIONAL,    -- Need S
    pusch-RepTypeIndicatorDCI-0-1-r16                 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB}                  OPTIONAL,    -- Need R
    frequencyHoppingDCI-0-1-r16                   ENUMERATED {interRepetition, interSlot}                           OPTIONAL,    -- Cond RepTypeB
    uci-OnPUSCH-ListDCI-0-1-r16                   SetupRelease { UCI-OnPUSCH-ListDCI-0-1-r16  }                     OPTIONAL,   -- Need M
    -- End of the parameters for DCI format 0_1 introduced in V16.1.0
    invalidSymbolPattern-r16                      InvalidSymbolPattern-r16                                          OPTIONAL,    -- Need S
    pusch-PowerControl-v1610                  SetupRelease {PUSCH-PowerControl-v1610}                               OPTIONAL,    -- Need M
    ul-FullPowerTransmission-r16              ENUMERATED {fullpower, fullpowerMode1, fullpowerMode2}                 OPTIONAL,    -- Need R
    pusch-TimeDomainAllocationListForMultiPUSCH-r16  SetupRelease { PUSCH-TimeDomainResourceAllocationList-r16 }
                                                                                                                    OPTIONAL,   --  Need M
    numberOfInvalidSymbolsForDL-UL-Switching-r16       INTEGER (1..4)                                               OPTIONAL    -- Cond RepTypeB2
    ]],
    [[
    ul-AccessConfigListDCI-0-2-r17            SetupRelease { UL-AccessConfigListDCI-0-2-r17 }                       OPTIONAL,   -- Need M
    betaOffsetsCrossPri0-r17                  SetupRelease { BetaOffsetsCrossPriSel-r17 }                           OPTIONAL,   -- Need M
    betaOffsetsCrossPri1-r17                  SetupRelease { BetaOffsetsCrossPriSel-r17 }                           OPTIONAL,   -- Need M
    betaOffsetsCrossPri0DCI-0-2-r17           SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17 }                    OPTIONAL,   -- Need M
    betaOffsetsCrossPri1DCI-0-2-r17           SetupRelease { BetaOffsetsCrossPriSelDCI-0-2-r17 }                    OPTIONAL,   -- Need M
    mappingPattern-r17                        ENUMERATED {cyclicMapping, sequentialMapping}                         OPTIONAL,   -- Cond SRSsets
    secondTPCFieldDCI-0-1-r17                 ENUMERATED {enabled}                                                  OPTIONAL,   -- Need R
    secondTPCFieldDCI-0-2-r17                 ENUMERATED {enabled}                                                  OPTIONAL,   -- Need R
    sequenceOffsetForRV-r17                   INTEGER (0..3)                                                        OPTIONAL,   -- Need R
    ul-AccessConfigListDCI-0-1-r17            SetupRelease { UL-AccessConfigListDCI-0-1-r17 }                        OPTIONAL,   -- Need M
    minimumSchedulingOffsetK2-r17             SetupRelease { MinSchedulingOffsetK2-Values-r17 }                      OPTIONAL,   -- Need M
    availableSlotCounting-r17                 ENUMERATED { enabled }                                                OPTIONAL,   -- Need S
    dmrs-BundlingPUSCH-Config-r17             SetupRelease { DMRS-BundlingPUSCH-Config-r17 }                         OPTIONAL,   -- Need M
    harq-ProcessNumberSizeDCI-0-2-v1700       INTEGER (5)                                                           OPTIONAL,   -- Need R
    harq-ProcessNumberSizeDCI-0-1-r17         INTEGER (5)                                                           OPTIONAL,   -- Need R
    mpe-ResourcePoolToAddModList-r17        SEQUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-Resource-r17    OPTIONAL,   -- Need N
    mpe-ResourcePoolToReleaseList-r17       SEQUENCE (SIZE(1..maxMPE-Resources-r17)) OF MPE-ResourceId-r17  OPTIONAL    -- Need N
    ]]
}

UCI-OnPUSCH ::=                         SEQUENCE {
    betaOffsets                             CHOICE {
        dynamic                             SEQUENCE (SIZE (4)) OF BetaOffsets,
        semiStatic                          BetaOffsets
    }                                                                                                   OPTIONAL, -- Need M
    scaling                                 ENUMERATED { f0p5, f0p65, f0p8, f1 }
}

MinSchedulingOffsetK2-Values-r16 ::=    SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r16)

MinSchedulingOffsetK2-Values-r17 ::=    SEQUENCE (SIZE (1..maxNrOfMinSchedulingOffsetValues-r16)) OF INTEGER (0..maxK2-SchedulingOffset-r17)

UCI-OnPUSCH-DCI-0-2-r16 ::=             SEQUENCE {
    betaOffsetsDCI-0-2-r16                  CHOICE {
        dynamicDCI-0-2-r16                      CHOICE {
            oneBit-r16                              SEQUENCE (SIZE (2)) OF BetaOffsets,
            twoBits-r16                             SEQUENCE (SIZE (4)) OF BetaOffsets
        },
        semiStaticDCI-0-2-r16           BetaOffsets
```

```
    }                                                                                   OPTIONAL,    -- Need M
    scalingDCI-0-2-r16                ENUMERATED { f0p5, f0p65, f0p8, f1 }
}

FrequencyHoppingOffsetListsDCI-0-2-r16 ::=  SEQUENCE (SIZE (1..4)) OF INTEGER (1.. maxNrofPhysicalResourceBlocks-1)

UCI-OnPUSCH-ListDCI-0-2-r16 ::=  SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH-DCI-0-2-r16

UCI-OnPUSCH-ListDCI-0-1-r16 ::=  SEQUENCE (SIZE (1..2)) OF UCI-OnPUSCH

UL-AccessConfigListDCI-0-1-r16 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)

UL-AccessConfigListDCI-0-1-r17 ::= SEQUENCE (SIZE (1..3)) OF INTEGER (0..2)

UL-AccessConfigListDCI-0-2-r17 ::= SEQUENCE (SIZE (1..64)) OF INTEGER (0..63)

BetaOffsetsCrossPriSel-r17 ::= CHOICE {
    dynamic-r17         SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17,
    semiStatic-r17          BetaOffsetsCrossPri-r17
}

BetaOffsetsCrossPriSelDCI-0-2-r17 ::= CHOICE {
    dynamicDCI-0-2-r17      CHOICE {
        oneBit-r17              SEQUENCE (SIZE (2)) OF BetaOffsetsCrossPri-r17,
        twoBits-r17             SEQUENCE (SIZE (4)) OF BetaOffsetsCrossPri-r17
    },
    semiStaticDCI-0-2-r17   BetaOffsetsCrossPri-r17
}

MPE-Resource-r17 ::=        SEQUENCE {
    mpe-ResourceId-r17          MPE-ResourceId-r17,
    cell-r17                    ServCellIndex                                       OPTIONAL,    -- Need R
    additionalPCI-r17           AdditionalPCIIndex-r17                              OPTIONAL,    -- Need R
    mpe-ReferenceSignal-r17     CHOICE {
        csi-RS-Resource-r17         NZP-CSI-RS-ResourceId,
        ssb-Resource-r17            SSB-Index
    }
}

MPE-ResourceId-r17 ::=      INTEGER (1..maxMPE-Resources-r17)

-- TAG-PUSCH-CONFIG-STOP
-- ASN1STOP
```

***PUSCH-Config* field descriptions**
antennaPortsFieldPresenceDCI-0-2
Configure the presence of "Antenna ports" field in DCI format 0_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0_2. Otherwise, the field size is set to 0 for DCI format 0_2 (See TS 38.212 [17], clause 7.3.1.1.3). If neither *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* nor *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* is configured, this field is absent.
availableSlotCounting
Indicate whether PUSCH repetitions counted on the basis of available slots is enabled. If the field is absent, PUSCH repetitions counted on the basis of available slots is disabled.
betaOffsetsCrossPri0, betaOffsetsCrossPri1, betaOffsetsCrossPri0DCI-0-2, betaOffsetsCrossPri1DCI-0-2
Selection between and configuration of dynamic and semi-static beta-offset for multiplexing HARQ-ACK on dynamically scheduled PUSCH with different priorities, see TS 38.213 [13], clause 9.3. The field *betaOffsetsCrossPrio0* indicates multiplexing low priority (LP) HARQ-ACK on dynamically scheduled high priority (HP) PUSCH. The field *betaOffsetsCrossPrio1* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH. The field *betaOffsetsCrossPrio0DCI-0-2* indicates multiplexing LP HARQ-ACK on dynamically scheduled HP PUSCH by DCI format 0_2. The field *betaOffsetsCrossPrio1DCI-0-2* indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH by DCI format 0_2.
codebookSubset, codebookSubsetDCI-0-2
Subset of PMIs addressed by TPMI, where PMIs are those supported by UEs with maximum coherence capabilities (see TS 38.214 [19], clause 6.1.1.1). The field *codebookSubset* applies to DCI format 0_1 and the field *codebookSubsetDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1).
dataScramblingIdentityPUSCH
Identifier used to initialise data scrambling (c_init) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1).
dmrs-BundlingPUSCH-Config
Configure the parameters for DMRS bundling for PUSCH (see TS 38.214 [19], clause 6.1.7). In this release, this is not applicable to FR2-2.
dmrs-SequenceInitializationDCI-0-2
Configure whether the field "DMRS Sequence Initialization" is present or not in DCI format 0_2. If the field is absent, then 0 bit for the field "DMRS Sequence Initialization" in DCI format 0_2. If the field is present, then the number of bits is determined in the same way as DCI format 0_1 (see TS 38.212 [17], clause 7.3.1).
dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2
DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeA* applies to DCI format 0_1 and the field *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).
dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2
DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via *PUSCH-TimeDomainResourceAllocation*). Only the fields *dmrs-Type*, *dmrs-AdditionalPosition* and *maxLength* may be set differently for mapping type A and B. The field *dmrs-UplinkForPUSCH-MappingTypeB* applies to DCI format 0_1 and the field *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).
frequencyHopping
The value *intraSlot* enables 'Intra-slot frequency hopping' and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3). The field *frequencyHopping* applies to DCI format 0_0 and 0_1 for 'pusch-RepTypeA'.
frequencyHoppingDCI-0-1
Indicates the frequency hopping scheme for DCI format 0_1 when *pusch-RepTypeIndicatorDCI-0-1* is set to 'pusch-RepTypeB', The value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured for DCI format 0_1 for 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1).
frequencyHoppingDCI-0-2
Indicate the frequency hopping scheme for DCI format 0_2. The value *intraSlot* enables 'intra-slot frequency hopping', and the value *interRepetition* enables 'Inter-repetition frequency hopping', and the value *interSlot* enables 'Inter-slot frequency hopping'. When *pusch-RepTypeIndicatorDCI-0-2* is not set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'intra-slot frequency hopping and 'inter-slot frequency hopping' if enabled. When *pusch-RepTypeIndicatorDCI-0-2* is set to '*pusch-RepTypeB*', the frequency hopping scheme can be chosen between 'inter-repetition frequency hopping' and 'inter-slot frequency hopping' if enabled. If the field is absent, frequency hopping is not configured for DCI format 0_2 (see TS 38.214 [19], clause 6.3).

frequencyHoppingOffsetLists, frequencyHoppingOffsetListsDCI-0-2 Set of frequency hopping offsets used when frequency hopping is enabled for granted transmission (not msg3) and type 2 configured grant activation (see TS 38.214 [19], clause 6.3). The field *frequencyHoppingOffsetLists* applies to DCI format 0_0 and DCI format 0_1 and the field *frequencyHoppingOffsetListsDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.3).
harq-ProcessNumberSizeDCI-0-2 Configure the number of bits for the field "HARQ process number" in DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).
invalidSymbolPattern Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0_1 and 0_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols (see TS 38.214 [19] clause 6.1).
invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2 Indicates the presence of an additional bit in the DCI format 0_1/0_2. If *invalidSymbolPattern* is absent, then both *invalidSymbolPatternIndicatorDCI-0-1* and *invalidSymbolPatternIndicatorDCI-0-2* are absent. The field *invalidSymbolPatternIndicatorDCI-0-1* applies to the DCI format 0_1 and the field *invalidSymbolPatternIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19] clause 6.1). If the field is absent, the UE behaviour is specified in TS 38.214 [19], clause 6.1.2.1.
mappingPattern Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook' for PUSCH transmission and the PUSCH transmission occasions are associated with both SRS resource sets.
maxRank, maxRankDCI-0-2 Subset of PMIs addressed by TRIs from 1 to ULmaxRank (see TS 38.214 [19], clause 6.1.1.1). The field *maxRank* applies to DCI format 0_1 and the field *maxRankDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1).
mcs-Table, mcs-TableFormat0-2 Indicates which MCS table the UE shall use for PUSCH without transform precoder (see TS 38.214 [19], clause 6.1.4.1). If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI format 0_0 and DCI format 0_1 and the field *mcs-TableDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).
mcs-TableTransformPrecoder, mcs-TableTransformPrecoderDCI-0-2 Indicates which MCS table the UE shall use for PUSCH with transform precoding (see TS 38.214 [19], clause 6.1.4.1) If the field is absent the UE applies the value 64QAM. The field *mcs-TableTransformPrecoder* applies to DCI format 0_0 and DCI format 0_1 and the field *mcs-TableTransformPrecoderDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).
minimumSchedulingOffsetK2 List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the *Time domain resource assignment* table for PUSCH (see TS 38.214 [19], clause 6.1.2.1).
mpe-ResourcePoolToAddModList List of SSB/CSI-RS resources for P-MPR reporting. Each resource is configured with serving cell index where the resource is configured for the UE. The *additionalPCI* is configured only if the resource is SSB. For each resource, if neither *cell* nor *additionalPCI* is present, the SSB/CSI-RS resource is from the serving cell where the *PUSCH-Config* is configured.
numberOfBitsForRV-DCI-0-2 Configures the number of bits for "Redundancy version" in the DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1).
numberOfInvalidSymbolsForDL-UL-Switching Indicates the number of symbols after the last semi-static DL symbol that are invalid symbols for PUSCH repetition Type B. If it is absent, no symbol is explicitly defined for DL-to-UL switching (see TS 38.214 [19], clause 6.1).
priorityIndicatorDCI-0-1, priorityIndicatorDCI-0-2 Configures the presence of "priority indicator" in DCI format 0_1/0_2. When the field is absent in the IE, then the UE shall apply 0 bit for "Priority indicator" in DCI format 0_1/0_2. The field *priorityIndicatorDCI-0-1* applies to DCI format 0_1 and the field *priorityIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9).
pusch-AggregationFactor Number of repetitions for data (see TS 38.214 [19], clause 6.1.2.1). If the field is absent the UE applies the value 1.

pusch-PowerControl Configures power control parameters PUSCH transmission. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell.
pusch-RepTypeIndicatorDCI-0-1, pusch-RepTypeIndicatorDCI-0-2 Indicates whether UE follows the behavior for "PUSCH repetition type A" or the behavior for "PUSCH repetition type B" for the PUSCH scheduled by DCI format 0_1/0_2 and for Type 2 CG associated with the activating DCI format 0_1/0_2.The value *pusch-RepTypeA* enables the 'PUSCH repetition type A' and the value *pusch-RepTypeB* enables the 'PUSCH repetition type B'. The field *pusch-RepTypeIndicatorDCI-0-1* applies to DCI format 0_1 and the field *pusch-RepTypeIndicatorDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1).
pusch-TimeDomainAllocationList List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI formats 0_0 or DCI format 0_1 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and table 6.1.2.1.1-1A). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*.
pusch-TimeDomainAllocationListDCI-0-1 Configuration of the time domain resource allocation (TDRA) table for DCI format 0_1 (see TS 38.214 [19], clause 6.1, table 6.1.2.1.1-1A).
pusch-TimeDomainAllocationListDCI-0-2 Configuration of the time domain resource allocation (TDRA) table for DCI format 0_2 (see TS 38.214 [19], clause 6.1.2, table 6.1.2.1.1-1B).
pusch-TimeDomainAllocationListForMultiPUSCH Configuration of the time domain resource allocation (TDRA) table for multiple PUSCH (see TS 38.214 [19], clause 6.1.2). The network configures at most 64 rows in this TDRA table in *PUSCH-TimeDomainResourceAllocationList-r16* configured by this field. This field is not configured simultaneously with *pusch-AggregationFactor*. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *pusch-TimeDomainAllocationListDCI-0-1-r16*. The network does not configure the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* simultaneously with the *numberOfSlotsTBoMS-r17*.
rbg-Size Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if *resourceAllocation* is set to *resourceAllocationType1*. Otherwise, the UE applies the value *config1* when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1).
resourceAllocation, resourceAllocationDCI-0-2 Configuration of resource allocation type 0 and resource allocation type 1 for non-fallback DCI (see TS 38.214 [19], clause 6.1.2). The field *resourceAllocation* applies to DCI format 0_1 and the field *resourceAllocationDCI-0-2* applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2).
resourceAllocationType1GranularityDCI-0-2 Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0_2. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2).
secondTPCFieldDCI-0-1, secondTPCFieldDCI-0-2 A second TPC field can be configured via RRC for DCI-0-1 and DCI-0-2. Each TPC field is for each closed-loop index value respectively (i.e., 1st /2nd TPC fields correspond to "closedLoopIndex" value = 0 and 1,
sequenceOffsetForRV Configures the RV offset for the starting RV for the first repetition (first actual repetition in PUSCH repetition Type B) towards the second 'SRS resource set' for PUSCH configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'.
tp-pi2BPSK Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise.
transformPrecoder The UE specific selection of transformer precoder for PUSCH (see TS 38.214 [19], clause 6.1.3). When the field is absent the UE applies the value of the field *msg3-transformPrecoder* from *rach-ConfigCommon* included directly within BWP configuration (i.e., not included in *additionalRACH-ConfigList*).
txConfig Whether UE uses codebook based or non-codebook based transmission (see TS 38.214 [19], clause 6.1.1). If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214 [19], clause 6.1.1.
uci-OnPUSCH-ListDCI-0-1, uci-OnPUSCH-ListDCI-0-2 Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0_1/0_2. The field uci-OnPUSCH-ListDCI-0-1 applies to DCI format 0_1 and the field uci-OnPUSCH-ListDCI-0-2 applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).

ul-AccessConfigListDCI-0-1, ul-AccessConfigListDCI-0-2
List of the combinations of cyclic prefix extension, channel access priority class (CAPC), and UL channel access type (see TS 38.212 [17], clause 7.3.1) applicable for DCI format 0_1 and DCI format 0_2, respectively. The fields *ul-AccessConfigListDCI-0-1-r16* and *ul-AccessConfigListDCI-0-2-r17* are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field *ul-AccessConfigListDCI-0-1-r17* only contains a list of UL channel access types and is only applicable for FR2-2 (see TS 38.212 [17], Table 7.3.1.1.2-35A).
ul-FullPowerTransmission
Configures the UE with UL full power transmission mode as specified in TS 38.213 [13]. This field is not configured if *ul-powerControl* is configured in the *BWP-UplinkDedicated* in which the *PUCCH-Config* is included.

***UCI-OnPUSCH* field descriptions**
betaOffsets
Selection between and configuration of dynamic and semi-static beta-offset for DCI formats other than DCI format 0_2. If the field is not configured, the UE applies the value 'semiStatic' (see TS 38.213 [13], clause 9.3).
scaling
Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI formats other than DCI format 0_2. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on. The value configured herein is applicable for PUSCH with configured grant (see TS 38.212 [17], clause 6.3).

***UCI-OnPUSCH-DCI-0-2* field descriptions**
betaOffsetsDCI-0-2
Configuration of beta-offset for DCI format 0_2. If semiStaticDCI-0-2 is chosen, the UE shall apply the value of 0 bit for the field of beta offset indicator in DCI format 0_2. If dynamicDCI-0-2 is chosen, the UE shall apply the value of 1 bit or 2 bits for the field of beta offset indicator in DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).
dynamicDCI-0-2
Indicates the UE applies the value 'dynamic' for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.3).
semiStaticDCI-0-2
Indicates the UE applies the value 'semiStatic' for DCI format 0_2. (see TS 38.212 [17], clause 7.3.1 and see TS 38.213 [13], clause 9.3).
scalingDCI-0-2
Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI format 0_2. Value f0p5 corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on (see TS 38.212 [17], clause 6.3).

Conditional Presence	Explanation
codebookBased	The field is mandatory present if *txConfig* is set to codebook and absent otherwise.
RepTypeB	The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB. It is absent otherwise.
RepTypeB2	The field is optionally present, Need S, if *pusch-RepTypeIndicatorDCI-0-1* or *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB. It is absent otherwise.
SRSsets	This field is mandatory present when UE is configured with two SRS sets in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage codebook or non-codebook.

– *PUSCH-ConfigCommon*

The IE *PUSCH-ConfigCommon* is used to configure the cell specific PUSCH parameters.

PUSCH-ConfigCommon information element

```
-- ASN1START
-- TAG-PUSCH-CONFIGCOMMON-START

PUSCH-ConfigCommon ::=                  SEQUENCE {
    groupHoppingEnabledTransformPrecoding   ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    pusch-TimeDomainAllocationList          PUSCH-TimeDomainResourceAllocationList                  OPTIONAL,   -- Need R
    msg3-DeltaPreamble                      INTEGER (-1..6)                                         OPTIONAL,   -- Need R
    p0-NominalWithGrant                     INTEGER (-202..24)                                      OPTIONAL,   -- Need R
    ...
}

-- TAG-PUSCH-CONFIGCOMMON-STOP
-- ASN1STOP
```

***PUSCH-ConfigCommon* field descriptions**
groupHoppingEnabledTransformPrecoding For DMRS transmission with transform precoder, the NW may configure group hopping by this cell-specific parameter, see TS 38.211 [16], clause 6.4.1.1.1.2.
msg3-DeltaPreamble Power offset between msg3 and RACH preamble transmission. Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1)
p0-NominalWithGrant P0 value for PUSCH with grant (except msg3). Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.1) This field is cell specific
pusch-TimeDomainAllocationList List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1).

– *PUSCH-PowerControl*

The IE *PUSCH-PowerControl* is used to configure UE specific power control parameter for PUSCH.

PUSCH-PowerControl information element

```
-- ASN1START
-- TAG-PUSCH-POWERCONTROL-START

PUSCH-PowerControl ::=              SEQUENCE {
    tpc-Accumulation                    ENUMERATED { disabled }                                     OPTIONAL, -- Need S
    msg3-Alpha                          Alpha                                                       OPTIONAL, -- Need S
    p0-NominalWithoutGrant              INTEGER (-202..24)                                          OPTIONAL, -- Need M
    p0-AlphaSets                        SEQUENCE (SIZE (1..maxNrofP0-PUSCH-AlphaSets)) OF P0-PUSCH-AlphaSet     OPTIONAL, -- Need M
    pathlossReferenceRSToAddModList     SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS
                                                                                                    OPTIONAL, -- Need N
    pathlossReferenceRSToReleaseList    SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs)) OF PUSCH-PathlossReferenceRS-Id
                                                                                                    OPTIONAL,  -- Need N
    twoPUSCH-PC-AdjustmentStates        ENUMERATED {twoStates}                                      OPTIONAL, -- Need S
    deltaMCS                            ENUMERATED {enabled}                                        OPTIONAL, -- Need S
    sri-PUSCH-MappingToAddModList       SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControl
                                                                                                    OPTIONAL, -- Need N
```

```
    sri-PUSCH-MappingToReleaseList      SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControlId
                                                                                                    OPTIONAL  -- Need N
}

P0-PUSCH-AlphaSet ::=               SEQUENCE {
    p0-PUSCH-AlphaSetId                 P0-PUSCH-AlphaSetId,
    p0                                  INTEGER (-16..15)                                           OPTIONAL, -- Need S
    alpha                               Alpha                                                       OPTIONAL  -- Need S
}

P0-PUSCH-AlphaSetId ::=             INTEGER (0..maxNrofP0-PUSCH-AlphaSets-1)

PUSCH-PathlossReferenceRS ::=       SEQUENCE {
    pusch-PathlossReferenceRS-Id        PUSCH-PathlossReferenceRS-Id,
    referenceSignal                     CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId
    }
}

PUSCH-PathlossReferenceRS-r16 ::=   SEQUENCE {
    pusch-PathlossReferenceRS-Id-r16    PUSCH-PathlossReferenceRS-Id-v1610,
    referenceSignal-r16                 CHOICE {
        ssb-Index-r16                       SSB-Index,
        csi-RS-Index-r16                    NZP-CSI-RS-ResourceId
    }
}

DummyPathlossReferenceRS-v1710 ::= SEQUENCE {
    pusch-PathlossReferenceRS-Id-r17    PUSCH-PathlossReferenceRS-Id-r17,
    additionalPCI-r17                   AdditionalPCIIndex-r17                              OPTIONAL  -- Need R
}

PUSCH-PathlossReferenceRS-Id ::=    INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1)

PUSCH-PathlossReferenceRS-Id-v1610 ::= INTEGER (maxNrofPUSCH-PathlossReferenceRSs..maxNrofPUSCH-PathlossReferenceRSs-1-r16)

PUSCH-PathlossReferenceRS-Id-r17 ::= INTEGER (0..maxNrofPUSCH-PathlossReferenceRSs-1-r16)

SRI-PUSCH-PowerControl ::=          SEQUENCE {
    sri-PUSCH-PowerControlId            SRI-PUSCH-PowerControlId,
    sri-PUSCH-PathlossReferenceRS-Id    PUSCH-PathlossReferenceRS-Id,
    sri-P0-PUSCH-AlphaSetId             P0-PUSCH-AlphaSetId,
    sri-PUSCH-ClosedLoopIndex           ENUMERATED { i0, i1 }
}

SRI-PUSCH-PowerControlId ::=        INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)

PUSCH-PowerControl-v1610 ::=        SEQUENCE {
    pathlossReferenceRSToAddModListSizeExt-v1610   SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSsDiff-r16)) OF PUSCH-PathlossReferenceRS-r16
                                                                                                    OPTIONAL, -- Need N
    pathlossReferenceRSToReleaseListSizeExt-v1610  SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSsDiff-r16)) OF PUSCH-PathlossReferenceRS-Id-
v1610
                                                                                                    OPTIONAL, -- Need N
```

```
    p0-PUSCH-SetList-r16                SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF P0-PUSCH-Set-r16      OPTIONAL, -- Need R
    olpc-ParameterSet                   SEQUENCE {
        olpc-ParameterSetDCI-0-1-r16        INTEGER (1..2)                                                      OPTIONAL, -- Need R
        olpc-ParameterSetDCI-0-2-r16        INTEGER (1..2)                                                      OPTIONAL  -- Need R
    }                                                                                                           OPTIONAL, -- Need M
    ...,
    [[
    sri-PUSCH-MappingToAddModList2-r17  SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControl
                                                                                                                OPTIONAL, -- Need N
    sri-PUSCH-MappingToReleaseList2-r17 SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF SRI-PUSCH-PowerControlId OPTIONAL, -- Need N
    p0-PUSCH-SetList2-r17               SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF P0-PUSCH-Set-r16      OPTIONAL, -- Need R
    dummy SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSs-r16)) OF DummyPathlossReferenceRS-v1710          OPTIONAL  -- Need N
    ]]
}

P0-PUSCH-Set-r16 ::=                SEQUENCE {
    p0-PUSCH-SetId-r16                  P0-PUSCH-SetId-r16,
    p0-List-r16                         SEQUENCE (SIZE (1..maxNrofP0-PUSCH-Set-r16)) OF P0-PUSCH-r16            OPTIONAL, -- Need R
    ...
}

P0-PUSCH-SetId-r16 ::=              INTEGER (0..maxNrofSRI-PUSCH-Mappings-1)

P0-PUSCH-r16 ::=                    INTEGER (-16..15)

-- TAG-PUSCH-POWERCONTROL-STOP
-- ASN1STOP
```

***P0-PUSCH-AlphaSet* field descriptions**
alpha alpha value for PUSCH with grant (except msg3) (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1.
p0 P0 value for PUSCH with grant (except msg3) in steps of 1dB (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 0.

***P0-PUSCH-Set* field descriptions**
p0-List Configuration of {p0-PUSCH, p0-PUSCH} sets for PUSCH. If SRI is present in the DCI, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and both *olpc-ParameterSetDCI-0-1* and *olpc-ParameterSetDCI-0-2* are configured to be 1 bit, then one p0-PUSCH can be configured in P0-PUSCH-Set. If SRI is not present in the DCI, and if any of *olpc-ParameterSetDCI-0-1* and *olpc-ParameterSetDCI-0-2* is configured to be 2 bits, then two p0-PUSCH values can be configured in P0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1).
p0-PUSCH-SetId Configure the index of a p0-PUSCH-Set (see TS 38.213 [13] clause 7 and TS 38.212 [17] clause 7.3.1).

***PUSCH-PowerControl* field descriptions**
deltaMCS Indicates whether to apply delta MCS. When the field is absent, the UE applies Ks = 0 in delta_TFC formula for PUSCH (see TS 38.213 [13], clause 7.1).
dummy This field is not used in the specification. If received it shall be ignored by the UE.
msg3-Alpha Dedicated alpha value for msg3 PUSCH (see TS 38.213 [13], clause 7.1). When the field is absent the UE applies the value 1.
olpc-ParameterSetDCI-0-1, olpc-ParameterSetDCI-0-2 Configures the number of bits for Open-loop power control parameter set indication for DCI format 0_1/0_2 in case SRI is not configured in the DCI. 2 bits is applicable only if SRI is not present in the DCI format 0_1. The field *olpc-ParameterSetDCI-0-1* applies to DCI format 0_1 and the field *olpc-ParameterSetDCI-0-2* applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11).
p0-AlphaSets Configuration {p0-pusch, alpha} sets for PUSCH (except msg3 and msgA PUSCH), i.e., { {p0,alpha,index1}, {p0,alpha,index2},...} (see TS 38.213 [13], clause 7.1). When no set is configured, the UE uses the P0-nominal for msg3/msgA PUSCH, P0-UE is set to 0 and alpha is set according to either msg3-Alpha or msgA-Alpha (see TS 38.213 [13], clause 7.1).
p0-NominalWithoutGrant P0 value for UL grant-free/SPS based PUSCH. Value in dBm. Only even values (step size 2) allowed (see TS 38.213 [13], clause 7.1).
p0-PUSCH-SetList Configure one additional *P0-PUSCH-Set* per SRI. If present, the one bit or 2 bits in the DCI is used to dynamically indicate among the P0 value from the existing *P0-PUSCH-AlphaSet* and the P0 value(s) from the *P0-PUSCH-Set* (See TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 17).
p0-PUSCH-SetList2 For indicating per-TRP OLPC set in DCI format 0_1/0_2 with the open-loop power control parameter set indication field, a second *p0-PUSCH-SetList-r16* is used. When this field is present the *p0-PUSCH-SetList-r16* corresponds to the first SRS resource set (see TS 38.213 [13]).
pathlossReferenceRSToAddModList, pathlossReferenceRSToAddModListSizeExt A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUSCH path loss estimation. The set consists of Reference Signals configured using *pathLossReferenceRSToAddModList* and *Reference* Signals configured using *pathlossReferenceRSToAddModListSizeExt*. Up to *maxNrofPUSCH-PathlossReferenceRSs* may be configured (see TS 38.213 [13], clause 7.1).
pathlossReferenceRSToReleaseList, pathlossReferenceRSToReleaseListSizeExt Lists of reference signals for PUSCH path loss estimation to be released by the UE.
sri-PUSCH-MappingToAddModList A list of *SRI-PUSCH-PowerControl* elements among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1).
sri-PUSCH-MappingToAddModList2 A list of *SRI-PUSCH-PowerControl* elements for second SRS-resource set, among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1). When this field is present the *sri-PUSCH-MappingToAddModList* corresponds to the first SRS resource set for PUSCH.
tpc-Accumulation If enabled, UE applies TPC commands via accumulation. If not enabled, UE applies the TPC command without accumulation. If the field is absent, TPC accumulation is enabled (see TS 38.213 [13], clause 7.1).
twoPUSCH-PC-AdjustmentStates Number of PUSCH power control adjustment states maintained by the UE (i.e., fc(i)). If the field is present (*n2*) the UE maintains two power control states (i.e., fc(i,0) and fc(i,1)). If the field is absent, it maintains one power control state (i.e., fc(i,0)) (see TS 38.213 [13], clause 7.1).

***SRI-PUSCH-PowerControl* field descriptions**
sri-P0-PUSCH-AlphaSetId The ID of a *P0-PUSCH-AlphaSet* as configured in *p0-AlphaSets in PUSCH-PowerControl*.
sri-PUSCH-ClosedLoopIndex The index of the closed power control loop associated with this *SRI-PUSCH-PowerControl.*
sri-PUSCH-PathlossReferenceRS-Id The ID of *PUSCH-PathlossReferenceRS* as configured in the *pathlossReferenceRSToAddModList* in *PUSCH-PowerControl*.
sri-PUSCH-PowerControlId The ID of this *SRI-PUSCH-PowerControl* configuration. It is used as the codepoint (payload) in the SRI DCI field.

– *PUSCH-ServingCellConfig*

The IE *PUSCH-ServingCellConfig* is used to configure UE specific PUSCH parameters that are common across the UE's BWPs of one serving cell.

PUSCH-ServingCellConfig information element

```
-- ASN1START
-- TAG-PUSCH-SERVINGCELLCONFIG-START

PUSCH-ServingCellConfig ::=             SEQUENCE {
    codeBlockGroupTransmission              SetupRelease { PUSCH-CodeBlockGroupTransmission }       OPTIONAL,   -- Need M
    rateMatching                            ENUMERATED {limitedBufferRM}                            OPTIONAL,   -- Need S
    xOverhead                               ENUMERATED {xoh6, xoh12, xoh18}                         OPTIONAL,   -- Need S
    ...,
    [[
    maxMIMO-Layers                          INTEGER (1..4)                                          OPTIONAL,   -- Need M
    processingType2Enabled                  BOOLEAN                                                 OPTIONAL    -- Need M
    ]],
    [[
    maxMIMO-LayersDCI-0-2-r16               SetupRelease { MaxMIMO-LayersDCI-0-2-r16}               OPTIONAL    -- Need M
    ]],
    [[
    nrofHARQ-ProcessesForPUSCH-r17          ENUMERATED {n32}                                    OPTIONAL,   -- Need R
    uplinkHARQ-mode-r17                     SetupRelease { UplinkHARQ-mode-r17}                     OPTIONAL    -- Need M
    ]]
}

PUSCH-CodeBlockGroupTransmission ::=    SEQUENCE {
    maxCodeBlockGroupsPerTransportBlock     ENUMERATED {n2, n4, n6, n8},
    ...
}

MaxMIMO-LayersDCI-0-2-r16 ::=           INTEGER (1..4)

UplinkHARQ-mode-r17 ::=                 BIT STRING (SIZE (32))

-- TAG-PUSCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

***PUSCH-CodeBlockGroupTransmission* field descriptions**
maxCodeBlockGroupsPerTransportBlock Maximum number of code-block-groups (CBGs) per TB (see TS 38.213 [13], clause 9.1).

***PUSCH-ServingCellConfig* field descriptions**
codeBlockGroupTransmission Enables and configures code-block-group (CBG) based transmission (see TS 38.214 [19], clause 5.1.5). The network does not configure this field if the SCS of at least one UL BWP configured in the cell is 480 or 960 kHz.
maxMIMO-Layers Indicates the maximum MIMO layer to be used for PUSCH in all BWPs of the corresponding UL of this serving cell (see TS 38.212 [17], clause 5.4.2.1). If present, the network sets *maxRank* to the same value. The field *maxMIMO-Layers* refers to DCI format 0_1.
nrofHARQ-ProcessesForPUSCH The number of HARQ processes to be used on the PUSCH of a serving cell. Value *n32* corresponds to 32 HARQ processes. If the field is absent, the UE uses 16 HARQ processes (see TS 38.214 [19], clause 6.1).
processingType2Enabled Enables configuration of advanced processing time capability 2 for PUSCH (see 38.214 [19], clause 6.4).
rateMatching Enables LBRM (Limited buffer rate-matching). When the field is absent the UE applies FBRM (Full buffer rate-matchingLBRM) (see TS 38.212 [17], clause 5.4.2).
xOverhead If the field is absent, the UE applies the value 'xoh0' (see TS 38.214 [19], clause 5.1.3.2).
maxMIMO-LayersDCI-0-2 Indicates the maximum MIMO layer to be used for PUSCH for DCI format 0_2 in all BWPs of the corresponding UL of this serving cell (see TS 38.212 [17], clause 5.4.2.1). If present, the network sets *maxRankDCI-0-2* to the same value.
uplinkHARQ-mode Used to set the HARQ mode per HARQ process ID, see TS 38.321 [3]. The first/leftmost bit corresponds to HARQ process ID 0, the next bit to HARQ process ID 1 and so on. Bits corresponding to HARQ process IDs that are not configured shall be ignored. A bit set to one identifies a HARQ process with *HARQmodeA* and a bit set to zero identifies a HARQ process with *HARQ modeB*. This field applies for SRBs and DRBs.

– *PUSCH-TimeDomainResourceAllocationList*

The IE *PUSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PUSCH. *PUSCH-TimeDomainResourceAllocationList* contains one or more of such *PUSCH-TimeDomainResourceAllocations*. The network indicates in the UL grant which of the configured time domain allocations the UE shall apply for that UL grant. The UE determines the bit width of the DCI field based on the number of entries in the *PUSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

***PUSCH-TimeDomainResourceAllocation* information element**

```
-- ASN1START
-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START

PUSCH-TimeDomainResourceAllocationList ::=  SEQUENCE (SIZE(1..maxNrofUL-Allocations)) OF PUSCH-TimeDomainResourceAllocation

PUSCH-TimeDomainResourceAllocation ::=  SEQUENCE {
    k2                                      INTEGER(0..32)                                  OPTIONAL,   -- Need S
```

```
    mappingType                             ENUMERATED {typeA, typeB},
    startSymbolAndLength                    INTEGER (0..127)
}

PUSCH-TimeDomainResourceAllocationList-r16 ::=  SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r16

PUSCH-TimeDomainResourceAllocation-r16 ::=  SEQUENCE {
    k2-r16                                  INTEGER(0..32)          OPTIONAL,   -- Need S
    puschAllocationList-r16                 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r16,
...
}

PUSCH-Allocation-r16 ::=  SEQUENCE {
    mappingType-r16                         ENUMERATED {typeA, typeB}                   OPTIONAL,   -- Cond NotFormat01-02-Or-TypeA
    startSymbolAndLength-r16                INTEGER (0..127)                            OPTIONAL,   -- Cond NotFormat01-02-Or-TypeA
    startSymbol-r16                         INTEGER (0..13)                             OPTIONAL,   -- Cond RepTypeB
    length-r16                              INTEGER (1..14)                             OPTIONAL,   -- Cond RepTypeB
    numberOfRepetitions-r16                 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} OPTIONAL,   -- Cond Format01-02
    ...,
    [[
    numberOfRepetitionsExt-r17              ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16, n20, n24, n28, n32, spare4, spare3, spare2,
                                                        spare1}                         OPTIONAL,   -- Cond Format01-02-For-TypeA
    numberOfSlotsTBoMS-r17                  ENUMERATED {n1, n2, n4, n8, spare4, spare3, spare2, spare1}   OPTIONAL,   -- Need R
    extendedK2-r17                          INTEGER (0..128)                            OPTIONAL    -- Cond MultiPUSCH
    ]]
}

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP
-- ASN1STOP
```

***PUSCH-TimeDomainResourceAllocationList* field descriptions**
extendedK2
Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1) configurable per PUSCH allocation. Only values {0..32} are applicable for PUSCH SCS of 120 kHz. When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH and *k2-r16* is absent, or when the field is absent and only one PUSCH is configured per PDCCH and *k2-r16* is absent, the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, the value 3 when PUSCH SCS is 120 kHz, the value 11 when PUSCH SCS is 480 kHz, and the value 21 when PUSCH SCS is 960 kHz. If multiple contiguous PUSCHs are configured per PDCCH, when the field *extendedK2(n)* corresponding to k2 of the PUSCH(s) in the n-th slot (n>1), or of the PUSCH(s) except the first PUSCH in the first slot (n=1), is absent, the UE applies k2 of the first PUSCH plus n-1.
k2
Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1). When the field is absent the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, and the value 3 when PUSCH SCS is 120 kHz. k2 is absent/ignored if *extendedK2* is present.
length
Indicates the length allocated for PUSCH for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1).
mappingType
Mapping type (see TS 38.214 [19], clause 6.1.2.1).
numberOfRepetitions
Number of repetitions for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1). When *numberOfSlotsTBoMS-r17* is set to 2, 4 or 8 (i.e. TB processing over multi-slot (TBoMS) PUSCH is enabled), it indicates the number of repetitions of a single TBoMS.
numberOfRepetitionsExt
Number of repetitions for DCI format 0_1/0_2 if *pusch-RepTypeIndicatorDCI-0-1*/*pusch-RepTypeIndicatorDCI-0-2* is not set to *pusch-RepTypeB* (see TS 38.214 [19], clause 6.1.2.1). If this field is present, the field *numberOfRepeitions-r16* is ignored for PUSCH repetition Type A.
numberOfSlotsTBoMS
Number of slots allocated for TB processing over multi-slot PUSCH for DCI format 0_1/0_2. If a number of repetitions K is configured by *numberOfRepetitions* or *numberOfRepetitionsExt*, the network configures *numberOfSlotsTBoMS* (N) and K such that N*K ≤ 32 (see TS 38.214 [19], clause 6.1.2.1). The network does not configure the *numberOfSlotsTBoMS-r17* simultaneously with the *pusch-TimeDomainAllocationListForMultiPUSCH-r16*.
puschAllocationList
The field *puschAllocationList-r16* indicates one or multiple PUSCH continuous in time domain which share a common k2 (see TS 38.214 [19], clause 6.1.2.1). In this release, this field configures one or multiple PUSCH that may be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 6.1.2.1). The *puschAllocationList-r16* only has one element in *pusch-TimeDomainAllocationListDCI-0-1-r16* and in *pusch-TimeDomainAllocationListDCI-0-2-r16*.
startSymbol
Indicates the index of start symbol for PUSCH for DCI format 0_1/0_2 (see TS 38.214 [19], clause 6.1.2.1).
startSymbolAndLength
An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary. (see TS 38.214 [19], clause 6.1.2.1).

Conditional Presence	Explanation
Format01-02	In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent. In *pusch-TimeDomainAllocationListDCI-0-1* and in *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present.
Format01-02-For-TypeA	In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent. In *pusch-TimeDomainAllocationListDCI-0-1*, the field is optionally present if *pusch-RepTypeIndicatorDCI-0-1* is not set to pusch-RepTypeB, Need R. It is absent otherwise, Need R. In *pusch-TimeDomainAllocationListDCI-0-2*, the field is optionally present if *pusch-RepTypeIndicatorDCI-0-2* is not set to pusch-RepTypeB, Need R. It is absent otherwise, Need R.
NotFormat01-02-Or-TypeA	In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is mandatory present. In *pusch-TimeDomainAllocationListDCI-0-1*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-1* is not set to pusch-RepTypeB. It is absent otherwise, Need R. In *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-2* is not set to pusch-RepTypeB. It is absent otherwise, Need R.
RepTypeB	In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent. In *pusch-TimeDomainAllocationListDCI-0-1*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB. It is absent otherwise, Need R. In *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB. It is absent otherwise, Need R.
MultiPUSCH	In case size of *puschAllocationList* is higher than 1, the field *extendedK2(n)* corresponding to k2 of the n-th PUSCH, n>1, is mandatory present for all n, if any two consecutive PUSCHs are non-contiguous. Otherwise, it is optionally present, Need S.

– *PUSCH-TPC-CommandConfig*

The IE *PUSCH-TPC-CommandConfig* is used to configure the UE for extracting TPC commands for PUSCH from a group-TPC messages on DCI.

***PUSCH-TPC-CommandConfig* information element**

```
-- ASN1START
-- TAG-PUSCH-TPC-COMMANDCONFIG-START

PUSCH-TPC-CommandConfig ::=         SEQUENCE {
    tpc-Index                           INTEGER (1..15)                                 OPTIONAL,   -- Cond SUL
    tpc-IndexSUL                        INTEGER (1..15)                                 OPTIONAL,   -- Cond SUL-Only
    targetCell                          ServCellIndex                                   OPTIONAL,   -- Need S
    ...
}

-- TAG-PUSCH-TPC-COMMANDCONFIG-STOP
-- ASN1STOP
```

***PUSCH-TPC-CommandConfig* field descriptions**
targetCell The serving cell to which the acquired power control commands are applicable. If the value is absent, the UE applies the TPC commands to the serving cell on which the command has been received.
tpc-Index An index determining the position of the first bit of TPC command inside the DCI format 2-2 payload.
tpc-IndexSUL An index determining the position of the first bit of TPC command inside the DCI format 2-2 payload.

Conditional Presence	Explanation
SUL-Only	The field is optionally present, Need R, if *supplementaryUplink* is configured within *ServingCellConfig*. It is absent otherwise.
SUL	The field is optionally present, Need R, if *supplementaryUplink* is configured within *ServingCellConfig*. It is mandatory present otherwise.

– *Q-OffsetRange*

The IE *Q-OffsetRange* is used to indicate a cell, beam or measurement object specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value is in dB. Value *dB-24* corresponds to -24 dB, *dB-22* corresponds to -22 dB and so on.

***Q-OffsetRange* information element**

```
-- ASN1START
-- TAG-Q-OFFSETRANGE-START

Q-OffsetRange ::=                   ENUMERATED {
                                                dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
                                                dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
                                                dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
                                                dB6, dB8, dB10, dB12, dB14, dB16, dB18,
                                                dB20, dB22, dB24}

-- TAG-Q-OFFSETRANGE-STOP
-- ASN1STOP
```

– *Q-QualMin*

The IE *Q-QualMin* is used to indicate for cell selection/ re-selection the required minimum received RSRQ level in the (NR) cell. Corresponds to parameter $Q_{qualmin}$ in TS 38.304 [20]. Actual value $Q_{qualmin}$ = field value [dB].

***Q-QualMin* information element**

```
-- ASN1START
-- TAG-Q-QUALMIN-START
```

```
Q-QualMin ::=                       INTEGER (-43..-12)

-- TAG-Q-QUALMIN-STOP
-- ASN1STOP
```

– *Q-RxLevMin*

The IE *Q-RxLevMin* is used to indicate for cell selection/ re-selection the required minimum received RSRP level in the (NR) cell. Corresponds to parameter $Q_{rxlevmin}$ in TS 38.304 [20]. Actual value $Q_{rxlevmin}$ = field value * 2 [dBm].

Q-RxLevMin information element

```
-- ASN1START
-- TAG-Q-RXLEVMIN-START

Q-RxLevMin ::=                      INTEGER (-70..-22)

-- TAG-Q-RXLEVMIN-STOP
-- ASN1STOP
```

– *QuantityConfig*

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for NR and inter-RAT measurements.

QuantityConfig information element

```
-- ASN1START
-- TAG-QUANTITYCONFIG-START


QuantityConfig ::=                  SEQUENCE {
    quantityConfigNR-List               SEQUENCE (SIZE (1..maxNrofQuantityConfig)) OF QuantityConfigNR          OPTIONAL,   -- Need M
    ...,
    [[
    quantityConfigEUTRA                 FilterConfig                                                            OPTIONAL    -- Need M
    ]],
    [[
    quantityConfigUTRA-FDD-r16          QuantityConfigUTRA-FDD-r16                                              OPTIONAL,   -- Need M
    quantityConfigCLI-r16               FilterConfigCLI-r16                                                     OPTIONAL    -- Need M
    ]]
}

QuantityConfigNR::=                 SEQUENCE {
    quantityConfigCell                  QuantityConfigRS,
    quantityConfigRS-Index              QuantityConfigRS                                                        OPTIONAL    -- Need M
}
```

```
QuantityConfigRS ::=                SEQUENCE {
    ssb-FilterConfig                    FilterConfig,
    csi-RS-FilterConfig                 FilterConfig
}

FilterConfig ::=                    SEQUENCE {
    filterCoefficientRSRP               FilterCoefficient                       DEFAULT fc4,
    filterCoefficientRSRQ               FilterCoefficient                       DEFAULT fc4,
    filterCoefficientRS-SINR            FilterCoefficient                       DEFAULT fc4
}

FilterConfigCLI-r16 ::=             SEQUENCE {
    filterCoefficientSRS-RSRP-r16       FilterCoefficient                       DEFAULT fc4,
    filterCoefficientCLI-RSSI-r16       FilterCoefficient                       DEFAULT fc4
}

QuantityConfigUTRA-FDD-r16 ::=      SEQUENCE {
    filterCoefficientRSCP-r16           FilterCoefficient                       DEFAULT fc4,
    filterCoefficientEcNO-r16           FilterCoefficient                       DEFAULT fc4
}

-- TAG-QUANTITYCONFIG-STOP
-- ASN1STOP
```

***QuantityConfigNR* field descriptions**
quantityConfigCell Specifies L3 filter configurations for cell measurement results for the configurable RS Types (e.g. SS/PBCH block and CSI-RS) and the configurable measurement quantities (e.g. RSRP, RSRQ and SINR).
quantityConfigRS-Index Specifies L3 filter configurations for measurement results per RS index for the configurable RS Types (e.g. SS/PBCH block and CSI-RS) and the configurable measurement quantities (e.g. RSRP, RSRQ and SINR).

***QuantityConfigRS* field descriptions**
csi-RS-FilterConfig CSI-RS based L3 filter configurations: Specifies L3 filter configurations for CSI-RSRP, CSI-RSRQ and CSI-SINR measurement results from the L1 filter(s), as defined in TS 38.215 [9].
ssb-FilterConfig SS Block based L3 filter configurations: Specifies L3 filter configurations for SS-RSRP, SS-RSRQ and SS-SINR measurement results from the L1 filter(s), as defined in TS 38.215 [9].

QuantityConfigUTRA-FDD field descriptions
filterCoefficientRSCP Specifies L3 filter coefficient for FDD UTRAN CPICH_RSCP measuement results from L1 filter.
filterCoefficientEcN0 Specifies L3 filter coefficient for FDD UTRAN CPICH_EcN0 measuement results from L1 filter.

– *RACH-ConfigCommon*

The IE *RACH-ConfigCommon* is used to specify the cell specific random-access parameters.

RACH-ConfigCommon information element

```
-- ASN1START
-- TAG-RACH-CONFIGCOMMON-START

RACH-ConfigCommon ::=               SEQUENCE {
    rach-ConfigGeneric                  RACH-ConfigGeneric,
    totalNumberOfRA-Preambles           INTEGER (1..63)                                                 OPTIONAL,   -- Need S
    ssb-perRACH-OccasionAndCB-PreamblesPerSSB   CHOICE {
        oneEighth                           ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        oneFourth                           ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        oneHalf                             ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        one                                 ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        two                                 ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},
        four                                INTEGER (1..16),
        eight                               INTEGER (1..8),
        sixteen                             INTEGER (1..4)
    }                                                                                                   OPTIONAL,   -- Need M

    groupBconfigured                    SEQUENCE {
        ra-Msg3SizeGroupA                   ENUMERATED {b56, b144, b208, b256, b282, b480, b640,
                                                        b800, b1000, b72, spare6, spare5,spare4, spare3, spare2, spare1},
        messagePowerOffsetGroupB            ENUMERATED { minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
        numberOfRA-PreamblesGroupA          INTEGER (1..64)
    }                                                                                                   OPTIONAL,   -- Need R
    ra-ContentionResolutionTimer            ENUMERATED { sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64},
    rsrp-ThresholdSSB                       RSRP-Range                                                  OPTIONAL,   -- Need R
    rsrp-ThresholdSSB-SUL                   RSRP-Range                                                  OPTIONAL,   -- Cond SUL
    prach-RootSequenceIndex                 CHOICE {
        l839                                    INTEGER (0..837),
        l139                                    INTEGER (0..137)
    },
    msg1-SubcarrierSpacing                  SubcarrierSpacing                                           OPTIONAL,   -- Cond L139
    restrictedSetConfig                     ENUMERATED {unrestrictedSet, restrictedSetTypeA, restrictedSetTypeB},
    msg3-transformPrecoder                  ENUMERATED {enabled}                                        OPTIONAL,   -- Need R
    ...,
    [[
    ra-PrioritizationForAccessIdentity-r16  SEQUENCE {
        ra-Prioritization-r16                   RA-Prioritization,
        ra-PrioritizationForAI-r16              BIT STRING (SIZE (2))
    }                                                                                                   OPTIONAL,   -- Cond InitialBWP-Only
    prach-RootSequenceIndex-r16             CHOICE {
        l571                                    INTEGER (0..569),
        l1151                                   INTEGER (0..1149)
    }   OPTIONAL    -- Need R
    ]],
    [[
    ra-PrioritizationForSlicing-r17         RA-PrioritizationForSlicing-r17                         OPTIONAL,   -- Cond InitialBWP-Only
```

```
    featureCombinationPreamblesList-r17     SEQUENCE (SIZE(1..maxFeatureCombPreamblesPerRACHResource-r17)) OF FeatureCombinationPreambles-r17
OPTIONAL -- Cond AdditionalRACH
    ]]
}

-- TAG-RACH-CONFIGCOMMON-STOP
-- ASN1STOP
```

***RACH-ConfigCommon* field descriptions**
featureCombinationPreamblesList
Specifies a series of preamble partitions each associated to a combination of features and 4-step RA. The network does not configure this list to have more than 16 entries.
messagePowerOffsetGroupB
Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.2)
msg1-SubcarrierSpacing
Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the following values are applicable depending on the used frequency: FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz If absent, the UE applies the SCS as derived from the *prach-ConfigurationIndex* in *RACH-ConfigGeneric* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]). The value also applies to contention free random access (*RACH-ConfigDedicated*), to SI-request and to contention-based beam failure recovery (CB-BFR). But it does not apply for contention free beam failure recovery (CF-BFR) (see *BeamFailureRecoveryConfig*).
msg3-transformPrecoder
Enables the transform precoder for Msg3 transmission according to clause 6.1.3 of TS 38.214 [19]. If the field is absent, the UE disables the transformer precoder (see TS 38.213 [13], clause 8.3).
numberOfRA-PreamblesGroupA
The number of CB preambles per SSB in group A. This determines implicitly the number of CB preambles per SSB available in group B. (see TS 38.321 [3], clause 5.1.1). The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*.
prach-RootSequenceIndex
PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1). The value range depends on whether L=839 or L=139 or L=571 or L=1151. The length of the root sequence corresponding with the index indicated in this IE should be consistent with the one indicated in *prach-ConfigurationIndex* in the *RACH-ConfigDedicated* (if configured). If *prach-RootSequenceIndex-r16* is signalled, UE shall ignore the *prach-RootSequenceIndex* (without suffix). For FR2-2, only the following values are applicable depending on the used subcarrier spacing: 120 kHz: L=139, L=571, and L=1151 480 kHz: L=139, and L=571 960 kHz: L=139
ra-ContentionResolutionTimer
The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on.
ra-Msg3SizeGroupA
Transport Blocks size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.2).
ra-Prioritization
Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a).
ra-PrioritizationForAI
Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value 1 indicates that the field *ra-Prioritization-r16* applies otherwise the field does not apply (see TS 23.501 [32]).
ra-PrioritizationForSlicing
Parameters which apply to configure prioritized CBRA 4-step random access type for slicing.
rach-ConfigGeneric
RACH parameters for both regular random access and beam failure recovery.
restrictedSetConfig
Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1.

rsrp-ThresholdSSB UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]).
rsrp-ThresholdSSB-SUL The UE selects SUL carrier to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). The value applies to all the BWPs and all RACH configurations.
ssb-perRACH-OccasionAndCB-PreamblesPerSSB The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEighth* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* * max(1, *SSB-per-rach-occasion*). See TS 38.213 [13].
totalNumberOfRA-Preambles Total number of preambles used for contention based and contention free 4-step or 2-step random access in the RACH resources defined in *RACH-ConfigCommon*, excluding preambles used for other purposes (e.g. for SI request). If the field is absent, all 64 preambles are available for RA. The setting should be consistent with the setting of *ssb-perRACH-OccasionAndCB-PreamblesPerSSB*, i.e. it should be a multiple of the number of SSBs per RACH occasion.

Conditional Presence	Explanation
AdditionalRACH	The field is mandatory present if the *RACH-ConfigCommon* is included in an *AdditionalRACH-Config*. When included in *initialUplinkBWP-RedCap* to indicate other feature(s) than *redcap,* this field is mandatory present with at least two *FeatureCombinationPreambles* list entries: one list entry indicating only *redcap* and the other(s) indicating both *redcap* and one or multiple other feature(s) (e.g. *smallData, nsag* or *msg3-Repetitions*). Otherwise, it is optional, Need R.
InitialBWP-Only	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
L139	The field is mandatory present if *prach-RootSequenceIndex* L=139, otherwise the field is absent, Need S.
SUL	The field is mandatory present in *rach-ConfigCommon* in *initialUplinkBWP* if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* or if *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon*; otherwise, the field is absent. This field is not configured in *additionalRACH-Config*.

– *RACH-ConfigCommonTwoStepRA*

The IE *RACH-ConfigCommonTwoStepRA* is used to specify cell specific 2-step random-access type parameters.

RACH-ConfigCommonTwoStepRA information element

```
-- ASN1START
-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-START

RACH-ConfigCommonTwoStepRA-r16 ::=                  SEQUENCE {
    rach-ConfigGenericTwoStepRA-r16                     RACH-ConfigGenericTwoStepRA-r16,
    msgA-TotalNumberOfRA-Preambles-r16                  INTEGER (1..63)                                 OPTIONAL, -- Need S
    msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16  CHOICE {
        oneEighth                                           ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        oneFourth                                           ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        oneHalf                                             ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
        one                                                 ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
```

```
        two                                             ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32},
        four                                            INTEGER (1..16),
        eight                                           INTEGER (1..8),
        sixteen                                         INTEGER (1..4)
    }                                                                                   OPTIONAL, -- Cond 2StepOnly
    msgA-CB-PreamblesPerSSB-PerSharedRO-r16             INTEGER (1..60)                 OPTIONAL, -- Cond SharedRO
    msgA-SSB-SharedRO-MaskIndex-r16                     INTEGER (1..15)                 OPTIONAL, -- Need S
    groupB-ConfiguredTwoStepRA-r16                      GroupB-ConfiguredTwoStepRA-r16  OPTIONAL, -- Need S
    msgA-PRACH-RootSequenceIndex-r16                    CHOICE {
        l839                                            INTEGER (0..837),
        l139                                            INTEGER (0..137),
        l571                                            INTEGER (0..569),
        l1151                                           INTEGER (0..1149)
    }                                                                                   OPTIONAL, -- Cond 2StepOnly
    msgA-TransMax-r16                                   ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}      OPTIONAL, -- Need R
    msgA-RSRP-Threshold-r16                             RSRP-Range                      OPTIONAL, -- Cond
2Step4Step
    msgA-RSRP-ThresholdSSB-r16                          RSRP-Range                      OPTIONAL, -- Need R
    msgA-SubcarrierSpacing-r16                          SubcarrierSpacing               OPTIONAL, -- Cond
2StepOnlyL139
    msgA-RestrictedSetConfig-r16                        ENUMERATED {unrestrictedSet, restrictedSetTypeA,
                                                                    restrictedSetTypeB} OPTIONAL, -- Cond 2StepOnly

    ra-PrioritizationForAccessIdentityTwoStep-r16       SEQUENCE {
        ra-Prioritization-r16                           RA-Prioritization,
        ra-PrioritizationForAI-r16                      BIT STRING (SIZE (2))
    }                                                                                   OPTIONAL, -- Cond
InitialBWP-Only
    ra-ContentionResolutionTimer-r16                    ENUMERATED {sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64}      OPTIONAL, -- Cond 2StepOnly
    ...,
    [[
    ra-PrioritizationForSlicingTwoStep-r17              RA-PrioritizationForSlicing-r17             OPTIONAL, -- Cond InitialBWP-Only
    featureCombinationPreamblesList-r17 SEQUENCE (SIZE(1..maxFeatureCombPreamblesPerRACHResource-r17)) OF FeatureCombinationPreambles-r17 OPTIONAL
-- Cond AdditionalRACH
    ]]
}

GroupB-ConfiguredTwoStepRA-r16 ::=                      SEQUENCE {
    ra-MsgA-SizeGroupA-r16                              ENUMERATED {b56, b144, b208, b256, b282, b480, b640, b800,
                                                                    b1000, b72, spare6, spare5, spare4, spare3, spare2, spare1},
    messagePowerOffsetGroupB-r16                        ENUMERATED {minusinfinity, dB0, dB5, dB8, dB10, dB12, dB15, dB18},
    numberOfRA-PreamblesGroupA-r16                      INTEGER (1..64)
}

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP
-- ASN1STOP
```

***RACH-ConfigCommonTwoStepRA* field descriptions**
featureCombinationPreamblesList
Specifies a series of preamble partitions each associated to a combination of features and 2-step RA. The network does not configure this list to have more than 16 entries.
groupB-ConfiguredTwoStepRA
Preamble grouping for 2-step random access type. If the field is absent then there is only one preamble group configured and only one msgA PUSCH configuration.
msgA-CB-PreamblesPerSSB-PerSharedRO
Number of contention-based preambles used for 2-step RA type from the non-CBRA 4-step type preambles associated with each SSB for RO shared with 4-step type RA. The number of preambles for 2-step RA type shall not exceed the number of preambles per SSB minus the number of contention-based preambles per SSB for 4-step type RA. The possible value range for this parameter needs to be aligned with value range for the configured SSBs per RACH occasion in *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon*. The field is only applicable for the case of shared ROs with 4-step type random access.
msgA-PRACH-RootSequenceIndex
PRACH root sequence index. If the field is not configured in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e., not within *AdditionalRACH-Config*), the UE applies the value in field *prach-RootSequenceIndex* in *RACH-ConfigCommon* in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE applies the corresponding value of *prach-RootSequenceIndex* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access. For FR2-2, only the following values are applicable depending on the used subcarrier spacing: 120 kHz: L=139, L=571, and L=1151 480 kHz: L=139, and L=571 960 kHz: L=139
msgA-RestrictedSetConfig
Configuration of an unrestricted set or one of two types of restricted sets for 2-step random access type preamble. If the field is not configured in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), the UE applies the value in field *restrictedSetConfig* in *RACH-ConfigCommon* in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE applies the value of *restrictedSetConfig* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. When both 2-step and 4-step type random access is configured, this field is only configured for the case of separate ROs between 2-step and 4-step type random access.
msgA-RSRP-Threshold
The UE selects 2-step random access type to perform random access based on this threshold (see TS 38.321 [3], clause 5.1.1). This field is only present if both 2-step and 4-step RA type are configured for the BWP.
msgA-RSRP-ThresholdSSB
UE may select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy the threshold (see TS 38.213 [13]).
msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB
The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value *oneEight* corresponds to one SSB associated with 8 RACH occasions, value *oneFourth* corresponds to one SSB associated with 4 RACH occasions, and so on. The ENUMERATED part indicates the number of Contention Based preambles per SSB. Value *n4* corresponds to 4 Contention Based preambles per SSB, value *n8* corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by *CB-preambles-per-SSB* * max(1, *SSB-per-rach-occasion*). If the field is not configured in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*) and both 2-step and 4-step are configured for the BWP, the UE applies the value in the field *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon.* If the field is not configured in *AdditionalRACH-Config* and both 2-step and 4-step are configured in *AdditionalRACH-Config*, the UE applies the value in the field *ssb-perRACH-OccasionAndCB-PreamblesPerSSB* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. The field is not present when RACH occasions are shared between 2-step and 4-step type random access in the BWP.
msgA-SSB-SharedRO-MaskIndex
Indicates the subset of 4-step type ROs shared with 2-step random access type for each SSB. This field is configured when there is more than one RO per SSB. If the field is absent, and 4-step and 2-step has shared ROs, then all ROs are shared.

msgA-SubcarrierSpacing Subcarrier spacing of PRACH (see TS 38.211 [16], clause 5.3.2). Only the following values are applicable depending on the used frequency: FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz. If the field is absent, the UE applies the SCS as derived from the *msgA-PRACH-ConfigurationIndex* in *RACH-ConfigGenericTwoStepRA* (see tables Table 6.3.3.1-1, Table 6.3.3.1-2, Table 6.3.3.2-2 and Table 6.3.3.2-3, TS 38.211 [16]) in case of 2-step only BWP, otherwise the UE applies the same SCS as Msg1 derived from *RACH-ConfigCommon*. The value also applies to contention free 2-step random access type (*RACH-ConfigDedicated*).
msgA-TotalNumberOfRA-Preambles Indicates the total number of preambles used for contention-based and contention-free 2-step random access type when ROs for 2-step are not shared with 4-step. If the field is absent, and 2-step and 4-step does not have shared ROs, all 64 preambles are available for 2-step random access type.
msgA-TransMax Max number of MsgA preamble transmissions performed before switching to 4-step random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent, switching from 2-step RA type to 4-step RA type is not allowed.
ra-ContentionResolutionTimer The initial value for the contention resolution timer for fallback RAR in case no 4-step random access type is configured (see TS 38.321 [3], clause 5.1.5). Value *sf8* corresponds to 8 subframes, value *sf16* corresponds to 16 subframes, and so on. If both 2-step and 4-step random access type resources are configured on the BWP, then this field is absent. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config.*
ra-Prioritization Parameters which apply for prioritized random access procedure on any UL BWP of SpCell for specific Access Identities (see TS 38.321 [3], clause 5.1.1a).
ra-PrioritizationForAI Indicates whether the field *ra-Prioritization-r16* applies for Access Identities. The first/leftmost bit corresponds to Access Identity 1, the next bit corresponds to Access Identity 2. Value *1* for an Access Identity indicates that the field *ra-Prioritization-r16* applies, otherwise the field does not apply.
ra-PrioritizationForSlicingTwoStep Parameters which apply to configure prioritized CBRA 2-step random access type for slicing.
rach-ConfigGenericTwoStepRA 2-step random access type parameters for both regular random access and beam failure recovery.

***GroupB-ConfiguredTwoStepRA* field descriptions**
messagePowerOffsetGroupB Threshold for preamble selection. Value is in dB. Value *minusinfinity* corresponds to –infinity. Value *dB0* corresponds to 0 dB, *dB5* corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1).
numberOfRA-PreamblesGroupA The number of CB preambles per SSB in group A for idle/inactive or connected mode. The setting of the number of preambles for each group should be consistent with *msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB* or *msgA-CB-PreamblesPerSSB-PerSharedRO* if configured.
ra-MsgA-SizeGroupA Transport block size threshold in bits below which the UE shall use a contention-based RA preamble of group A. (see TS 38.321 [3], clause 5.1.1).

Conditional Presence	Explanation
2Step4Step	The field is mandatory present if both 2-step random access type and 4-step random access type are configured in the BWP, otherwise the field is not present. The field is mandatory present in *msgA-ConfigCommon* field in *AdditionalRACH-Config* if both 2-step random access type and 4-step random access type are configured for the same feature combination in the BWP.
2StepOnlyL139	The field is mandatory present if *msgA-PRACH-RootSequenceIndex* L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S.
2StepOnly	The field is mandatory present in *msgA-ConfigCommon* field in B*WP-UplinkCommon* if *rach-ConfigCommon* field is absent in this *BWP-UplinkCommon*, otherwise the field is optionally present in *msgA-ConfigCommon* field in *BWP-UplinkCommon*, Need S. The field is mandatory present in *msgA-ConfigCommon* field in *AdditionalRACH-Config* if *rach-ConfigCommon* field is absent in this *AdditionalRACH-Config*, otherwise the field is optionally present in *msgA-ConfigCommon* field in *AdditionalRACH-Config*, Need S.
AdditionalRACH	The field is mandatory present if the *msgA-ConfigCommon* is included in an *AdditionalRACH-Config*. When included in *initialUplinkBWP-RedCap* to indicate other feature(s) than *redcap,* this field is mandatory present with at least two *FeatureCombinationPreambles* list entries: one list entry indicating only *redcap* and the other(s) indicating both *redcap* and one or multiple other feature(s) (e.g. *smallData, nsag* or *msg3-Repetitions*). Otherwise, it is optional, Need R.
InitialBWP-Only	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
SharedRO	The field is mandatory present if the 2-step random access type occasions are shared with 4-step random access type, otherwise the field is not present.

– *RACH-ConfigDedicated*

The IE *RACH-ConfigDedicated* is used to specify the dedicated random access parameters.

RACH-ConfigDedicated information element

```
-- ASN1START
-- TAG-RACH-CONFIGDEDICATED-START


RACH-ConfigDedicated ::=        SEQUENCE {
    cfra                            CFRA                                                    OPTIONAL, -- Need S
    ra-Prioritization               RA-Prioritization                                       OPTIONAL, -- Need N
    ...,
    [[
    ra-PrioritizationTwoStep-r16    RA-Prioritization                                       OPTIONAL, -- Need N
    cfra-TwoStep-r16                CFRA-TwoStep-r16                                        OPTIONAL  -- Need S
    ]]
}

CFRA ::=                    SEQUENCE {
    occasions                       SEQUENCE {
        rach-ConfigGeneric              RACH-ConfigGeneric,
        ssb-perRACH-Occasion            ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}
                                                                                            OPTIONAL  -- Cond Mandatory
    }                                                                                       OPTIONAL, -- Need S
```

```
    resources                       CHOICE {
        ssb                             SEQUENCE {
            ssb-ResourceList                SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,
            ra-ssb-OccasionMaskIndex        INTEGER (0..15)
        },
        csirs                           SEQUENCE {
            csirs-ResourceList              SEQUENCE (SIZE(1..maxRA-CSIRS-Resources)) OF CFRA-CSIRS-Resource,
            rsrp-ThresholdCSI-RS            RSRP-Range
        }
    },
    ...,
    [[
    totalNumberOfRA-Preambles INTEGER (1..63)                                                   OPTIONAL -- Cond Occasions
    ]]
}

CFRA-TwoStep-r16 ::=                    SEQUENCE {
    occasionsTwoStepRA-r16                  SEQUENCE {
        rach-ConfigGenericTwoStepRA-r16         RACH-ConfigGenericTwoStepRA-r16,
        ssb-PerRACH-OccasionTwoStepRA-r16       ENUMERATED {oneEighth, oneFourth, oneHalf, one,
                                                            two, four, eight, sixteen}
    }                                                                                           OPTIONAL, -- Need S
    msgA-CFRA-PUSCH-r16                     MsgA-PUSCH-Resource-r16,
    msgA-TransMax-r16                       ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}    OPTIONAL, -- Need S
    resourcesTwoStep-r16                    SEQUENCE {
        ssb-ResourceList                        SEQUENCE (SIZE(1..maxRA-SSB-Resources)) OF CFRA-SSB-Resource,
        ra-ssb-OccasionMaskIndex                INTEGER (0..15)
    },
    ...
}

CFRA-SSB-Resource ::=           SEQUENCE {
    ssb                             SSB-Index,
    ra-PreambleIndex                INTEGER (0..63),
    ...,
    [[
    msgA-PUSCH-Resource-Index-r16   INTEGER (0..3071)     OPTIONAL  -- Cond 2StepCFRA
    ]]

}

CFRA-CSIRS-Resource ::=         SEQUENCE {
    csi-RS                          CSI-RS-Index,
    ra-OccasionList                 SEQUENCE (SIZE(1..maxRA-OccasionsPerCSIRS)) OF INTEGER (0..maxRA-Occasions-1),
    ra-PreambleIndex                INTEGER (0..63),
    ...
}

-- TAG-RACH-CONFIGDEDICATED-STOP
-- ASN1STOP
```

***CFRA-CSIRS-Resource* field descriptions**
csi-RS The ID of a CSI-RS resource defined in the measurement object associated with this serving cell.
ra-OccasionList RA occasions that the UE shall use when performing CF-RA upon selecting the candidate beam identified by this CSI-RS. The network ensures that the RA occasion indexes provided herein are also configured by prach-ConfigurationIndex and msg1-FDM. Each RACH occasion is sequentially numbered, first, in increasing order of frequency resource indexes for frequency multiplexed PRACH occasions; second, in increasing order of time resource indexes for time multiplexed PRACH occasions within a PRACH slot and Third, in increasing order of indexes for PRACH slots.
ra-PreambleIndex The RA preamble index to use in the RA occasions associated with this CSI-RS.

***CFRA* field descriptions**
occasions RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in *RACH-ConfigCommon* in the first active UL BWP.
ra-ssb-OccasionMaskIndex Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources signalled in *ssb-ResourceList*.
rach-ConfigGeneric Configuration of contention free random access occasions for CFRA. The UE shall ignore *preambleReceivedTargetPower*, *preambleTransMax*, *powerRampingStep*, *ra-ResponseWindow* signaled within this field and use the corresponding values provided in *RACH-ConfigCommon*.
ssb-perRACH-Occasion Number of SSBs per RACH occasion.
totalNumberOfRA-Preambles Total number of preambles used for contention free random access in the RACH resources defined in CFRA, excluding preambles used for other purposes (e.g. for SI request). If the field is absent but the field *occasions* is present, the UE may assume all the 64 preambles are for RA. The setting should be consistent with the setting of *ssb-perRACH-Occasion*, if present, i.e. it should be a multiple of the number of SSBs per RACH occasion.

***CFRA-SSB-Resource* field descriptions**
msgA-PUSCH-Resource-Index Identifies the index of the PUSCH resource used for MSGA CFRA. The PUSCH resource index indicates a valid PUSCH occasion (as specified in TS 38.213 [13], clause 8.1A) and the associated DMRS resources corresponding to a PRACH slot. The PUSCH resource indexes are sequentially numbered and are mapped to valid PUSCH occasions corresponding to a PRACH slot which are ordered, first, in increasing order of frequency resource indexes for frequency multiplexed PUSCH occasions; second, in increasing order of DMRS resource indexes within a PUSCH occasion, where a DMRS resource index $DMRS_{id}$ is determined first in an ascending order of a DMRS port index and then in an ascending order of a DMRS sequence index, third in increasing order of time resource indexes for time multiplexed PUSCH occasions within a PUSCH slot and fourth, in increasing order of indexes for PUSCH slots. For the case of contention free 2-step random access type, if this field is absent, the UE shall use the value 0.
ra-PreambleIndex The preamble index that the UE shall use when performing CF-RA upon selecting the candidate beams identified by this SSB.
ssb The ID of an SSB transmitted by this serving cell.

***CFRA-TwoStep* field descriptions**
msgA-CFRA-PUSCH PUSCH resource configuration(s) for msgA CFRA.
msgA-TransMax Max number of MsgA preamble transmissions performed before switching to 4-step type random access (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when 2-step and 4-step RA type are configured and switching to 4-step type RA is supported. If the field is absent in *cfra-TwoStep*, switching from 2-step RA type to 4-step RA type is not allowed.
occasionsTwoStepRA RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in *RACH-ConfigCommonTwoStepRA* in the first active UL BWP.
ra-SSB-OccasionMaskIndex Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources signalled in *ssb-ResourceList*.
rach-ConfigGenericTwoStepRA Configuration of contention free random access occasions for CFRA 2-step random access type.
ssb-PerRACH-OccasionTwoStep Number of SSBs per RACH occasion for 2-step random access type.

***RACH-ConfigDedicated* field descriptions**
cfra Parameters for contention free random access to a given target cell. If this field and *cfra-TwoStep* are absent, the UE performs contention based random access.
cfra-TwoStep Parameters for contention free 2-step random access type to a given target cell. Network ensures that *cfra* and *cfra-TwoStep* are not configured at the same time. If this field and *cfra* are absent, the UE performs contention based random access. This field may only be present if *msgA-ConfigCommon* is configured on the BWP.
ra-prioritization Parameters which apply for prioritized random access procedure to a given target cell (see TS 38.321 [3], clause 5.1.1).
ra-PrioritizationTwoStep Parameters which apply for prioritized 2-step random access type procedure to a given target cell (see TS 38.321 [3], clause 5.1.1).

Conditional Presence	Explanation
Mandatory	The field is mandatory present.
Occasions	The field is optionally present, Need S, if the field *occasions* is present, otherwise it is absent.
2StepCFRA	The field is optionally present for the case of 2-step RA type contention free random access, Need S, otherwise it is absent.

– *RACH-ConfigGeneric*

The IE *RACH-ConfigGeneric* is used to specify the random-access parameters both for regular random access as well as for beam failure recovery.

***RACH-ConfigGeneric* information element**

```
-- ASN1START
-- TAG-RACH-CONFIGGENERIC-START

RACH-ConfigGeneric ::=              SEQUENCE {
```

```
    prach-ConfigurationIndex            INTEGER (0..255),
    msg1-FDM                            ENUMERATED {one, two, four, eight},
    msg1-FrequencyStart                 INTEGER (0..maxNrofPhysicalResourceBlocks-1),
    zeroCorrelationZoneConfig           INTEGER(0..15),
    preambleReceivedTargetPower         INTEGER (-202..-60),
    preambleTransMax                    ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200},
    powerRampingStep                    ENUMERATED {dB0, dB2, dB4, dB6},
    ra-ResponseWindow                   ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80},
    ...,
    [[
    prach-ConfigurationPeriodScaling-IAB-r16    ENUMERATED {scf1,scf2,scf4,scf8,scf16,scf32,scf64}             OPTIONAL,   -- Need R
    prach-ConfigurationFrameOffset-IAB-r16      INTEGER (0..63)                                               OPTIONAL,   -- Need R
    prach-ConfigurationSOffset-IAB-r16          INTEGER (0..39)                                               OPTIONAL,   -- Need R
    ra-ResponseWindow-v1610                     ENUMERATED { sl60, sl160}                                     OPTIONAL,   -- Need R
    prach-ConfigurationIndex-v1610              INTEGER (256..262)                                            OPTIONAL    -- Need R
    ]],
    [[
    ra-ResponseWindow-v1700                     ENUMERATED {sl240, sl320, sl640, sl960, sl1280, sl1920, sl2560} OPTIONAL    -- Need R
    ]]
}

-- TAG-RACH-CONFIGGENERIC-STOP
-- ASN1STOP
```

***RACH-ConfigGeneric* field descriptions**
msg1-FDM The number of PRACH transmission occasions FDMed in one time instance. (see TS 38.211 [16], clause 6.3.3.2).
msg1-FrequencyStart Offset of lowest PRACH transmission occasion in frequency domain with respective to PRB 0. The value is configured so that the corresponding RACH resource is entirely within the bandwidth of the UL BWP. (see TS 38.211 [16], clause 6.3.3.2).
powerRampingStep Power ramping steps for PRACH (see TS 38.321 [3],5.1.3).
prach-ConfigurationFrameOffset-IAB Frame offset for ROs defined in the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2).
prach-ConfigurationIndex PRACH configuration index. For *prach-ConfigurationIndex* configured under *beamFailureRecoveryConfig*, the *prach-ConfigurationIndex* can only correspond to the short preamble format, (see TS 38.211 [16], clause 6.3.3.2). If the field *prach-ConfigurationIndex-v1610* is present, the UE shall ignore the value provided in *prach-ConfigurationIndex* (without suffix).
prach-ConfigurationPeriodScaling-IAB Scaling factor to extend the periodicity of the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT. Value scf1 corresponds to scaling factor of 1 and so on. (see TS 38.211 [16], clause 6.3.3.2).
prach-ConfigurationSOffset-IAB Subframe/Slot offset for ROs defined in the baseline configuration indicated by *prach-ConfigurationIndex* and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2).
preambleReceivedTargetPower The target power level at the network receiver side (see TS 38.213 [13], clause 7.4, TS 38.321 [3], clauses 5.1.2, 5.1.3). Only multiples of 2 dBm may be chosen (e.g. -202, -200, -198, ...).
preambleTransMax Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5).
ra-ResponseWindow Msg2 (RAR) window length in number of slots. The network configures a value lower than or equal to 10 ms when Msg2 is transmitted in licensed spectrum and a value lower than or equal to 40 ms when Msg2 is transmitted with shared spectrum channel access (see TS 38.321 [3], clause 5.1.4). UE ignores the field if included in *SCellConfig*. If *ra-ResponseWindow-v1610* or *ra-ResponseWindow-v1700* is signalled, UE shall ignore the *ra-ResponseWindow* (without suffix). The field *ra-ResponseWindow-v1700* is applicable to SCS 480 kHz and SCS 960 kHz.
zeroCorrelationZoneConfig N-CS configuration, see Table 6.3.3.1-5 in TS 38.211 [16].

– *RACH-ConfigGenericTwoStepRA*

The IE *RACH-ConfigGenericTwoStepRA* is used to specify the 2-step random access type parameters.

***RACH-ConfigGenericTwoStepRA* information element**

```
-- ASN1START
-- TAG-RACH-CONFIGGENERICTWOSTEPRA-START

RACH-ConfigGenericTwoStepRA-r16 ::=     SEQUENCE {
    msgA-PRACH-ConfigurationIndex-r16       INTEGER (0..262)                                    OPTIONAL, -- Cond 2StepOnly
    msgA-RO-FDM-r16                         ENUMERATED {one, two, four, eight}                  OPTIONAL, -- Cond 2StepOnly
    msgA-RO-FrequencyStart-r16              INTEGER (0..maxNrofPhysicalResourceBlocks-1)        OPTIONAL, -- Cond 2StepOnly
    msgA-ZeroCorrelationZoneConfig-r16      INTEGER (0..15)                                     OPTIONAL, -- Cond 2StepOnly
```

```
    msgA-PreamblePowerRampingStep-r16       ENUMERATED {dB0, dB2, dB4, dB6}                                 OPTIONAL, -- Cond 2StepOnlyNoCFRA
    msgA-PreambleReceivedTargetPower-r16    INTEGER (-202..-60)                                             OPTIONAL, -- Cond 2StepOnlyNoCFRA
    msgB-ResponseWindow-r16                 ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80, sl160, sl320}
                                                                                                            OPTIONAL, -- Cond NoCFRA
    preambleTransMax-r16                    ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}  OPTIONAL, -- Cond 2StepOnlyNoCFRA
    ...,
    [[
    msgB-ResponseWindow-v1700               ENUMERATED {sl240, sl640, sl960, sl1280, sl1920, sl2560}         OPTIONAL  -- Cond NoCFRA2
    ]]
}

-- TAG-RACH-CONFIGGENERICTWOSTEPRA-STOP
-- ASN1STOP
```

***RACH-ConfigGenericTwoStepRA* field descriptions**
msgA-PreamblePowerRampingStep
Power ramping steps for msgA PRACH. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. If the field is absent in other cases, UE shall use the value of *powerRampingStep* in *RACH-ConfigGeneric* in the configured BWP (see TS 38.321 [3], 5.1.3). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and then the UE uses the value of *msgA-PreamblePowerRampingStep* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.
msgA-PreambleReceivedTargetPower
The target power level at the network receiver side (see TS 38.213 [13], clause 7.1.1 and TS 38.321 [3], clause 5.1.1). Only multiples of 2 dBm may be chosen (e.g -202, -200, -198, …). If the field is absent, UE shall use the value of *preambleReceivedTargetPower* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and then the UE uses the value of *msgA-PreambleReceivedTargetPower* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.
msgA-PRACH-ConfigurationIndex
Cell-specific PRACH configuration index for 2-step RA type. If the field is absent in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), the UE shall use the value of corresponding 4-step random access parameter in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. If the value is in the range of 256 to 262, the field *prach-ConfigurationIndex-v1610* should be considered configured (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.
msgA-RO-FDM
The number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance. If the field is absent in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), UE shall use value of *msg1-FDM* in *RACH-ConfigGeneric* in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the value of *msg1-FDM* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config* (see TS 38.211 [16], clause 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.
msgA-RO-FrequencyStart
Offset of lowest PRACH transmissions occasion in frequency domain with respect to PRB 0. If the field is absent in *RACH-ConfigCommonTwoStepRA* which is configured directly within a BWP (i.e. not within *AdditionalRACH-Config*), UE shall use value of *msg1-FrequencyStart* in *RACH-ConfigGeneric* in the configured BWP. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the value of *msg1-FrequencyStart* in *RACH-ConfigCommon* in the same *AdditionalRACH-Config* (see TS 38.211 [16], clauses 5.3.2 and 6.3.3.2). This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.
msgA-ZeroCorrelationZoneConfig
N-CS configuration for msgA preamble, see Table 6.3.3.1-5 in TS 38.211 [16]. If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. If the field is absent in other cases, UE shall use value *zeroCorrelationZoneConfig* in *RACH-ConfigGeneric* in the configured BWP. This field may only be present if no 4-step type RA is configured in the BWP or in the case of separate ROs with 4-step type RA.
msgB-ResponseWindow
MsgB monitoring window length in number of slots. The network configures a value lower than or equal to 40ms (see TS 38.321 [3], clause 5.1.1). The network does not configure *msgB-ResponseWindow-r16* simultaneously with *msgB-ResponseWindow-v1700*, and if both fields are absent, the UE uses the value of *msgB-ResponseWindow* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.
preambleTransMax
Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). If the field is absent in *RACH-ConfigCommonTwoStepRA* in *AdditionalRACH-Config*, the UE shall apply the corresponding value in *RACH-ConfigCommon* in the same *AdditionalRACH-Config*. If the field is absent in other cases, UE shall use the value of *preambleTransMax* in *RACH-ConfigGeneric* in the configured BWP. The field is absent if *RACH-ConfigGenericTwoStepRA* is included in *CFRA-TwoStep* in *RACH-ConfigDedicated* and then the UE uses the value of *preambleTransMax* in *RACH-ConfigGenericTwoStepRA* configured for CBRA.

Conditional Presence	Explanation
2StepOnly	The field is mandatory present in *msgA-ConfigCommon* field in *BWP-UplinkCommon* if *rach-ConfigCommon* field is absent in this *BWP-UplinkCommon*, otherwise the field is optionally present in *msgA-ConfigCommon* field in *BWP-UplinkCommon*, Need S. The field is mandatory present in *msgA-ConfigCommon* in *AdditionalRACH-Config* if *rach-ConfigCommon* field is absent in this *AdditionalRACH-Config,* otherwise the field is optionally present in *msgA-ConfigCommon* field in *AdditionalRACH-Config*, Need S.
2StepOnlyNoCFRA	The field is mandatory present if *RACH-ConfigGenericTwoStepRA* is included in the *RACH-ConfigCommonTwoStepRA* and there are no 4-step random access configurations configured in the BWP (i.e only 2-step random access type configured in the BWP), otherwise (i.e. 4-step random access configuration also exists in the BWP) the field is optionally present, Need S. When *RACH-ConfigGenericTwoStepRA* is included in the *RACH-ConfigDedicated*, this field is absent.
NoCFRA	The field is mandatory present if *msgB-ResponseWindow-r17* is absent and *RACH-ConfigGenericTwoStepRA* is not included in *CFRA-TwoStep* in *RACH-ConfigDedicated,* otherwise the field is absent, Need S.
NoCFRA2	The field is mandatory present if *msgB-ResponseWindow-r16* is absent and *RACH-ConfigGenericTwoStepRA* is not included in *CFRA-TwoStep* in *RACH-ConfigDedicated*, otherwise the field is absent, Need S.

– *RA-Prioritization*

The IE *RA-Prioritization* is used to configure prioritized random access.

RA-Prioritization information element

```
-- ASN1START
-- TAG-RA-PRIORITIZATION-START

RA-Prioritization ::=           SEQUENCE {
    powerRampingStepHighPriority    ENUMERATED {dB0, dB2, dB4, dB6},
    scalingFactorBI                 ENUMERATED {zero, dot25, dot5, dot75}                   OPTIONAL,   -- Need R
    ...
}

-- TAG-RA-PRIORITIZATION-STOP
-- ASN1STOP
```

RA-Prioritization field descriptions
powerRampingStepHighPrioritiy Power ramping step applied for prioritized random access procedure.
scalingFactorBI Scaling factor for the backoff indicator (BI) for the prioritized random access procedure. (see TS 38.321 [3], clause 5.1.4). Value *zero* corresponds to 0, value *dot25* corresponds to 0.25 and so on.

– *RA-PrioritizationForSlicing*

The IE *RA-PrioritizationForSlicing* is used to configure prioritized random access for slicing.

RA-PrioritizationForSlicing information element

```
-- ASN1START
-- TAG-RA-PRIORITIZATIONFORSLICING-START

RA-PrioritizationForSlicing-r17 ::=    SEQUENCE {
    ra-PrioritizationSliceInfoList-r17     RA-PrioritizationSliceInfoList-r17,
    ...
}

RA-PrioritizationSliceInfoList-r17 ::= SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF RA-PrioritizationSliceInfo-r17

RA-PrioritizationSliceInfo-r17 ::=     SEQUENCE {
    nsag-ID-List-r17                       SEQUENCE (SIZE (1..maxSliceInfo-r17)) OF NSAG-ID-r17,
    ra-Prioritization-r17                  RA-Prioritization,
    ...
}

-- TAG-RA-PRIORITIZATIONFORSLICING-STOP
-- ASN1STOP
```

– *RadioBearerConfig*

The IE *RadioBearerConfig* is used to add, modify and release signalling, multicast MRBs and/or data radio bearers. Specifically, this IE carries the parameters for PDCP and, if applicable, SDAP entities for the radio bearers.

RadioBearerConfig information element

```
-- ASN1START
-- TAG-RADIOBEARERCONFIG-START

RadioBearerConfig ::=                  SEQUENCE {
    srb-ToAddModList                       SRB-ToAddModList                                OPTIONAL,   -- Cond HO-Conn
    srb3-ToRelease                         ENUMERATED{true}                                OPTIONAL,   -- Need N
    drb-ToAddModList                       DRB-ToAddModList                                OPTIONAL,   -- Cond HO-toNR
    drb-ToReleaseList                      DRB-ToReleaseList                               OPTIONAL,   -- Need N
    securityConfig                         SecurityConfig                                  OPTIONAL,   -- Need M
    ...,
    [[
    mrb-ToAddModList-r17                   MRB-ToAddModList-r17                            OPTIONAL,   -- Need N
    mrb-ToReleaseList-r17                  MRB-ToReleaseList-r17                           OPTIONAL,   -- Need N
    srb4-ToAddMod-r17                      SRB-ToAddMod                                    OPTIONAL,   -- Need N
    srb4-ToRelease-r17                     ENUMERATED{true}                                OPTIONAL    -- Need N
    ]]
```

```
}

SRB-ToAddModList ::=                SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod

SRB-ToAddMod ::=                    SEQUENCE {
    srb-Identity                        SRB-Identity,
    reestablishPDCP                     ENUMERATED{true}                        OPTIONAL,   -- Need N
    discardOnPDCP                       ENUMERATED{true}                        OPTIONAL,   -- Need N
    pdcp-Config                         PDCP-Config                             OPTIONAL,   -- Cond PDCP
    ...,
    [[
    srb-Identity-v1700                  SRB-Identity-v1700                      OPTIONAL    -- Need M
    ]]
}

DRB-ToAddModList ::=                SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod

DRB-ToAddMod ::=                    SEQUENCE {
    cnAssociation                       CHOICE {
        eps-BearerIdentity                  INTEGER (0..15),
        sdap-Config                         SDAP-Config
    }                                                                           OPTIONAL,   -- Cond DRBSetup
    drb-Identity                        DRB-Identity,
    reestablishPDCP                     ENUMERATED{true}                        OPTIONAL,   -- Need N
    recoverPDCP                         ENUMERATED{true}                        OPTIONAL,   -- Need N
    pdcp-Config                         PDCP-Config                             OPTIONAL,   -- Cond PDCP
    ...,
    [[
    daps-Config-r16                     ENUMERATED{true}                        OPTIONAL    -- Cond DAPS
    ]]
}
DRB-ToReleaseList ::=               SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity

SecurityConfig ::=                  SEQUENCE {
    securityAlgorithmConfig             SecurityAlgorithmConfig                 OPTIONAL,   -- Cond RBTermChange1
    keyToUse                            ENUMERATED{master, secondary}           OPTIONAL,   -- Cond RBTermChange
    ...
}

MRB-ToAddModList-r17 ::=            SEQUENCE (SIZE (1..maxMRB-r17)) OF MRB-ToAddMod-r17

MRB-ToAddMod-r17 ::=                SEQUENCE {
    mbs-SessionId-r17                   TMGI-r17                                OPTIONAL,   -- Cond MRBSetup
    mrb-Identity-r17                    MRB-Identity-r17,
    mrb-IdentityNew-r17                 MRB-Identity-r17                        OPTIONAL,   -- Need N
    reestablishPDCP-r17                 ENUMERATED{true}                        OPTIONAL,   -- Need N
    recoverPDCP-r17                     ENUMERATED{true}                        OPTIONAL,   -- Need N
    pdcp-Config-r17                     PDCP-Config                             OPTIONAL,   -- Cond PDCP
    ...
}

MRB-ToReleaseList-r17 ::=           SEQUENCE (SIZE (1..maxMRB-r17)) OF MRB-Identity-r17

-- TAG-RADIOBEARERCONFIG-STOP
```

```
-- ASN1STOP
```

***DRB-ToAddMod* and *MRB-ToAddMod* field descriptions**
cnAssociation Indicates if the bearer is associated with the *eps-bearerIdentity* (when connected to EPC) or *sdap-Config* (when connected to 5GC).
daps-Config Indicates that the bearer is configured as DAPS bearer.
drb-Identity In case of DC, the DRB identity is unique within the scope of the UE, i.e. an MCG DRB cannot use the same value as a split DRB. For a split DRB the same identity is used for the MCG and SCG parts of the configuration.
eps-BearerIdentity The EPS bearer ID determines the EPS bearer.
mbs-SessionId Indicates which multicast MBS session the bearer is associated with.
mrb-Identity Identification of the multicast MRB.
mrb-IdentityNew New identity of the multicast MRB when *mrb-Identity* needs to be changed, e.g. as a result of a handover.
reestablishPDCP Indicates that PDCP should be re-established. Network sets this to *true* whenever the security key used for this radio bearer changes. Key change could for example be due to termination point change for the bearer, reconfiguration with sync, resuming an RRC connection, or the first reconfiguration after reestablishment. It is also applicable for LTE procedures when NR PDCP is configured. Network doesn't include this field for DRB if the bearer is configured as DAPS bearer.
recoverPDCP Indicates that PDCP should perform recovery according to TS 38.323 [5]. Network doesn't include this field if the bearer is configured as DAPS bearer.
sdap-Config The SDAP configuration determines how to map QoS flows to DRBs when NR or E-UTRA connects to the 5GC and presence/absence of UL/DL SDAP headers.

***RadioBearerConfig* field descriptions**
securityConfig Indicates the security algorithm and key to use for the signalling and data radio bearers configured with the list in this IE *RadioBearerConfig*. When the field is not included after AS security has been activated, the UE shall continue to use the currently configured *keyToUse* and security algorithm for the radio bearers reconfigured with the lists in this IE *RadioBearerConfig*. The field is not included when configuring SRB1 before AS security is activated.
srb3-ToRelease Release SRB3. SRB3 release can only be done over SRB1 and only at SCG release and reconfiguration with sync.

***SecurityConfig* field descriptions**
keyToUse Indicates if the bearers configured with the list in this IE *RadioBearerConfig* are using the master key or the secondary key for deriving ciphering and/or integrity protection keys. For MR-DC, network should not configure SRB1 and SRB2 with secondary key and SRB3 with the master key. When the field is not included, the UE shall continue to use the currently configured *keyToUse* for the radio bearers reconfigured with the lists in this IE *RadioBearerConfig*.
securityAlgorithmConfig Indicates the security algorithm for the signalling and data radio bearers configured with the list in this IE *RadioBearerConfig*. When the field is not included, the UE shall continue to use the currently configured security algorithm for the radio bearers reconfigured with the lists in this IE *RadioBearerConfig*.

***SRB-ToAddMod* field descriptions**
discardOnPDCP Indicates that PDCP should discard stored SDU and PDU according to TS 38.323 [5].
reestablishPDCP Indicates that PDCP should be re-established. Network sets this to *true* whenever the security key used for this radio bearer changes. Key change could for example be due to reconfiguration with sync, for SRB2 when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment in NR. For SRB1, when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment in NR, the network does not set this field to *true*. For LTE SRBs using NR PDCP, it could be for handover, RRC connection reestablishment or resume. Network doesn't include this field if any DAPS bearer is configured.
srb-Identity, srb-Identity-v1700 Value 1 is applicable for SRB1 only. Value 2 is applicable for SRB2 only. Value 3 is applicable for SRB3 only. Value 4 is applicable for SRB4 only. If *srb-Identity-v1700* is received for an SRB, the UE shall ignore *srb-Identity* (i.e. without suffix) for this SRB.

Conditional Presence	Explanation
RBTermChange	The field is mandatory present in case of: - set up of signalling and data radio bearer, - change of termination point for the radio bearer between MN and SN. It is optionally present otherwise, Need S.
RBTermChange1	The field is mandatory present in case of: - set up of signalling and data radio bearer, - change of termination point for the radio bearer between MN and SN, - handover from E-UTRA/EPC or E-UTRA/5GC to NR, - handover from NR or E-UTRA/EPC to E-UTRA/5GC if the UE supports NGEN-DC. It is optionally present otherwise, Need S.
PDCP	The field is mandatory present if the corresponding DRB/multicast MRB is being setup or corresponding DRB/multicast MRB is reconfigured with NR PDCP or corresponding SRB associated with two RLC entities is being setup or if the number of RLC bearers associated with the DRB/multicast MRB or SRB is changed. The field is optionally present, Need S, if the corresponding SRB associated with one RLC entity is being setup or corresponding SRB is reconfigured with NR PDCP; otherwise the field is optionally present, need M.
DRBSetup	The field is mandatory present if the corresponding DRB is being setup; otherwise the field is optionally present, need M.
HO-Conn	The field is mandatory present - in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR, - or when the *fullConfig* is included in the *RRCReconfiguration* message and NE-DC/NR-DC is not configured, - or in case of *RRCSetup*. Otherwise the field is optionally present, need N. Upon *RRCSetup*, only SRB1 can be present.
HO-toNR	If *mrb-ToAddModList* is not included, the field is mandatory present - in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR, - or when the *fullConfig* is included in the *RRCReconfiguration* message and NE-DC/NR-DC is not configured. In case of *RRCSetup*, the field is absent; otherwise the field is optionally present, need N.
DAPS	The field is optionally present, need N, in case masterCellGroup includes ReconfigurationWithSync, SCell(s) and SCG are not configured, multi-DCI/single-DCI based multi-TRP are not configured in any DL BWP, *supplementaryUplink* is not configured, ethernetHeaderCompression is not configured for the DRB, *conditionalReconfiguration* is not configured, and NR sidelink and V2X sidelink are not configured. Otherwise the field is absent.
MRBSetup	The field is mandatory present if the corresponding multicast MRB is being setup; otherwise the field is optionally present, need M.

– *RadioLinkMonitoringConfig*

The IE *RadioLinkMonitoringConfig* is used to configure radio link monitoring for detection of beam- and/or cell radio link failure. See also TS 38.321 [3], clause 5.1.1.

RadioLinkMonitoringConfig information element

```
-- ASN1START
-- TAG-RADIOLINKMONITORINGCONFIG-START

RadioLinkMonitoringConfig ::=       SEQUENCE {
    failureDetectionResourcesToAddModList   SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF RadioLinkMonitoringRS
                                                                                                    OPTIONAL, -- Need N
    failureDetectionResourcesToReleaseList  SEQUENCE (SIZE(1..maxNrofFailureDetectionResources)) OF RadioLinkMonitoringRS-Id
                                                                                                    OPTIONAL, -- Need N
    beamFailureInstanceMaxCount             ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10}            OPTIONAL, -- Need R
    beamFailureDetectionTimer               ENUMERATED {pbfd1, pbfd2, pbfd3, pbfd4, pbfd5, pbfd6, pbfd8, pbfd10}  OPTIONAL, -- Need R
    ...,
    [[
    beamFailure-r17                         BeamFailureDetection-r17                                OPTIONAL  -- Need R
    ]]
}

BeamFailureDetection-r17 ::=        SEQUENCE {
    failureDetectionSet1-r17            BeamFailureDetectionSet-r17                                 OPTIONAL, -- Need R
    failureDetectionSet2-r17            BeamFailureDetectionSet-r17                                 OPTIONAL, -- Need R
    additionalPCI-r17                   AdditionalPCIIndex-r17                                      OPTIONAL  -- Need R
}

RadioLinkMonitoringRS ::=           SEQUENCE {
    radioLinkMonitoringRS-Id            RadioLinkMonitoringRS-Id,
    purpose                             ENUMERATED {beamFailure, rlf, both},
    detectionResource                   CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId
    },
    ...
}

BeamFailureDetectionSet-r17  ::=    SEQUENCE {
    bfdResourcesToAddModList-r17        SEQUENCE (SIZE(1..maxNrofBFDResourcePerSet-r17)) OF BeamLinkMonitoringRS-r17
                                                                                                    OPTIONAL, -- Need N
    bfdResourcesToReleaseList-r17       SEQUENCE (SIZE(1..maxNrofBFDResourcePerSet-r17)) OF BeamLinkMonitoringRS-Id-r17
                                                                                                    OPTIONAL, -- Need N
    beamFailureInstanceMaxCount-r17     ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10}                OPTIONAL, -- Need R
    beamFailureDetectionTimer-r17       ENUMERATED {pbfd1, pbfd2, pbfd3, pbfd4, pbfd5, pbfd6, pbfd8, pbfd10}      OPTIONAL, -- Need R
    ...
}

BeamLinkMonitoringRS-r17 ::=        SEQUENCE {
    beamLinkMonitoringRS-Id-r17         BeamLinkMonitoringRS-Id-r17,
    detectionResource-r17               CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId
```

```
    },
    ...
}

BeamLinkMonitoringRS-Id-r17 ::=     INTEGER (0..maxNrofFailureDetectionResources-1-r17)

-- TAG-RADIOLINKMONITORINGCONFIG-STOP
-- ASN1STOP
```

***RadioLinkMonitoringConfig* field descriptions**
additionalPCI Indicates the physical cell IDs (PCI) of the SSBs in the *failureDetectionSet2*. If *candidateBeamRS-List2* is configured in IE *BeamFailureRecoveryRSConfig* the field indicates the physical cell IDs (PCI) of the SSBs in the *candidateBeamRS-List2*.
beamFailureDetectionTimer Timer for beam failure detection (see TS 38.321 [3], clause 5.17). See also the *BeamFailureRecoveryConfig* IE. Value in number of "$Q_{out,LR}$ reporting periods of Beam Failure Detection" Reference Signal (see TS 38.213 [13], clause 6). Value *pbfd1* corresponds to 1 $Q_{out,LR}$ reporting period of Beam Failure Detection Reference Signal, value *pbfd2* corresponds to 2 $Q_{out,LR}$ reporting periods of Beam Failure Detection Reference Signal and so on.
beamFailureInstanceMaxCount This field determines after how many beam failure events the UE triggers beam failure recovery (see TS 38.321 [3], clause 5.17). Value n1 corresponds to 1 beam failure instance, value n2 corresponds to 2 beam failure instances and so on.
failureDetectionResourcesToAddModList A list of reference signals for detecting beam failure and/or cell level radio link failure (RLF). The limits of the reference signals that the network can configure are specified in TS 38.213 [13], table 5-1. The network configures at most two detectionResources per BWP for the purpose *beamFailure* or *both*. If no RSs are provided for the purpose of beam failure detection, the UE performs beam monitoring based on the activated *TCI-State* for PDCCH as described in TS 38.213 [13], clause 6. If no RSs are provided in this list for the purpose of RLF detection, the UE performs Cell-RLM based on the activated *TCI-State* of PDCCH as described in TS 38.213 [13], clause 5. The network ensures that the UE has a suitable set of reference signals for performing cell-RLM. If *failureDetectionSet1-r17* and *failureDetectionSet2-r17* are present, the *purpose* of *RadioLinkMonitoringRS* in *failureDetectionResourcesToAddModList* only can be set to *rlf*.
failureDetectionSet1, failureDetectionSet2 Configures parameters for beamfailure detection towards beam failure detection resources configured in the set. If additional PCIs are configured using *additionalPCI-ToAddModList* for the serving cell, each RS in one set can be associated only with one PCI. Network always configures the *failureDetectionSet1* and *failureDetectionSet2* together. *failureDetectionSetN* is present if and only if *candidateBeamRS-List2-r17* is configured. When a *failureDetectionSetN* is present, after the reconfiguration, the UE shall consider all the reference signals for this failure detection set as activated if at most *maxBFD-RS-resourcesPerSetPerBWP-r17* reference signals are configured for each failure detection set, otherwise the UE shall consider all the reference signals in this failure detection set as deactivated. If *bfdResourcesToAddModList-r17* in *failureDetectionSetN* is not present, the UE determines the RS(es) in each *failureDetectionSetN* as described in TS 38.213 [13], clause 6.

***RadioLinkMonitoringRS* field descriptions**
detectionResource A reference signal that the UE shall use for radio link monitoring or beam failure detection (depending on the indicated *purpose*). Only periodic 1-port CSI-RS can be configured on SCell for beam failure detection purpose.
purpose Determines whether the UE shall monitor the associated reference signal for the purpose of cell- and/or beam failure detection. For SCell, network only configures the value to beamFailure.

– *RadioLinkMonitoringRS-Id*

The IE *RadioLinkMonitoringRS-Id* is used to identify one *RadioLinkMonitoringRS*.

RadioLinkMonitoringRS-Id information element

```
-- ASN1START
-- TAG-RADIOLINKMONITORINGRS-ID-START

RadioLinkMonitoringRS-Id ::=            INTEGER (0..maxNrofFailureDetectionResources-1)

-- TAG-RADIOLINKMONITORINGRS-ID-STOP
-- ASN1STOP
```

– *RAN-AreaCode*

The IE *RAN-AreaCode* is used to identify a RAN area within the scope of a tracking area.

RAN-AreaCode information element

```
-- ASN1START
-- TAG-RAN-AREACODE-START

RAN-AreaCode ::=                INTEGER (0..255)

-- TAG-RAN-AREACODE-STOP
-- ASN1STOP
```

– *RateMatchPattern*

The IE *RateMatchPattern* is used to configure one rate matching pattern for PDSCH, see TS 38.214 [19], clause 5.1.4.1.

RateMatchPattern information element

```
-- ASN1START
-- TAG-RATEMATCHPATTERN-START

RateMatchPattern ::=                SEQUENCE {
    rateMatchPatternId                  RateMatchPatternId,

    patternType                         CHOICE {
        bitmaps                             SEQUENCE {
            resourceBlocks                      BIT STRING (SIZE (275)),
            symbolsInResourceBlock              CHOICE {
                oneSlot                             BIT STRING (SIZE (14)),
                twoSlots                            BIT STRING (SIZE (28))
```

```
            },
            periodicityAndPattern               CHOICE {
                n2                                  BIT STRING (SIZE (2)),
                n4                                  BIT STRING (SIZE (4)),
                n5                                  BIT STRING (SIZE (5)),
                n8                                  BIT STRING (SIZE (8)),
                n10                                 BIT STRING (SIZE (10)),
                n20                                 BIT STRING (SIZE (20)),
                n40                                 BIT STRING (SIZE (40))
            }                                                                   OPTIONAL,   -- Need S
            ...
        },
        controlResourceSet                  ControlResourceSetId
    },
    subcarrierSpacing                   SubcarrierSpacing                       OPTIONAL,   -- Cond CellLevel
    dummy                               ENUMERATED { dynamic, semiStatic },
    ...,
    [[
    controlResourceSet-r16              ControlResourceSetId-r16                OPTIONAL    -- Need R
    ]]

}

-- TAG-RATEMATCHPATTERN-STOP
-- ASN1STOP
```

***RateMatchPattern* field descriptions**
bitmaps Indicates rate matching pattern by a pair of bitmaps *resourceBlocks* and *symbolsInResourceBlock* to define the rate match pattern within one or two slots, and a third bitmap *periodicityAndPattern* to define the repetition pattern with which the pattern defined by the above bitmap pair occurs.
controlResourceSet This ControlResourceSet is used as a PDSCH rate matching pattern, i.e., PDSCH reception rate matches around it. In frequency domain, the resource is determined by the frequency domain resource of the CORESET with the corresponding CORESET ID. Time domain resource is determined by the parameters of the associated search space of the CORESET. If the field *controlResourceSetId-r16* is present, UE shall ignore the *controlResourceSetId* (without suffix).
periodicityAndPattern A time domain repetition pattern at which the pattern defined by *symbolsInResourceBlock* and *resourceBlocks* recurs. This slot pattern repeats itself continuously. Absence of this field indicates the value *n1* (see TS 38.214 [19], clause 5.1.4.1).
resourceBlocks A resource block level bitmap in the frequency domain. A bit in the bitmap set to 1 indicates that the UE shall apply rate matching in the corresponding resource block in accordance with the *symbolsInResourceBlock* bitmap. If used as cell-level rate matching pattern, the bitmap identifies "common resource blocks (CRB)". If used for MBS broadcast CFR, the bitmap identifies "physical resource blocks" inside the MBS broadcast CFR. If used as BWP-level rate matching pattern, the bitmap identifies "physical resource blocks" inside the BWP or MBS multicast CFR. The first/ leftmost bit corresponds to resource block 0, and so on (see TS 38.214 [19], clause 5.1.4.1).
subcarrierSpacing The SubcarrierSpacing for this resource pattern. If the field is absent, the UE applies the SCS of the associated BWP. The value *kHz15* corresponds to μ=0, the value *kHz30* corresponds to μ=1, and so on. Only the following values are applicable depending on the used frequency (see TS 38.214 [19], clause 5.1.4.1): FR1: 15, 30 or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz
symbolsInResourceBlock A symbol level bitmap in time domain. It indicates with a bit set to true that the UE shall rate match around the corresponding symbol. This pattern recurs (in time domain) with the configured periodicityAndPattern (see TS 38.214 [19], clause 5.1.4.1). For *oneSlot*, if ECP is configured, the first 12 bits represent the symbols within the slot and the last two bits within the bitstring are ignored by the UE; Otherwise, the 14 bits represent the symbols within the slot. For *twoSlots*, if ECP is configured, the first 12 bits represent the symbols within the first slot and the next 12 bits represent the symbols in the second slot and the last four bits within the bit string are ignored by the UE; Otherwise, the first 14 bits represent the symbols within the first slot and the next 14 bits represent the symbols in the second slot. For the bits representing symbols in a slot, the most significant bit of the bit string represents the first symbol in the slot and the second most significant bit represents the second symbol in the slot and so on.

Conditional Presence	Explanation
CellLevel	The field is mandatory present if the *RateMatchPattern* is defined on cell level. The field is absent when the *RateMatchPattern* is defined on BWP level or defined for MBS broadcast CFR. If the *RateMatchPattern* is defined on BWP level, the UE applies the SCS of the BWP and if *RateMatchPattern* is defined for MBS broadcast CFR, the UE applies the SCS of the initial BWP or RedCap-specific initial BWP (if configured) for RedCap UEs.

– *RateMatchPatternId*

The IE *RateMatchPatternId* identifies one *RateMatchPattern* (see TS 38.214 [19], clause 5.1.4.1).

RateMatchPatternId information element

```
-- ASN1START
-- TAG-RATEMATCHPATTERNID-START

RateMatchPatternId ::=              INTEGER (0..maxNrofRateMatchPatterns-1)

-- TAG-RATEMATCHPATTERNID-STOP
-- ASN1STOP
```

– *RateMatchPatternLTE-CRS*

The IE *RateMatchPatternLTE-CRS* is used to configure a pattern to rate match around LTE CRS. See TS 38.214 [19], clause 5.1.4.2.

RateMatchPatternLTE-CRS information element

```
-- ASN1START
-- TAG-RATEMATCHPATTERNLTE-CRS-START

RateMatchPatternLTE-CRS ::=         SEQUENCE {
    carrierFreqDL                       INTEGER (0..16383),
    carrierBandwidthDL                  ENUMERATED {n6, n15, n25, n50, n75, n100, spare2, spare1},
    mbsfn-SubframeConfigList            EUTRA-MBSFN-SubframeConfigList                                  OPTIONAL,   -- Need M
    nrofCRS-Ports                       ENUMERATED {n1, n2, n4},
    v-Shift                             ENUMERATED {n0, n1, n2, n3, n4, n5}
}

LTE-CRS-PatternList-r16 ::=         SEQUENCE (SIZE (1..maxLTE-CRS-Patterns-r16)) OF RateMatchPatternLTE-CRS

-- TAG-RATEMATCHPATTERNLTE-CRS-STOP
-- ASN1STOP
```

RateMatchPatternLTE-CRS field descriptions
carrierBandwidthDL BW of the LTE carrier in number of PRBs (see TS 38.214 [19], clause 5.1.4.2).
carrierFreqDL Center of the LTE carrier (see TS 38.214 [19], clause 5.1.4.2).
mbsfn-SubframeConfigList LTE MBSFN subframe configuration (see TS 38.214 [19], clause 5.1.4.2).
nrofCRS-Ports Number of LTE CRS antenna port to rate-match around (see TS 38.214 [19], clause 5.1.4.2).
v-Shift Shifting value v-shift in LTE to rate match around LTE CRS (see TS 38.214 [19], clause 5.1.4.2).

– *ReferenceLocation*

The IE *ReferenceLocation* contains location information used as a reference location. The value of the field is same as *Ellipsoid-Point* defined in TS37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

ReferenceLocation information element

```
-- ASN1START
-- TAG-REFERENCELOCATION-START

ReferenceLocation-r17 ::= OCTET STRING

-- TAG-REFERENCELOCATION-STOP
-- ASN1STOP
```

– *ReferenceTimeInfo*

The IE *ReferenceTimeInfo* contains timing information for 5G internal system clock used for, e.g., time stamping, see TS 23.501 [32], clause 5.27.1.2.

ReferenceTimeInfo information element

```
-- ASN1START
-- TAG-REFERENCETIMEINFO-START

ReferenceTimeInfo-r16 ::= SEQUENCE {
    time-r16                        ReferenceTime-r16,
    uncertainty-r16                 INTEGER (0..32767)          OPTIONAL,   -- Need S
    timeInfoType-r16                ENUMERATED {localClock}     OPTIONAL,   -- Need S
    referenceSFN-r16                INTEGER (0..1023)           OPTIONAL    -- Cond RefTime
}

ReferenceTime-r16 ::=           SEQUENCE {
    refDays-r16                     INTEGER (0..72999),
    refSeconds-r16                  INTEGER (0..86399),
    refMilliSeconds-r16             INTEGER (0..999),
    refTenNanoSeconds-r16           INTEGER (0..99999)
}

-- TAG-REFERENCETIMEINFO-STOP
-- ASN1STOP
```

***ReferenceTimeInfo* field descriptions**
referenceSFN This field indicates the reference SFN corresponding to the reference time information. If *referenceTimeInfo* field is received in *DLInformationTransfer* message, this field indicates the SFN of PCell.
time This field indicates time reference with 10ns granularity. If included in *DLInformationTransfer* and if UE-side TA PDC is de-activated, the indicated time may not be referenced at the network, i.e., gNB may pre-compensate for RF propagation delay. If included in *DLInformationTransfer* and if UE is requested to transmit UE Rx-Tx time difference measurement, the indicated time may not be referenced at the network, i.e., gNB may pre-compensate for RF propagation delay. Otherwise, the indicated time is referenced at the network, i.e., without compensating for RF propagation delay. In an NTN cell, the indicated time is referenced at the uplink time synchronization reference point (RP), i.e., UE should take into account the propagation delay between UE and RP when determining the UTC time at the UE. The indicated time in 10ns unit from the origin is *refDays**86400*1000*100000 + *refSeconds**1000*100000 + *refMilliSeconds**100000 + *refTenNanoSeconds*. The *refDays* field specifies the sequential number of days (with day count starting at 0) from the origin of the *time* field. If the *referenceTimeInfo* field is received in *DLInformationTransfer* message, the time field indicates the *time* at the ending boundary of the system frame indicated by *referenceSFN*. The UE considers this frame (indicated by *referenceSFN*) to be the frame which is nearest to the frame where the message is received (which can be either in the past or in the future). If the *referenceTimeInfo* field is received in *SIB9*, the *time* field indicates the time at the SFN boundary at or immediately after the ending boundary of the SI-window in which *SIB9* is transmitted. If *referenceTimeInfo* field is received in *SIB9*, this field is excluded when determining changes in system information, i.e. changes of time should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*. NOTE: The estimated time in an NTN-cell may be less accurate than the estimated time in a TN-cell.
timeInfoType If *timeInfoType* is not included, the *time* indicates the GPS time and the origin of the *time* field is 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time). If *timeInfoType* is set to *localClock*, the origin of the *time* is unspecified.
uncertainty This field indicates the uncertainty of the reference time information provided by the time field. The uncertainty is 25ns multiplied by this field. If this field is absent, the uncertainty is unspecified.

Conditional Presence	Explanation
RefTime	The field is mandatory present if *referenceTimeInfo* is included in *DLInformationTransfer* message; otherwise the field is absent.

– *RejectWaitTime*

The IE *RejectWaitTime* is used to provide the value in seconds for timer T302.

***RejectWaitTime* information element**

```
-- ASN1START
-- TAG-REJECTWAITTIME-START

RejectWaitTime ::=                INTEGER (1..16)

-- TAG-REJECTWAITTIME-STOP
-- ASN1STOP
```

– *RepetitionSchemeConfig*

The IE *RepetitionSchemeConfig* is used to configure the UE with repetition schemes as specified in TS 38.214 [19] clause 5.1.

RepetitionSchemeConfig **information element**

```
-- ASN1START
-- TAG-REPETITIONSCHEMECONFIG-START

RepetitionSchemeConfig-r16 ::= CHOICE {
    fdm-TDM-r16                         SetupRelease { FDM-TDM-r16 },
    slotBased-r16                       SetupRelease { SlotBased-r16 }
}

RepetitionSchemeConfig-v1630 ::=   SEQUENCE {
    slotBased-v1630                     SetupRelease { SlotBased-v1630 }
}

FDM-TDM-r16 ::=                SEQUENCE {
    repetitionScheme-r16            ENUMERATED {fdmSchemeA, fdmSchemeB,tdmSchemeA },
    startingSymbolOffsetK-r16       INTEGER (0..7)                                      OPTIONAL  -- Need R
}

SlotBased-r16 ::=              SEQUENCE {
    tciMapping-r16                  ENUMERATED {cyclicMapping, sequentialMapping},
    sequenceOffsetForRV-r16         INTEGER (1..3)
}

SlotBased-v1630 ::=            SEQUENCE {
    tciMapping-r16                  ENUMERATED {cyclicMapping, sequentialMapping},
    sequenceOffsetForRV-r16         INTEGER (0)
}

-- TAG-REPETITIONSCHEMECONFIG-STOP
-- ASN1STOP
```

***RepetitionSchemeConfig* field descriptions**
fdm-TDM Configures UE with a repetition scheme among fdmSchemeA, fdmSchemeB and tdmSchemeA as specified in clause 5.1 of TS 38.214 [19]. The network does not set this field to *release*. Upon reception of this field in *RepetitionSchemeConfig-r16*, the UE shall release *slotBased* if previously configured in the same instance of *RepetitionSchemeConfig-r16*.
sequenceOffsetForRV For slot-based repetition scheme, selected RV sequence is applied to transmission occasions associated to the first TCI state. The RV sequence associated to the second TCI state is determined by a RV offset from that selected RV sequence.
slotBased Configures UE with slot-based repetition scheme. Network always configures this field when the parameter *repetitionNumber* is present in IE *PDSCH-TimeDomainResourceAllocationList.* The network does not set this field to *release*. Upon reception of this field in *RepetitionSchemeConfig-r16*, the UE shall release *fdm-TDM* if previously configured in the same instance of *RepetitionSchemeConfig-r16*.
startingSymbolOffsetK The starting symbol of the second transmission occasion has K symbol offset relative to the last symbol of the first transmission occasion. When UE is configured with *tdmSchemeA,* the parameter *startingSymbolOffsetK* is present, otherwise absent.
tciMapping Enables TCI state mapping method to PDSCH transmission occasions.

– *ReportConfigId*

The IE *ReportConfigId* is used to identify a measurement reporting configuration.

ReportConfigId information element

```
-- ASN1START
-- TAG-REPORTCONFIGID-START

ReportConfigId ::=                      INTEGER (1..maxReportConfigId)

-- TAG-REPORTCONFIGID-STOP
-- ASN1STOP
```

– *ReportConfigInterRAT*

The IE *ReportConfigInterRAT* specifies criteria for triggering of an inter-RAT measurement reporting event, or an L2 U2N relay measurement reporting event. The inter-RAT measurement reporting events for E-UTRA and UTRA-FDD are labelled B*N* with *N* equal to 1, 2 and so on. The measurement reporting events for L2 U2N relay UE are labelled Y*N* with *N* equal to 1, 2 and so on.

Event B1: Neighbour becomes better than absolute threshold;

Event B2: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2;

Event Y1: PCell becomes worse than absolute threshold1 AND candidate L2 U2N Relay UE becomes better than another absolute threshold2;

Event Y2: Candidate L2 U2N Relay UE becomes better than absolute threshold;

ReportConfigInterRAT information element

```
-- ASN1START
-- TAG-REPORTCONFIGINTERRAT-START

ReportConfigInterRAT ::=                    SEQUENCE {
    reportType                                  CHOICE {
        periodical                                  PeriodicalReportConfigInterRAT,
        eventTriggered                              EventTriggerConfigInterRAT,
        reportCGI                                   ReportCGI-EUTRA,
        ...,
        reportSFTD                                  ReportSFTD-EUTRA
    }
}

ReportCGI-EUTRA ::=                         SEQUENCE {
    cellForWhichToReportCGI         EUTRA-PhysCellId,
    ...,
    [[
    useAutonomousGaps-r16           ENUMERATED {setup}              OPTIONAL     -- Need R
    ]]
}

ReportSFTD-EUTRA ::=                    SEQUENCE {
    reportSFTD-Meas                         BOOLEAN,
    reportRSRP                              BOOLEAN,
    ...
}

EventTriggerConfigInterRAT ::=              SEQUENCE {
    eventId                                     CHOICE {
        eventB1                                     SEQUENCE {
            b1-ThresholdEUTRA                           MeasTriggerQuantityEUTRA,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger,
            ...
        },
        eventB2                                     SEQUENCE {
            b2-Threshold1                               MeasTriggerQuantity,
            b2-Threshold2EUTRA                          MeasTriggerQuantityEUTRA,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger,
            ...
        },
        ...,
        [[
        eventB1-UTRA-FDD-r16                         SEQUENCE {
            b1-ThresholdUTRA-FDD-r16                    MeasTriggerQuantityUTRA-FDD-r16,
            reportOnLeave-r16                           BOOLEAN,
```

```
            hysteresis-r16                          Hysteresis,
            timeToTrigger-r16                       TimeToTrigger,
            ...
        },
        eventB2-UTRA-FDD-r16                    SEQUENCE {
            b2-Threshold1-r16                       MeasTriggerQuantity,
            b2-Threshold2UTRA-FDD-r16               MeasTriggerQuantityUTRA-FDD-r16,
            reportOnLeave-r16                       BOOLEAN,
            hysteresis-r16                          Hysteresis,
            timeToTrigger-r16                       TimeToTrigger,
            ...
        }
        ]],
        [[
        eventY1-Relay-r17                       SEQUENCE {
            y1-Threshold1-r17                       MeasTriggerQuantity,
            y1-Threshold2-Relay-r17                 SL-MeasTriggerQuantity-r16,
            reportOnLeave-r17                       BOOLEAN,
            hysteresis-r17                          Hysteresis,
            timeToTrigger-r17                       TimeToTrigger,
            ...
        },
        eventY2-Relay-r17                       SEQUENCE {
            y2-Threshold-Relay-r17                  SL-MeasTriggerQuantity-r16,
            reportOnLeave-r17                       BOOLEAN,
            hysteresis-r17                          Hysteresis,
            timeToTrigger-r17                       TimeToTrigger,
            ...
        }
       ]]
    },
    rsType                          NR-RS-Type,

    reportInterval                  ReportInterval,
    reportAmount                    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantity                  MeasReportQuantity,
    maxReportCells                  INTEGER (1..maxCellReport),
    ...,
    [[
    reportQuantityUTRA-FDD-r16      MeasReportQuantityUTRA-FDD-r16      OPTIONAL    -- Need R
    ]],
    [[
    includeCommonLocationInfo-r16   ENUMERATED {true}                                   OPTIONAL,   -- Need R
    includeBT-Meas-r16              SetupRelease {BT-NameList-r16}                      OPTIONAL,   -- Need M
    includeWLAN-Meas-r16            SetupRelease {WLAN-NameList-r16}                    OPTIONAL,   -- Need M
    includeSensor-Meas-r16          SetupRelease {Sensor-NameList-r16}                  OPTIONAL    -- Need M
    ]],
    [[
    reportQuantityRelay-r17         SL-MeasReportQuantity-r16                           OPTIONAL    -- Need R
    ]]}

PeriodicalReportConfigInterRAT ::=          SEQUENCE {
    reportInterval                              ReportInterval,
    reportAmount                                ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
```

```
    reportQuantity                          MeasReportQuantity,
    maxReportCells                          INTEGER (1..maxCellReport),
    ...,
    [[
    reportQuantityUTRA-FDD-r16              MeasReportQuantityUTRA-FDD-r16      OPTIONAL    -- Need R
    ]],
    [[
    includeCommonLocationInfo-r16       ENUMERATED {true}                                   OPTIONAL,   -- Need R
    includeBT-Meas-r16                  SetupRelease {BT-NameList-r16}                      OPTIONAL,   -- Need M
    includeWLAN-Meas-r16                SetupRelease {WLAN-NameList-r16}                    OPTIONAL,   -- Need M
    includeSensor-Meas-r16              SetupRelease {Sensor-NameList-r16}                  OPTIONAL    -- Need M
    ]],
    [[
    reportQuantityRelay-r17             SL-MeasReportQuantity-r16                           OPTIONAL    -- Need R
    ]]

}

MeasTriggerQuantityUTRA-FDD-r16 ::=         CHOICE{
    utra-FDD-RSCP-r16                           INTEGER (-5..91),
    utra-FDD-EcN0-r16                           INTEGER (0..49)
}

MeasReportQuantityUTRA-FDD-r16 ::=      SEQUENCE {
    cpich-RSCP                              BOOLEAN,
    cpich-EcN0                              BOOLEAN
}

-- TAG-REPORTCONFIGINTERRAT-STOP
-- ASN1STOP
```

ReportConfigInterRAT field descriptions
reportType Type of the configured measurement report. In (NG)EN-DC, and NR-DC, network does not configure report of type *ReportCGI-EUTRA* for SCG.

ReportCGI-EUTRA field descriptions
useAutonomousGaps Indicates whether or not the UE is allowed to use autonomous gaps in acquiring system information from the E-UTRAN neighbour cell. When the field is included, the UE applies the corresponding value for T321.

***EventTriggerConfigInterRAT* field descriptions**
b2-Threshold1 NR threshold to be used in inter RAT measurement report triggering condition for event B2.
bN-ThresholdEUTRA E-UTRA threshold value associated with the selected trigger quantity (RSRP, RSRQ, SINR) to be used in inter RAT measurement report triggering condition for event number bN. In the same *eventB2*, the network configures the same CHOICE name (*rsrp*, *rsrq* or *sinr*) for the *MeasTriggerQuantity* of the *b2-Threshold1* and for the *MeasTriggerQuantityEUTRA* of the *b2-Threshold2EUTRA*.
eventId Choice of inter RAT event triggered reporting criteria.
maxReportCells Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.
reportAmount *Number* of measurement reports applicable for *eventTriggered* as well as for *periodical* report types
reportOnLeave Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in *cellsTriggeredList*, as specified in 5.5.4.1.
reportQuantity, reportQuantityUTRA-FDD The cell measurement quantities to be included in the measurement report. If the field *eventB1-UTRA-FDD* or *eventB2-UTRA-FDD* is present, the UE shall ignore the value(s) provided in *reportQuantity*.
reportQuantityRelay The L2 U2N Relay UE measurement quantity to be included in measuremet report.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
bN-ThresholdUTRA-FDD UTRA-FDD threshold value associated with the selected trigger quantity (RSCP, EcN0) to be used in inter RAT measurement report triggering condition for event number bN. *utra-FDD-RSCP* corresponds to CPICH_RSCP in TS 25.133 [46] for FDD. *utra-FDD-EcN0* corresponds to CPICH_Ec/No in TS 25.133 [46] for FDD. For *utra-FDD-RSCP*: The actual value is field value – 115 dBm. For *utra-FDD-EcN0*: The actual value is (field value – 49)/2 dB.
y1-Threshold1 NR threshold to be used in measurement report triggering condition for event Y1.
y1-Threshold2-Relay L2 U2N Relay threshold value associated with the selected trigger quantity (i.e. RSRP) to be used in measurement report triggering condition for event Y1.
y2-Threshold-Relay L2 U2N Relay threshold value associated with the selected trigger quantity (i.e. RSRP) to be used in measurement report triggering condition for event Y2.

***PeriodicalReportConfigInterRAT* field descriptions**
maxReportCells Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.
reportAmount Number of measurement reports applicable for *eventTriggered* as well as for *periodical* report types
reportQuantity, reportQuantityUTRA-FDD The cell measurement quantities to be included in the measurement report. If the field *reportQuantityUTRA-FDD* is present, the UE shall ignore the value(s) provided in *reportQuantity*.

– *ReportConfigNR*

The IE *ReportConfigNR* specifies criteria for triggering of an NR measurement reporting event or of a CHO, CPA or CPC event or of an L2 U2N relay measurement reporting event. For events labelled AN with N equal to 1, 2 and so on, measurement reporting events and CHO, CPA or CPC events are based on cell measurement results, which can either be derived based on SS/PBCH block or CSI-RS.

Event A1: Serving becomes better than absolute threshold;

Event A2: Serving becomes worse than absolute threshold;

Event A3: Neighbour becomes amount of offset better than PCell/PSCell;

Event A4: Neighbour becomes better than absolute threshold;

Event A5: PCell/PSCell becomes worse than absolute threshold1 AND Neighbour/SCell becomes better than another absolute threshold2;

Event A6: Neighbour becomes amount of offset better than SCell;

Event D1: Distance between UE and a reference location *referenceLocation1* becomes larger than configured threshold *distanceThreshFromReference1* and distance between UE and a reference location *referenceLocation2* becomes shorter than configured threshold *distanceThreshFromReference2*;

CondEvent A3: Conditional reconfiguration candidate becomes amount of offset better than PCell/PSCell;

CondEvent A4: Conditional reconfiguration candidate becomes better than absolute threshold;

CondEvent A5: PCell/PSCell becomes worse than absolute threshold1 AND Conditional reconfiguration candidate becomes better than another absolute threshold2;

CondEvent D1: Distance between UE and a reference location *referenceLocation1* becomes larger than configured threshold *distanceThreshFromReference1* and distance between UE and a reference location *referenceLocation2* of conditional reconfiguration candidate becomes shorter than configured threshold *distanceThreshFromReference2*;

CondEvent T1: Time measured at UE becomes more than configured threshold *t1-Threshold* but is less than *t1-Threshold + duration*;

Event X1: Serving L2 U2N Relay UE becomes worse than absolute threshold1 AND NR Cell becomes better than another absolute threshold2;

Event X2: Serving L2 U2N Relay UE becomes worse than absolute threshold;

For event I1, measurement reporting event is based on CLI measurement results, which can either be derived based on SRS-RSRP or CLI-RSSI.

Event I1: Interference becomes higher than absolute threshold.

***ReportConfigNR* information element**

```
-- ASN1START
-- TAG-REPORTCONFIGNR-START

ReportConfigNR ::=                      SEQUENCE {
```

```
    reportType                                  CHOICE {
        periodical                                  PeriodicalReportConfig,
        eventTriggered                              EventTriggerConfig,
        ...,
        reportCGI                                   ReportCGI,
        reportSFTD                                  ReportSFTD-NR,
        condTriggerConfig-r16                       CondTriggerConfig-r16,
        cli-Periodical-r16                          CLI-PeriodicalReportConfig-r16,
        cli-EventTriggered-r16                      CLI-EventTriggerConfig-r16,
        rxTxPeriodical-r17                          RxTxPeriodical-r17
    }
}

ReportCGI ::=                       SEQUENCE {
    cellForWhichToReportCGI             PhysCellId,
        ...,
    [[
    useAutonomousGaps-r16               ENUMERATED {setup}                  OPTIONAL    -- Need R
    ]]

}

ReportSFTD-NR ::=                   SEQUENCE {
    reportSFTD-Meas                     BOOLEAN,
    reportRSRP                          BOOLEAN,
    ...,
    [[
    reportSFTD-NeighMeas                ENUMERATED {true}                               OPTIONAL,   -- Need R
    drx-SFTD-NeighMeas                  ENUMERATED {true}                               OPTIONAL,   -- Need R
    cellsForWhichToReportSFTD           SEQUENCE (SIZE (1..maxCellSFTD)) OF PhysCellId  OPTIONAL    -- Need R
    ]]
}

CondTriggerConfig-r16 ::=           SEQUENCE {
    condEventId                         CHOICE {
        condEventA3                         SEQUENCE {
            a3-Offset                           MeasTriggerQuantityOffset,
            hysteresis                          Hysteresis,
            timeToTrigger                       TimeToTrigger
        },
        condEventA5                         SEQUENCE {
            a5-Threshold1                       MeasTriggerQuantity,
            a5-Threshold2                       MeasTriggerQuantity,
            hysteresis                          Hysteresis,
            timeToTrigger                       TimeToTrigger
        },
        ...,
        condEventA4-r17                     SEQUENCE {
            a4-Threshold-r17                    MeasTriggerQuantity,
            hysteresis-r17                      Hysteresis,
            timeToTrigger-r17                   TimeToTrigger
        },
        condEventD1-r17                     SEQUENCE {
            distanceThreshFromReference1-r17 INTEGER(0.. 65525),
```

```
            distanceThreshFromReference2-r17 INTEGER(0.. 65525),
            referenceLocation1-r17           ReferenceLocation-r17,
            referenceLocation2-r17           ReferenceLocation-r17,
            hysteresisLocation-r17           HysteresisLocation-r17,
            timeToTrigger-r17                TimeToTrigger
        },
        condEventT1-r17                 SEQUENCE {
            t1-Threshold-r17                INTEGER (0..549755813887),
            duration-r17                    INTEGER (1..6000)
        }
    },
    rsType-r16                      NR-RS-Type,
    ...
}

EventTriggerConfig::=                       SEQUENCE {
    eventId                                     CHOICE {
        eventA1                                     SEQUENCE {
            a1-Threshold                                MeasTriggerQuantity,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger
        },
        eventA2                                     SEQUENCE {
            a2-Threshold                                MeasTriggerQuantity,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger
        },
        eventA3                                     SEQUENCE {
            a3-Offset                                   MeasTriggerQuantityOffset,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger,
            useAllowedCellList                          BOOLEAN
        },
        eventA4                                     SEQUENCE {
            a4-Threshold                                MeasTriggerQuantity,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger,
            useAllowedCellList                          BOOLEAN
        },
        eventA5                                     SEQUENCE {
            a5-Threshold1                               MeasTriggerQuantity,
            a5-Threshold2                               MeasTriggerQuantity,
            reportOnLeave                               BOOLEAN,
            hysteresis                                  Hysteresis,
            timeToTrigger                               TimeToTrigger,
            useAllowedCellList                          BOOLEAN
        },
        eventA6                                     SEQUENCE {
            a6-Offset                                   MeasTriggerQuantityOffset,
            reportOnLeave                               BOOLEAN,
```

```
            hysteresis                          Hysteresis,
            timeToTrigger                       TimeToTrigger,
            useAllowedCellList                  BOOLEAN
        },
        ...,
        [[
        eventX1-r17                         SEQUENCE {
            x1-Threshold1-Relay-r17             SL-MeasTriggerQuantity-r16,
            x1-Threshold2-r17                   MeasTriggerQuantity,
            reportOnLeave-r17                   BOOLEAN,
            hysteresis-r17                      Hysteresis,
            timeToTrigger-r17                   TimeToTrigger,
            useAllowedCellList-r17              BOOLEAN
        },
        eventX2-r17                         SEQUENCE {
            x2-Threshold-Relay-r17              SL-MeasTriggerQuantity-r16,
            reportOnLeave-r17                   BOOLEAN,
            hysteresis-r17                      Hysteresis,
            timeToTrigger-r17                   TimeToTrigger
        },
        eventD1-r17                         SEQUENCE {
            distanceThreshFromReference1-r17    INTEGER(1.. 65525),
            distanceThreshFromReference2-r17    INTEGER(1.. 65525),
            referenceLocation1-r17              ReferenceLocation-r17,
            referenceLocation2-r17              ReferenceLocation-r17,
            reportOnLeave-r17                   BOOLEAN,
            hysteresisLocation-r17              HysteresisLocation-r17,
            timeToTrigger-r17                   TimeToTrigger
        }
        ]]
    },
    rsType                              NR-RS-Type,
    reportInterval                      ReportInterval,
    reportAmount                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantityCell                  MeasReportQuantity,
    maxReportCells                      INTEGER (1..maxCellReport),
    reportQuantityRS-Indexes             MeasReportQuantity                                 OPTIONAL,   -- Need R
    maxNrofRS-IndexesToReport           INTEGER (1..maxNrofIndexesToReport)                OPTIONAL,   -- Need R
    includeBeamMeasurements             BOOLEAN,
    reportAddNeighMeas                  ENUMERATED {setup}                                 OPTIONAL,   -- Need R
    ...,
    [[
    measRSSI-ReportConfig-r16           MeasRSSI-ReportConfig-r16                          OPTIONAL,   -- Need R
    useT312-r16                         BOOLEAN                                            OPTIONAL,   -- Need M
    includeCommonLocationInfo-r16       ENUMERATED {true}                                  OPTIONAL,   -- Need R
    includeBT-Meas-r16                  SetupRelease {BT-NameList-r16}                     OPTIONAL,   -- Need M
    includeWLAN-Meas-r16                SetupRelease {WLAN-NameList-r16}                   OPTIONAL,   -- Need M
    includeSensor-Meas-r16              SetupRelease {Sensor-NameList-r16}                 OPTIONAL    -- Need M
    ]],
    [[
    coarseLocationRequest-r17           ENUMERATED {true}                                  OPTIONAL,   -- Need R
    reportQuantityRelay-r17             SL-MeasReportQuantity-r16                          OPTIONAL    -- Need R
    ]]
}
```

```
PeriodicalReportConfig ::=              SEQUENCE {
    rsType                                  NR-RS-Type,
    reportInterval                          ReportInterval,
    reportAmount                            ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantityCell                      MeasReportQuantity,
    maxReportCells                          INTEGER (1..maxCellReport),
    reportQuantityRS-Indexes                MeasReportQuantity                                  OPTIONAL,   -- Need R
    maxNrofRS-IndexesToReport               INTEGER (1..maxNrofIndexesToReport)                 OPTIONAL,   -- Need R
    includeBeamMeasurements                 BOOLEAN,
    useAllowedCellList                      BOOLEAN,
    ...,
    [[
    measRSSI-ReportConfig-r16               MeasRSSI-ReportConfig-r16                           OPTIONAL,   -- Need R
    includeCommonLocationInfo-r16           ENUMERATED {true}                                   OPTIONAL,   -- Need R
    includeBT-Meas-r16                      SetupRelease {BT-NameList-r16}                      OPTIONAL,   -- Need M
    includeWLAN-Meas-r16                    SetupRelease {WLAN-NameList-r16}                    OPTIONAL,   -- Need M
    includeSensor-Meas-r16                  SetupRelease {Sensor-NameList-r16}                  OPTIONAL,   -- Need M
    ul-DelayValueConfig-r16                 SetupRelease { UL-DelayValueConfig-r16 }            OPTIONAL,   -- Need M
    reportAddNeighMeas-r16                  ENUMERATED {setup}                                  OPTIONAL    -- Need R
    ]],
    [[
    ul-ExcessDelayConfig-r17                SetupRelease { UL-ExcessDelayConfig-r17 }           OPTIONAL,   -- Need M
    coarseLocationRequest-r17               ENUMERATED {true}                                   OPTIONAL,   -- Need R
    reportQuantityRelay-r17                 SL-MeasReportQuantity-r16                           OPTIONAL    -- Need R
    ]]
}

NR-RS-Type ::=                          ENUMERATED {ssb, csi-rs}

MeasTriggerQuantity ::=                 CHOICE {
    rsrp                                    RSRP-Range,
    rsrq                                    RSRQ-Range,
    sinr                                    SINR-Range
}

MeasTriggerQuantityOffset ::=           CHOICE {
    rsrp                                    INTEGER (-30..30),
    rsrq                                    INTEGER (-30..30),
    sinr                                    INTEGER (-30..30)
}


MeasReportQuantity ::=                  SEQUENCE {
    rsrp                                    BOOLEAN,
    rsrq                                    BOOLEAN,
    sinr                                    BOOLEAN
}

MeasRSSI-ReportConfig-r16 ::=           SEQUENCE {
    channelOccupancyThreshold-r16           RSSI-Range-r16          OPTIONAL    -- Need R
}

CLI-EventTriggerConfig-r16 ::=          SEQUENCE {
```

```
    eventId-r16                             CHOICE {
        eventI1-r16                             SEQUENCE {
            i1-Threshold-r16                        MeasTriggerQuantityCLI-r16,
            reportOnLeave-r16                       BOOLEAN,
            hysteresis-r16                          Hysteresis,
            timeToTrigger-r16                       TimeToTrigger
        },
    ...
    },
    reportInterval-r16                      ReportInterval,
    reportAmount-r16                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    maxReportCLI-r16                        INTEGER (1..maxCLI-Report-r16),
    ...
}

CLI-PeriodicalReportConfig-r16 ::=          SEQUENCE {
    reportInterval-r16                      ReportInterval,
    reportAmount-r16                        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantityCLI-r16                   MeasReportQuantityCLI-r16,
    maxReportCLI-r16                        INTEGER (1..maxCLI-Report-r16),
    ...
}

RxTxPeriodical-r17  ::=                     SEQUENCE {
    rxTxReportInterval-r17                  RxTxReportInterval-r17                          OPTIONAL,   -- Need R
    reportAmount-r17                        ENUMERATED {r1, infinity, spare6, spare5, spare4, spare3, spare2, spare1},
    ...
}

RxTxReportInterval-r17 ::= ENUMERATED {ms80,ms120,ms160,ms240,ms320,ms480,ms640,ms1024,ms1280,ms2048,ms2560,ms5120,spare4,spare3,spare2,spare1}

MeasTriggerQuantityCLI-r16 ::=              CHOICE {
    srs-RSRP-r16                            SRS-RSRP-Range-r16,
    cli-RSSI-r16                            CLI-RSSI-Range-r16
}

MeasReportQuantityCLI-r16 ::=               ENUMERATED {srs-rsrp, cli-rssi}

-- TAG-REPORTCONFIGNR-STOP
-- ASN1STOP
```

***CondTriggerConfig* field descriptions**
a3-Offset Offset value(s) to be used in NR conditional reconfiguration triggering condition for cond event a3. The actual value is field value * 0.5 dB.
a4-Threshold Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR conditional reconfiguration triggering condition for cond event a4.
a5-Threshold1/ a5-Threshold2 Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR conditional reconfiguration triggering condition for cond event a5. In the same *condeventA5*, the network configures the same quantity for the *MeasTriggerQuantity* of the *a5-Threshold1* and for the *MeasTriggerQuantity* of the *a5-Threshold2*.
condEventId Choice of NR conditional reconfiguration event triggered criteria.
distanceThreshFromReference1, distanceThreshFromReference2 Distance from a reference location configured with *referenceLocation1* or *referenceLocation2*. Each step represents 50m.
duration This field is used for defining the leaving condition T1-2 for conditional HO event *condEventT1*. Each step represents 100ms.
referenceLocation1, referenceLocation2 Reference locations used for *condEventD1*. The r*eferenceLocation1* is associated to serving cell and *referenceLocation2* is associated to candidate target cell.
t1-Threshold The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900).
timeToTrigger Time during which specific criteria for the event needs to be met in order to execute the conditional reconfiguration evaluation.

***ReportConfigNR* field descriptions**
reportType Type of the configured measurement report. In MR-DC, network does not configure report of type *reportCGI* using SRB3. The *condTriggerConfig is* used for CHO, CPA or CPC configuration.

***ReportCGI* field descriptions**
useAutonomousGaps Indicates whether or not the UE is allowed to use autonomous gaps in acquiring system information from the NR neighbour cell. When the field is included, the UE applies the corresponding value for T321.

***EventTriggerConfig* field descriptions**
a3-Offset/a6-Offset
Offset value(s) to be used in NR measurement report triggering condition for event a3/a6. The actual value is field value * 0.5 dB.
aN-ThresholdM
Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR measurement report triggering condition for event number aN. If multiple thresholds are defined for event number aN, the thresholds are differentiated by M. In the same *eventA5*, the network configures the same quantity for the *MeasTriggerQuantity* of the *a5-Threshold1* and for the *MeasTriggerQuantity* of the *a5-Threshold2*.
channelOccupancyThreshold
RSSI threshold which is used for channel occupancy evaluation.
coarseLocationRequest
This field is used to request UE to report coarse location information.
distanceThreshFromReference1, distanceThreshFromReference2
Threshold value associated to the distance from a reference location configured with *referenceLocation1* or *referenceLocation2.* Each step represents 50m.
eventId
Choice of NR event triggered reporting criteria.
maxNrofRS-IndexesToReport
Max number of RS indexes to include in the measurement report for A1-A6 events.
maxReportCells
Max number of non-serving cells to include in the measurement report.
referenceLocation1, referenceLocation2
Reference locations used for *eventD1*. The *referenceLocation1* is associated to serving cell and *referenceLocation2* is associated to neighbour cell.
reportAddNeighMeas
Indicates that the UE shall include the best neighbour cells per serving frequency.
reportAmount
Number of measurement reports applicable for *eventTriggered* as well as for *periodical* report types.
reportOnLeave
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in *cellsTriggeredList*, as specified in 5.5.4.1. Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met if configured in *eventD1*, as specified in 5.5.4.1.
reportQuantityCell
The cell measurement quantities to be included in the measurement report.
reportQuantityRS-Indexes
Indicates which measurement information per RS index the UE shall include in the measurement report.
timeToTrigger
Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
useAllowedCellList
Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.
useT312
If value *TRUE* is configured, the UE shall use the timer T312 with the value *t312* as specified in the corresponding *measObjectNR*. If value FALSE is configured, the timer T312 is considered as disabled. Network configures value *TRUE* only if *reportType* is set to *eventTriggered*.
xN-ThresholdM
Threshold value associated to the selected trigger quantity (e.g. RSRP, RSRQ, SINR) per RS Type (e.g. SS/PBCH block, CSI-RS) to be used in NR measurement report triggering condition for event xN. If multiple thresholds are defined for event number xN, the thresholds are differentiated by M. *x1-Threshold1* and *x2-Threshold* indicates the threshold value for the serving L2 U2N Relay UE, *x1-Threshold2* indicates the threshold value for the NR Cells.

***CLI-EventTriggerConfig* field descriptions**
i1-Threshold Threshold value associated to the selected trigger quantity (e.g. SRS-RSRP, CLI-RSSI) to be used in CLI measurement report triggering condition for event i1.
eventId Choice of CLI event triggered reporting criteria.
maxReportCLI Max number of CLI measurement resource to include in the measurement report.
reportAmount *Number* of measurement reports.
reportOnLeave Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CLI measurement resource in *srsTriggeredList* or *rssiTriggeredList*, as specified in 5.5.4.1.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

***CLI-PeriodicalReportConfig* field descriptions**
maxReportCLI Max number of CLI measurement resource to include in the measurement report.
reportAmount *Number* of measurement reports.
reportQuantityCLI The CLI measurement quantities to be included in the measurement report.

***PeriodicalReportConfig* field descriptions**
coarseLocationRequest This field is used to request UE to report coarse location information.
maxNrofRS-IndexesToReport Max number of RS indexes to include in the measurement report.
maxReportCells Max number of non-serving cells to include in the measurement report.
reportAddNeighMeas Indicates that the UE shall include the best neighbour cells per serving frequency.
reportAmount *Number* of measurement reports applicable for *eventTriggered* as well as for *periodical* report types
reportQuantityCell The cell measurement quantities to be included in the measurement report.
reportQuantityRS-Indexes Indicates which measurement information per RS index the UE shall include in the measurement report.
ul-DelayValueConfig If the field is present, the UE shall perform the actual UL PDCP Packet Average Delay measurement per DRB as specified in TS 38.314 [53] and the UE shall ignore the fields *reportQuantityCell* and *maxReportCells*. The applicable values for the corresponding *reportInterval* are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1,min6, min12, min30}. The *reportInterval* indicates the periodicity for performing and reporting of UL PDCP Packet Average Delay per DRB measurement as specified in TS 38.314 [53].
ul-ExcessDelayConfig If the field is present, the UE shall perform the actual UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53] and the UE shall ignore the fields *reportQuantityCell* and *maxReportCells*. The applicable values for the corresponding *reportInterval* are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1,min6, min12, min30}. The *reportInterval* indicates the periodicity for performing and reporting of UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53].
useAllowedCellList Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.

***ReportSFTD-NR* field descriptions**
cellForWhichToReportSFTD Indicates the target NR neighbour cells for SFTD measurement between PCell and NR neighbour cells.
drx-SFTD-NeighMeas Indicates that the UE shall use available idle periods (i.e. DRX off periods) for the SFTD measurement in NR standalone. The network only includes *drx-SFTD-NeighMeas* field when *reprtSFTD-NeighMeas* is set to true.
reportSFTD-Meas Indicates whether UE is required to perform SFTD measurement between PCell and NR PSCell in NR-DC.
reportSFTD-NeighMeas Indicates whether UE is required to perform SFTD measurement between PCell and NR neighbour cells in NR standalone. The network does not include this field if *reportSFTD-Meas* is set to *true*.
reportRSRP Indicates whether UE is required to include RSRP result of NR PSCell or NR neighbour cells in SFTD measurement result, derived based on SSB. If it is set to true, the network should ensure that *ssb-ConfigMobility* is included in the measurement object for NR PSCell or NR neighbour cells.

RxTxPeriodical field descriptions
reportAmount This field indicates the number of UE Rx-Tx time difference measurement reports. If configured to *r1*, the network does not configure *rxTxReportInterval* and only one measurement is reported. If configured to *infinity*, UE periodically reports measurements according to the periodicity configured by *rxTxReportInterval*.
rxTxReportInterval This field indicates the measurement reporting periodicity of UE Rx-Tx time difference.

other field descriptions
MeasTriggerQuantity SINR is applicable only for CONNECTED mode events.

– *ReportConfigNR-SL*

The IE *ReportConfigNR-SL* specifies criteria for triggering of a CBR measurement reporting event for NR sidelink communication/discovery. Measurement reporting events are based on CBR measurement results on the corresponding transmission resource pools. These events are labelled CN with N equal to 1 and 2.

Event C1: CBR of NR sidelink communication/discovery is above a threshold;

Event C2: CBR of NR sidelink communication/discovery is below a threshold;

ReportConfigNR-SL information element

```
-- ASN1START
-- TAG-REPORTCONFIGNR-SL-START

ReportConfigNR-SL-r16 ::=           SEQUENCE {
    reportType-r16                      CHOICE {
        periodical-r16                      PeriodicalReportConfigNR-SL-r16,
        eventTriggered-r16                  EventTriggerConfigNR-SL-r16
    }
}

EventTriggerConfigNR-SL-r16::=      SEQUENCE {
    eventId-r16                         CHOICE {
        eventC1                             SEQUENCE {
            c1-Threshold-r16                    SL-CBR-r16,
            hysteresis-r16                      Hysteresis,
            timeToTrigger-r16                   TimeToTrigger
        },
        eventC2-r16                 SEQUENCE {
            c2-Threshold-r16            SL-CBR-r16,
            hysteresis-r16              Hysteresis,
            timeToTrigger-r16           TimeToTrigger
        },
        ...
    },
    reportInterval-r16              ReportInterval,
```

```
    reportAmount-r16                ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantity-r16              MeasReportQuantity-r16,
    ...
}

PeriodicalReportConfigNR-SL-r16 ::=  SEQUENCE {
    reportInterval-r16                  ReportInterval,
    reportAmount-r16                    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    reportQuantity-r16                  MeasReportQuantity-r16,
    ...
}

MeasReportQuantity-r16 ::=          SEQUENCE {
    cbr-r16                             BOOLEAN,
    ...
}

-- TAG-REPORTCONFIGNR-SL-STOP
-- ASN1STOP
```

***ReportConfigNR-SL* field descriptions**
reportType Type of the configured CBR measurement report for NR sidelink communication/discovery.

***EventTriggerConfigNR-SL* field descriptions**
cN-Threshold Threshold used for events C1 and C2 specified in clauses 5.5.4.11 and 5.5.4.12, respectively.
eventId Choice of NR event triggered reporting criteria.
reportAmoun Number of measurement reports applicable for *eventTriggered* as well as for *periodical* report types.
reportQuantity The sidelink measurement quantities to be included in the measurement report. In this release, this is set as the CBR measurement result.
timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

***PeriodicalReportConfigNR-SL* field descriptions**
reportAmount Number of measurement reports applicable for *eventTriggered* as well as for *periodical* report types.
reportQuantity The sidelink measurement quantities to be included in the measurement report. In this release, this is set as the CBR measurement result.

– *ReportConfigToAddModList*

The IE *ReportConfigToAddModList* concerns a list of reporting configurations to add or modify.

ReportConfigToAddModList information element

```
-- ASN1START
-- TAG-REPORTCONFIGTOADDMODLIST-START

ReportConfigToAddModList ::=        SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

ReportConfigToAddMod ::=            SEQUENCE {
    reportConfigId                      ReportConfigId,
    reportConfig                        CHOICE {
        reportConfigNR                      ReportConfigNR,
        ...,
        reportConfigInterRAT                ReportConfigInterRAT,
        reportConfigNR-SL-r16               ReportConfigNR-SL-r16
    }
}

-- TAG-REPORTCONFIGTOADDMODLIST-STOP
-- ASN1STOP
```

– *ReportInterval*

The IE *ReportInterval* indicates the interval between periodical reports. The *ReportInterval* is applicable if the UE performs periodical reporting (i.e. when *reportAmount* exceeds 1) when *reportType* is set to either *eventTriggered*, *periodical*, *cli-EventTriggered* or *cli-Periodical*. Value *ms120* corresponds to 120 ms, value *ms240* corresponds to 240 ms and so on, while value *min1* corresponds to 1 min, *min6* corresponds to 6 min and so on.

***ReportInterval* information element**

```
-- ASN1START
-- TAG-REPORTINTERVAL-START

ReportInterval ::=                  ENUMERATED {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960,
                                                min1,min6, min12, min30 }

-- TAG-REPORTINTERVAL-STOP
-- ASN1STOP
```

– *ReselectionThreshold*

The IE *ReselectionThreshold* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

ReselectionThreshold information element

```
-- ASN1START
-- TAG-RESELECTIONTHRESHOLD-START

ReselectionThreshold ::=                INTEGER (0..31)

-- TAG-RESELECTIONTHRESHOLD-STOP
-- ASN1STOP
```

– ReselectionThresholdQ

The IE *ReselectionThresholdQ* is used to indicate a quality level threshold for cell reselection. Actual value of threshold = field value [dB].

ReselectionThresholdQ information element

```
-- ASN1START
-- TAG-RESELECTIONTHRESHOLDQ-START

ReselectionThresholdQ ::=           INTEGER (0..31)

-- TAG-RESELECTIONTHRESHOLDQ-STOP
-- ASN1STOP
```

– ResumeCause

The IE *ResumeCause* is used to indicate the resume cause in *RRCResumeRequest*, *RRCResumeRequest1* and *UEAssistanceInformation*.

ResumeCause information element

```
-- ASN1START
-- TAG-RESUMECAUSE-START

ResumeCause ::=             ENUMERATED {emergency, highPriorityAccess, mt-Access, mo-Signalling,
                                        mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, rna-Update, mps-PriorityAccess,
                                        mcs-PriorityAccess, spare1, spare2, spare3, spare4, spare5 }

-- TAG-RESUMECAUSE-STOP
-- ASN1STOP
```

– RLC-BearerConfig

The IE *RLC-BearerConfig* is used to configure an RLC entity, a corresponding logical channel in MAC and the linking to a PDCP entity (served radio bearer).

RLC-BearerConfig information element

```
-- ASN1START
-- TAG-RLC-BEARERCONFIG-START

RLC-BearerConfig ::=                SEQUENCE {
    logicalChannelIdentity              LogicalChannelIdentity,
    servedRadioBearer                   CHOICE {
        srb-Identity                        SRB-Identity,
        drb-Identity                        DRB-Identity
    }                                                                   OPTIONAL,   -- Cond LCH-SetupOnly
    reestablishRLC                      ENUMERATED {true}               OPTIONAL,   -- Need N
    rlc-Config                          RLC-Config                      OPTIONAL,   -- Cond LCH-Setup
    mac-LogicalChannelConfig            LogicalChannelConfig            OPTIONAL,   -- Cond LCH-Setup
    ...,
    [[
    rlc-Config-v1610                    RLC-Config-v1610                OPTIONAL    -- Need R
    ]],
    [[
    rlc-Config-v1700                    RLC-Config-v1700                OPTIONAL,   -- Need R
    logicalChannelIdentityExt-r17       LogicalChannelIdentityExt-r17   OPTIONAL,   -- Cond LCH-SetupModMRB
    multicastRLC-BearerConfig-r17       MulticastRLC-BearerConfig-r17   OPTIONAL,   -- Cond LCH-SetupOnlyMRB
    servedRadioBearerSRB4-r17           SRB-Identity-v1700              OPTIONAL    -- Need N
    ]]
}

MulticastRLC-BearerConfig-r17 ::=   SEQUENCE {
    servedMBS-RadioBearer-r17           MRB-Identity-r17,
    isPTM-Entity-r17                    ENUMERATED {true}               OPTIONAL    -- Need S
}

LogicalChannelIdentityExt-r17 ::=   INTEGER (320..65855)

-- TAG-RLC-BEARERCONFIG-STOP
-- ASN1STOP
```

***RLC-BearerConfig* field descriptions**
isPTM-Entity If configured, indicates that the RLC entity is used for PTM reception. When the field is absent the RLC entity is used for PTP transmission/reception.
logicalChannelIdentity ID used commonly for the MAC logical channel and for the RLC bearer. Value 4 is not configured for DRBs if SRB4 is configured.
logicalChannelIdentityExt Extended logical channel ID used commonly for the MAC logical channel and for the RLC bearer for PTM reception. If this field is configured, the UE shall ignore *logicalChannelIdentity*.
reestablishRLC Indicates that RLC should be re-established. Network sets this to *true* at least whenever the security key used for the radio bearer associated with this RLC entity changes. For SRB2, multicast MRBs and DRBs, unless full configuration is used, it is also set to *true* during the resumption of the RRC connection or the first reconfiguration after reestablishment. For SRB1, when resuming an RRC connection, or at the first reconfiguration after RRC connection reestablishment, the network does not set this field to *true.*
rlc-Config Determines the RLC mode (UM, AM) and provides corresponding parameters. RLC mode reconfiguration can only be performed by DRB/multicast MRB release/addition or full configuration. The network may configure *rlc-Config-v1610* only when *rlc-Config* (without suffix) is set to *am*.
servedMBS-RadioBearer Associates the RLC Bearer with a multicast MRB. The UE shall deliver DL RLC SDUs received via the RLC entity of this RLC bearer to the PDCP entity of the *servedMBS-RadioBearer*.
servedRadioBearer, servedRadioBearerSRB4 Associates the RLC Bearer with an SRB or a DRB. The UE shall deliver DL RLC SDUs received via the RLC entity of this RLC bearer to the PDCP entity of the *servedRadioBearer*. Furthermore, the UE shall advertise and deliver uplink PDCP PDUs of the uplink PDCP entity of the *servedRadioBearer* to the uplink RLC entity of this RLC bearer unless the uplink scheduling restrictions (*moreThanOneRLC* in *PDCP-Config* and the restrictions in *LogicalChannelConfig*) forbid it to do so.

Conditional Presence	Explanation
LCH-Setup	This field is mandatory present upon creation of a new logical channel for a DRB or a multicast MRB or SRB4. This field is optionally present, Need S, upon creation of a new logical channel for an SRB except SRB4. It is optionally present, Need M, otherwise.
LCH-SetupModMRB	This field is optionally present upon creation of a new logical channel for PTM reception for a multicast MRB. If this field is included upon creation of a new logical channel for PTM reception for a multicast MRB, it shall be present when modifying this logical channel. The field is absent for logical channels configured for an SRB and a DRB.
LCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a DRB or an SRB (*servedRadioBearer*). It is absent, Need M otherwise.
LCH-SetupOnlyMRB	This field is mandatory present upon creation of a new logical channel for a multicast MRB and upon modification of *MRB-Identity* of the served MRB. It is absent, Need M otherwise.

– *RLC-Config*

The IE *RLC-Config* is used to specify the RLC configuration of SRBs, multicast MRBs and DRBs.

***RLC-Config* information element**

```
-- ASN1START
-- TAG-RLC-CONFIG-START

RLC-Config ::=                  CHOICE {
```

```
    am                                  SEQUENCE {
        ul-AM-RLC                           UL-AM-RLC,
        dl-AM-RLC                           DL-AM-RLC
    },
    um-Bi-Directional                   SEQUENCE {
        ul-UM-RLC                           UL-UM-RLC,
        dl-UM-RLC                           DL-UM-RLC
    },
    um-Uni-Directional-UL               SEQUENCE {
        ul-UM-RLC                           UL-UM-RLC
    },
    um-Uni-Directional-DL               SEQUENCE {
        dl-UM-RLC                           DL-UM-RLC
    },
    ...
}

UL-AM-RLC ::=                       SEQUENCE {
    sn-FieldLength                      SN-FieldLengthAM                                OPTIONAL,   -- Cond Reestab
    t-PollRetransmit                    T-PollRetransmit,
    pollPDU                             PollPDU,
    pollByte                            PollByte,
    maxRetxThreshold                    ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 }
}

DL-AM-RLC ::=                       SEQUENCE {
    sn-FieldLength                      SN-FieldLengthAM                                OPTIONAL,   -- Cond Reestab
    t-Reassembly                        T-Reassembly,
    t-StatusProhibit                    T-StatusProhibit
}

UL-UM-RLC ::=                       SEQUENCE {
    sn-FieldLength                      SN-FieldLengthUM                                OPTIONAL    -- Cond Reestab
}

DL-UM-RLC ::=                       SEQUENCE {
    sn-FieldLength                      SN-FieldLengthUM                                OPTIONAL,   -- Cond Reestab
    t-Reassembly                        T-Reassembly
}

T-PollRetransmit ::=                ENUMERATED {
                                        ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                        ms110, ms115, ms120, ms125, ms130, ms135,
                                        ms140, ms145, ms150, ms155, ms160, ms165,
                                        ms170, ms175, ms180, ms185, ms190, ms195,
                                        ms200, ms205, ms210, ms215, ms220, ms225,
                                        ms230, ms235, ms240, ms245, ms250, ms300,
                                        ms350, ms400, ms450, ms500, ms800, ms1000,
                                        ms2000, ms4000, ms1-v1610, ms2-v1610, ms3-v1610,
                                        ms4-v1610, spare1}
```

```
PollPDU ::=                         ENUMERATED {
                                        p4, p8, p16, p32, p64, p128, p256, p512, p1024, p2048, p4096, p6144, p8192, p12288, p16384,p20480,
                                        p24576, p28672, p32768, p40960, p49152, p57344, p65536, infinity, spare8, spare7, spare6, spare5, spare4,
                                        spare3, spare2, spare1}

PollByte ::=                        ENUMERATED {
                                        kB1, kB2, kB5, kB8, kB10, kB15, kB25, kB50, kB75,
                                        kB100, kB125, kB250, kB375, kB500, kB750, kB1000,
                                        kB1250, kB1500, kB2000, kB3000, kB4000, kB4500,
                                        kB5000, kB5500, kB6000, kB6500, kB7000, kB7500,
                                        mB8, mB9, mB10, mB11, mB12, mB13, mB14, mB15,
                                        mB16, mB17, mB18, mB20, mB25, mB30, mB40, infinity,
                                        spare20, spare19, spare18, spare17, spare16,
                                        spare15, spare14, spare13, spare12, spare11,
                                        spare10, spare9, spare8, spare7, spare6, spare5,
                                        spare4, spare3, spare2, spare1}

T-Reassembly ::=                    ENUMERATED {
                                        ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms110,
                                        ms120, ms130, ms140, ms150, ms160, ms170,
                                        ms180, ms190, ms200, spare1}

T-StatusProhibit ::=                ENUMERATED {
                                        ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
                                        ms40, ms45, ms50, ms55, ms60, ms65, ms70,
                                        ms75, ms80, ms85, ms90, ms95, ms100, ms105,
                                        ms110, ms115, ms120, ms125, ms130, ms135,
                                        ms140, ms145, ms150, ms155, ms160, ms165,
                                        ms170, ms175, ms180, ms185, ms190, ms195,
                                        ms200, ms205, ms210, ms215, ms220, ms225,
                                        ms230, ms235, ms240, ms245, ms250, ms300,
                                        ms350, ms400, ms450, ms500, ms800, ms1000,
                                        ms1200, ms1600, ms2000, ms2400, spare2, spare1}

SN-FieldLengthUM ::=                ENUMERATED {size6, size12}
SN-FieldLengthAM ::=                ENUMERATED {size12, size18}

RLC-Config-v1610 ::=                SEQUENCE {
    dl-AM-RLC-v1610                     DL-AM-RLC-v1610
}

RLC-Config-v1700 ::=                SEQUENCE {
    dl-AM-RLC-v1700                     DL-AM-RLC-v1700,
    dl-UM-RLC-v1700                     DL-UM-RLC-v1700
}

DL-AM-RLC-v1610 ::=                 SEQUENCE {
    t-StatusProhibit-v1610              T-StatusProhibit-v1610                          OPTIONAL,   -- Need R
    ...
}

DL-AM-RLC-v1700 ::=                 SEQUENCE {
```

```
    t-ReassemblyExt-r17                 T-ReassemblyExt-r17                                 OPTIONAL    -- Need R
}

DL-UM-RLC-v1700 ::=                 SEQUENCE {
    t-ReassemblyExt-r17                 T-ReassemblyExt-r17                                 OPTIONAL    -- Need R
}

T-StatusProhibit-v1610 ::=          ENUMERATED { ms1, ms2, ms3, ms4, spare4, spare3, spare2, spare1}

T-ReassemblyExt-r17 ::=             ENUMERATED {ms210, ms220, ms340, ms350, ms550, ms1100, ms1650, ms2200}

-- TAG-RLC-CONFIG-STOP
-- ASN1STOP
```

***RLC-Config* field descriptions**
maxRetxThreshold Parameter for RLC AM in TS 38.322 [4]. Value *t1* corresponds to 1 retransmission, value *t2* corresponds to 2 retransmissions and so on.
pollByte Parameter for RLC AM in TS 38.322 [4]. Value *kB25* corresponds to 25 kBytes, value *kB50* corresponds to 50 kBytes and so on. *infinity* corresponds to an infinite amount of kBytes.
pollPDU Parameter for RLC AM in TS 38.322 [4]. Value *p4* corresponds to 4 PDUs, value *p8* corresponds to 8 PDUs and so on. *infinity* corresponds to an infinite number of PDUs.
sn-FieldLength Indicates the RLC SN field size, see TS 38.322 [4], in bits. Value *size6* means 6 bits, value *size12* means 12 bits, value *size18* means 18 bits. The value of *sn-FieldLength* of an RLC entity for the DRB/multicast MRB shall be changed only using reconfiguration with sync. The network configures only value *size12* in *SN-FieldLengthAM* for SRB.
t-PollRetransmit Timer for RLC AM in TS 38.322 [4], in milliseconds. Value *ms5* means 5 ms, value *ms10* means 10 ms and so on.
t-Reassembly, t-ReassemblyExt Timer for reassembly in TS 38.322 [4], in milliseconds. Value *ms0* means 0 ms, value *ms5* means 5 ms and so on. If *t-ReassemblyExt-r17* is configured, the UE shall ignore *t-Reassembly* (without suffix).
t-StatusProhibit Timer for status reporting in TS 38.322 [4], in milliseconds. Value *ms0* means 0 ms, value *ms5* means 5 ms and so on. If *t-StatusProhibit-v1610* is present, the UE shall ignore *t-StatusProhibit* (without suffix).

Conditional Presence	Explanation
Reestab	The field is mandatory present at RLC bearer setup. It is optionally present, need M, at RLC re-establishment. Otherwise it is absent. Need M.

– *RLF-TimersAndConstants*

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

***RLF-TimersAndConstants* information element**

```
-- ASN1START
```

```
-- TAG-RLF-TIMERSANDCONSTANTS-START

RLF-TimersAndConstants ::=          SEQUENCE {
    t310                                ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000, ms4000, ms6000},
    n310                                ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20},
    n311                                ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10},
    ...,
    [[
    t311                                ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000}
    ]]
}

-- TAG-RLF-TIMERSANDCONSTANTS-STOP
-- ASN1STOP
```

***RLF-TimersAndConstants* field descriptions**
n3xy Constants are described in clause 7.3. Value *n1* corresponds to 1, value *n2* corresponds to 2 and so on.
t3xy Timers are described in clause 7.1. Value *ms0* corresponds to 0 ms, value *ms50* corresponds to 50 ms and so on.

– *RNTI-Value*

The IE *RNTI-Value* represents a Radio Network Temporary Identity.

RNTI-Value information element

```
-- ASN1START
-- TAG-RNTI-VALUE-START

RNTI-Value ::=                      INTEGER (0..65535)

-- TAG-RNTI-VALUE-STOP
-- ASN1STOP
```

– *RSRP-Range*

The IE *RSRP-Range* specifies the value range used in RSRP measurements and thresholds. For measurements, integer value for RSRP measurements is according to Table 10.1.6.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value – 156) dBm, except for the IE value 127, in which case the actual value is infinity.

RSRP-Range information element

```
-- ASN1START
-- TAG-RSRP-RANGE-START
```

```
RSRP-Range ::=                      INTEGER(0..127)

-- TAG-RSRP-RANGE-STOP
-- ASN1STOP
```

– *RSRQ-Range*

The IE *RSRQ-Range* specifies the value range used in RSRQ measurements and thresholds. For measurements, integer value for RSRQ measurements is according to Table 10.1.11.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value – 87) / 2 dB.

RSRQ-Range information element

```
-- ASN1START
-- TAG-RSRQ-RANGE-START

RSRQ-Range ::=                      INTEGER(0..127)

-- TAG-RSRQ-RANGE-STOP
-- ASN1STOP
```

– *RSSI-Range*

The IE *RSSI-Range* specifies the value range used in RSSI measurements and thresholds for NR operation with shared spectrum channel access. The integer value for RSSI measurements is according to Table 10.1.34.3-1 in TS 38.133 [14].

RSSI-Range information element

```
-- ASN1START
-- TAG-RSSI-RANGE-START

RSSI-Range-r16 ::=                  INTEGER(0..76)

-- TAG-RSSI-RANGE-STOP
-- ASN1STOP
```

– *RxTxTimeDiff*

The IE *RxTxTimeDiff* contains the Rx-Tx time difference measurement at either the UE or the gNB.

RxTxTimeDiff information element

```
-- ASN1START
-- TAG-RXTXTIMEDIFF-START
```

```
RxTxTimeDiff-r17  ::= SEQUENCE {
    result-k5-r17         INTEGER (0..61565)                OPTIONAL, -- Need N
    ...
}

-- TAG-RXTXTIMEDIFF-STOP
-- ASN1STOP
```

RxTxTimeDiff field descriptions
result-k5   This field indicates the Rx-Tx time difference measurement, see TS 38.215 [9], clause 10.1.25.3.1 of TS 38.133 [14] for UE Rx-Tx time difference and clause 13.2.1 of TS 38.133 [14] for gNB Rx-Tx time difference.

– *SCellActivationRS-Config*

The IE *SCellActivationRS-Config* is used to configure a Reference Signal for fast activation of the SCell where the IE is included (see TS 38.214 [19], clause 5.2.1.5.3. Usage of an *SCellActivationRS-Config* is indicated by including its *scellActivationRS-Id* in the Enhanced SCell activation MAC CE (see TS 38.321 [3] clause 6.1.3.55).

***SCellActivationRS-Config* information element**

```
-- ASN1START
-- TAG-SCELLACTIVATIONRS-CONFIG-START

SCellActivationRS-Config-r17 ::= SEQUENCE {
    scellActivationRS-Id-r17         SCellActivationRS-ConfigId-r17,
    resourceSet-r17                  NZP-CSI-RS-ResourceSetId,
    gapBetweenBursts-r17             INTEGER (2..31)                                    OPTIONAL, -- Need R
    qcl-Info-r17                     TCI-StateId,
    ...
}

-- TAG-SCELLACTIVATIONRS-CONFIG-STOP
-- ASN1STOP
```

***SCellActivationRS-Config* field descriptions**
gapBetweenBursts When this field is present, there are two bursts and it indicates the gap between the two bursts in number of slots. When this field is absent, there is a single burst.
qcl-Info Reference to TCI-State for providing the QCL source and QCL type for each *NZP-CSI-RS-Resource* listed in *nzp-CSI-RS-Resources* of the *NZP-CSI-RS-ResourceSet* indicated by *resourceSet* (see TS 38.214 [19], clause 5.1.6.1.1.1). *TCI-StateId* refers to the *TCI-State* which has this value for *tci-StateId* and is defined in *tci-StatesToAddModList* or *dl-OrJointTCI-StateList* in the *PDSCH-Config* included in the *BWP-Downlink* of this serving cell indicated by *firstActiveDownlinkBWP-Id* in the *ServingCellConfig* in which this IE is included.
resourceSet *nzp-CSI-ResourceSetId* of the *NZP-CSI-RS-ResourceSet* of this serving cell used as resource configuration for one or two bursts for SCell activation. This NZP-CSI-RS-ResourceSet consists of four NZP CSI-RS resources in two consecutive slots with two NZP CSI-RS resources in each slot (see TS 38.214 [19], clause 5.1.6.1.1.1). The CSI-RS associated with this NZP-CSI-RS-ResourceSet are located in the BWP addressed by firstActiveDownlinkBWP-Id.

– *SCellActivationRS-ConfigId*

The IE *SCellActivationRS-ConfigId* is used to identify one *SCellActivationRS-Config*.

SCellActivationRS-ConfigId information element

```
-- ASN1START
-- TAG-SCELLACTIVATIONRS-CONFIGID-START

SCellActivationRS-ConfigId-r17 ::=        INTEGER (1.. maxNrofSCellActRS-r17)

-- TAG-SCELLACTIVATIONRS-CONFIGID-STOP
-- ASN1STOP
```

– *SCellIndex*

The IE *SCellIndex* concerns a short identity, used to identify an SCell. The value range is shared across the Cell Groups.

SCellIndex information element

```
-- ASN1START
-- TAG-SCELLINDEX-START

SCellIndex ::=                      INTEGER (1..31)

-- TAG-SCELLINDEX-STOP
-- ASN1STOP
```

– *SchedulingRequestConfig*

The IE *SchedulingRequestConfig* is used to configure the parameters, for the dedicated scheduling request (SR) resources.

SchedulingRequestConfig information element

```
-- ASN1START
-- TAG-SCHEDULINGREQUESTCONFIG-START

SchedulingRequestConfig ::=         SEQUENCE {
    schedulingRequestToAddModList       SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestToAddMod
                                                                                           OPTIONAL, -- Need N
    schedulingRequestToReleaseList      SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestId
                                                                                           OPTIONAL  -- Need N
}

SchedulingRequestToAddMod ::=       SEQUENCE {
    schedulingRequestId                 SchedulingRequestId,
    sr-ProhibitTimer                    ENUMERATED {ms1, ms2, ms4, ms8, ms16, ms32, ms64, ms128}          OPTIONAL, -- Need S
    sr-TransMax                         ENUMERATED { n4, n8, n16, n32, n64, spare3, spare2, spare1}
}

SchedulingRequestConfig-v1700 ::=       SEQUENCE {
    schedulingRequestToAddModListExt-v1700  SEQUENCE (SIZE (1..maxNrofSR-ConfigPerCellGroup)) OF SchedulingRequestToAddModExt-v1700
                                                                                           OPTIONAL  -- Need N
}

SchedulingRequestToAddModExt-v1700 ::=  SEQUENCE {
    sr-ProhibitTimer-v1700                  ENUMERATED { ms192, ms256, ms320, ms384, ms448, ms512, ms576, ms640, ms1082, spare7, spare6, spare5,
spare4, spare3, spare2, spare1}
                                                                                           OPTIONAL  -- Need R
}

-- TAG-SCHEDULINGREQUESTCONFIG-STOP
-- ASN1STOP
```

***SchedulingRequestConfig* field descriptions**
schedulingRequestToAddModList, schedulingRequestToAddModListExt List of Scheduling Request configurations to add or modify. If *schedulingRequestToAddModListExt* is configured, it contains the same number of entries, and in the same order, as *schedulingRequestToAddModList.*
schedulingRequestToReleaseList List of Scheduling Request configurations to release.

***SchedulingRequestToAddMod* field descriptions**
schedulingRequestId Used to modify a SR configuration and to indicate, in *LogicalChannelConfig*, the SR configuration to which a logical channel is mapped and to indicate, in *SchedulingRequestresourceConfig*, the SR configuration for which a scheduling request resource is used.
sr-ProhibitTimer Timer for SR transmission on PUCCH in TS 38.321 [3]. Value is in ms. Value *ms1* corresponds to 1ms, value *ms2* corresponds to 2ms, and so on. If sr-*ProhibitTimer-v1700* is configured, UE shall ignore *sr-ProhibitTimer* (without suffix). If both sr-ProhibitTimer (without suffix) and sr-ProhibitTimer-v1700 are absent, the UE applies the value 0.
sr-TransMax Maximum number of SR transmissions as described in TS 38.321 [3]. Value *n4* corresponds to 4, value *n8* corresponds to 8, and so on.

– *SchedulingRequestId*

The IE *SchedulingRequestId* is used to identify a Scheduling Request instance in the MAC layer.

***SchedulingRequestId* information element**

```
-- ASN1START
-- TAG-SCHEDULINGREQUESTID-START

SchedulingRequestId ::=             INTEGER (0..7)

-- TAG-SCHEDULINGREQUESTID-STOP
-- ASN1STOP
```

– *SchedulingRequestResourceConfig*

The IE *SchedulingRequestResourceConfig* determines physical layer resources on PUCCH where the UE may send the dedicated scheduling request (D-SR) (see TS 38.213 [13], clause 9.2.4).

***SchedulingRequestResourceConfig* information element**

```
-- ASN1START
-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-START

SchedulingRequestResourceConfig ::=     SEQUENCE {
    schedulingRequestResourceId             SchedulingRequestResourceId,
    schedulingRequestID                     SchedulingRequestId,
    periodicityAndOffset                    CHOICE {
        sym2                                    NULL,
        sym6or7                                 NULL,
        sl1                                     NULL,                       -- Recurs in every slot
        sl2                                     INTEGER (0..1),
        sl4                                     INTEGER (0..3),
        sl5                                     INTEGER (0..4),
        sl8                                     INTEGER (0..7),
        sl10                                    INTEGER (0..9),
```

```
        sl16                                    INTEGER (0..15),
        sl20                                    INTEGER (0..19),
        sl40                                    INTEGER (0..39),
        sl80                                    INTEGER (0..79),
        sl160                                   INTEGER (0..159),
        sl320                                   INTEGER (0..319),
        sl640                                   INTEGER (0..639)
    }                                                                   OPTIONAL,   -- Need M
    resource                                PUCCH-ResourceId            OPTIONAL    -- Need M
}

SchedulingRequestResourceConfigExt-v1610 ::=   SEQUENCE {
    phy-PriorityIndex-r16                       ENUMERATED {p0, p1}     OPTIONAL,   -- Need M
    ...
}

SchedulingRequestResourceConfigExt-v1700 ::=    SEQUENCE {
    periodicityAndOffset-r17                        CHOICE {
        sl1280                                          INTEGER (0..1279),
        sl2560                                          INTEGER (0..2559),
        sl5120                                          INTEGER (0..5119)
    }                                                                   OPTIONAL   -- Need M
}

-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-STOP
-- ASN1STOP
```

***SchedulingRequestResourceConfig* field descriptions**
periodicityAndOffset SR periodicity and offset in number of symbols or slots (see TS 38.213 [13], clause 9.2.4) The following periodicities may be configured depending on the chosen subcarrier spacing: SCS = 15 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl SCS = 30 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl, 160sl SCS = 60 kHz: 2sym, 7sym/6sym, 1sl, 2sl, 4sl, 8sl, 16sl, 20sl, 40sl, 80sl, 160sl, 320sl SCS = 120 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl SCS = 480 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl, 1280sl, 2560sl SCS = 960 kHz: 1sl, 2sl, 4sl, 8sl, 16sl, 40sl, 80sl, 160sl, 320sl, 640sl, 1280sl, 2560sl, 5120sl sym6or7 corresponds to 6 symbols if extended cyclic prefix and a SCS of 60 kHz are configured, otherwise it corresponds to 7 symbols. For periodicities 2sym, 7sym and sl1 the UE assumes an offset of 0 slots. If *periodicityAndOffset-r17* is present, any previously configured *periodicityAndOffset* (without suffix) is released, and vice versa.
phy-PriorityIndex Indicates whether this scheduling request resource is *high* or *low* priority in PHY prioritization/multiplexing handling (see TS 38.213 [13], clause 9.2.4). Value *p0* indicates low priority and value *p1* indicates high priority.
resource ID of the PUCCH resource in which the UE shall send the scheduling request. The actual *PUCCH-Resource* is configured in *PUCCH-Config* of the same UL BWP and serving cell as this *SchedulingRequestResourceConfig*. The network configures a *PUCCH-Resource* of *PUCCH-format0* or *PUCCH-format1* (other formats not supported) (see TS 38.213 [13], clause 9.2.4)
schedulingRequestID The ID of the *SchedulingRequestConfig* that uses this scheduling request resource.

– *SchedulingRequestResourceId*

The IE *SchedulingRequestResourceId* is used to identify scheduling request resources on PUCCH.

SchedulingRequestResourceId information element

```
-- ASN1START
-- TAG-SCHEDULINGREQUESTRESOURCEID-START

SchedulingRequestResourceId ::=     INTEGER (1..maxNrofSR-Resources)

-- TAG-SCHEDULINGREQUESTRESOURCEID-STOP
-- ASN1STOP
```

– *ScramblingId*

The IE *ScramblingID* is used for scrambling channels and reference signals.

ScramblingId information element

```
-- ASN1START
-- TAG-SCRAMBLINGID-START

ScramblingId ::=                    INTEGER(0..1023)

-- TAG-SCRAMBLINGID-STOP
-- ASN1STOP
```

– *SCS-SpecificCarrier*

The IE *SCS-SpecificCarrier* provides parameters determining the location and width of the actual carrier or the carrier bandwidth. It is defined specifically for a numerology (subcarrier spacing (SCS)) and in relation (frequency offset) to Point A.

SCS-SpecificCarrier information element

```
-- ASN1START
-- TAG-SCS-SPECIFICCARRIER-START

SCS-SpecificCarrier ::=             SEQUENCE {
    offsetToCarrier                     INTEGER (0..2199),
    subcarrierSpacing                   SubcarrierSpacing,
    carrierBandwidth                    INTEGER (1..maxNrofPhysicalResourceBlocks),
    ...,
    [[
    txDirectCurrentLocation         INTEGER (0..4095)                                   OPTIONAL            -- Need S
    ]]
}

-- TAG-SCS-SPECIFICCARRIER-STOP
-- ASN1STOP
```

***SCS-SpecificCarrier* field descriptions**
carrierBandwidth Width of this carrier in number of PRBs (using the *subcarrierSpacing* defined for this carrier) (see TS 38.211 [16], clause 4.4.2).
offsetToCarrier Offset in frequency domain between Point A (lowest subcarrier of common RB 0) and the lowest usable subcarrier on this carrier in number of PRBs (using the subcarrierSpacing defined for this carrier). The maximum value corresponds to 275*8-1. See TS 38.211 [16], clause 4.4.2.
txDirectCurrentLocation Indicates the downlink Tx Direct Current location for the carrier. A value in the range 0..3299 indicates the subcarrier index within the carrier. The values in the value range 3301..4095 are reserved and ignored by the UE. If this field is absent for downlink within *ServingCellConfigCommon* and *ServingCellConfigCommonSIB*, the UE assumes the default value of 3300 (i.e. "Outside the carrier"). (see TS 38.211 [16], clause 4.4.2). Network does not configure this field via *ServingCellConfig* or for uplink carriers.
subcarrierSpacing Subcarrier spacing of this carrier. It is used to convert the offsetToCarrier into an actual frequency. Only the following values are applicable depending on the used frequency: FR1: 15 or 30 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz

– *SDAP-Config*

The IE *SDAP-Config* is used to set the configurable SDAP parameters for a data radio bearer. All configured instances of SDAP-Config with the same value of pdu-Session correspond to the same SDAP entity as specified in TS 37.324 [24].

***SDAP-Config* information element**

```
-- ASN1START
-- TAG-SDAP-CONFIG-START

SDAP-Config ::=                 SEQUENCE {
    pdu-Session                     PDU-SessionID,
    sdap-HeaderDL                   ENUMERATED {present, absent},
    sdap-HeaderUL                   ENUMERATED {present, absent},
    defaultDRB                      BOOLEAN,
    mappedQoS-FlowsToAdd            SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI                 OPTIONAL, -- Need N
    mappedQoS-FlowsToRelease        SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI                 OPTIONAL, -- Need N
    ...
}

QFI ::=                         INTEGER (0..maxQFI)

PDU-SessionID ::=               INTEGER (0..255)

-- TAG-SDAP-CONFIG-STOP
-- ASN1STOP
```

***SDAP-Config* field descriptions**
defaultDRB Indicates whether or not this is the default DRB for this PDU session. Among all configured instances of *SDAP-Config* with the same value of *pdu-Session*, this field shall be set to *true* in at most one instance of SDAP-Config and to *false* in all other instances.
mappedQoS-FlowsToAdd Indicates the list of QFIs of UL QoS flows of the PDU session to be additionally mapped to this DRB. A QFI value can be included at most once in all configured instances of *SDAP-Config* with the same value of *pdu-Session*. For QoS flow remapping, the QFI value of the remapped QoS flow is only included in *mappedQoS-FlowsToAdd* in *sdap-Config* corresponding to the new DRB and not included in *mappedQoS-FlowsToRelease* in *sdap-Config* corresponding to the old DRB.
mappedQoS-FlowsToRelease Indicates the list of QFIs of QoS flows of the PDU session to be released from existing QoS flow to DRB mapping of this DRB.
pdu-Session Identity of the PDU session whose QoS flows are mapped to the DRB.
sdap-HeaderUL Indicates whether or not a SDAP header is present for UL data on this DRB. The field cannot be changed after a DRB is established. The network sets this field to *present* if the field *defaultDRB* is set to *true*.
sdap-HeaderDL Indicates whether or not a SDAP header is present for DL data on this DRB. The field cannot be changed after a DRB is established.

– *SearchSpace*

The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled SCell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent (regardless of their presence conditions). For a scheduled SpCell in the case of the cross carrier scheduling, if the search space is linked to another search space in the scheduling SCell, all the optional fields of this search space in the scheduled SpCell are absent (regardless of their presence conditions) except for *nrofCandidates*.

***SearchSpace* information element**

```
-- ASN1START
-- TAG-SEARCHSPACE-START

SearchSpace ::=                         SEQUENCE {
    searchSpaceId                           SearchSpaceId,
    controlResourceSetId                    ControlResourceSetId                                    OPTIONAL,   -- Cond SetupOnly
    monitoringSlotPperiodicityAndOffset     CHOICE {
        sl1                                     NULL,
        sl2                                     INTEGER (0..1),
        sl4                                     INTEGER (0..3),
        sl5                                     INTEGER (0..4),
        sl8                                     INTEGER (0..7),
        sl10                                    INTEGER (0..9),
        sl16                                    INTEGER (0..15),
        sl20                                    INTEGER (0..19),
        sl40                                    INTEGER (0..39),
        sl80                                    INTEGER (0..79),
        sl160                                   INTEGER (0..159),
        sl320                                   INTEGER (0..319),
        sl640                                   INTEGER (0..639),
```

```
        sl1280                              INTEGER (0..1279),
        sl2560                              INTEGER (0..2559)
    }                                                                                   OPTIONAL,   -- Cond Setup4
    duration                            INTEGER (2..2559)                               OPTIONAL,   -- Need S
    monitoringSymbolsWithinSlot         BIT STRING (SIZE (14))                          OPTIONAL,   -- Cond Setup
    nrofCandidates                      SEQUENCE {
        aggregationLevel1                   ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel2                   ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel4                   ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel8                   ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8},
        aggregationLevel16                  ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8}
    }                                                                                   OPTIONAL,   -- Cond Setup
    searchSpaceType                     CHOICE {
        common                              SEQUENCE {
            dci-Format0-0-AndFormat1-0          SEQUENCE {
                ...
            }                                                                           OPTIONAL,   -- Need R
            dci-Format2-0                       SEQUENCE {
                nrofCandidates-SFI                  SEQUENCE {
                    aggregationLevel1                   ENUMERATED {n1, n2}             OPTIONAL,   -- Need R
                    aggregationLevel2                   ENUMERATED {n1, n2}             OPTIONAL,   -- Need R
                    aggregationLevel4                   ENUMERATED {n1, n2}             OPTIONAL,   -- Need R
                    aggregationLevel8                   ENUMERATED {n1, n2}             OPTIONAL,   -- Need R
                    aggregationLevel16                  ENUMERATED {n1, n2}             OPTIONAL    -- Need R
                },
                ...
            }                                                                           OPTIONAL,   -- Need R
            dci-Format2-1                       SEQUENCE {
                ...
            }                                                                           OPTIONAL,   -- Need R
            dci-Format2-2                       SEQUENCE {
                ...
            }                                                                           OPTIONAL,   -- Need R
            dci-Format2-3                       SEQUENCE {
                dummy1                              ENUMERATED {sl1, sl2, sl4, sl5, sl8, sl10, sl16, sl20}  OPTIONAL,   -- Cond Setup
                dummy2                              ENUMERATED {n1, n2},
                ...
            }                                                                           OPTIONAL    -- Need R
        },
        ue-Specific                         SEQUENCE {
            dci-Formats                         ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1},
            ...,
            [[
            dci-Formats-MT-r16              ENUMERATED {formats2-5}                     OPTIONAL,   -- Need R
            dci-FormatsSL-r16               ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1, formats3-0, formats3-1,
                                                        formats3-0-And-3-1}             OPTIONAL,   -- Need R
            dci-FormatsExt-r16              ENUMERATED {formats0-2-And-1-2, formats0-1-And-1-1And-0-2-And-1-2}
                                                                                        OPTIONAL    -- Need R
            ]]
        }
    }                                                                                   OPTIONAL    -- Cond Setup2
}

SearchSpaceExt-r16 ::=              SEQUENCE {
```

```
    controlResourceSetId-r16                ControlResourceSetId-r16                                    OPTIONAL,   -- Cond SetupOnly2
    searchSpaceType-r16                     SEQUENCE {
        common-r16                              SEQUENCE {
            dci-Format2-4-r16                       SEQUENCE {
                nrofCandidates-CI-r16                   SEQUENCE {
                    aggregationLevel1-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel2-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel4-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel8-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel16-r16                  ENUMERATED {n1, n2}                         OPTIONAL    -- Need R
                },
                ...
            }                                                                                           OPTIONAL,   -- Need R
            dci-Format2-5-r16                       SEQUENCE {
                nrofCandidates-IAB-r16                  SEQUENCE {
                    aggregationLevel1-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel2-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel4-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel8-r16                   ENUMERATED {n1, n2}                         OPTIONAL,   -- Need R
                    aggregationLevel16-r16                  ENUMERATED {n1, n2}                         OPTIONAL    -- Need R
                },
                ...
            }                                                                                           OPTIONAL,   -- Need R
            dci-Format2-6-r16                       SEQUENCE {
                ...
            }                                                                                           OPTIONAL,   -- Need R
            ...
        }
    }                                                                                                   OPTIONAL,    -- Cond Setup3
    searchSpaceGroupIdList-r16                  SEQUENCE (SIZE (1.. 2)) OF INTEGER (0..1)               OPTIONAL,    -- Need R
    freqMonitorLocations-r16                    BIT STRING (SIZE (5))                                   OPTIONAL     -- Need R
}

SearchSpaceExt-v1700 ::=            SEQUENCE {
    monitoringSlotPeriodicityAndOffset-v1710 CHOICE {
        sl32                                    INTEGER (0..31),
        sl64                                    INTEGER (0..63),
        sl128                                   INTEGER (0..127),
        sl5120                                  INTEGER (0..5119),
        sl10240                                 INTEGER (0..10239),
        sl20480                                 INTEGER (0..20479)
    }                                                                                                   OPTIONAL,   -- Cond Setup5
    monitoringSlotsWithinSlotGroup-r17      CHOICE {
        slotGroupLength4-r17                    BIT STRING (SIZE (4)),
        slotGroupLength8-r17                    BIT STRING (SIZE (8))
    }                                                                                                   OPTIONAL,   -- Need R
    duration-r17                            INTEGER (4..20476)                                          OPTIONAL,   -- Need R

    searchSpaceType-r17             SEQUENCE{
        common-r17                      SEQUENCE {
            dci-Format4-0-r17               SEQUENCE {
                ...
            }                                                                                           OPTIONAL,   -- Need R
            dci-Format4-1-r17               SEQUENCE {
```

```
                ...
            }                                                                                   OPTIONAL,   -- Need R
            dci-Format4-2-r17               SEQUENCE {
                ...
            }                                                                                   OPTIONAL,   -- Need R
            dci-Format4-1-AndFormat4-2-r17  SEQUENCE {
                ...
            }                                                                                   OPTIONAL,   -- Need R
            dci-Format2-7-r17               SEQUENCE {
                nrofCandidates-PEI-r17          SEQUENCE {
                    aggregationLevel4-r17       ENUMERATED {n0, n1, n2, n3, n4}             OPTIONAL,   -- Need R
                    aggregationLevel8-r17       ENUMERATED {n0, n1, n2}                     OPTIONAL,   -- Need R
                    aggregationLevel16-r17      ENUMERATED {n0, n1}                         OPTIONAL    -- Need R
                },
                ...
            }                                                                                   OPTIONAL    -- Need R
        }
    }                                                                                           OPTIONAL,   -- Need R
    searchSpaceGroupIdList-r17          SEQUENCE (SIZE (1.. 3)) OF INTEGER (0.. maxNrofSearchSpaceGroups-1-r17)  OPTIONAL,  -- Cond DedicatedOnly
    searchSpaceLinkingId-r17            INTEGER (0..maxNrofSearchSpacesLinks-1-r17)          OPTIONAL    -- Cond DedicatedOnly
}

-- TAG-SEARCHSPACE-STOP
-- ASN1STOP
```

***SearchSpace* field descriptions**
common Configures this search space as common search space (CSS) and DCI formats to monitor.
controlResourceSetId The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in *ServingCellConfigCommon*. Values 1..*maxNrofControlResourceSets-1* identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with *non-zero controlResourceSetId* are configured in the same BWP as this *SearchSpace* except *commonControlResourceSetExt* which is configured by SIB20. If the field *controlResourceSetId-r16* is present, UE shall ignore the *controlResourceSetId* (without suffix).
dummy1, dummy2 This field is not used in the specification. If received it shall be ignored by the UE.
dci-Format0-0-AndFormat1-0 If configured, the UE monitors the DCI formats 0_0 and 1_0 according to TS 38.213 [13], clause 10.1.
dci-Format2-0 If configured, UE monitors the DCI format 2_0 according to TS 38.213 [13], clause 10.1, 11.1.1.
dci-Format2-1 If configured, UE monitors the DCI format 2_1 according to TS 38.213 [13], clause 10.1, 11.2.
dci-Format2-2 If configured, UE monitors the DCI format 2_2 according to TS 38.213 [13], clause 10.1, 11.3.
dci-Format2-3 If configured, UE monitors the DCI format 2_3 according to TS 38.213 [13], clause 10.1, 11.4
dci-Format2-4 If configured, UE monitors the DCI format 2_4 according to TS 38.213 [13], clause 11.2A.
dci-Format2-5 If configured, IAB-MT monitors the DCI format 2_5 according to TS 38.213 [13], clause 14.
dci-Format2-6 If configured, UE monitors the DCI format 2_6 according to TS 38.213 [13], clause 10.1, 10.3. DCI format 2_6 can only be configured on the SpCell.
dci-Format2-7 If configured, UE monitors the DCI format 2_7 according to TS 38.213 [13], clause 10.1, 10.4A.
dci-Format4-0 If configured, the UE monitors the DCI format 4_0 with CRC scrambled by MCCH-RNTI/G-RNTI according to TS 38.213 [13], clause [10.1].
dci-Format4-1-AndFormat4-2 If configured, the UE monitors the DCI format 4_1 and 4_2 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [11.1].
dci-Format4-1 If configured, the UE monitors the DCI format 4_1 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [10.1].
dci-Format4-2 If configured, the UE monitors the DCI format 4_2 with CRC scrambled by G-RNTI/G-CS-RNTI according to TS 38.213 [13], clause [10.1].
dci-Formats Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1.
dci-FormatsExt If this field is present, the field *dci-Formats* is ignored and *dci-FormatsExt* is used instead to indicate whether the UE monitors in this USS for DCI format 0_2 and 1_2 or formats 0_1 and 1_1 and 0_2 and 1_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1). This field is not configured for operation with shared spectrum channel access in this release.
dci-Formats-MT Indicates whether the IAB-MT monitors the DCI formats 2-5 according to TS 38.213 [13], clause 14.

dci-FormatsSL
Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1 or for format 3-0 or for format 3-1 or for formats 3-0 and 3-1. If this field is present, the field *dci-Formats* is ignored and *dci-FormatsSL* is used.

duration
Number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the UE applies the value 1 slot, except for DCI format 2_0. The UE ignores this field for DCI format 2_0. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).
For SCS 480 kHz and SCS 960 kHz, duration-r17 is used, and the configured duration is restricted to be an integer multiple of L slots and smaller than periodicity, where L is the configured length of the bitmap *monitoringSlotsWithinSlotGroup-r17*. If *duration-r17* is absent, the UE assumes the duration in slots is equal to L. The maximum valid duration is periodicity-L.

For IAB-MT, duration indicates number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the *periodicityAndOffset*. If the field is absent, the IAB-MT applies the value 1 slot, except for DCI format 2_0 and DCI format 2_5. The IAB-MT ignores this field for DCI format 2_0 and DCI format 2_5. The maximum valid duration is periodicity-1 (periodicity as given in the *monitoringSlotPeriodicityAndOffset*).

freqMonitorLocations
Defines an association of the search space to multiple monitoring locations in the frequency domain and indicates whether the pattern configured in the associated CORESET is replicated to a specific RB set, see TS 38.213, clause 10.1. Each bit in the bitmap corresponds to one RB set, and the leftmost (most significant) bit corresponds to RB set 0 in the BWP. A bit set to 1 indicates that a frequency domain resource allocation replicated from the pattern configured in the associated CORESET is mapped to the RB set.

monitoringSlotPeriodicityAndOffset
Slots for PDCCH Monitoring configured as periodicity and offset.
For SCS 15, 30, 60, and 120 kHz and if the UE is configured to monitor:
- DCI format 2_1, only the values 'sl1', 'sl2' or 'sl4' are applicable.
- DCI format 2_0, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8', 'sl10', 'sl16', and 'sl20' are applicable (see TS 38.213 [13], clause 10).
- DCI format 2_4, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8' and 'sl10' are applicable.

For SCS 480 kHz and if the UE is configured to monitor:
- DCI format 2_0, only the values 'sl4', 'sl8', 'sl16', 'sl20', 'sl32', 'sl40', 'sl64', and 'sl80' are applicable.
- DCI format 2_1, only the values 'sl4', 'sl8', and 'sl16' are applicable.
- DCI format 2_4, only the values 'sl4', 'sl8', 'sl16', 'sl20', 'sl32', 'sl40' are applicable.

For SCS 960 kHz and if the UE is configured to monitor:
- DCI format 2_0, only the values 'sl8', 'sl16', 'sl32', 'sl40', 'sl64', 'sl80', 'sl128', and 'sl160' are applicable.
- DCI format 2_1, only the values 'sl8', 'sl16', and 'sl32' are applicable.
- DCI format 2_4, only the values 'sl8', 'sl16', 'sl32', 'sl40', 'sl64', 'sl80' are applicable.

For SCS 480 kHz and SCS 960 kHz, and the configured periodicity and offset are restricted to be an integer multiple of L slots, where L is the configured length of the bitmap provided by *monitoringSlotsWithinSlotGroup-r17*, i.e. for a given periodicity, the offset has a range of {0, L, 2*L, …, L*FLOOR(1/L*(periodicity-1))}.

For IAB-MT, If the IAB-MT is configured to monitor DCI format 2_1, only the values 'sl1', 'sl2' or 'sl4' are applicable. If the IAB-MT is configured to monitor DCI format 2_0 or DCI format 2_5, only the values 'sl1', 'sl2', 'sl4', 'sl5', 'sl8', 'sl10', 'sl16', and 'sl20' are applicable (see TS 38.213, clause 10).
If *monitoringSlotPeriodicityAndOffset-v1710* is present, any previously configured *monitoringSlotPeriodicityAndOffset* is released, and if *monitoringSlotPeriodicityAndOffset* is present, any previously configured *monitoringSlotPeriodicityAndOffset-v1710* is released.

monitoringSlotsWithinSlotGroup
Indicates which slot(s) within a slot group are configured for multi-slot PDCCH monitoring. The first (leftmost, most significant) bit represents the first slot in the slot group, the second bit represents the second slot in the slot group, and so on. A bit set to '1' indicates that the corresponding slot is configured for multi-slot PDCCH monitoring (see TS 38.213 [13], clause 10). The number of slots for multi-slot PDCCH monitoring is configured according to clause 10 in TS 38.213 [13].

monitoringSymbolsWithinSlot
The first symbol(s) for PDCCH monitoring in the slots configured for (multi-slot) PDCCH monitoring (see *monitoringSlotPeriodicityAndOffset* and *duration*). The most significant (left) bit represents the first OFDM in a slot, and the second most significant (left) bit represents the second OFDM symbol in a slot and so on. The bit(s) set to one identify the first OFDM symbol(s) of the control resource set within a slot. If the cyclic prefix of the BWP is set to extended CP, the last two bits within the bit string shall be ignored by the UE or IAB-MT.
For DCI format 2_0, the first one symbol applies if the *duration* of CORESET (in the IE *ControlResourceSet*) identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.
See TS 38.213 [13], clause 10.
For IAB-MT: For DCI format 2_0 or DCI format 2_5, the first one symbol applies if the duration of CORESET (in the IE *ControlResourceSet*) identified by *controlResourceSetId* indicates 3 symbols, the first two symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 2 symbols, and the first three symbols apply if the *duration* of CORESET identified by *controlResourceSetId* indicates 1 symbol.
See TS 38.213 [13], clause 10.

nrofCandidates-CI
The number of PDCCH candidates specifically for format 2-4 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 10.1).

nrofCandidates-PEI
The number of PDCCH candidates specifically for format 2-7 for the configured aggregation level.

nrofCandidates-SFI
The number of PDCCH candidates specifically for format 2-0 for the configured aggregation level. If an aggregation level is absent, the UE does not search for any candidates with that aggregation level. The network configures only one aggregationLevel and the corresponding number of candidates (see TS 38.213 [13], clause 11.1.1). For a search space configured with *freqMonitorLocations-r16*, only value 'n1' is valid.

nrofCandidates
Number of PDCCH candidates per aggregation level. The number of candidates and aggregation levels configured here applies to all formats unless a particular value is specified or a format-specific value is provided (see inside *searchSpaceType*). If configured in the *SearchSpace* of a cross carrier scheduled cell, this field determines the number of candidates and aggregation levels to be used on the linked scheduling cell (see TS 38.213 [13], clause 10).

searchSpaceGroupIdList-r16, searchSpaceGroupIdList-r17
List of search space group IDs which the search space is associated with. The network configures at most 2 search space groups per BWP where the group ID is either 0 or 1 if *searchSpaceGroupIdList-r16* is included. The network configures at most 3 search space groups per BWP where the group ID is either 0, 1 or 2 if *searchSpaceGroupIdList-r17* is included. And if *searchSpaceGroupIdList-r17* is included, *searchSpaceGroupIdList-r16* is ignored.

searchSpaceId
Identity of the search space. SearchSpaceId = 0 identifies the *searchSpaceZero* configured via PBCH (MIB) or *ServingCellConfigCommon* and may hence not be used in the *SearchSpace* IE. The *searchSpaceId* is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same *searchSpaceId* in scheduled cell and scheduling cell are linked to each other. The UE applies the search space for the scheduled cell only if the DL BWPs in which the linked search spaces are configured in scheduling cell and scheduled cell are both active.
For an IAB-MT, the search space defines how/where to search for PDCCH candidates for an IAB-MT where each search space is associated with one ControlResearchSet and for a scheduled cell in the case of cross carrier scheduling, except for nrofCandidates, all the optional fields are absent.

SearchSpaceLinkingId This parameter is used to link two search spaces of same type in the same BWP. If two search spaces have the same SearchSpaceLinkingId UE assumes these search spaces are linked to PDCCH repetition REF. When PDCCH repetition is monitored in two linked search space (SS) sets, the UE does not expect a third monitored SS set to be linked with any of the two linked SS sets. The two linked SS sets have the same SS set type (USS/CSS). The two linked SS sets have the same DCI formats to monitor. For intra-slot PDCCH repetition: The two SS sets should have the same periodicity and offset (monitoringSlotPeriodicityAndOffset), and the same duration. For linking monitoring occasions across the two SS sets that exist in the same slot: The two SS sets have the same number of monitoring occasions within a slot and n-th monitoring occasion of one SS set is linked to n-th monitoring occasion of the other SS set. The following SS sets cannot be linked with another SS set for PDCCH repetition: SS set 0, *searchSpaceSIB1*, *searchSpaceOtherSystemInformation*, *pagingSearchSpace*, *ra-SearchSpace*, *searchSpaceMCCH*, *searchSpaceMTCH*, *peiSearchSpace*, and *sdt-SearchSpace*. SS set configured by *recoverySearchSpaceId* cannot be linked to another SS set for PDCCH repetition. When a scheduled serving cell is configured to be cross-carrier scheduled by a scheduling serving cell, two PDCCH candidates (with the same AL and candidate index associated with the scheduled serving cell) are linked only if the corresponding two SS sets in the scheduling serving cell are linked and two SS sets in the scheduled serving cell with the same SS set IDs are also linked. This parameter is not applicable to search space configured with *dci-FormatsSL* for monitoring format 3-0 or format 3-1 or for monitoring formats 3-0 and format 3-1.
searchSpaceType Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for.
ue-Specific Configures this search space as UE specific search space (USS). The UE monitors the DCI format with CRC scrambled by C-RNTI, CS-RNTI (if configured), and SP-CSI-RNTI (if configured)

Conditional Presence	Explanation
DedicatedOnly	In PDCCH-Config, the field is optionally present, Need R. Otherwise it is absent, Need R.
Setup	This field is mandatory present upon creation of a new *SearchSpace*. It is optionally present, Need M, otherwise.
Setup2	This field is mandatory present when a new *SearchSpace* is set up, if the same *SearchSpace* ID is not included in *searchSpacesToAddModListExt-r16* of the parent IE with the field *searchSpaceType-r16* or *searchSpaceType-r17* included. Otherwise it is optionally present, Need M.
Setup3	This field is mandatory present when a new *SearchSpace* is set up, if the same *SearchSpace* ID is not included in *searchSpacesToAddModListExt* (without suffix) of the parent IE with the field *searchSpaceType* (without suffix) included. Otherwise it is optionally present, Need M.
Setup4	This field is mandatory present upon creation of a new *SearchSpace* if *monitoringSlotPeriodicityAndOffset-v1710* is not included. It is optionally present, Need M, otherwise.
Setup5	This field is mandatory present upon creation of a new *SearchSpace* if *monitoringSlotPeriodicityAndOffset* (without suffix) is not included. It is optionally present, Need M, otherwise.
SetupOnly	This field is mandatory present upon creation of a new *SearchSpace*. It is absent, Need M, otherwise.
SetupOnly2	In PDCCH-Config, the field is optionally present upon creation of a new SearchSpace and absent, Need M upon reconfiguration of an existing SearchSpace. In PDCCH-ConfigCommon, the field is absent.

– *SearchSpaceId*

The IE *SearchSpaceId* is used to identify Search Spaces. The ID space is used across the BWPs of a Serving Cell. The search space with the *SearchSpaceId* = 0 identifies the search space configured via PBCH (MIB) and in *ServingCellConfigCommon* (*searchSpaceZero*). The number of Search Spaces per BWP is limited to 10 including the common and UE specific Search Spaces.

SearchSpaceId information element

```
-- ASN1START
-- TAG-SEARCHSPACEID-START

SearchSpaceId ::=                   INTEGER (0..maxNrofSearchSpaces-1)

-- TAG-SEARCHSPACEID-STOP
-- ASN1STOP
```

– SearchSpaceZero

The IE *SearchSpaceZero* is used to configure SearchSpace#0 of the initial BWP (see TS 38.213 [13], clause 13).

SearchSpaceZero information element

```
-- ASN1START
-- TAG-SEARCHSPACEZERO-START

SearchSpaceZero ::=                 INTEGER (0..15)

-- TAG-SEARCHSPACEZERO-STOP
-- ASN1STOP
```

– SecurityAlgorithmConfig

The IE *SecurityAlgorithmConfig* is used to configure AS integrity protection algorithm and AS ciphering algorithm for SRBs and DRBs.

SecurityAlgorithmConfig information element

```
-- ASN1START
-- TAG-SECURITYALGORITHMCONFIG-START

SecurityAlgorithmConfig ::=         SEQUENCE {
    cipheringAlgorithm                  CipheringAlgorithm,
    integrityProtAlgorithm              IntegrityProtAlgorithm          OPTIONAL,   -- Need R
    ...
}

IntegrityProtAlgorithm ::=          ENUMERATED {
                                        nia0, nia1, nia2, nia3, spare4, spare3,
                                        spare2, spare1, ...}

CipheringAlgorithm ::=              ENUMERATED {
                                        nea0, nea1, nea2, nea3, spare4, spare3,
                                        spare2, spare1, ...}
```

```
-- TAG-SECURITYALGORITHMCONFIG-STOP
-- ASN1STOP
```

***SecurityAlgorithmConfig* field descriptions**
cipheringAlgorithm Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.501 [11]. The algorithms *nea0-nea3* are identical to the LTE algorithms eea0-3. The algorithms configured for all bearers using master key shall be the same, and the algorithms configured for all bearers using secondary key, if any, shall be the same. If UE is connected to E-UTRA/EPC, this field indicates the ciphering algorithm to be used for RBs configured with NR PDCP, as specified in TS 33.501 [11].
integrityProtAlgorithm Indicates the integrity protection algorithm to be used for SRBs and DRBs, as specified in TS 33.501 [11]. The algorithms *nia0-nia3* are identical to the E-UTRA algorithms *eia0-3*. The algorithms configured for all bearers using master key shall be the same and the algorithms configured for all bearers using secondary key, if any, shall be the same. The network does not configure *nia0* except for unauthenticated emergency sessions for unauthenticated UEs in LSM (limited service mode). If UE is connected to E-UTRA/EPC, this field indicates the integrity protection algorithm to be used for SRBs configured with NR PDCP as specified in TS 33.501 [11], and DRBs configured with integrity protection as specified in TS 33.401 [30]. The network does not configure *nia0* for SRB3.

– *SemiStaticChannelAccessConfig*

The IE *SemiStaticChannelAccessConfig* is used to configure channel access parameters when the network is operating in semi-static channel access mode (see clause 4.3 in TS 37.213 [48].

***SemiStaticChannelAccessConfig* information element**

```
-- ASN1START
-- TAG-SEMISTATICCHANNELACCESSCONFIG-START

SemiStaticChannelAccessConfig-r16 ::=    SEQUENCE {
    period-r16                               ENUMERATED {ms1, ms2, ms2dot5, ms4, ms5, ms10}
}

-- TAG-SEMISTATICCHANNELACCESSCONFIG-STOP
-- ASN1STOP
```

***SemiStaticChannelAccessConfig* field descriptions**
period Indicates the periodicity of the semi-static channel access mode (see TS 37.213 [48], clause 4.3). Value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, value ms2dot5 corresponds to 2.5 ms, and so on.

– *SemiStaticChannelAccessConfigUE*

The IE *SemiStaticChannelAccessConfigUE* is used to configure channel access parameters for UE initiated semi-static channel access.

SemiStaticChannelAccessConfigUE information element

```
-- ASN1START
-- TAG-SEMISTATICCHANNELACCESSCONFIGUE-START

SemiStaticChannelAccessConfigUE-r17 ::=    SEQUENCE {
    periodUE-r17                               ENUMERATED {ms1, ms2, ms2dot5, ms4, ms5, ms10, spare2, spare1},
    offsetUE-r17                               INTEGER (0..559)
}

-- TAG-SEMISTATICCHANNELACCESSCONFIGUE-STOP
-- ASN1STOP
```

***SemiStaticChannelAccessConfigUE* field descriptions**
periodUE Indicates the period of a channel occupancy that the UE can initiate as described in TS 37.213 [48], clause 4.3. Value ms1 corresponds to 1 ms, value ms2 corresponds to 2 ms, value ms2dot5 corresponds to 2.5 ms, and so on.
offsetUE Indicates the number of symbols from the beginning of the even indexed radio frame to the start of the first period within that radio frame that the UE can initiate a channel occupancy (see TS 37.213 [48], clause 4.3), based on the smallest SCS among the configured SCSs in the serving cell. The offset duration indicated by this field is less than the period duration indicated by *periodUE*. The maximum value is 139, 279 and 559 for 15, 30 and 60 kHz subcarrier spacing, respectively.

– *Sensor-LocationInfo*

The IE *Sensor-LocationInfo* is used by the UE to provide sensor information.

Sensor-LocationInfo information element

```
-- ASN1START
-- TAG-SENSORLOCATIONINFO-START

Sensor-LocationInfo-r16 ::= SEQUENCE {
    sensor-MeasurementInformation-r16    OCTET STRING    OPTIONAL,
    sensor-MotionInformation-r16         OCTET STRING    OPTIONAL,
    ...
}

-- TAG-SENSORLOCATIONINFO-STOP
-- ASN1STOP
```

***Sensor-LocationInfo* field descriptions**
sensor-MeasurementInformation This field provides barometric pressure measurements as *Sensor-MeasurementInformation* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.
sensor-MotionInformation This field provides motion sensor measurements as *Sensor-MotionInformation* defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

– *ServingCellAndBWP-Id*

The IE *ServingCellAndBWP-Id* is used to indicate a serving cell and an uplink or a downlink BWP.

ServingCellAndBWP-Id information element

```
-- ASN1START
-- TAG-SERVINGCELLANDBWP-ID-START

ServingCellAndBWP-Id-r17 ::= SEQUENCE {
    servingcell-r17             ServCellIndex,
    bwp-r17                     BWP-Id
}

-- TAG-SERVINGCELLANDBWP-ID-STOP
-- ASN1STOP
```

– *ServCellIndex*

The IE *ServCellIndex* concerns a short identity, used to uniquely identify a serving cell (i.e. the PCell, the PSCell or an SCell) across the cell groups. Value 0 applies for the PCell, while the *SCellIndex* that has previously been assigned applies for SCells.

ServCellIndex information element

```
-- ASN1START
-- TAG-SERVCELLINDEX-START

ServCellIndex ::=                   INTEGER (0..maxNrofServingCells-1)

-- TAG-SERVCELLINDEX-STOP
-- ASN1STOP
```

– *ServingCellConfig*

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

ServingCellConfig information element

```
-- ASN1START
-- TAG-SERVINGCELLCONFIG-START

ServingCellConfig ::=               SEQUENCE {
    tdd-UL-DL-ConfigurationDedicated    TDD-UL-DL-ConfigDedicated                                       OPTIONAL,   -- Cond TDD
    initialDownlinkBWP                  BWP-DownlinkDedicated                                           OPTIONAL,   -- Need M
    downlinkBWP-ToReleaseList           SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id                      OPTIONAL,   -- Need N
    downlinkBWP-ToAddModList            SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Downlink                OPTIONAL,   -- Need N
    firstActiveDownlinkBWP-Id           BWP-Id                                                          OPTIONAL,   -- Cond SyncAndCellAdd
    bwp-InactivityTimer                 ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms8, ms10, ms20, ms30,
                                                    ms40,ms50, ms60, ms80,ms100, ms200,ms300, ms500,
                                                    ms750, ms1280, ms1920, ms2560, spare10, spare9, spare8,
                                                    spare7, spare6, spare5, spare4, spare3, spare2, spare1 }    OPTIONAL,   --Need R
    defaultDownlinkBWP-Id               BWP-Id                                                          OPTIONAL,   -- Need S
    uplinkConfig                        UplinkConfig                                                    OPTIONAL,   -- Need M
    supplementaryUplink                 UplinkConfig                                                    OPTIONAL,   -- Need M
    pdcch-ServingCellConfig             SetupRelease { PDCCH-ServingCellConfig }                        OPTIONAL,   -- Need M
    pdsch-ServingCellConfig             SetupRelease { PDSCH-ServingCellConfig }                        OPTIONAL,   -- Need M
    csi-MeasConfig                      SetupRelease { CSI-MeasConfig }                                 OPTIONAL,   -- Need M
    sCellDeactivationTimer              ENUMERATED {ms20, ms40, ms80, ms160, ms200, ms240,
                                                    ms320, ms400, ms480, ms520, ms640, ms720,
                                                    ms840, ms1280, spare2,spare1}       OPTIONAL,   -- Cond ServingCellWithoutPUCCH
    crossCarrierSchedulingConfig        CrossCarrierSchedulingConfig                                    OPTIONAL,   -- Need M
    tag-Id                              TAG-Id,
    dummy1                              ENUMERATED {enabled}                                            OPTIONAL,   -- Need R
    pathlossReferenceLinking            ENUMERATED {spCell, sCell}                                      OPTIONAL,   -- Cond SCellOnly
    servingCellMO                       MeasObjectId                                                    OPTIONAL,   -- Cond MeasObject
    ...,
    [[
    lte-CRS-ToMatchAround               SetupRelease { RateMatchPatternLTE-CRS }                        OPTIONAL,   -- Need M
    rateMatchPatternToAddModList        SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern       OPTIONAL,   -- Need N
    rateMatchPatternToReleaseList       SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId     OPTIONAL,   -- Need N
    downlinkChannelBW-PerSCS-List       SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier             OPTIONAL    -- Need S
    ]],
    [[
    supplementaryUplinkRelease-r16      ENUMERATED {true}                                               OPTIONAL,   -- Need N
    tdd-UL-DL-ConfigurationDedicated-IAB-MT-r16    TDD-UL-DL-ConfigDedicated-IAB-MT-r16                 OPTIONAL,   -- Cond TDD_IAB
    dormantBWP-Config-r16               SetupRelease { DormantBWP-Config-r16 }                          OPTIONAL,   -- Need M
    ca-SlotOffset-r16                   CHOICE {
        refSCS15kHz                         INTEGER (-2..2),
        refSCS30KHz                         INTEGER (-5..5),
        refSCS60KHz                         INTEGER (-10..10),
        refSCS120KHz                        INTEGER (-20..20)
    }                                                                                                   OPTIONAL,   -- Cond AsyncCA
```

```
    dummy2                              SetupRelease { DummyJ }                                                 OPTIONAL,   -- Need M
    intraCellGuardBandsDL-List-r16      SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16           OPTIONAL,   -- Need S
    intraCellGuardBandsUL-List-r16      SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16           OPTIONAL,   -- Need S
    csi-RS-ValidationWithDCI-r16        ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    lte-CRS-PatternList1-r16            SetupRelease { LTE-CRS-PatternList-r16 }                                OPTIONAL,   -- Need M
    lte-CRS-PatternList2-r16            SetupRelease { LTE-CRS-PatternList-r16 }                                OPTIONAL,   -- Need M
    crs-RateMatch-PerCORESETPoolIndex-r16  ENUMERATED {enabled}                                                 OPTIONAL,   -- Need R
    enableTwoDefaultTCI-States-r16      ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    enableDefaultTCI-StatePerCoresetPoolIndex-r16 ENUMERATED {enabled}                                          OPTIONAL,   -- Need R
    enableBeamSwitchTiming-r16          ENUMERATED {true}                                                       OPTIONAL,   -- Need R
    cbg-TxDiffTBsProcessingType1-r16    ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    cbg-TxDiffTBsProcessingType2-r16    ENUMERATED {enabled}                                                    OPTIONAL    -- Need R
    ]],
    [[
    directionalCollisionHandling-r16    ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    channelAccessConfig-r16             SetupRelease { ChannelAccessConfig-r16 }                                OPTIONAL    -- Need M
    ]],
    [[
    nr-dl-PRS-PDC-Info-r17                 SetupRelease {NR-DL-PRS-PDC-Info-r17}                                OPTIONAL,   -- Need M
    semiStaticChannelAccessConfigUE-r17    SetupRelease {SemiStaticChannelAccessConfigUE-r17}                   OPTIONAL,   -- Need M
    mimoParam-r17                       SetupRelease {MIMOParam-r17}                                            OPTIONAL,   -- Need M
    channelAccessMode2-r17              ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    timeDomainHARQ-BundlingType1-r17    ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    nrofHARQ-BundlingGroups-r17         ENUMERATED {n1, n2, n4}                                                 OPTIONAL,   -- Need R
    fdmed-ReceptionMulticast-r17        ENUMERATED {true}                                                       OPTIONAL,   -- Need R
    moreThanOneNackOnlyMode-r17         ENUMERATED {mode2}                                                      OPTIONAL,   -- Need S
    tci-ActivatedConfig-r17             TCI-ActivatedConfig-r17                                                 OPTIONAL,   -- Cond
TCI_ActivatedConfig
    directionalCollisionHandling-DC-r17 ENUMERATED {enabled}                                                    OPTIONAL,   -- Need R
    lte-NeighCellsCRS-AssistInfoList-r17  SetupRelease { LTE-NeighCellsCRS-AssistInfoList-r17 }                 OPTIONAL    -- Need M
    ]],
    [[
    lte-NeighCellsCRS-Assumptions-r17   ENUMERATED {false}                                                      OPTIONAL    -- Need R
    ]],
    [[
    crossCarrierSchedulingConfigRelease-r17 ENUMERATED {true}                                                   OPTIONAL    -- Need N
    ]],
    [[
    multiPDSCH-PerSlotType1-CB-r17      ENUMERATED {enabled, disabled}                                          OPTIONAL    -- Need R
    ]]
}

UplinkConfig ::=                    SEQUENCE {
    initialUplinkBWP                    BWP-UplinkDedicated                                                     OPTIONAL,   -- Need M
    uplinkBWP-ToReleaseList             SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Id                              OPTIONAL,   -- Need N
    uplinkBWP-ToAddModList              SEQUENCE (SIZE (1..maxNrofBWPs)) OF BWP-Uplink                          OPTIONAL,   -- Need N
    firstActiveUplinkBWP-Id             BWP-Id                                                                  OPTIONAL,   -- Cond SyncAndCellAdd
    pusch-ServingCellConfig             SetupRelease { PUSCH-ServingCellConfig }                                OPTIONAL,   -- Need M
    carrierSwitching                    SetupRelease { SRS-CarrierSwitching }                                   OPTIONAL,   -- Need M
    ...,
    [[
    powerBoostPi2BPSK                   BOOLEAN                                                                 OPTIONAL,   -- Need M
    uplinkChannelBW-PerSCS-List         SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier                     OPTIONAL    -- Need S
    ]],
```

```
    [[
    enablePL-RS-UpdateForPUSCH-SRS-r16  ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    enableDefaultBeamPL-ForPUSCH0-0-r16 ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    enableDefaultBeamPL-ForPUCCH-r16    ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    enableDefaultBeamPL-ForSRS-r16      ENUMERATED {enabled}                                    OPTIONAL,   -- Need R
    uplinkTxSwitching-r16               SetupRelease { UplinkTxSwitching-r16 }                  OPTIONAL,   -- Need M
    mpr-PowerBoost-FR2-r16              ENUMERATED {true}                                       OPTIONAL    -- Need R
    ]]
}

DummyJ ::=                          SEQUENCE {
    maxEnergyDetectionThreshold-r16         INTEGER(-85..-52),
    energyDetectionThresholdOffset-r16      INTEGER (-20..-13),
    ul-toDL-COT-SharingED-Threshold-r16     INTEGER (-85..-52)                                  OPTIONAL,   -- Need R
    absenceOfAnyOtherTechnology-r16         ENUMERATED {true}                                   OPTIONAL    -- Need R
}

ChannelAccessConfig-r16 ::=         SEQUENCE {
    energyDetectionConfig-r16           CHOICE {
        maxEnergyDetectionThreshold-r16         INTEGER (-85..-52),
        energyDetectionThresholdOffset-r16      INTEGER (-13..20)
    }                                                                                           OPTIONAL,   -- Need R
    ul-toDL-COT-SharingED-Threshold-r16         INTEGER (-85..-52)                              OPTIONAL,   -- Need R
    absenceOfAnyOtherTechnology-r16             ENUMERATED {true}                               OPTIONAL    -- Need R
}

IntraCellGuardBandsPerSCS-r16 ::=       SEQUENCE {
    guardBandSCS-r16                        SubcarrierSpacing,
    intraCellGuardBands-r16                 SEQUENCE (SIZE (1..4)) OF GuardBand-r16
}

GuardBand-r16 ::=                       SEQUENCE {
     startCRB-r16                       INTEGER (0..274),
     nrofCRBs-r16                       INTEGER (0..15)
}

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

DormantBWP-Config-r16::=                SEQUENCE {
    dormantBWP-Id-r16                       BWP-Id                                          OPTIONAL,   -- Need M
    withinActiveTimeConfig-r16              SetupRelease { WithinActiveTimeConfig-r16 }     OPTIONAL,   -- Need M
    outsideActiveTimeConfig-r16             SetupRelease { OutsideActiveTimeConfig-r16 }    OPTIONAL    -- Need M
}

WithinActiveTimeConfig-r16 ::=          SEQUENCE {
   firstWithinActiveTimeBWP-Id-r16          BWP-Id                                          OPTIONAL,   -- Need M
   dormancyGroupWithinActiveTime-r16        DormancyGroupID-r16                             OPTIONAL    -- Need R
}

OutsideActiveTimeConfig-r16 ::=         SEQUENCE {
   firstOutsideActiveTimeBWP-Id-r16         BWP-Id                                          OPTIONAL,   -- Need M
   dormancyGroupOutsideActiveTime-r16       DormancyGroupID-r16                             OPTIONAL    -- Need R
}
```

```
UplinkTxSwitching-r16 ::=              SEQUENCE {
    uplinkTxSwitchingPeriodLocation-r16    BOOLEAN,
    uplinkTxSwitchingCarrier-r16           ENUMERATED {carrier1, carrier2}
}

MIMOParam-r17 ::= SEQUENCE {
    additionalPCI-ToAddModList-r17     SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF SSB-MTC-AdditionalPCI-r17  OPTIONAL,   -- Need N
    additionalPCI-ToReleaseList-r17    SEQUENCE (SIZE(1..maxNrofAdditionalPCI-r17)) OF AdditionalPCIIndex-r17     OPTIONAL,   -- Need N
    unifiedTCI-StateType-r17           ENUMERATED {separate, joint}                                               OPTIONAL,   -- Need R
    uplink-PowerControlToAddModList-r17  SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControl-r17      OPTIONAL,   -- Need N
    uplink-PowerControlToReleaseList-r17 SEQUENCE (SIZE (1..maxUL-TCI-r17)) OF Uplink-powerControlId-r17    OPTIONAL,   -- Need N
    sfnSchemePDCCH-r17                 ENUMERATED {sfnSchemeA,sfnSchemeB}                                         OPTIONAL,   -- Need R
    sfnSchemePDSCH-r17                 ENUMERATED {sfnSchemeA,sfnSchemeB}                                         OPTIONAL    -- Need R

}

-- TAG-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

***ChannelAccessConfig* field descriptions**
absenceOfAnyOtherTechnology Presence of this field indicates absence on a long term basis (e.g. by level of regulation) of any other technology sharing the carrier; absence of this field indicates the potential presence of any other technology sharing the carrier, as specified in TS 37.213 [48] clauses 4.2.1 and 4.2.3.
energyDetectionConfig Indicates whether to use the *maxEnergyDetectionThreshold* or the *energyDetectionThresholdOffset* (see TS 37.213 [48], clause 4.2.3).
energyDetectionThresholdOffset Indicates the offset to the default maximum energy detection threshold value. Unit in dB. Value -13 corresponds to -13dB, value -12 corresponds to -12dB, and so on (i.e. in steps of 1dB) as specified in TS 37.213 [48], clause 4.2.3.
maxEnergyDetectionThreshold Indicates the absolute maximum energy detection threshold value. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm) as specified in TS 37.213 [48], clause 4.2.3.
ul-toDL-COT-SharingED-Threshold Maximum energy detection threshold that the UE should use to share channel occupancy with gNB for DL transmission as specified in TS 37.213 [48], clause 4.1.3 for downlink channel access and clause 4.2.3 for uplink channel access. This field is not applicable in semi-static channel access mode.

***ServingCellConfig* field descriptions**
additionalPCI-ToAddModList List of information for the additional SSB with different PCI than the serving cell PCI. The additional SSBs with different PCIs are not used for serving cell quality derivation.
bwp-InactivityTimer The duration in ms after which the UE falls back to the default Bandwidth Part (see TS 38.321 [3], clause 5.15). When the network releases the timer configuration, the UE stops the timer without switching to the default BWP.
ca-SlotOffset Slot offset between the primary cell (PCell/PSCell) and the SCell in unaligned frame boundary with slot alignment and partial SFN alignment inter-band CA. Based on this field, the UE determines the time offset of the SCell as specified in clause 4.5 of TS 38.211 [16]. The granularity of this field is determined by the reference SCS for the slot offset (i.e. the maximum of PCell/PSCell lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* and this serving cell's lowest SCS among all the configured SCSs in DL/UL *SCS-SpecificCarrierList* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*). The Network configures at most single non-zero offset duration in ms (independent on SCS) among CCs in the unaligned CA configuration. If the field is absent, the UE applies the value of 0. The slot offset value can only be changed with SCell release and add.
cbg-TxDiffTBsProcessingType1, cbg-TxDiffTBsProcessingType2 Indicates whether processing types 1 and 2 based CBG based operation is enabled according to Rel-16 UE capabilities.
channelAccessConfig List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48].
channelAccessMode2 If present, this field indicates that the UE shall apply channel access 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 does not apply these channel access procedures. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations. Overwrites the corresponding field in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* for this serving cell.
crossCarrierSchedulingConfig Indicates whether this serving cell is cross-carrier scheduled by another serving cell or whether it cross-carrier schedules another serving cell. If the field *other* is configured for an SpCell (i.e., the SpCell is cross-carrier scheduled by another serving cell), the SpCell can be additionally scheduled by the PDCCH on the SpCell.
crossCarrierSchedulingConfigRelease If this field is included, the UE shall release the cross carrier scheduling configuration configured by *crossCarrierSchedulingConfig*. The network may only include either *crossCarrierSchedulingConfigRelease* or *crossCarrierSchedulingConfig* at a time.
crs-RateMatch-PerCORESETPoolIndex Indicates how UE performs rate matching when both lte-CRS-PatternList1-r16 and lte-CRS-PatternList2-r16 are configured as specified in TS 38.214 [19], clause 5.1.4.2.
csi-RS-ValidationWithDCI Indicates how the UE performs periodic and semi-persistent CSI-RS reception in a slot. The presence of this field indicates that the UE uses DCI detection to validate whether to receive CSI-RS (see TS 38.213 [13], clause 11.1).
defaultDownlinkBWP-Id The initial bandwidth part is referred to by BWP-Id = 0. ID of the downlink bandwidth part to be used upon expiry of the BWP inactivity timer. This field is UE specific. When the field is absent the UE uses the initial BWP as default BWP. (see TS 38.213 [13], clause 12 and TS 38.321 [3], clause 5.15).
directionalCollisionHandling Indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD CA with same SCS as specified in TS 38.213 [13], clause 11.1. The half-duplex operation only applies within the same frequency range and cell group. The network only configures this field for TDD serving cells that are using the same SCS.
directionalCollisionHandling-DC For the IAB-MT, it indicates that this serving cell is using directional collision handling between a reference and other cell(s) for half-duplex operation in TDD NR-DC with same SCS within same cell group or cross different cell groups.
dormantBWP-Config The dormant BWP configuration for an SCell. This field can be configured only for a (non-PUCCH) SCell.

downlinkBWP-ToAddModList List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12).
downlinkBWP-ToReleaseList List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12).
downlinkChannelBW-PerSCS-List A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *DownlinkConfigCommon* / *DownlinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15], TS 38.101-2 [39], and TS 38.101-5 [75]. If the UE is a RedCap UE and needs to autonomously switch to its initial downlink bandwidth part to perform a random access procedure but its current UE specific channel bandwidth does not cover the initial downlink bandwidth part, the UE autonomously changes its UE specific channel bandwidth to cover the initial downlink bandwidth part. In that case, after completion of the random access procedure, the network ensures that the UE specific channel bandwidth fully covers the UE's active downlink bandwidth part in subsequent bandwidth part switch operations.
dummy1, dummy 2 This field is not used in the specification. If received it shall be ignored by the UE.
enableBeamSwitchTiming Indicates the aperiodic CSI-RS triggering with beam switching triggering behaviour as defined in clause 5.2.1.5.1 of TS 38.214 [19].
enableDefaultTCI-StatePerCoresetPoolIndex Presence of this field indicates the UE shall follow the release 16 behavior of default TCI state per CORESETPoolindex when the UE is configured by higher layer parameter PDCCH-Config that contains two different values of CORESETPoolIndex in ControlResourceSet is enabled.
enableTwoDefaultTCI-States Presence of this field indicates the UE shall follow the release 16 behavior of two default TCI states for PDSCH when at least one TCI codepoint is mapped to two TCI states is enabled
fdmed-ReceptionMulticast Indicates the Type-1 HARQ codebook generation as specified in TS 38.213 [13], clause 9.1.2.1.
firstActiveDownlinkBWP-Id If configured for an SpCell, this field contains the ID of the DL BWP to be activated or to be used for RLM, BFD and measurements if included in an *RRCReconfiguration* message contained in an NR or E-UTRA RRC message indicating that the SCG is deactivated, upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch. If the field is absent for the PSCell at SCG deactivation, the UE considers the previously activated DL BWP as the BWP to be used for RLM, BFD and measurements. If the field is absent for the PSCell at SCG activation, the DL BWP to be activated is the DL BWP previously to be used for RLM, BFD and measurements. If configured for an SCell, this field contains the ID of the downlink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BWP-Id = 0. Upon reconfiguration with *reconfigurationWithSync*, the network sets the *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* to the same value.
initialDownlinkBWP The dedicated (UE-specific) configuration for the initial downlink bandwidth-part (i.e., DL BWP#0). If any of the optional IEs are configured within this IE, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1
intraCellGuardBandsDL-List, intraCellGuardBandsUL-List List of intra-cell guard bands in a serving cell for operation with shared spectrum channel access in FR1. If not configured, the guard bands are defined according to 38.101-1 [15], see TS 38.214 [19], clause 7. For operation in licensed spectrum, this field is absent, and no UE action is required.
lte-CRS-PatternList1 A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH. The LTE CRS patterns in this list shall be non-overlapping in frequency. The network does not configure this field and *lte-CRS-ToMatchAround* simultaneously.

lte-CRS-PatternList2
A list of LTE CRS patterns around which the UE shall do rate matching for PDSCH scheduled with a DCI detected on a CORESET with CORESETPoolIndex configured with 1. This list is configured only if CORESETPoolIndex configured with 1. The first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in lte-CRS-PatternList1, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in lte-CRS-PatternList1, and so on. Network configures this field only if the field *lte-CRS-ToMatchAround* is not configured and there is at least one ControlResourceSet in one DL BWP of this serving cell with *coresetPoolIndex* set to 1.

lte-CRS-ToMatchAround
Parameters to determine an LTE CRS pattern that the UE shall rate match around.

lte-NeighCellsCRS-AssistInfoList
A list of LTE neighbour cells configuration information which is used to assist the UE to perform CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]). If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the *LTE-NeighCellsCRS-AssistInfo* entries is considered to be newly created and the conditions and Need codes for setup of the entry apply.

lte-NeighCellsCRS-Assumptions
If the field is not configured, the following default network configuration assumptions are valid for all LTE neighbour cells for the purpose of CRS interference mitigation (CRS-IM) in scenarios with overlapping spectrum for LTE and NR (see TS 38.101-4 [59]).
- The CRS port number is the same as the one indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell.
- The CRS port number is 4 if *RateMatchPatternLTE-CRS* is not configured for the serving cell.
- The channel bandwidth and centre frequency are the same as the ones indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell.
- The MBSFN configuration is the same as the one indicated in *RateMatchPatternLTE-CRS* if configured for the serving cell. If *RateMatchPatternLTE-CRS* is not configured for the serving cell, MBSFN subframe is not configured.
- Network-based CRS interference mitigation (i.e., CRS muting), as in *crs-IntfMitigConfig* specified in TS 36.331 [10], is not enabled.

If the field is configured (i.e. false) and *LTE-NeighCellsCRS-AssistInfoList* is configured, the configuration provided in *LTE-NeighCellsCRS-AssistInfoList* overrides the default network configuration assumptions.
If the field is configured (i.e. false) and *LTE-NeighCellsCRS-AssistInfoList* is not configured, it is up to the UE implementation whether to apply CRS-IM operation.

multiPDSCH-PerSlotType1-CB
Configures the UE behaviour for Type1 codebook HARQ ACK generation regarding the number of PDSCHs per slot on a serving cell as specified in TS 38.213 [13], clause 9.1.2.1.
When this parameter is configured and set to disabled for a serving cell, the network does not schedule UE with more than one PDSCH in a slot on the serving cell if HARQ-ACKs of any two PDSCHs in the slot on the serving cell are supposed to be reported on one PUCCH resource in the same PUCCH slot. If two *coresetPoolIndex* values are configured, the number of received PDSCHs is per *coresetPoolIndex* value per slot for a serving cell. If the UE generates two HARQ-ACK codebooks for two priorities, the number of received PDSCHs is per priority per slot for a serving cell. If *fdmed-ReceptionMulticast* is configured, the number of received PDSCHs is per traffic type (unicast / multicast) per slot for a serving cell.

nr-dl-PRS-PDC-Info
Configures the DL PRS for propagation delay compensation. When configured, the UE measures the UE Rx-Tx time difference based on the reference signals configured in this field.

nrofHARQ-BundlingGroups
Indicates the number of HARQ bundling groups for type2 HARQ-ACK codebook.

pathlossReferenceLinking
Indicates whether UE shall apply as pathloss reference either the downlink of SpCell (PCell for MCG or PSCell for SCG) or of SCell that corresponds with this uplink (see TS 38.213 [13], clause 7).

pdsch-ServingCellConfig
PDSCH related parameters that are not BWP-specific.

rateMatchPatternToAddModList Resources patterns which the UE should rate match PDSCH around. The UE rate matches around the union of all resources indicated in the rate match patterns. Rate match patterns defined here on cell level apply only to PDSCH of the same numerology. See TS 38.214 [19], clause 5.1.4.1. 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, including the set of RBs/REs indicated by the patterns for the rate matching around, and they are counted as a single rate match pattern in the total configured rate match patterns as defined in TS 38.214 [19].
sCellDeactivationTimer SCell deactivation timer in TS 38.321 [3]. If the field is absent, the UE applies the value infinity.
sfnSchemePDCCH This parameter is used to configure single frequency network scheme for PDCCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both *sfnSchemePDCCH* and *sfnSchemePDSCH*, same value shall be configured.
sfnSchemePDSCH This parameter is used to configure single frequency network scheme for PDSCH: sfnSchemeA or sfnSchemeB as specified (see TS 38.214 [19], clause 5.1). If network includes both *sfnSchemePDCCH* and *sfnSchemePDSCH*, same value shall be configured. The network does not configure this parameter and *repetitionSchemeConfig* in *PDSCH-Config* simultaneously in the same serving cell.
semiStaticChannelAccessConfigUE When this field is configured and when *channelAccessMode-r16* (see IE ServingCellConfigCommon and IE ServingCellConfigCommonSIB) is configured to *semiStatic*, the UE operates in semi-static channel access mode and can initiate a channel occupancy periodically (see TS 37.213 [48], Clause 4.3). The period can be configured independently from period configured in *SemiStaticChannelAccessConfig-r16* if the UE indicates the corresponding capability. Otherwise, the periodicity configured by *periodUE-r17* is an integer multiple of or an integer factor of the periodicity indicated by *period* in *SemiStaticChannelAccessConfig-r16.*
servingCellMO *measObjectId* of the *MeasObjectNR* in *MeasConfig* which is associated to the serving cell. For this *MeasObjectNR*, the following relationship applies between this MeasObjectNR and *frequencyInfoDL* in *ServingCellConfigCommon/ServingCellConfigCommonSIB* of the serving cell: if *ssbFrequency* is configured, its value is the same as the *absoluteFrequencySSB* and if *csi-rs-ResourceConfigMobility* is configured, the value of its *subcarrierSpacing* is present in one entry of the *scs-SpecificCarrierList*, *csi-RS-CellListMobility* includes an entry corresponding to the serving cell (with *cellId* equal to *physCellId* in *ServingCellConfigCommon*) and the frequency range indicated by the *csi-rs-MeasurementBW* of the entry in *csi-RS-CellListMobility* is included in the frequency range indicated by in the entry of the *scs-SpecificCarrierList*.
supplementaryUplink Network may configure this field only when *supplementaryUplinkConfig* is configured in *ServingCellConfigCommon* or *supplementaryUplink* is configured in *ServingCellConfigCommonSIB*.
supplementaryUplinkRelease If this field is included, the UE shall release the uplink configuration configured by *supplementaryUplink*. The network only includes either *supplementaryUplinkRelease* or *supplementaryUplink* at a time.
tag-Id Timing Advance Group ID, as specified in TS 38.321 [3], which this cell belongs to.
tci-ActivatedConfig If configured for an SCell, or if configured for the PSCell when the SCG is being activated upon the reception of the containing message, the UE shall consider the TCI states provided in this field as the activated TCI states for PDCCH/PDSCH reception on this serving cell. If configured for the PSCell when the SCG is indicated as deactivated in the containing message: - the UE shall consider the TCI states provided in this field as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which *tci-ActivatedConfig* is absent - if bfd-and-RLM is configured and no RS is configured in *RadioLinkMonitoringConfig* for RLM, respectively for BFD, the UE shall use the TCI states provided in this field for PDCCH as RS for RLM, respectively for BFD. When this field is absent for the PSCell and the SCG is being deactivated: - the UE shall consider the previously activated TCI states as the TCI states to be activated for PDCCH/PDSCH reception upon a later SCG activation in which *tci-ActivatedConfig* is absent - if *bfd-and-RLM* is configured and no RS is configured in *RadioLinkMonitoringConfig* for RLM, respectively for BFD, the UE shall use the previously activated TCI states for PDCCH as RS for RLM, respectively for BFD.

tdd-UL-DL-ConfigurationDedicated-IAB-MT Resource configuration per IAB-MT D/U/F overrides all symbols (with a limitation that effectively only flexible symbols can be overwritten in Rel-16) per slot over the number of slots as provided by *TDD-UL-DL ConfigurationCommon*.
unifiedTCI-StateType Indicates the unified TCI state type the UE is configured for this serving cell. The value *separate* means this serving cell is configured with *dl-OrJointTCI-StateList* for DL TCI state and *ul-TCI-ToAddModList* for UL TCI state. The value *joint* means this serving cell is configured with *dl-OrJointTCI-StateList* for joint TCI state for UL and DL operation. The network does not configure the field in a serving cell that is configured with more than one value for the *coresetPoolIndex.*
uplinkConfig Network may configure this field only when *uplinkConfigCommon* is configured in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB*. Addition or release of this field can only be done upon SCell addition or release (respectively).
uplink-PowerControlToAddModList Configures UL power control parameters for PUSCH, PUCCH and SRS when field unifiedTCI-StateType is configured for this serving cell.

***UplinkConfig* field descriptions**
carrierSwitching Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3.
enableDefaultBeamPL-ForPUSCH0-0, enableDefaultBeamPL-ForPUCCH, enableDefaultBeamPL-ForSRS When the parameter is present, UE derives the spatial relation and the corresponding pathloss reference Rs as specified in 38.213, clauses 7.1.1, 7.2.1, 7.3.1 and 9.2.2. The network only configures these parameters for FR2.
enablePL-RS-UpdateForPUSCH-SRS When this parameter is present, the Rel-16 feature of MAC CE based pathloss RS updates for PUSCH/SRS is enabled. Network only configures this parameter when the UE is configured with *sri-PUSCH-PowerControl*. If this field is not configured, network configures at most 4 pathloss RS resources for PUSCH/PUCCH/SRS transmissions per BWP, not including pathloss RS resources for SRS transmissions for positioning. (See TS 38.213 [13], clause 7).
firstActiveUplinkBWP-Id If configured for an SpCell, this field contains the ID of the UL BWP to be activated upon performing the RRC (re-)configuration. If the field is absent, the RRC (re-)configuration does not impose a BWP switch. If configured for an SCell, this field contains the ID of the uplink bandwidth part to be used upon activation of an SCell. The initial bandwidth part is referred to by BandiwdthPartId = 0.
initialUplinkBWP The dedicated (UE-specific) configuration for the initial uplink bandwidth-part (i.e. UL BWP#0). If any of the optional IEs are configured within this IE as part of the IE *uplinkConfig*, the UE considers the BWP#0 to be an RRC configured BWP (from UE capability viewpoint). Otherwise, the UE does not consider the BWP#0 as an RRC configured BWP (from UE capability viewpoint). Network always configures the UE with a value for this field if no other BWPs are configured. NOTE1
moreThanOneNackOnlyMode Indicates the mode of NACK-only feedback in the PUCCH transmission, as specified in TS 38.213 [13], clause 18. If multicast CFR is not configured, this field is not included. Otherwise, if the field is absent, UE uses mode 1 for multicast CFR.
mpr-PowerBoost-FR2 Indicates whether UE is allowed to boost uplink transmission power by suspending in-band emission (IBE) requirements as specified in TS 38.101-2 [39]. Network only configures this field for FR2 serving cells.
powerBoostPi2BPSK If this field is set to *true*, the UE determines the maximum output power for PUCCH/PUSCH transmissions that use pi/2 BPSK modulation according to TS 38.101-1 [15], clause 6.2.4.
pusch-ServingCellConfig PUSCH related parameters that are not BWP-specific.
uplinkBWP-ToAddModList The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same *bandwidthPartId* are considered as a BWP pair and must have the same center frequency.
uplinkBWP-ToReleaseList The additional bandwidth parts for uplink to be released.
uplinkChannelBW-PerSCS-List A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. If absent, UE uses the configuration indicated in *scs-SpecificCarrierList* in *UplinkConfigCommon* / *UplinkConfigCommonSIB*. Network only configures channel bandwidth that corresponds to the channel bandwidth values defined in TS 38.101-1 [15], TS 38.101-2 [39], and TS 38.101-5 [75]. If the UE is a RedCap UE and needs to autonomously switch to its initial uplink bandwidth part to perform a random access procedure but its current UE specific channel bandwidth does not cover the initial uplink bandwidth part, the UE autonomously changes its UE specific channel bandwidth to cover the initial uplink bandwidth part. In that case, after completion of the random access procedure, the network ensures that the UE specific channel bandwidth fully covers the UE's active uplink bandwidth part in subsequent bandwidth part switch operations.

uplinkTxSwitchingPeriodLocation Indicates whether the location of UL Tx switching period is configured in this uplink carrier in case of inter-band UL CA, SUL, or (NG)EN-DC, as specified in TS 38.101-1 [15] and TS 38.101-3 [34]. In case of (NG)EN-DC, network always configures this field to TRUE for NR carrier (i.e. with (NG)EN-DC, the UL switching period always occurs on the NR carrier). In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures this field to TRUE for the uplink carrier(s) on one band and configures this field to FALSE for the uplink carrier(s) on the other band. This field is set to the same value for the carriers on the same band.
uplinkTxSwitchingCarrier Indicates that the configured carrier is carrier1 or carrier2 for dynamic uplink Tx switching, as defined in TS 38.101-1 [15] and TS 38.101-3 [34]. In case of (NG)EN-DC, network always configures the NR carrier as carrier 2. In case of inter-band UL CA or SUL, for dynamic uplink Tx switching between 2 bands with 2 uplink carriers or 3 uplink carriers as defined in TS 38.101-1 [15], network configures the uplink carrier(s) on one band as carrier1 and the uplink carrier(s) on the other band as carrier2. This field is set to the same value for the carriers on the same band.

DormantBWP-Config **field descriptions**
dormancyGroupWithinActiveTime This field contains the ID of an SCell group for Dormancy within active time, to which this SCell belongs. The use of the Dormancy within active time for SCell groups is specified in TS 38.213 [13].
dormancyGroupOutsideActiveTime This field contains the ID of an SCell group for Dormancy outside active time, to which this SCell belongs. The use of the Dormancy outside active time for SCell groups is specified in TS 38.213 [13].
dormantBWP-Id This field contains the ID of the downlink bandwidth part to be used as dormant BWP. If this field is configured, its value is different from *defaultDownlinkBWP-Id*, and at least one of the *withinActiveTimeConfig* and *outsideActiveTimeConfig* should be configured.
firstOutsideActiveTimeBWP-Id This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy outside active time.
firstWithinActiveTimeBWP-Id This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy within active time.
outsideActiveTimeConfig This field contains the configuration to be used for SCell dormancy outside active time, as specified in TS 38.213 [13]. The field can only be configured when the cell group the SCell belongs to is configured with *dcp-Config*.
withinActiveTimeConfig This field contains the configuration to be used for SCell dormancy within active time, as specified in TS 38.213 [13].

GuardBand **field descriptions**
startCRB Indicates the starting RB of the guard band.
nrofCRB Indicates the length of the guard band in RBs. When set to 0, zero-size guard band is used.

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

Conditional Presence	Explanation
AsyncCA	This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S.
MeasObject	This field is mandatory present for the SpCell if the UE has a *measConfig*, and it is optionally present, Need M, for SCells. For RedCap UEs, this field is optionally present, Need M.
SCellOnly	This field is optionally present, Need R, for SCells. It is absent otherwise.
ServingCellWithoutPUCCH	This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise.
SyncAndCellAdd	This field is mandatory present for a SpCell upon reconfiguration with *reconfigurationWithSync* and upon *RRCSetup*/*RRCResume*. The field is optionally present for an SpCell, Need N, upon reconfiguration without *reconfigurationWithSync*. The field is mandatory present for an SCell upon addition, and absent for SCell in other cases, Need M.
TCI_ActivatedConfig	This field is optional Need N for SCells if *sCellState* is configured, otherwise it is absent. This field is optional Need S for the PSCell when the SCG is indicated as deactivated or is being activated, otherwise it is absent. This field is absent for the PCell.
TDD	This field is optionally present, Need R, for TDD cells. It is absent otherwise.
TDD_IAB	For IAB-MT, this field is optionally present, Need R, for TDD cells. It is absent otherwise.

– *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
    ]],
    [[
    featurePriorities-r17               SEQUENCE {
        redCapPriority-r17                  FeaturePriority-r17                             OPTIONAL, -- Need R
        slicingPriority-r17                 FeaturePriority-r17                             OPTIONAL, -- Need R
        msg3-Repetitions-Priority-r17       FeaturePriority-r17                             OPTIONAL, -- Need R
        sdt-Priority-r17                    FeaturePriority-r17                             OPTIONAL  -- Need R
    }                                                                                       OPTIONAL  -- Need R
    ]],
    [[
    ra-ChannelAccess-r17            ENUMERATED {enabled}                                OPTIONAL -- Cond SharedSpectrum2
    ]]
}

-- 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 as defined in TS 37.213, clause 4.1 and 4.2.
channelAccessMode2
If present, the UE shall apply channel access 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. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.
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.
featurePriorities
Indicates priorities for features, such as RedCap, Slicing, SDT and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which *FeatureCombinationPreambles* the UE shall use when a feature maps to more than one *FeatureCombinationPreambles*, as specified in TS 38.321 [3]. A lower value means a higher priority. The network does not signal the same priority for more than one feature. The network signals a priority for all feature that map to at least one *FeatureCombinationPreambles*.
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.
ra-ChannelAccess
If present, this field indicates that the UE shall apply channel access procedures before msg1/msgA transmission for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4.5 for FR2-2.
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, including the set of RBs/REs indicated by the patterns for the rate matching around, 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, Need R. Otherwise, it is absent, Need R.
TDD	The field is optionally present, Need R, for TDD cells; otherwise it is absent.

– *ServingCellConfigCommonSIB*

The IE *ServingCellConfigCommonSIB* is used to configure cell specific parameters of a UE's serving cell in SIB1.

ServingCellConfigCommonSIB information element

```
-- ASN1START
-- TAG-SERVINGCELLCONFIGCOMMONSIB-START

ServingCellConfigCommonSIB ::=      SEQUENCE {
    downlinkConfigCommon                DownlinkConfigCommonSIB,
    uplinkConfigCommon                  UplinkConfigCommonSIB                                   OPTIONAL, -- Need R
    supplementaryUplink                 UplinkConfigCommonSIB                                   OPTIONAL, -- Need R
    n-TimingAdvanceOffset               ENUMERATED { n0, n25600, n39936 }                       OPTIONAL, -- Need S
    ssb-PositionsInBurst                SEQUENCE {
        inOneGroup                          BIT STRING (SIZE (8)),
        groupPresence                       BIT STRING (SIZE (8))                               OPTIONAL  -- Cond FR2-Only
    },
    ssb-PeriodicityServingCell          ENUMERATED {ms5, ms10, ms20, ms40, ms80, ms160},
    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
    highSpeedConfig-r16                 HighSpeedConfig-r16                                     OPTIONAL  -- Need R
    ]],
    [[
    channelAccessMode2-r17              ENUMERATED {enabled}                                    OPTIONAL, -- Cond SharedSpectrum2
    discoveryBurstWindowLength-v1700    ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25} OPTIONAL,  -- Need R
    highSpeedConfigFR2-r17              HighSpeedConfigFR2-r17                                  OPTIONAL, -- Need R
    uplinkConfigCommon-v1700            UplinkConfigCommonSIB-v1700                             OPTIONAL  -- Need R
    ]],
    [[
    enhancedMeasurementLEO-r17          ENUMERATED {true}                                       OPTIONAL  -- Need R
    ]],
    [[
    ra-ChannelAccess-r17                ENUMERATED {enabled}                                    OPTIONAL  -- Cond SharedSpectrum2
    ]],
    [[
    downlinkConfigCommon-v1760          DownlinkConfigCommonSIB-v1760                           OPTIONAL, -- Need R
    uplinkConfigCommon-v1760            UplinkConfigCommonSIB-v1760                             OPTIONAL  -- Need R
    ]]
}

-- TAG-SERVINGCELLCONFIGCOMMONSIB-STOP
-- ASN1STOP
```

***ServingCellConfigCommonSIB* 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 as defined in TS 37.213, clause 4.1 and 4.2.
channelAccessMode2 If present, this field indicates that the UE shall apply channel access 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. The network always configures this field if channel access procedures are required for the serving cell within this region by regulations.
discoveryBurstWindowLength Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field *discoveryBurstWindowLength-v1700* is applicable to SCS 480 kHz and SCS 960 kHz.
enhancedMeasurementLEO If the field is present and UE supports the enhanced cell reselection requirements for NTN LEO in RRC_IDLE/RRC_INACTIVE, the UE shall apply the enhanced cell reselection requirements for NTN LEO as specified in TS 38.133 [14], clauses 4.2C.2.3 and 4.2C.2.4.
groupPresence This field is present when maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1. The first/leftmost bit corresponds to the SS/PBCH index 0-7, the second bit corresponds to SS/PBCH block 8-15, and so on. Value 0 in the bitmap indicates that the SSBs according to *inOneGroup* are absent. Value 1 indicates that the SS/PBCH blocks are transmitted in accordance with *inOneGroup*.
inOneGroup When maximum number of SS/PBCH blocks per half frame equals to 4 as defined in TS 38.213 [13], clause 4.1, only the 4 leftmost bits are valid; the UE ignores the 4 rightmost bits. When maximum number of SS/PBCH blocks per half frame equals to 8 as defined in TS 38.213 [13], clause 4.1, all 8 bits are valid. The first/ leftmost bit corresponds to SS/PBCH block index 0, the second bit corresponds to SS/PBCH block index 1, and so on. When maximum number of SS/PBCH blocks per half frame equals to 64 as defined in TS 38.213 [13], clause 4.1, all 8 bit are valid; The first/ leftmost bit corresponds to the first SS/PBCH block index in the group (i.e., to SSB index 0, 8, and so on); the second bit corresponds to the second SS/PBCH block index in the group (i.e., to SSB index 1, 9, and so on), 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.
n-TimingAdvanceOffset The N_TA-Offset to be applied for random access 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.
ra-ChannelAccess If present, this field indicates that the UE shall apply channel access procedures before msg1/msgA transmission for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4.5 for FR2-2.
ssb-PositionsInBurst Time domain positions of the transmitted SS-blocks in an SS-burst as defined in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access in FR1, only *inOneGroup* is used and the UE interprets this field same as *mediumBitmap* in *ServingCellConfigCommon*. The UE assumes that a bit in *inOneGroup* at position k > N_{SSB}^{QCL} is 0, where N_{SSB}^{QCL} is obtained from *MIB* as specified in TS 38.213 [13], clause 4.1. For operation with shared spectrum channel access in FR2-2, the m-th bit in *groupPresence* is set to 0 for m > N_{SSB}^{QCL}/8, where N_{SSB}^{QCL} is obtained from *MIB* as specified 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.

Conditional Presence	Explanation
FR2-Only	This field is mandatory present for an FR2 carrier frequency. It is absent otherwise and UE releases any configured value.
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, Need R. Otherwise, it is absent, Need R.
TDD	The field is optionally present, Need R, for TDD cells; otherwise it is absent.

– *ShortI-RNTI-Value*

The IE *ShortI-RNTI-Value* is used to identify the suspended UE context of a UE in RRC_INACTIVE using fewer bits compared to I-RNTI-Value.

ShortI-RNTI-Value information element

```
-- ASN1START
-- TAG-SHORTI-RNTI-VALUE-START

ShortI-RNTI-Value ::=   BIT STRING (SIZE(24))

-- TAG-SHORTI-RNTI-VALUE-STOP
-- ASN1STOP
```

– *ShortMAC-I*

The IE *ShortMAC-I* is used to identify and verify the UE at RRC connection re-establishment. The 16 least significant bits of the MAC-I calculated using the AS security configuration of the source PCell, as specified in 5.3.7.4.

ShortMAC-I information element

```
-- ASN1START
-- TAG-SHORTMAC-I-START

ShortMAC-I ::=                  BIT STRING (SIZE (16))

-- TAG-SHORTMAC-I-STOP
-- ASN1STOP
```

– *SINR-Range*

The IE *SINR-Range* specifies the value range used in SINR measurements and thresholds. For measurements, integer value for SINR measurements is according to Table 10.1.16.1-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value – 46) / 2 dB.

SINR-Range information element

```
-- ASN1START
-- TAG-SINR-RANGE-START

SINR-Range ::=                  INTEGER(0..127)

-- TAG-SINR-RANGE-STOP
-- ASN1STOP
```

– *SI-RequestConfig*

The IE *SI-RequestConfig* contains configuration for Msg1 based SI request.

SI-RequestConfig information element

```
-- ASN1START
-- TAG-SI-REQUESTCONFIG-START

SI-RequestConfig ::=                SEQUENCE {
    rach-OccasionsSI                    SEQUENCE {
        rach-ConfigSI                       RACH-ConfigGeneric,
        ssb-perRACH-Occasion                ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}
    }                                                                                   OPTIONAL,   -- Need R
    si-RequestPeriod                    ENUMERATED {one, two, four, six, eight, ten, twelve, sixteen}       OPTIONAL,   -- Need R
    si-RequestResources                 SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResources
}

SI-RequestResources ::=             SEQUENCE {
    ra-PreambleStartIndex               INTEGER (0..63),
    ra-AssociationPeriodIndex           INTEGER (0..15)                                 OPTIONAL,   -- Need R
    ra-ssb-OccasionMaskIndex            INTEGER (0..15)                                 OPTIONAL    -- Need R
}

-- TAG-SI-REQUESTCONFIG-STOP
-- ASN1STOP
```

***SI-RequestConfig* field descriptions**
rach-OccasionsSI Configuration of dedicated RACH Occasions for SI. If the field is absent, the UE uses the corresponding parameters configured in *rach-ConfigCommon* of the initial uplink BWP.
si-RequestPeriod Periodicity of the *SI-Request* configuration in number of association periods.
si-RequestResources If there is only one entry in the list, the configuration is used for all SI messages for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting*. Otherwise: - If *si-SchedulingInfo-v1700* is not present and the *SI-RequestConfig* is used for on-demand SI request in *SI-SchedulingInfo* or *PosSI-SchedulingInfo*, the 1st entry in the list corresponds to the first SI message in *schedulingInfoList* or *posSchedulingInfoList* for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message in *schedulingInfoList* or *posSchedulingInfoList* for which *si-BroadcastStatus* or *posSI-BroadcastStatus* is set to *notBroadcasting* and so on. - If *si-SchedulingInfo-v1700* is present and *SI-RequestConfig* is configured in *SI-SchedulingInfo* for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messages configured by *schedulingInfoList* in *si-SchedulingInfo.* The 1st entry in the list corresponds to the first SI message for which *si-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message for which *si-BroadcastStatus* is set to *notBroadcasting* and so on. - If *si-SchedulingInfo-v1700* is present and *SI-RequestConfig* is configured in *PosSI-SchedulingInfo* for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* to the SI messages configured by *posSchedulingInfoList* in *posSI-SchedulingInfo.* The 1st entry in the list corresponds to the first SI message for which *posSI-BroadcastStatus* or *si-BroadcastStatus* is set to *notBroadcasting*, 2nd entry in the list corresponds to the second SI message for which *posSI-BroadcastStatus* or *si-BroadcastStatus* is set to *notBroadcasting* and so on. Change of *si-RequestResources* should not result in system information change notification.

***SI-RequestResources* field descriptions**
ra-AssociationPeriodIndex Index of the association period in the *si-RequestPeriod* in which the UE can send the SI request for SI message(s) corresponding to this *SI-RequestResources*, using the preambles indicated by *ra-PreambleStartIndex* and rach occasions indicated by *ra-ssb-OccasionMaskIndex*.
ra-PreambleStartIndex If N SSBs are associated with a RACH occasion, where N > = 1, for the i-th SSB (i=0, …, N-1) the preamble with preamble index = *ra-PreambleStartIndex* + i is used for SI request; For N < 1, the preamble with preamble index = *ra-PreambleStartIndex* is used for SI request.

– *SI-SchedulingInfo*

The IE *SI-SchedulingInfo* contains information needed for acquisition of SI messages.

***SI-SchedulingInfo* information element**

```
-- ASN1START
-- TAG-SI-SCHEDULINGINFO-START

SI-SchedulingInfo ::=               SEQUENCE {
    schedulingInfoList                  SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo,
    si-WindowLength                     ENUMERATED {s5, s10, s20, s40, s80, s160, s320, s640, s1280, s2560-v1710, s5120-v1710 },
    si-RequestConfig                    SI-RequestConfig                                        OPTIONAL,  -- Cond MSG-1
    si-RequestConfigSUL                 SI-RequestConfig                                        OPTIONAL,  -- Cond SUL-MSG-1
    systemInformationAreaID             BIT STRING (SIZE (24))                                  OPTIONAL,  -- Need R
```

```
    ...
}

SchedulingInfo ::=                  SEQUENCE {
    si-BroadcastStatus                  ENUMERATED {broadcasting, notBroadcasting},
    si-Periodicity                      ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    sib-MappingInfo                     SIB-Mapping
}

SI-SchedulingInfo-v1700 ::=         SEQUENCE {
    schedulingInfoList2-r17             SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo2-r17,
    dummy                              SI-RequestConfig                                    OPTIONAL
}

SI-SchedulingInfo-v1740 ::=         SEQUENCE {
    si-RequestConfigRedCap-r17          SI-RequestConfig                                    OPTIONAL   -- Cond REDCAP-MSG-1
}

SchedulingInfo2-r17 ::=             SEQUENCE {
    si-BroadcastStatus-r17              ENUMERATED {broadcasting, notBroadcasting},
    si-WindowPosition-r17               INTEGER (1..256),
    si-Periodicity-r17                  ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
    sib-MappingInfo-r17                 SIB-Mapping-v1700
}

SIB-Mapping ::=                     SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo

SIB-Mapping-v1700  ::=              SEQUENCE (SIZE (1..maxSIB)) OF SIB-TypeInfo-v1700

SIB-TypeInfo ::=                    SEQUENCE {
    type                                ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType6, sibType7, sibType8, sibType9,
                                                    sibType10-v1610, sibType11-v1610, sibType12-v1610, sibType13-v1610,
                                                    sibType14-v1610, spare3, spare2, spare1,... },
    valueTag                            INTEGER (0..31)                                     OPTIONAL, -- Cond SIB-TYPE
    areaScope                           ENUMERATED {true}                                   OPTIONAL -- Need S
}

SIB-TypeInfo-v1700 ::=              SEQUENCE {
    sibType-r17                         CHOICE {
        type1-r17                           ENUMERATED {sibType15, sibType16, sibType17, sibType18, sibType19, sibType20, sibType21,
                                                        spare9, spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1,...},
        type2-r17                           SEQUENCE {
            posSibType-r17                      ENUMERATED {posSibType1-9, posSibType1-10, posSibType2-24, posSibType2-25,
                                                            posSibType6-4, posSibType6-5, posSibType6-6, posSibType2-17a-v1770,
                                                            posSibType2-18a-v1770, posSibType2-20a-v1770, spare6,
                                                            spare5, spare4, spare3, spare2, spare1,...},
            encrypted-r17                       ENUMERATED { true }                         OPTIONAL, -- Need R
            gnss-id-r17                         GNSS-ID-r16                                 OPTIONAL, -- Need R
            sbas-id-r17                         SBAS-ID-r16                                 OPTIONAL  -- Cond GNSS-ID-SBAS
        }
    },
    valueTag-r17                        INTEGER (0..31)                                     OPTIONAL, -- Cond NonPosSIB
    areaScope-r17                       ENUMERATED {true}                                   OPTIONAL  -- Need S
}
```

```
-- TAG-SI-SCHEDULINGINFO-STOP
-- ASN1STOP
```

***SchedulingInfo* field descriptions**
areaScope Indicates that a SIB is area specific. If the field is absent, the SIB is cell specific.
si-BroadcastStatus Indicates if the SI message is being broadcasted or not. Change of *si-BroadcastStat*us should not result in system information change notifications in Short Message transmitted with P-RNTI over DCI (see clause 6.5). The value of the indication is valid until the end of the BCCH modification period when set to *broadcasting.* When *SIB19* is scheduled, the *si-BroadcastStatus* for the mapped *SIB19* is set to *broadcasting*. If *si-SchedulingInfo-v1700* is present, the network ensures that the total number of SI messages with *si-BroadcastStatus* set to *notBroadcasting* in the list of concatenated SI messages configured by *schedulingInfoList* in *si-SchedulingInfo* and SI messages containing type1 SIB configured by *schedulingInfoList2* in *si-SchedulingInfo-v1700* does not exceed the limit of *maxSI-Message* when *si-RequestConfig*, *si-RequestConfigRedCap* or *si-RequestConfigSUL* is configured.
si-Periodicity Periodicity of the SI-message in radio frames. Value *rf8* corresponds to 8 radio frames, value *rf16* corresponds to 16 radio frames, and so on.

***SI-SchedulingInfo* field descriptions**
dummy This field is not used in this specification. If received, it is ignored by the UE.
si-RequestConfig Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*.
si-RequestConfigRedCap Configuration of Msg1 resources for *initialUplinkBWP-RedCap* that the RedCap UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*.
si-RequestConfigSUL Configuration of Msg1 resources that the UE uses for requesting SI-messages for which *si-BroadcastStatus* is set to *notBroadcasting*.
si-WindowLength The length of the SI scheduling window. Value *s5* corresponds to 5 slots, value *s10* corresponds to 10 slots and so on. The network always configures *si-WindowLength* to be shorter than or equal to the *si-Periodicity*. The values *s2560-v1710* and *s5120-v1710* are only applicable for SCS 480 kHz.
systemInformationAreaID Indicates the system information area that the cell belongs to, if any. Any SIB with *areaScope* within the SI is considered to belong to this *systemInformationAreaID*. The systemInformationAreaID is unique within a PLMN/SNPN.

***SchedulingInfo2* field descriptions**
encrypted The presence of this field indicates that the pos-sib-type is encrypted as specified in TS 37.355 [49].
gnss-id The presence of this field indicates that the positioning SIB type is for a specific GNSS. Indicates a specific GNSS (see also TS 37.355 [49])
posSibType The posSIBs as defined in TS 37.355 [49] mapped to SI for scheduling using *schedulingInfoList2*.
sbas-id The presence of this field indicates that the positioning SIB type is for a specific SBAS. Indicates a specific SBAS (see also TS 37.355 [49]).
si-WindowPosition This field indicates the SI window position of the associated SI-message. The network provides *si-WindowPosition* in an ascending order, i.e. *si-WindowPosition* in the subsequent entry in *schedulingInfoList2* has always value higher than in the previous entry of *schedulingInfoList2*. The network configures this field in a way that ensures that SI messages scheduled by *schedulingInfoList* and/or *posSchedulingInfoList* do not overlap with SI messages scheduled by *schedulingInfoList2*.
sib-MappingInfo Indicates which SIBs or posSIBs are contained in the SI message.
sibType The type of SIB(s) mapped to SI for scheduling using *schedulingInfoList2*. Value *type1* indicates SIBs and value *type2* indicates posSIBs.

Conditional presence	Explanation
GNSS-ID-SBAS	The field is mandatory present if *gnss-id* is set to *sbas*. It is absent otherwise.
MSG-1	The field is optionally present, Need R, if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* or any SI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise.
SIB-TYPE	The field is mandatory present if the SIB type is different from *SIB6*, *SIB7* or *SIB8*. For *SIB6*, *SIB7* and *SIB8* it is absent.
NonPosSIB	The field is mandatory present if the SIB type is *type1*. For *type2* it is absent.
SUL-MSG-1	The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfigCommonSIB* and if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* or any SI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise.
REDCAP-MSG-1	The field is optionally present, Need R, if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *si-BroadcastStatus* is set to *notBroadcasting* for any SI-message included in *schedulingInfoList* or any SI-message containing type1 SIB included in *schedulingInfoList2*. It is absent otherwise.

– *SK-Counter*

The IE *SK-Counter* is a counter used upon initial configuration of SN security for NR-DC and NE-DC, as well as upon refresh of S-K_{gNB} or S-K_{eNB} based on the current or newly derived K_{gNB} during RRC Resume or RRC Reconfiguration, as defined in TS 33.501 [11].

```
-- ASN1START
-- TAG-SKCOUNTER-START

SK-Counter ::=  INTEGER (0..65535)

-- TAG-SKCOUNTER-STOP
-- ASN1STOP
```

– *SlotFormatCombinationsPerCell*

The IE *SlotFormatCombinationsPerCell* is used to configure the SlotFormatCombinations applicable for one serving cell (see TS 38.213 [13], clause 11.1.1).

SlotFormatCombinationsPerCell information element

```
-- ASN1START
-- TAG-SLOTFORMATCOMBINATIONSPERCELL-START

SlotFormatCombinationsPerCell ::=   SEQUENCE {
    servingCellId                       ServCellIndex,
    subcarrierSpacing                   SubcarrierSpacing,
    subcarrierSpacing2                  SubcarrierSpacing                                                   OPTIONAL, -- Need R
    slotFormatCombinations              SEQUENCE (SIZE (1..maxNrofSlotFormatCombinationsPerSet)) OF SlotFormatCombination
                                                                                                            OPTIONAL, -- Need M
    positionInDCI                       INTEGER(0..maxSFI-DCI-PayloadSize-1)                                OPTIONAL, -- Need M
    ...,
    [[
    enableConfiguredUL-r16              ENUMERATED {enabled}                                                OPTIONAL  -- Need R
    ]]

}

SlotFormatCombination ::=           SEQUENCE {
    slotFormatCombinationId             SlotFormatCombinationId,
    slotFormats                         SEQUENCE (SIZE (1..maxNrofSlotFormatsPerCombination)) OF INTEGER (0..255)
}

SlotFormatCombinationId ::=         INTEGER (0..maxNrofSlotFormatCombinationsPerSet-1)

-- TAG-SLOTFORMATCOMBINATIONSPERCELL-STOP
-- ASN1STOP
```

***SlotFormatCombination* field descriptions**
slotFormatCombinationId This ID is used in the DCI payload to dynamically select this *SlotFormatCombination* (see TS 38.213 [13], clause 11.1.1).
slotFormats Slot formats that occur in consecutive slots in time domain order as listed here (see TS 38.213 [13], clause 11.1.1 and TS 38.213 [13], clause 14 for IAB-MT).

***SlotFormatCombinationsPerCell* field descriptions**
enableConfiguredUL If configured, the UE is allowed to transmit uplink signals/channels (SRS, PUCCH, CG-PUSCH) in the set of symbols of the slot when the UE does not detect a DCI format 2_0 providing a slot format for the set of symbols (see TS 38.213 [13], 11.1.1). This field is applicable only if *cg-RetransmissionTimer-r16* is configured.
positionInDCI The (starting) position (bit) of the slotFormatCombinationId (SFI-Index) for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.1.1).
servingCellId The ID of the serving cell for which the slotFormatCombinations are applicable.
slotFormatCombinations A list with *SlotFormatCombinations*. Each *SlotFormatCombination* comprises of one or more *SlotFormats* (see TS 38.211 [16], clause 4.3.2). The total number of *slotFormats* in the *slotFormatCombinations* list does not exceed 512.
subcarrierSpacing2 Reference subcarrier spacing for a Slot Format Combination on an FDD or SUL cell (see TS 38.213 [13], clause 11.1.1). For FDD, subcarrierSpacing (SFI-scs) is the reference SCS for DL BWP and subcarrierSpacing2 (SFI-scs2) is the reference SCS for UL BWP. For SUL, *subcarrierSpacing* (SFI-scs) is the reference SCS for non-SUL carrier and *subcarrierSpacing2* (SFI-scs2) is the reference SCS for SUL carrier. The network configures a value that is smaller than or equal to any SCS of configured BWPs of the serving cell that the command applies to. And the network configures a value that is smaller than or equal to the SCS of the serving cell which the UE monitors for SFI indications.
subcarrierSpacing Reference subcarrier spacing for this Slot Format Combination. The network configures a value that is smaller than or equal to any SCS of configured BWPs of the serving cell that the command applies to. And the network configures a value that is smaller than or equal to the SCS of the serving cell which the UE monitors for SFI indications (see TS 38.213 [13], clause 11.1.1).

– *SlotFormatIndicator*

The IE *SlotFormatIndicator* is used to configure monitoring a Group-Common-PDCCH for Slot-Format-Indicators (SFI).

***SlotFormatIndicator* information element**

```
-- ASN1START
-- TAG-SLOTFORMATINDICATOR-START

SlotFormatIndicator ::=     SEQUENCE {
    sfi-RNTI                    RNTI-Value,
    dci-PayloadSize             INTEGER (1..maxSFI-DCI-PayloadSize),
    slotFormatCombToAddModList  SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF SlotFormatCombinationsPerCell
                                                                                                    OPTIONAL, -- Need N
    slotFormatCombToReleaseList SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF ServCellIndex                 OPTIONAL, -- Need N
    ...,
    [[
    availableRB-SetsToAddModList-r16  SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF AvailableRB-SetsPerCell-r16   OPTIONAL, -- Need N
    availableRB-SetsToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF ServCellIndex                OPTIONAL, -- Need N
    switchTriggerToAddModList-r16     SEQUENCE (SIZE(1..4)) OF SearchSpaceSwitchTrigger-r16                             OPTIONAL, -- Need N
    switchTriggerToReleaseList-r16    SEQUENCE (SIZE(1..4)) OF ServCellIndex                                            OPTIONAL, -- Need N
    co-DurationsPerCellToAddModList-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF CO-DurationsPerCell-r16     OPTIONAL, -- Need N
    co-DurationsPerCellToReleaseList-r16 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF ServCellIndex             OPTIONAL  -- Need N
    ]],
    [[
    switchTriggerToAddModListSizeExt-r16   SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroupMinus4-r16)) OF
        SearchSpaceSwitchTrigger-r16  OPTIONAL, -- Need N
```

```
    switchTriggerToReleaseListSizeExt-r16  SEQUENCE (SIZE(1.. maxNrofAggregatedCellsPerCellGroupMinus4-r16)) OF
        ServCellIndex                OPTIONAL  -- Need N
    ]],
    [[
    co-DurationsPerCellToAddModList-r17 SEQUENCE (SIZE(1..maxNrofAggregatedCellsPerCellGroup)) OF CO-DurationsPerCell-r17 OPTIONAL  -- Need N
    ]]
}

CO-DurationsPerCell-r16 ::=   SEQUENCE {
    servingCellId-r16             ServCellIndex,
    positionInDCI-r16             INTEGER(0..maxSFI-DCI-PayloadSize-1),
    subcarrierSpacing-r16         SubcarrierSpacing,
    co-DurationList-r16           SEQUENCE (SIZE(1..64)) OF CO-Duration-r16
}

CO-DurationsPerCell-r17 ::=   SEQUENCE {
    servingCellId-r17             ServCellIndex,
    positionInDCI-r17             INTEGER(0..maxSFI-DCI-PayloadSize-1),
    subcarrierSpacing-r17         SubcarrierSpacing,
    co-DurationList-r17           SEQUENCE (SIZE(1..64)) OF CO-Duration-r17
}

CO-Duration-r16 ::=    INTEGER (0..1120)
CO-Duration-r17 ::=    INTEGER (0..4480)

AvailableRB-SetsPerCell-r16 ::=   SEQUENCE {
    servingCellId-r16                 ServCellIndex,
    positionInDCI-r16                 INTEGER(0..maxSFI-DCI-PayloadSize-1)
}

SearchSpaceSwitchTrigger-r16 ::=   SEQUENCE {
    servingCellId-r16                  ServCellIndex,
    positionInDCI-r16                  INTEGER(0..maxSFI-DCI-PayloadSize-1)
}

-- TAG-SLOTFORMATINDICATOR-STOP
-- ASN1STOP
```

***SlotFormatIndicator* field descriptions**
availableRB-SetsToAddModList A list of *AvailableRB-SetsPerCell* objects (see TS 38.213 [13], clause 11.1.1).
co-DurationsPerCellToAddModList A list of *CO-DurationsPerCell* objects. If not configured, the UE uses the slot format indicator (SFI), if available, to determine the channel occupancy duration (see TS 38.213 [13], clause 11.1.1).
co-DurationsPerCellToReleaseList A list of *CO-DurationsPerCell* objects to be released. An entry created using *co-DurationsPerCellToAddModList-r16* or *co-DurationsPerCellToAddModList-r17* can be deleted using *co-DurationsPerCellToReleaseList.*
dci-PayloadSize Total length of the DCI payload scrambled with SFI-RNTI (see TS 38.213 [13], clause 11.1.1).
sfi-RNTI RNTI used for SFI on the given cell (see TS 38.213 [13], clause 11.1.1).
slotFormatCombToAddModList A list of SlotFormatCombinations for the UE's serving cells (see TS 38.213 [13], clause 11.1.1).
switchTriggerToAddModList, switchTriggerToAddModListSizeExt A list of *SearchSpaceSwitchTrigger* objects. Each *SearchSpaceSwitchTrigger* object provides position in DCI of the bit field indicating search space switching flag for a serving cell or, if *cellGroupsForSwitchList* is configured, group of serving cells (see TS 38.213 [13], clause 10.4). If *cellGroupsForSwitchList* is configured, only one of the cells belonging to the same cell group is added/modified, and the configuration applies to all cells belonging to the *cellGroupsForSwitchList* (see TS 38.213 [13], clause 10.4). The network configures more than 4 *SearchSpaceSwitchTrigger* objects only if *cellGroupsForSwitchList* is not configured. The UE shall consider entries in *switchTriggerToAddModList* and in *switchTriggerToAddModListSizeExt* as a single list, i.e. an entry created using *switchTriggerToAddModList* can be modifed using *switchTriggerToAddModListSizeExt* and vice-versa.
switchTriggerToReleaseModList, switchTriggerToReleaseListSizeExt A list of *SearchSpaceSwitchTriggers* to be released. If *cellGroupsForSwitchList* is configured, the *SearchSpaceSwitchTrigger* is released for all serving cells belonging to the same *CellGroupForSwitch*. The UE shall consider entries in *switchTriggerToReleaseList* and in *switchTriggerToReleaseListSizeExt* as a single list, i.e. an entry created using *switchTriggerToAddModList* or *switchTriggerToAddModListSizeExt* can be deleted using *switchTriggerToReleaseList* or *switchTriggerToReleaseListSizeExt*.

***AvailableRB-SetsPerCell* field descriptions**
positionInDCI The (starting) position of the bits within DCI payload indicating the availability of the RB sets of a serving cell (see TS 38.213 [13], clause 11.1.1).
servingCellId The ID of the serving cell for which the configuration is applicable.

***CO-DurationsPerCell* field descriptions**
co-DurationList A list of Channel Occupancy duration in symbols. The maximum duration that can be configured for the following SCS: - 15 kHz: 280. - 30 kHz: 560. - 60 kHz: 1120. - 120 kHz: 560. - 480 kHz: 2240. - 960 kHz: 4480.
positionInDCI Position in DCI of the bit field indicating Channel Occupancy duration for UE's serving cells (see TS 38.213 [13], clause 11.1.1).
servingCellId The ID of the serving cell for which the configuration is applicable.
subcarrierSpacing Reference subcarrier spacing for the list of Channel Occupancy durations (see TS 38.213 [13], clause 11.1.1). Only the following values are applicable depending on the used frequency range: FR1: 15, 30, or 60 kHz FR2-2: 120, 480, or 960 kHz

***SearchSpaceSwitchTrigger* field descriptions**
positionInDCI The position of the bit within DCI payload containing a search space switching flag (see TS 38.213 [13], clause 11.1.1).
servingCellId The ID of the serving cell for which the configuration is applicable or the group of serving cells as indicated by *CellGroupsForSwitch-r16* containing this *servingCellId*.

– *S-NSSAI*

The IE *S-NSSAI (Single Network Slice Selection Assistance Information)* identifies a Network Slice end to end and comprises a slice/service type and a slice differentiator, see TS 23.003 [21].

***S-NSSAI* information element**

```
-- ASN1START
-- TAG-S-NSSAI-START

S-NSSAI  ::=                        CHOICE{
    sst                                 BIT STRING (SIZE (8)),
    sst-SD                              BIT STRING (SIZE (32))
}

-- TAG-S-NSSAI-STOP
-- ASN1STOP
```

***S-NSSAI* field descriptions**
sst
Indicates the S-NSSAI consisting of Slice/Service Type, see TS 23.003 [21].
sst-SD
Indicates the S-NSSAI consisting of Slice/Service Type and Slice Differentiator, see TS 23.003 [21].

– *SpeedStateScaleFactors*

The IE *SpeedStateScaleFactors* concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

SpeedStateScaleFactors information element

```
-- ASN1START
-- TAG-SPEEDSTATESCALEFACTORS-START

SpeedStateScaleFactors ::=          SEQUENCE {
    sf-Medium                           ENUMERATED {oDot25, oDot5, oDot75, lDot0},
    sf-High                             ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
-- TAG-SPEEDSTATESCALEFACTORS-STOP
-- ASN1STOP
```

***SpeedStateScaleFactors* field descriptions**
sf-High
The concerned mobility control related parameter is multiplied with this factor if the UE is in High Mobility state as defined in TS 38.304 [20]. Value *oDot25* corresponds to 0.25, value *oDot5* corresponds to 0.5, *oDot75* corresponds to 0.75 and so on.
sf-Medium
The concerned mobility control related parameter is multiplied with this factor if the UE is in Medium Mobility state as defined in TS 38.304 [20]. Value *oDot25* corresponds to 0.25, value *oDot5* corresponds to 0.5, value *oDot75* corresponds to 0.75, and so on.

– *SPS-Config*

The IE *SPS-Config* is used to configure downlink semi-persistent transmission. Multiple Downlink SPS configurations may be configured in one BWP of a serving cell.

SPS-Config information element

```
-- ASN1START
-- TAG-SPS-CONFIG-START

SPS-Config ::=                  SEQUENCE {
    periodicity                     ENUMERATED {ms10, ms20, ms32, ms40, ms64, ms80, ms128, ms160, ms320, ms640,
                                                spare6, spare5, spare4, spare3, spare2, spare1},
    nrofHARQ-Processes              INTEGER (1..8),
    n1PUCCH-AN                      PUCCH-ResourceId                                                    OPTIONAL,   -- Need M
```

```
    mcs-Table                       ENUMERATED {qam64LowSE}                                 OPTIONAL,   -- Need S
    ...,
    [[
    sps-ConfigIndex-r16             SPS-ConfigIndex-r16                                     OPTIONAL,   -- Cond SPS-List
    harq-ProcID-Offset-r16          INTEGER (0..15)                                         OPTIONAL,   -- Need R
    periodicityExt-r16              INTEGER (1..5120)                                       OPTIONAL,   -- Need R
    harq-CodebookID-r16             INTEGER (1..2)                                          OPTIONAL,   -- Need R
    pdsch-AggregationFactor-r16     ENUMERATED {n1, n2, n4, n8 }                            OPTIONAL    -- Need S
    ]],
    [[
    sps-HARQ-Deferral-r17           INTEGER (1..32)                                         OPTIONAL,   -- Need R
    n1PUCCH-AN-PUCCHsSCell-r17      PUCCH-ResourceId                                        OPTIONAL,   -- Need R
    periodicityExt-r17              INTEGER (1..40960)                                      OPTIONAL,   -- Need R
    nrofHARQ-Processes-v1710        INTEGER(9..32)                                          OPTIONAL,   -- Need R
    harq-ProcID-Offset-v1700        INTEGER (16..31)                                        OPTIONAL    -- Need R
    ]]
}

-- TAG-SPS-CONFIG-STOP
-- ASN1STOP
```

***SPS-Config* field descriptions**
harq-CodebookID Indicates the HARQ-ACK codebook index for the corresponding HARQ-ACK codebook for SPS PDSCH and ACK for SPS PDSCH release.
harq-ProcID-Offset Indicates the offset used in deriving the HARQ process IDs, see TS 38.321 [3], clause 5.3.1.
mcs-Table Indicates the MCS table the UE shall use for DL SPS (see TS 38.214 [19],clause 5.1.3.1. If present, the UE shall use the MCS table of low-SE 64QAM table indicated in Table 5.1.3.1-3 of TS 38.214 [19]. If this field is absent and field mcs-table in PDSCH-Config is set to 'qam256' and the activating DCI is of format 1_1, the UE applies the 256QAM table indicated in Table 5.1.3.1-2 of TS 38.214 [19]. If this field is absent and the field *mcs-Table-r17* in *PDSCH-Config* is set to 'qam1024' and the activating DCI is format 1_1, the UE applies the 1024QAM table indicated in Table 5.1.3.1-4 of TS 38.214 [19]. Otherwise, the UE applies the non-low-SE 64QAM table indicated in Table 5.1.3.1-1 of TS 38.214 [19].
n1PUCCH-AN HARQ resource for PUCCH for DL SPS. The network configures the resource either as format0 or format1. The actual *PUCCH-Resource* is configured in *PUCCH-Config* and referred to by its ID. See TS 38.213 [13], clause 9.2.3.
n1PUCCH-AN-PUCCHsSCell HARQ resource for PUCCH on PUCCH switching SCell (sSCell) for DL SPS. The network configures the resource either as format 0 or format 1. The actual PUCCH-Resource is configured in PUCCH-Config of the PUCCH sSCell and referred to by its ID. See TS 38.213 [13], clause 9.2.3.
nrofHARQ-Processes Number of configured HARQ processes for SPS DL (see TS 38.321 [3], clause 5.8.1). If UE is configured with *nrofHARQ-Processes-v1710* UE shall ignore *nrofHARQ-Processes (without suffix)*.
pdsch-AggregationFactor Number of repetitions for SPS PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent, the UE applies the value 1 for MBS multicast data and the *pdsch-AggregationFactor* in *pdsch-Config* for other data.
periodicity Periodicity for DL SPS (see TS 38.214 [19] and TS 38.321 [3], clause 5.8.1).
periodicityExt This field is used to calculate the periodicity for DL SPS (see TS 38.214 [19] and see TS 38.321 [3], clause 5.8.1). If this field is present, the field *periodicity* is ignored. The following periodicities are supported depending on the configured subcarrier spacing [ms]: 15 kHz: *periodicityExt*, where *periodicityExt* has a value between 1 and 640. 30 kHz: 0.5 x *periodicityExt*, where *periodicityExt* has a value between 1 and 1280. 60 kHz with normal CP. 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560. 60 kHz with ECP: 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560. 120 kHz: 0.125 x *periodicityExt*, where *periodicityExt* has a value between 1 and 5120. 480 kHz: 0.03125 x periodicityExt, where periodicityExt has a value between 1 and 20480. 960 kHz: 0.015625 x periodicityExt, where periodicityExt has a value between 1 and 40960. *periodicityExt-r17* is only applicable for SCS 480 kHz and 960 kHz.
sps-ConfigIndex Indicates the index of one of multiple SPS configurations.
sps-HARQ-Deferral Indicates the maximum number of slots or subslots the transmission of DL SPS HARQ-ACK in a slot or subslot can be deferred (see TS 38.213 [13], clause 9.2.5.4).

Conditional Presence	Explanation
SPS-List	The field is mandatory present when included in *sps-ConfigToAddModList-r16* or *sps-ConfigMulticastToAddModList-r17*, otherwise the field is absent.

– *SPS-ConfigIndex*

The IE *SPS-ConfigIndex* is used to indicate the index of one of multiple DL SPS configurations in one BWP.

SPS-ConfigIndex information element

```
-- ASN1START
-- TAG-SPS-CONFIGINDEX-START

SPS-ConfigIndex-r16             ::= INTEGER (0.. maxNrofSPS-Config-1-r16)

-- TAG-SPS-CONFIGINDEX-STOP
-- ASN1STOP
```

– *SPS-PUCCH-AN*

The IE *SPS-PUCCH-AN* is used to indicate a PUCCH resource for HARQ ACK and configure the corresponding maximum payload size for the PUCCH resource.

SPS-PUCCH-AN information element

```
-- ASN1START
-- TAG-SPS-PUCCH-AN-START

SPS-PUCCH-AN-r16  ::=           SEQUENCE {
    sps-PUCCH-AN-ResourceID-r16     PUCCH-ResourceId,
    maxPayloadSize-r16              INTEGER (4..256)                    OPTIONAL    -- Need R
}

-- TAG-SPS-PUCCH-AN-STOP
-- ASN1STOP
```

SPS-PUCCH-AN field descriptions
maxPayloadSize Indicates the maximum payload size for the corresponding PUCCH resource ID.
sps-PUCCH-AN-ResourceID Indicates the PUCCH resource ID

– *SPS-PUCCH-AN-List*

The IE *SPS-PUCCH-AN-List* is used to configure the list of PUCCH resources per HARQ ACK codebook

SPS-PUCCH-AN-List information element

```
-- ASN1START
```

```
-- TAG-SPS-PUCCH-AN-LIST-START

SPS-PUCCH-AN-List-r16 ::=      SEQUENCE (SIZE(1..4)) OF SPS-PUCCH-AN-r16

-- TAG-SPS-PUCCH-AN-LIST-STOP
-- ASN1STOP
```

– *SRB-Identity*

The IE SRB-Identity is used to identify a Signalling Radio Bearer (SRB) used by a UE.

SRB-Identity information element

```
-- ASN1START
-- TAG-SRB-IDENTITY-START

SRB-Identity ::=                    INTEGER (1..3)

SRB-Identity-v1700 ::=              INTEGER (4)

-- TAG-SRB-IDENTITY-STOP
-- ASN1STOP
```

– *SRS-CarrierSwitching*

The IE *SRS-CarrierSwitching* is used to configure for SRS carrier switching when PUSCH is not configured and independent SRS power control from that of PUSCH.

SRS-CarrierSwitching information element

```
-- ASN1START
-- TAG-SRS-CARRIERSWITCHING-START

SRS-CarrierSwitching ::=            SEQUENCE {
    srs-SwitchFromServCellIndex         INTEGER (0..31)                                         OPTIONAL,   -- Need M
    srs-SwitchFromCarrier               ENUMERATED {sUL, nUL},
    srs-TPC-PDCCH-Group                 CHOICE {
        typeA                               SEQUENCE (SIZE (1..32)) OF SRS-TPC-PDCCH-Config,
        typeB                               SRS-TPC-PDCCH-Config
    }                                                                                           OPTIONAL,   -- Need M
    monitoringCells                     SEQUENCE (SIZE (1..maxNrofServingCells)) OF ServCellIndex   OPTIONAL,   -- Need M
    ...
}

SRS-TPC-PDCCH-Config ::=            SEQUENCE {
    srs-CC-SetIndexlist                 SEQUENCE (SIZE(1..4)) OF SRS-CC-SetIndex                OPTIONAL    -- Need M
}
```

```
SRS-CC-SetIndex ::=                 SEQUENCE {
    cc-SetIndex                         INTEGER (0..3)                                  OPTIONAL,   -- Need M
    cc-IndexInOneCC-Set                 INTEGER (0..7)                                  OPTIONAL    -- Need M
}

-- TAG-SRS-CARRIERSWITCHING-STOP
-- ASN1STOP
```

***SRS-CC-SetIndex* field descriptions**
cc-IndexInOneCC-Set Indicates the CC index in one CC set for Type A (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network always includes this field when the *srs-TPC-PDCCH-Group* is set to *typeA.*
cc-SetIndex Indicates the CC set index for Type A associated (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network always includes this field when the *srs-TPC-PDCCH-Group* is set to *typeA.* The network does not configure this field to 3 in this release of specification.

***SRS-CarrierSwitching* field descriptions**
monitoringCells A set of serving cells for monitoring PDCCH conveying SRS DCI format with CRC scrambled by TPC-SRS-RNTI (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.3).
srs-SwitchFromServCellIndex Indicates the serving cell whose UL transmission may be interrupted during SRS transmission on a PUSCH-less SCell. During SRS transmission on a PUSCH-less SCell, the UE may temporarily suspend the UL transmission on a serving cell with PUSCH in the same CG to allow the PUSCH-less SCell to transmit SRS. (see TS 38.214 [19], clause 6.2.1.3).
srs-TPC-PDCCH-Group Network configures the UE with either typeA-SRS-TPC-PDCCH-Group or typeB-SRS-TPC-PDCCH-Group, if any.
typeA Type A trigger configuration for SRS transmission on a PUSCH-less SCell (see TS 38.213 [13], clause 11.4). In this release, the network configures at most one entry (the first entry) of *typeA*, and the first entry corresponds to the serving cell in which the *SRS-CarrierSwitching* field is configured. SRS carrier switching to SUL carrier is not supported in this version of the specification.
typeB Type B trigger configuration for SRS transmission on a PUSCH-less SCell (see TS 38.213 [13], clause 11.4).

***SRS-TPC-PDCCH-Config* field descriptions**
srs-CC-SetIndexlist A list of pairs of [cc-SetIndex; cc-IndexInOneCC-Set] (see TS 38.212 [17], TS 38.213 [13], clause 7.3.1, 11.4). The network does not configure this field for *typeB*.

– *SRS-Config*

The IE *SRS-Config* is used to configure sounding reference signal transmissions. The configuration defines a list of SRS-Resources, a list of SRS-PosResources, a list of SRS-PosResourceSets and a list of SRS-ResourceSets. Each resource set defines a set of SRS-Resources or SRS-PosResources. The network triggers the transmission of the set of SRS-Resources or SRS-PosResources using a configured aperiodicSRS-ResourceTrigger (L1 DCI). The network does not configure SRS specific power control parameters, *alpha* (without suffix), *p0* (without suffix) or *pathlossReferenceRS* if *unifiedTCI-StateType* is configured for the serving cell.

SRS-Config information element

```
-- ASN1START
-- TAG-SRS-CONFIG-START

SRS-Config ::=                          SEQUENCE {
    srs-ResourceSetToReleaseList            SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId        OPTIONAL,   -- Need N
    srs-ResourceSetToAddModList             SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet          OPTIONAL,   -- Need N
    srs-ResourceToReleaseList               SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-ResourceId              OPTIONAL,   -- Need N
    srs-ResourceToAddModList                SEQUENCE (SIZE(1..maxNrofSRS-Resources)) OF SRS-Resource                OPTIONAL,   -- Need N
    tpc-Accumulation                        ENUMERATED {disabled}                                                   OPTIONAL,   -- Need S
    ...,
    [[
    srs-RequestDCI-1-2-r16                  INTEGER (1..2)                                                          OPTIONAL, -- Need S
    srs-RequestDCI-0-2-r16                  INTEGER (1..2)                                                          OPTIONAL, -- Need S
    srs-ResourceSetToAddModListDCI-0-2-r16  SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSet         OPTIONAL, -- Need N
    srs-ResourceSetToReleaseListDCI-0-2-r16 SEQUENCE (SIZE(1..maxNrofSRS-ResourceSets)) OF SRS-ResourceSetId       OPTIONAL, -- Need N
    srs-PosResourceSetToReleaseList-r16     SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSetId-r16
                                                                                                                    OPTIONAL, -- Need N
    srs-PosResourceSetToAddModList-r16      SEQUENCE (SIZE(1..maxNrofSRS-PosResourceSets-r16)) OF SRS-PosResourceSet-r16       OPTIONAL,-- Need N
    srs-PosResourceToReleaseList-r16        SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResourceId-r16           OPTIONAL,-- Need N
    srs-PosResourceToAddModList-r16         SEQUENCE (SIZE(1..maxNrofSRS-PosResources-r16)) OF SRS-PosResource-r16             OPTIONAL -- Need N
    ]]
}

SRS-ResourceSet ::=                     SEQUENCE {
    srs-ResourceSetId                       SRS-ResourceSetId,
    srs-ResourceIdList                      SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-ResourceId    OPTIONAL, -- Cond Setup
    resourceType                            CHOICE {
        aperiodic                               SEQUENCE {
            aperiodicSRS-ResourceTrigger            INTEGER (1..maxNrofSRS-TriggerStates-1),
            csi-RS                                  NZP-CSI-RS-ResourceId                                   OPTIONAL, -- Cond NonCodebook
            slotOffset                              INTEGER (1..32)                                         OPTIONAL, -- Need S
            ...,
            [[
            aperiodicSRS-ResourceTriggerList            SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-2))
                                                            OF INTEGER (1..maxNrofSRS-TriggerStates-1)      OPTIONAL  -- Need M
            ]]
        },
        semi-persistent                         SEQUENCE {
            associatedCSI-RS                        NZP-CSI-RS-ResourceId                                   OPTIONAL, -- Cond NonCodebook
            ...
        },
        periodic                                SEQUENCE {
            associatedCSI-RS                        NZP-CSI-RS-ResourceId                                   OPTIONAL, -- Cond NonCodebook
            ...
        }
    },
    usage                                   ENUMERATED {beamManagement, codebook, nonCodebook, antennaSwitching},
    alpha                                   Alpha                                                           OPTIONAL, -- Need S
    p0                                      INTEGER (-202..24)                                              OPTIONAL, -- Cond Setup
    pathlossReferenceRS                     PathlossReferenceRS-Config                                      OPTIONAL, -- Need M
    srs-PowerControlAdjustmentStates        ENUMERATED { sameAsFci2, separateClosedLoop}                    OPTIONAL, -- Need S
    ...,
```

```
    [[
    pathlossReferenceRSList-r16             SetupRelease { PathlossReferenceRSList-r16}                 OPTIONAL  -- Need M
    ]],
    [[
    usagePDC-r17                            ENUMERATED {true}                                           OPTIONAL, -- Need R
    availableSlotOffsetList-r17             SEQUENCE (SIZE(1..4)) OF AvailableSlotOffset-r17            OPTIONAL, -- Need R
    followUnifiedTCI-StateSRS-r17           ENUMERATED {enabled}                                        OPTIONAL  -- Need R
    ]]
}

AvailableSlotOffset-r17 ::=   INTEGER (0..7)

PathlossReferenceRS-Config ::=              CHOICE {
    ssb-Index                                   SSB-Index,
    csi-RS-Index                                NZP-CSI-RS-ResourceId
}

PathlossReferenceRSList-r16 ::=             SEQUENCE (SIZE (1..maxNrofSRS-PathlossReferenceRS-r16)) OF PathlossReferenceRS-r16

PathlossReferenceRS-r16 ::=                 SEQUENCE {
    srs-PathlossReferenceRS-Id-r16              SRS-PathlossReferenceRS-Id-r16,
    pathlossReferenceRS-r16                     PathlossReferenceRS-Config
}

SRS-PathlossReferenceRS-Id-r16 ::=          INTEGER (0..maxNrofSRS-PathlossReferenceRS-1-r16)

SRS-PosResourceSet-r16 ::=                  SEQUENCE {
    srs-PosResourceSetId-r16                    SRS-PosResourceSetId-r16,
    srs-PosResourceIdList-r16                   SEQUENCE (SIZE(1..maxNrofSRS-ResourcesPerSet)) OF SRS-PosResourceId-r16
                                                                                                    OPTIONAL, -- Cond Setup
    resourceType-r16                            CHOICE {
        aperiodic-r16                               SEQUENCE {
            aperiodicSRS-ResourceTriggerList-r16        SEQUENCE (SIZE(1..maxNrofSRS-TriggerStates-1))
                                                            OF INTEGER (1..maxNrofSRS-TriggerStates-1)  OPTIONAL, -- Need M
            ...
        },
        semi-persistent-r16                         SEQUENCE {
            ...
        },
        periodic-r16                                SEQUENCE {
            ...
        }
    },
    alpha-r16                                   Alpha                                                   OPTIONAL, -- Need S
    p0-r16                                      INTEGER (-202..24)                                      OPTIONAL, -- Cond Setup
    pathlossReferenceRS-Pos-r16                 CHOICE {
        ssb-IndexServing-r16                        SSB-Index,
        ssb-Ncell-r16                               SSB-InfoNcell-r16,
        dl-PRS-r16                                  DL-PRS-Info-r16
    }                                                                                                   OPTIONAL, -- Need M
    ...
}

SRS-ResourceSetId ::=                   INTEGER (0..maxNrofSRS-ResourceSets-1)
```

```
SRS-PosResourceSetId-r16 ::=            INTEGER (0..maxNrofSRS-PosResourceSets-1-r16)

SRS-Resource ::=                        SEQUENCE {
    srs-ResourceId                          SRS-ResourceId,
    nrofSRS-Ports                           ENUMERATED {port1, ports2, ports4},
    ptrs-PortIndex                          ENUMERATED {n0, n1 }                                    OPTIONAL,   -- Need R
    transmissionComb                        CHOICE {
        n2                                      SEQUENCE {
            combOffset-n2                           INTEGER (0..1),
            cyclicShift-n2                          INTEGER (0..7)
        },
        n4                                      SEQUENCE {
            combOffset-n4                           INTEGER (0..3),
            cyclicShift-n4                          INTEGER (0..11)
        }
    },
    resourceMapping                         SEQUENCE {
        startPosition                           INTEGER (0..5),
        nrofSymbols                             ENUMERATED {n1, n2, n4},
        repetitionFactor                        ENUMERATED {n1, n2, n4}
    },
    freqDomainPosition                      INTEGER (0..67),
    freqDomainShift                         INTEGER (0..268),
    freqHopping                             SEQUENCE {
        c-SRS                                   INTEGER (0..63),
        b-SRS                                   INTEGER (0..3),
        b-hop                                   INTEGER (0..3)
    },
    groupOrSequenceHopping                  ENUMERATED { neither, groupHopping, sequenceHopping },
    resourceType                            CHOICE {
        aperiodic                               SEQUENCE {
            ...
        },
        semi-persistent                         SEQUENCE {
            periodicityAndOffset-sp                 SRS-PeriodicityAndOffset,
            ...
        },
        periodic                                SEQUENCE {
            periodicityAndOffset-p                  SRS-PeriodicityAndOffset,
            ...
        }
    },
    sequenceId                              INTEGER (0..1023),
    spatialRelationInfo                     SRS-SpatialRelationInfo                                 OPTIONAL,   -- Need R
    ...,
    [[
    resourceMapping-r16                     SEQUENCE {
        startPosition-r16                       INTEGER (0..13),
        nrofSymbols-r16                         ENUMERATED {n1, n2, n4},
        repetitionFactor-r16                    ENUMERATED {n1, n2, n4}
    }                                                                                               OPTIONAL    -- Need R
    ]],
    [[
```

```
    spatialRelationInfo-PDC-r17             SetupRelease { SpatialRelationInfo-PDC-r17 }                OPTIONAL,   -- Need M
    resourceMapping-r17                     SEQUENCE {
        startPosition-r17                       INTEGER (0..13),
        nrofSymbols-r17                         ENUMERATED {n1, n2, n4, n8, n10, n12, n14},
        repetitionFactor-r17                    ENUMERATED {n1, n2, n4, n5, n6, n7, n8, n10, n12, n14}
    }                                                                                                   OPTIONAL,   -- Need R
    partialFreqSounding-r17                 SEQUENCE {
        startRBIndexFScaling-r17                CHOICE{
            startRBIndexAndFreqScalingFactor2-r17   INTEGER (0..1),
            startRBIndexAndFreqScalingFactor4-r17   INTEGER (0..3)
        },
        enableStartRBHopping-r17                ENUMERATED {enable}                                     OPTIONAL    -- Need R
    }                                                                                                   OPTIONAL,   -- Need R
    transmissionComb-n8-r17                 SEQUENCE {
        combOffset-n8-r17                       INTEGER (0..7),
        cyclicShift-n8-r17                      INTEGER (0..5)
    }                                                                                                   OPTIONAL,   -- Need R
    srs-TCI-State-r17                       CHOICE {
        srs-UL-TCI-State                        TCI-UL-StateId-r17,
        srs-DLorJointTCI-State                  TCI-StateId
    }                                                                                                   OPTIONAL    -- Need R
    ]],
    [[
    repetitionFactor-v1730                  ENUMERATED {n3}                                             OPTIONAL,   -- Need R
    srs-DLorJointTCI-State-v1730            SEQUENCE {
        cellAndBWP-r17                          ServingCellAndBWP-Id-r17
    }                                                                                                   OPTIONAL -- Cond DLorJointTCI-SRS
    ]]
}

SRS-PosResource-r16::=                  SEQUENCE {
    srs-PosResourceId-r16                   SRS-PosResourceId-r16,
    transmissionComb-r16                    CHOICE {
        n2-r16                                  SEQUENCE {
            combOffset-n2-r16                       INTEGER (0..1),
            cyclicShift-n2-r16                      INTEGER (0..7)
        },
        n4-r16                                  SEQUENCE {
            combOffset-n4-r16                       INTEGER (0..3),
            cyclicShift-n4-r16                      INTEGER (0..11)
        },
        n8-r16                                  SEQUENCE {
            combOffset-n8-r16                       INTEGER (0..7),
            cyclicShift-n8-r16                      INTEGER (0..5)
        },
    ...
    },
    resourceMapping-r16                     SEQUENCE {
        startPosition-r16                       INTEGER (0..13),
        nrofSymbols-r16                         ENUMERATED {n1, n2, n4, n8, n12}
    },
    freqDomainShift-r16                     INTEGER (0..268),
    freqHopping-r16                         SEQUENCE {
        c-SRS-r16                               INTEGER (0..63),
```

```
        ...
    },
    groupOrSequenceHopping-r16              ENUMERATED { neither, groupHopping, sequenceHopping },
    resourceType-r16                        CHOICE {
        aperiodic-r16                           SEQUENCE {
            slotOffset-r16                          INTEGER (1..32)                                 OPTIONAL,   -- Need S
            ...
        },
        semi-persistent-r16                     SEQUENCE {
            periodicityAndOffset-sp-r16             SRS-PeriodicityAndOffset-r16,
            ...,
            [[
            periodicityAndOffset-sp-Ext-r16         SRS-PeriodicityAndOffsetExt-r16                 OPTIONAL    -- Need R
            ]]
        },
        periodic-r16                            SEQUENCE {
            periodicityAndOffset-p-r16              SRS-PeriodicityAndOffset-r16,
            ...,
            [[
            periodicityAndOffset-p-Ext-r16          SRS-PeriodicityAndOffsetExt-r16                 OPTIONAL    -- Need R
            ]]
        }
    },
    sequenceId-r16                          INTEGER (0..65535),
    spatialRelationInfoPos-r16              SRS-SpatialRelationInfoPos-r16                          OPTIONAL,   -- Need R
    ...
}

SRS-SpatialRelationInfo ::=     SEQUENCE {
    servingCellId                       ServCellIndex                                               OPTIONAL,   -- Need S
    referenceSignal                     CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId,
        srs                                 SEQUENCE {
            resourceId                          SRS-ResourceId,
            uplinkBWP                           BWP-Id
        }
    }
}

SRS-SpatialRelationInfoPos-r16 ::=      CHOICE {
    servingRS-r16                           SEQUENCE {
        servingCellId                           ServCellIndex                                       OPTIONAL,   -- Need S
        referenceSignal-r16                     CHOICE {
            ssb-IndexServing-r16                    SSB-Index,
            csi-RS-IndexServing-r16                 NZP-CSI-RS-ResourceId,
            srs-SpatialRelation-r16                 SEQUENCE {
                resourceSelection-r16                   CHOICE {
                    srs-ResourceId-r16                      SRS-ResourceId,
                    srs-PosResourceId-r16                   SRS-PosResourceId-r16
                },
                uplinkBWP-r16                           BWP-Id
            }
        }
```

```
    },
    ssb-Ncell-r16                       SSB-InfoNcell-r16,
    dl-PRS-r16                          DL-PRS-Info-r16
}

SSB-Configuration-r16  ::=          SEQUENCE {
    ssb-Freq-r16                     ARFCN-ValueNR,
    halfFrameIndex-r16                  ENUMERATED {zero, one},
    ssbSubcarrierSpacing-r16            SubcarrierSpacing,
    ssb-Periodicity-r16                 ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2,spare1 }   OPTIONAL, -- Need S
    sfn0-Offset-r16                     SEQUENCE {
        sfn-Offset-r16                      INTEGER (0..1023),
        integerSubframeOffset-r16           INTEGER (0..9)                                                  OPTIONAL  -- Need R
    }                                                                                                       OPTIONAL, -- Need R
    sfn-SSB-Offset-r16                  INTEGER (0..15),
    ss-PBCH-BlockPower-r16              INTEGER (-60..50)                                                   OPTIONAL  -- Cond Pathloss
}

SSB-InfoNcell-r16  ::=              SEQUENCE {
    physicalCellId-r16                  PhysCellId,
    ssb-IndexNcell-r16                  SSB-Index                                                           OPTIONAL, -- Need S
    ssb-Configuration-r16               SSB-Configuration-r16                                               OPTIONAL  -- Need S
}

DL-PRS-Info-r16  ::=                SEQUENCE {
    dl-PRS-ID-r16                      INTEGER (0..255),
    dl-PRS-ResourceSetId-r16           INTEGER (0..7),
    dl-PRS-ResourceId-r16              INTEGER (0..63)                                                     OPTIONAL  -- Need S
}

SRS-ResourceId ::=                      INTEGER (0..maxNrofSRS-Resources-1)
SRS-PosResourceId-r16 ::=               INTEGER (0..maxNrofSRS-PosResources-1-r16)

SRS-PeriodicityAndOffset ::=            CHOICE {
    sl1                                     NULL,
    sl2                                     INTEGER(0..1),
    sl4                                     INTEGER(0..3),
    sl5                                     INTEGER(0..4),
    sl8                                     INTEGER(0..7),
    sl10                                    INTEGER(0..9),
    sl16                                    INTEGER(0..15),
    sl20                                    INTEGER(0..19),
    sl32                                    INTEGER(0..31),
    sl40                                    INTEGER(0..39),
    sl64                                    INTEGER(0..63),
    sl80                                    INTEGER(0..79),
    sl160                                   INTEGER(0..159),
    sl320                                   INTEGER(0..319),
    sl640                                   INTEGER(0..639),
    sl1280                                  INTEGER(0..1279),
    sl2560                                  INTEGER(0..2559)
}

SRS-PeriodicityAndOffset-r16 ::=        CHOICE {
```

```
    sl1                                     NULL,
    sl2                                     INTEGER(0..1),
    sl4                                     INTEGER(0..3),
    sl5                                     INTEGER(0..4),
    sl8                                     INTEGER(0..7),
    sl10                                    INTEGER(0..9),
    sl16                                    INTEGER(0..15),
    sl20                                    INTEGER(0..19),
    sl32                                    INTEGER(0..31),
    sl40                                    INTEGER(0..39),
    sl64                                    INTEGER(0..63),
    sl80                                    INTEGER(0..79),
    sl160                                   INTEGER(0..159),
    sl320                                   INTEGER(0..319),
    sl640                                   INTEGER(0..639),
    sl1280                                  INTEGER(0..1279),
    sl2560                                  INTEGER(0..2559),
    sl5120                                  INTEGER(0..5119),
    sl10240                                 INTEGER(0..10239),
    sl40960                                 INTEGER(0..40959),
    sl81920                                 INTEGER(0..81919),
    ...
}

SRS-PeriodicityAndOffsetExt-r16 ::=     CHOICE {
    sl128                                   INTEGER(0..127),
    sl256                                   INTEGER(0..255),
    sl512                                   INTEGER(0..511),
    sl20480                                 INTEGER(0..20479)
}

SpatialRelationInfo-PDC-r17 ::=   SEQUENCE {
    referenceSignal                     CHOICE {
        ssb-Index                           SSB-Index,
        csi-RS-Index                        NZP-CSI-RS-ResourceId,
        dl-PRS-PDC                          NR-DL-PRS-ResourceID-r17,
        srs                                 SEQUENCE {
            resourceId                          SRS-ResourceId,
            uplinkBWP                           BWP-Id
        },
        ...
    },
    ...
}

-- TAG-SRS-CONFIG-STOP
-- ASN1STOP
```

***SRS-Config* field descriptions**
tpc-Accumulation If the field is absent, UE applies TPC commands via accumulation. If disabled, UE applies the TPC command without accumulation (this applies to SRS when a separate closed loop is configured for SRS) (see TS 38.213 [13], clause 7.3).

***SRS-Resource, SRS-PosResource* field descriptions**
cyclicShift-n2 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).
cyclicShift-n4 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).
cyclicShift-n8 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).
enableStartRBHopping When this RRC parameter is configured, start RB location hopping is enabled for partial frequency sounding in different SRS frequency hopping periods for periodic/semi-persistent/aperiodic SRS as described in Clause 6.4.1.4 in TS 38.211.
freqHopping Includes parameters capturing SRS frequency hopping (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, the network always configures this field such that *b-hop* > *b-SRS*.
groupOrSequenceHopping Parameter(s) for configuring group or sequence hopping (see TS 38.211 [16], clause 6.4.1.4.2). For CLI SRS-RSRP measurement, the network always configures this parameter to 'neither'.
nrofSRS-Ports Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'.
periodicityAndOffset-p, periodicityAndOffset-p-Ext Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, *sl1280* and *sl2560* cannot be configured. For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz. When *periodicityAndOffset-p-Ext* is present, *periodicityAndOffset-p* shall be ignored by the UE.
periodicityAndOffset-sp, periodicityAndOffset-sp-Ext Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value *sl1* corresponds to a periodicity of 1 slot, value *sl2* corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity *sl1* the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For *SRS-PosResource*, values *sl20480*, *sl40960* and *sl81920* cannot be configured for SCS=15kHz, values *sl40960* and *sl81920* cannot be configured for SCS=30kHz, and value *sl81920* cannot be configured for SCS=60kHz. When *periodicityAndOffset-sp-Ext* is present, *periodicityAndOffset-sp* shall be ignored by the UE.
ptrs-PortIndex The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding *PTRS-UplinkConfig* is set to CP-OFDM. The *ptrs-PortIndex* configured here must be smaller than the *maxNrofPorts* configured in the *PTRS-UplinkConfig* (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement.
resourceMapping OFDM symbol location of the SRS resource within a slot including *nrofSymbols* (number of OFDM symbols), *startPosition* (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and *repetitionFactor* (see TS 38.214 [19], clause 6.2.1 and TS 38.211 [16], clause 6.4.1.4). The configured SRS resource does not exceed the slot boundary. If *resourceMapping-r16* is signalled, UE shall ignore the *resourceMapping* (without suffix). If *resourceMapping-r17* is signalled, *resourceMapping-r16* is not signalled and the UE shall ignore the *resourceMapping* (without suffix) and only the values of nrofSymbols which are integer multiples of the configured repetitionFactor can be configured. The network can only signal *repetitionFactor-v1730* if *resourceMapping-r17* is signalled. When *repetitionFactor-v1730* is signalled, the UE shall ignore *repetitionFactor-r17*. For CLI SRS-RSRP measurement, the network always configures *nrofSymbols* and *repetitionFactor* to 'n1'.
resourceType Periodicity and offset for semi-persistent and periodic SRS resource, or slot offset for aperiodic SRS resource for positioning (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, only 'periodic' is applicable for *resourceType*.
sequenceId Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1).

spatialRelationInfo Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS (see TS 38.214 [19], clause 6.2.1). This parameter is not applicable to CLI SRS-RSRP measurement. This field is not configured if *unifiedTCI-StateType* is configured for the serving cell.
spatialRelationInfo-PDC Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS-PDC (see TS 38.214 [19], clause 6.2.1). The field is present in case of *resourceType=periodic* and *usagePDC-r17=true* in the *SRS-ResourceSet*, otherwise the field is absent.
spatialRelationInfoPos Configuration of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS/DL-PRS (see TS 38.214 [19], clause 6.2.1). If the IE *srs-ResourceId-Ext* is present, the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 63. Otherwise the IE *srs-ResourceId* in *spatialRelationInfoPos* represents the index from 0 to 31.
srs-RequestDCI-0-2 Indicate the number of bits for "SRS request"in DCI format 0_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 0_2 is applied. If the parameter *srs-RequestDCI-0-2* is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 [17] for triggered aperiodic SRS resource set. If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 [17]. When UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication.
srs-RequestDCI-1-2 Indicate the number of bits for "SRS request" in DCI format 1_2. When the field is absent, then the value of 0 bit for "SRS request" in DCI format 1_2 is applied. When the UE is configured with *supplementaryUplink*, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication (see TS 38.214 [19], clause 6.1.1.2).
srs-ResourceSetToAddModListDCI-0-2 List of SRS resource set to be added or modified for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).
srs-ResourceSetToReleaseListDCI-0-2 List of SRS resource set to be released for DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).
srs-TCI-State Configuration of either a UL TCI state or a joint TCI state for the SRS resource. In case of *UL TCI-State*, refers to the TCI state defined in *ul-TCI-StateList* in the *BWP-UplinkDedicated* where the *SRS-Config* is configured. In case of joint TCI state, refers to a TCI state defined in *dl-OrJointTCI-StateList* in *pdsch-Config* of the *BWP-DownlinkDedicated* and serving cell indicated by *cellAndBWP*. This field is absent when the SRS resource is in an *SRS-ResourceSet* configured with *followUnifiedTCI-StateSRS-r17* or when the field *unifiedTCI-StateType* is not configured to the serving cell which the SRS resource is located in.
startRBIndexAndFreqScalingFactor Configures the UE with the startRBIndex and freqScalingFactor for partial frequency sounding as described in Clause 6.4.1.4 in TS 38.211. The startRBIndexForFScaling2 gives the startRBIndex when freqScalingFactor is 2 and the startRBIndexForFScaling4 gives the startRBIndex when FreqScalingFactor is 4
transmissionComb, transmissionComb-n8 Comb value (2 or 4 or 8) and comb offset (0..combValue-1) (see TS 38.214 [19], clause 6.2.1). If network configures field *transmissionComb-n8*, the UE ignores *transmissionComb.*

***SRS-ResourceSet, SRS-PosResourceSet* field descriptions**
alpha alpha value for SRS power control (see TS 38.213 [13], clause 7.3). When the field is absent the UE applies the value 1.
aperiodicSRS-ResourceTriggerList An additional list of DCI "code points" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6). When the field is not included during a reconfiguration of *SRS-ResourceSet* of *resourceType* set to *aperiodic*, UE maintains this value based on the Need M; that is, this list is not considered as an extension of *aperiodicSRS-ResourceTrigger* for purpose of applying the general rule for extended list in clause 6.1.3.
aperiodicSRS-ResourceTrigger The DCI "code point" upon which the UE shall transmit SRS according to this SRS resource set configuration (see TS 38.214 [19], clause 6).
associatedCSI-RS ID of CSI-RS resource associated with this SRS resource set in non-codebook based operation (see TS 38.214 [19], clause 6.1.1.2).
availableSlotOffsetList Indicates a list of up to four different available slot offset values from slot n+k to the slot where the aperiodic SRS resource set is transmitted, where slot n is the slot with the triggering DCI, and k is the *slotOffset* (without suffix) as described in clause 6.2.1 of TS 38.214 [19].
csi-RS ID of CSI-RS resource associated with this SRS resource set (see TS 38.214 [19], clause 6.1.1.2).
dl-PRS This field indicates a PRS configuration.
followUnifiedTCI-StateSRS When set to enabled, for SRS resource Set, the UE applies the "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. This parameter may be configured for aperiodic SRS for BM or SRS of any time-domain behavior for codebook, non-codebook, and antenna switching.
p0 P0 value for SRS power control. The value is in dBm. Only even values (step size 2) are allowed (see TS 38.213 [13], clause 7.3).
pathlossReferenceRS A reference signal (e.g. a CSI-RS config or a SS block) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3).
pathlossReferenceRS-Pos A reference signal (e.g. a SS block or a DL-PRS config) to be used for SRS path loss estimation (see TS 38.213 [13], clause 7.3).
pathlossReferenceRSList Multiple candidate pathloss reference RS(s) for SRS power control, where one candidate RS can be mapped to SRS Resource Set via MAC CE (clause 6.1.3.27 in TS 38.321 [3]). The network can only configure this field if *pathlossReferenceRS* is not configured in the same *SRS-ResourceSet*.
resourceType Time domain behavior of SRS resource configuration, see TS 38.214 [19], clause 6.2.1. The network configures SRS resources in the same resource set with the same time domain behavior on periodic, aperiodic and semi-persistent SRS. The aperiodic SRS is not applicable for the UE in RRC_INACTIVE.
slotOffset An offset in number of slots between the triggering DCI and the actual transmission of this *SRS-ResourceSet*. If the field is absent the UE applies no offset (value 0).
srs-PowerControlAdjustmentStates Indicates whether hsrs,c(i) = fc(i,1) or hsrs,c(i) = fc(i,2) (if twoPUSCH-PC-AdjustmentStates are configured) or separate close loop is configured for SRS. This parameter is applicable only for Uls on which UE also transmits PUSCH. If absent or release, the UE applies the value sameAs-Fci1 (see TS 38.213 [13], clause 7.3).
srs-ResourceIdList, srs-PosResourceIdList The IDs of the SRS-Resources/SRS-PosResource used in this *SRS-ResourceSet/SRS-PosResourceSet*. If this *SRS-ResourceSet* is configured with usage set to codebook, the *srs-ResourceIdList* contains at most 2 entries. If this *SRS-ResourceSet* is configured with *usage* set to *nonCodebook*, the *srs-ResourceIdList* contains at most 4 entries.
srs-ResourceSetId, srs-PosResourceSetId The ID of this resource set. It is unique in the context of the BWP in which the parent *SRS-Config* is defined.
ssb-IndexServing Indicates SSB index belonging to a serving cell where the SRS is configured.

ssb-NcellI This field indicates a SSB configuration from neighboring cell.
usage Indicates if the SRS resource set is used for beam management, codebook based or non-codebook based transmission or antenna switching. See TS 38.214 [19], clause 6.2.1. Reconfiguration between codebook based and non-codebook based transmission is not supported.
usagePDC If configured, it indicates that this SRS resource set is used for propagation delay compensation. The field can be present in only one *SRS-ResourceSet*.

***SRS-SpatialRelationInfoPos* field descriptions**
csi-RS-IndexServing Indicates CSI-RS index belonging to a serving cell.
dl-PRS This field indicates a PRS configuration.
resourceSelection Indicates whether the configured SRS spatial relation resource is a *SRS-Resource* or *SRS-PosResource*.
servingCellId The serving Cell ID of the source SSB, CSI-RS, or SRS for the spatial relation of the target SRS resource. If this field is absent the SSB, the CSI-RS, or the SRS is from the same serving cell where the SRS is configured.
ssb-IndexServing Indicates SSB index belonging to a serving cell.
ssb-NcellI This field indicates a SSB configuration from neighboring cell.

***SSB-InfoNCell* field descriptions**
physicalCellId This field specifies the physical cell ID of the neighbour cell for which SSB configuration is provided.
ssb-IndexNcell This field specifies the index of the SSB for a neighbour cell. See TS 38.213 [13]. If this field is absent, the UE determines the *ssb-IndexNcell* of the *physicalCellId* based on its SSB measurement from the cell.
ssb-Configuration This field specifies the full configuration of the SSB. If this field is absent, the UE obtains the configuration for the SSB from *nr-SSB-Config* received as part of DL-PRS assistance data in LPP, see TS 37.355 [49], by looking up the corresponding SSB configuration using the field *physicalCellId*.

***DL-PRS-Info* field descriptions**
dl-PRS-ID This field specifies the UE specific TRP ID (see TS 37.355 [49]) for which PRS configuration is provided.
dl-PRS-ResourceSetId This field specifies the PRS-ResourceSet ID of a PRS resourceSet.
dl-PRS-ResourceId This field specifies the PRS-Resource ID of a PRS resource. If this field is absent, the UE determines the *dl-PRS-ResourceID* based on its PRS measurement from the TRP (see TS 37.355 [49]) and DL-PRS Resource Set.

***SSB-Configuration* field descriptions**
halfFrameIndex Indicates whether SSB is in the first half or the second half of the frame. Value zero indicates the first half and value 1 indicates the second half.
integerSubframeOffset Indicates the subframe boundary offset of the cell in which SSB is transmited.
sfn0-Offset Indiactes the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell.
sfn-Offset Specifies the SFN offset between the cell in which SSB is transmited and serving cell. The offset corresponds to the number of full radio frames counted from the beginning of a radio frame #0 of serving cell to the beginning of the closest subsequent radio frame #0 of the cell in which SSB is transmitted.
sfn-SSB-Offset Indicates the SFN offset of the transmitted SSB relative to the start of the SSB period. Value 0 indicates that the SSB is transmitted in the first system frame, value 1 indicates that SSB is transmitted in the second system frame and so on. The network configures this field according to the field *ssb-Periodicity* such that the indicated system frame does not exceed the configured SSB periodicity.
ssb-Freq Indicates the frequency of the SSB.
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-Periodicity Indicates the periodicity of the SSB. If the field is absent, the UE applies the value ms5. (see TS 38.213 [13], clause 4.1)
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

Conditional Presence	Explanation
Setup	This field is mandatory present upon configuration of *SRS-ResourceSet* or *SRS-Resource* and optionally present, Need M, otherwise.
NonCodebook	This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent.
Pathloss	The field is mandatory present if the IE *SSB-InfoNcell* is included in *pathlossReferenceRS-Pos*; otherwise it is optionally present, Need R
DLorJointTCI-SRS	The field is mandatory present if srs-DLorJointTCI-State is configured, otherwise it is absent Need R.

– *SRS-RSRP-Range*

The IE *SRS-RSRP-Range* specifies the value range used in SRS-RSRP measurements and thresholds. The integer value for SRS-RSRP measurements is according to Table 10.1.22.1.2-1 in TS 38.133 [14]. For thresholds, the actual value is (IE value –140) dBm, except for the IE value 98, in which case the actual value is infinity.

***SRS-RSRP-Range* information element**

```
-- ASN1START
-- TAG-SRS-RSRP-RANGE-START
```

```
SRS-RSRP-Range-r16 ::=                  INTEGER(0..98)

-- TAG-SRS-RSRP-RANGE-STOP
-- ASN1STOP
```

– SRS-TPC-CommandConfig

The IE *SRS-TPC-CommandConfig* is used to configure the UE for extracting TPC commands for SRS from a group-TPC messages on DCI

SRS-TPC-CommandConfig information element

```
-- ASN1START
-- TAG-SRS-TPC-COMMANDCONFIG-START

SRS-TPC-CommandConfig ::=               SEQUENCE {
    startingBitOfFormat2-3                  INTEGER (1..31)                                 OPTIONAL,   -- Need R
    fieldTypeFormat2-3                      INTEGER (0..1)                                  OPTIONAL,   -- Need R
    ...,
    [[
    startingBitOfFormat2-3SUL               INTEGER (1..31)                                 OPTIONAL    -- Need R
    ]]
}

-- TAG-SRS-TPC-COMMANDCONFIG-STOP
-- ASN1STOP
```

SRS-TPC-CommandConfig field descriptions
fieldTypeFormat2-3   The type of a field within the group DCI with SRS request fields (optional), which indicates how many bits in the field are for SRS request (0 or 2).   Note that for Type A, there is a common SRS request field for all SCells in the set, but each SCell has its own TPC command bits. See TS 38.212 [17] clause 7.3.1 and , TS 38.213 [13], clause 11.3.
startingBitOfFormat2-3   The starting bit position of a block within the group DCI with SRS request fields (optional) and TPC commands. The value 1 of the field corresponds to the first/left most bit of format2-3. The value 2 of the field corresponds to the second bit format2-3, and so on (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11.3).
startingBitOfFormat2-3SUL   The starting bit position of a block within the group DCI with SRS request fields (optional) and TPC commands for SUL carrier (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11.3).

– SSB-Index

The IE *SSB-Index* identifies an SS-Block within an SS-Burst. See TS 38.213 [13], clause 4.1.

SSB-Index information element

```
-- ASN1START
-- TAG-SSB-INDEX-START

SSB-Index ::=                       INTEGER (0..maxNrofSSBs-1)

-- TAG-SSB-INDEX-STOP
-- ASN1STOP
```

– SSB-MTC

The IE *SSB-MTC* is used to configure measurement timing configurations, i.e., timing occasions at which the UE measures SSBs.

SSB-MTC information element

```
-- ASN1START
-- TAG-SSB-MTC-START

SSB-MTC ::=                             SEQUENCE {
    periodicityAndOffset                    CHOICE {
        sf5                                 INTEGER (0..4),
        sf10                                    INTEGER (0..9),
        sf20                                    INTEGER (0..19),
        sf40                                    INTEGER (0..39),
        sf80                                    INTEGER (0..79),
        sf160                                   INTEGER (0..159)
    },
    duration                                ENUMERATED { sf1, sf2, sf3, sf4, sf5 }
}

SSB-MTC2 ::=                        SEQUENCE {
    pci-List                            SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId                   OPTIONAL,   -- Need M
    periodicity                         ENUMERATED {sf5, sf10, sf20, sf40, sf80, spare3, spare2, spare1}
}

SSB-MTC2-LP-r16 ::=                 SEQUENCE {
    pci-List                            SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId                   OPTIONAL,   -- Need R
    periodicity                         ENUMERATED {sf10, sf20, sf40, sf80, sf160, spare3, spare2, spare1}
}

SSB-MTC3-r16 ::=                    SEQUENCE {
    periodicityAndOffset-r16            CHOICE {
        sf5-r16                                 INTEGER (0..4),
        sf10-r16                                INTEGER (0..9),
        sf20-r16                                INTEGER (0..19),
        sf40-r16                                INTEGER (0..39),
        sf80-r16                                INTEGER (0..79),
        sf160-r16                               INTEGER (0..159),
        sf320-r16                               INTEGER (0..319),
        sf640-r16                               INTEGER (0..639),
```

```
        sf1280-r16                              INTEGER (0..1279)
    },
    duration-r16                        ENUMERATED {sf1, sf2, sf3, sf4, sf5},
    pci-List-r16                        SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId                   OPTIONAL,   -- Need M
    ssb-ToMeasure-r16                   SetupRelease { SSB-ToMeasure }                                          OPTIONAL    -- Need M
}

SSB-MTC4-r17 ::=            SEQUENCE {
    pci-List-r17                SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId                           OPTIONAL,   -- Need M
    offset-r17                  INTEGER (0..159)
}

SSB-MTC-AdditionalPCI-r17 ::=       SEQUENCE {
    additionalPCIIndex-r17              AdditionalPCIIndex-r17,
    additionalPCI-r17                   PhysCellId,
    periodicity-r17                     ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 },
    ssb-PositionsInBurst-r17            CHOICE {
        shortBitmap                         BIT STRING (SIZE (4)),
        mediumBitmap                        BIT STRING (SIZE (8)),
        longBitmap                          BIT STRING (SIZE (64))
    },
    ss-PBCH-BlockPower-r17              INTEGER (-60..50)
}

AdditionalPCIIndex-r17  ::=  INTEGER(1..maxNrofAdditionalPCI-r17)

-- TAG-SSB-MTC-STOP
-- ASN1STOP
```

***SSB-MTC* field descriptions**
duration
Duration of the measurement window in which to receive SS/PBCH blocks. It is given in number of subframes (see TS 38.213 [13], clause 4.1).
periodicityAndOffset
Periodicity and offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Periodicity and offset are given in number of subframes.

***SSB-MTC2* field descriptions**
pci-List
PCIs that follow this SMTC.

***SSB-MTC3* field descriptions**
duration Duration of the measurement window in which to receive SS/PBCH blocks. It is given in number of subframes (see TS 38.213 [13], clause 4.1).
pci-List PCIs that follow this SMTC, used for IAB-node discovery.
periodicityAndOffset Periodicity and offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Periodicity and offset are given in number of subframes.
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration. The first/leftmost bit corresponds to SS block index 0, the second bit corresponds to SS block index 1, and so on. Value 0 in the bitmap indicates that the corresponding SS block is not to be measured while value 1 indicates that the corresponding SS block is to be measured (see TS 38.215 [9]). When the field is not configured the IAB-MT measures on all SS blocks. Regardless of the value of this field, SS blocks outside of the applicable *smtc* are not to be measured. See TS 38.215 [9] clause 5.1.1.

***SSB-MTC4* field descriptions**
pci-List PCIs that follow this SMTC.
offset Offset of the measurement window in which to receive SS/PBCH blocks, see 5.5.2.10. Offset is given in number of subframes.

***SSB-MTC-AdditionalPCI* field descriptions**
additionalPCI PCI of the additional SSB different from serving cell PCI.
periodicity Periodicity of the SS/PBCH blocks, see 5.5.2.10. Periodicity is given in number of subframes.
ssb-PositionsInBurst 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.
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-PositionQCL-Relation*

The IE *SSB-PositionQCL-Relation* is used to indicate the QCL relationship between SSB positions on the frequency indicated by *ssbFrequency* (see TS 38.213 [13], clause 4.1) for operation with shared spectrum channel access. Value n1 corresponds to 1, value n2 corresponds to 2 and so on.

***SSB-PositionQCL-Relation* information element**

```
-- ASN1START
-- TAG-SSB-POSITIONQCL-RELATION-START

SSB-PositionQCL-Relation-r16 ::=  ENUMERATED {n1,n2,n4,n8}
```

```
SSB-PositionQCL-Relation-r17 ::=  ENUMERATED {n32, n64}

-- TAG-SSB-POSITIONQCL-RELATION-STOP
-- ASN1STOP
```

– SSB-ToMeasure

The IE *SSB-ToMeasure* is used to configure a pattern of SSBs. For operation with shared spectrum channel access in FR1, only *mediumBitmap* is used, and for FR2-2, *longBitmap* is used.

SSB-ToMeasure information element

```
-- ASN1START
-- TAG-SSB-TOMEASURE-START

SSB-ToMeasure ::=                 CHOICE {
    shortBitmap                       BIT STRING (SIZE (4)),
    mediumBitmap                      BIT STRING (SIZE (8)),
    longBitmap                        BIT STRING (SIZE (64))
}

-- TAG-SSB-TOMEASURE-STOP
-- ASN1STOP
```

***SSB-ToMeasure* field descriptions**
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. For operation with shared spectrum channel access in FR2-2, if the k-th bit is set to 1, the UE assumes that one or more SS/PBCH blocks within the SMTC measurement duration with candidate SS/PBCH block indexes corresponding to SS/PBCH block index equal to (k– 1) may be transmitted; if the k-th bit is set to 0, the UE assumes that the corresponding SS/PBCH block(s) are not transmitted.
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. For operation with shared spectrum channel access, if the k-th bit is set to 1, the UE assumes that one or more SS/PBCH blocks within the SMTC measurement duration 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-Common* and the number of actually transmitted SS/PBCH blocks is not larger than the number of 1's in the bitmap. If *ssb-PositionQCL* is configured with a value smaller than *ssb-PositionQCL-Common*, only the leftmost K bits (K = *ssb-PositionQCL*) are applicable for the corresponding cell.
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-RSSI-Measurement

The IE *SS-RSSI-Measurement* is used to configure RSSI measurements based on synchronization reference signals.

SS-RSSI-Measurement information element

```
-- ASN1START
-- TAG-SS-RSSI-MEASUREMENT-START

SS-RSSI-Measurement ::=             SEQUENCE {
    measurementSlots                    BIT STRING (SIZE (1..80)),
    endSymbol                           INTEGER(0..3)
}

-- TAG-SS-RSSI-MEASUREMENT-STOP
-- ASN1STOP
```

SS-RSSI-Measurement field descriptions
endSymbol Within a slot that is configured for RSSI measurements (see *measurementSlots*) the UE measures the RSSI from symbol 0 to symbol *endSymbol*. This field identifies the entry in Table 5.1.3-1 in TS 38.215 [9], which determines the actual end symbol.
measurementSlots Indicates the slots in which the UE can perform RSSI measurements. The length of the BIT STRING is equal to the number of slots in the configured SMTC window (determined by the duration and by the subcarrierSpacing). The first (left-most / most significant) bit in the bitmap corresponds to the first slot in the SMTC window, the second bit in the bitmap corresponds to the second slot in the SMTC window, and so on. The UE measures in slots for which the corresponding bit in the bitmap is set to 1. In case this field is configured for a SCell with *ca-SlotOffset-r16*, the bits in the bitmap corresponds to the slots that are fully contained in the SMTC window.

– *SubcarrierSpacing*

The IE *SubcarrierSpacing* determines the subcarrier spacing. Restrictions applicable for certain frequencies, channels or signals are clarified in the fields that use this IE.

SubcarrierSpacing information element

```
-- ASN1START
-- TAG-SUBCARRIERSPACING-START

SubcarrierSpacing ::=               ENUMERATED {kHz15, kHz30, kHz60, kHz120, kHz240, kHz480-v1700, kHz960-v1700, spare1}

-- TAG-SUBCARRIERSPACING-STOP
-- ASN1STOP
```

– *TAG-Config*

The IE *TAG-Config* is used to configure parameters for a time-alignment group.

TAG-Config information element

```
-- ASN1START
-- TAG-TAG-CONFIG-START
```

```
TAG-Config ::=                      SEQUENCE {
    tag-ToReleaseList                   SEQUENCE (SIZE (1..maxNrofTAGs)) OF TAG-Id                  OPTIONAL,   -- Need N
    tag-ToAddModList                    SEQUENCE (SIZE (1..maxNrofTAGs)) OF TAG                     OPTIONAL    -- Need N
}

TAG ::=                             SEQUENCE {
    tag-Id                              TAG-Id,
    timeAlignmentTimer                  TimeAlignmentTimer,
    ...
}

TAG-Id ::=                          INTEGER (0..maxNrofTAGs-1)

-- TAG-TAG-CONFIG-STOP
-- ASN1STOP
```

***TAG* field descriptions**
tag-Id Indicates the TAG of the SpCell or an SCell, see TS 38.321 [3]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG).
timeAlignmentTimer The *timeAlignmentTimer* for TAG with ID *tag-Id*, as specified in TS 38.321 [3].

– *TAR-Config*

The IE *TAR-Config* is used to configure Timing Advance reporting in non-terrestrial networks.

TAR-Config information element

```
-- ASN1START
-- TAG-TAR-CONFIG-START

TAR-Config-r17 ::=                  SEQUENCE {
    offsetThresholdTA-r17               ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5, ms6 ,ms7, ms8, ms9, ms10, ms11, ms12,
                                                    ms13, ms14, ms15, spare13, spare12, spare11, spare10, spare9, spare8, spare7,
                                                    spare6, spare5, spare4, spare3, spare2, spare1}         OPTIONAL,   -- Need R
    timingAdvanceSR-r17                 ENUMERATED {enabled}                                            OPTIONAL,   -- Need R
    ...
}

-- TAG-TAR-CONFIG-STOP
-- ASN1STOP
```

TAR-Config field descriptions
offsetThresholdTA
Offset for TA reporting as specified in TS 38.321 [3]. Network only configures this parameter for MCG.
timingAdvanceSR
Used to configure whether a Timing Advance report may trigger a Scheduling Request as specified in TS 38.321 [3].

– *TCI-ActivatedConfig*

The IE *TCI-ActivatedConfig* is used to provide activated TCI states for PDSCH and/or PDCCH of the PSCell or of an SCell.

TCI-ActivatedConfig information element

```
-- ASN1START
-- TAG-TCI-ACTIVATEDCONFIG-START

TCI-ActivatedConfig-r17 ::= SEQUENCE {
    pdcch-TCI-r17               SEQUENCE (SIZE (1..5)) OF TCI-StateId,
    pdsch-TCI-r17               BIT STRING (SIZE (1..maxNrofTCI-States))
}

-- TAG-TCI-ACTIVATEDCONFIG-STOP
-- ASN1STOP
```

TCI-ActivatedConfig field descriptions
pdcch-TCI
Indicates the TCI state for PDCCH for each configured CORESET of the DL BWP to be activated at SCell activation, to be activated for the PSCell at SCG activation and/or to be used for BFD, RLM and measurements while the SCG is deactivated. The list includes exactly as many entries as CORESETs configured in this BWP, ordered by increasing values of *ControlResourceSet-Id*, i.e. the first entry indicates the TCI state for the configured CORESET with the lowest *ControlResourceset-Id value*, the second value indicates the TCI states for the configured CORESET with the second lowest *ControlResourceset-Id* value, and so on.
pdsch-TCI
Indicates TCI states for PDSCH reception at SCell addition/activation or of the PSCell at SCG activation. This field indicates activated TCI state(s) for this BWP ordered by increasing values of *TCI-StateId*, i.e. the first bit indicates the activation state of the TCI state with the lowest *TCI-StateId* value, the second value indicates the activation status of the TCI state with the second lowest *TCI-State-Id* value, and so on. A bit set to 0 indicates that the corresponding TCI state is deactivated, a bit set to 1 indicates that the TCI state is activated.

– *TCI-State*

The IE *TCI-State* associates one or two DL reference signals with a corresponding quasi-colocation (QCL) type.

TCI-State information element

```
-- ASN1START
-- TAG-TCI-STATE-START
```

```
TCI-State ::=                       SEQUENCE {
    tci-StateId                         TCI-StateId,
    qcl-Type1                           QCL-Info,
    qcl-Type2                           QCL-Info                                        OPTIONAL,   -- Need R
    ...,
    [[
    additionalPCI-r17                   AdditionalPCIIndex-r17                          OPTIONAL,   -- Need R
    pathlossReferenceRS-Id-r17          PathlossReferenceRS-Id-r17                      OPTIONAL,   -- Cond JointTCI1
    ul-powerControl-r17                 Uplink-powerControlId-r17                       OPTIONAL    -- Cond JointTCI
    ]]

}

QCL-Info ::=                        SEQUENCE {
    cell                                ServCellIndex                                   OPTIONAL,   -- Need R
    bwp-Id                              BWP-Id                                          OPTIONAL, -- Cond CSI-RS-Indicated
    referenceSignal                     CHOICE {
        csi-rs                              NZP-CSI-RS-ResourceId,
        ssb                                 SSB-Index
    },
    qcl-Type                            ENUMERATED {typeA, typeB, typeC, typeD},
    ...
}

-- TAG-TCI-STATE-STOP
-- ASN1STOP
```

***QCL-Info* field descriptions**
bwp-Id The DL BWP which the RS is located in. If the field is absent, the RS is located in the DL BWP in which the *TCI-State* is applied by the UE.
cell The UE's serving cell in which the *referenceSignal* is configured. If the field is absent, the *referenceSignal* is configured in the serving cell in which the *TCI-State* is applied by the UE. The RS can be located on a serving cell other than the serving cell for which the *TCI-State* is applied by the UE only if the *qcl-Type* is configured as *typeC* or *typeD*. If the *referenceSignal* is set to *csi-rs* and *unifiedTCI-StateType* is configured, either both *cell* and *bwp-Id* are present or both *cell* and *bwp-Id* are absent. See TS 38.214 [19] clause 5.1.5.
referenceSignal Reference signal with which quasi-collocation information is provided as specified in TS 38.214 [19] clause 5.1.5.
qcl-Type QCL type as specified in TS 38.214 [19] clause 5.1.5.

***TCI-State* field descriptions**
additionalPCI   Indicates the physical cell IDs (PCI) of the SSBs when *referenceSignal* is configured as SSB for both QCL-Type1 and QCL-Type2. In case the c*ell* is present, the *additionalPCI* refers to a PCI value configured in the list configured using *additionalPCI-ToAddModList* in the serving cell indicated by the field c*ell*. Otherwise, it refers to a PCI value configured in a list *additionalPCI-ToAddModList* configured in the serving cell where the *TCI-State* is applied by the UE. When this field is present the *cell* for *qcl-Type1* and *qcl-Type2* is configured with same value, if present.
pathlossReferenceRS-Id   The ID of the reference signal (e.g. a CSI-RS or an SS block) used for PUSCH, PUCCH and SRS path loss estimation. This field refers to an element in the list configured using *pathlossReferenceRSToAddModList* in the serving cell and UL BWP where the TCI State is applied by the UE.
qcl-Type1, qcl-Type2   QCL information for the TCI state as specified in TS 38.214 [19] clause 5.1.5.
tci-StateId   ID number of the TCI state.
ul-PowerControl   Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if *ul-powerControl* is not configured in any *BWP-Uplink-Dedicated* of this serving cell. This field refers to an element in the list configured using *uplink-PowerControlToAddModList* in the serving cell where the *dl-OrJointTCI-StateToAddModList* is configured.

Conditional Presence	Explanation
CSI-RS-Indicated	This field is mandatory present if *csi-rs* is included and *unifiedTCI-StateType* is not configured. This field is optionally present, Need R, if *csi-rs* is included and *unifiedTCI-StateType* is configured. Otherwise, it is absent, Need R.
JointTCI	This field is optionally present, Need R, if this serving cell is configured with *unifiedTCI-StateType* set to '*joint*'. It is absent, Need R, otherwise.
JointTCI1	This field is mandatory present, if this serving cell is configured with unifiedTCI-StateType set to 'joint'. It is absent, Need R, otherwise.

– *TCI-StateId*

The IE *TCI-StateId* is used to identify one *TCI-State* configuration.

TCI-StateId information element

```
-- ASN1START
-- TAG-TCI-STATEID-START

TCI-StateId ::=                     INTEGER (0..maxNrofTCI-States-1)

-- TAG-TCI-STATEID-STOP
-- ASN1STOP
```

– *TCI-UL-State*

The IE *TCI-UL-State* indicates the TCI state information for UL transmission.

TCI-UL-State information element

```
-- ASN1START
-- TAG-TCI-UL-STATE-START

TCI-UL-State-r17 ::=            SEQUENCE {
    tci-UL-StateId-r17              TCI-UL-StateId-r17,
    servingCellId-r17               ServCellIndex                                   OPTIONAL,   -- Need R
    bwp-Id-r17                      BWP-Id                                          OPTIONAL,   -- Cond CSI-RSorSRS-Indicated
    referenceSignal-r17             CHOICE {
        ssb-Index-r17                   SSB-Index,
        csi-RS-Index-r17                NZP-CSI-RS-ResourceId,
        srs-r17                         SRS-ResourceId
    },
    additionalPCI-r17               AdditionalPCIIndex-r17                          OPTIONAL,   -- Need R
    ul-powerControl-r17             Uplink-powerControlId-r17                       OPTIONAL,   -- Need R
    pathlossReferenceRS-Id-r17      PathlossReferenceRS-Id-r17                      OPTIONAL,   -- Cond Mandatory
    ...
}

-- TAG-TCI-UL-STATE-STOP
-- ASN1STOP
```

***TCI-UL-State* field descriptions**
additionalPCI Indicates the physical cell IDs (PCI) of the SSBs when *referenceSignal* is configured as SSB. In case the *servingCellId* is present, the *additionalPCI* refers to a PCI value configured in the list configured using *additionalPCI-ToAddModList* in the serving cell indicated by the field *servingCellId*. Otherwise, it refers to a PCI value configured in the list configured using *additionalPCI-ToAddModList* in the serving cell where the *ul-TCI-StateList* is applied by the UE.
bwp-Id The DL BWP which the CSI-RS is located in or UL BWP where the SRS is located in.
servingCellId The UE's serving cell in which the *referenceSignal* is configured. If the field is absent, the *referenceSignal* is configured in the serving cell in which the *TCI-UL-State* is applied by the UE.
pathlossReferenceRS-Id The ID of the reference Signal (e.g. a CSI-RS or a SS block) used for PUSCH, PUCCH and SRS path loss estimation. This field refers to an element in the list configured using *pathlossReferenceRSToAddModList* in the serving cell and UL BWP where the UL TCI State is applied by the UE.
ul-powerControl Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if *ul-powerControl* is not configured in any *BWP-Uplink-Dedicated* of this serving cell. This field refers to an element in the list configured using *uplink-PowerControlToAddModList* in the serving cell where the *ul-TCI-ToAddModList* is configured.

Conditional Presence	Explanation
CSI-RSorSRS-Indicated	This field is mandatory present if *referenceSignal* is set to *csi-RS-index* or to *srs*, absent otherwise
Mandatory	The field is mandatory present.

– *TCI-UL-StateId*

The IE *TCI-UL-StateId* is used to identify one *TCI-UL-State* configuration.

TCI-UL-StateId information element

```
-- ASN1START
-- TAG-TCI-UL-STATEID-START

TCI-UL-StateId-r17 ::=              INTEGER (0..maxUL-TCI-1-r17)

-- TAG-TCI-UL-STATEID-STOP
-- ASN1STOP
```

– *TDD-UL-DL-ConfigCommon*

The IE *TDD-UL-DL-ConfigCommon* determines the cell specific Uplink/Downlink TDD configuration.

TDD-UL-DL-ConfigCommon information element

```
-- ASN1START
-- TAG-TDD-UL-DL-CONFIGCOMMON-START

TDD-UL-DL-ConfigCommon ::=          SEQUENCE {
    referenceSubcarrierSpacing          SubcarrierSpacing,
    pattern1                            TDD-UL-DL-Pattern,
    pattern2                            TDD-UL-DL-Pattern                                                   OPTIONAL, -- Need R
    ...
}

TDD-UL-DL-Pattern ::=               SEQUENCE {
    dl-UL-TransmissionPeriodicity       ENUMERATED {ms0p5, ms0p625, ms1, ms1p25, ms2, ms2p5, ms5, ms10},
    nrofDownlinkSlots                   INTEGER (0..maxNrofSlots),
    nrofDownlinkSymbols                 INTEGER (0..maxNrofSymbols-1),
    nrofUplinkSlots                     INTEGER (0..maxNrofSlots),
    nrofUplinkSymbols                   INTEGER (0..maxNrofSymbols-1),
    ...,
    [[
    dl-UL-TransmissionPeriodicity-v1530     ENUMERATED {ms3, ms4}                                           OPTIONAL -- Need R
    ]]
}

-- TAG-TDD-UL-DL-CONFIGCOMMON-STOP
-- ASN1STOP
```

***TDD-UL-DL-ConfigCommon* field descriptions**
referenceSubcarrierSpacing Reference SCS used to determine the time domain boundaries in the UL-DL pattern which must be common across all subcarrier specific carriers, i.e., independent of the actual subcarrier spacing using for data transmission. Only the following values are applicable depending on the used frequency: FR1: 15, 30, or 60 kHz FR2-1: 60 or 120 kHz FR2-2: 120, 480, or 960 kHz The network configures a not larger than any SCS of configured BWPs for the serving cell. The network or *SL-PreconfigGeneral* configures a not larger than the SCS of (pre-)configured SL BWP.See TS 38.213 [13], clause 11.1.

***TDD-UL-DL-Pattern* field descriptions**
dl-UL-TransmissionPeriodicity Periodicity of the DL-UL pattern, see TS 38.213 [13], clause 11.1. If the *dl-UL-TransmissionPeriodicity-v1530* is signalled, UE shall ignore the *dl-UL-TransmissionPeriodicity* (without suffix).
nrofDownlinkSlots Number of consecutive full DL slots at the beginning of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 320.
nrofDownlinkSymbols Number of consecutive DL symbols in the beginning of the slot following the last full DL slot (as derived from *nrofDownlinkSlots*). The value 0 indicates that there is no partial-downlink slot. (see TS 38.213 [13], clause 11.1).
nrofUplinkSlots Number of consecutive full UL slots at the end of each DL-UL pattern, see TS 38.213 [13], clause 11.1. In this release, the maximum value for this field is 320.
nrofUplinkSymbols Number of consecutive UL symbols in the end of the slot preceding the first full UL slot (as derived from *nrofUplinkSlots*). The value 0 indicates that there is no partial-uplink slot. (see TS 38.213 [13], clause 11.1).

– *TDD-UL-DL-ConfigDedicated*

The IE *TDD-UL-DL-ConfigDedicated* determines the UE-specific Uplink/Downlink TDD configuration.

***TDD-UL-DL-ConfigDedicated* information element**

```
-- ASN1START
-- TAG-TDD-UL-DL-CONFIGDEDICATED-START

TDD-UL-DL-ConfigDedicated ::=       SEQUENCE {
    slotSpecificConfigurationsToAddModList      SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotConfig       OPTIONAL, -- Need N
    slotSpecificConfigurationsToReleaseList     SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotIndex        OPTIONAL, -- Need N
    ...
}

TDD-UL-DL-ConfigDedicated-IAB-MT-r16::=         SEQUENCE {
    slotSpecificConfigurationsToAddModList-IAB-MT-r16  SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotConfig-IAB-MT-r16      OPTIONAL, -- Need
N
```

```
    slotSpecificConfigurationsToReleaseList-IAB-MT-r16 SEQUENCE (SIZE (1..maxNrofSlots)) OF TDD-UL-DL-SlotIndex                OPTIONAL, -- Need
N
    ...
}

TDD-UL-DL-SlotConfig ::=            SEQUENCE {
    slotIndex                           TDD-UL-DL-SlotIndex,
    symbols                             CHOICE {
        allDownlink                         NULL,
        allUplink                           NULL,
        explicit                            SEQUENCE {
            nrofDownlinkSymbols                 INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL, -- Need S
            nrofUplinkSymbols                   INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL  -- Need S
        }
    }
}

TDD-UL-DL-SlotConfig-IAB-MT-r16::=    SEQUENCE {
    slotIndex-r16                       TDD-UL-DL-SlotIndex,
    symbols-IAB-MT-r16                  CHOICE {
        allDownlink-r16                     NULL,
        allUplink-r16                       NULL,
        explicit-r16                        SEQUENCE {
            nrofDownlinkSymbols-r16             INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL, -- Need S
            nrofUplinkSymbols-r16               INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL  -- Need S
        },
        explicit-IAB-MT-r16                 SEQUENCE {
            nrofDownlinkSymbols-r16             INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL, -- Need S
            nrofUplinkSymbols-r16               INTEGER (1..maxNrofSymbols-1)                                   OPTIONAL  -- Need S
        }
    }
}

TDD-UL-DL-SlotIndex ::=             INTEGER (0..maxNrofSlots-1)

-- TAG-TDD-UL-DL-CONFIGDEDICATED-STOP
-- ASN1STOP
```

***TDD-UL-DL-ConfigDedicated* field descriptions**
slotSpecificConfigurationsToAddModList
The *slotSpecificConfigurationToAddModList* allows overriding UL/DL allocations provided in tdd-UL-DL-configurationCommon, see TS 38.213 [13], clause 11.1.

TDD-UL-DL-ConfigDedicated-IAB-MT field descriptions
slotSpecificConfigurationsToAddModList-IAB-MT
The *slotSpecificConfigurationToAddModList-IAB-MT* allows overriding UL/DL allocations provided in tdd-UL-DL-configurationCommon with a limitation that effectively only flexible symbols can be overwritten in Rel-16.
slotSpecificConfigurationsToReleaseList-IAB-MT
The *slotSpecificConfigurationsToReleaseList-IAB-MT* allows release of a set of slot configuration previously add with *slotSpecificConfigurationToAddModList-IAB-MT*.

***TDD-UL-DL-SlotConfig* field descriptions**
nrofDownlinkSymbols Number of consecutive DL symbols in the beginning of the slot identified by *slotIndex*. If the field is absent the UE assumes that there are no leading DL symbols. (see TS 38.213 [13], clause 11.1).
nrofUplinkSymbols Number of consecutive UL symbols in the end of the slot identified by *slotIndex*. If the field is absent the UE assumes that there are no trailing UL symbols. (see TS 38.213 [13], clause 11.1).
slotIndex Identifies a slot within a slot configuration period given in *tdd-UL-DL-configurationCommon*, see TS 38.213 [13], clause 11.1.
symbols The direction (downlink or uplink) for the symbols in this slot. Value *allDownlink* indicates that all symbols in this slot are used for downlink; value *allUplink* indicates that all symbols in this slot are used for uplink; value *explicit* indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively.

***TDD-UL-DL-SlotConfig-IAB-MT* field descriptions**
symbols-IAB-MT The *symbols-IAB-MT* is used to configure an IAB-MT with the SlotConfig applicable for one serving cell. Value *allDownlink* indicates that all symbols in this slot are used for downlink; value *allUplink* indicates that all symbols in this slot are used for uplink; value *explicit* indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively; value *explicit-IAB-MT* indicates explicitly how many symbols in the beginning and end of this slot are allocated to uplink and downlink, respectively.

– *TrackingAreaCode*

The IE *TrackingAreaCode* is used to identify a tracking area within the scope of a PLMN/SNPN, see TS 24.501 [23].

TrackingAreaCode information element

```
-- ASN1START
-- TAG-TRACKINGAREACODE-START

TrackingAreaCode ::= BIT STRING (SIZE (24))

-- TAG-TRACKINGAREACODE-STOP
-- ASN1STOP
```

– *T-Reselection*

The IE *T-Reselection* concerns the cell reselection timer $\text{Treselection}_{\text{RAT}}$ for NR and E-UTRA. Value in seconds. For value 0, behaviour as specified in 7.1.2 applies.

T-Reselection information element

```
-- ASN1START
-- TAG-TRESELECTION-START
```

```
T-Reselection ::=                   INTEGER (0..7)

-- TAG-TRESELECTION-STOP
-- ASN1STOP
```

– *TimeAlignmentTimer*

The IE *TimeAlignmentTimer* is used to configure the time alignment timer as specified in TS 38.321 [3]. The values are in ms.

TimeAlignmentTimer information element

```
-- ASN1START
-- TAG-TIMEALIGNMENTTIMER-START

TimeAlignmentTimer ::=              ENUMERATED {ms500, ms750, ms1280, ms1920, ms2560, ms5120, ms10240, infinity}

-- TAG-TIMEALIGNMENTTIMER-STOP
-- ASN1STOP
```

– *TimeToTrigger*

The IE *TimeToTrigger* specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value *ms0* corresponds to 0 ms and behaviour as specified in 7.1.2 applies, value *ms40* corresponds to 40 ms, and so on.

TimeToTrigger information element

```
-- ASN1START
-- TAG-TIMETOTRIGGER-START

TimeToTrigger ::=                   ENUMERATED {
                                        ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
                                        ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
                                        ms5120}

-- TAG-TIMETOTRIGGER-STOP
-- ASN1STOP
```

– *UAC-BarringInfoSetIndex*

The IE *UAC-BarringInfoSetIndex* provides the index of the entry in *uac-BarringInfoSetList*. Value 1 corresponds to the first entry in *uac-BarringInfoSetList*, value 2 corresponds to the second entry in this list and so on. An index value referring to an entry not included in *uac-BarringInfoSetList* indicates no barring.

UAC-BarringInfoSetIndex information element

```
-- ASN1START
```

```
-- TAG-UAC-BARRINGINFOSETINDEX-START

UAC-BarringInfoSetIndex ::=               INTEGER (1..maxBarringInfoSet)

-- TAG-UAC-BARRINGINFOSETINDEX-STOP
-- ASN1STOP
```

– *UAC-BarringInfoSetList*

The IE *UAC-BarringInfoSetList* provides a list of access control parameter sets. An access category can be configured with access parameters according to one of the sets.

UAC-BarringInfoSetList information element

```
-- ASN1START
-- TAG-UAC-BARRINGINFOSETLIST-START

UAC-BarringInfoSetList ::=          SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet

UAC-BarringInfoSetList-v1700 ::= SEQUENCE (SIZE(1..maxBarringInfoSet)) OF UAC-BarringInfoSet-v1700

UAC-BarringInfoSet ::=              SEQUENCE {
    uac-BarringFactor                   ENUMERATED {p00, p05, p10, p15, p20, p25, p30, p40,
                                                    p50, p60, p70, p75, p80, p85, p90, p95},
    uac-BarringTime                     ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
    uac-BarringForAccessIdentity        BIT STRING (SIZE(7))
}

UAC-BarringInfoSet-v1700 ::= SEQUENCE {
    uac-BarringFactorForAI3-r17  ENUMERATED {p00, p05, p10, p15, p20, p25, p30, p40, p50, p60, p70, p75, p80, p85, p90, p95}
                                                                    OPTIONAL  -- Need S
}

-- TAG-UAC-BARRINGINFOSETLIST-STOP
-- ASN1STOP
```

***UAC-BarringInfoSetList* field descriptions**
uac-BarringInfoSetList List of access control parameter sets. Each access category can be configured with access parameters corresponding to a particular set by *uac-barringInfoSetIndex*. Association of an access category with an index that has no corresponding entry in the *uac-BarringInfoSetList* is valid configuration and indicates no barring.
uac-BarringForAccessIdentity Indicates whether access attempt is allowed for each Access Identity. The leftmost bit, bit 0 in the bit string corresponds to Access Identity 1, bit 1 in the bit string corresponds to Access Identity 2, bit 2 in the bit string corresponds to Access Identity 11, bit 3 in the bit string corresponds to Access Identity 12, bit 4 in the bit string corresponds to Access Identity 13, bit 5 in the bit string corresponds to Access Identity 14, and bit 6 in the bit string corresponds to Access Identity 15. Value 0 means that access attempt is allowed for the corresponding access identity.
uac-BarringFactor Represents the probability that access attempt would be allowed during access barring check.
uac-BarringFactorForAI3 Barring factor applicable for Access Identity 3. Represents the probability that access attempt would be allowed during access barring check. If absent, the UE considers the access attempt as allowed.
uac-BarringTime The average time in seconds before a new access attempt is to be performed after an access attempt was barred at access barring check for the same access category, see 5.3.14.5.

– *UAC-BarringPerCatList*

The IE *UAC-BarringPerCatList* provides access control parameters for a list of access categories.

***UAC-BarringPerCatList* information element**

```
-- ASN1START
-- TAG-UAC-BARRINGPERCATLIST-START

UAC-BarringPerCatList ::=           SEQUENCE (SIZE (1..maxAccessCat-1)) OF UAC-BarringPerCat

UAC-BarringPerCat ::=               SEQUENCE {
   accessCategory                       INTEGER (1..maxAccessCat-1),
   uac-barringInfoSetIndex              UAC-BarringInfoSetIndex
}

-- TAG-UAC-BARRINGPERCATLIST-STOP
-- ASN1STOP
```

***UAC-BarringPerCatList* field descriptions**
accessCategory The Access Category according to TS 22.261 [25].

– *UAC-BarringPerPLMN-List*

The IE *UAC-BarringPerPLMN-List* provides access category specific access control parameters, which are configured per PLMN/SNPN.

UAC-BarringPerPLMN-List information element

```
-- ASN1START
-- TAG-UAC-BARRINGPERPLMN-LIST-START

UAC-BarringPerPLMN-List ::=         SEQUENCE (SIZE (1.. maxPLMN)) OF UAC-BarringPerPLMN

UAC-BarringPerPLMN ::=              SEQUENCE {
    plmn-IdentityIndex                  INTEGER (1..maxPLMN),
    uac-ACBarringListType               CHOICE{
        uac-ImplicitACBarringList           SEQUENCE (SIZE(maxAccessCat-1)) OF UAC-BarringInfoSetIndex,
        uac-ExplicitACBarringList           UAC-BarringPerCatList
    }                                                                                   OPTIONAL     -- Need S
}

-- TAG-UAC-BARRINGPERPLMN-LIST-STOP
-- ASN1STOP
```

***UAC-BarringPerPLMN-List* field descriptions**
uac-ACBarringListType Access control parameters for each access category valid only for a specific PLMN or SNPN. UE behaviour upon absence of this field is specified in clause 5.3.14.2.
plmn-IdentityIndex Index of the PLMN or SNPN across the *plmn-IdentityInfoList* and *npn-IdentityInfoList* fields included in SIB1.

– *UE-TimersAndConstants*

The IE UE-TimersAndConstants contains timers and constants used by the UE in RRC_CONNECTED, RRC_INACTIVE and RRC_IDLE.

UE-TimersAndConstants information element

```
-- ASN1START
-- TAG-UE-TIMERSANDCONSTANTS-START

UE-TimersAndConstants ::=           SEQUENCE {
    t300                                ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    t301                                ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    t310                                ENUMERATED {ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
    n310                                ENUMERATED {n1, n2, n3, n4, n6, n8, n10, n20},
    t311                                ENUMERATED {ms1000, ms3000, ms5000, ms10000, ms15000, ms20000, ms30000},
    n311                                ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10},
    t319                                ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000},
    ...
}

-- TAG-UE-TIMERSANDCONSTANTS-STOP
-- ASN1STOP
```

– *UE-TimersAndConstantsRemoteUE*

The IE *UE-TimersAndConstantsRemoteUE* contains timers and constants used by the L2 U2N Remote UE in RRC_CONNECTED, RRC_INACTIVE and RRC_IDLE.

UE-TimersAndConstantsRemoteUE information element

```
-- ASN1START
-- TAG-UE-TIMERSANDCONSTANTSREMOTEUE-START

UE-TimersAndConstantsRemoteUE-r17 ::= SEQUENCE {
    t300-RemoteUE-r17                   ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need S
    t301-RemoteUE-r17                   ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need S
    t319-RemoteUE-r17                   ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL, -- Need S
    ...
}

-- TAG-UE-TIMERSANDCONSTANTSREMOTEUE-STOP
-- ASN1STOP
```

***UE-TimersAndConstantsRemoteUE* field descriptions**
t300-RemoteUE Indicates the timer value of T300 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t300 applies to L2 U2N Remote UE.
t301-RemoteUE Indicates the timer value of T301 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t301 applies to L2 U2N Remote UE.
t319-RemoteUE Indicates the timer value of T319 used by L2 U2N Remote UE. If the field is absent, the timer value indicated in t319 applies to L2 U2N Remote UE.

– *UL-DelayValueConfig*

The IE *UL-DelayValueConfig* specifies the configuration of the UL PDCP Packet Delay value per DRB measurement specified in TS 38.314 [53].

UL-DelayValueConfig information element

```
-- ASN1START
-- TAG-ULDELAYVALUECONFIG-START

UL-DelayValueConfig-r16 ::=  SEQUENCE {
    delay-DRBlist-r16            SEQUENCE (SIZE(1..maxDRB)) OF DRB-Identity
}

-- TAG-ULDELAYVALUECONFIG-STOP
-- ASN1STOP
```

***UL-DelayValueConfig* field descriptions**
delay-DRBlist
Indicates the DRB IDs used by UE to provide results of UL PDCP Packet Delay value per DRB measurement as specified in TS 38.314 [53].

– *UL-ExcessDelayConfig*

The IE *UL-ExcessDelayConfig* IE specifies the configuration of the UL PDCP Excess Packet Delay per DRB measurement specified in TS 38.314 [53].

UL-ExcessDelayConfig information element

```
-- ASN1START
-- TAG-ULEXCESSDELAYCONFIG-START

UL-ExcessDelayConfig-r17 ::=  SEQUENCE {
    excessDelay-DRBlist-r17       SEQUENCE (SIZE(1..maxDRB)) OF ExcessDelay-DRB-IdentityInfo-r17
}

ExcessDelay-DRB-IdentityInfo-r17 ::=  SEQUENCE {
    drb-IdentityList                    SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity,
    delayThreshold                      ENUMERATED {ms0dot25, ms0dot5, ms1, ms2, ms4, ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70,
                                                    ms80, ms90, ms100, ms150, ms300, ms500}
}

-- TAG-ULEXCESSDELAYCONFIG-STOP
-- ASN1STOP
```

***UL-ExcessDelayConfig* field descriptions**
drb-IdentityList
Indicates the DRB IDs used by UE to provide results of UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53].
delayThreshold
Indicates the delay threshold for the DRB IDs indicated in DRB-IdentityList. Value ms0dot25 corresponds to 0.25ms, ms0dot5 corresponds to 0.5ms, ms1 corresponds to 1ms and so on.

– *UL-GapFR2-Config*

The IE *UL-GapFR2-Config* specifies the FR2 uplink gap configuration.

UL-GapFR2-Config information element

```
-- ASN1START
-- TAG-UL-GAPFR2-CONFIG-START

UL-GapFR2-Config-r17 ::=      SEQUENCE {
    gapOffset-r17                 INTEGER (0..159),
    ugl-r17                       ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms1},
```

```
    ugrp-r17                    ENUMERATED {ms5, ms20, ms40, ms160},
    refFR2-ServCellAsyncCA-r17  ServCellIndex                                   OPTIONAL -- Cond AsyncCA
}

-- TAG-UL-GAPFR2-CONFIG-STOP
-- ASN1STOP
```

***UL-GapFR2-Config* field descriptions**
gapOffset Value *gapOffset* is the gap offset of the FR2 UL gap pattern with UGRP indicated in the field *ugrp*. The value range is from 0 to *ugrp*-1.
refFR2-ServCellAsyncCA Indicates the FR2 serving cell identifier whose SFN and subframe is used for FR2 UL gap calculation for this gap pattern with asynchronous CA involving FR2 carrier(s).
ugl Value *ugl* is the gap length in ms of the FR2 UL gap. The FR2 UL gap length is according to Table 9.1.11-1 in TS 38.133 [14]. Value *ms0dot125* corresponds to 0.125 ms, *ms0dot25* corresponds to 0.25 ms and so on.
ugrp Value *ugrp* is the gap repetition period in (ms) of the FR2 UL gap. The FR2 UL gap repetition period is according to Table 9.1.11-1 in TS 38.133 [14].

Conditional Presence	Explanation
AsyncCA	This field is mandatory present when configuring FR2 UL gap pattern to UE in: - (NG)EN-DC, NR SA, NE-DC or NR-DC without FR2-FR2 band combination, with asynchronous CA involving FR2 carriers. Otherwise, it is absent.

– *UplinkCancellation*

The IE *UplinkCancellation* is used to configure the UE to monitor PDCCH for the CI-RNTI.

***UplinkCancellation* information element**

```
-- ASN1START
-- TAG-UPLINKCANCELLATION-START

UplinkCancellation-r16 ::=          SEQUENCE {
    ci-RNTI-r16                         RNTI-Value,
    dci-PayloadSizeForCI-r16            INTEGER (0..maxCI-DCI-PayloadSize-r16),
    ci-ConfigurationPerServingCell-r16  SEQUENCE (SIZE (1..maxNrofServingCells)) OF CI-ConfigurationPerServingCell-r16,
    ...
}

CI-ConfigurationPerServingCell-r16 ::=  SEQUENCE {
    servingCellId                       ServCellIndex,
    positionInDCI-r16                   INTEGER (0..maxCI-DCI-PayloadSize-1-r16),
    positionInDCI-ForSUL-r16            INTEGER (0..maxCI-DCI-PayloadSize-1-r16)                    OPTIONAL,   -- Cond SUL-Only
    ci-PayloadSize-r16                  ENUMERATED {n1, n2, n4, n5, n7, n8, n10, n14, n16, n20, n28, n32, n35, n42, n56, n112},
    timeFrequencyRegion-r16             SEQUENCE {
```

```
        timeDurationForCI-r16                   ENUMERATED {n2, n4, n7, n14}                                    OPTIONAL,   -- Cond
SymbolPeriodicity
        timeGranularityForCI-r16                ENUMERATED {n1, n2, n4, n7, n14, n28},
        frequencyRegionForCI-r16                INTEGER (0..37949),
        deltaOffset-r16                         INTEGER (0..2),
        ...
    },
    uplinkCancellationPriority-v1610        ENUMERATED {enabled}                                            OPTIONAL    -- Need S
}

-- TAG-UPLINKCANCELLATION-STOP
-- ASN1STOP
```

***UplinkCancellation* field descriptions**
ci-ConfigurationPerServingCell Indicates (per serving cell) the position of the *ci-PaylaodSize* bit CI values inside the DCI payload (see TS 38.213 [13], clause 11.2A).
ci-RNTI RNTI used for indication cancellation in UL (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13], clause 11.2A).
dci-PayloadSizeForCI Total length of the DCI payload scrambled with CI-RNTI (see TS 38.213 [13], clause 11.2A).

***CI-ConfigurationPerServingCell* field descriptions**
ci-PayloadSize Configures the field size for each UL cancelation indicator of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).
deltaOffset Configures the additional offset from the end of a PDCCH reception where the UE detects the DCI format 2_4 and the first symbol of the T_"CI" symbols, in the unit of OFDM symbols (see TS 38.213 [13], clause 11.2A).
frequencyRegionForCI Configures the reference frequency region where a detected UL CI is applicable (see TS 38.213 [13], clause 11.2A). It is defined in the same way as *locationAndBandwidth*.
positionInDCI Starting position (in number of bit) of the *ci-PayloadSize* bit CI value applicable for this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.2A).
positionInDCI-ForSUL Starting position (in number of bit) of the *ci-PayloadSize* bit CI value applicable for SUL of this serving cell (servingCellId) within the DCI payload (see TS 38.213 [13], clause 11.2A).
timeDurationForCI Configures the duration of the reference time region in symbols where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A). If the field is absent, i.e., the configured UL CI monitoring periodicity indicated by *monitoringSlotPeriodicityAndOffset* for DCI format 2_4 is larger than 1 slot or 1 slot with only one monitoring occasion, the UE applies the value of the configured UL CI monitoring periodicity,
timeFrequencyRegion Configures the reference time and frequency region where a detected UL CI is applicable of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).
timeGranularityForCI Configures the number of partitions within the time region of this serving cell (servingCellId) (see TS 38.213 [13], clause 11.2A).
uplinkCancellationPriority Configures uplink cancellation behavior if both UL CI and intra-UE priority indicator are configured for a given UE. If the field is present, then UL CI is only applicable to the UL transmissions indicated/configured as low priority level. If the field is absent, UL CI is applicable to UL transmission irrespective of its priority level (see TS 38.213 [13], clause 11.2A).

Conditional Presence	Explanation
SUL-Only	The field is optionally present, Need R, if *supplementaryUplink* is configured in *ServingCellConfig*. It is absent otherwise.
SymbolPeriodicity	This field is mandatory present if the configured UL CI monitoring periodicity indicated by *monitoringSlotPeriodicityAndOffset* for DCI format 2_4 is 1 slot with more than one monitoring occasion, otherwise absent.

– *UplinkConfigCommon*

The IE *UplinkConfigCommon* provides common uplink parameters of a cell.

***UplinkConfigCommon* information element**

```
-- ASN1START
-- TAG-UPLINKCONFIGCOMMON-START

UplinkConfigCommon ::=              SEQUENCE {
    frequencyInfoUL                     FrequencyInfoUL                                 OPTIONAL,   -- Cond InterFreqHOAndServCellAdd
    initialUplinkBWP                    BWP-UplinkCommon                                OPTIONAL,   -- Cond ServCellAdd
    dummy                               TimeAlignmentTimer
}
```

```
UplinkConfigCommon-v1700 ::=        SEQUENCE {
    initialUplinkBWP-RedCap-r17         BWP-UplinkCommon                                OPTIONAL    -- Need R
}

-- TAG-UPLINKCONFIGCOMMON-STOP
-- ASN1STOP
```

***UplinkConfigCommon* field descriptions**
frequencyInfoUL Absolute uplink frequency configuration and subcarrier specific virtual carriers.
initialUplinkBWP The initial uplink BWP configuration for a serving cell (see TS 38.213 [13], clause 12).
initialUplinkBWP-RedCap If present, RedCap UEs use this UL BWP instead of *initialUplinkBWP*. If absent, RedCap UEs use *initialUplinkBWP* provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Conditional Presence	Explanation
InterFreqHOAndServCellAdd	This field is mandatory present for inter-frequency handover and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally present, Need M.
ServCellAdd	This field is mandatory present upon serving cell addition (for PSCell and SCell) and upon handover from E-UTRA to NR. It is optionally present, Need M otherwise.

– *UplinkConfigCommonSIB*

The IE *UplinkConfigCommonSIB* provides common uplink parameters of a cell.

***UplinkConfigCommonSIB* information element**

```
-- ASN1START
-- TAG-UPLINKCONFIGCOMMONSIB-START

UplinkConfigCommonSIB ::=               SEQUENCE {
    frequencyInfoUL                         FrequencyInfoUL-SIB,
    initialUplinkBWP                        BWP-UplinkCommon,
    timeAlignmentTimerCommon                TimeAlignmentTimer
}

UplinkConfigCommonSIB-v1700 ::=         SEQUENCE {
    initialUplinkBWP-RedCap-r17             BWP-UplinkCommon                            OPTIONAL    -- Need R
}

UplinkConfigCommonSIB-v1760 ::=         SEQUENCE {
    frequencyInfoUL-v1760                   FrequencyInfoUL-SIB-v1760
}
```

```
-- TAG-UPLINKCONFIGCOMMONSIB-STOP
-- ASN1STOP
```

***UplinkConfigCommonSIB* field descriptions**
frequencyInfoUL Absolute uplink frequency configuration and subcarrier specific virtual carriers.
InitialUplinkBWP The initial uplink BWP configuration for a PCell (see TS 38.213 [13], clause 12).
initialUplinkBWP-RedCap If present, RedCap UEs use this UL BWP instead of *initialUplinkBWP*. If absent, RedCap UEs use *initialUplinkBWP* provided that it does not exceed the RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

– *Uplink-PowerControl*

The IE *Uplink-PowerControl* is used to configure UE specific power control parameter for PUSCH, PUCCH and SRS.

***Uplink-PowerControl* information element**

```
-- ASN1START
-- TAG-UPLINK-POWERCONTROL-START

Uplink-powerControl-r17  ::= SEQUENCE {
    ul-powercontrolId-r17        Uplink-powerControlId-r17,
    p0AlphaSetforPUSCH-r17       P0AlphaSet-r17                                  OPTIONAL, -- Need R
    p0AlphaSetforPUCCH-r17       P0AlphaSet-r17                                  OPTIONAL, -- Need R
    p0AlphaSetforSRS-r17         P0AlphaSet-r17                                  OPTIONAL  -- Need R
}

P0AlphaSet-r17 ::=           SEQUENCE {
    p0-r17                       INTEGER (-16..15)                               OPTIONAL, -- Need R
    alpha-r17                    Alpha                                           OPTIONAL, -- Need S
    closedLoopIndex-r17          ENUMERATED { i0, i1 }
}

Uplink-powerControlId-r17 ::= INTEGER(1.. maxUL-TCI-r17)

-- TAG-UPLINK-POWERCONTROL-STOP
-- ASN1STOP
```

***Uplink-PowerControl* field descriptions**
p0AlphaSetforPUSCH, p0AlphaSetforPUCCH, p0AlphaSetforSRS Configures power control parameters for PUSCH, PUCCH and SRS (see TS 38.213 [13], clause 7.2). When the field *alpha* is absent in *p0AlphaSetforPUSCH*, the UE applies the value 1 for PUSCH power control. When the field *alpha* is absent in *p0AlphaSetforSRS*, the UE applies the value 1 for SRS power control. In *p0AlphaSetForPUCCH*, the field alpha is absent (not used).

– *Uu-RelayRLC-ChannelConfig*

The IE *Uu-RelayRLC-ChannelConfig* is used to configure an RLC entity, a corresponding logical channel in MAC for Uu Relay RLC channel between L2 U2N Relay UE and network.

Uu-RelayRLC-ChannelConfig information element

```
-- ASN1START
-- TAG-UU-RELAYRLC-CHANNELCONFIG-START

Uu-RelayRLC-ChannelConfig-r17::= SEQUENCE {
    uu-LogicalChannelIdentity-r17    LogicalChannelIdentity                 OPTIONAL,   -- Cond RelayLCH-SetupOnly
    uu-RelayRLC-ChannelID-r17        Uu-RelayRLC-ChannelID-r17,
    reestablishRLC-r17               ENUMERATED {true}                      OPTIONAL,   -- Need N
    rlc-Config-r17                   RLC-Config                             OPTIONAL,   -- Cond RelayLCH-Setup
    mac-LogicalChannelConfig-r17     LogicalChannelConfig                   OPTIONAL,   -- Cond RelayLCH-Setup
    ...
}

-- TAG-UU-RELAYRLC-CHANNELCONFIG-STOP
-- ASN1STOP
```

***Uu-RelayRLC-ChannelConfig* field descriptions**
uu-LogicalChannelIdentity Indicates the logical channel id for Uu Relay RLC channel of the L2 U2N Relay UE.
uu-RelayRLC-ChannelID Indicates the Uu Relay RLC channel in the link between L2 U2N Relay UE and network.
reestablishRLC Indicates that RLC should be re-established.
rlc-Config Determines the RLC mode (UM, AM) and provides corresponding parameters.

Conditional Presence	Explanation
RelayLCH-Setup	This field is mandatory present upon creation of a new logical channel for a Uu Relay RLC channel. It is optionally present, Need M, otherwise.
RelayLCH-SetupOnly	This field is mandatory present upon creation of a new logical channel for a Uu Relay RLC channel. It is absent otherwise.

– *Uu-RelayRLC-ChannelID*

The IE *Uu-RelayRLC-ChannelID* is used to identify a Uu Relay RLC channel in the link between L2 U2N Relay UE and network.

Uu-RelayRLC-ChannelID information element

```
-- ASN1START
```

```
-- TAG-UU-RELAYRLC-CHANNELID-START

Uu-RelayRLC-ChannelID-r17 ::= INTEGER (1..maxLC-ID)

-- TAG-UU-RELAYRLC-CHANNELID-STOP
-- ASN1STOP
```

– *UplinkTxDirectCurrentList*

The IE *UplinkTxDirectCurrentList* indicates the Tx Direct Current locations per serving cell for each configured UL BWP in the serving cell, based on the BWP numerology and the associated carrier bandwidth.

UplinkTxDirectCurrentList information element

```
-- ASN1START
-- TAG-UPLINKTXDIRECTCURRENTLIST-START

UplinkTxDirectCurrentList ::=           SEQUENCE (SIZE (1..maxNrofServingCells)) OF UplinkTxDirectCurrentCell

UplinkTxDirectCurrentCell ::=           SEQUENCE {
    servCellIndex                           ServCellIndex,
    uplinkDirectCurrentBWP                  SEQUENCE (SIZE (1..maxNrofBWPs)) OF UplinkTxDirectCurrentBWP,
    ...,
    [[
    uplinkDirectCurrentBWP-SUL              SEQUENCE (SIZE (1..maxNrofBWPs)) OF UplinkTxDirectCurrentBWP              OPTIONAL
    ]]
}

UplinkTxDirectCurrentBWP ::=            SEQUENCE {
    bwp-Id                                  BWP-Id,
    shift7dot5kHz                           BOOLEAN,
    txDirectCurrentLocation                 INTEGER (0..3301)
}

-- TAG-UPLINKTXDIRECTCURRENTLIST-STOP
-- ASN1STOP
```

UplinkTxDirectCurrentBWP field descriptions
bwp-Id The BWP-Id of the corresponding uplink BWP.
shift7dot5kHz Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to *true*. Otherwise 7.5 kHz shift is not applied.
txDirectCurrentLocation The uplink Tx Direct Current location for the carrier. Only values in the value range of this field between 0 and 3299, which indicate the subcarrier index within the carrier corresponding to the numerology of the corresponding uplink BWP and value 3300, which indicates "Outside the carrier" and value 3301, which indicates "Undetermined position within the carrier" are used in this version of the specification.

***UplinkTxDirectCurrentCell* field descriptions**
servCellIndex The serving cell ID of the serving cell corresponding to the *uplinkDirectCurrentBWP*.
uplinkDirectCurrentBWP The Tx Direct Current locations for all the uplink BWPs configured at the corresponding serving cell.
uplinkDirectCurrentBWP-SUL The Tx Direct Current locations for all the supplementary uplink BWPs configured at the corresponding serving cell.

– *UplinkTxDirectCurrentMoreCarrierList*

The IE *UplinkTxDirectCurrentMoreCarrierList* indicates the Tx Direct Current locations for intra-band CA including one, two or more uplink carriers. The UE does not report the uplink Direct Current location information for SUL carrier(s).

***UplinkTxDirectCurrentMoreCarrierList* information element**

```
-- ASN1START
-- TAG-UPLINKTXDIRECTCURRENTMORECARRIERLIST-START

UplinkTxDirectCurrentMoreCarrierList-r17 ::=   SEQUENCE (SIZE (1..maxNrofCC-Group-r17)) OF CC-Group-r17

CC-Group-r17 ::=           SEQUENCE {
    servCellIndexLower-r17     ServCellIndex,
    servCellIndexHigher-r17    ServCellIndex              OPTIONAL,
    defaultDC-Location-r17     DefaultDC-Location-r17,
    offsetToDefault-r17        CHOICE{
        offsetValue                OffsetValue-r17,
        offsetlist                 SEQUENCE (SIZE(1..maxNrofReqComDC-Location-r17)) OF OffsetValue-r17
    }                                                     OPTIONAL
}


OffsetValue-r17::=         SEQUENCE {
    offsetValue-r17            INTEGER (-20000.. 20000),
    shift7dot5kHz-r17          BOOLEAN
}

DefaultDC-Location-r17 ::= CHOICE {
    ul                         FrequencyComponent-r17,
    dl                         FrequencyComponent-r17,
    ulAndDL                    FrequencyComponent-r17
}

FrequencyComponent-r17 ::=  ENUMERATED {activeCarrier,configuredCarrier,activeBWP,configuredBWP}

-- TAG-UPLINKTXDIRECTCURRENTMORECARRIERLIST-STOP
-- ASN1STOP
```

***UplinkTxDirectCurrentMoreCarrierList* and *CC-Group* field descriptions**
CC-Group The contiguous carriers sharing the same PA in an intra-band UL CA configuration. The UE shall report only one DC location for an intra-band CC combination with one active uplink carrier in case *DefaultDC-Location* is set to *activeCarrier* or *activeBWP*.
defaultDC-Location Indicates the default DC location derivation option. The default Tx Direct Current is located at the mathematical center of the UE bandwidth, i.e. between the lower edge of the lowest subcarrier of the lowest frequency component and the upper edge of the highest subcarrier of the highest frequency component, rounded to the subcarrier grid of the lowest SCS defined for the component carrier on which the default Direct Current is located. The lowest and highest frequency components used for derivation of mathematical center are indicated by *FrequencyComponent* in the associated *CC-Group*, where the lowest frequency component and the highest frequency component may be the same. If the mathematical center of the UE bandwidth lands on frequencies where there is no subcarrier grid defined, the subcarrier grid of the lowest SCS of the nearest lower frequency component carrier shall be extended to cover the frequency of the mathematical default Direct Current location.
offsetToDefault Indicates the DC location offset to the default DC location derived from *defaultDC-Location*. The lowest SCS in the CC group is used as the offset granularity. Value 0 respresents no offset. offsetValue is used in case *DefaultDC-Location* is set to *configuredCarrier* or *configuredBWP*. *offsetlist* is used in case *DefaultDC-Location* is set to *activeCarrier* or *activeBWP*. Each entity in this list corresponds to the entry in carriers combination in *IntraBandCC-CombinationReqList* of the intra-band CA component. For each CC group, the UE shall include the same number of entries, and listed in the same order as in CC-CombinationList. If *DefaultDC-Location* is set the *activeCarrier*, same offsetValue is signalled for all requested carriers combinations with same active carriers states(regardless of the active BWP index).
servCellIndexHigher Indicates the serving cell index of the highest edge of the *CC-Group*. If asbsent, there is only one carrier in this group indicated by *servCellIndexLower*.
servCellIndexLower Indicates the serving cell index of the lowest edge of the *CC-Group*.
shift7dot5kHz Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to true, otherwise 7.5 kHz shift is not applied.

***DefaultDC-Location* field descriptions**
dl Indicates that the default DC location is derived based on the DL frequencies of the frequency component.
ul Indicates that the default DC location is derived based on the UL frequencies of the frequency component.
ulAndDL Indicates that the default DC location is derived based on the edge most frequencies among any DL and UL frequency components.

– *UplinkTxDirectCurrentTwoCarrierList*

The IE *UplinkTxDirectCurrentTwoCarrierList* indicates the Tx Direct Current locations when uplink intra-band CA with two carriers is configured, based on the configured carriers and BWP numerology and the associated carrier bandwidth of the carriers. The UE does not report the uplink Direct Current location information for SUL carrier(s).

***UplinkTxDirectCurrentTwoCarrierList* information element**

```
-- ASN1START
-- TAG-UPLINKTXDIRECTCURRENTTWOCARRIERLIST-START

UplinkTxDirectCurrentTwoCarrierList-r16 ::=   SEQUENCE (SIZE (1..maxNrofTxDC-TwoCarrier-r16)) OF UplinkTxDirectCurrentTwoCarrier-r16
```

```
UplinkTxDirectCurrentTwoCarrier-r16 ::=       SEQUENCE {
    carrierOneInfo-r16                            UplinkTxDirectCurrentCarrierInfo-r16,
    carrierTwoInfo-r16                            UplinkTxDirectCurrentCarrierInfo-r16,
    singlePA-TxDirectCurrent-r16                  UplinkTxDirectCurrentTwoCarrierInfo-r16,
    secondPA-TxDirectCurrent-r16                  UplinkTxDirectCurrentTwoCarrierInfo-r16           OPTIONAL
}

UplinkTxDirectCurrentCarrierInfo-r16 ::=      SEQUENCE {
    servCellIndex-r16                             ServCellIndex,
    servCellInfo-r16                              CHOICE {
        bwp-Id-r16                                    BWP-Id,
        deactivatedCarrier-r16                        ENUMERATED {deactivated}
    }
}

UplinkTxDirectCurrentTwoCarrierInfo-r16 ::=   SEQUENCE {
    referenceCarrierIndex-r16                     ServCellIndex,
    shift7dot5kHz-r16                             BOOLEAN,
    txDirectCurrentLocation-r16                   INTEGER (0..3301)
}

-- TAG-UPLINKTXDIRECTCURRENTTWOCARRIERLIST-STOP
-- ASN1STOP
```

***UplinkTxDirectCurrentTwoCarrierInfo* field descriptions**
referenceCarrierIndex The serving cell ID of the carrier which is to be used as the reference for interpreting the Tx Direction Current location as reported using *txDirectCurrentLocation-r16*. The numerology of the uplink BWP ID reported with *bwp-Id-r16* for this serving cell is the numerology used for interpreting the reported subcarrier location.
shift7dot5kHz Indicates whether there is 7.5 kHz shift or not. 7.5 kHz shift is applied if the field is set to *true*. Otherwise 7.5 kHz shift is not applied.
txDirectCurrentLocation The uplink Tx Direct Current location for the two carrier uplink CA with the serving cells reported using *carrierOneInfo-r16* and *carrierTwoInfo-r16*. Values in the range of this field between 0 and 3299 indicate the subcarrier index of the uplink Tx Direct Current location with the subcarrier taken from the serving cell with ID *referenceCarrierIndex* and the numerology of the corresponding uplink BWP reported for this serving cell. Value 3300 indicates "Outside the carrier" and value 3301 indicates "Undetermined position within the carrier".

***UplinkTxDirectCurrentCarrierInfo* field descriptions**
bwp-Id The BWP ID of the serving cell which is part of the two carrier uplink carrier aggregation. The UE shall not report this field if the serving cell is reported as deactivated using *deactivatedCarrier-r16.*
deactivatedCarrier For the reported uplink Tx Direct Current location(s) corresponding to *singlePA-TxDirectCurrent-r16*, indicates whether the carrier is deactivated or not for this serving cell. If the carrier refers to the PCell, the UE shall not set this field to *deactivated*.
servCellIndex The serving cell ID of the serving cell which is part of the two carrier uplink carrier aggregation.

UplinkTxDirectCurrentTwoCarrier field descriptions
carrierOneInfo The serving cell ID and BWP ID of the first carrier of the uplink carrier aggregation for which the uplink Tx Direct Current location(s) are being reported.
carrierTwoInfo The serving cell ID and BWP ID of the second carrier of the uplink carrier aggregation for which the uplink Tx Direct Current location(s) are being reported.
singlePA-TxDirectCurrent The uplink Tx Direct Current location for the UE which support single PA for this uplink carrier aggregation. For the UEs which support dual PA for this uplink carrier aggregation, this field is for reporting the uplink Tx Direct Current location of the first PA.
secondPA-TxDirectCurrent The uplink Tx Direct Current location used by the UE with the second PA for the UEs which support dual PA for this uplink carrier aggregation. This field shall be absent for the *UplinkTxDirectCurrentTwoCarrier* entity where *deactivatedCarrier* of *carrierOneInfo* or *carrierTwoInfo* is set to *deactivated*.

– *ZP-CSI-RS-Resource*

The IE *ZP-CSI-RS-Resource* is used to configure a Zero-Power (ZP) CSI-RS resource (see TS 38.214 [19], clause 5.1.4.2). Reconfiguration of a *ZP-CSI-RS-Resource* between periodic or semi-persistent and aperiodic is not supported.

ZP-CSI-RS-Resource information element

```
-- ASN1START
-- TAG-ZP-CSI-RS-RESOURCE-START

ZP-CSI-RS-Resource ::=              SEQUENCE {
    zp-CSI-RS-ResourceId                ZP-CSI-RS-ResourceId,
    resourceMapping                     CSI-RS-ResourceMapping,
    periodicityAndOffset                CSI-ResourcePeriodicityAndOffset                OPTIONAL, --Cond PeriodicOrSemiPersistent
    ...
}

ZP-CSI-RS-ResourceId ::=            INTEGER (0..maxNrofZP-CSI-RS-Resources-1)

-- TAG-ZP-CSI-RS-RESOURCE-STOP
-- ASN1STOP
```

ZP-CSI-RS-Resource field descriptions
periodicityAndOffset Periodicity and slot offset for periodic/semi-persistent ZP-CSI-RS (see TS 38.214 [19], clause 5.1.4.2). Network always configures the UE with a value for this field for periodic and semi-persistent ZP-CSI-RS resource (as indicated in PDSCH-Config).
resourceMapping OFDM symbol and subcarrier occupancy of the ZP-CSI-RS resource within a slot.
zp-CSI-RS-ResourceId ZP CSI-RS resource configuration ID (see TS 38.214 [19], clause 5.1.4.2).

Conditional Presence	Explanation
PeriodicOrSemiPersistent	The field is optionally present, Need M, for periodic and semi-persistent ZP-CSI-RS-Resources (as indicated in PDSCH-Config). The field is absent otherwise.

– *ZP-CSI-RS-ResourceSet*

The IE *ZP-CSI-RS-ResourceSet* refers to a set of *ZP-CSI-RS-Resources* using their *ZP-CSI-RS-ResourceIds*.

ZP-CSI-RS-ResourceSet information element

```
-- ASN1START
-- TAG-ZP-CSI-RS-RESOURCESET-START

ZP-CSI-RS-ResourceSet ::=           SEQUENCE {
    zp-CSI-RS-ResourceSetId             ZP-CSI-RS-ResourceSetId,
    zp-CSI-RS-ResourceIdList            SEQUENCE (SIZE(1..maxNrofZP-CSI-RS-ResourcesPerSet)) OF ZP-CSI-RS-ResourceId,
    ...
}

-- TAG-ZP-CSI-RS-RESOURCESET-STOP
-- ASN1STOP
```

***ZP-CSI-RS-ResourceSet* field descriptions**
zp-CSI-RS-ResourceIdList The list of *ZP-CSI-RS-ResourceId* identifying the *ZP-CSI-RS-Resource* elements belonging to this set.

– *ZP-CSI-RS-ResourceSetId*

The IE *ZP-CSI-RS-ResourceSetId* identifies a *ZP-CSI-RS-ResourceSet*.

ZP-CSI-RS-ResourceSetId information element

```
-- ASN1START
-- TAG-ZP-CSI-RS-RESOURCESETID-START

ZP-CSI-RS-ResourceSetId ::=                     INTEGER (0..maxNrofZP-CSI-RS-ResourceSets-1)

-- TAG-ZP-CSI-RS-RESOURCESETID-STOP
-- ASN1STOP
```

6.3.3 UE capability information elements

– *AccessStratumRelease*

The IE *AccessStratumRelease* indicates the release supported by the UE.

AccessStratumRelease information element

```
-- ASN1START
-- TAG-ACCESSSTRATUMRELEASE-START

AccessStratumRelease ::= ENUMERATED {
                           rel15, rel16, rel17, spare5, spare4, spare3, spare2, spare1, ... }

-- TAG-ACCESSSTRATUMRELEASE-STOP
-- ASN1STOP
```

– *AppLayerMeasParameters*

The IE *AppLayerMeasParameters* is used to convey the capabilities supported by the UE for application layer measurements.

AppLayerMeasParameters information element

```
-- ASN1START
-- TAG-APPLAYERMEASPARAMETERS-START

AppLayerMeasParameters-r17 ::=            SEQUENCE {
    qoe-Streaming-MeasReport-r17              ENUMERATED {supported}                                  OPTIONAL,
    qoe-MTSI-MeasReport-r17                   ENUMERATED {supported}                                  OPTIONAL,
    qoe-VR-MeasReport-r17                     ENUMERATED {supported}                                  OPTIONAL,
    ran-VisibleQoE-Streaming-MeasReport-r17   ENUMERATED {supported}                                  OPTIONAL,
    ran-VisibleQoE-VR-MeasReport-r17          ENUMERATED {supported}                                  OPTIONAL,
    ul-MeasurementReportAppLayer-Seg-r17      ENUMERATED {supported}                                  OPTIONAL,
    ...
}

-- TAG-APPLAYERMEASPARAMETERS-STOP
-- ASN1STOP
```

– *BandCombinationList*

The IE *BandCombinationList* contains a list of NR CA, NR non-CA and/or MR-DC band combinations (also including DL only or UL only band).

BandCombinationList information element

```
-- ASN1START
-- TAG-BANDCOMBINATIONLIST-START

BandCombinationList ::=             SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination

BandCombinationList-v1540 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1540

BandCombinationList-v1550 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1550

BandCombinationList-v1560 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1560

BandCombinationList-v1570 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1570

BandCombinationList-v1580 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1580

BandCombinationList-v1590 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1590

BandCombinationList-v15g0 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v15g0

BandCombinationList-v15n0 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v15n0

BandCombinationList-v1610 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1610

BandCombinationList-v1630 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1630

BandCombinationList-v1640 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1640

BandCombinationList-v1650 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1650

BandCombinationList-v1680 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1680

BandCombinationList-v1690 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1690

BandCombinationList-v16a0 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v16a0

BandCombinationList-v1700 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1700

BandCombinationList-v1720 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1720

BandCombinationList-v1730 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1730

BandCombinationList-v1740 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1740

BandCombinationList-v1760 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1760

BandCombinationList-v1770 ::=       SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1770

BandCombinationList-UplinkTxSwitch-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-r16

BandCombinationList-UplinkTxSwitch-v1630 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1630

BandCombinationList-UplinkTxSwitch-v1640 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1640
```

```
BandCombinationList-UplinkTxSwitch-v1650 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1650

BandCombinationList-UplinkTxSwitch-v1670 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1670

BandCombinationList-UplinkTxSwitch-v1690 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1690

BandCombinationList-UplinkTxSwitch-v16a0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v16a0

BandCombinationList-UplinkTxSwitch-v16e0 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v16e0

BandCombinationList-UplinkTxSwitch-v1700 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1700

BandCombinationList-UplinkTxSwitch-v1720 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1720

BandCombinationList-UplinkTxSwitch-v1730 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1730

BandCombinationList-UplinkTxSwitch-v1740 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1740

BandCombinationList-UplinkTxSwitch-v1760 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1760

BandCombinationList-UplinkTxSwitch-v1770 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1770

BandCombination ::=                 SEQUENCE {
    bandList                            SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters,
    featureSetCombination               FeatureSetCombinationId,
    ca-ParametersEUTRA                  CA-ParametersEUTRA                          OPTIONAL,
    ca-ParametersNR                     CA-ParametersNR                             OPTIONAL,
    mrdc-Parameters                     MRDC-Parameters                             OPTIONAL,
    supportedBandwidthCombinationSet    BIT STRING (SIZE (1..32))                   OPTIONAL,
    powerClass-v1530                    ENUMERATED {pc2}                            OPTIONAL
}

BandCombination-v1540::=            SEQUENCE {
    bandList-v1540                      SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1540,
    ca-ParametersNR-v1540               CA-ParametersNR-v1540                       OPTIONAL
}

BandCombination-v1550 ::=           SEQUENCE {
    ca-ParametersNR-v1550               CA-ParametersNR-v1550
}
BandCombination-v1560::=            SEQUENCE {
    ne-DC-BC                                ENUMERATED {supported}              OPTIONAL,
    ca-ParametersNRDC                       CA-ParametersNRDC                   OPTIONAL,
    ca-ParametersEUTRA-v1560                CA-ParametersEUTRA-v1560            OPTIONAL,
    ca-ParametersNR-v1560                   CA-ParametersNR-v1560               OPTIONAL
}

BandCombination-v1570 ::=           SEQUENCE {
    ca-ParametersEUTRA-v1570            CA-ParametersEUTRA-v1570
}

BandCombination-v1580 ::=           SEQUENCE {
    mrdc-Parameters-v1580               MRDC-Parameters-v1580
```

```
}

BandCombination-v1590::=            SEQUENCE {
    supportedBandwidthCombinationSetIntraENDC  BIT STRING (SIZE (1..32))          OPTIONAL,
    mrdc-Parameters-v1590                      MRDC-Parameters-v1590
}

BandCombination-v15g0::=            SEQUENCE {
    ca-ParametersNR-v15g0              CA-ParametersNR-v15g0                      OPTIONAL,
    ca-ParametersNRDC-v15g0            CA-ParametersNRDC-v15g0                    OPTIONAL,
    mrdc-Parameters-v15g0              MRDC-Parameters-v15g0                      OPTIONAL
}

BandCombination-v15n0::=            SEQUENCE {
    mrdc-Parameters-v15n0              MRDC-Parameters-v15n0
}

BandCombination-v1610 ::=           SEQUENCE {
    bandList-v1610                     SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1610  OPTIONAL,
    ca-ParametersNR-v1610              CA-ParametersNR-v1610                  OPTIONAL,
    ca-ParametersNRDC-v1610            CA-ParametersNRDC-v1610                OPTIONAL,
    powerClass-v1610                   ENUMERATED {pc1dot5}                   OPTIONAL,
    powerClassNRPart-r16               ENUMERATED {pc1, pc2, pc3, pc5}        OPTIONAL,
    featureSetCombinationDAPS-r16      FeatureSetCombinationId                OPTIONAL,
    mrdc-Parameters-v1620              MRDC-Parameters-v1620                  OPTIONAL
}

BandCombination-v1630 ::=               SEQUENCE {
    ca-ParametersNR-v1630                  CA-ParametersNR-v1630                                    OPTIONAL,
    ca-ParametersNRDC-v1630                CA-ParametersNRDC-v1630                                  OPTIONAL,
    mrdc-Parameters-v1630                  MRDC-Parameters-v1630                                    OPTIONAL,
    supportedTxBandCombListPerBC-Sidelink-r16   BIT STRING (SIZE (1..maxBandComb))                  OPTIONAL,
    supportedRxBandCombListPerBC-Sidelink-r16   BIT STRING (SIZE (1..maxBandComb))                  OPTIONAL,
    scalingFactorTxSidelink-r16            SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16   OPTIONAL,
    scalingFactorRxSidelink-r16            SEQUENCE (SIZE (1..maxBandComb)) OF ScalingFactorSidelink-r16   OPTIONAL
}

BandCombination-v1640 ::=               SEQUENCE {
    ca-ParametersNR-v1640                  CA-ParametersNR-v1640                                    OPTIONAL,
    ca-ParametersNRDC-v1640                CA-ParametersNRDC-v1640                                  OPTIONAL
}

BandCombination-v1650 ::=           SEQUENCE {
    ca-ParametersNRDC-v1650            CA-ParametersNRDC-v1650                OPTIONAL
}

BandCombination-v1680 ::=           SEQUENCE {
    intrabandConcurrentOperationPowerClass-r16 SEQUENCE (SIZE (1..maxBandComb)) OF IntraBandPowerClass-r16     OPTIONAL
}

BandCombination-v1690 ::=           SEQUENCE {
    ca-ParametersNR-v1690              CA-ParametersNR-v1690                  OPTIONAL
}
```

```
BandCombination-v16a0 ::=          SEQUENCE {
    ca-ParametersNR-v16a0              CA-ParametersNR-v16a0                    OPTIONAL,
    ca-ParametersNRDC-v16a0            CA-ParametersNRDC-v16a0                  OPTIONAL
}
BandCombination-v1700 ::=          SEQUENCE {
    ca-ParametersNR-v1700              CA-ParametersNR-v1700                    OPTIONAL,
    ca-ParametersNRDC-v1700            CA-ParametersNRDC-v1700                  OPTIONAL,
    mrdc-Parameters-v1700              MRDC-Parameters-v1700                    OPTIONAL,
    bandList-v1710                      SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1710  OPTIONAL,
    supportedBandCombListPerBC-SL-RelayDiscovery-r17      BIT STRING (SIZE (1..maxBandComb))               OPTIONAL,
    supportedBandCombListPerBC-SL-NonRelayDiscovery-r17   BIT STRING (SIZE (1..maxBandComb))               OPTIONAL
}

BandCombination-v1720 ::=          SEQUENCE {
    ca-ParametersNR-v1720              CA-ParametersNR-v1720                    OPTIONAL,
    ca-ParametersNRDC-v1720            CA-ParametersNRDC-v1720                  OPTIONAL
}

BandCombination-v1730 ::=          SEQUENCE {
    ca-ParametersNR-v1730              CA-ParametersNR-v1730                    OPTIONAL,
    ca-ParametersNRDC-v1730            CA-ParametersNRDC-v1730                  OPTIONAL,
    bandList-v1730                     SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1730  OPTIONAL
}

BandCombination-v1740 ::=          SEQUENCE {
    ca-ParametersNR-v1740              CA-ParametersNR-v1740                    OPTIONAL
}

BandCombination-v1760 ::=          SEQUENCE {
    ca-ParametersNR-v1760              CA-ParametersNR-v1760,
    ca-ParametersNRDC-v1760            CA-ParametersNRDC-v1760
}

BandCombination-v1770::=            SEQUENCE {
    bandList-v1770                      SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1770,
    mrdc-Parameters-v1770               MRDC-Parameters-v1770                     OPTIONAL,
    ca-ParametersNR-v1770               CA-ParametersNR-v1770                     OPTIONAL}

BandCombination-UplinkTxSwitch-r16 ::= SEQUENCE {
    bandCombination-r16                 BandCombination,
    bandCombination-v1540               BandCombination-v1540                     OPTIONAL,
    bandCombination-v1560               BandCombination-v1560                     OPTIONAL,
    bandCombination-v1570               BandCombination-v1570                     OPTIONAL,
    bandCombination-v1580               BandCombination-v1580                     OPTIONAL,
    bandCombination-v1590               BandCombination-v1590                     OPTIONAL,
    bandCombination-v1610               BandCombination-v1610                     OPTIONAL,
    supportedBandPairListNR-r16         SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-r16,
    uplinkTxSwitching-OptionSupport-r16 ENUMERATED {switchedUL, dualUL, both}     OPTIONAL,
    uplinkTxSwitching-PowerBoosting-r16 ENUMERATED {supported}                    OPTIONAL,
    ...,
    [[
    -- R4 16-5 UL-MIMO coherence capability for dynamic Tx switching between 3CC 1Tx-2Tx switching
    uplinkTxSwitching-PUSCH-TransCoherence-r16     ENUMERATED {nonCoherent, fullCoherent}   OPTIONAL
    ]]
```

```
}

BandCombination-UplinkTxSwitch-v1630 ::=    SEQUENCE {
    bandCombination-v1630                       BandCombination-v1630             OPTIONAL
}

BandCombination-UplinkTxSwitch-v1640 ::=    SEQUENCE {
    bandCombination-v1640                       BandCombination-v1640             OPTIONAL
}

BandCombination-UplinkTxSwitch-v1650 ::= SEQUENCE {
    bandCombination-v1650               BandCombination-v1650                     OPTIONAL
}

BandCombination-UplinkTxSwitch-v1670 ::= SEQUENCE {
    bandCombination-v15g0                   BandCombination-v15g0                 OPTIONAL
}

BandCombination-UplinkTxSwitch-v1690 ::=  SEQUENCE {
    bandCombination-v1690                    BandCombination-v1690                OPTIONAL
}

BandCombination-UplinkTxSwitch-v16a0 ::= SEQUENCE {
    bandCombination-v16a0                   BandCombination-v16a0                 OPTIONAL
}

BandCombination-UplinkTxSwitch-v16e0 ::= SEQUENCE {
    bandCombination-v15n0                   BandCombination-v15n0                 OPTIONAL
}

BandCombination-UplinkTxSwitch-v1700 ::= SEQUENCE {
    bandCombination-v1700                   BandCombination-v1700                     OPTIONAL,
    -- R4 16-1/16-2/16-3 Dynamic Tx switching between 2CC/3CC 2Tx-2Tx/1Tx-2Tx switching
    supportedBandPairListNR-v1700           SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-v1700  OPTIONAL,
    -- R4 16-6: UL-MIMO coherence capability for dynamic Tx switching between 2Tx-2Tx switching
    uplinkTxSwitchingBandParametersList-v1700 SEQUENCE (SIZE (1.. maxSimultaneousBands)) OF UplinkTxSwitchingBandParameters-v1700  OPTIONAL
}

BandCombination-UplinkTxSwitch-v1720 ::= SEQUENCE {
    bandCombination-v1720                   BandCombination-v1720                 OPTIONAL,
    uplinkTxSwitching-OptionSupport2T2T-r17  ENUMERATED {switchedUL, dualUL, both} OPTIONAL
}

BandCombination-UplinkTxSwitch-v1730 ::= SEQUENCE {
    bandCombination-v1730                   BandCombination-v1730                 OPTIONAL
}

BandCombination-UplinkTxSwitch-v1740 ::= SEQUENCE {
    bandCombination-v1740                   BandCombination-v1740                 OPTIONAL
}

BandCombination-UplinkTxSwitch-v1760 ::= SEQUENCE {
    bandCombination-v1760                   BandCombination-v1760                 OPTIONAL
}
```

```
BandCombination-UplinkTxSwitch-v1770 ::= SEQUENCE {
    bandCombination-v1770                   BandCombination-v1770                OPTIONAL
}

ULTxSwitchingBandPair-r16 ::=       SEQUENCE {
    bandIndexUL1-r16                    INTEGER(1..maxSimultaneousBands),
    bandIndexUL2-r16                    INTEGER(1..maxSimultaneousBands),
    uplinkTxSwitchingPeriod-r16         ENUMERATED {n35us, n140us, n210us},
    uplinkTxSwitching-DL-Interruption-r16 BIT STRING (SIZE(1..maxSimultaneousBands)) OPTIONAL
}

ULTxSwitchingBandPair-v1700 ::=     SEQUENCE {
    uplinkTxSwitchingPeriod2T2T-r17     ENUMERATED {n35us, n140us, n210us}     OPTIONAL
}

UplinkTxSwitchingBandParameters-v1700 ::=       SEQUENCE {
    bandIndex-r17                               INTEGER(1..maxSimultaneousBands),
    uplinkTxSwitching2T2T-PUSCH-TransCoherence-r17  ENUMERATED {nonCoherent, fullCoherent}           OPTIONAL
}

BandParameters ::=                      CHOICE {
    eutra                               SEQUENCE {
        bandEUTRA                           FreqBandIndicatorEUTRA,
        ca-BandwidthClassDL-EUTRA           CA-BandwidthClassEUTRA               OPTIONAL,
        ca-BandwidthClassUL-EUTRA           CA-BandwidthClassEUTRA               OPTIONAL
    },
    nr                                  SEQUENCE {
        bandNR                              FreqBandIndicatorNR,
        ca-BandwidthClassDL-NR              CA-BandwidthClassNR                  OPTIONAL,
        ca-BandwidthClassUL-NR              CA-BandwidthClassNR                  OPTIONAL
    }
}

BandParameters-v1540 ::=            SEQUENCE {
    srs-CarrierSwitch                   CHOICE {
        nr                                  SEQUENCE {
            srs-SwitchingTimesListNR            SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeNR
        },
        eutra                               SEQUENCE {
            srs-SwitchingTimesListEUTRA         SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingTimeEUTRA
        }
    }                                                                                OPTIONAL,
    srs-TxSwitch                        SEQUENCE {
        supportedSRS-TxPortSwitch       ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, t1r1, t2r2, t4r4, notSupported},
        txSwitchImpactToRx              INTEGER (1..32)                          OPTIONAL,
        txSwitchWithAnotherBand         INTEGER (1..32)                          OPTIONAL
    }                                                                            OPTIONAL
}

BandParameters-v1610 ::=        SEQUENCE {
    srs-TxSwitch-v1610              SEQUENCE {
        supportedSRS-TxPortSwitch-v1610  ENUMERATED {t1r1-t1r2, t1r1-t1r2-t1r4, t1r1-t1r2-t2r2-t2r4, t1r1-t1r2-t2r2-t1r4-t2r4,
                                                     t1r1-t2r2, t1r1-t2r2-t4r4}
```

```
    }                                                                                   OPTIONAL
}

BandParameters-v1710 ::=        SEQUENCE {
    -- R1 23-8-3    SRS Antenna switching for >4Rx
    srs-AntennaSwitchingBeyond4RX-r17                   SEQUENCE {
        -- 1. Support of SRS antenna switching xTyR with y>4
        supportedSRS-TxPortSwitchBeyond4Rx-r17              BIT STRING (SIZE (11)),
        -- 2. Report the entry number of the first-listed band with UL in the band combination that affects this DL
        entryNumberAffectBeyond4Rx-r17                      INTEGER (1..32)     OPTIONAL,
        -- 3. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL
        entryNumberSwitchBeyond4Rx-r17                      INTEGER (1..32)     OPTIONAL
    }                                                                               OPTIONAL
}

BandParameters-v1730 ::= SEQUENCE {
    -- R1 39-3-2    Affected bands for inter-band CA during SRS carrier switching
    srs-SwitchingAffectedBandsListNR-r17    SEQUENCE (SIZE (1..maxSimultaneousBands)) OF SRS-SwitchingAffectedBandsNR-r17
}

BandParameters-v1770 ::=        SEQUENCE {
    ca-BandwidthClassDL-NR-r17      CA-BandwidthClassNR-r17                 OPTIONAL,
    ca-BandwidthClassUL-NR-r17      CA-BandwidthClassNR-r17                 OPTIONAL
}

ScalingFactorSidelink-r16 ::=       ENUMERATED {f0p4, f0p75, f0p8, f1}

IntraBandPowerClass-r16 ::=         ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}

SRS-SwitchingAffectedBandsNR-r17 ::= BIT STRING (SIZE (1..maxSimultaneousBands))

-- TAG-BANDCOMBINATIONLIST-STOP
-- ASN1STOP
```

***BandCombination* field descriptions**
BandCombinationList-v1540, BandCombinationList-v1550, BandCombinationList-v1560, BandCombinationList-v1570, BandCombinationList-v1580, BandCombinationList-v1590, BandCombinationList-v15g0, BandCombinationList-v15n0, BandCombinationList-v1610*, *BandCombinationList-v1630*, *BandCombinationList-v1640*, *BandCombinationList-v1650, BandCombinationList-v1680, BandCombinationList-v1690, BandCombinationList-v16a0, BandCombinationList-v1700, BandCombinationList-v1720, BandCombinationList-v1730, BandCombinationList-v1760, BandCombinationList-v1770 The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix). If the field is included in *supportedBandCombinationListNEDC-Only-v1610*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* of *supportedBandCombinationListNEDC-Only* (without suffix) field. If the field is included in *supportedBandCombinationListNEDC-Only-v15a0*, the UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList* (without suffix) of *supportedBandCombinationListNEDC-Only* (without suffix) field.
BandCombinationList-UplinkTxSwitch-r16, BandCombinationList-UplinkTxSwitch-v1630, BandCombinationList-UplinkTxSwitch-v1640, BandCombinationList-UplinkTxSwitch-v1650, BandCombinationList-UplinkTxSwitch-v1690, BandCombinationList-UplinkTxSwitch-v16a0, BandCombinationList-UplinkTxSwitch-v16e0, BandCombinationList-UplinkTxSwitch-v1700, BandCombinationList-UplinkTxSwitch-v1720, BandCombinationList-UplinkTxSwitch-v1730, BandCombinationList-UplinkTxSwitch-v1760, BandCombinationList-UplinkTxSwitch-v1770 The UE shall include the same number of entries, and listed in the same order, as in *BandCombinationList-UplinkTxSwitch-r16*. For the field of *supportedBandCombinationList-UplinkTxSwitch-v1700*, if the UE does not support 2Tx-2Tx switching for a given band combination, the field of *supportedBandPairListNR-v1700* in the corresponding entry is absent.
ca-ParametersNRDC If the field is included for a band combination in the NR capability container, the field indicates support of NR-DC. Otherwise, the field is absent.
featureSetCombinationDAPS If this field is present for a band combination, it reports the feature set combination supported for the band combination when any DAPS bearer is configured.
ne-DC-BC If the field is included for a band combination in the MR-DC capability container, the field indicates support of NE-DC. Otherwise, the field is absent.
supportedBandPairListNR-r16, supportedBandPairListNR-v1700 Indicates a list of band pair supporting UL Tx switching as defined in TS 38.101-1 [15] for a given band combination. A UE supporting 2Tx-2Tx switching should include both of *supportedBandPairListNR-r16* and *supportedBandPairListNR-v1700*. And the UE shall include the same number of entries listed in the same order as in *supportedBandPairListNR-r16*. If the UE does not support 2Tx-2Tx switching for a given band pair, the field of *uplinkTxSwitchingPeriod2T2T* in the corresponding entry is absent.
srs-SwitchingTimesListNR Indicates, for a particular pair of NR bands, the RF retuning time when switching between a NR carrier corresponding to this band entry and another (PUSCH-less) NR carrier corresponding to the band entry in the order indicated below: - For the first NR band, the UE shall include the same number of entries for NR bands as in *bandList*, i.e. first entry corresponds to first NR band in *bandList* and so on, - For the second NR band, the UE shall include one entry less, i.e. first entry corresponds to the second NR band in *bandList* and so on - And so on
srs-SwitchingTimesListEUTRA Indicates, for a particular pair of E-UTRA bands, the RF retuning time when switching between an E-UTRA carrier corresponding to this band entry and another (PUSCH-less) E-UTRA carrier corresponding to the band entry in the order indicated below: - For the first E-UTRA band, the UE shall include the same number of entries for E-UTRA bands as in *bandList,* i.e. first entry corresponds to first E-UTRA band in *bandList* and so on, - For the second E-UTRA band, the UE shall include one entry less, i.e. first entry corresponds to the second E-UTRA band in *bandList* and so on - And so on
srs-TxSwitch Indicates supported SRS antenna switch capability for the associated band. If the UE indicates support of *SRS-SwitchingTimeNR*, the UE is allowed to set this field for a band with associated *FeatureSetUplinkId* set to 0 for SRS carrier switching.
uplinkTxSwitchingBandParametersList-v1700 Indicates a list of per band per band combination capabilities for UL Tx switching.

– *BandCombinationListSidelinkEUTRA-NR*

The IE *BandCombinationListSidelinkEUTRA-NR* contains a list of V2X sidelink and NR sidelink band combinations.

BandCombinationListSidelinkEUTRA-NR information element

```
-- ASN1START
-- TAG-BANDCOMBINATIONLISTSIDELINKEUTRANR-START

BandCombinationListSidelinkEUTRA-NR-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-r16

BandCombinationListSidelinkEUTRA-NR-v1630 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-v1630

BandCombinationListSidelinkEUTRA-NR-v1710 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkEUTRA-NR-v1710

BandCombinationParametersSidelinkEUTRA-NR-r16 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-r16

BandCombinationParametersSidelinkEUTRA-NR-v1630 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-v1630

BandCombinationParametersSidelinkEUTRA-NR-v1710 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkEUTRA-NR-v1710

BandParametersSidelinkEUTRA-NR-r16 ::= CHOICE {
    eutra                                   SEQUENCE {
        bandParametersSidelinkEUTRA1-r16        OCTET STRING                        OPTIONAL,
        bandParametersSidelinkEUTRA2-r16        OCTET STRING                        OPTIONAL
    },
    nr                                      SEQUENCE {
        bandParametersSidelinkNR-r16            BandParametersSidelink-r16
    }
}

BandParametersSidelinkEUTRA-NR-v1630 ::= CHOICE {
    eutra                                   NULL,
    nr                                      SEQUENCE {
        tx-Sidelink-r16                         ENUMERATED {supported}                      OPTIONAL,
        rx-Sidelink-r16                         ENUMERATED {supported}                      OPTIONAL,
        sl-CrossCarrierScheduling-r16           ENUMERATED {supported}                      OPTIONAL
    }
}

BandParametersSidelinkEUTRA-NR-v1710 ::= CHOICE {
    eutra                                   NULL,
    nr                                      SEQUENCE {
        --32-4
        sl-TransmissionMode2-PartialSensing-r17  SEQUENCE {
            harq-TxProcessModeTwoSidelink-r17       ENUMERATED {n8, n16},
            scs-CP-PatternTxSidelinkModeTwo-r17     CHOICE {
                fr1-r17                                 SEQUENCE {
                    scs-15kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL,
                    scs-30kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL,
                    scs-60kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL
                },
                fr2-r17                                 SEQUENCE {
```

```
                    scs-60kHz-r17                           BIT STRING (SIZE (16))              OPTIONAL,
                    scs-120kHz-r17                          BIT STRING (SIZE (16))              OPTIONAL
                }
            }                                                                                   OPTIONAL,
            extendedCP-Mode2PartialSensing-r17          ENUMERATED {supported}                  OPTIONAL,
            dl-openLoopPC-Sidelink-r17                  ENUMERATED {supported}                  OPTIONAL
        }                                                                                       OPTIONAL,
        --32-2a:  Receiving NR sidelink of PSFCH
        rx-sidelinkPSFCH-r17                    ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
        --32-5a-1
        tx-IUC-Scheme1-Mode2Sidelink-r17        ENUMERATED {supported}                          OPTIONAL,
        --32-5b-1
        tx-IUC-Scheme2-Mode2Sidelink-r17        ENUMERATED {n4, n8, n16}                        OPTIONAL
    }
}

BandParametersSidelink-r16 ::= SEQUENCE {
    freqBandSidelink-r16          FreqBandIndicatorNR
}

-- TAG-BANDCOMBINATIONLISTSIDELINKEUTRANR-STOP
-- ASN1STOP
```

***BandParametersSidelinkEUTRA-NR* field descriptions**
bandParametersSidelinkEUTRA1, bandParametersSidelinkEUTRA2
This field includes the *V2X-BandParameters-r14* and *V2X-BandParameters-v1530* IE as specified in 36.331 [10]. It is used for reporting the per-band capability for V2X sidelink communication.

– *BandCombinationListSL-Discovery*

The IE *BandCombinationListSL-Discovery* contains a list of NR Sidelink discovery band combinations.

***BandCombinationListSidelinkSL-Discovery* information element**

```
-- ASN1START
-- TAG-BANDCOMBINATIONLISTSLDISCOVERY-START

BandCombinationListSL-Discovery-r17 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelinkDiscovery-r17

BandParametersSidelinkDiscovery-r17 ::= SEQUENCE {
    sl-CrossCarrierScheduling-r17           ENUMERATED {supported}                      OPTIONAL,
    --R1 32-4: Transmitting NR sidelink mode 2 with partial sensing
    sl-TransmissionMode2-PartialSensing-r17  SEQUENCE {
        harq-TxProcessModeTwoSidelink-r17       ENUMERATED {n8, n16},
        scs-CP-PatternTxSidelinkModeTwo-r17     CHOICE {
            fr1-r17                                 SEQUENCE {
                scs-15kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL,
                scs-30kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL,
                scs-60kHz-r17                           BIT STRING (SIZE (16))          OPTIONAL
```

```
            },
            fr2-r17                                 SEQUENCE {
                scs-60kHz-r17                           BIT STRING (SIZE (16))              OPTIONAL,
                scs-120kHz-r17                          BIT STRING (SIZE (16))              OPTIONAL
            }
        }                                                                                   OPTIONAL,
        extendedCP-Mode2PartialSensing-r17          ENUMERATED {supported}                  OPTIONAL,
        dl-openLoopPC-Sidelink-r17                  ENUMERATED {supported}                  OPTIONAL
    }                                                                                       OPTIONAL,
    --R1 32-5a-1: Transmitting Inter-UE coordination scheme 1 in NR sidelink mode 2
    tx-IUC-Scheme1-Mode2Sidelink-r17        ENUMERATED {supported}                          OPTIONAL
}

-- TAG-BANDCOMBINATIONLISTSLDISCOVERY-STOP
-- ASN1STOP
```

– *CA-BandwidthClassEUTRA*

The IE *CA-BandwidthClassEUTRA* indicates the E-UTRA CA bandwidth class as defined in TS 36.101 [22], table 5.6A-1.

***CA-BandwidthClassEUTRA* information element**

```
-- ASN1START
-- TAG-CA-BANDWIDTHCLASSEUTRA-START

CA-BandwidthClassEUTRA ::=          ENUMERATED {a, b, c, d, e, f, ...}

-- TAG-CA-BANDWIDTHCLASSEUTRA-STOP
-- ASN1STOP
```

– *CA-BandwidthClassNR*

The IE *CA-BandwidthClassNR* indicates the NR CA bandwidth class as defined in TS 38.101-1 [15], table 5.3A.5-1 and TS 38.101-2 [39], table 5.3A.4-1.

***CA-BandwidthClassNR* information element**

```
-- ASN1START
-- TAG-CA-BANDWIDTHCLASSNR-START

-- R4 17-6: new CA BW Classes R2-R12
-- R4 17-7: new CA BW Classes V, W

CA-BandwidthClassNR ::=             ENUMERATED {a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, ...,r2-v1730, r3-v1730, r4-v1730, r5-v1730, r6-
v1730, r7-v1730, r8-v1730, r9-v1730, r10-v1730, r11-v1730, r12-v1730,v-v1770, w-v1770 }
```

```
CA-BandwidthClassNR-r17 ::=         ENUMERATED {r, s, t, u, ...}

-- TAG-CA-BANDWIDTHCLASSNR-STOP
-- ASN1STOP
```

– *CA-ParametersEUTRA*

The IE *CA-ParametersEUTRA* contains the E-UTRA part of band combination parameters for a given MR-DC band combination.

NOTE: If additional E-UTRA band combination parameters are defined in TS 36.331 [10], which are supported for MR-DC, they will be defined here as well.

CA-ParametersEUTRA information element

```
-- ASN1START
-- TAG-CA-PARAMETERSEUTRA-START

CA-ParametersEUTRA ::=                          SEQUENCE {
    multipleTimingAdvance                           ENUMERATED {supported}                      OPTIONAL,
    simultaneousRx-Tx                               ENUMERATED {supported}                      OPTIONAL,
    supportedNAICS-2CRS-AP                          BIT STRING (SIZE (1..8))                    OPTIONAL,
    additionalRx-Tx-PerformanceReq                  ENUMERATED {supported}                      OPTIONAL,
    ue-CA-PowerClass-N                              ENUMERATED {class2}                         OPTIONAL,
    supportedBandwidthCombinationSetEUTRA-v1530     BIT STRING (SIZE (1..32))                   OPTIONAL,
    ...
}

CA-ParametersEUTRA-v1560 ::=                    SEQUENCE {
    fd-MIMO-TotalWeightedLayers                     INTEGER (2..128)                            OPTIONAL
}

CA-ParametersEUTRA-v1570 ::=                    SEQUENCE {
    dl-1024QAM-TotalWeightedLayers                  INTEGER (0..10)                             OPTIONAL
}

-- TAG-CA-PARAMETERSEUTRA-STOP
-- ASN1STOP
```

– *CA-ParametersNR*

The IE *CA-ParametersNR* contains carrier aggregation and inter-frequency DAPS handover related capabilities that are defined per band combination.

CA-ParametersNR information element

```
-- ASN1START
-- TAG-CA-PARAMETERSNR-START

CA-ParametersNR ::=                 SEQUENCE {
```

```
    dummy                                       ENUMERATED {supported}      OPTIONAL,
    parallelTxSRS-PUCCH-PUSCH                   ENUMERATED {supported}      OPTIONAL,
    parallelTxPRACH-SRS-PUCCH-PUSCH             ENUMERATED {supported}      OPTIONAL,
    simultaneousRxTxInterBandCA                 ENUMERATED {supported}      OPTIONAL,
    simultaneousRxTxSUL                         ENUMERATED {supported}      OPTIONAL,
    diffNumerologyAcrossPUCCH-Group             ENUMERATED {supported}      OPTIONAL,
    diffNumerologyWithinPUCCH-GroupSmallerSCS   ENUMERATED {supported}      OPTIONAL,
    supportedNumberTAG                          ENUMERATED {n2, n3, n4}     OPTIONAL,
    ...
}

CA-ParametersNR-v1540 ::=           SEQUENCE {
    simultaneousSRS-AssocCSI-RS-AllCC                       INTEGER (5..32)         OPTIONAL,
    csi-RS-IM-ReceptionForFeedbackPerBandComb               SEQUENCE {
        maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC            INTEGER (1..64)     OPTIONAL,
        totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC     INTEGER (2..256)    OPTIONAL
    }                                                                               OPTIONAL,
    simultaneousCSI-ReportsAllCC                            INTEGER (5..32)         OPTIONAL,
    dualPA-Architecture                                     ENUMERATED {supported}  OPTIONAL
}

CA-ParametersNR-v1550 ::=           SEQUENCE {
    dummy                               ENUMERATED {supported}                  OPTIONAL
}

CA-ParametersNR-v1560 ::=           SEQUENCE {
    diffNumerologyWithinPUCCH-GroupLargerSCS    ENUMERATED {supported}          OPTIONAL
}

CA-ParametersNR-v15g0 ::=           SEQUENCE {
    simultaneousRxTxInterBandCAPerBandPair      SimultaneousRxTxPerBandPair     OPTIONAL,
    simultaneousRxTxSULPerBandPair              SimultaneousRxTxPerBandPair     OPTIONAL
}

CA-ParametersNR-v1610 ::=           SEQUENCE {
     -- R1 9-3: Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in inter-band CA
    parallelTxMsgA-SRS-PUCCH-PUSCH-r16              ENUMERATED {supported}      OPTIONAL,
     -- R1 9-4: MsgA operation in a band combination including SUL
    msgA-SUL-r16                                    ENUMERATED {supported}      OPTIONAL,
    -- R1 10-9c: Joint search space group switching across multiple cells
    jointSearchSpaceSwitchAcrossCells-r16           ENUMERATED {supported}      OPTIONAL,
    -- R1 14-5: Half-duplex UE behaviour in TDD CA for same SCS
    half-DuplexTDD-CA-SameSCS-r16                   ENUMERATED {supported}      OPTIONAL,
    -- R1 18-4: SCell dormancy within active time
    scellDormancyWithinActiveTime-r16               ENUMERATED {supported}      OPTIONAL,
    -- R1 18-4a: SCell dormancy outside active time
    scellDormancyOutsideActiveTime-r16              ENUMERATED {supported}      OPTIONAL,
    -- R1 18-6: Cross-carrier A-CSI RS triggering with different SCS
    crossCarrierA-CSI-trigDiffSCS-r16               ENUMERATED {higherA-CSI-SCS,lowerA-CSI-SCS,both}   OPTIONAL,
    -- R1 18-6a: Default QCL assumption for cross-carrier A-CSI-RS triggering
    defaultQCL-CrossCarrierA-CSI-Trig-r16           ENUMERATED {diffOnly, both}   OPTIONAL,
    -- R1 18-7: CA with non-aligned frame boundaries for inter-band CA
    interCA-NonAlignedFrame-r16                     ENUMERATED {supported}      OPTIONAL,
    simul-SRS-Trans-BC-r16                          ENUMERATED {n2}             OPTIONAL,
```

```
    interFreqDAPS-r16                                SEQUENCE {
        interFreqAsyncDAPS-r16                           ENUMERATED {supported}    OPTIONAL,
        interFreqDiffSCS-DAPS-r16                        ENUMERATED {supported}    OPTIONAL,
        interFreqMultiUL-TransmissionDAPS-r16            ENUMERATED {supported}    OPTIONAL,
        interFreqSemiStaticPowerSharingDAPS-Mode1-r16    ENUMERATED {supported}    OPTIONAL,
        interFreqSemiStaticPowerSharingDAPS-Mode2-r16    ENUMERATED {supported}    OPTIONAL,
        interFreqDynamicPowerSharingDAPS-r16             ENUMERATED {short, long}  OPTIONAL,
        interFreqUL-TransCancellationDAPS-r16            ENUMERATED {supported}    OPTIONAL
    }                                                                              OPTIONAL,
    codebookParametersPerBC-r16                      CodebookParameters-v1610      OPTIONAL,
    -- R1 16-2a-10 Value of R for BD/CCE
    blindDetectFactor-r16                            INTEGER (1..2)                OPTIONAL,
    -- R1 11-2a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when configured
    -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-MonitoringCA-r16                           SEQUENCE {
        maxNumberOfMonitoringCC-r16                      INTEGER (2..16),
        supportedSpanArrangement-r16                     ENUMERATED {alignedOnly, alignedAndNonAligned}
    }                                                                              OPTIONAL,
    -- R1 11-2c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 16 and Rel. 15 PDCCH monitoring capabilities on
    -- different carriers
    pdcch-BlindDetectionCA-Mixed-r16                 SEQUENCE {
        pdcch-BlindDetectionCA1-r16                      INTEGER (1..15),
        pdcch-BlindDetectionCA2-r16                      INTEGER (1..15),
        supportedSpanArrangement-r16                     ENUMERATED {alignedOnly, alignedAndNonAligned}
    }                                                                              OPTIONAL,
    -- R1 11-2d: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span for MCG and for
    -- SCG when configured for NR-DC operation with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-BlindDetectionMCG-UE-r16                   INTEGER (1..14)               OPTIONAL,
    pdcch-BlindDetectionSCG-UE-r16                   INTEGER (1..14)               OPTIONAL,
    -- R1 11-2e: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 16 and
    -- Rel. 15 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMCG-UE-Mixed-r16             SEQUENCE {
        pdcch-BlindDetectionMCG-UE1-r16                  INTEGER (0..15),
        pdcch-BlindDetectionMCG-UE2-r16                  INTEGER (0..15)
    }                                                                              OPTIONAL,
    pdcch-BlindDetectionSCG-UE-Mixed-r16             SEQUENCE {
        pdcch-BlindDetectionSCG-UE1-r16                  INTEGER (0..15),
        pdcch-BlindDetectionSCG-UE2-r16                  INTEGER (0..15)
    }                                                                              OPTIONAL,
     -- R1 18-5 cross-carrier scheduling with different SCS in DL CA
    crossCarrierSchedulingDL-DiffSCS-r16             ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,
    -- R1 18-5a Default QCL assumption for cross-carrier scheduling
    crossCarrierSchedulingDefaultQCL-r16             ENUMERATED {diff-only, both}  OPTIONAL,
    -- R1 18-5b cross-carrier scheduling with different SCS in UL CA
    crossCarrierSchedulingUL-DiffSCS-r16             ENUMERATED {low-to-high, high-to-low, both} OPTIONAL,
    -- R1 13.19a Simultaneous positioning SRS and MIMO SRS transmission for a given BC
    simul-SRS-MIMO-Trans-BC-r16                      ENUMERATED {n2}               OPTIONAL,
    -- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1: New Individual Codebook
    codebookParametersAdditionPerBC-r16              CodebookParametersAdditionPerBC-r16         OPTIONAL,
    -- R1 16-8: Mixed codebook
    codebookComboParametersAdditionPerBC-r16         CodebookComboParametersAdditionPerBC-r16    OPTIONAL
}

CA-ParametersNR-v1630 ::= SEQUENCE {
```

```
    -- R1 22-5b: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for inter-band UL CA
    -- R1 22-5d: Simultaneous transmission of SRS for antenna switching for inter-band UL CA
    simulTX-SRS-AntSwitchingInterBandUL-CA-r16       SimulSRS-ForAntennaSwitching-r16          OPTIONAL,
    -- R4 8-5: supported beam management type for inter-band CA
    beamManagementType-r16                           ENUMERATED {ibm, dummy}                     OPTIONAL,
    -- R4 7-3a: UL frequency separation class with aggregate BW and Gap BW
    intraBandFreqSeparationUL-AggBW-GapBW-r16        ENUMERATED {classI, classII, classIII}    OPTIONAL,
    -- RAN 89: Case B in case of Inter-band CA with non-aligned frame boundaries
    interCA-NonAlignedFrame-B-r16                    ENUMERATED {supported}                    OPTIONAL
}

CA-ParametersNR-v1640 ::= SEQUENCE {
    -- R4 7-5: Support of reporting UL Tx DC locations for uplink intra-band CA.
    uplinkTxDC-TwoCarrierReport-r16                                 ENUMERATED {supported}          OPTIONAL,
    -- RAN 22-6: Support of up to 3 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA
    -- where UE is not configured with two NR PUCCH groups
    maxUpTo3Diff-NumerologiesConfigSinglePUCCH-grp-r16              PUCCH-Grp-CarrierTypes-r16      OPTIONAL,
    -- RAN 22-6a: Support of up to 4 different numerologies in the same NR PUCCH group for NR part of EN-DC, NGEN-DC, NE-DC and NR-CA
    -- where UE is not configured with two NR PUCCH groups
    maxUpTo4Diff-NumerologiesConfigSinglePUCCH-grp-r16              PUCCH-Grp-CarrierTypes-r16      OPTIONAL,
    -- RAN 22-7: Support two PUCCH groups for NR-CA with 3 or more bands with at least two carrier types
    twoPUCCH-Grp-ConfigurationsList-r16 SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r16)) OF TwoPUCCH-Grp-Configurations-r16 OPTIONAL,
    -- R1 22-7a: Different numerology across NR PUCCH groups
    diffNumerologyAcrossPUCCH-Group-CarrierTypes-r16                ENUMERATED {supported}          OPTIONAL,
    -- R1 22-7b: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of smaller SCS
    diffNumerologyWithinPUCCH-GroupSmallerSCS-CarrierTypes-r16      ENUMERATED {supported}          OPTIONAL,
    -- R1 22-7c: Different numerologies across NR carriers within the same NR PUCCH group, with PUCCH on a carrier of larger SCS
    diffNumerologyWithinPUCCH-GroupLargerSCS-CarrierTypes-r16       ENUMERATED {supported}          OPTIONAL,
    -- R1 11-2f: add the replicated FGs of 11-2a/c with restriction for non-aligned span case
    -- with DL CA with Rel-16 PDCCH monitoring capability on all the serving cells
    pdcch-MonitoringCA-NonAlignedSpan-r16                           INTEGER (2..16)                 OPTIONAL,
    -- R1 11-2g: add the replicated FGs of 11-2a/c with restriction for non-aligned span case
    pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r16                 SEQUENCE {
        pdcch-BlindDetectionCA1-r16                                     INTEGER (1..15),
        pdcch-BlindDetectionCA2-r16                                     INTEGER (1..15)
    }                                                                                           OPTIONAL
}

CA-ParametersNR-v1690 ::= SEQUENCE {
    csi-ReportingCrossPUCCH-Grp-r16          SEQUENCE {
        computationTimeForA-CSI-r16              ENUMERATED {sameAsNoCross, relaxed},
        additionalSymbols-r16                    SEQUENCE {
            scs-15kHz-additionalSymbols-r16          ENUMERATED {s14, s28}            OPTIONAL,
            scs-30kHz-additionalSymbols-r16          ENUMERATED {s14, s28}            OPTIONAL,
            scs-60kHz-additionalSymbols-r16          ENUMERATED {s14, s28, s56}       OPTIONAL,
            scs-120kHz-additionalSymbols-r16         ENUMERATED {s14, s28, s56}       OPTIONAL
        }                                                                             OPTIONAL,
        sp-CSI-ReportingOnPUCCH-r16              ENUMERATED {supported}               OPTIONAL,
        sp-CSI-ReportingOnPUSCH-r16              ENUMERATED {supported}               OPTIONAL,
        carrierTypePairList-r16                  SEQUENCE (SIZE (1..maxCarrierTypePairList-r16)) OF CarrierTypePair-r16
    }                                                                                 OPTIONAL
}

CA-ParametersNR-v16a0 ::= SEQUENCE {
```

```
    pdcch-BlindDetectionMixedList-r16    SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetectionMixed-1-r16)) OF PDCCH-BlindDetectionMixedList-r16
}

CA-ParametersNR-v1700 ::= SEQUENCE {
    -- R1 23-9-1: Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) per band combination information
    codebookParametersfetype2PerBC-r17              CodebookParametersfetype2PerBC-r17          OPTIONAL,
    -- R4 18-4: Support of enhanced Demodulation requirements for CA in HST SFN FR1
    demodulationEnhancementCA-r17                   ENUMERATED {supported}                      OPTIONAL,
    -- R4 20-1: Maximum uplink duty cycle for NR inter-band CA power class 2
    maxUplinkDutyCycle-interBandCA-PC2-r17          ENUMERATED {n50, n60, n70, n80, n90, n100}  OPTIONAL,
    -- R4 20-2: Maximum uplink duty cycle for NR SUL combination power class 2
    maxUplinkDutyCycle-SULcombination-PC2-r17       ENUMERATED {n50, n60, n70, n80, n90, n100}  OPTIONAL,
    beamManagementType-CBM-r17                      ENUMERATED {supported}                      OPTIONAL,
    -- R1 25-18: Parallel PUCCH and PUSCH transmission across CCs in inter-band CA
    parallelTxPUCCH-PUSCH-r17                       ENUMERATED {supported}      OPTIONAL,
    -- R1 23-9-5    Active CSI-RS resources and ports for mixed codebook types in any slot per band combination
    codebookComboParameterMixedTypePerBC-r17        CodebookComboParameterMixedTypePerBC-r17    OPTIONAL,
   -- R1 23-7-1 Basic Features of CSI Enhancement for Multi-TRP
    mTRP-CSI-EnhancementPerBC-r17                   SEQUENCE {
        maxNumNZP-CSI-RS-r17                            INTEGER (2..8),
        cSI-Report-mode-r17                             ENUMERATED {mode1, mode2, both},
        supportedComboAcrossCCs-r17                     SEQUENCE (SIZE (1..16)) OF CSI-MultiTRP-SupportedCombinations-r17,
        codebookMode-NCJT-r17   ENUMERATED{mode1,mode1And2}
    }                                                                                       OPTIONAL,
     -- R1 23-7-1b  Active CSI-RS resources and ports in the presence of multi-TRP CSI
    codebookComboParameterMultiTRP-PerBC-r17        CodebookComboParameterMultiTRP-PerBC-r17    OPTIONAL,
    -- R1 24-8b: 32 DL HARQ processes for FR 2-2 - maximum number of component carriers
    maxCC-32-DL-HARQ-ProcessFR2-2-r17               ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32} OPTIONAL,
    -- R1 24-9b: 32 UL HARQ processes for FR 2-2 - maximum number of component carriers
    maxCC-32-UL-HARQ-ProcessFR2-2-r17               ENUMERATED {n1, n2, n3, n4, n5, n8, n16, n32}  OPTIONAL,
    -- R1 34-2: Cross-carrier scheduling from SCell to PCell/PSCell (Type B)
    crossCarrierSchedulingSCell-SpCellTypeB-r17     CrossCarrierSchedulingSCell-SpCell-r17      OPTIONAL,
-- R1 34-1: Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A)
    crossCarrierSchedulingSCell-SpCellTypeA-r17     CrossCarrierSchedulingSCell-SpCell-r17      OPTIONAL,
    -- R1 34-1a: DCI formats on PCell/PSCell USS set(s) support
    dci-FormatsPCellPSCellUSS-Sets-r17              ENUMERATED {supported}                      OPTIONAL,
    -- R1 34-3: Disabling scaling factor alpha when sSCell is deactivated
    disablingScalingFactorDeactSCell-r17            ENUMERATED {supported}                      OPTIONAL,
    -- R1 34-4: Disabling scaling factor alpha when sSCell is deactivated
    disablingScalingFactorDormantSCell-r17          ENUMERATED {supported}                      OPTIONAL,
    -- R1 34-5: Non-aligned frame boundaries between PCell/PSCell and sSCell
    non-AlignedFrameBoundaries-r17 SEQUENCE {
        scs15kHz-15kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL,
        scs15kHz-30kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL,
        scs15kHz-60kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL,
        scs30kHz-30kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL,
        scs30kHz-60kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL,
        scs60kHz-60kHz-r17                              BIT STRING (SIZE (1..496))              OPTIONAL
    }                                                                                           OPTIONAL
}

CA-ParametersNR-v1720 ::= SEQUENCE {
    -- R1 39-1: Parallel SRS and PUCCH/PUSCH transmission across CCs in intra-band non-contiguous CA
    parallelTxSRS-PUCCH-PUSCH-intraBand-r17         ENUMERATED {supported}                      OPTIONAL,
```

```
    -- R1 39-2: Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA
    parallelTxPRACH-SRS-PUCCH-PUSCH-intraBand-r17    ENUMERATED {supported}                    OPTIONAL,
    -- R1 25-9: Semi-static PUCCH cell switching for a single PUCCH group only
    semiStaticPUCCH-CellSwitchSingleGroup-r17        SEQUENCE {
        pucch-Group-r17                                ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
        pucch-Group-Config-r17                           PUCCH-Group-Config-r17
    }                                                                                          OPTIONAL,
    -- R1 25-9a: Semi-static PUCCH cell switching for two PUCCH groups
    semiStaticPUCCH-CellSwitchTwoGroups-r17    SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17 OPTIONAL,
    -- R1 25-10: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for a single
    -- PUCCH group only
    dynamicPUCCH-CellSwitchSameLengthSingleGroup-r17 SEQUENCE {
        pucch-Group-r17                                ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
        pucch-Group-Config-r17                       PUCCH-Group-Config-r17
    }                                                                                          OPTIONAL,
    -- R1 25-10a: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots
    -- for a single PUCCH group only
    dynamicPUCCH-CellSwitchDiffLengthSingleGroup-r17 SEQUENCE {
        pucch-Group-r17                                ENUMERATED {primaryGroupOnly, secondaryGroupOnly, eitherPrimaryOrSecondaryGroup},
        pucch-Group-Config-r17                         PUCCH-Group-Config-r17
    }                                                                                          OPTIONAL,
    -- R1 25-10b: PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for two PUCCH
    -- groups
    dynamicPUCCH-CellSwitchSameLengthTwoGroups-r17   SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17
                                                                                               OPTIONAL,
    -- R1 25-10c: PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots for two
    -- PUCCH groups
    dynamicPUCCH-CellSwitchDiffLengthTwoGroups-r17   SEQUENCE (SIZE (1..maxTwoPUCCH-Grp-ConfigList-r17)) OF TwoPUCCH-Grp-Configurations-r17
                                                                                               OPTIONAL,
    -- R1 33-2a: ACK/NACK based HARQ-ACK feedback and RRC-based enabling/disabling ACK/NACK-based
    -- feedback for dynamic scheduling for multicast
    ack-NACK-FeedbackForMulticast-r17                ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-2d: PTP retransmission for multicast dynamic scheduling
    ptp-Retx-Multicast-r17                           ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-4: NACK-only based HARQ-ACK feedback for RRC-based enabling/disabling multicast with ACK/NACK transforming
    nack-OnlyFeedbackForMulticast-r17                ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-4a: NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission
    nack-OnlyFeedbackSpecificResourceForMulticast-r17 ENUMERATED {supported}                   OPTIONAL,
    -- R1 33-5-1a: ACK/NACK based HARQ-ACK feedback and RRC-based enabling/disabling ACK/NACK-based feedback
    -- for SPS group-common PDSCH for multicast
    ack-NACK-FeedbackForSPS-Multicast-r17            ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-5-1d: PTP retransmission for SPS group-common PDSCH for multicast
    ptp-Retx-SPS-Multicast-r17                       ENUMERATED {supported}                    OPTIONAL,
    -- R4 26-1: Higher Power Limit CA DC
    higherPowerLimit-r17                             ENUMERATED {supported}                    OPTIONAL,
    -- R1 39-4: Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA
    parallelTxMsgA-SRS-PUCCH-PUSCH-intraBand-r17     ENUMERATED {supported}                    OPTIONAL,
    -- R1 24-11a: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs per span when
    -- configured with DL CA with Rel-17 PDCCH monitoring capability on all the serving cells
    pdcch-MonitoringCA-r17                           INTEGER (4..16)                           OPTIONAL,
    -- R1 24-11f: Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs for MCG and for SCG
    -- when configured for NR-DC operation with Rel-17 PDCCH monitoring capability on all the serving cells
    pdcch-BlindDetectionMCG-SCG-List-r17             SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMCG-SCG-r17
                                                                                               OPTIONAL,
```

```
    -- R1 24-11c: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 15 PDCCH monitoring capabilities on
    -- different Carriers
    -- R1 24-11g: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and
    -- Rel. 15 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMixedList1-r17              SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17
                                                                                                       OPTIONAL,
    -- R1 24-11d: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 16 PDCCH monitoring capabilities on
    -- different Carriers
    -- R1 24-11h: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and
    -- Rel. 16 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMixedList2-r17              SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed-r17
                                                                                                       OPTIONAL,
    -- R1 24-11e: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17, Rel. 16 and Rel. 15 PDCCH monitoring
    -- capabilities on different carriers
    -- R1 24-11i: Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17,
    -- Rel. 16 and Rel. 15 PDCCH monitoring capabilities on different carriers
    pdcch-BlindDetectionMixedList3-r17              SEQUENCE(SIZE(1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed1-r17
                                                                                                       OPTIONAL
}

CA-ParametersNR-v1730 ::= SEQUENCE {
    -- R1 30-4a: DM-RS bundling for PUSCH repetition type A (per BC)
    dmrs-BundlingPUSCH-RepTypeAPerBC-r17                    ENUMERATED {supported}                  OPTIONAL,
    -- R1 30-4b: DM-RS bundling for PUSCH repetition type B(per BC)
    dmrs-BundlingPUSCH-RepTypeBPerBC-r17                    ENUMERATED {supported}                  OPTIONAL,
    -- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH(per BC)
    dmrs-BundlingPUSCH-multiSlotPerBC-r17                   ENUMERATED {supported}                  OPTIONAL,
    -- R1 30-4d: DMRS bundling for PUCCH repetitions(per BC)
    dmrs-BundlingPUCCH-RepPerBC-r17                         ENUMERATED {supported}                  OPTIONAL,
    -- R1 30-4g: Restart DM-RS bundling (per BC)
    dmrs-BundlingRestartPerBC-r17                           ENUMERATED {supported}                  OPTIONAL,
    -- R1 30-4h: DM-RS bundling for non-back-to-back transmission (per BC)
    dmrs-BundlingNonBackToBackTX-PerBC-r17                  ENUMERATED {supported}                  OPTIONAL,
    -- R1 39-3-1: Stay on the target CC for SRS carrier switching
    stayOnTargetCC-SRS-CarrierSwitch-r17                    ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-3-3a: FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast
    fdm-CodebookForMux-UnicastMulticastHARQ-ACK-r17         ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-3-3b: Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast
    mode2-TDM-CodebookForMux-UnicastMulticastHARQ-ACK-r17   ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-3-4: Mode 1 for type1 codebook generation
    mode1-ForType1-CodebookGeneration-r17                   ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-5-1j: NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission
    -- for SPS group-commmon PDSCH for multicast
    nack-OnlyFeedbackSpecificResourceForSPS-Multicast-r17   ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-8-2: Up to 2 PUCCH resources configuration for multicast feedback for dynamically scheduled multicast
    multiPUCCH-ConfigForMulticast-r17                       ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-8-3: PUCCH resource configuration for multicast feedback for SPS GC-PDSCH
    pucch-ConfigForSPS-Multicast-r17                        ENUMERATED {supported}                  OPTIONAL,
    -- The following parameter is associated with R1 33-2a, R1 33-3-3a, and R1 33-3-3b, and is not a RAN1 FG.
    maxNumberG-RNTI-HARQ-ACK-Codebook-r17                   INTEGER (1..4)                          OPTIONAL,
    -- R1 33-3-5: Feedback multiplexing for unicast PDSCH and group-common PDSCH for multicast with same priority and different codebook
    -- type
    mux-HARQ-ACK-UnicastMulticast-r17                       ENUMERATED {supported}                  OPTIONAL
}
```

```
CA-ParametersNR-v1740 ::= SEQUENCE {
    -- R1 33-5-1f: NACK-only based HARQ-ACK feedback for multicast RRC-based enabling/disabling NACK-only based feedback
    -- for SPS group-common PDSCH for multicast
    nack-OnlyFeedbackForSPS-Multicast-r17                ENUMERATED {supported}                        OPTIONAL,
    -- R1 33-8-1: PUCCH resource configuration for multicast feedback for dynamically scheduled multicast
    singlePUCCH-ConfigForMulticast-r17                   ENUMERATED {supported}                        OPTIONAL
}

CA-ParametersNR-v1760 ::= SEQUENCE {
    prioSCellPRACH-OverSP-PeriodicSRS-Support-r17        ENUMERATED {supported}                        OPTIONAL
}

CA-ParametersNR-v1770 ::= SEQUENCE {
    parallelTxPUCCH-PUSCH-SamePriority-r17               ENUMERATED {supported}                        OPTIONAL
}

CrossCarrierSchedulingSCell-SpCell-r17 ::= SEQUENCE {
    supportedSCS-Combinations-r17             SEQUENCE {
        scs15kHz-15kHz-r17                        ENUMERATED {supported}                    OPTIONAL,
        scs15kHz-30kHz-r17                        ENUMERATED {supported}                    OPTIONAL,
        scs15kHz-60kHz-r17                        ENUMERATED {supported}                    OPTIONAL,
        scs30kHz-30kHz-r17                        BIT STRING (SIZE (1..496))                OPTIONAL,
        scs30kHz-60kHz-r17                        BIT STRING (SIZE (1..496))                OPTIONAL,
        scs60kHz-60kHz-r17                        BIT STRING (SIZE (1..496))                OPTIONAL
    },
    pdcch-MonitoringOccasion-r17              ENUMERATED {val1, val2}
}

PDCCH-BlindDetectionMixedList-r16::=      SEQUENCE {
    pdcch-BlindDetectionCA-MixedExt-r16       CHOICE {
        pdcch-BlindDetectionCA-Mixed-v16a0               PDCCH-BlindDetectionCA-MixedExt-r16,
        pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16a0 PDCCH-BlindDetectionCA-MixedExt-r16
    }                                                                                          OPTIONAL,
    pdcch-BlindDetectionCG-UE-MixedExt-r16    SEQUENCE{
    pdcch-BlindDetectionMCG-UE-Mixed-v16a0           PDCCH-BlindDetectionCG-UE-MixedExt-r16,
        pdcch-BlindDetectionSCG-UE-Mixed-v16a0       PDCCH-BlindDetectionCG-UE-MixedExt-r16
    }                                                                                          OPTIONAL
}

PDCCH-BlindDetectionCA-MixedExt-r16 ::=   SEQUENCE {
    pdcch-BlindDetectionCA1-r16               INTEGER (1..15),
    pdcch-BlindDetectionCA2-r16               INTEGER (1..15)
}

PDCCH-BlindDetectionCG-UE-MixedExt-r16 ::= SEQUENCE {
    pdcch-BlindDetectionCG-UE1-r16            INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r16            INTEGER (0..15)
}

PDCCH-BlindDetectionMCG-SCG-r17 ::=       SEQUENCE {
    pdcch-BlindDetectionMCG-UE-r17            INTEGER (1..15),
    pdcch-BlindDetectionSCG-UE-r17            INTEGER (1..15)
}
```

```
PDCCH-BlindDetectionMixed-r17::=          SEQUENCE {
    pdcch-BlindDetectionCA-Mixed-r17          PDCCH-BlindDetectionCA-Mixed-r17                  OPTIONAL,
    pdcch-BlindDetectionCG-UE-Mixed-r17       SEQUENCE{
        pdcch-BlindDetectionMCG-UE-Mixed-v17      PDCCH-BlindDetectionCG-UE-Mixed-r17,
        pdcch-BlindDetectionSCG-UE-Mixed-v17      PDCCH-BlindDetectionCG-UE-Mixed-r17
    }                                                                                           OPTIONAL
}

PDCCH-BlindDetectionCG-UE-Mixed-r17 ::=   SEQUENCE {
    pdcch-BlindDetectionCG-UE1-r17            INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r17            INTEGER (0..15)
}

PDCCH-BlindDetectionCA-Mixed-r17 ::=      SEQUENCE {
    pdcch-BlindDetectionCA1-r17               INTEGER (1..15)                                   OPTIONAL,
    pdcch-BlindDetectionCA2-r17               INTEGER (1..15)                                   OPTIONAL
}
PDCCH-BlindDetectionMixed1-r17::=         SEQUENCE {
    pdcch-BlindDetectionCA-Mixed1-r17         PDCCH-BlindDetectionCA-Mixed1-r17                 OPTIONAL,
    pdcch-BlindDetectionCG-UE-Mixed1-r17      SEQUENCE{
        pdcch-BlindDetectionMCG-UE-Mixed1-v17     PDCCH-BlindDetectionCG-UE-Mixed1-r17,
        pdcch-BlindDetectionSCG-UE-Mixed1-v17     PDCCH-BlindDetectionCG-UE-Mixed1-r17
    }                                                                                           OPTIONAL
}

PDCCH-BlindDetectionCG-UE-Mixed1-r17 ::=  SEQUENCE {
    pdcch-BlindDetectionCG-UE1-r17            INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r17            INTEGER (0..15),
    pdcch-BlindDetectionCG-UE3-r17            INTEGER (0..15)
}

PDCCH-BlindDetectionCA-Mixed1-r17 ::=     SEQUENCE {
    pdcch-BlindDetectionCA1-r17               INTEGER (1..15)                                   OPTIONAL,
    pdcch-BlindDetectionCA2-r17               INTEGER (1..15)                                   OPTIONAL,
    pdcch-BlindDetectionCA3-r17               INTEGER (1..15)                                   OPTIONAL
}

SimulSRS-ForAntennaSwitching-r16 ::= SEQUENCE {
    supportSRS-xTyR-xLessThanY-r16       ENUMERATED {supported}                 OPTIONAL,
    supportSRS-xTyR-xEqualToY-r16        ENUMERATED {supported}                 OPTIONAL,
    supportSRS-AntennaSwitching-r16      ENUMERATED {supported}                 OPTIONAL
}

TwoPUCCH-Grp-Configurations-r16 ::=  SEQUENCE {
    pucch-PrimaryGroupMapping-r16        TwoPUCCH-Grp-ConfigParams-r16,
    pucch-SecondaryGroupMapping-r16      TwoPUCCH-Grp-ConfigParams-r16
}

TwoPUCCH-Grp-Configurations-r17 ::=  SEQUENCE {
    primaryPUCCH-GroupConfig-r17         PUCCH-Group-Config-r17,
    secondaryPUCCH-GroupConfig-r17       PUCCH-Group-Config-r17
}
```

```
TwoPUCCH-Grp-ConfigParams-r16 ::=    SEQUENCE {
    pucch-GroupMapping-r16              PUCCH-Grp-CarrierTypes-r16,
    pucch-TX-r16                        PUCCH-Grp-CarrierTypes-r16
}


CarrierTypePair-r16 ::=             SEQUENCE {
    carrierForCSI-Measurement-r16       PUCCH-Grp-CarrierTypes-r16,
    carrierForCSI-Reporting-r16         PUCCH-Grp-CarrierTypes-r16
}

PUCCH-Grp-CarrierTypes-r16 ::=      SEQUENCE {
    fr1-NonSharedTDD-r16                ENUMERATED {supported}                  OPTIONAL,
    fr1-SharedTDD-r16                   ENUMERATED {supported}                  OPTIONAL,
    fr1-NonSharedFDD-r16                ENUMERATED {supported}                  OPTIONAL,
    fr2-r16                             ENUMERATED {supported}                  OPTIONAL
}

PUCCH-Group-Config-r17 ::=          SEQUENCE {
    fr1-FR1-NonSharedTDD-r17            ENUMERATED {supported}                  OPTIONAL,
    fr2-FR2-NonSharedTDD-r17            ENUMERATED {supported}                  OPTIONAL,
    fr1-FR2-NonSharedTDD-r17            ENUMERATED {supported}                  OPTIONAL
}

-- TAG-CA-PARAMETERSNR-STOP
-- ASN1STOP
```

***CA-ParametersNR* field description**
codebookParametersPerBC   For a given supported band combination, this field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type, amongst the supported CSI-RS resources included in *codebookParametersPerBand* in *MIMO-ParametersPerBand*.

– *CA-ParametersNRDC*

The IE *CA-ParametersNRDC* contains dual connectivity related capabilities that are defined per band combination.

***CA-ParametersNRDC* information element**

```
-- ASN1START
-- TAG-CA-PARAMETERS-NRDC-START

CA-ParametersNRDC ::=                   SEQUENCE {
     ca-ParametersNR-ForDC                 CA-ParametersNR                       OPTIONAL,
     ca-ParametersNR-ForDC-v1540           CA-ParametersNR-v1540                 OPTIONAL,
     ca-ParametersNR-ForDC-v1550           CA-ParametersNR-v1550                 OPTIONAL,
     ca-ParametersNR-ForDC-v1560           CA-ParametersNR-v1560                 OPTIONAL,
     featureSetCombinationDC               FeatureSetCombinationId               OPTIONAL
}
```

```
CA-ParametersNRDC-v15g0 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v15g0                 CA-ParametersNR-v15g0                       OPTIONAL
}

CA-ParametersNRDC-v1610 ::= SEQUENCE {
    -- R1 18-1: Semi-static power sharing mode1 between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-PwrSharingMode1-r16       ENUMERATED {supported}          OPTIONAL,
    -- R1 18-1a: Semi-static power sharing mode 2 between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-PwrSharingMode2-r16       ENUMERATED {supported}          OPTIONAL,
    -- R1 18-1b: Dynamic power sharing between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-DynamicPwrSharing-r16     ENUMERATED {short, long}        OPTIONAL,
    asyncNRDC-r16                           ENUMERATED {supported}          OPTIONAL
}

CA-ParametersNRDC-v1630 ::=                     SEQUENCE {
     ca-ParametersNR-ForDC-v1610                CA-ParametersNR-v1610                       OPTIONAL,
     ca-ParametersNR-ForDC-v1630                CA-ParametersNR-v1630                       OPTIONAL
}

CA-ParametersNRDC-v1640 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v1640                 CA-ParametersNR-v1640                       OPTIONAL
}

CA-ParametersNRDC-v1650 ::=                 SEQUENCE {
    supportedCellGrouping-r16                   BIT STRING (SIZE (1..maxCellGroupings-r16))  OPTIONAL
}

CA-ParametersNRDC-v16a0 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v16a0                 CA-ParametersNR-v16a0                       OPTIONAL
}

CA-ParametersNRDC-v1700 ::=                  SEQUENCE {
    -- R1 31-9: Indicates the support of simultaneous transmission and reception of an IAB-node from multiple parent nodes
    simultaneousRxTx-IAB-MultipleParents-r17    ENUMERATED {supported}              OPTIONAL,
    condPSCellAdditionNRDC-r17                  ENUMERATED {supported}              OPTIONAL,
    scg-ActivationDeactivationNRDC-r17          ENUMERATED {supported}              OPTIONAL,
    scg-ActivationDeactivationResumeNRDC-r17    ENUMERATED {supported}              OPTIONAL,
    beamManagementType-CBM-r17                  ENUMERATED {supported}              OPTIONAL
}

CA-ParametersNRDC-v1720 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v1700                 CA-ParametersNR-v1700                       OPTIONAL,
    ca-ParametersNR-ForDC-v1720                 CA-ParametersNR-v1720                       OPTIONAL
}

CA-ParametersNRDC-v1730 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v1730                 CA-ParametersNR-v1730                       OPTIONAL
}

CA-ParametersNRDC-v1760 ::=                 SEQUENCE {
    ca-ParametersNR-ForDC-v1760                 CA-ParametersNR-v1760
}

-- TAG-CA-PARAMETERS-NRDC-STOP
```

```
-- ASN1STOP
```

***CA-ParametersNRDC* field descriptions**
ca-ParametersNR-forDC (with and without suffix)
If this field is present for a band combination, it reports the UE capabilities when NR-DC is configured with the band combination. If a version of this field (i.e., with or without suffix) is absent for a band combination, the corresponding *ca-ParametersNR* field version in *BandCombination* is applicable to the UE configured with NR-DC for the band combination. If a version of this field (i.e., with or without suffix) is present for a band combination but does not contain any parameters, the UE does not support the corresponding field version when configured with NR-DC for the band combination.
featureSetCombinationDC
If this field is present for a band combination, it reports the feature set combination supported for the band combination when NR-DC is configured. If this field is absent for a band combination, the *featureSetCombination* in *BandCombination* (without suffix) is applicable to the UE configured with NR-DC for the band combination.

– *CarrierAggregationVariant*

The IE *CarrierAggregationVariant* informs the network about supported "placement" of the SpCell in an NR cell group.

***CarrierAggregationVariant* information element**

```
-- ASN1START
-- TAG-CARRIERAGGREGATIONVARIANT-START

CarrierAggregationVariant ::=          SEQUENCE {
    fr1fdd-FR1TDD-CA-SpCellOnFR1FDD          ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR1TDD-CA-SpCellOnFR1TDD          ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR2TDD-CA-SpCellOnFR1FDD          ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR2TDD-CA-SpCellOnFR2TDD          ENUMERATED {supported}                    OPTIONAL,
    fr1tdd-FR2TDD-CA-SpCellOnFR1TDD          ENUMERATED {supported}                    OPTIONAL,
    fr1tdd-FR2TDD-CA-SpCellOnFR2TDD          ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1FDD   ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR1TDD   ENUMERATED {supported}                    OPTIONAL,
    fr1fdd-FR1TDD-FR2TDD-CA-SpCellOnFR2TDD   ENUMERATED {supported}                    OPTIONAL
}

-- TAG-CARRIERAGGREGATIONVARIANT-STOP
-- ASN1STOP
```

– *CodebookParameters*

The IE *CodebookParameters* is used to convey codebook related parameters.

***CodebookParameters* information element**

```
-- ASN1START
-- TAG-CODEBOOKPARAMETERS-START
```

```
CodebookParameters ::=              SEQUENCE {
    type1                                   SEQUENCE {
        singlePanel                             SEQUENCE {
            supportedCSI-RS-ResourceList        SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
            modes                                   ENUMERATED {mode1, mode1andMode2},
            maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
        },
        multiPanel                              SEQUENCE {
            supportedCSI-RS-ResourceList        SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
            modes                                   ENUMERATED {mode1, mode2, both},
            nrofPanels                              ENUMERATED {n2, n4},
            maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
        }                                                                                                   OPTIONAL
    },
    type2                                   SEQUENCE {
        supportedCSI-RS-ResourceList        SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
        parameterLx                             INTEGER (2..4),
        amplitudeScalingType                ENUMERATED {wideband, widebandAndSubband},
        amplitudeSubsetRestriction          ENUMERATED {supported}              OPTIONAL
    }                                                                                                       OPTIONAL,
    type2-PortSelection                 SEQUENCE {
        supportedCSI-RS-ResourceList        SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource,
        parameterLx                             INTEGER (2..4),
        amplitudeScalingType                ENUMERATED {wideband, widebandAndSubband}
    }                                                                                                       OPTIONAL
}

CodebookParameters-v1610 ::=        SEQUENCE {
    supportedCSI-RS-ResourceListAlt-r16  SEQUENCE {
        type1-SinglePanel-r16               SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
        type1-MultiPanel-r16                SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
        type2-r16                           SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
        type2-PortSelection-r16             SEQUENCE (SIZE (1..maxNrofCSI-RS-Resources)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL
    }
OPTIONAL
}

CodebookParametersAddition-r16 ::=      SEQUENCE {
    etype2-r16                              SEQUENCE {
        -- R1 16-3a Regular eType 2 R=1
        etype2R1-r16                            SEQUENCE {
            supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                    INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        },
        -- R1 16-3a-1 Regular eType 2 R=2
        etype2R2-r16                            SEQUENCE {
            supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                                    INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        }                                                               OPTIONAL,
        -- R1 16-3a-2: Support of parameter combinations 7-8
```

```
        paramComb7-8-r16                    ENUMERATED {supported}      OPTIONAL,
        -- R1 16-3a-3: Support of rank 3,4
        rank3-4-r16                         ENUMERATED {supported}      OPTIONAL,
        -- R1 16-3a-4: CBSR with soft amplitude restriction
        amplitudeSubsetRestriction-r16      ENUMERATED {supported}      OPTIONAL
    }                                                                   OPTIONAL,
    etype2-PS-r16                       SEQUENCE {
        -- R1 16-3b Regular eType 2 R=1 PortSelection
        etype2R1-PortSelection-r16          SEQUENCE {
            supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                        INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        },
        -- R1 16-3b-1 Regular eType 2 R=2 PortSelection
        etype2R2-PortSelection-r16          SEQUENCE {
            supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
                                                                        INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
        }                                                               OPTIONAL,
        -- R1 16-3b-2: Support of rank 3,4
        rank3-4-r16                         ENUMERATED {supported}      OPTIONAL
    }                                                                   OPTIONAL
}

CodebookComboParametersAddition-r16 ::= SEQUENCE {
    -- R1 16-8 Mixed codebook types
    type1SP-Type2-null-r16              SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-Type2PS-null-r16            SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-eType2R1-null-r16           SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-eType2R2-null-r16           SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-eType2R1PS-null-r16         SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-eType2R2PS-null-r16         SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1SP-Type2-Type2PS-r16           SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1MP-Type2-null-r16              SEQUENCE {
    supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1MP-Type2PS-null-r16            SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
    type1MP-eType2R1-null-r16           SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                   OPTIONAL,
```

```
    type1MP-eType2R2-null-r16              SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                                                  OPTIONAL,
    type1MP-eType2R1PS-null-r16            SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                                                  OPTIONAL,
    type1MP-eType2R2PS-null-r16            SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                                                  OPTIONAL,
    type1MP-Type2-Type2PS-r16              SEQUENCE {
        supportedCSI-RS-ResourceListAdd-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
    }                                                                                                  OPTIONAL
}

CodebookParametersfetype2-r17 ::= SEQUENCE {
    -- R1 23-9-1  Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II)
    fetype2basic-r17        SEQUENCE (SIZE (1.. maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
    -- R1 23-9-2  Support of M=2 and R=1 for FeType-II
    fetype2R1-r17           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                    OPTIONAL,
    -- R1 23-9-4  Support of R = 2 for FeType-II
    fetype2R2-r17           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                    OPTIONAL,
    -- R1 23-9-3  Support of rank 3, 4 for FeType-II
    fetype2Rank3Rank4-r17   ENUMERATED {supported}     OPTIONAL
}

CodebookComboParameterMixedType-r17 ::= SEQUENCE {
    -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot
    type1SP-feType2PS-null-r17              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-feType2PS-M2R1-null-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-feType2PS-M2R2-null-r1          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-Type2-feType2-PS-M1-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-Type2-feType2-PS-M2R1-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-eType2R1-feType2-PS-M1-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1SP-eType2R1-feType2-PS-M2R1-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-feType2PS-null-r17              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-feType2PS-M2R1-null-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-feType2PS-M2R2-null-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-Type2-feType2-PS-M1-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-Type2-feType2-PS-M2R1-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                   OPTIONAL,
    type1MP-eType2R1-feType2-PS-M1-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
```

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                                                    OPTIONAL,
    type1MP-eType2R1-feType2-PS-M2R1-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL
}

CodebookComboParameterMultiTRP-r17::= SEQUENCE {
    -- R1 23-7-1b   Active CSI-RS resources and ports in the presence of multi-TRP CSI
    --  {Codebook 2, Codebook 3} =(NULL, NULL}
    nCJT-null-null                      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-null-null                   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    --    {Codebook 2, Codebook 3} = {( {"Rel 16 combinations in FG 16-8"}
    nCJT-Type2-null-r16                 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-Type2PS-null-r16               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-eType2R1-null-r16              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-eType2R2-null-r16              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-eType2R1PS-null-r16            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-eType2R2PS-null-r16            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-Type2-Type2PS-r16              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-Type2-null-r16              SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-Type2PS-null-r16            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-eType2R1-null-r16           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-eType2R2-null-r16           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-eType2R1PS-null-r16         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-eType2R2PS-null-r16         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT1SP-Type2-Type2PS-r16           SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    -- {Codebook 2, Codebook 3} = {"New Rel17 combinations in FG 23-9-5"}
    nCJT-feType2PS-null-r17             SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-feType2PS-M2R1-null-r17        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-feType2PS-M2R2-null-r17        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-Type2-feType2-PS-M1-r17        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-Type2-feType2-PS-M2R1-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    nCJT-eType2R1-feType2-PS-M1-r17     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
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    nCJT-eType2R1-feType2-PS-M2R1-r17     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-feType2PS-null-r17            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-feType2PS-M2R1-null-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-feType2PS-M2R2-null-r1        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M1-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M2R1-r17     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M1-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M2R1-r17  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL
}

CodebookParametersAdditionPerBC-r16::=  SEQUENCE {
    -- R1 16-3a Regular eType 2 R=1
    etype2R1-r16                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    -- R1 16-3a-1 Regular eType 2 R=2
    etype2R2-r16                    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                                    OPTIONAL,
    -- R1 16-3b Regular eType 2 R=1 PortSelection
    etype2R1-PortSelection-r16      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    -- R1 16-3b-1 Regular eType 2 R=2 PortSelection
    etype2R2-PortSelection-r16      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL
}

CodebookComboParametersAdditionPerBC-r16::= SEQUENCE {
    -- R1 16-8 Mixed codebook types
    type1SP-Type2-null-r16          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-Type2PS-null-r16        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-eType2R1-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-eType2R2-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-eType2R1PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-eType2R2PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1SP-Type2-Type2PS-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1MP-Type2-null-r16          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1MP-Type2PS-null-r16        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                              OPTIONAL,
    type1MP-eType2R1-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
```

```
                                                    OPTIONAL,
    type1MP-eType2R2-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-eType2R1PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-eType2R2PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-Type2-Type2PS-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL
}

CodebookParametersfetype2PerBC-r17 ::= SEQUENCE {
    -- R1 23-9-1    Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II)
    fetype2basic-r17    SEQUENCE (SIZE (1.. maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
    -- R1 23-9-2    Support of M=2 and R=1 for FeType-II
    fetype2R1-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                        OPTIONAL,
    -- R1 23-9-4    Support of R = 2 for FeType-II
    fetype2R2-r17       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r17)) OF INTEGER (0.. maxNrofCSI-RS-ResourcesAlt-1-r16)
                        OPTIONAL
}

CodebookComboParameterMixedTypePerBC-r17 ::= SEQUENCE {
    -- R1 23-9-5 Active CSI-RS resources and ports for mixed codebook types in any slot
    type1SP-feType2PS-null-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-feType2PS-M2R1-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-feType2PS-M2R2-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-eType2R1-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1SP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-feType2PS-null-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-feType2PS-M2R1-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-feType2PS-M2R2-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-eType2R1-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL,
    type1MP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                    OPTIONAL
}
```

```
CodebookComboParameterMultiTRP-PerBC-r17::= SEQUENCE {
    -- R1 23-7-1b   Active CSI-RS resources and ports in the presence of multi-TRP CSI
    --  {Codebook 2, Codebook 3} =(NULL, NULL}
    nCJT-null-null               SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-null-null            SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    --    {Codebook 2, Codebook 3} = {( {"Rel 16 combinations in FG 16-8"}
    nCJT-Type2-null-r16          SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-Type2PS-null-r16        SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R1-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R2-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R1PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R2PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-Type2-Type2PS-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-Type2-null-r16       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-Type2PS-null-r16     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-eType2R1-null-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-eType2R2-null-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-eType2R1PS-null-r16  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-eType2R2PS-null-r16  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-Type2-Type2PS-r16    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    -- {Codebook 2, Codebook 3} = {"New Rel17 combinations in FG 23-9-5"}
    nCJT-feType2PS-null-r17         SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-feType2PS-M2R1-null-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-feType2PS-M2R2-null-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-Type2-feType2-PS-M1-r17    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-Type2-feType2-PS-M2R1-r17  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R1-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-feType2PS-null-r17      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                                     OPTIONAL,
    nCJT1SP-feType2PS-M2R1-null-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
```

```
                                                        OPTIONAL,
    nCJT1SP-feType2PS-M2R2-null-r1  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                        OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                        OPTIONAL,
    nCJT1SP-Type2-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                        OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                        OPTIONAL,
    nCJT1SP-eType2R1-feType2-PS-M2R1-r17 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                        OPTIONAL
}

CodebookVariantsList-r16 ::= SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesAlt-r16)) OF SupportedCSI-RS-Resource

SupportedCSI-RS-Resource ::=     SEQUENCE {
    maxNumberTxPortsPerResource      ENUMERATED {p2, p4, p8, p12, p16, p24, p32},
    maxNumberResourcesPerBand        INTEGER (1..64),
    totalNumberTxPortsPerBand        INTEGER (2..256)
}

-- TAG-CODEBOOKPARAMETERS-STOP
-- ASN1STOP
```

***CodebookParameters* field descriptions**
supportedCSI-RS-ResourceListAlt This field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type. The supported CSI-RS resource is indicated by an integer value which pinpoints *SupportedCSI-RS-Resource* defined in *CodebookVariantsList*. The value 0 corresponds to the first entry of *CodebookVariantsList*. The value 1 corresponds to the second entry of *CodebookVariantsList*, and so on. For each codebook type, the field shall be included in both *codebookParametersPerBC* (but optional for single CC) and *codebookParametersPerBand*.

– *FeatureSetCombination*

The IE *FeatureSetCombination* is a two-dimensional matrix of *FeatureSet* entries.

Each *FeatureSetsPerBand* contains a list of feature sets applicable to the carrier(s) of one band entry of the associated band combination. Across the associated bands, the UE shall support the combination of *FeatureSets* at the same position in the *FeatureSetsPerBand*. All *FeatureSetsPerBand* in one *FeatureSetCombination* must have the same number of entries.

The number of *FeatureSetsPerBand* in the *FeatureSetCombination* must be equal to the number of band entries in an associated band combination. The first *FeatureSetPerBand* applies to the first band entry of the band combination, and so on.

Each *FeatureSet* contains either a pair of NR or E-UTRA feature set IDs for UL and DL.

In case of NR, the actual feature sets for UL and DL are defined in the *FeatureSets* IE and referred to from here by their ID, i.e., their position in the *featureSetsUplink* / *featureSetsDownlink* list in the FeatureSet IE.

In case of E-UTRA, the feature sets referred to from this list are defined in TS 36.331 [10] and conveyed as part of the *UE-EUTRA-Capability* container.

The *FeatureSetUplink* and *FeatureSetDownlink* referred to from the *FeatureSet* comprise, among other information, a set of *FeatureSetUplinkPerCC-Ids* and *FeatureSetDownlinkPerCC-Ids*. The number of these per-CC IDs determines the number of carriers that the UE is able to aggregate contiguously in frequency domain in the corresponding band. The number of carriers supported by the UE is also restricted by the bandwidth class indicated in the associated *BandCombination*, if present.

In feature set combinations the UE shall exclude entries with same or lower capabilities, since the network may anyway assume that the UE supports those.

NOTE 1: The UE may advertise fallback band-combinations in which it supports additional functionality explicitly in two ways: Either by setting FeatureSet IDs to zero (inter-band and intra-band non-contiguous fallback) and by reducing the number of FeatureSet-PerCC Ids in a Feature Set (intra-band contiguous fallback). Or by separate *BandCombination* entries with associated *FeatureSetCombinations*.

NOTE 2: The UE may advertise a *FeatureSetCombination* containing only fallback band combinations. That means, in a *FeatureSetCombination*, each group of *FeatureSets* across the bands may contain at least one pair of *FeatureSetUplinkId* and *FeatureSetDownlinkId* which is set to 0/0.

NOTE 3: The Network configures serving cell(s) and BWP(s) configuration to comply with capabilities derived from the combination of FeatureSets at the same position in the FeatureSetsPerBand, regardless of activated/deactivated serving cell(s) and BWP(s).

FeatureSetCombination information element

```
-- ASN1START
-- TAG-FEATURESETCOMBINATION-START

FeatureSetCombination ::=       SEQUENCE (SIZE (1..maxSimultaneousBands)) OF FeatureSetsPerBand

FeatureSetsPerBand ::=          SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSet

FeatureSet ::=                  CHOICE {
    eutra                           SEQUENCE {
        downlinkSetEUTRA                FeatureSetEUTRA-DownlinkId,
        uplinkSetEUTRA                  FeatureSetEUTRA-UplinkId
    },
    nr                              SEQUENCE {
        downlinkSetNR                   FeatureSetDownlinkId,
        uplinkSetNR                     FeatureSetUplinkId
    }
}

-- TAG-FEATURESETCOMBINATION-STOP
-- ASN1STOP
```

– *FeatureSetCombinationId*

The IE *FeatureSetCombinationId* identifies a *FeatureSetCombination*. The *FeatureSetCombinationId* of a *FeatureSetCombination* is the position of the *FeatureSetCombination* in the featureSetCombinations list (in *UE-NR-Capability* or *UE-MRDC-Capability*). The *FeatureSetCombinationId* = 0 refers to the first entry in the *featureSetCombinations* list (in *UE-NR-Capability* or *UE-MRDC-Capability*).

NOTE: The *FeatureSetCombinationId* = 1024 is not used due to the maximum entry number of *featureSetCombinations*.

FeatureSetCombinationId information element

```
-- ASN1START
-- TAG-FEATURESETCOMBINATIONID-START

FeatureSetCombinationId ::=         INTEGER (0.. maxFeatureSetCombinations)

-- TAG-FEATURESETCOMBINATIONID-STOP
-- ASN1STOP
```

– *FeatureSetDownlink*

The IE *FeatureSetDownlink* indicates a set of features that the UE supports on the carriers corresponding to one band entry in a band combination.

FeatureSetDownlink information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINK-START

FeatureSetDownlink ::=                  SEQUENCE {
    featureSetListPerDownlinkCC             SEQUENCE (SIZE (1..maxNrofServingCells)) OF FeatureSetDownlinkPerCC-Id,

    intraBandFreqSeparationDL               FreqSeparationClass                                          OPTIONAL,
    scalingFactor                           ENUMERATED {f0p4, f0p75, f0p8}                              OPTIONAL,
    dummy8                                  ENUMERATED {supported}                                      OPTIONAL,
    scellWithoutSSB                         ENUMERATED {supported}                                      OPTIONAL,
    csi-RS-MeasSCellWithoutSSB              ENUMERATED {supported}                                      OPTIONAL,
    dummy1                                  ENUMERATED {supported}                                      OPTIONAL,
    type1-3-CSS                             ENUMERATED {supported}                                      OPTIONAL,
    pdcch-MonitoringAnyOccasions            ENUMERATED {withoutDCI-Gap, withDCI-Gap}                    OPTIONAL,
    dummy2                                  ENUMERATED {supported}                                      OPTIONAL,
    ue-SpecificUL-DL-Assignment             ENUMERATED {supported}                                      OPTIONAL,
    searchSpaceSharingCA-DL                 ENUMERATED {supported}                                      OPTIONAL,
    timeDurationForQCL                      SEQUENCE {
        scs-60kHz                           ENUMERATED {s7, s14, s28}                                   OPTIONAL,
        scs-120kHz                          ENUMERATED {s14, s28}                                       OPTIONAL
    }                                                                                                   OPTIONAL,
    pdsch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {
        scs-15kHz                               ENUMERATED {upto2, upto4, upto7}                        OPTIONAL,
        scs-30kHz                               ENUMERATED {upto2, upto4, upto7}                        OPTIONAL,
        scs-60kHz                               ENUMERATED {upto2, upto4, upto7}                        OPTIONAL,
        scs-120kHz                              ENUMERATED {upto2, upto4, upto7}                        OPTIONAL
    }                                                                                                   OPTIONAL,
    dummy3                                  DummyA                                                      OPTIONAL,
    dummy4                                  SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyB            OPTIONAL,
    dummy5                                  SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyC            OPTIONAL,
    dummy6                                  SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyD            OPTIONAL,
    dummy7                                  SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyE            OPTIONAL
```

```
}

FeatureSetDownlink-v1540 ::= SEQUENCE {
    oneFL-DMRS-TwoAdditionalDMRS-DL         ENUMERATED {supported}                    OPTIONAL,
    additionalDMRS-DL-Alt                   ENUMERATED {supported}                    OPTIONAL,
    twoFL-DMRS-TwoAdditionalDMRS-DL         ENUMERATED {supported}                    OPTIONAL,
    oneFL-DMRS-ThreeAdditionalDMRS-DL       ENUMERATED {supported}                    OPTIONAL,
    pdcch-MonitoringAnyOccasionsWithSpanGap SEQUENCE {
        scs-15kHz                               ENUMERATED {set1, set2, set3}             OPTIONAL,
        scs-30kHz                               ENUMERATED {set1, set2, set3}             OPTIONAL,
        scs-60kHz                               ENUMERATED {set1, set2, set3}             OPTIONAL,
        scs-120kHz                              ENUMERATED {set1, set2, set3}             OPTIONAL
    }                                                                                 OPTIONAL,
    pdsch-SeparationWithGap                 ENUMERATED {supported}                    OPTIONAL,
    pdsch-ProcessingType2                   SEQUENCE {
        scs-15kHz                               ProcessingParameters                      OPTIONAL,
        scs-30kHz                               ProcessingParameters                      OPTIONAL,
        scs-60kHz                               ProcessingParameters                      OPTIONAL
    } OPTIONAL,
    pdsch-ProcessingType2-Limited           SEQUENCE {
        differentTB-PerSlot-SCS-30kHz           ENUMERATED {upto1, upto2, upto4, upto7}
    } OPTIONAL,
    dl-MCS-TableAlt-DynamicIndication       ENUMERATED {supported}                    OPTIONAL
}

FeatureSetDownlink-v15a0 ::= SEQUENCE {
    supportedSRS-Resources              SRS-Resources                             OPTIONAL
}

FeatureSetDownlink-v1610 ::=   SEQUENCE {
    -- R1 22-4e/4f/4g/4h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 1
    cbgPDSCH-ProcessingType1-DifferentTB-PerSlot-r16   SEQUENCE {
        scs-15kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-30kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-60kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-120kHz-r16       ENUMERATED {one, upto2, upto4, upto7} OPTIONAL
    } OPTIONAL,

    -- R1 22-3e/3f/3g/3h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 2
    cbgPDSCH-ProcessingType2-DifferentTB-PerSlot-r16   SEQUENCE {
        scs-15kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-30kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-60kHz-r16        ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,
        scs-120kHz-r16       ENUMERATED {one, upto2, upto4, upto7} OPTIONAL
    } OPTIONAL,
    intraFreqDAPS-r16                  SEQUENCE {
        intraFreqDiffSCS-DAPS-r16          ENUMERATED {supported}           OPTIONAL,
        intraFreqAsyncDAPS-r16             ENUMERATED {supported}           OPTIONAL
    }                                                                       OPTIONAL,
    intraBandFreqSeparationDL-v1620    FreqSeparationClassDL-v1620          OPTIONAL,
    intraBandFreqSeparationDL-Only-r16 FreqSeparationClassDL-Only-r16       OPTIONAL,

    -- R1 11-2: Rel-16 PDCCH monitoring capability
    pdcch-Monitoring-r16               SEQUENCE {
```

```
        pdsch-ProcessingType1-r16          SEQUENCE {
            scs-15kHz-r16                      PDCCH-MonitoringOccasions-r16 OPTIONAL,
            scs-30kHz-r16                      PDCCH-MonitoringOccasions-r16 OPTIONAL
        }                                                                    OPTIONAL,
        pdsch-ProcessingType2-r16      SEQUENCE {
            scs-15kHz-r16                  PDCCH-MonitoringOccasions-r16     OPTIONAL,
            scs-30kHz-r16                  PDCCH-MonitoringOccasions-r16     OPTIONAL
        }                                                                    OPTIONAL
    }                                                                        OPTIONAL,

    -- R1 11-2b: Mix of Rel. 16 PDCCH monitoring capability and Rel. 15 PDCCH monitoring capability on different carriers
    pdcch-MonitoringMixed-r16          ENUMERATED {supported}                OPTIONAL,

    -- R1 18-5c: Processing up to X unicast DCI scheduling for DL per scheduled CC
    crossCarrierSchedulingProcessing-DiffSCS-r16  SEQUENCE {
        scs-15kHz-120kHz-r16               ENUMERATED {n1,n2,n4}             OPTIONAL,
        scs-15kHz-60kHz-r16                ENUMERATED {n1,n2,n4}             OPTIONAL,
        scs-30kHz-120kHz-r16               ENUMERATED {n1,n2,n4}             OPTIONAL,
        scs-15kHz-30kHz-r16                ENUMERATED {n2}                   OPTIONAL,
        scs-30kHz-60kHz-r16                ENUMERATED {n2}                   OPTIONAL,
        scs-60kHz-120kHz-r16               ENUMERATED {n2}                   OPTIONAL
    }                                                                        OPTIONAL,

    -- R1 16-2b-1: Support of single-DCI based SDM scheme
    singleDCI-SDM-scheme-r16           ENUMERATED {supported}                OPTIONAL
}

FeatureSetDownlink-v1700 ::= SEQUENCE {
    -- R1 36-2: Scaling factor to be applied to 1024QAM for FR1
    scalingFactor-1024QAM-FR1-r17 ENUMERATED {f0p4, f0p75, f0p8}             OPTIONAL,
    -- R1 24 feature for existing UE cap to include new SCS
    timeDurationForQCL-v1710     SEQUENCE {
        scs-480kHz                     ENUMERATED {s56, s112}                OPTIONAL,
        scs-960kHz                     ENUMERATED {s112, s224}               OPTIONAL
    }                                                                        OPTIONAL,
    -- R1 23-6-1    SFN scheme A (scheme 1) for PDSCH and PDCCH
    sfn-SchemeA-r17                    ENUMERATED {supported}                OPTIONAL,
    -- R1 23-6-1-1  SFN scheme A (scheme 1) for PDCCH only
    sfn-SchemeA-PDCCH-only-r17         ENUMERATED {supported}                OPTIONAL,
    -- R1 23-6-1a   Dynamic switching - scheme A
    sfn-SchemeA-DynamicSwitching-r17 ENUMERATED {supported}                  OPTIONAL,
    -- R1 23-6-1b   SFN scheme A (scheme 1) for PDSCH only
    sfn-SchemeA-PDSCH-only-r17         ENUMERATED {supported}                OPTIONAL,
    -- R1 23-6-2    SFN scheme B (TRP based pre-compensation) for PDSCH and PDCCH
    sfn-SchemeB-r17                    ENUMERATED {supported}                OPTIONAL,
    -- R1 23-6-2a   Dynamic switching - scheme B
    sfn-SchemeB-DynamicSwitching-r17 ENUMERATED {supported}                  OPTIONAL,
    -- R1 23-6-2b   SFN scheme B (TRP based pre-compensation) for PDSCH only
    sfn-SchemeB-PDSCH-only-r17         ENUMERATED {supported}                OPTIONAL,
    -- R1 23-2-1d   PDCCH repetition for Case 2 PDCCH monitoring with a span gap
    mTRP-PDCCH-Case2-1SpanGap-r17    SEQUENCE {
        scs-15kHz-r17                      PDCCH-RepetitionParameters-r17    OPTIONAL,
        scs-30kHz-r17                      PDCCH-RepetitionParameters-r17    OPTIONAL,
        scs-60kHz-r17                      PDCCH-RepetitionParameters-r17    OPTIONAL,
```

```
        scs-120kHz-r17                  PDCCH-RepetitionParameters-r17      OPTIONAL
    }                                                                       OPTIONAL,
    -- R1 23-2-1e   PDCCH repetition for Rel-16 PDCCH monitoring
    mTRP-PDCCH-legacyMonitoring-r17  SEQUENCE {
        scs-15kHz-r17                   PDCCH-RepetitionParameters-r17      OPTIONAL,
        scs-30kHz-r17                   PDCCH-RepetitionParameters-r17      OPTIONAL
    }                                                                       OPTIONAL,
    -- R1  23-2-4   Simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP
    mTRP-PDCCH-multiDCI-multiTRP-r17 ENUMERATED {supported}                 OPTIONAL,
    -- R1 33-2: Dynamic scheduling for multicast for PCell
    dynamicMulticastPCell-r17        ENUMERATED {supported}                 OPTIONAL,
    -- R1 23-2-1    PDCCH repetition
    mTRP-PDCCH-Repetition-r17        SEQUENCE {
        numBD-twoPDCCH-r17              INTEGER (2..3),
        maxNumOverlaps-r17              ENUMERATED {n1,n2,n3,n5,n10,n20,n40}
    }                                                                       OPTIONAL
}

FeatureSetDownlink-v1720 ::=                SEQUENCE {
    -- R1 25-19: RTT-based Propagation delay compensation based on CSI-RS for tracking and SRS
    rtt-BasedPDC-CSI-RS-ForTracking-r17          ENUMERATED {supported}                                                  OPTIONAL,
    -- R1 25-19a: RTT-based Propagation delay compensation based on DL PRS for RTT-based PDC and SRS
    rtt-BasedPDC-PRS-r17                         SEQUENCE {
        maxNumberPRS-Resource-r17                   ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
        maxNumberPRS-ResourceProcessedPerSlot-r17   SEQUENCE {
            scs-15kHz-r17                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
            scs-30kHz-r17                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
            scs-60kHz-r17                               ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
            scs-120kHz-r17                              ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL
        }
    }                                                                                                                   OPTIONAL,
    -- R1 33-5-1: SPS group-common PDSCH for multicast on PCell
    sps-Multicast-r17                            ENUMERATED {supported}                                                 OPTIONAL
}

FeatureSetDownlink-v1730 ::=                SEQUENCE {
    -- R1 25-19b: Support of PRS as spatial relation RS for SRS
    prs-AsSpatialRelationRS-For-SRS-r17          ENUMERATED {supported}                                                 OPTIONAL
}

PDCCH-MonitoringOccasions-r16 ::= SEQUENCE {
    period7span3-r16                ENUMERATED {supported}              OPTIONAL,
    period4span3-r16                ENUMERATED {supported}              OPTIONAL,
    period2span2-r16                ENUMERATED {supported}              OPTIONAL
}

PDCCH-RepetitionParameters-r17 ::= SEQUENCE {
    supportedMode-r17               ENUMERATED {intra-span, inter-span, both},
    limitX-PerCC-r17                ENUMERATED {n4, n8, n16, n32, n44, n64, nolimit}                    OPTIONAL,
    limitX-AcrossCC-r17             ENUMERATED {n4, n8, n16, n32, n44, n64, n128, n256, n512, nolimit}  OPTIONAL
}

DummyA ::=      SEQUENCE {
    maxNumberNZP-CSI-RS-PerCC               INTEGER (1..32),
```

```
    maxNumberPortsAcrossNZP-CSI-RS-PerCC        ENUMERATED {p2, p4, p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,
                                                            p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,
                                                            p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256},
    maxNumberCS-IM-PerCC                        ENUMERATED {n1, n2, n4, n8, n16, n32},
    maxNumberSimultaneousCSI-RS-ActBWP-AllCC    ENUMERATED {n5, n6, n7, n8, n9, n10, n12, n14, n16, n18, n20, n22, n24, n26,
                                                            n28, n30, n32, n34, n36, n38, n40, n42, n44, n46, n48, n50, n52,
                                                            n54, n56, n58, n60, n62, n64},
    totalNumberPortsSimultaneousCSI-RS-ActBWP-AllCC ENUMERATED {p8, p12, p16, p24, p32, p40, p48, p56, p64, p72, p80,
                                                            p88, p96, p104, p112, p120, p128, p136, p144, p152, p160, p168,
                                                            p176, p184, p192, p200, p208, p216, p224, p232, p240, p248, p256}
}

DummyB ::=       SEQUENCE {
    maxNumberTxPortsPerResource         ENUMERATED {p2, p4, p8, p12, p16, p24, p32},
    maxNumberResources                  INTEGER (1..64),
    totalNumberTxPorts                  INTEGER (2..256),
    supportedCodebookMode               ENUMERATED {mode1, mode1AndMode2},
    maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
}

DummyC ::=        SEQUENCE {
    maxNumberTxPortsPerResource         ENUMERATED {p8, p16, p32},
    maxNumberResources                  INTEGER (1..64),
    totalNumberTxPorts                  INTEGER (2..256),
    supportedCodebookMode               ENUMERATED {mode1, mode2, both},
    supportedNumberPanels               ENUMERATED {n2, n4},
    maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
}

DummyD ::=                SEQUENCE {
    maxNumberTxPortsPerResource         ENUMERATED {p4, p8, p12, p16, p24, p32},
    maxNumberResources                  INTEGER (1..64),
    totalNumberTxPorts                  INTEGER (2..256),
    parameterLx                         INTEGER (2..4),
    amplitudeScalingType                ENUMERATED {wideband, widebandAndSubband},
    amplitudeSubsetRestriction          ENUMERATED {supported}                          OPTIONAL,
    maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
}

DummyE ::=    SEQUENCE {
    maxNumberTxPortsPerResource         ENUMERATED {p4, p8, p12, p16, p24, p32},
    maxNumberResources                  INTEGER (1..64),
    totalNumberTxPorts                  INTEGER (2..256),
    parameterLx                         INTEGER (2..4),
    amplitudeScalingType                ENUMERATED {wideband, widebandAndSubband},
    maxNumberCSI-RS-PerResourceSet      INTEGER (1..8)
}

-- TAG-FEATURESETDOWNLINK-STOP
-- ASN1STOP
```

***FeatureSetDownlink* field descriptions**
featureSetListPerDownlinkCC Indicates which features the UE supports on the individual DL carriers of the feature set (and hence of a band entry that refer to the feature set). The UE shall hence include at least as many *FeatureSetDownlinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassDL*, except if indicating additional functionality by reducing the number of *FeatureSetDownlinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetDownlinkPerCC-Id* in this list.
supportedSRS-Resources Indicates supported SRS resources for SRS carrier switching to the band associated with this *FeatureSetDownlink*. The UE is only allowed to set this field for a band with associated *FeatureSetUplinkId* set to 0.

– *FeatureSetDownlinkId*

The IE *FeatureSetDownlinkId* identifies a downlink feature set. The *FeatureSetDownlinkId* of a *FeatureSetDownlink* is the index position of the *FeatureSetDownlink* in the *featureSetsDownlink* list in the *FeatureSets* IE. The first element in that list is referred to by *FeatureSetDownlinkId* = 1. The *FeatureSetDownlinkId=0* is not used by an actual *FeatureSetDownlink* but means that the UE does not support a carrier in this band of a band combination.

***FeatureSetDownlinkId* information element**

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKID-START

FeatureSetDownlinkId ::=            INTEGER (0..maxDownlinkFeatureSets)

-- TAG-FEATURESETDOWNLINKID-STOP
-- ASN1STOP
```

– *FeatureSetDownlinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

***FeatureSetDownlinkPerCC* information element**

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKPERCC-START

FeatureSetDownlinkPerCC ::=         SEQUENCE {
    supportedSubcarrierSpacingDL        SubcarrierSpacing,
    supportedBandwidthDL                SupportedBandwidth,
    channelBW-90mhz                     ENUMERATED {supported}                          OPTIONAL,
    maxNumberMIMO-LayersPDSCH           MIMO-LayersDL                                   OPTIONAL,
    supportedModulationOrderDL          ModulationOrder                                 OPTIONAL
}

FeatureSetDownlinkPerCC-v1620 ::=   SEQUENCE {
    -- R1 16-2a: Mulit-DCI based multi-TRP
    multiDCI-MultiTRP-r16               MultiDCI-MultiTRP-r16                           OPTIONAL,
```

```
    -- R1 16-2b-3: Support of single-DCI based FDMSchemeB
    supportFDM-SchemeB-r16              ENUMERATED {supported}                                  OPTIONAL
}

FeatureSetDownlinkPerCC-v1700 ::=   SEQUENCE {
    supportedMinBandwidthDL-r17             SupportedBandwidth-v1700                            OPTIONAL,
    broadcastSCell-r17                     ENUMERATED {supported}                              OPTIONAL,
    -- R1 33-2g: MIMO layers for multicast PDSCH
    maxNumberMIMO-LayersMulticastPDSCH-r17  ENUMERATED {n2, n4, n8}                            OPTIONAL,
    -- R1 33-2h: Dynamic scheduling for multicast for SCell
    dynamicMulticastSCell-r17               ENUMERATED {supported}                              OPTIONAL,
    supportedBandwidthDL-v1710              SupportedBandwidth-v1700                            OPTIONAL,
    -- R4 24-1/24-2/24-3/24-4/24-5
    supportedCRS-InterfMitigation-r17       CRS-InterfMitigation-r17                            OPTIONAL
}

FeatureSetDownlinkPerCC-v1720 ::=   SEQUENCE {
    -- R1 33-2j: Supported maximum modulation order used for maximum data rate calculation for multicast PDSCH
    maxModulationOrderForMulticastDataRateCalculation-r17  ENUMERATED {qam64, qam256, qam1024}  OPTIONAL,
    -- R1 33-1-2: FDM-ed unicast PDSCH and group-common PDSCH for broadcast
    fdm-BroadcastUnicast-r17            ENUMERATED {supported}                                  OPTIONAL,
    -- R1 33-3-2: FDM-ed unicast PDSCH and one group-common PDSCH for multicast
    fdm-MulticastUnicast-r17            ENUMERATED {supported}                                  OPTIONAL
}

FeatureSetDownlinkPerCC-v1730 ::=           SEQUENCE {
    -- R1 33-3-3: Intra-slot TDM-ed unicast PDSCH and group-common PDSCH
    intraSlotTDM-UnicastGroupCommonPDSCH-r17    ENUMERATED {yes, no}                    OPTIONAL,
    -- R1 33-5-3: One SPS group-common PDSCH configuration for multicast for SCell
    sps-MulticastSCell-r17                      ENUMERATED {supported}                  OPTIONAL,
    -- R1 33-5-4: Up to 8 SPS group-common PDSCH configurations per CFR for multicast for SCell
    sps-MulticastSCellMultiConfig-r17           INTEGER (1..8)                          OPTIONAL,
    -- R1 33-1-1: Dynamic slot-level repetition for broadcast MTCH
    dci-BroadcastWith16Repetitions-r17          ENUMERATED {supported}                  OPTIONAL
}

MultiDCI-MultiTRP-r16 ::=           SEQUENCE {
    maxNumberCORESET-r16                ENUMERATED {n2, n3, n4, n5},
    maxNumberCORESETPerPoolIndex-r16    INTEGER (1..3),
    maxNumberUnicastPDSCH-PerPool-r16   ENUMERATED {n1, n2, n3, n4, n7}
}

CRS-InterfMitigation-r17 ::=        SEQUENCE {
    -- R4 24-1 CRS-IM (Interference Mitigation) in DSS scenario
    crs-IM-DSS-15kHzSCS-r17             ENUMERATED {supported}                                  OPTIONAL,
    -- R4 24-2 CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-15kHzSCS-r17          ENUMERATED {supported}                                  OPTIONAL,
    -- R4 24-3 CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-NWA-15kHzSCS-r17      ENUMERATED {supported}                                  OPTIONAL,
    -- R4 24-4 CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-30kHzSCS-r17          ENUMERATED {supported}                                  OPTIONAL,
    -- R4 24-5 CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth
    crs-IM-nonDSS-NWA-30kHzSCS-r17      ENUMERATED {supported}                                  OPTIONAL
}
```

```
-- TAG-FEATURESETDOWNLINKPERCC-STOP
-- ASN1STOP
```

– *FeatureSetDownlinkPerCC-Id*

The IE *FeatureSetDownlinkPerCC-Id* identifies a set of features applicable to one carrier of a feature set. The *FeatureSetDownlinkPerCC-Id* of a *FeatureSetDownlinkPerCC* is the index position of the *FeatureSetDownlinkPerCC* in the *featureSetsDownlinkPerCC*. The first element in the list is referred to by *FeatureSetDownlinkPerCC-Id* = 1, and so on.

FeatureSetDownlinkPerCC-Id information element

```
-- ASN1START
-- TAG-FEATURESETDOWNLINKPERCC-ID-START

FeatureSetDownlinkPerCC-Id ::=      INTEGER (1..maxPerCC-FeatureSets)

-- TAG-FEATURESETDOWNLINKPERCC-ID-STOP
-- ASN1STOP
```

– *FeatureSetEUTRA-DownlinkId*

The IE *FeatureSetEUTRA-DownlinkId* identifies a downlink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by *FeatureSetEUTRA-DownlinkId* = 1. The *FeatureSetEUTRA-DownlinkId=0* is used when the UE does not support a carrier in this band of a band combination.

FeatureSetEUTRA-DownlinkId information element

```
-- ASN1START
-- TAG-FEATURESETEUTRADOWNLINKID-START

FeatureSetEUTRA-DownlinkId ::=      INTEGER (0..maxEUTRA-DL-FeatureSets)

-- TAG-FEATURESETEUTRADOWNLINKID-STOP
-- ASN1STOP
```

– *FeatureSetEUTRA-UplinkId*

The IE *FeatureSetEUTRA-UplinkId* identifies an uplink feature set in E-UTRA list (see TS 36.331 [10]. The first element in that list is referred to by *FeatureSetEUTRA-UplinkId* = 1. The *FeatureSetEUTRA-UplinkId =0* is used when the UE does not support a carrier in this band of a band combination.

FeatureSetEUTRA-UplinkId information element

```
-- ASN1START
```

```
-- TAG-FEATURESETEUTRAUPLINKID-START

FeatureSetEUTRA-UplinkId ::=                    INTEGER (0..maxEUTRA-UL-FeatureSets)

-- TAG-FEATURESETEUTRAUPLINKID-STOP
-- ASN1STOP
```

– *FeatureSets*

The IE *FeatureSets* is used to provide pools of downlink and uplink features sets. A *FeatureSetCombination* refers to the IDs of the feature set(s) that the UE supports in that *FeatureSetCombination*. The *BandCombination* entries in the *BandCombinationList* then indicate the ID of the *FeatureSetCombination* that the UE supports for that band combination.

The entries in the lists in this IE are identified by their index position. For example, the *FeatureSetUplinkPerCC-Id* = 4 identifies the 4th element in the *featureSetsUplinkPerCC* list.

NOTE: When feature sets (per CC) IEs require extension in future versions of the specification, new versions of the *FeatureSetDownlink*, *FeatureSetUplink*, *FeatureSets*, *FeatureSetDownlinkPerCC* and/or *FeatureSetUplinkPerCC* will be created and instantiated in corresponding new lists in the *FeatureSets* IE. For example, if new capability bits are to be added to the *FeatureSetDownlink*, they will instead be defined in a new *FeatureSetDownlink-rxy* which will be instantiated in a new *featureSetDownlinkList-rxy* list. If a UE indicates in a *FeatureSetCombination* that it supports the *FeatureSetDownlink* with ID #5, it implies that it supports both the features in *FeatureSetDownlink* #5 and *FeatureSetDownlink-rxy* #5 (if present). The number of entries in the new list(s) shall be the same as in the original list(s).

***FeatureSets* information element**

```
-- ASN1START
-- TAG-FEATURESETS-START

FeatureSets ::=    SEQUENCE {
    featureSetsDownlink                 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink              OPTIONAL,
    featureSetsDownlinkPerCC            SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC           OPTIONAL,
    featureSetsUplink                   SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink                 OPTIONAL,
    featureSetsUplinkPerCC              SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC            OPTIONAL,
    ...,
    [[
    featureSetsDownlink-v1540           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1540        OPTIONAL,
    featureSetsUplink-v1540             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1540            OPTIONAL,
    featureSetsUplinkPerCC-v1540        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1540       OPTIONAL
    ]],
    [[
    featureSetsDownlink-v15a0           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v15a0        OPTIONAL
    ]],
    [[
    featureSetsDownlink-v1610           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1610        OPTIONAL,
    featureSetsUplink-v1610             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1610            OPTIONAL,
    featureSetDownlinkPerCC-v1620       SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1620     OPTIONAL
    ]],
    [[
```

```
    featureSetsUplink-v1630             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1630             OPTIONAL
    ]],
    [[
    featureSetsUplink-v1640             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1640             OPTIONAL
    ]],
    [[
    featureSetsDownlink-v1700           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1700         OPTIONAL,
    featureSetsDownlinkPerCC-v1700      SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1700      OPTIONAL,
    featureSetsUplink-v1710             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1710             OPTIONAL,
    featureSetsUplinkPerCC-v1700        SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1700        OPTIONAL
    ]],
    [[
    featureSetsDownlink-v1720           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1720         OPTIONAL,
    featureSetsDownlinkPerCC-v1720      SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1720      OPTIONAL,
    featureSetsUplink-v1720             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1720             OPTIONAL
    ]],
    [[
    featureSetsDownlink-v1730           SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1730         OPTIONAL,
    featureSetsDownlinkPerCC-v1730      SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1730      OPTIONAL
    ]]
}

FeatureSets-v16d0 ::=    SEQUENCE {
    featureSetsUplink-v16d0             SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v16d0             OPTIONAL
}

-- TAG-FEATURESETS-STOP
-- ASN1STOP
```

– *FeatureSetUplink*

The IE *FeatureSetUplink* is used to indicate the features that the UE supports on the carriers corresponding to one band entry in a band combination.

FeatureSetUplink information element

```
-- ASN1START
-- TAG-FEATURESETUPLINK-START

FeatureSetUplink ::=                SEQUENCE {
    featureSetListPerUplinkCC           SEQUENCE (SIZE (1.. maxNrofServingCells)) OF FeatureSetUplinkPerCC-Id,
    scalingFactor                       ENUMERATED {f0p4, f0p75, f0p8}                                      OPTIONAL,
    dummy3                              ENUMERATED {supported}                                              OPTIONAL,
    intraBandFreqSeparationUL           FreqSeparationClass                                                 OPTIONAL,
    searchSpaceSharingCA-UL             ENUMERATED {supported}                                              OPTIONAL,
    dummy1                              DummyI                                                              OPTIONAL,
    supportedSRS-Resources              SRS-Resources                                                       OPTIONAL,
    twoPUCCH-Group                      ENUMERATED {supported}                                              OPTIONAL,
    dynamicSwitchSUL                    ENUMERATED {supported}                                              OPTIONAL,
    simultaneousTxSUL-NonSUL            ENUMERATED {supported}                                              OPTIONAL,
    pusch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {
        scs-15kHz                           ENUMERATED {upto2, upto4, upto7}                                    OPTIONAL,
```

```
        scs-30kHz                               ENUMERATED {upto2, upto4, upto7}                                OPTIONAL,
        scs-60kHz                               ENUMERATED {upto2, upto4, upto7}                                OPTIONAL,
        scs-120kHz                              ENUMERATED {upto2, upto4, upto7}                                OPTIONAL
    }                                                                                                           OPTIONAL,
    dummy2                              DummyF                                                                  OPTIONAL
}

FeatureSetUplink-v1540 ::=          SEQUENCE {
    zeroSlotOffsetAperiodicSRS          ENUMERATED {supported}                  OPTIONAL,
    pa-PhaseDiscontinuityImpacts        ENUMERATED {supported}                  OPTIONAL,
    pusch-SeparationWithGap             ENUMERATED {supported}                  OPTIONAL,
    pusch-ProcessingType2               SEQUENCE {
        scs-15kHz                           ProcessingParameters                    OPTIONAL,
        scs-30kHz                           ProcessingParameters                    OPTIONAL,
        scs-60kHz                           ProcessingParameters                    OPTIONAL
    }                                                                           OPTIONAL,
    ul-MCS-TableAlt-DynamicIndication   ENUMERATED {supported}                  OPTIONAL
}

FeatureSetUplink-v1610 ::=      SEQUENCE {
    -- R1 11-5: PUsCH repetition Type B
    pusch-RepetitionTypeB-r16       SEQUENCE {
        maxNumberPUSCH-Tx-r16           ENUMERATED {n2, n3, n4, n7, n8, n12},
        hoppingScheme-r16               ENUMERATED {interSlotHopping, interRepetitionHopping, both}
    }                                                                       OPTIONAL,
    -- R1 11-7: UL cancelation scheme for self-carrier
    ul-CancellationSelfCarrier-r16      ENUMERATED {supported}              OPTIONAL,
    -- R1 11-7a: UL cancelation scheme for cross-carrier
    ul-CancellationCrossCarrier-r16     ENUMERATED {supported}              OPTIONAL,
    -- R1 16-5c: The maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for Mode 2
    ul-FullPwrMode2-MaxSRS-ResInSet-r16 ENUMERATED {n1, n2, n4}             OPTIONAL,

    -- R1 22-4a/4b/4c/4d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 1
    cbgPUSCH-ProcessingType1-DifferentTB-PerSlot-r16    SEQUENCE {
        scs-15kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-30kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-60kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-120kHz-r16      ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL
     } OPTIONAL,

    -- R1 22-3a/3b/3c/3d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 2
    cbgPUSCH-ProcessingType2-DifferentTB-PerSlot-r16    SEQUENCE {
        scs-15kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-30kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-60kHz-r16       ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL,
        scs-120kHz-r16      ENUMERATED {one-pusch, upto2, upto4, upto7}         OPTIONAL
     } OPTIONAL,
    supportedSRS-PosResources-r16           SRS-AllPosResources-r16             OPTIONAL,
    intraFreqDAPS-UL-r16                        SEQUENCE {
        dummy                                       ENUMERATED {supported}  OPTIONAL,
        intraFreqTwoTAGs-DAPS-r16                   ENUMERATED {supported}  OPTIONAL,
        dummy1                                      ENUMERATED {supported}  OPTIONAL,
        dummy2                                      ENUMERATED {supported}  OPTIONAL,
        dummy3                                      ENUMERATED {short, long}  OPTIONAL
```

```
}                                                                   OPTIONAL,
intraBandFreqSeparationUL-v1620                 FreqSeparationClassUL-v1620   OPTIONAL,

-- R1 11-3: More than one PUCCH for HARQ-ACK transmission within a slot
multiPUCCH-r16                          SEQUENCE {
    sub-SlotConfig-NCP-r16                  ENUMERATED {set1, set2}             OPTIONAL,
    sub-SlotConfig-ECP-r16                  ENUMERATED {set1, set2}             OPTIONAL
}                                                                   OPTIONAL,
-- R1 11-3c: 2 PUCCH of format 0 or 2 for a single 7*2-symbol subslot based HARQ-ACK codebook
twoPUCCH-Type1-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-3d: 2 PUCCH of format 0 or 2 for a single 2*7-symbol subslot based HARQ-ACK codebook
twoPUCCH-Type2-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-3e: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for a single 2*7-symbol HARQ-ACK codebooks
twoPUCCH-Type3-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-3f: 2 PUCCH transmissions in the same subslot for a single 2*7-symbol HARQ-ACK codebooks which are not covered by 11-3d and
-- 11-3e
twoPUCCH-Type4-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-3g: SR/HARQ-ACK multiplexing once per subslot using a PUCCH (or HARQ-ACK piggybacked on a PUSCH) when SR/HARQ-ACK
-- are supposed to be sent with different starting symbols in a subslot
mux-SR-HARQ-ACK-r16                     ENUMERATED {supported}                  OPTIONAL,
dummy1                                  ENUMERATED {supported}                  OPTIONAL,
dummy2                                  ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4c: 2 PUCCH of format 0 or 2 for two HARQ-ACK codebooks with one 7*2-symbol sub-slot based HARQ-ACK codebook
twoPUCCH-Type5-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4d: 2 PUCCH of format 0 or 2 in consecutive symbols for two HARQ-ACK codebooks with one 2*7-symbol sub-slot based HARQ-ACK
-- codebook
twoPUCCH-Type6-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4e: 2 PUCCH of format 0 or 2 for two subslot based HARQ-ACK codebooks
twoPUCCH-Type7-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4f: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for HARQ-ACK codebooks with one 2*7-symbol
-- subslot based HARQ-ACK codebook
twoPUCCH-Type8-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4g: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for two subslot based HARQ-ACK codebooks
twoPUCCH-Type9-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4h: 2 PUCCH transmissions in the same subslot for two HARQ-ACK codebooks with one 2*7-symbol subslot which are not covered
-- by 11-4c and 11-4e
twoPUCCH-Type10-r16                     ENUMERATED {supported}                  OPTIONAL,
-- R1 11-4i: 2 PUCCH transmissions in the same subslot for two subslot based HARQ-ACK codebooks which are not covered by 11-4d and
-- 11-4f
twoPUCCH-Type11-r16                     ENUMERATED {supported}                  OPTIONAL,
-- R1 12-1: UL intra-UE multiplexing/prioritization of overlapping channel/signals with two priority levels in physical layer
ul-IntraUE-Mux-r16                      SEQUENCE {
    pusch-PreparationLowPriority-r16        ENUMERATED {sym0, sym1, sym2},
    pusch-PreparationHighPriority-r16       ENUMERATED {sym0, sym1, sym2}
}                                                                   OPTIONAL,
-- R1 16-5a: Supported UL full power transmission mode of fullpower
ul-FullPwrMode-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 18-5d: Processing up to X unicast DCI scheduling for UL per scheduled CC
crossCarrierSchedulingProcessing-DiffSCS-r16    SEQUENCE {
    scs-15kHz-120kHz-r16                    ENUMERATED {n1,n2,n4}               OPTIONAL,
    scs-15kHz-60kHz-r16                     ENUMERATED {n1,n2,n4}               OPTIONAL,
    scs-30kHz-120kHz-r16                    ENUMERATED {n1,n2,n4}               OPTIONAL,
    scs-15kHz-30kHz-r16                     ENUMERATED {n2}                     OPTIONAL,
    scs-30kHz-60kHz-r16                     ENUMERATED {n2}                     OPTIONAL,
```

```
        scs-60kHz-120kHz-r16                ENUMERATED {n2}                     OPTIONAL
    }                                                                           OPTIONAL,
    -- R1 16-5b: Supported UL full power transmission mode of fullpowerMode1
    ul-FullPwrMode1-r16                 ENUMERATED {supported}                  OPTIONAL,
    -- R1 16-5c-2: Ports configuration for Mode 2
    ul-FullPwrMode2-SRSConfig-diffNumSRSPorts-r16  ENUMERATED {p1-2, p1-4, p1-2-4} OPTIONAL,
    -- R1 16-5c-3: TPMI group for Mode 2
    ul-FullPwrMode2-TPMIGroup-r16         SEQUENCE {
        twoPorts-r16                        BIT STRING(SIZE(2))                     OPTIONAL,
        fourPortsNonCoherent-r16            ENUMERATED{g0, g1, g2, g3}              OPTIONAL,
        fourPortsPartialCoherent-r16        ENUMERATED{g0, g1, g2, g3, g4, g5, g6}  OPTIONAL
    }                                                                               OPTIONAL
}

FeatureSetUplink-v1630 ::=      SEQUENCE {
    -- R1 22-8: For SRS for CB PUSCH and antenna switching on FR1 with symbol level offset for aperiodic SRS transmission
    offsetSRS-CB-PUSCH-Ant-Switch-fr1-r16                   ENUMERATED {supported}          OPTIONAL,
    -- R1 22-8a: PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot and constrained timeline for SRS for CB
    -- PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorSingleOcc-fr1-r16       ENUMERATED {supported}          OPTIONAL,
    -- R1 22-8b: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)
    -- of a slot for Case 2 and constrained timeline for SRS for CB PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithoutGap-fr1-r16    ENUMERATED {supported}          OPTIONAL,
    -- R1 22-8c: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)
    -- of a slot for Case 2 with a DCI gap and constrained timeline for SRS for CB PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithGap-fr1-r16   ENUMERATED {supported}          OPTIONAL,
    dummy                                                   ENUMERATED {supported}          OPTIONAL,
    -- R1 22-9: Cancellation of PUCCH, PUSCH or PRACH with a DCI scheduling a PDSCH or CSI-RS or a DCI format 2_0 for SFI
    partialCancellationPUCCH-PUSCH-PRACH-TX-r16             ENUMERATED {supported}          OPTIONAL
}

FeatureSetUplink-v1640 ::=          SEQUENCE {
   -- R1 11-4: Two HARQ-ACK codebooks with up to one sub-slot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based +
    -- sub-slot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE
    twoHARQ-ACK-Codebook-type1-r16          SubSlot-Config-r16      OPTIONAL,
    -- R1 11-4a: Two sub-slot based HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different
    -- priorities at a UE
    twoHARQ-ACK-Codebook-type2-r16          SubSlot-Config-r16      OPTIONAL,
    -- R1 22-8d: All PDCCH monitoring occasion can be any OFDM symbol(s) of a slot for Case 2 with a span gap and constrained timeline
    -- for SRS for CB PUSCH and antenna switching on FR1
    offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithSpanGap-fr1-r16 SEQUENCE {
        scs-15kHz-r16                       ENUMERATED {set1, set2, set3}               OPTIONAL,
        scs-30kHz-r16                       ENUMERATED {set1, set2, set3}               OPTIONAL,
        scs-60kHz-r16                       ENUMERATED {set1, set2, set3}               OPTIONAL
    }                                                                                   OPTIONAL
}

FeatureSetUplink-v16d0 ::=      SEQUENCE {
    pusch-RepetitionTypeB-v16d0     SEQUENCE {
        maxNumberPUSCH-Tx-Cap1-r16      ENUMERATED {n2, n3, n4, n7, n8, n12},
        maxNumberPUSCH-Tx-Cap2-r16      ENUMERATED {n2, n3, n4, n7, n8, n12}
    }                                                                               OPTIONAL
}
```

```
FeatureSetUplink-v1710 ::= SEQUENCE {
    -- R1 23-3-1    Multi-TRP PUSCH repetition (type A) -codebook based
    mTRP-PUSCH-TypeA-CB-r17                 ENUMERATED {n1,n2,n4}                           OPTIONAL,
    -- R1 23-3-1-2  Multi-TRP PUSCH repetition (type A) - non-codebook based
    mTRP-PUSCH-RepetitionTypeA-r17          ENUMERATED {n1,n2,n3,n4}                        OPTIONAL,
    -- R1 23-3-3    Multi-TRP PUCCH repetition-intra-slot
    mTRP-PUCCH-IntraSlot-r17                ENUMERATED {pf0-2, pf1-3-4, pf0-4}              OPTIONAL,
    -- R1 23-8-4    Maximum 2 SP and 1 periodic SRS sets for antenna switching
    srs-AntennaSwitching2SP-1Periodic-r17   ENUMERATED {supported}                          OPTIONAL,
    -- R1 23-8-9    Extension of aperiodic SRS configuration for 1T4R, 1T2R and 2T4R
    srs-ExtensionAperiodicSRS-r17           ENUMERATED {supported}                          OPTIONAL,
    -- R1 23-8-10   1 aperiodic SRS resource set for 1T4R
    srs-OneAP-SRS-r17                       ENUMERATED {supported}                          OPTIONAL,
    -- R4 16-8 UE power class per band per band combination
    ue-PowerClassPerBandPerBC-r17           ENUMERATED {pc1dot5, pc2, pc3}                  OPTIONAL,
    -- R4 17-8 UL transmission in FR2 bands within an UL gap when the UL gap is activated
    tx-Support-UL-GapFR2-r17                ENUMERATED {supported}                          OPTIONAL
}

FeatureSetUplink-v1720 ::= SEQUENCE {
    -- R1 25-3: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with configured K = 2, 4, 8
    pucch-Repetition-F0-1-2-3-4-RRC-Config-r17         ENUMERATED {supported}               OPTIONAL,
    -- R1 25-3a: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots using dynamic repetition indication
    pucch-Repetition-F0-1-2-3-4-DynamicIndication-r17  ENUMERATED {supported}               OPTIONAL,
    -- R1 25-3b: Inter-subslot frequency hopping for PUCCH repetitions
    interSubslotFreqHopping-PUCCH-r17                  ENUMERATED {supported}               OPTIONAL,
    -- R1 25-8: Semi-static HARQ-ACK codebook for sub-slot PUCCH
    semiStaticHARQ-ACK-CodebookSub-SlotPUCCH-r17       ENUMERATED {supported}               OPTIONAL,
    -- R1 25-14: PHY prioritization of overlapping low-priority DG-PUSCH and high-priority CG-PUSCH
    phy-PrioritizationLowPriorityDG-HighPriorityCG-r17 INTEGER(1..16)                       OPTIONAL,
    -- R1 25-15: PHY prioritization of overlapping high-priority DG-PUSCH and low-priority CG-PUSCH
    phy-PrioritizationHighPriorityDG-LowPriorityCG-r17 SEQUENCE {
        pusch-PreparationLowPriority-r17                   ENUMERATED{sym0, sym1, sym2},
        additionalCancellationTime-r17                     SEQUENCE {
            scs-15kHz-r17                                      ENUMERATED{sym0, sym1, sym2}   OPTIONAL,
            scs-30kHz-r17                                      ENUMERATED{sym0, sym1, sym2, sym3, sym4}    OPTIONAL,
            scs-60kHz-r17                                      ENUMERATED{sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8} OPTIONAL,
            scs-120kHz-r17                                     ENUMERATED{sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8, sym9,
                                                                          sym10, sym11, sym12, sym13, sym14, sym15, sym16}    OPTIONAL
        },
        maxNumberCarriers-r17                              INTEGER(1..16)
    }                                                                                       OPTIONAL,
    -- R4 17-5 Support of UL DC location(s) report
    extendedDC-LocationReport-r17                      ENUMERATED {supported}               OPTIONAL
}

SubSlot-Config-r16 ::=                  SEQUENCE {
    sub-SlotConfig-NCP-r16                  ENUMERATED {n4,n5,n6,n7}            OPTIONAL,
    sub-SlotConfig-ECP-r16                  ENUMERATED {n4,n5,n6}               OPTIONAL
}

SRS-AllPosResources-r16 ::=             SEQUENCE {
    srs-PosResources-r16                    SRS-PosResources-r16,
    srs-PosResourceAP-r16                   SRS-PosResourceAP-r16               OPTIONAL,
```

```
    srs-PosResourceSP-r16                   SRS-PosResourceSP-r16               OPTIONAL
}

SRS-PosResources-r16 ::=                        SEQUENCE {
    maxNumberSRS-PosResourceSetPerBWP-r16               ENUMERATED {n1, n2, n4, n8, n12, n16},
    maxNumberSRS-PosResourcesPerBWP-r16                 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberSRS-ResourcesPerBWP-PerSlot-r16            ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
    maxNumberPeriodicSRS-PosResourcesPerBWP-r16         ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r16  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
}

SRS-PosResourceAP-r16 ::=               SEQUENCE {
    maxNumberAP-SRS-PosResourcesPerBWP-r16         ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberAP-SRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
}

SRS-PosResourceSP-r16 ::=                       SEQUENCE {
    maxNumberSP-SRS-PosResourcesPerBWP-r16              ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
    maxNumberSP-SRS-PosResourcesPerBWP-PerSlot-r16      ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
}

SRS-Resources ::=                           SEQUENCE {
    maxNumberAperiodicSRS-PerBWP                ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberAperiodicSRS-PerBWP-PerSlot        INTEGER (1..6),
    maxNumberPeriodicSRS-PerBWP                 ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberPeriodicSRS-PerBWP-PerSlot         INTEGER (1..6),
    maxNumberSemiPersistentSRS-PerBWP           ENUMERATED {n1, n2, n4, n8, n16},
    maxNumberSemiPersistentSRS-PerBWP-PerSlot   INTEGER (1..6),
    maxNumberSRS-Ports-PerResource              ENUMERATED {n1, n2, n4}
}

DummyF ::=                                  SEQUENCE {
    maxNumberPeriodicCSI-ReportPerBWP           INTEGER (1..4),
    maxNumberAperiodicCSI-ReportPerBWP          INTEGER (1..4),
    maxNumberSemiPersistentCSI-ReportPerBWP     INTEGER (0..4),
    simultaneousCSI-ReportsAllCC                INTEGER (5..32)
}

-- TAG-FEATURESETUPLINK-STOP
-- ASN1STOP
```

***FeatureSetUplink* field descriptions**
featureSetListPerUplinkCC Indicates which features the UE supports on the individual UL carriers of the feature set (and hence of a band entry that refers to the feature set). The UE shall hence include at least as many *FeatureSetUplinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassUL*, except if indicating additional functionality by reducing the number of *FeatureSetUplinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetUplinkPerCC-Id* in this list.

– *FeatureSetUplinkId*

The IE *FeatureSetUplinkId* identifies an uplink feature set. The *FeatureSetUplinkId* of a *FeatureSetUplink* is the index position of the *FeatureSetUplink* in the *featureSetsUplink* list in the *FeatureSets* IE. The first element in the list is referred to by *FeatureSetUplinkId* = 1, and so on. The *FeatureSetUplinkId =0* is not used by an actual *FeatureSetUplink* but means that the UE does not support a carrier in this band of a band combination.

FeatureSetUplinkId information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKID-START

FeatureSetUplinkId ::=                  INTEGER (0..maxUplinkFeatureSets)

-- TAG-FEATURESETUPLINKID-STOP
-- ASN1STOP
```

– *FeatureSetUplinkPerCC*

The IE *FeatureSetUplinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

FeatureSetUplinkPerCC information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKPERCC-START

FeatureSetUplinkPerCC ::=               SEQUENCE {
    supportedSubcarrierSpacingUL            SubcarrierSpacing,
    supportedBandwidthUL                    SupportedBandwidth,
    channelBW-90mhz                         ENUMERATED {supported}                  OPTIONAL,
    mimo-CB-PUSCH                           SEQUENCE {
        maxNumberMIMO-LayersCB-PUSCH            MIMO-LayersUL                           OPTIONAL,
        maxNumberSRS-ResourcePerSet             INTEGER (1..2)
    }                                                                               OPTIONAL,
    maxNumberMIMO-LayersNonCB-PUSCH         MIMO-LayersUL                           OPTIONAL,
    supportedModulationOrderUL              ModulationOrder                         OPTIONAL
}
FeatureSetUplinkPerCC-v1540 ::=       SEQUENCE {
    mimo-NonCB-PUSCH                        SEQUENCE {
        maxNumberSRS-ResourcePerSet             INTEGER (1..4),
        maxNumberSimultaneousSRS-ResourceTx     INTEGER (1..4)
    } OPTIONAL
}

FeatureSetUplinkPerCC-v1700 ::=   SEQUENCE {
    supportedMinBandwidthUL-r17       SupportedBandwidth-v1700                      OPTIONAL,
    -- R1 23-3-1-3  FeMIMO: Multi-TRP PUSCH repetition (type B) - non-codebook based
    mTRP-PUSCH-RepetitionTypeB-r17    ENUMERATED {n1,n2,n3,n4}                      OPTIONAL,
    -- R1 23-3-1-1 -codebook based Multi-TRP PUSCH repetition (type B)
    mTRP-PUSCH-TypeB-CB-r17           ENUMERATED {n1,n2,n4}                         OPTIONAL,
```

```
    supportedBandwidthUL-v1710        SupportedBandwidth-v1700                      OPTIONAL
}

-- TAG-FEATURESETUPLINKPERCC-STOP
-- ASN1STOP
```

– *FeatureSetUplinkPerCC-Id*

The IE *FeatureSetUplinkPerCC-Id* identifies a set of features applicable to one carrier of a feature set. The *FeatureSetUplinkPerCC-Id* of a *FeatureSetUplinkPerCC* is the index position of the *FeatureSetUplinkPerCC* in the *featureSetsUplinkPerCC*. The first element in the list is referred to by *FeatureSetUplinkPerCC-Id* = 1, and so on.

FeatureSetUplinkPerCC-Id information element

```
-- ASN1START
-- TAG-FEATURESETUPLINKPERCC-ID-START

FeatureSetUplinkPerCC-Id ::=            INTEGER (1..maxPerCC-FeatureSets)

-- TAG-FEATURESETUPLINKPERCC-ID-STOP
-- ASN1STOP
```

– *FreqBandIndicatorEUTRA*

```
-- ASN1START
-- TAG-FREQBANDINDICATOREUTRA-START

FreqBandIndicatorEUTRA ::=  INTEGER (1..maxBandsEUTRA)

-- TAG-FREQBANDINDICATOREUTRA-STOP
-- ASN1STOP
```

– *FreqBandList*

The IE *FreqBandList* is used by the network to request NR CA, NR non-CA and/or MR-DC band combinations for specific NR and/or E-UTRA frequency bands and/or up to a specific number of carriers and/or up to specific aggregated bandwidth. This is also used to request feature sets (for NR) and feature set combinations (for NR and MR-DC). For NR sidelink communication, this is used by the initiating UE to request sidelink UE radio access capabilities from the peer UE.

FreqBandList information element

```
-- ASN1START
-- TAG-FREQBANDLIST-START

FreqBandList ::=                SEQUENCE (SIZE (1..maxBandsMRDC)) OF FreqBandInformation
```

```
FreqBandInformation ::=         CHOICE {
    bandInformationEUTRA            FreqBandInformationEUTRA,
    bandInformationNR               FreqBandInformationNR
}

FreqBandInformationEUTRA ::=    SEQUENCE {
    bandEUTRA                       FreqBandIndicatorEUTRA,
    ca-BandwidthClassDL-EUTRA       CA-BandwidthClassEUTRA                  OPTIONAL,   -- Need N
    ca-BandwidthClassUL-EUTRA       CA-BandwidthClassEUTRA                  OPTIONAL    -- Need N
}

FreqBandInformationNR ::=       SEQUENCE {
    bandNR                          FreqBandIndicatorNR,
    maxBandwidthRequestedDL         AggregatedBandwidth                     OPTIONAL,   -- Need N
    maxBandwidthRequestedUL         AggregatedBandwidth                     OPTIONAL,   -- Need N
    maxCarriersRequestedDL          INTEGER (1..maxNrofServingCells)        OPTIONAL,   -- Need N
    maxCarriersRequestedUL          INTEGER (1..maxNrofServingCells)        OPTIONAL    -- Need N
}

AggregatedBandwidth ::=         ENUMERATED {mhz50, mhz100, mhz150, mhz200, mhz250, mhz300, mhz350,
                                            mhz400, mhz450, mhz500, mhz550, mhz600, mhz650, mhz700, mhz750, mhz800}

-- TAG-FREQBANDLIST-STOP
-- ASN1STOP
```

– *FreqSeparationClass*

The IE *FreqSeparationClas*s is used for an intra-band non-contiguous CA band combination to indicate frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band.

FreqSeparationClass information element

```
-- ASN1START
-- TAG-FREQSEPARATIONCLASS-START

FreqSeparationClass ::= ENUMERATED { mhz800, mhz1200, mhz1400, ..., mhz400-v1650, mhz600-v1650}

FreqSeparationClassDL-v1620 ::= ENUMERATED {mhz1000, mhz1600, mhz1800, mhz2000, mhz2200, mhz2400}

FreqSeparationClassUL-v1620 ::= ENUMERATED {mhz1000}

-- TAG-FREQSEPARATIONCLASS-STOP
-- ASN1STOP
```

– *FreqSeparationClassDL-Only*

The IE *FreqSeparationClassDL-Only* is used to indicate the frequency separation between lower edge of lowest CC and upper edge of highest CC of DL only frequency spectrum in a frequency band.

FreqSeparationClassDL-Only information element

```
-- ASN1START
-- TAG-FREQSEPARATIONCLASSDL-Only-START

FreqSeparationClassDL-Only-r16 ::= ENUMERATED {mhz200, mhz400, mhz600, mhz800, mhz1000, mhz1200}

-- TAG-FREQSEPARATIONCLASSDL-Only-STOP
-- ASN1STOP
```

– *FR2-2-AccessParamsPerBand*

The IE *FR2-2-AccessParamsPerBand* is used to convey FR2-2 related parameters specific for a certain frequency band (not per feature set or band combination).

FR2-2-AccessParamsPerBand information element

```
-- ASN1START
-- TAG-FR2-2-ACCESSPARAMSPERBAND-START

FR2-2-AccessParamsPerBand-r17 ::=       SEQUENCE {
    -- R1 24-1: Basic FR2-2 DL support
    dl-FR2-2-SCS-120kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-1a: Basic FR2-2 UL support
    ul-FR2-2-SCS-120kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-2: 120KHz SSB support for initial access in FR2-2
    initialAccessSSB-120kHz-r17             ENUMERATED {supported}            OPTIONAL,
    -- R1 24-1b: Wideband PRACH for 120 kHz in FR2-2
    widebandPRACH-SCS-120kHz-r17            ENUMERATED {supported}            OPTIONAL,
    -- R1 24-1c: Multi-RB support PUCCH format 0/1/4 for 120 kHz in FR2-2
    multiRB-PUCCH-SCS-120kHz-r17            ENUMERATED {supported}            OPTIONAL,
    -- R1 24-1d: Multiple PDSCH scheduling by single DCI for 120kHz in FR2-2
    multiPDSCH-SingleDCI-FR2-2-SCS-120kHz-r17 ENUMERATED {supported}          OPTIONAL,
    -- R1 24-1e: Multiple PUSCH scheduling by single DCI for 120kHz in FR2-2
    multiPUSCH-SingleDCI-FR2-2-SCS-120kHz-r17 ENUMERATED {supported}          OPTIONAL,
    -- R1 24-4: 480KHz SCS support for DL
    dl-FR2-2-SCS-480kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-4a: 480KHz SCS support for UL
    ul-FR2-2-SCS-480kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-3: 480KHz SSB support for initial access in FR2-2
    initialAccessSSB-480kHz-r17             ENUMERATED {supported}            OPTIONAL,
    -- R1 24-4b: Wideband PRACH for 480 kHz in FR2-2
    widebandPRACH-SCS-480kHz-r17            ENUMERATED {supported}            OPTIONAL,
    -- R1 24-4c: Multi-RB support PUCCH format 0/1/4 for 480 kHz in FR2-2
    multiRB-PUCCH-SCS-480kHz-r17            ENUMERATED {supported}            OPTIONAL,
    -- R1 24-4f: Enhanced PDCCH monitoring for 480KHz in FR2-2
    enhancedPDCCH-monitoringSCS-480kHz-r17  ENUMERATED {supported}            OPTIONAL,
    -- R1 24-5: 960KHz SCS support for DL
    dl-FR2-2-SCS-960kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-5a: 960KHz SCS support for UL
    ul-FR2-2-SCS-960kHz-r17                 ENUMERATED {supported}            OPTIONAL,
    -- R1 24-5c: Multi-RB support PUCCH format 0/1/4 for 960 kHz in FR2-2
```

```
    multiRB-PUCCH-SCS-960kHz-r17            ENUMERATED {supported}            OPTIONAL,
    -- R1 24-5f: Enhanced PDCCH monitoring for 960KHz in FR2-2
    enhancedPDCCH-monitoringSCS-960kHz-r17  SEQUENCE {
        pdcch-monitoring4-1-r17                 ENUMERATED {supported}        OPTIONAL,
        pdcch-monitoring4-2-r17                 ENUMERATED {supported}        OPTIONAL,
        pdcch-monitoring8-4-r17                 ENUMERATED {supported}        OPTIONAL
    }                                                                         OPTIONAL,
    -- R1 24-6: Type 1 channel access procedure in uplink for FR2-2 with shared spectrum channel access
    type1-ChannelAccess-FR2-2-r17           ENUMERATED {supported}            OPTIONAL,
    -- R1 24-7: Type 2 channel access procedure in uplink for FR2-2 with shared spectrum channel access
    type2-ChannelAccess-FR2-2-r17           ENUMERATED {supported}            OPTIONAL,
    -- R1 24-10: Reduced beam switching time delay
    reduced-BeamSwitchTiming-FR2-2-r17      ENUMERATED {supported}            OPTIONAL,
    -- R1 24-8: 32 DL HARQ processes for FR 2-2
    support32-DL-HARQ-ProcessPerSCS-r17     SEQUENCE {
        scs-120kHz-r17                          ENUMERATED {supported}        OPTIONAL,
        scs-480kHz-r17                          ENUMERATED {supported}        OPTIONAL,
        scs-960kHz-r17                          ENUMERATED {supported}        OPTIONAL
    }                                                                         OPTIONAL,
    -- R1 24-9: 32 UL HARQ processes for FR 2-2
    support32-UL-HARQ-ProcessPerSCS-r17     SEQUENCE {
        scs-120kHz-r17                          ENUMERATED {supported}        OPTIONAL,
        scs-480kHz-r17                          ENUMERATED {supported}        OPTIONAL,
        scs-960kHz-r17                          ENUMERATED {supported}        OPTIONAL
    }                                                                         OPTIONAL,
    ...,
    [[
    -- R4 15-1: 64QAM for PUSCH for FR2-2
    modulation64-QAM-PUSCH-FR2-2-r17            ENUMERATED {supported}        OPTIONAL
    ]]
}

-- TAG-FR2-2-ACCESSPARAMSPERBAND-STOP
-- ASN1STOP
```

– *HighSpeedParameters*

The IE *HighSpeedParameters* is used to convey capabilities related to high speed scenarios.

HighSpeedParameters **information element**

```
-- ASN1START
-- TAG-HIGHSPEEDPARAMETERS-START

HighSpeedParameters-r16 ::= SEQUENCE {
    measurementEnhancement-r16       ENUMERATED {supported}   OPTIONAL,
    demodulationEnhancement-r16      ENUMERATED {supported}   OPTIONAL
}

HighSpeedParameters-v1650 ::= CHOICE {
    intraNR-MeasurementEnhancement-r16       ENUMERATED {supported},
```

```
    interRAT-MeasurementEnhancement-r16      ENUMERATED {supported}
}

HighSpeedParameters-v1700 ::= SEQUENCE {
    -- R4 18-1: Enhanced RRM requirements specified for CA for FR1 HST
    measurementEnhancementCA-r17            ENUMERATED {supported}   OPTIONAL,
    -- R4 18-2: Enhanced RRM requirements specified for inter-frequency measurement in connected mode for FR1 HST
    measurementEnhancementInterFreq-r17     ENUMERATED {supported}   OPTIONAL
}

-- TAG-HIGHSPEEDPARAMETERS-STOP
-- ASN1STOP
```

– *IMS-Parameters*

The IE *IMS-Parameters* is used to convey capabilities related to IMS.

IMS-Parameters information element

```
-- ASN1START
-- TAG-IMS-PARAMETERS-START

IMS-Parameters ::=         SEQUENCE {
    ims-ParametersCommon       IMS-ParametersCommon                OPTIONAL,
    ims-ParametersFRX-Diff     IMS-ParametersFRX-Diff              OPTIONAL,
    ...
}

IMS-Parameters-v1700 ::=   SEQUENCE {
    ims-ParametersFR2-2-r17    IMS-ParametersFR2-2-r17             OPTIONAL
}

IMS-ParametersCommon ::=   SEQUENCE {
    voiceOverEUTRA-5GC                 ENUMERATED {supported}              OPTIONAL,
    ...,
    [[
    voiceOverSCG-BearerEUTRA-5GC       ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    voiceFallbackIndicationEPS-r16      ENUMERATED {supported}                 OPTIONAL
    ]]
}

IMS-ParametersFRX-Diff ::= SEQUENCE {
    voiceOverNR                ENUMERATED {supported}              OPTIONAL,
    ...
}

IMS-ParametersFR2-2-r17 ::= SEQUENCE {
    voiceOverNR-r17             ENUMERATED {supported}             OPTIONAL,
    ...
```

```
}

-- TAG-IMS-PARAMETERS-STOP
-- ASN1STOP
```

– *InterRAT-Parameters*

The IE *InterRAT-Parameters* is used convey UE capabilities related to the other RATs.

InterRAT-Parameters information element

```
-- ASN1START
-- TAG-INTERRAT-PARAMETERS-START

InterRAT-Parameters ::=             SEQUENCE {
    eutra                               EUTRA-Parameters                OPTIONAL,
    ...,
    [[
    utra-FDD-r16                        UTRA-FDD-Parameters-r16         OPTIONAL
    ]]

}

EUTRA-Parameters ::=                SEQUENCE {
    supportedBandListEUTRA          SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA,
    eutra-ParametersCommon              EUTRA-ParametersCommon                                  OPTIONAL,
    eutra-ParametersXDD-Diff            EUTRA-ParametersXDD-Diff                                OPTIONAL,
    ...
}

EUTRA-ParametersCommon ::=      SEQUENCE {
    mfbi-EUTRA                          ENUMERATED {supported}          OPTIONAL,
    modifiedMPR-BehaviorEUTRA           BIT STRING (SIZE (32))          OPTIONAL,
    multiNS-Pmax-EUTRA                  ENUMERATED {supported}          OPTIONAL,
    rs-SINR-MeasEUTRA                   ENUMERATED {supported}          OPTIONAL,
    ...,
    [[
    ne-DC                               ENUMERATED {supported}          OPTIONAL
    ]],
    [[
    nr-HO-ToEN-DC-r16                   ENUMERATED {supported}          OPTIONAL
    ]]
}

EUTRA-ParametersXDD-Diff ::=        SEQUENCE {
    rsrqMeasWidebandEUTRA               ENUMERATED {supported}          OPTIONAL,
    ...
}

UTRA-FDD-Parameters-r16 ::=             SEQUENCE {
    supportedBandListUTRA-FDD-r16           SEQUENCE (SIZE (1..maxBandsUTRA-FDD-r16)) OF SupportedBandUTRA-FDD-r16,
```

```
    ...
}

SupportedBandUTRA-FDD-r16 ::=           ENUMERATED {
                                            bandI, bandII, bandIII, bandIV, bandV, bandVI,
                                            bandVII, bandVIII, bandIX, bandX, bandXI,
                                            bandXII, bandXIII, bandXIV, bandXV, bandXVI,
                                            bandXVII, bandXVIII, bandXIX, bandXX,
                                            bandXXI, bandXXII, bandXXIII, bandXXIV,
                                            bandXXV, bandXXVI, bandXXVII, bandXXVIII,
                                            bandXXIX, bandXXX, bandXXXI, bandXXXII}

-- TAG-INTERRAT-PARAMETERS-STOP
-- ASN1STOP
```

– *MAC-Parameters*

The IE *MAC-Parameters* is used to convey capabilities related to MAC.

MAC-Parameters information element

```
-- ASN1START
-- TAG-MAC-PARAMETERS-START

MAC-Parameters ::= SEQUENCE {
    mac-ParametersCommon            MAC-ParametersCommon        OPTIONAL,
    mac-ParametersXDD-Diff          MAC-ParametersXDD-Diff      OPTIONAL
}

MAC-Parameters-v1610 ::= SEQUENCE {
    mac-ParametersFRX-Diff-r16      MAC-ParametersFRX-Diff-r16  OPTIONAL
}

MAC-Parameters-v1700 ::= SEQUENCE {
    mac-ParametersFR2-2-r17         MAC-ParametersFR2-2-r17     OPTIONAL
}

MAC-ParametersCommon ::=    SEQUENCE {
    lcp-Restriction                         ENUMERATED {supported}      OPTIONAL,
    dummy                                   ENUMERATED {supported}      OPTIONAL,
    lch-ToSCellRestriction                  ENUMERATED {supported}      OPTIONAL,
    ...,
    [[
    recommendedBitRate                      ENUMERATED {supported}      OPTIONAL,
    recommendedBitRateQuery                 ENUMERATED {supported}      OPTIONAL
    ]],
    [[
    recommendedBitRateMultiplier-r16         ENUMERATED {supported}     OPTIONAL,
    preEmptiveBSR-r16                        ENUMERATED {supported}     OPTIONAL,
    autonomousTransmission-r16               ENUMERATED {supported}     OPTIONAL,
    lch-PriorityBasedPrioritization-r16      ENUMERATED {supported}     OPTIONAL,
```

```
    lch-ToConfiguredGrantMapping-r16         ENUMERATED {supported}     OPTIONAL,
    lch-ToGrantPriorityRestriction-r16       ENUMERATED {supported}     OPTIONAL,
    singlePHR-P-r16                          ENUMERATED {supported}     OPTIONAL,
    ul-LBT-FailureDetectionRecovery-r16      ENUMERATED {supported}     OPTIONAL,
    -- R4 8-1: MPE
    tdd-MPE-P-MPR-Reporting-r16              ENUMERATED {supported}     OPTIONAL,
    lcid-ExtensionIAB-r16                    ENUMERATED {supported}     OPTIONAL
    ]],
    [[
    spCell-BFR-CBRA-r16                      ENUMERATED {supported}     OPTIONAL
    ]],
    [[
    srs-ResourceId-Ext-r16                   ENUMERATED {supported}     OPTIONAL
    ]],
    [[
    enhancedUuDRX-forSidelink-r17            ENUMERATED {supported}     OPTIONAL,
    --27-10: Support of UL MAC CE based MG activation request for PRS measurements
    mg-ActivationRequestPRS-Meas-r17         ENUMERATED {supported}     OPTIONAL,
    --27-11: Support of DL MAC CE based MG activation request for PRS measurements
    mg-ActivationCommPRS-Meas-r17            ENUMERATED {supported}     OPTIONAL,
    intraCG-Prioritization-r17               ENUMERATED {supported}     OPTIONAL,
    jointPrioritizationCG-Retx-Timer-r17     ENUMERATED {supported}     OPTIONAL,
    survivalTime-r17                         ENUMERATED {supported}     OPTIONAL,
    lcg-ExtensionIAB-r17                     ENUMERATED {supported}     OPTIONAL,
    harq-FeedbackDisabled-r17                ENUMERATED {supported}     OPTIONAL,
    uplink-Harq-ModeB-r17                    ENUMERATED {supported}     OPTIONAL,
    sr-TriggeredBy-TA-Report-r17             ENUMERATED {supported}     OPTIONAL,
    extendedDRX-CycleInactive-r17            ENUMERATED {supported}     OPTIONAL,
    simultaneousSR-PUSCH-DiffPUCCH-groups-r17 ENUMERATED {supported}    OPTIONAL,
    lastTransmissionUL-r17                   ENUMERATED {supported}     OPTIONAL
    ]]
}

MAC-ParametersFRX-Diff-r16 ::=  SEQUENCE {
    directMCG-SCellActivation-r16            ENUMERATED {supported}     OPTIONAL,
    directMCG-SCellActivationResume-r16      ENUMERATED {supported}     OPTIONAL,
    directSCG-SCellActivation-r16            ENUMERATED {supported}     OPTIONAL,
    directSCG-SCellActivationResume-r16      ENUMERATED {supported}     OPTIONAL,
    -- R1 19-1: DRX Adaptation
    drx-Adaptation-r16           SEQUENCE {
        non-SharedSpectrumChAccess-r16       MinTimeGap-r16             OPTIONAL,
        sharedSpectrumChAccess-r16           MinTimeGap-r16             OPTIONAL
    }                                                                   OPTIONAL,
    ...
}

MAC-ParametersFR2-2-r17 ::=  SEQUENCE {
    directMCG-SCellActivation-r17            ENUMERATED {supported}     OPTIONAL,
    directMCG-SCellActivationResume-r17      ENUMERATED {supported}     OPTIONAL,
    directSCG-SCellActivation-r17            ENUMERATED {supported}     OPTIONAL,
    directSCG-SCellActivationResume-r17      ENUMERATED {supported}     OPTIONAL,
    drx-Adaptation-r17         SEQUENCE {
        non-SharedSpectrumChAccess-r17       MinTimeGapFR2-2-r17        OPTIONAL,
        sharedSpectrumChAccess-r17           MinTimeGapFR2-2-r17        OPTIONAL
```

```
    }                                                       OPTIONAL,
    ...
}

MAC-ParametersXDD-Diff ::=  SEQUENCE {
    skipUplinkTxDynamic                     ENUMERATED {supported}     OPTIONAL,
    logicalChannelSR-DelayTimer             ENUMERATED {supported}     OPTIONAL,
    longDRX-Cycle                           ENUMERATED {supported}     OPTIONAL,
    shortDRX-Cycle                          ENUMERATED {supported}     OPTIONAL,
    multipleSR-Configurations               ENUMERATED {supported}     OPTIONAL,
    multipleConfiguredGrants                ENUMERATED {supported}     OPTIONAL,
    ...,
    [[
    secondaryDRX-Group-r16                  ENUMERATED {supported}     OPTIONAL
    ]],
    [[
    enhancedSkipUplinkTxDynamic-r16         ENUMERATED {supported}     OPTIONAL,
    enhancedSkipUplinkTxConfigured-r16      ENUMERATED {supported}     OPTIONAL
    ]]
}

MinTimeGap-r16 ::=    SEQUENCE {
    scs-15kHz-r16                       ENUMERATED {sl1, sl3}        OPTIONAL,
    scs-30kHz-r16                       ENUMERATED {sl1, sl6}        OPTIONAL,
    scs-60kHz-r16                       ENUMERATED {sl1, sl12}       OPTIONAL,
    scs-120kHz-r16                      ENUMERATED {sl2, sl24}       OPTIONAL
}

MinTimeGapFR2-2-r17 ::= SEQUENCE {
    scs-120kHz-r17                      ENUMERATED {sl2, sl24}       OPTIONAL,
    scs-480kHz-r17                      ENUMERATED {sl8, sl96}       OPTIONAL,
    scs-960kHz-r17                      ENUMERATED {sl16, sl192}     OPTIONAL
}

-- TAG-MAC-PARAMETERS-STOP
-- ASN1STOP
```

– *MeasAndMobParameters*

The IE *MeasAndMobParameters* is used to convey UE capabilities related to measurements for radio resource management (RRM), radio link monitoring (RLM) and mobility (e.g. handover).

MeasAndMobParameters **information element**

```
-- ASN1START
-- TAG-MEASANDMOBPARAMETERS-START

MeasAndMobParameters ::=                SEQUENCE {
    measAndMobParametersCommon          MeasAndMobParametersCommon              OPTIONAL,
    measAndMobParametersXDD-Diff            MeasAndMobParametersXDD-Diff        OPTIONAL,
    measAndMobParametersFRX-Diff            MeasAndMobParametersFRX-Diff        OPTIONAL
```

```
}

MeasAndMobParameters-v1700 ::=          SEQUENCE {
    measAndMobParametersFR2-2-r17           MeasAndMobParametersFR2-2-r17           OPTIONAL
}

MeasAndMobParametersCommon ::=          SEQUENCE {
    supportedGapPattern                     BIT STRING (SIZE (22))                  OPTIONAL,
    ssb-RLM                                 ENUMERATED {supported}                  OPTIONAL,
    ssb-AndCSI-RS-RLM                       ENUMERATED {supported}                  OPTIONAL,
    ...,
    [[
    eventB-MeasAndReport                    ENUMERATED {supported}                  OPTIONAL,
    handoverFDD-TDD                         ENUMERATED {supported}                  OPTIONAL,
    eutra-CGI-Reporting                     ENUMERATED {supported}                  OPTIONAL,
    nr-CGI-Reporting                        ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    independentGapConfig                    ENUMERATED {supported}                  OPTIONAL,
    periodicEUTRA-MeasAndReport             ENUMERATED {supported}                  OPTIONAL,
    handoverFR1-FR2                         ENUMERATED {supported}                  OPTIONAL,
    maxNumberCSI-RS-RRM-RS-SINR             ENUMERATED {n4, n8, n16, n32, n64, n96} OPTIONAL
    ]],
    [[
    nr-CGI-Reporting-ENDC                   ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    eutra-CGI-Reporting-NEDC                ENUMERATED {supported}                  OPTIONAL,
    eutra-CGI-Reporting-NRDC                ENUMERATED {supported}                  OPTIONAL,
    nr-CGI-Reporting-NEDC                   ENUMERATED {supported}                  OPTIONAL,
    nr-CGI-Reporting-NRDC                   ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    reportAddNeighMeasForPeriodic-r16       ENUMERATED {supported}                  OPTIONAL,
    condHandoverParametersCommon-r16        SEQUENCE {
       condHandoverFDD-TDD-r16                  ENUMERATED {supported}              OPTIONAL,
       condHandoverFR1-FR2-r16                  ENUMERATED {supported}              OPTIONAL
    }                                                                               OPTIONAL,
    nr-NeedForGap-Reporting-r16             ENUMERATED {supported}                  OPTIONAL,
    supportedGapPattern-NRonly-r16          BIT STRING (SIZE (10))                  OPTIONAL,
    supportedGapPattern-NRonly-NEDC-r16     ENUMERATED {supported}                  OPTIONAL,
    maxNumberCLI-RSSI-r16                   ENUMERATED {n8, n16, n32, n64}          OPTIONAL,
    maxNumberCLI-SRS-RSRP-r16               ENUMERATED {n4, n8, n16, n32}           OPTIONAL,
    maxNumberPerSlotCLI-SRS-RSRP-r16        ENUMERATED {n2, n4, n8}                 OPTIONAL,
    mfbi-IAB-r16                            ENUMERATED {supported}                  OPTIONAL,
    dummy                                   ENUMERATED {supported}                  OPTIONAL,
    nr-CGI-Reporting-NPN-r16                ENUMERATED {supported}                  OPTIONAL,
    idleInactiveEUTRA-MeasReport-r16        ENUMERATED {supported}                  OPTIONAL,
    idleInactive-ValidityArea-r16           ENUMERATED {supported}                  OPTIONAL,
    eutra-AutonomousGaps-r16                ENUMERATED {supported}                  OPTIONAL,
    eutra-AutonomousGaps-NEDC-r16           ENUMERATED {supported}                  OPTIONAL,
    eutra-AutonomousGaps-NRDC-r16           ENUMERATED {supported}                  OPTIONAL,
    pcellT312-r16                           ENUMERATED {supported}                  OPTIONAL,
    supportedGapPattern-r16                 BIT STRING (SIZE (2))                   OPTIONAL
```

```
]],
[[
-- R4 19-2 Concurrent measurement gaps
concurrentMeasGap-r17                   CHOICE {
    concurrentPerUE-OnlyMeasGap-r17         ENUMERATED {supported},
    concurrentPerUE-PerFRCombMeasGap-r17    ENUMERATED {supported}
}                                                                       OPTIONAL,
-- R4 19-1 Network controlled small gap (NCSG)
nr-NeedForGapNCSG-Reporting-r17         ENUMERATED {supported}          OPTIONAL,
eutra-NeedForGapNCSG-Reporting-r17      ENUMERATED {supported}          OPTIONAL,
-- R4 19-1-1 per FR Network controlled small gap (NCSG)
ncsg-MeasGapPerFR-r17                   ENUMERATED {supported}          OPTIONAL,
-- R4 19-1-2 Network controlled small gap (NCSG) supported patterns
ncsg-MeasGapPatterns-r17                BIT STRING (SIZE(24))           OPTIONAL,
-- R4 19-1-3 Network controlled small gap (NCSG) supported NR-only patterns
ncsg-MeasGapNR-Patterns-r17             BIT STRING (SIZE(24))           OPTIONAL,
-- R4 19-3-2 pre-configured measurement gap
preconfiguredUE-AutonomousMeasGap-r17   ENUMERATED {supported}          OPTIONAL,
-- R4 19-3-1 pre-configured measurement gap
preconfiguredNW-ControlledMeasGap-r17   ENUMERATED {supported}          OPTIONAL,
handoverFR1-FR2-2-r17                   ENUMERATED {supported}          OPTIONAL,
handoverFR2-1-FR2-2-r17                 ENUMERATED {supported}          OPTIONAL,
-- RAN4 14-1: per-FR MG for PRS measurement
independentGapConfigPRS-r17             ENUMERATED {supported}          OPTIONAL,
rrm-RelaxationRRC-ConnectedRedCap-r17   ENUMERATED {supported}          OPTIONAL,
-- R4 25-3: Parallel measurements with multiple measurement gaps
parallelMeasurementGap-r17              ENUMERATED {n2}                 OPTIONAL,
condHandoverWithSCG-NRDC-r17            ENUMERATED {supported}          OPTIONAL,
gNB-ID-LengthReporting-r17              ENUMERATED {supported}          OPTIONAL,
gNB-ID-LengthReporting-ENDC-r17         ENUMERATED {supported}          OPTIONAL,
gNB-ID-LengthReporting-NEDC-r17         ENUMERATED {supported}          OPTIONAL,
gNB-ID-LengthReporting-NRDC-r17         ENUMERATED {supported}          OPTIONAL,
gNB-ID-LengthReporting-NPN-r17          ENUMERATED {supported}          OPTIONAL
]],
[[
-- R4 25-1: Parallel measurements on multiple SMTC-s for a single frequency carrier
parallelSMTC-r17                        ENUMERATED {n4}                 OPTIONAL,
-- R4 19-2-1 Concurrent measurement gaps for EUTRA
concurrentMeasGapEUTRA-r17              ENUMERATED {supported}          OPTIONAL,
serviceLinkPropDelayDiffReporting-r17   ENUMERATED {supported}          OPTIONAL,
-- R4 19-1-4 Network controlled small gap (NCSG) performing measurement based on flag deriveSSB-IndexFromCellInter
ncsg-SymbolLevelScheduleRestrictionInter-r17  ENUMERATED {supported}    OPTIONAL
]],
[[
eventD1-MeasReportTrigger-r17           ENUMERATED {supported}          OPTIONAL,
independentGapConfig-maxCC-r17          SEQUENCE {
    fr1-Only-r17                            INTEGER (1..32)             OPTIONAL,
    fr2-Only-r17                            INTEGER (1..32)             OPTIONAL,
    fr1-AndFR2-r17                          INTEGER (1..32)             OPTIONAL
}                                                                       OPTIONAL
]],
[[
interSatMeas-r17                            ENUMERATED {supported}      OPTIONAL,
deriveSSB-IndexFromCellInterNon-NCSG-r17    ENUMERATED {supported}      OPTIONAL
```

```
    ]]
}

MeasAndMobParametersXDD-Diff ::=        SEQUENCE {
    intraAndInterF-MeasAndReport            ENUMERATED {supported}                  OPTIONAL,
    eventA-MeasAndReport                    ENUMERATED {supported}                  OPTIONAL,
    ...,
    [[
    handoverInterF                          ENUMERATED {supported}                  OPTIONAL,
    handoverLTE-EPC                         ENUMERATED {supported}                  OPTIONAL,
    handoverLTE-5GC                         ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    sftd-MeasNR-Neigh                       ENUMERATED {supported}                  OPTIONAL,
    sftd-MeasNR-Neigh-DRX                   ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    dummy                                   ENUMERATED {supported}                  OPTIONAL
    ]]
}

MeasAndMobParametersFRX-Diff ::=            SEQUENCE {
    ss-SINR-Meas                                ENUMERATED {supported}              OPTIONAL,
    csi-RSRP-AndRSRQ-MeasWithSSB                ENUMERATED {supported}              OPTIONAL,
    csi-RSRP-AndRSRQ-MeasWithoutSSB             ENUMERATED {supported}              OPTIONAL,
    csi-SINR-Meas                               ENUMERATED {supported}              OPTIONAL,
    csi-RS-RLM                                  ENUMERATED {supported}              OPTIONAL,
    ...,
    [[
    handoverInterF                              ENUMERATED {supported}              OPTIONAL,
    handoverLTE-EPC                             ENUMERATED {supported}              OPTIONAL,
    handoverLTE-5GC                             ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    maxNumberResource-CSI-RS-RLM                ENUMERATED {n2, n4, n6, n8}         OPTIONAL
    ]],
    [[
    simultaneousRxDataSSB-DiffNumerology        ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    nr-AutonomousGaps-r16                       ENUMERATED {supported}              OPTIONAL,
    nr-AutonomousGaps-ENDC-r16                  ENUMERATED {supported}              OPTIONAL,
    nr-AutonomousGaps-NEDC-r16                  ENUMERATED {supported}              OPTIONAL,
    nr-AutonomousGaps-NRDC-r16                  ENUMERATED {supported}              OPTIONAL,
    dummy                                       ENUMERATED {supported}              OPTIONAL,
    cli-RSSI-Meas-r16                           ENUMERATED {supported}              OPTIONAL,
    cli-SRS-RSRP-Meas-r16                       ENUMERATED {supported}              OPTIONAL,
    interFrequencyMeas-NoGap-r16                ENUMERATED {supported}              OPTIONAL,
    simultaneousRxDataSSB-DiffNumerology-Inter-r16  ENUMERATED {supported}          OPTIONAL,
    idleInactiveNR-MeasReport-r16               ENUMERATED {supported}              OPTIONAL,
    -- R4 6-2: Support of beam level Early Measurement Reporting
    idleInactiveNR-MeasBeamReport-r16           ENUMERATED {supported}              OPTIONAL
    ]],
    [[
```

```
    increasedNumberofCSIRSPerMO-r16             ENUMERATED {supported}              OPTIONAL
    ]]
}

MeasAndMobParametersFR2-2-r17 ::=           SEQUENCE {
    handoverInterF-r17                          ENUMERATED {supported}              OPTIONAL,
    handoverLTE-EPC-r17                         ENUMERATED {supported}              OPTIONAL,
    handoverLTE-5GC-r17                         ENUMERATED {supported}              OPTIONAL,
    idleInactiveNR-MeasReport-r17               ENUMERATED {supported}              OPTIONAL,
...
}

-- TAG-MEASANDMOBPARAMETERS-STOP
-- ASN1STOP
```

– *MeasAndMobParametersMRDC*

The IE *MeasAndMobParametersMRDC* is used to convey capability parameters related to RRM measurements and RRC mobility.

MeasAndMobParametersMRDC information element

```
-- ASN1START
-- TAG-MEASANDMOBPARAMETERSMRDC-START

MeasAndMobParametersMRDC ::=            SEQUENCE {
    measAndMobParametersMRDC-Common         MeasAndMobParametersMRDC-Common             OPTIONAL,
    measAndMobParametersMRDC-XDD-Diff       MeasAndMobParametersMRDC-XDD-Diff           OPTIONAL,
    measAndMobParametersMRDC-FRX-Diff       MeasAndMobParametersMRDC-FRX-Diff           OPTIONAL
}

MeasAndMobParametersMRDC-v1560 ::=      SEQUENCE {
    measAndMobParametersMRDC-XDD-Diff-v1560     MeasAndMobParametersMRDC-XDD-Diff-v1560     OPTIONAL
}

MeasAndMobParametersMRDC-v1610 ::=      SEQUENCE {
    measAndMobParametersMRDC-Common-v1610       MeasAndMobParametersMRDC-Common-v1610       OPTIONAL,
    interNR-MeasEUTRA-IAB-r16                   ENUMERATED {supported}                      OPTIONAL
}

MeasAndMobParametersMRDC-v1700 ::=      SEQUENCE {
    measAndMobParametersMRDC-Common-v1700       MeasAndMobParametersMRDC-Common-v1700       OPTIONAL
}

MeasAndMobParametersMRDC-v1730 ::=      SEQUENCE {
    measAndMobParametersMRDC-Common-v1730   MeasAndMobParametersMRDC-Common-v1730           OPTIONAL
}

MeasAndMobParametersMRDC-Common ::=     SEQUENCE {
    independentGapConfig                        ENUMERATED {supported}                      OPTIONAL
}
```

```
MeasAndMobParametersMRDC-Common-v1610 ::=   SEQUENCE {
    condPSCellChangeParametersCommon-r16        SEQUENCE {
        condPSCellChangeFDD-TDD-r16                 ENUMERATED {supported}                  OPTIONAL,
        condPSCellChangeFR1-FR2-r16                 ENUMERATED {supported}                  OPTIONAL
    }                                                                                       OPTIONAL,
    pscellT312-r16                              ENUMERATED {supported}                  OPTIONAL
}

MeasAndMobParametersMRDC-Common-v1700 ::=   SEQUENCE {
    condPSCellChangeParameters-r17              SEQUENCE {
        inter-SN-condPSCellChangeFDD-TDD-NRDC-r17       ENUMERATED {supported}          OPTIONAL,
        inter-SN-condPSCellChangeFR1-FR2-NRDC-r17       ENUMERATED {supported}          OPTIONAL,
        inter-SN-condPSCellChangeFDD-TDD-ENDC-r17       ENUMERATED {supported}          OPTIONAL,
        inter-SN-condPSCellChangeFR1-FR2-ENDC-r17       ENUMERATED {supported}          OPTIONAL,
        mn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL,
        mn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL,
        mn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL,
        sn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL,
        sn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL,
        sn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17    ENUMERATED {supported}          OPTIONAL
    }                                                                                   OPTIONAL,
    condHandoverWithSCG-ENDC-r17                    ENUMERATED {supported}              OPTIONAL,
    condHandoverWithSCG-NEDC-r17                    ENUMERATED {supported}              OPTIONAL
}

MeasAndMobParametersMRDC-Common-v1730 ::= SEQUENCE {
    independentGapConfig-maxCC-r17          SEQUENCE {
        fr1-Only-r17                            INTEGER (1..32)                         OPTIONAL,
        fr2-Only-r17                            INTEGER (1..32)                         OPTIONAL,
        fr1-AndFR2-r17                          INTEGER (1..32)                         OPTIONAL
    }
}

MeasAndMobParametersMRDC-XDD-Diff ::=   SEQUENCE {
    sftd-MeasPSCell                         ENUMERATED {supported}                      OPTIONAL,
    sftd-MeasNR-Cell                        ENUMERATED {supported}                      OPTIONAL
}

MeasAndMobParametersMRDC-XDD-Diff-v1560 ::=    SEQUENCE {
    sftd-MeasPSCell-NEDC                        ENUMERATED {supported}                  OPTIONAL
}

MeasAndMobParametersMRDC-FRX-Diff ::=           SEQUENCE {
    simultaneousRxDataSSB-DiffNumerology        ENUMERATED {supported}                  OPTIONAL
}

-- TAG-MEASANDMOBPARAMETERSMRDC-STOP
-- ASN1STOP
```

– *MIMO-Layers*

The IE *MIMO-Layers* is used to convey the number of supported MIMO layers.

MIMO-Layers information element

```
-- ASN1START
-- TAG-MIMO-LAYERS-START

MIMO-LayersDL ::=   ENUMERATED {twoLayers, fourLayers, eightLayers}

MIMO-LayersUL ::=   ENUMERATED {oneLayer, twoLayers, fourLayers}

-- TAG-MIMO-LAYERS-STOP
-- ASN1STOP
```

– *MIMO-ParametersPerBand*

The IE *MIMO-ParametersPerBand* is used to convey MIMO related parameters specific for a certain band (not per feature set or band combination).

MIMO-ParametersPerBand information element

```
-- ASN1START
-- TAG-MIMO-PARAMETERSPERBAND-START

MIMO-ParametersPerBand ::=          SEQUENCE {
    tci-StatePDSCH                      SEQUENCE {
        maxNumberConfiguredTCI-StatesPerCC  ENUMERATED {n4, n8, n16, n32, n64, n128}                        OPTIONAL,
        maxNumberActiveTCI-PerBWP           ENUMERATED {n1, n2, n4, n8}                                     OPTIONAL
    }                                                                                                       OPTIONAL,
    additionalActiveTCI-StatePDCCH              ENUMERATED {supported}                                      OPTIONAL,
    pusch-TransCoherence                        ENUMERATED {nonCoherent, partialCoherent, fullCoherent}     OPTIONAL,
    beamCorrespondenceWithoutUL-BeamSweeping    ENUMERATED {supported}                                      OPTIONAL,
    periodicBeamReport                          ENUMERATED {supported}                                      OPTIONAL,
    aperiodicBeamReport                         ENUMERATED {supported}                                      OPTIONAL,
    sp-BeamReportPUCCH                          ENUMERATED {supported}                                      OPTIONAL,
    sp-BeamReportPUSCH                          ENUMERATED {supported}                                      OPTIONAL,
    dummy1                                      DummyG                                                      OPTIONAL,
    maxNumberRxBeam                             INTEGER (2..8)                                              OPTIONAL,
    maxNumberRxTxBeamSwitchDL                   SEQUENCE {
        scs-15kHz                                   ENUMERATED {n4, n7, n14}                                OPTIONAL,
        scs-30kHz                                   ENUMERATED {n4, n7, n14}                                OPTIONAL,
        scs-60kHz                                   ENUMERATED {n4, n7, n14}                                OPTIONAL,
        scs-120kHz                                  ENUMERATED {n4, n7, n14}                                OPTIONAL,
        scs-240kHz                                  ENUMERATED {n4, n7, n14}                                OPTIONAL
    }                                                                                                       OPTIONAL,
    maxNumberNonGroupBeamReporting              ENUMERATED {n1, n2, n4}                                     OPTIONAL,
    groupBeamReporting                          ENUMERATED {supported}                                      OPTIONAL,
    uplinkBeamManagement                        SEQUENCE {
        maxNumberSRS-ResourcePerSet-BM              ENUMERATED {n2, n4, n8, n16},
        maxNumberSRS-ResourceSet                    INTEGER (1..8)
    }                                                                                                       OPTIONAL,
    maxNumberCSI-RS-BFD                 INTEGER (1..64)                                                     OPTIONAL,
    maxNumberSSB-BFD                    INTEGER (1..64)                                                     OPTIONAL,
    maxNumberCSI-RS-SSB-CBD             INTEGER (1..256)                                                    OPTIONAL,
```

```
    dummy2                          ENUMERATED {supported}                                                  OPTIONAL,
    twoPortsPTRS-UL                 ENUMERATED {supported}                                                  OPTIONAL,
    dummy5                          SRS-Resources                                                           OPTIONAL,
    dummy3                          INTEGER (1..4)                                                          OPTIONAL,
    beamReportTiming                SEQUENCE {
        scs-15kHz                       ENUMERATED {sym2, sym4, sym8}                                           OPTIONAL,
        scs-30kHz                       ENUMERATED {sym4, sym8, sym14, sym28}                                   OPTIONAL,
        scs-60kHz                       ENUMERATED {sym8, sym14, sym28}                                         OPTIONAL,
        scs-120kHz                      ENUMERATED {sym14, sym28, sym56}                                        OPTIONAL
    }                                                                                                       OPTIONAL,
    ptrs-DensityRecommendationSetDL     SEQUENCE {
        scs-15kHz                       PTRS-DensityRecommendationDL                                            OPTIONAL,
        scs-30kHz                       PTRS-DensityRecommendationDL                                            OPTIONAL,
        scs-60kHz                       PTRS-DensityRecommendationDL                                            OPTIONAL,
        scs-120kHz                      PTRS-DensityRecommendationDL                                            OPTIONAL
    }                                                                                                       OPTIONAL,
    ptrs-DensityRecommendationSetUL     SEQUENCE {
        scs-15kHz                       PTRS-DensityRecommendationUL                                            OPTIONAL,
        scs-30kHz                       PTRS-DensityRecommendationUL                                            OPTIONAL,
        scs-60kHz                       PTRS-DensityRecommendationUL                                            OPTIONAL,
        scs-120kHz                      PTRS-DensityRecommendationUL                                            OPTIONAL
    }                                                                                                       OPTIONAL,
    dummy4                          DummyH                                                                  OPTIONAL,
    aperiodicTRS                    ENUMERATED {supported}                                                  OPTIONAL,
    ...,
    [[
    dummy6                          ENUMERATED {true}                                                       OPTIONAL,
    beamManagementSSB-CSI-RS        BeamManagementSSB-CSI-RS                                                OPTIONAL,
    beamSwitchTiming                SEQUENCE {
        scs-60kHz                       ENUMERATED {sym14, sym28, sym48, sym224, sym336}                        OPTIONAL,
        scs-120kHz                      ENUMERATED {sym14, sym28, sym48, sym224, sym336}                        OPTIONAL
    }                                                                                                       OPTIONAL,
    codebookParameters              CodebookParameters                                                      OPTIONAL,
    csi-RS-IM-ReceptionForFeedback  CSI-RS-IM-ReceptionForFeedback                                          OPTIONAL,
    csi-RS-ProcFrameworkForSRS      CSI-RS-ProcFrameworkForSRS                                              OPTIONAL,
    csi-ReportFramework             CSI-ReportFramework                                                     OPTIONAL,
    csi-RS-ForTracking              CSI-RS-ForTracking                                                      OPTIONAL,
    srs-AssocCSI-RS                 SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource  OPTIONAL,
    spatialRelations                SpatialRelations                                                        OPTIONAL
    ]],
    [[
    -- R1 16-2b-0: Support of default QCL assumption with two TCI states
    defaultQCL-TwoTCI-r16           ENUMERATED {supported}                                                  OPTIONAL,
    codebookParametersPerBand-r16   CodebookParameters-v1610                                                OPTIONAL,
    -- R1 16-1b-3: Support of PUCCH resource groups per BWP for simultaneous spatial relation update
    simul-SpatialRelationUpdatePUCCHResGroup-r16    ENUMERATED {supported}                                  OPTIONAL,

    -- R1 16-1f: Maximum number of SCells configured for SCell beam failure recovery simultaneously
    maxNumberSCellBFR-r16                   ENUMERATED {n1,n2,n4,n8}                                        OPTIONAL,

    -- R1 16-2c: Supports simultaneous reception with different Type-D for FR2 only
    simultaneousReceptionDiffTypeD-r16              ENUMERATED {supported}                                  OPTIONAL,
    -- R1 16-1a-1: SSB/CSI-RS for L1-SINR measurement
    ssb-csirs-SINR-measurement-r16  SEQUENCE {
```

```
        maxNumberSSB-CSIRS-OneTx-CMR-r16    ENUMERATED {n8, n16, n32, n64},
        maxNumberCSI-IM-NZP-IMR-res-r16     ENUMERATED {n8, n16, n32, n64},
        maxNumberCSIRS-2Tx-res-r16          ENUMERATED {n0, n4, n8, n16, n32, n64},
        maxNumberSSB-CSIRS-res-r16          ENUMERATED {n8, n16, n32, n64, n128},
        maxNumberCSI-IM-NZP-IMR-res-mem-r16 ENUMERATED {n8, n16, n32, n64, n128},
        supportedCSI-RS-Density-CMR-r16     ENUMERATED {one, three, oneAndThree},
        maxNumberAperiodicCSI-RS-Res-r16    ENUMERATED {n2, n4, n8, n16, n32, n64},
        supportedSINR-meas-r16              ENUMERATED {ssbWithCSI-IM, ssbWithNZP-IMR, csirsWithNZP-IMR, csi-RSWithoutIMR}  OPTIONAL
    }                                                                                                                       OPTIONAL,
    -- R1 16-1a-2: Non-group based L1-SINR reporting
    nonGroupSINR-reporting-r16              ENUMERATED {n1, n2, n4}                                                         OPTIONAL,
    -- R1 16-1a-3: Non-group based L1-SINR reporting
    groupSINR-reporting-r16                 ENUMERATED {supported}                                                          OPTIONAL,

    multiDCI-multiTRP-Parameters-r16        SEQUENCE {
        -- R1 16-2a-0: Overlapping PDSCHs in time and fully overlapping in frequency and time
        overlapPDSCHsFullyFreqTime-r16          INTEGER (1..2)                                                              OPTIONAL,
        -- R1 16-2a-1: Overlapping PDSCHs in time and partially overlapping in frequency and time
        overlapPDSCHsInTimePartiallyFreq-r16    ENUMERATED {supported}                                                      OPTIONAL,
        -- R1 16-2a-2: Out of order operation for DL
        outOfOrderOperationDL-r16               SEQUENCE {
            supportPDCCH-ToPDSCH-r16                ENUMERATED {supported}                                                  OPTIONAL,
            supportPDSCH-ToHARQ-ACK-r16             ENUMERATED {supported}                                                  OPTIONAL
        }                                                                                                                   OPTIONAL,
        -- R1 16-2a-3: Out of order operation for UL
        outOfOrderOperationUL-r16               ENUMERATED {supported}                                                      OPTIONAL,
        -- R1 16-2a-5: Separate CRS rate matching
        separateCRS-RateMatching-r16            ENUMERATED {supported}                                                      OPTIONAL,
        -- R1 16-2a-6: Default QCL enhancement for multi-DCI based multi-TRP
        defaultQCL-PerCORESETPoolIndex-r16      ENUMERATED {supported}                                                      OPTIONAL,
        -- R1 16-2a-7: Maximum number of activated TCI states
        maxNumberActivatedTCI-States-r16        SEQUENCE {
            maxNumberPerCORESET-Pool-r16            ENUMERATED {n1, n2, n4, n8},
            maxTotalNumberAcrossCORESET-Pool-r16    ENUMERATED {n2, n4, n8, n16}
        }                                                                                                                   OPTIONAL
    }                                                                                                                       OPTIONAL,
    singleDCI-SDM-scheme-Parameters-r16      SEQUENCE {
        -- R1 16-2b-1b: Single-DCI based SDM scheme - Support of new DMRS port entry
        supportNewDMRS-Port-r16                 ENUMERATED {supported1, supported2, supported3}
OPTIONAL,
        -- R1 16-2b-1a: Support of s-port DL PTRS
        supportTwoPortDL-PTRS-r16               ENUMERATED {supported}                                                      OPTIONAL
    }                                                                                                                       OPTIONAL,
    -- R1 16-2b-2: Support of single-DCI based FDMSchemeA
    supportFDM-SchemeA-r16                  ENUMERATED {supported}                                                          OPTIONAL,
    -- R1 16-2b-3a: Single-DCI based FDMSchemeB CW soft combining
    supportCodeWordSoftCombining-r16        ENUMERATED {supported}                                                          OPTIONAL,
    -- R1 16-2b-4: Single-DCI based TDMSchemeA
    supportTDM-SchemeA-r16                  ENUMERATED {kb3, kb5, kb10, kb20, noRestriction}                                OPTIONAL,
    -- R1 16-2b-5: Single-DCI based inter-slot TDM
    supportInter-slotTDM-r16                SEQUENCE {
        supportRepNumPDSCH-TDRA-r16             ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16},
        maxTBS-Size-r16                         ENUMERATED {kb3, kb5, kb10, kb20, noRestriction},
        maxNumberTCI-states-r16                 INTEGER (1..2)
```

```
}                                                                                   OPTIONAL,
-- R1 16-4: Low PAPR DMRS for PDSCH
lowPAPR-DMRS-PDSCH-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 16-6a: Low PAPR DMRS for PUSCH without transform precoding
lowPAPR-DMRS-PUSCHwithoutPrecoding-r16      ENUMERATED {supported}                  OPTIONAL,
-- R1 16-6b: Low PAPR DMRS for PUCCH
lowPAPR-DMRS-PUCCH-r16                      ENUMERATED {supported}                  OPTIONAL,
-- R1 16-6c: Low PAPR DMRS for PUSCH with transform precoding & pi/2 BPSK
lowPAPR-DMRS-PUSCHwithPrecoding-r16         ENUMERATED {supported}                  OPTIONAL,
-- R1 16-7: Extension of the maximum number of configured aperiodic CSI report settings
csi-ReportFrameworkExt-r16                  CSI-ReportFrameworkExt-r16              OPTIONAL,
-- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1, 16-8: Individual new codebook types
codebookParametersAddition-r16              CodebookParametersAddition-r16          OPTIONAL,
-- R1 16-8: Mixed codebook types
codebookComboParametersAddition-r16         CodebookComboParametersAddition-r16     OPTIONAL,
-- R4 8-2: SSB based beam correspondence
beamCorrespondenceSSB-based-r16             ENUMERATED {supported}                  OPTIONAL,
-- R4 8-3: CSI-RS based beam correspondence
beamCorrespondenceCSI-RS-based-r16          ENUMERATED {supported}                  OPTIONAL,
beamSwitchTiming-r16                        SEQUENCE {
    scs-60kHz-r16                               ENUMERATED {sym224, sym336}         OPTIONAL,
    scs-120kHz-r16                              ENUMERATED {sym224, sym336}         OPTIONAL
}                                                                                   OPTIONAL
]],
[[
-- R1 16-1a-4: Semi-persistent L1-SINR report on PUCCH
semi-PersistentL1-SINR-Report-PUCCH-r16     SEQUENCE {
    supportReportFormat1-2OFDM-syms-r16         ENUMERATED {supported}                      OPTIONAL,
    supportReportFormat4-14OFDM-syms-r16        ENUMERATED {supported}                      OPTIONAL
}                                                                                           OPTIONAL,
-- R1 16-1a-5: Semi-persistent L1-SINR report on PUSCH
semi-PersistentL1-SINR-Report-PUSCH-r16     ENUMERATED {supported}                          OPTIONAL
]],
[[
-- R1 16-1h: Support of 64 configured PUCCH spatial relations
spatialRelations-v1640                      SEQUENCE {
    maxNumberConfiguredSpatialRelations-v1640   ENUMERATED {n96, n128, n160, n192, n224, n256, n288, n320}
}                                                                                       OPTIONAL,
-- R1 16-1i: Support of 64 configured candidate beam RSs for BFR
support64CandidateBeamRS-BFR-r16            ENUMERATED {supported}                      OPTIONAL
]],
[[
-- R1 16-2a-9: Interpretation of maxNumberMIMO-LayersPDSCH for multi-DCI based mTRP
maxMIMO-LayersForMulti-DCI-mTRP-r16         ENUMERATED {supported}                      OPTIONAL
]],
[[
supportedSINR-meas-v1670                    BIT STRING (SIZE (4))                       OPTIONAL
]],
[[
-- R1 23-8-5    Increased repetition for SRS
srs-increasedRepetition-r17                 ENUMERATED {supported}                      OPTIONAL,
-- R1 23-8-6    Partial frequency sounding of SRS
srs-partialFrequencySounding-r17            ENUMERATED {supported}                      OPTIONAL,
-- R1 23-8-7    Start RB location hopping for partial frequency SRS
```

```
        srs-startRB-locationHoppingPartial-r17      ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-8-8    Comb-8 SRS
        srs-combEight-r17                           ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-9-1    Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) per band information
        codebookParametersfetype2-r17               CodebookParametersfetype2-r17                           OPTIONAL,
        -- R1 23-3-1-2a    Two associated CSI-RS resources
        mTRP-PUSCH-twoCSI-RS-r17                    ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-3-2    Multi-TRP PUCCH repetition scheme 1 (inter-slot)
        mTRP-PUCCH-InterSlot-r17                    ENUMERATED {pf0-2, pf1-3-4, pf0-4}                      OPTIONAL,
        -- R1 23-3-2b    Cyclic mapping for multi-TRP PUCCH repetition
        mTRP-PUCCH-CyclicMapping-r17                ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-3-2c    Second TPC field for multi-TRP PUCCH repetition
        mTRP-PUCCH-SecondTPC-r17                    ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-5-2    MTRP BFR based on two BFD-RS set
        mTRP-BFR-twoBFD-RS-Set-r17                  SEQUENCE {
            maxBFD-RS-resourcesPerSetPerBWP-r17          ENUMERATED {n1, n2},
            maxBFR-r17                                   INTEGER (1..9),
            maxBFD-RS-resourcesAcrossSetsPerBWP-r17      ENUMERATED {n2, n3, n4}
        }                                                                                                   OPTIONAL,
        -- R1 23-5-2a    PUCCH-SR resources for MTRP BFRQ - Max number of PUCCH-SR resources for MTRP BFRQ per cell group
        mTRP-BFR-PUCCH-SR-perCG-r17                 ENUMERATED{n1, n2}                                      OPTIONAL,
        -- R1 23-5-2b    Association between a BFD-RS resource set on SpCell and a PUCCH SR resource
        mTRP-BFR-association-PUCCH-SR-r17           ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-6-3    Simultaneous activation of two TCI states for PDCCH across multiple CCs (HST/URLLC)
        sfn-SimulTwoTCI-AcrossMultiCC-r17           ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-6-4    Default DL beam setup for SFN
        sfn-DefaultDL-BeamSetup-r17                 ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-6-4a    Default UL beam setup for SFN PDCCH(FR2 only)
        sfn-DefaultUL-BeamSetup-r17                 ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-8-1    SRS triggering offset enhancement
        srs-TriggeringOffset-r17                    ENUMERATED {n1, n2, n4}                                 OPTIONAL,
        -- R1 23-8-2    Triggering SRS only in DCI 0_1/0_2
        srs-TriggeringDCI-r17                       ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-9-5    Active CSI-RS resources and ports for mixed codebook types in any slot per band information
        codebookComboParameterMixedType-r17         CodebookComboParameterMixedType-r17                     OPTIONAL,
        -- R1 23-1-1    Unified TCI [with joint DL/UL TCI update] for intra-cell beam management
        unifiedJointTCI-r17                         SEQUENCE{
            maxConfiguredJointTCI-r17                    ENUMERATED {n8, n12, n16, n24, n32, n48, n64, n128},
            maxActivatedTCIAcrossCC-r17                  ENUMERATED {n1, n2, n4, n8, n16}
        }                                                                                                   OPTIONAL,
        -- R1  23-1-1b    Unified TCI with joint DL/UL TCI update for intra- and inter-cell beam management with more than one MAC-CE
        unifiedJointTCI-multiMAC-CE-r17             SEQUENCE{
            minBeamApplicationTime-r17                   ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336}
                                                                                                            OPTIONAL,
            maxNumMAC-CE-PerCC                           ENUMERATED {n2, n3, n4, n5, n6, n7, n8}
        } OPTIONAL,
        -- R1 23-1-1d    Per BWP TCI state pool configuration for CA mode
        unifiedJointTCI-perBWP-CA-r17               ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-1-1e    TCI state pool configuration with TCI pool sharing for CA mode
        unifiedJointTCI-ListSharingCA-r17           ENUMERATED {n1,n2,n4,n8}                                OPTIONAL,
        -- R1 23-1-1f    Common multi-CC TCI state ID update and activation
        unifiedJointTCI-commonMultiCC-r17           ENUMERATED {supported}                                  OPTIONAL,
        -- R1 23-1-1g    Beam misalignment between the DL source RS in the TCI state
        unifiedJointTCI-BeamAlignDLRS-r17           ENUMERATED {supported}                                  OPTIONAL,
```

```
    -- R1 23-1-1h    Association between TCI state and UL PC settings for PUCCH, PUSCH, and SRS
    unifiedJointTCI-PC-association-r17          ENUMERATED {supported}                                  OPTIONAL,
    -- R1 23-1-1i    Indication/configuration of R17 TCI states for aperiodic CSI-RS, PDCCH, PDSCH
    unifiedJointTCI-Legacy-r17                  ENUMERATED {supported}                                  OPTIONAL,
    -- 23-1-1m    Indication/configuration of R17 TCI states for SRS
    unifiedJointTCI-Legacy-SRS-r17              ENUMERATED {supported}                                  OPTIONAL,
    -- R1 23-1-1j    Indication/configuration of R17 TCI states for CORESET #0
    unifiedJointTCI-Legacy-CORESET0-r17         ENUMERATED {supported}                                  OPTIONAL,
    -- R1 23-1-1c    SCell BFR with unified TCI framework  (NOTE; pre-requisite is empty)
    unifiedJointTCI-SCellBFR-r17                ENUMERATED {supported}                                  OPTIONAL,
    -- R1 23-1-1a    Unified TCI with joint DL/UL TCI update for inter-cell beam management
    unifiedJointTCI-InterCell-r17               SEQUENCE{
        additionalMAC-CE-PerCC-r17                  ENUMERATED {n0, n1, n2, n4},
        additionalMAC-CE-AcrossCC-r17               ENUMERATED {n0, n1, n2, n4}
    }                                                                                                   OPTIONAL,
    -- R1  23-10-1    Unified TCI with separate DL/UL TCI update for intra-cell beam management
    unifiedSeparateTCI-r17                      SEQUENCE{
        maxConfiguredDL-TCI-r17                     ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64, n128},
        maxConfiguredUL-TCI-r17                     ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64},
        maxActivatedDL-TCIAcrossCC-r17              ENUMERATED {n1, n2, n4, n8, n16},
        maxActivatedUL-TCIAcrossCC-r17              ENUMERATED {n1, n2, n4, n8, n16}
    } OPTIONAL,
    -- R1  23-10-1b    Unified TCI with separate DL/UL TCI update for intra-cell beam management with more than one MAC-CE
    unifiedSeparateTCI-multiMAC-CE-r17          SEQUENCE{
        minBeamApplicationTime-r17                  ENUMERATED {n1, n2, n4, n7, n14, n28, n42, n56, n70, n84, n98, n112, n224, n336},
        maxActivatedDL-TCIPerCC-r17                 INTEGER (2..8),
        maxActivatedUL-TCIPerCC-r17                 INTEGER (2..8)
    }                                                                                                   OPTIONAL,
    -- R1 23-10-1d    Per BWP DL/UL-TCI state pool configuration for CA mode
    unifiedSeparateTCI-perBWP-CA-r17            ENUMERATED {supported}                                  OPTIONAL,
    -- R1 23-10-1e    TCI state pool configuration with DL/UL-TCI pool sharing for CA mode
    unifiedSeparateTCI-ListSharingCA-r17        SEQUENCE {
        maxNumListDL-TCI-r17                        ENUMERATED {n1,n2,n4,n8}                            OPTIONAL,
        maxNumListUL-TCI-r17                        ENUMERATED {n1,n2,n4,n8}                            OPTIONAL
    } OPTIONAL,
    -- R1 23-10-1f    Common multi-CC DL/UL-TCI state ID update and activation with separate DL/UL TCI update
    unifiedSeparateTCI-commonMultiCC-r17    ENUMERATED {supported}                                      OPTIONAL,
    -- 23-10-1m    Unified TCI with separate DL/UL TCI update for inter-cell beam management with more than one MAC-CE
    unifiedSeparateTCI-InterCell-r17            SEQUENCE {
        k-DL-PerCC-r17                              ENUMERATED {n0, n1, n2, n4},
        k-UL-PerCC-r17                              ENUMERATED {n0, n1, n2, n4},
        k-DL-AcrossCC-r17                           ENUMERATED {n0, n1, n2, n4},
        k-UL-AcrossCC-r17                           ENUMERATED {n0, n1, n2, n4}
    }                                                                                                   OPTIONAL,
    -- R1  23-1-2    Inter-cell beam measurement and reporting (for inter-cell BM and mTRP)
    unifiedJointTCI-mTRP-InterCell-BM-r17       SEQUENCE {
        maxNumAdditionalPCI-L1-RSRP-r17             INTEGER (1..7),
        maxNumSSB-ResourceL1-RSRP-AcrossCC-r17      ENUMERATED {n1,n2,n4,n8}
    }                                                                                                   OPTIONAL,
    -- R1  23-1-3    MPE mitigation
    mpe-Mitigation-r17                          SEQUENCE {
        maxNumP-MPR-RI-pairs-r17                    INTEGER (1..4),
        maxNumConfRS-r17                            ENUMERATED {n1, n2, n4, n8, n12, n16, n28, n32, n48, n64}
    }                                                                                                   OPTIONAL,
```

```
    -- R1  23-1-4    UE capability value reporting
    srs-PortReport-r17                          SEQUENCE {
            capVal1-r17                             ENUMERATED {n1, n2, n4}                                 OPTIONAL,
            capVal2-r17                             ENUMERATED {n1, n2, n4}                                 OPTIONAL,
            capVal3-r17                             ENUMERATED {n1, n2, n4}                                 OPTIONAL,
            capVal4-r17                             ENUMERATED {n1, n2, n4}                                 OPTIONAL
    }                                                                                                       OPTIONAL,
  -- R1 23-2-1a    Monitoring of individual candidates
    mTRP-PDCCH-individual-r17                   ENUMERATED {supported}                                      OPTIONAL,
  -- R1 23-2-1b    PDCCH repetition with PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot
    mTRP-PDCCH-anySpan-3Symbols-r17             ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-2-2    Two QCL TypeD for CORESET monitoring in PDCCH repetition
    mTRP-PDCCH-TwoQCL-TypeD-r17                 ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-1-2b    CSI-RS processing framework for SRS with two associated CSI-RS resources
    mTRP-PUSCH-CSI-RS-r17                       SEQUENCE {
        maxNumPeriodicSRS-r17                       INTEGER (1..8),
        maxNumAperiodicSRS-r17                      INTEGER (1..8),
        maxNumSP-SRS-r17                            INTEGER (0..8),
        numSRS-ResourcePerCC-r17                    INTEGER (1..16),
        numSRS-ResourceNonCodebook-r17              INTEGER (1..2)
    }                                                                                                       OPTIONAL,
    -- R1 23-3-1a    Cyclic mapping for Multi-TRP PUSCH repetition
    mTRP-PUSCH-cyclicMapping-r17                ENUMERATED {typeA,typeB,both}                               OPTIONAL,
    -- R1 23-3-1b    Second TPC field for Multi-TRP PUSCH repetition
    mTRP-PUSCH-secondTPC-r17                    ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-1c     Two PHR reporting
    mTRP-PUSCH-twoPHR-Reporting-r17             ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-1e    A-CSI report
    mTRP-PUSCH-A-CSI-r17                        ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-1f    SP-CSI report
    mTRP-PUSCH-SP-CSI-r17                       ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-1g    CG PUSCH transmission
    mTRP-PUSCH-CG-r17                           ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-2d    Updating two Spatial relation or two sets of power control parameters for PUCCH group
    mTRP-PUCCH-MAC-CE-r17                       ENUMERATED {supported}                                      OPTIONAL,
    -- R1 23-3-2e    Maximum number of power control parameter sets configured for multi-TRP PUCCH repetition in FR1
    mTRP-PUCCH-maxNum-PC-FR1-r17                INTEGER (3..8)                                              OPTIONAL,
    -- R1 23-4    IntCell-mTRP
    mTRP-inter-Cell-r17                         SEQUENCE {
        maxNumAdditionalPCI-Case1-r17               INTEGER (1..7),
        maxNumAdditionalPCI-Case2-r17               INTEGER (0..7)
    }                                                                                                       OPTIONAL,
    -- R1 23-5-1    Group based L1-RSRP reporting enhancements
    mTRP-GroupBasedL1-RSRP-r17                  SEQUENCE {
        maxNumBeamGroups-r17                        INTEGER (1..4),
        maxNumRS-WithinSlot-r17                     ENUMERATED {n2,n3,n4,n8,n16,n32,n64},
        maxNumRS-AcrossSlot-r17                     ENUMERATED {n8, n16, n32, n64, n128}
    }                                                                                                       OPTIONAL,
    -- R1 23-5-2c    MAC-CE based update of explicit BFD-RS    mTRP-PUCCH-IntraSlot-r17  => per band
    mTRP-BFD-RS-MAC-CE-r17                      ENUMERATED {n4, n8, n12, n16, n32, n48, n64 }               OPTIONAL,
  -- R1 23-7-1    Basic Features of CSI Enhancement for Multi-TRP
    mTRP-CSI-EnhancementPerBand-r17             SEQUENCE {
        maxNumNZP-CSI-RS-r17                        INTEGER (2..8),
        cSI-Report-mode-r17                         ENUMERATED {mode1, mode2, both},
```

```
        supportedComboAcrossCCs-r17                 SEQUENCE (SIZE (1..16)) OF CSI-MultiTRP-SupportedCombinations-r17,
        codebookModeNCJT-r17                        ENUMERATED{mode1,mode1And2}
    }                                                                                       OPTIONAL,
    -- R1 23-7-1b    Active CSI-RS resources and ports in the presence of multi-TRP CSI
    codebookComboParameterMultiTRP-r17          CodebookComboParameterMultiTRP-r17          OPTIONAL,
    -- R1 23-7-1a    Additional CSI report mode 1
    mTRP-CSI-additionalCSI-r17                  ENUMERATED{x1,x2}                           OPTIONAL,
    -- R1 23-7-4    Support of Nmax=2 for Multi-TRP CSI
    mTRP-CSI-N-Max2-r17                         ENUMERATED {supported}                      OPTIONAL,
    -- R1 23-7-5    CMR sharing
    mTRP-CSI-CMR-r17                            ENUMERATED {supported}                      OPTIONAL,
    -- R1 23-8-11    Partial frequency sounding of SRS for non-frequency hopping case
    srs-partialFreqSounding-r17                 ENUMERATED {supported}                      OPTIONAL,
    -- R1-24 feature: Extend beamSwitchTiming for FR2-2
    beamSwitchTiming-v1710                      SEQUENCE {
        scs-480kHz                                  ENUMERATED {sym56, sym112, sym192, sym896, sym1344}     OPTIONAL,
        scs-960kHz                                  ENUMERATED {sym112, sym224, sym384, sym1792, sym2688}   OPTIONAL
    }                                                                                       OPTIONAL,
    -- R1-24 feature: Extend beamSwitchTiming-r16 for FR2-2
    beamSwitchTiming-r17                        SEQUENCE {
        scs-480kHz-r17                              ENUMERATED {sym896, sym1344}            OPTIONAL,
        scs-960kHz-r17                              ENUMERATED {sym1792, sym2688}           OPTIONAL
    }                                                                                       OPTIONAL,
    -- R1-24 feature: Extend beamReportTiming for FR2-2
    beamReportTiming-v1710                      SEQUENCE {
        scs-480kHz-r17                              ENUMERATED {sym56, sym112, sym224}      OPTIONAL,
        scs-960kHz-r17                              ENUMERATED {sym112, sym224, sym448}     OPTIONAL
    }                                                                                       OPTIONAL,
    -- R1-24 feature:    Extend maximum number of RX/TX beam switch DL for FR2-2
    maxNumberRxTxBeamSwitchDL-v1710             SEQUENCE {
        scs-480kHz-r17                              ENUMERATED {n2, n4, n7}                 OPTIONAL,
        scs-960kHz-r17                              ENUMERATED {n1, n2, n4, n7}             OPTIONAL
    }                                                                                       OPTIONAL
    ]],
    [[
    -- R1-23-1-4a:  Semi-persistent/aperiodic capability value report
    srs-PortReportSP-AP-r17                     ENUMERATED {supported}                      OPTIONAL,
    maxNumberRxBeam-v1720                       INTEGER (9..12)                             OPTIONAL,
    -- R1-23-6-5    Support implicit configuration of RS(s) with two TCI states for beam failure detection
    sfn-ImplicitRS-twoTCI-r17                   ENUMERATED {supported}                      OPTIONAL,
    -- R1-23-6-6    QCL-TypeD collision handling with CORESET with 2 TCI states
    sfn-QCL-TypeD-Collision-twoTCI-r17          ENUMERATED {supported}                      OPTIONAL,
    -- R1-23-7-1c   Basic Features of CSI Enhancement for Multi-TRP - number of CPUs
    mTRP-CSI-numCPU-r17                         ENUMERATED {n2, n3, n4}                     OPTIONAL
    ]],
    [[
    supportRepNumPDSCH-TDRA-DCI-1-2-r17         ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}    OPTIONAL
    ]]
}

DummyG ::=                          SEQUENCE {
    maxNumberSSB-CSI-RS-ResourceOneTx   ENUMERATED {n8, n16, n32, n64},
    maxNumberSSB-CSI-RS-ResourceTwoTx   ENUMERATED {n0, n4, n8, n16, n32, n64},
    supportedCSI-RS-Density             ENUMERATED {one, three, oneAndThree}
```

```
}

BeamManagementSSB-CSI-RS ::=        SEQUENCE {
    maxNumberSSB-CSI-RS-ResourceOneTx   ENUMERATED {n0, n8, n16, n32, n64},
    maxNumberCSI-RS-Resource            ENUMERATED {n0, n4, n8, n16, n32, n64},
    maxNumberCSI-RS-ResourceTwoTx       ENUMERATED {n0, n4, n8, n16, n32, n64},
    supportedCSI-RS-Density             ENUMERATED {one, three, oneAndThree}                    OPTIONAL,
    maxNumberAperiodicCSI-RS-Resource   ENUMERATED {n0, n1, n4, n8, n16, n32, n64}
}

DummyH ::=                          SEQUENCE {
    burstLength                         INTEGER (1..2),
    maxSimultaneousResourceSetsPerCC    INTEGER (1..8),
    maxConfiguredResourceSetsPerCC      INTEGER (1..64),
    maxConfiguredResourceSetsAllCC      INTEGER (1..128)
}

CSI-RS-ForTracking ::=              SEQUENCE {
    maxBurstLength                      INTEGER (1..2),
    maxSimultaneousResourceSetsPerCC    INTEGER (1..8),
    maxConfiguredResourceSetsPerCC      INTEGER (1..64),
    maxConfiguredResourceSetsAllCC      INTEGER (1..256)
}

CSI-RS-IM-ReceptionForFeedback ::=              SEQUENCE {
    maxConfigNumberNZP-CSI-RS-PerCC                 INTEGER (1..64),
    maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC      INTEGER (2..256),
    maxConfigNumberCSI-IM-PerCC                     ENUMERATED {n1, n2, n4, n8, n16, n32},
    maxNumberSimultaneousNZP-CSI-RS-PerCC           INTEGER (1..64),
    totalNumberPortsSimultaneousNZP-CSI-RS-PerCC    INTEGER (2..256)
}

CSI-RS-ProcFrameworkForSRS ::=                  SEQUENCE {
    maxNumberPeriodicSRS-AssocCSI-RS-PerBWP         INTEGER (1..4),
    maxNumberAperiodicSRS-AssocCSI-RS-PerBWP        INTEGER (1..4),
    maxNumberSP-SRS-AssocCSI-RS-PerBWP              INTEGER (0..4),
    simultaneousSRS-AssocCSI-RS-PerCC               INTEGER (1..8)
}

CSI-ReportFramework ::=                         SEQUENCE {
    maxNumberPeriodicCSI-PerBWP-ForCSI-Report       INTEGER (1..4),
    maxNumberAperiodicCSI-PerBWP-ForCSI-Report      INTEGER (1..4),
    maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report INTEGER (0..4),
    maxNumberPeriodicCSI-PerBWP-ForBeamReport       INTEGER (1..4),
    maxNumberAperiodicCSI-PerBWP-ForBeamReport      INTEGER (1..4),
    maxNumberAperiodicCSI-triggeringStatePerCC      ENUMERATED {n3, n7, n15, n31, n63, n128},
    maxNumberSemiPersistentCSI-PerBWP-ForBeamReport INTEGER (0..4),
    simultaneousCSI-ReportsPerCC                    INTEGER (1..8)
}

CSI-ReportFrameworkExt-r16 ::=                      SEQUENCE {
    maxNumberAperiodicCSI-PerBWP-ForCSI-ReportExt-r16   INTEGER (5..8)
}
```

```
PTRS-DensityRecommendationDL ::=    SEQUENCE {
    frequencyDensity1                   INTEGER (1..276),
    frequencyDensity2                   INTEGER (1..276),
    timeDensity1                        INTEGER (0..29),
    timeDensity2                        INTEGER (0..29),
    timeDensity3                        INTEGER (0..29)
}

PTRS-DensityRecommendationUL ::=    SEQUENCE {
    frequencyDensity1                   INTEGER (1..276),
    frequencyDensity2                   INTEGER (1..276),
    timeDensity1                        INTEGER (0..29),
    timeDensity2                        INTEGER (0..29),
    timeDensity3                        INTEGER (0..29),
    sampleDensity1                      INTEGER (1..276),
    sampleDensity2                      INTEGER (1..276),
    sampleDensity3                      INTEGER (1..276),
    sampleDensity4                      INTEGER (1..276),
    sampleDensity5                      INTEGER (1..276)
}

SpatialRelations ::=                    SEQUENCE {
    maxNumberConfiguredSpatialRelations     ENUMERATED {n4, n8, n16, n32, n64, n96},
    maxNumberActiveSpatialRelations         ENUMERATED {n1, n2, n4, n8, n14},
    additionalActiveSpatialRelationPUCCH    ENUMERATED {supported}                          OPTIONAL,
    maxNumberDL-RS-QCL-TypeD                ENUMERATED {n1, n2, n4, n8, n14}
}

DummyI ::=              SEQUENCE {
    supportedSRS-TxPortSwitch           ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, tr-equal},
    txSwitchImpactToRx                  ENUMERATED {true}                                   OPTIONAL
}

CSI-MultiTRP-SupportedCombinations-r17 ::= SEQUENCE {
    maxNumTx-Ports-r17                      ENUMERATED {n2, n4, n8, n12, n16, n24, n32},
    maxTotalNumCMR-r17                      INTEGER (2..64),
    maxTotalNumTx-PortsNZP-CSI-RS-r17       INTEGER (2..256)
}

-- TAG-MIMO-PARAMETERSPERBAND-STOP
-- ASN1STOP
```

***MIMO-ParametersPerBand* field descriptions**
codebookParametersPerBand For a given frequency band, this field this field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type. The supported CSI-RS resources indicated by this field are referred by *codebookParametersperBC* in *CA-ParametersNR* to indicate the supported CSI-RS resource per band combination.
csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework CSI related capabilities which the UE supports on each of the carriers operated on this band. If the network configures the UE with serving cells on both FR1 and FR2 bands these values may be further limited by the corresponding fields in *fr1-fr2-Add-UE-NR-Capabilities*.
supportNewDMRS-Port Presence of this field set to *supported1*, *supported2* or *supported3* indicates that the UE supports the new DMRS port entry {0,2,3}.

– *ModulationOrder*

The IE *ModulationOrder* is used to convey the maximum supported modulation order.

***ModulationOrder* information element**

```
-- ASN1START
-- TAG-MODULATIONORDER-START

ModulationOrder ::= ENUMERATED {bpsk-halfpi, bpsk, qpsk, qam16, qam64, qam256}

-- TAG-MODULATIONORDER-STOP
-- ASN1STOP
```

– *MRDC-Parameters*

The IE *MRDC-Parameters* contains the band combination parameters specific to MR-DC for a given MR-DC band combination.

***MRDC-Parameters* information element**

```
-- ASN1START
-- TAG-MRDC-PARAMETERS-START

MRDC-Parameters ::= SEQUENCE {
    singleUL-Transmission               ENUMERATED {supported}              OPTIONAL,
    dynamicPowerSharingENDC             ENUMERATED {supported}              OPTIONAL,
    tdm-Pattern                         ENUMERATED {supported}              OPTIONAL,
    ul-SharingEUTRA-NR                  ENUMERATED {tdm, fdm, both}         OPTIONAL,
    ul-SwitchingTimeEUTRA-NR            ENUMERATED {type1, type2}           OPTIONAL,
    simultaneousRxTxInterBandENDC       ENUMERATED {supported}              OPTIONAL,
    asyncIntraBandENDC                  ENUMERATED {supported}              OPTIONAL,
    ...,
    [[
    dualPA-Architecture                 ENUMERATED {supported}              OPTIONAL,
    intraBandENDC-Support               ENUMERATED {non-contiguous, both}   OPTIONAL,
    ul-TimingAlignmentEUTRA-NR          ENUMERATED {required}               OPTIONAL
```

```
    ]]
}

MRDC-Parameters-v1580 ::= SEQUENCE {
    dynamicPowerSharingNEDC             ENUMERATED {supported}              OPTIONAL
}

MRDC-Parameters-v1590 ::=   SEQUENCE {
    interBandContiguousMRDC             ENUMERATED {supported}              OPTIONAL
}

MRDC-Parameters-v15g0 ::=   SEQUENCE {
    simultaneousRxTxInterBandENDCPerBandPair   SimultaneousRxTxPerBandPair  OPTIONAL
}

MRDC-Parameters-v15n0 ::= SEQUENCE {
    intraBandENDC-Support-UL            ENUMERATED {non-contiguous, both}   OPTIONAL
}

MRDC-Parameters-v1620 ::=    SEQUENCE {
    maxUplinkDutyCycle-interBandENDC-TDD-PC2-r16    SEQUENCE{
        eutra-TDD-Config0-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config1-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config2-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config3-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config4-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config5-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        eutra-TDD-Config6-r16    ENUMERATED {n20, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL
    }                                                                                    OPTIONAL,
    -- R1 18-2 Single UL TX operation for TDD PCell in EN-DC
    tdm-restrictionTDD-endc-r16          ENUMERATED {supported}                          OPTIONAL,
    -- R1 18-2a Single UL TX operation for FDD PCell in EN-DC
    tdm-restrictionFDD-endc-r16          ENUMERATED {supported}                          OPTIONAL,
    --  R1 18-2b Support of HARQ-offset for SUO case1 in EN-DC with LTE TDD PCell for type 1 UE
    singleUL-HARQ-offsetTDD-PCell-r16    ENUMERATED {supported}                          OPTIONAL,
    --  R1 18-3 Dual Tx transmission for EN-DC with FDD PCell(TDM pattern for dual Tx UE)
    tdm-restrictionDualTX-FDD-endc-r16   ENUMERATED {supported}                          OPTIONAL
}

MRDC-Parameters-v1630 ::= SEQUENCE {
    -- R4 2-20 Maximum uplink duty cycle for FDD+TDD EN-DC power class 2
    maxUplinkDutyCycle-interBandENDC-FDD-TDD-PC2-r16  SEQUENCE {
        maxUplinkDutyCycle-FDD-TDD-EN-DC1-r16            ENUMERATED {n30, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL,
        maxUplinkDutyCycle-FDD-TDD-EN-DC2-r16            ENUMERATED {n30, n40, n50, n60, n70, n80, n90, n100}    OPTIONAL
    }                                                                                                            OPTIONAL,

    -- R4 2-19 FDD-FDD or TDD-TDD inter-band MR-DC with overlapping or partially overlapping DL spectrum
    interBandMRDC-WithOverlapDL-Bands-r16       ENUMERATED {supported}                  OPTIONAL
}

MRDC-Parameters-v1700 ::=   SEQUENCE {
    condPSCellAdditionENDC-r17                  ENUMERATED {supported}                  OPTIONAL,
    scg-ActivationDeactivationENDC-r17          ENUMERATED {supported}                  OPTIONAL,
    scg-ActivationDeactivationResumeENDC-r17    ENUMERATED {supported}                  OPTIONAL
```

```
}

MRDC-Parameters-v1770 ::=   SEQUENCE {
    -- R4 26-1: Higher Power Limit CA DC
    higherPowerLimitMRDC-r17                    ENUMERATED {supported}                  OPTIONAL
}

-- TAG-MRDC-PARAMETERS-STOP
-- ASN1STOP
```

– *NRDC-Parameters*

The IE *NRDC-Parameters* contains parameters specific to NR-DC, i.e., which are not applicable to NR SA.

NRDC-Parameters information element

```
-- ASN1START
-- TAG-NRDC-PARAMETERS-START

NRDC-Parameters ::=                 SEQUENCE {
    measAndMobParametersNRDC            MeasAndMobParametersMRDC                OPTIONAL,
    generalParametersNRDC               GeneralParametersMRDC-XDD-Diff          OPTIONAL,
    fdd-Add-UE-NRDC-Capabilities        UE-MRDC-CapabilityAddXDD-Mode           OPTIONAL,
    tdd-Add-UE-NRDC-Capabilities        UE-MRDC-CapabilityAddXDD-Mode           OPTIONAL,
    fr1-Add-UE-NRDC-Capabilities        UE-MRDC-CapabilityAddFRX-Mode           OPTIONAL,
    fr2-Add-UE-NRDC-Capabilities        UE-MRDC-CapabilityAddFRX-Mode           OPTIONAL,
    dummy2                              OCTET STRING                            OPTIONAL,
    dummy                               SEQUENCE {}                             OPTIONAL
}

NRDC-Parameters-v1570 ::=           SEQUENCE {
    sfn-SyncNRDC                        ENUMERATED {supported}                  OPTIONAL
}

NRDC-Parameters-v15c0 ::=           SEQUENCE {
    pdcp-DuplicationSplitSRB            ENUMERATED {supported}                  OPTIONAL,
    pdcp-DuplicationSplitDRB            ENUMERATED {supported}                  OPTIONAL
}

NRDC-Parameters-v1610 ::=           SEQUENCE {
    measAndMobParametersNRDC-v1610      MeasAndMobParametersMRDC-v1610          OPTIONAL
}

NRDC-Parameters-v1700   ::=         SEQUENCE {
    f1c-OverNR-RRC-r17                  ENUMERATED {supported}                  OPTIONAL,
    measAndMobParametersNRDC-v1700      MeasAndMobParametersMRDC-v1700
}

-- TAG-NRDC-PARAMETERS-STOP
-- ASN1STOP
```

– *NTN-Parameters*

The IE *NTN-Parameters* is used to convey the subset of UE Radio Access Capability Parameters that apply to NTN access when there is a difference compared to TN access.

NTN-Parameters information element

```
-- ASN1START
-- TAG-NTN-PARAMETERS-START

NTN-Parameters-r17 ::= SEQUENCE {
    inactiveStateNTN-r17                ENUMERATED {supported}                      OPTIONAL,
    ra-SDT-NTN-r17                      ENUMERATED {supported}                      OPTIONAL,
    srb-SDT-NTN-r17                     ENUMERATED {supported}                      OPTIONAL,
    measAndMobParametersNTN-r17         MeasAndMobParameters                        OPTIONAL,
    mac-ParametersNTN-r17               MAC-Parameters                              OPTIONAL,
    phy-ParametersNTN-r17               Phy-Parameters                              OPTIONAL,
    fdd-Add-UE-NR-CapabilitiesNTN-r17   UE-NR-CapabilityAddXDD-Mode                 OPTIONAL,
    fr1-Add-UE-NR-CapabilitiesNTN-r17   UE-NR-CapabilityAddFRX-Mode                 OPTIONAL,
    ue-BasedPerfMeas-ParametersNTN-r17  UE-BasedPerfMeas-Parameters-r16             OPTIONAL,
    son-ParametersNTN-r17               SON-Parameters-r16                          OPTIONAL
}

-- TAG-NTN-PARAMETERS-STOP
-- ASN1STOP
```

NTN-Parameters field descriptions
fdd-Add-UE-NR-CapabilitiesNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *fdd-Add-UE-NR-Capabilities* applies to NTN.
fr1-Add-UE-NR-CapabilitiesNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *fr1-Add-UE-NR-Capabilities* applies to NTN.
mac-ParametersNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *mac-Parameters* applies to NTN.
measAndMobParametersNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *measAndMobParameters* applies to NTN.
phy-ParametersNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *phy-Parameters* applies to NTN.
son-ParametersNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *son-Parameters-r16* applies to NTN.
ue-BasedPerfMeas-ParametersNTN   NTN related capabilities which the UE supports in NTN differently than in TN. If absent, *ue-BasedPerfMeas-Parameters-r16* applies to NTN.

– *OLPC-SRS-Pos*

The IE *OLPC-SRS-Pos* is used to convey OLPC SRS positioning related parameters specific for a certain band.

OLPC-SRS-Pos information element

```
-- ASN1START
-- TAG-OLPC-SRS-POS-START

OLPC-SRS-Pos-r16 ::=        SEQUENCE {
    olpc-SRS-PosBasedOnPRS-Serving-r16         ENUMERATED {supported}              OPTIONAL,
    olpc-SRS-PosBasedOnSSB-Neigh-r16           ENUMERATED {supported}              OPTIONAL,
    olpc-SRS-PosBasedOnPRS-Neigh-r16           ENUMERATED {supported}              OPTIONAL,
    maxNumberPathLossEstimatePerServing-r16    ENUMERATED {n1, n4, n8, n16}        OPTIONAL
}

--TAG-OLPC-SRS-POS-STOP
-- ASN1STOP
```

– *PDCP-Parameters*

The IE *PDCP-Parameters* is used to convey capabilities related to PDCP.

PDCP-Parameters information element

```
-- ASN1START
-- TAG-PDCP-PARAMETERS-START

PDCP-Parameters ::=         SEQUENCE {
    supportedROHC-Profiles      SEQUENCE {
        profile0x0000               BOOLEAN,
        profile0x0001               BOOLEAN,
        profile0x0002               BOOLEAN,
        profile0x0003               BOOLEAN,
        profile0x0004               BOOLEAN,
        profile0x0006               BOOLEAN,
        profile0x0101               BOOLEAN,
        profile0x0102               BOOLEAN,
        profile0x0103               BOOLEAN,
        profile0x0104               BOOLEAN
    },
    maxNumberROHC-ContextSessions       ENUMERATED {cs2, cs4, cs8, cs12, cs16, cs24, cs32, cs48, cs64,
                                                    cs128, cs256, cs512, cs1024, cs16384, spare2, spare1},
    uplinkOnlyROHC-Profiles             ENUMERATED {supported}      OPTIONAL,
    continueROHC-Context                ENUMERATED {supported}      OPTIONAL,
    outOfOrderDelivery                  ENUMERATED {supported}      OPTIONAL,
    shortSN                             ENUMERATED {supported}      OPTIONAL,
    pdcp-DuplicationSRB                 ENUMERATED {supported}      OPTIONAL,
    pdcp-DuplicationMCG-OrSCG-DRB       ENUMERATED {supported}      OPTIONAL,
    ...,
```

```
    [[
    drb-IAB-r16                         ENUMERATED {supported}      OPTIONAL,
    non-DRB-IAB-r16                     ENUMERATED {supported}      OPTIONAL,
    extendedDiscardTimer-r16            ENUMERATED {supported}      OPTIONAL,
    continueEHC-Context-r16             ENUMERATED {supported}      OPTIONAL,
    ehc-r16                             ENUMERATED {supported}      OPTIONAL,
    maxNumberEHC-Contexts-r16           ENUMERATED {cs2, cs4, cs8, cs16, cs32, cs64, cs128, cs256, cs512,
                                                    cs1024, cs2048, cs4096, cs8192, cs16384, cs32768, cs65536}    OPTIONAL,
    jointEHC-ROHC-Config-r16            ENUMERATED {supported}      OPTIONAL,
    pdcp-DuplicationMoreThanTwoRLC-r16  ENUMERATED {supported}      OPTIONAL
    ]],
    [[
    longSN-RedCap-r17                   ENUMERATED {supported}      OPTIONAL,
    udc-r17                             SEQUENCE {
        standardDictionary-r17              ENUMERATED {supported}  OPTIONAL,
        operatorDictionary-r17              SEQUENCE {
            versionOfDictionary-r17             INTEGER (0..15),
            associatedPLMN-ID-r17               PLMN-Identity
        }                                                           OPTIONAL,
        continueUDC-r17                     ENUMERATED {supported}  OPTIONAL,
        supportOfBufferSize-r17             ENUMERATED {kbyte4, kbyte8}  OPTIONAL
    }                                                               OPTIONAL
    ]]
}

-- TAG-PDCP-PARAMETERS-STOP
-- ASN1STOP
```

– *PDCP-ParametersMRDC*

The IE *PDCP-ParametersMRDC* is used to convey PDCP related capabilities for MR-DC.

PDCP-ParametersMRDC **information element**

```
-- ASN1START
-- TAG-PDCP-PARAMETERSMRDC-START

PDCP-ParametersMRDC ::=                 SEQUENCE {
    pdcp-DuplicationSplitSRB                ENUMERATED {supported}      OPTIONAL,
    pdcp-DuplicationSplitDRB                ENUMERATED {supported}      OPTIONAL
}

PDCP-ParametersMRDC-v1610 ::= SEQUENCE {
    scg-DRB-NR-IAB-r16                  ENUMERATED {supported}          OPTIONAL
}

-- TAG-PDCP-PARAMETERSMRDC-STOP
-- ASN1STOP
```

– *Phy-Parameters*

The IE *Phy-Parameters* is used to convey the physical layer capabilities.

Phy-Parameters **information element**

```
-- ASN1START
-- TAG-PHY-PARAMETERS-START

Phy-Parameters ::=                  SEQUENCE {
    phy-ParametersCommon                Phy-ParametersCommon                    OPTIONAL,
    phy-ParametersXDD-Diff              Phy-ParametersXDD-Diff                  OPTIONAL,
    phy-ParametersFRX-Diff              Phy-ParametersFRX-Diff                  OPTIONAL,
    phy-ParametersFR1                   Phy-ParametersFR1                       OPTIONAL,
    phy-ParametersFR2                   Phy-ParametersFR2                       OPTIONAL
}

Phy-Parameters-v16a0 ::=            SEQUENCE {
    phy-ParametersCommon-v16a0          Phy-ParametersCommon-v16a0              OPTIONAL
}

Phy-ParametersCommon ::=            SEQUENCE {
    csi-RS-CFRA-ForHO                   ENUMERATED {supported}                  OPTIONAL,
    dynamicPRB-BundlingDL               ENUMERATED {supported}                  OPTIONAL,
    sp-CSI-ReportPUCCH                  ENUMERATED {supported}                  OPTIONAL,
    sp-CSI-ReportPUSCH                  ENUMERATED {supported}                  OPTIONAL,
    nzp-CSI-RS-IntefMgmt                ENUMERATED {supported}                  OPTIONAL,
    type2-SP-CSI-Feedback-LongPUCCH     ENUMERATED {supported}                  OPTIONAL,
    precoderGranularityCORESET          ENUMERATED {supported}                  OPTIONAL,
    dynamicHARQ-ACK-Codebook            ENUMERATED {supported}                  OPTIONAL,
    semiStaticHARQ-ACK-Codebook         ENUMERATED {supported}                  OPTIONAL,
    spatialBundlingHARQ-ACK             ENUMERATED {supported}                  OPTIONAL,
    dynamicBetaOffsetInd-HARQ-ACK-CSI   ENUMERATED {supported}                  OPTIONAL,
    pucch-Repetition-F1-3-4             ENUMERATED {supported}                  OPTIONAL,
    ra-Type0-PUSCH                      ENUMERATED {supported}                  OPTIONAL,
    dynamicSwitchRA-Type0-1-PDSCH       ENUMERATED {supported}                  OPTIONAL,
    dynamicSwitchRA-Type0-1-PUSCH       ENUMERATED {supported}                  OPTIONAL,
    pdsch-MappingTypeA                  ENUMERATED {supported}                  OPTIONAL,
    pdsch-MappingTypeB                  ENUMERATED {supported}                  OPTIONAL,
    interleavingVRB-ToPRB-PDSCH         ENUMERATED {supported}                  OPTIONAL,
    interSlotFreqHopping-PUSCH          ENUMERATED {supported}                  OPTIONAL,
    type1-PUSCH-RepetitionMultiSlots    ENUMERATED {supported}                  OPTIONAL,
    type2-PUSCH-RepetitionMultiSlots    ENUMERATED {supported}                  OPTIONAL,
    pusch-RepetitionMultiSlots          ENUMERATED {supported}                  OPTIONAL,
    pdsch-RepetitionMultiSlots          ENUMERATED {supported}                  OPTIONAL,
    downlinkSPS                         ENUMERATED {supported}                  OPTIONAL,
    configuredUL-GrantType1             ENUMERATED {supported}                  OPTIONAL,
    configuredUL-GrantType2             ENUMERATED {supported}                  OPTIONAL,
    pre-EmptIndication-DL               ENUMERATED {supported}                  OPTIONAL,
    cbg-TransIndication-DL              ENUMERATED {supported}                  OPTIONAL,
    cbg-TransIndication-UL              ENUMERATED {supported}                  OPTIONAL,
    cbg-FlushIndication-DL              ENUMERATED {supported}                  OPTIONAL,
    dynamicHARQ-ACK-CodeB-CBG-Retx-DL   ENUMERATED {supported}                  OPTIONAL,
```

```
    rateMatchingResrcSetSemi-Static     ENUMERATED {supported}                  OPTIONAL,
    rateMatchingResrcSetDynamic         ENUMERATED {supported}                  OPTIONAL,
    bwp-SwitchingDelay                  ENUMERATED {type1, type2}               OPTIONAL,
    ...,
    [[
    dummy                               ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    maxNumberSearchSpaces               ENUMERATED {n10}                        OPTIONAL,
    rateMatchingCtrlResrcSetDynamic     ENUMERATED {supported}                  OPTIONAL,
    maxLayersMIMO-Indication            ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    spCellPlacement                             CarrierAggregationVariant       OPTIONAL
    ]],
    [[
    -- R1 9-1: Basic channel structure and procedure of 2-step RACH
    twoStepRACH-r16                             ENUMERATED {supported}          OPTIONAL,
    -- R1 11-1: Monitoring DCI format 1_2 and DCI format 0_2
    dci-Format1-2And0-2-r16                     ENUMERATED {supported}          OPTIONAL,
    -- R1 11-1a: Monitoring both DCI format 0_1/1_1 and DCI format 0_2/1_2 in the same search space
    monitoringDCI-SameSearchSpace-r16           ENUMERATED {supported}          OPTIONAL,
    -- R1 11-10: Type 2 configured grant release by DCI format 0_1
    type2-CG-ReleaseDCI-0-1-r16                 ENUMERATED {supported}          OPTIONAL,
    -- R1 11-11: Type 2 configured grant release by DCI format 0_2
    type2-CG-ReleaseDCI-0-2-r16                 ENUMERATED {supported}          OPTIONAL,
    -- R1 12-3: SPS release by DCI format 1_1
    sps-ReleaseDCI-1-1-r16                      ENUMERATED {supported}          OPTIONAL,
    -- R1 12-3a: SPS release by DCI format 1_2
    sps-ReleaseDCI-1-2-r16                      ENUMERATED {supported}          OPTIONAL,
    -- R1 14-8: CSI trigger states containing non-active BWP
    csi-TriggerStateNon-ActiveBWP-r16           ENUMERATED {supported}          OPTIONAL,
    -- R1 20-2: Support up to 4 SMTCs configured for an IAB node MT per frequency location, including IAB-specific SMTC window periodicities
    separateSMTC-InterIAB-Support-r16           ENUMERATED {supported}          OPTIONAL,
    -- R1 20-3: Support RACH configuration separately from the RACH configuration for UE access, including new IAB-specific offset and scaling
factors
    separateRACH-IAB-Support-r16                ENUMERATED {supported}          OPTIONAL,
    -- R1 20-5a: Support semi-static configuration/indication of UL-Flexible-DL slot formats for IAB-MT resources
    ul-flexibleDL-SlotFormatSemiStatic-IAB-r16  ENUMERATED {supported}          OPTIONAL,
    -- R1 20-5b: Support dynamic indication of UL-Flexible-DL slot formats for IAB-MT resources
    ul-flexibleDL-SlotFormatDynamics-IAB-r16    ENUMERATED {supported}          OPTIONAL,
    dft-S-OFDM-WaveformUL-IAB-r16               ENUMERATED {supported}          OPTIONAL,
    -- R1 20-6: Support DCI Format 2_5 based indication of soft resource availability to an IAB node
    dci-25-AI-RNTI-Support-IAB-r16              ENUMERATED {supported}          OPTIONAL,
    -- R1 20-7: Support T_delta reception.
    t-DeltaReceptionSupport-IAB-r16             ENUMERATED {supported}          OPTIONAL,
    -- R1 20-8: Support of Desired guard symbol reporting and provided guard symbok reception.
    guardSymbolReportReception-IAB-r16          ENUMERATED {supported}          OPTIONAL,
    -- R1 18-8 HARQ-ACK codebook type and spatial bundling per PUCCH group
    harqACK-CB-SpatialBundlingPUCCH-Group-r16   ENUMERATED {supported}          OPTIONAL,
    -- R1 19-2: Cross Slot Scheduling
    crossSlotScheduling-r16                     SEQUENCE {
        non-SharedSpectrumChAccess-r16              ENUMERATED {supported}      OPTIONAL,
        sharedSpectrumChAccess-r16                  ENUMERATED {supported}      OPTIONAL
```

```
}                                                                                   OPTIONAL,
maxNumberSRS-PosPathLossEstimateAllServingCells-r16  ENUMERATED {n1, n4, n8, n16}         OPTIONAL,
extendedCG-Periodicities-r16                ENUMERATED {supported}              OPTIONAL,
extendedSPS-Periodicities-r16               ENUMERATED {supported}              OPTIONAL,
codebookVariantsList-r16                    CodebookVariantsList-r16            OPTIONAL,
-- R1 11-6: PUSCH repetition Type A
pusch-RepetitionTypeA-r16                   SEQUENCE {
    sharedSpectrumChAccess-r16                  ENUMERATED {supported}          OPTIONAL,
    non-SharedSpectrumChAccess-r16              ENUMERATED {supported}          OPTIONAL
}                                                                               OPTIONAL,
-- R1 11-4b: DL priority indication in DCI with mixed DCI formats
dci-DL-PriorityIndicator-r16                ENUMERATED {supported}              OPTIONAL,
-- R1 12-1a: UL priority indication in DCI with mixed DCI formats
dci-UL-PriorityIndicator-r16                ENUMERATED {supported}              OPTIONAL,
-- R1 16-1e: Maximum number of configured pathloss reference RSs for PUSCH/PUCCH/SRS by RRC for MAC-CE based pathloss reference RS update
maxNumberPathlossRS-Update-r16              ENUMERATED {n4, n8, n16, n32, n64}  OPTIONAL,

-- R1 18-9: Usage of the PDSCH starting time for HARQ-ACK type 2 codebook
type2-HARQ-ACK-Codebook-r16                 ENUMERATED {supported}              OPTIONAL,
-- R1 16-1g-1: Resources for beam management, pathloss measurement, BFD, RLM and new beam identification across frequency ranges
maxTotalResourcesForAcrossFreqRanges-r16    SEQUENCE {
    maxNumberResWithinSlotAcrossCC-AcrossFR-r16 ENUMERATED {n2, n4, n8, n12, n16, n32, n64, n128}        OPTIONAL,
    maxNumberResAcrossCC-AcrossFR-r16           ENUMERATED {n2, n4, n8, n12, n16, n32, n40, n48, n64, n72, n80, n96, n128, n256}
                                                                                OPTIONAL
}                                                                               OPTIONAL,
-- R1 16-2a-4: HARQ-ACK for multi-DCI based multi-TRP - separate
harqACK-separateMultiDCI-MultiTRP-r16       SEQUENCE {
maxNumberLongPUCCHs-r16                         ENUMERATED {longAndLong, longAndShort, shortAndShort}    OPTIONAL
}                                                                               OPTIONAL,
-- R1 16-2a-4: HARQ-ACK for multi-DCI based multi-TRP - joint
harqACK-jointMultiDCI-MultiTRP-r16          ENUMERATED {supported}              OPTIONAL,
-- R4 9-1: BWP switching on multiple CCs RRM requirements
bwp-SwitchingMultiCCs-r16                   CHOICE {
    type1-r16                                   ENUMERATED {us100, us200},
    type2-r16                                   ENUMERATED {us200, us400, us800, us1000}
}                                                                               OPTIONAL
]],
[[
targetSMTC-SCG-r16                          ENUMERATED {supported}              OPTIONAL,
supportRepetitionZeroOffsetRV-r16           ENUMERATED {supported}              OPTIONAL,
-- R1 11-12: in-order CBG-based re-transmission
cbg-TransInOrderPUSCH-UL-r16                ENUMERATED {supported}              OPTIONAL
]],
[[
-- R4 6-3: Dormant BWP switching on multiple CCs RRM requirements
bwp-SwitchingMultiDormancyCCs-r16           CHOICE {
    type1-r16                                   ENUMERATED {us100, us200},
    type2-r16                                   ENUMERATED {us200, us400, us800, us1000}
}                                                                               OPTIONAL,
-- R1 16-2a-8: Indicates that retransmission scheduled by a different CORESETPoolIndex for multi-DCI multi-TRP is not supported.
supportRetx-Diff-CoresetPool-Multi-DCI-TRP-r16              ENUMERATED {notSupported}          OPTIONAL,
-- R1 22-10: Support of pdcch-MonitoringAnyOccasionsWithSpanGap in case of cross-carrier scheduling with different SCSs
pdcch-MonitoringAnyOccasionsWithSpanGapCrossCarrierSch-r16   ENUMERATED {mode2, mode3}          OPTIONAL
]],
```

```
    [[
    -- R1 16-1j-1: Support of 2 port CSI-RS for new beam identification
    newBeamIdentifications2PortCSI-RS-r16       ENUMERATED {supported}              OPTIONAL,
    -- R1 16-1j-2: Support of 2 port CSI-RS for pathloss estimation
    pathlossEstimation2PortCSI-RS-r16           ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    mux-HARQ-ACK-withoutPUCCH-onPUSCH-r16       ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    -- R1 31-1: Support of Desired Guard Symbol reporting and provided guard symbol reception.
    guardSymbolReportReception-IAB-r17          ENUMERATED {supported}              OPTIONAL,
    -- R1 31-2: support of restricted IAB-DU beam reception
    restricted-IAB-DU-BeamReception-r17         ENUMERATED {supported}              OPTIONAL,
    -- R1 31-3: support of recommended IAB-MT beam transmission for DL and UL beam
    recommended-IAB-MT-BeamTransmission-r17     ENUMERATED {supported}              OPTIONAL,
    -- R1 31-4: support of case 6 timing alignment indication reception
    case6-TimingAlignmentReception-IAB-r17      ENUMERATED {supported}              OPTIONAL,
    -- R1 31-5: support of case 7 timing offset indication reception and case 7 timing at parent-node indication reception
    case7-TimingAlignmentReception-IAB-r17      ENUMERATED {supported}              OPTIONAL,
    -- R1 31-6: support of desired DL Tx power adjustment reporting and DL Tx power adjustment reception
    dl-tx-PowerAdjustment-IAB-r17               ENUMERATED {supported}              OPTIONAL,
    -- R1 31-7: support of desired IAB-MT PSD range reporting
    desired-ul-tx-PowerAdjustment-r17           ENUMERATED {supported}              OPTIONAL,
    -- R1 31-8: support of monitoring DCI Format 2_5 scrambled by AI-RNTI for indication of FDM soft resource availability to an IAB node
    fdm-SoftResourceAvailability-DynamicIndication-r17  ENUMERATED{supported}       OPTIONAL,
    -- R1 31-10: Support of updated T_delta range reception
    updated-T-DeltaRangeReception-r17           ENUMERATED{supported}               OPTIONAL,
    -- R1 30-5: Support slot based dynamic PUCCH repetition indication for PUCCH formats 0/1/2/3/4
    slotBasedDynamicPUCCH-Rep-r17               ENUMERATED {supported}              OPTIONAL,
    -- R1 25-1: Support of HARQ-ACK deferral in case of TDD collision
    sps-HARQ-ACK-Deferral-r17                   SEQUENCE {
        non-SharedSpectrumChAccess-r17              ENUMERATED {supported}          OPTIONAL,
        sharedSpectrumChAccess-r17                  ENUMERATED {supported}          OPTIONAL
    }                                                                               OPTIONAL,
    -- R1 23-1-1k Maximum number of configured CC lists (per UE)
    unifiedJointTCI-commonUpdate-r17            INTEGER (1..4)                      OPTIONAL,
    -- R1 23-2-1c PDCCH repetition with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot
    mTRP-PDCCH-singleSpan-r17                   ENUMERATED {supported}              OPTIONAL,
    -- R1 27-23: Support of more than one activated PRS processing windows across all active DL BWPs
    supportedActivatedPRS-ProcessingWindow-r17  ENUMERATED {n2, n3, n4}             OPTIONAL,
    cg-TimeDomainAllocationExtension-r17        ENUMERATED {supported}              OPTIONAL
    ]],
     [[
    -- R1 25-20: Propagation delay compensation based on Rel-15 TA procedure for TN and licensed
    ta-BasedPDC-TN-NonSharedSpectrumChAccess-r17 ENUMERATED {supported}             OPTIONAL,
    -- R1 31-11: Directional Collision Handling in DC operation
    directionalCollisionDC-IAB-r17              ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    dummy1                                      ENUMERATED {supported}              OPTIONAL,
    dummy2                                      ENUMERATED {supported}              OPTIONAL,
    dummy3                                      ENUMERATED {supported}              OPTIONAL,
    dummy4                                      ENUMERATED {supported}              OPTIONAL,
```

```
    srs-AdditionalRepetition-r17                ENUMERATED {supported}              OPTIONAL,
    pusch-Repetition-CG-SDT-r17                 ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    multiPDSCH-PerSlotType1-CB-Support-r17      ENUMERATED {supported}              OPTIONAL
    ]]
}

Phy-ParametersCommon-v16a0 ::=                  SEQUENCE {
    srs-PeriodicityAndOffsetExt-r16                 ENUMERATED {supported}          OPTIONAL
}

Phy-ParametersXDD-Diff ::=          SEQUENCE {
    dynamicSFI                          ENUMERATED {supported}                      OPTIONAL,
    twoPUCCH-F0-2-ConsecSymbols         ENUMERATED {supported}                      OPTIONAL,
    twoDifferentTPC-Loop-PUSCH          ENUMERATED {supported}                      OPTIONAL,
    twoDifferentTPC-Loop-PUCCH          ENUMERATED {supported}                      OPTIONAL,
    ...,
    [[
    dl-SchedulingOffset-PDSCH-TypeA     ENUMERATED {supported}                      OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB     ENUMERATED {supported}                      OPTIONAL,
    ul-SchedulingOffset                 ENUMERATED {supported}                      OPTIONAL
    ]]
}

Phy-ParametersFRX-Diff ::=                  SEQUENCE {
    dynamicSFI                                  ENUMERATED {supported}                  OPTIONAL,
    dummy1                                      BIT STRING (SIZE (2))                   OPTIONAL,
    twoFL-DMRS                                  BIT STRING (SIZE (2))                   OPTIONAL,
    dummy2                                      BIT STRING (SIZE (2))                   OPTIONAL,
    dummy3                                      BIT STRING (SIZE (2))                   OPTIONAL,
    supportedDMRS-TypeDL                        ENUMERATED {type1, type1And2}           OPTIONAL,
    supportedDMRS-TypeUL                        ENUMERATED {type1, type1And2}           OPTIONAL,
    semiOpenLoopCSI                             ENUMERATED {supported}                  OPTIONAL,
    csi-ReportWithoutPMI                        ENUMERATED {supported}                  OPTIONAL,
    csi-ReportWithoutCQI                        ENUMERATED {supported}                  OPTIONAL,
    onePortsPTRS                                BIT STRING (SIZE (2))                   OPTIONAL,
    twoPUCCH-F0-2-ConsecSymbols                 ENUMERATED {supported}                  OPTIONAL,
    pucch-F2-WithFH                             ENUMERATED {supported}                  OPTIONAL,
    pucch-F3-WithFH                             ENUMERATED {supported}                  OPTIONAL,
    pucch-F4-WithFH                             ENUMERATED {supported}                  OPTIONAL,
    pucch-F0-2WithoutFH                         ENUMERATED {notSupported}               OPTIONAL,
    pucch-F1-3-4WithoutFH                       ENUMERATED {notSupported}               OPTIONAL,
    mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot      ENUMERATED {supported}                  OPTIONAL,
    uci-CodeBlockSegmentation                   ENUMERATED {supported}                  OPTIONAL,
    onePUCCH-LongAndShortFormat                 ENUMERATED {supported}                  OPTIONAL,
    twoPUCCH-AnyOthersInSlot                    ENUMERATED {supported}                  OPTIONAL,
    intraSlotFreqHopping-PUSCH                  ENUMERATED {supported}                  OPTIONAL,
    pusch-LBRM                                  ENUMERATED {supported}                  OPTIONAL,
    pdcch-BlindDetectionCA                      INTEGER (4..16)                         OPTIONAL,
    tpc-PUSCH-RNTI                              ENUMERATED {supported}                  OPTIONAL,
    tpc-PUCCH-RNTI                              ENUMERATED {supported}                  OPTIONAL,
    tpc-SRS-RNTI                                ENUMERATED {supported}                  OPTIONAL,
    absoluteTPC-Command                         ENUMERATED {supported}                  OPTIONAL,
```

```
    twoDifferentTPC-Loop-PUSCH                  ENUMERATED {supported}                  OPTIONAL,
    twoDifferentTPC-Loop-PUCCH                  ENUMERATED {supported}                  OPTIONAL,
    pusch-HalfPi-BPSK                           ENUMERATED {supported}                  OPTIONAL,
    pucch-F3-4-HalfPi-BPSK                      ENUMERATED {supported}                  OPTIONAL,
    almostContiguousCP-OFDM-UL                  ENUMERATED {supported}                  OPTIONAL,
    sp-CSI-RS                                   ENUMERATED {supported}                  OPTIONAL,
    sp-CSI-IM                                   ENUMERATED {supported}                  OPTIONAL,
    tdd-MultiDL-UL-SwitchPerSlot                ENUMERATED {supported}                  OPTIONAL,
    multipleCORESET                             ENUMERATED {supported}                  OPTIONAL,
    ...,
    [[
    csi-RS-IM-ReceptionForFeedback              CSI-RS-IM-ReceptionForFeedback          OPTIONAL,
    csi-RS-ProcFrameworkForSRS                  CSI-RS-ProcFrameworkForSRS              OPTIONAL,
    csi-ReportFramework                         CSI-ReportFramework                     OPTIONAL,
    mux-SR-HARQ-ACK-CSI-PUCCH-OncePerSlot       SEQUENCE {
        sameSymbol                                  ENUMERATED {supported}                  OPTIONAL,
        diffSymbol                                  ENUMERATED {supported}                  OPTIONAL
    }                                                                                   OPTIONAL,
    mux-SR-HARQ-ACK-PUCCH                       ENUMERATED {supported}                  OPTIONAL,
    mux-MultipleGroupCtrlCH-Overlap             ENUMERATED {supported}                  OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeA             ENUMERATED {supported}                  OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB             ENUMERATED {supported}                  OPTIONAL,
    ul-SchedulingOffset                         ENUMERATED {supported}                  OPTIONAL,
    dl-64QAM-MCS-TableAlt                       ENUMERATED {supported}                  OPTIONAL,
    ul-64QAM-MCS-TableAlt                       ENUMERATED {supported}                  OPTIONAL,
    cqi-TableAlt                                ENUMERATED {supported}                  OPTIONAL,
    oneFL-DMRS-TwoAdditionalDMRS-UL             ENUMERATED {supported}                  OPTIONAL,
    twoFL-DMRS-TwoAdditionalDMRS-UL             ENUMERATED {supported}                  OPTIONAL,
    oneFL-DMRS-ThreeAdditionalDMRS-UL           ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    pdcch-BlindDetectionNRDC                SEQUENCE {
        pdcch-BlindDetectionMCG-UE              INTEGER (1..15),
        pdcch-BlindDetectionSCG-UE              INTEGER (1..15)
    }                                                                                   OPTIONAL,
    mux-HARQ-ACK-PUSCH-DiffSymbol               ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    -- R1 11-1b: Type 1 HARQ-ACK codebook support for relative TDRA for DL
    type1-HARQ-ACK-Codebook-r16                 ENUMERATED {supported}                  OPTIONAL,
    -- R1 11-8: Enhanced UL power control scheme
    enhancedPowerControl-r16                    ENUMERATED {supported}                  OPTIONAL,
    -- R1 16-1b-1: TCI state activation across multiple CCs
    simultaneousTCI-ActMultipleCC-r16           ENUMERATED {supported}                  OPTIONAL,
    -- R1 16-1b-2: Spatial relation update across multiple CCs
    simultaneousSpatialRelationMultipleCC-r16   ENUMERATED {supported}                  OPTIONAL,
    cli-RSSI-FDM-DL-r16                         ENUMERATED {supported}                  OPTIONAL,
    cli-SRS-RSRP-FDM-DL-r16                     ENUMERATED {supported}                  OPTIONAL,
    -- R1 19-3: Maximum MIMO Layer Adaptation
    maxLayersMIMO-Adaptation-r16                ENUMERATED {supported}                  OPTIONAL,
    -- R1 12-5: Configuration of aggregation factor per SPS configuration
    aggregationFactorSPS-DL-r16                 ENUMERATED {supported}                  OPTIONAL,
    -- R1 16-1g: Resources for beam management, pathloss measurement, BFD, RLM and new beam identification
    maxTotalResourcesForOneFreqRange-r16        SEQUENCE {
```

```
        maxNumberResWithinSlotAcrossCC-OneFR-r16    ENUMERATED {n2, n4, n8, n12, n16, n32, n64, n128}    OPTIONAL,
        maxNumberResAcrossCC-OneFR-r16              ENUMERATED {n2, n4, n8, n12, n16, n32, n40, n48, n64, n72, n80, n96, n128, n256}
                                                                                                          OPTIONAL
    }                                           OPTIONAL,
    -- R1 16-7: Extension of the maximum number of configured aperiodic CSI report settings
    csi-ReportFrameworkExt-r16                  CSI-ReportFrameworkExt-r16                    OPTIONAL
    ]],
    [[
    twoTCI-Act-servingCellInCC-List-r16         ENUMERATED {supported}                        OPTIONAL
    ]],
    [[
    -- R1 22-11: Support of 'cri-RI-CQI' report without non-PMI-PortIndication
    cri-RI-CQI-WithoutNon-PMI-PortInd-r16       ENUMERATED {supported}                        OPTIONAL
    ]],
    [[
    -- R1 25-11: 4-bits subband CQI for TN and licensed
    cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17  ENUMERATED {supported}                 OPTIONAL
    ]],
    [[
    multipleCORESET-RedCap-r17                  ENUMERATED {supported}                        OPTIONAL
    ]]
}

Phy-ParametersFR1 ::=                       SEQUENCE {
    pdcch-MonitoringSingleOccasion              ENUMERATED {supported}                        OPTIONAL,
    scs-60kHz                                   ENUMERATED {supported}                        OPTIONAL,
    pdsch-256QAM-FR1                            ENUMERATED {supported}                        OPTIONAL,
    pdsch-RE-MappingFR1-PerSymbol               ENUMERATED {n10, n20}                         OPTIONAL,
    ...,
    [[
    pdsch-RE-MappingFR1-PerSlot                 ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,
                                                n144, n160, n176, n192, n208, n224, n240, n256}         OPTIONAL
    ]],
    [[
    -- R1 22-12: PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a
    -- slot
    pdcch-MonitoringSingleSpanFirst4Sym-r16     ENUMERATED {supported}                        OPTIONAL
    ]]
}

Phy-ParametersFR2 ::=                       SEQUENCE {
    dummy                                       ENUMERATED {supported}                                  OPTIONAL,
    pdsch-RE-MappingFR2-PerSymbol               ENUMERATED {n6, n20}                                    OPTIONAL,
    ...,
    [[
    pCell-FR2                                   ENUMERATED {supported}                                  OPTIONAL,
    pdsch-RE-MappingFR2-PerSlot                 ENUMERATED {n16, n32, n48, n64, n80, n96, n112, n128,
                                                    n144, n160, n176, n192, n208, n224, n240, n256}     OPTIONAL
    ]],
    [[
    -- R1 16-1c: Support of default spatial relation and pathloss reference RS for dedicated-PUCCH/SRS and PUSCH
    defaultSpatialRelationPathlossRS-r16        ENUMERATED {supported}                                  OPTIONAL,
    -- R1 16-1d: Support of spatial relation update for AP-SRS via MAC CE
    spatialRelationUpdateAP-SRS-r16             ENUMERATED {supported}                                  OPTIONAL,
```

```
    maxNumberSRS-PosSpatialRelationsAllServingCells-r16  ENUMERATED {n0, n1, n2, n4, n8, n16}          OPTIONAL
    ]]
}

-- TAG-PHY-PARAMETERS-STOP
-- ASN1STOP
```

***Phy-ParametersFRX-Diff* field descriptions**
csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework
These fields are optionally present in *fr1-fr2-Add-UE-NR-Capabilities* in *UE-NR-Capability*. They shall not be set in any other instance of the IE *Phy-ParametersFRX-Diff*. If the network configures the UE with serving cells on both FR1 and FR2 bands, these parameters, if present, limit the corresponding parameters in *MIMO-ParametersPerBand*.

– *Phy-ParametersMRDC*

The IE *Phy-ParametersMRDC* is used to convey physical layer capabilities for MR-DC.

***Phy-ParametersMRDC* information element**

```
-- ASN1START
-- TAG-PHY-PARAMETERSMRDC-START

Phy-ParametersMRDC ::=              SEQUENCE {
    naics-Capability-List               SEQUENCE (SIZE (1..maxNrofNAICS-Entries)) OF NAICS-Capability-Entry        OPTIONAL,
    ...,
    [[
    spCellPlacement                     CarrierAggregationVariant                                                  OPTIONAL
    ]],
    [[
    -- R1 18-3b: Semi-statically configured LTE UL transmissions in all UL subframes not limited to tdm-pattern in case of TDD PCell
    tdd-PCellUL-TX-AllUL-Subframe-r16   ENUMERATED {supported}                                                     OPTIONAL,
    -- R1 18-3a: Semi-statically configured LTE UL transmissions in all UL subframes not limited to tdm-pattern in case of FDD PCell
    fdd-PCellUL-TX-AllUL-Subframe-r16   ENUMERATED {supported}                                                     OPTIONAL
    ]]
}

NAICS-Capability-Entry ::=          SEQUENCE {
    numberOfNAICS-CapableCC             INTEGER(1..5),
    numberOfAggregatedPRB               ENUMERATED {n50, n75, n100, n125, n150, n175, n200, n225,
                                                    n250, n275, n300, n350, n400, n450, n500, spare},
    ...
}

-- TAG-PHY-PARAMETERSMRDC-STOP
-- ASN1STOP
```

***PHY-ParametersMRDC* field descriptions**
naics-Capability-List
Indicates that UE in MR-DC supports NAICS as defined in TS 36.331 [10].

– *Phy-ParametersSharedSpectrumChAccess*

The IE *Phy-ParametersSharedSpectrumChAccess* is used to convey the physical layer capabilities specific for shared spectrum channel access.

***Phy-ParametersSharedSpectrumChAccess* information element**

```
-- ASN1START
-- TAG-PHY-PARAMETERSSHAREDSPECTRUMCHACCESS-START

Phy-ParametersSharedSpectrumChAccess-r16 ::=    SEQUENCE {
    -- 10-32 (1-2): SS block based SINR measurement (SS-SINR) for unlicensed spectrum
    ss-SINR-Meas-r16                            ENUMERATED {supported}                  OPTIONAL,
    -- 10-33 (2-32a): Semi-persistent CSI report on PUCCH for unlicensed spectrum
    sp-CSI-ReportPUCCH-r16                      ENUMERATED {supported}                  OPTIONAL,
    -- 10-33a (2-32b): Semi-persistent CSI report on PUSCH for unlicensed spectrum
    sp-CSI-ReportPUSCH-r16                      ENUMERATED {supported}                  OPTIONAL,
    -- 10-34 (3-6): Dynamic SFI monitoring for unlicensed spectrum
    dynamicSFI-r16                              ENUMERATED {supported}                  OPTIONAL,
    -- 10-35c (4-19c): SR/HARQ-ACK/CSI multiplexing once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when SR/HARQ-
    -- ACK/CSI are supposed to be sent with different starting symbols in a slot for unlicensed spectrum
    -- 10-35 (4-19): SR/HARQ-ACK/CSI multiplexing once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when SR/HARQ-
    -- ACK/CSI are supposed to be sent with the same starting symbol on the PUCCH resources in a slot for unlicensed spectrum
    mux-SR-HARQ-ACK-CSI-PUCCH-OncePerSlot-r16       SEQUENCE {
        sameSymbol-r16                              ENUMERATED {supported}              OPTIONAL,
        diffSymbol-r16                              ENUMERATED {supported}              OPTIONAL
    }                                                                                   OPTIONAL,
    -- 10-35a (4-19a): Overlapping PUCCH resources have different starting symbols in a slot for unlicensed spectrum
    mux-SR-HARQ-ACK-PUCCH-r16                   ENUMERATED {supported}                  OPTIONAL,
    -- 10-35b (4-19b): SR/HARQ-ACK/CSI multiplexing more than once per slot using a PUCCH (or HARQ-ACK/CSI piggybacked on a PUSCH) when
    -- SR/HARQ ACK/CSI are supposed to be sent with the same or different starting symbol in a slot for unlicensed spectrum
    mux-SR-HARQ-ACK-CSI-PUCCH-MultiPerSlot-r16      ENUMERATED {supported}              OPTIONAL,
    -- 10-36 (4-28): HARQ-ACK multiplexing on PUSCH with different PUCCH/PUSCH starting OFDM symbols for unlicensed spectrum
    mux-HARQ-ACK-PUSCH-DiffSymbol-r16           ENUMERATED {supported}                  OPTIONAL,
    -- 10-37 (4-23): Repetitions for PUCCH format 1, 3, and 4 over multiple slots with K = 2, 4, 8 for unlicensed spectrum
    pucch-Repetition-F1-3-4-r16                 ENUMERATED {supported}                  OPTIONAL,
    -- 10-38 (5-14): Type 1 configured PUSCH repetitions over multiple slots for unlicensed spectrum
    type1-PUSCH-RepetitionMultiSlots-r16        ENUMERATED {supported}                  OPTIONAL,
    -- 10-39 (5-16): Type 2 configured PUSCH repetitions over multiple slots for unlicensed spectrum
    type2-PUSCH-RepetitionMultiSlots-r16        ENUMERATED {supported}                  OPTIONAL,
    -- 10-40 (5-17): PUSCH repetitions over multiple slots for unlicensed spectrum
    pusch-RepetitionMultiSlots-r16              ENUMERATED {supported}                  OPTIONAL,
    -- 10-40a (5-17a): PDSCH repetitions over multiple slots for unlicensed spectrum
    pdsch-RepetitionMultiSlots-r16              ENUMERATED {supported}                  OPTIONAL,
    -- 10-41 (5-18): DL SPS
    downlinkSPS-r16                             ENUMERATED {supported}                  OPTIONAL,
    -- 10-42 (5-19): Type 1 Configured UL grant
```

```
    configuredUL-GrantType1-r16                     ENUMERATED {supported}                  OPTIONAL,
    -- 10-43 (5-20): Type 2 Configured UL grant
    configuredUL-GrantType2-r16                     ENUMERATED {supported}                  OPTIONAL,
    -- 10-44 (5-21): Pre-emption indication for DL
    pre-EmptIndication-DL-r16                       ENUMERATED {supported}                  OPTIONAL,
    ...
}

-- TAG-PHY-PARAMETERSSHAREDSPECTRUMCHACCESS-STOP
-- ASN1STOP
```

– *PosSRS-RRC-Inactive-OutsideInitialUL-BWP*

The IE *PosSRS-RRC-Inactive-OutsideInitialUL-BWP* is used to convey the capabilities supported by the UE for Positioning SRS transmission in RRC_INACTIVE state configured outside initial UL BWP.

PosSRS-RRC-Inactive-OutsideInitialUL-BWP information element

```
-- ASN1START
-- TAG-POSSRS-RRC-INACTIVE-OUTSIDEINITIALUL-BWP-START

PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17::= SEQUENCE {
    -- R1 27-15b: Positioning SRS transmission in RRC_INACTIVE state configured outside initial UL BWP
    maxSRSposBandwidthForEachSCS-withinCC-FR1-r17   ENUMERATED {mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz35, mhz40,
                                                    mhz45, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100}            OPTIONAL,
    maxSRSposBandwidthForEachSCS-withinCC-FR2-r17   ENUMERATED {mhz50, mhz100, mhz200, mhz400}                  OPTIONAL,
    maxNumOfSRSposResourceSets-r17                  ENUMERATED {n1, n2, n4, n8, n12, n16}                       OPTIONAL,
    maxNumOfPeriodicSRSposResources-r17             ENUMERATED {n1, n2, n4, n8, n16, n32, n64}                  OPTIONAL,
    maxNumOfPeriodicSRSposResourcesPerSlot-r17      ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}      OPTIONAL,
    differentNumerologyBetweenSRSposAndInitialBWP-r17  ENUMERATED {supported}                                   OPTIONAL,
    srsPosWithoutRestrictionOnBWP-r17               ENUMERATED {supported}                                      OPTIONAL,
    maxNumOfPeriodicAndSemipersistentSRSposResources-r17  ENUMERATED {n1, n2, n4, n8, n16, n32, n64}           OPTIONAL,
    maxNumOfPeriodicAndSemipersistentSRSposResourcesPerSlot-r17  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
    differentCenterFreqBetweenSRSposAndInitialBWP-r17  ENUMERATED {supported}                                   OPTIONAL,
    switchingTimeSRS-TX-OtherTX-r17                 ENUMERATED {us100, us140, us200, us300, us500}              OPTIONAL,
    -- R1 27-15c: Support of positioning SRS transmission in RRC_INACTIVE state outside initial BWP with semi-persistent SRS
    maxNumOfSemiPersistentSRSposResources-r17       ENUMERATED {n1, n2, n4, n8, n16, n32, n64}                  OPTIONAL,
    maxNumOfSemiPersistentSRSposResourcesPerSlot-r17  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}   OPTIONAL,
    ...
}

-- TAG-POSSRS-RRC-INACTIVE-OUTSIDEINITIALUL-BWP-STOP
-- ASN1STOP
```

– *PowSav-Parameters*

The IE *PowSav-Parameters* is used to convey the capabilities supported by the UE for the power saving preferences.

PowSav-Parameters information element

```
-- ASN1START
-- TAG-POWSAV-PARAMETERS-START

PowSav-Parameters-r16 ::=         SEQUENCE {
    powSav-ParametersCommon-r16               PowSav-ParametersCommon-r16                                   OPTIONAL,
    powSav-ParametersFRX-Diff-r16             PowSav-ParametersFRX-Diff-r16                                 OPTIONAL,
    ...
}

PowSav-Parameters-v1700 ::=     SEQUENCE {
    powSav-ParametersFR2-2-r17      PowSav-ParametersFR2-2-r17                                              OPTIONAL,
    ...
}

PowSav-ParametersCommon-r16 ::=    SEQUENCE {
    drx-Preference-r16                        ENUMERATED {supported}                                        OPTIONAL,
    maxCC-Preference-r16                      ENUMERATED {supported}                                        OPTIONAL,
    releasePreference-r16                     ENUMERATED {supported}                                        OPTIONAL,
    -- R1 19-4a: UE assistance information
    minSchedulingOffsetPreference-r16         ENUMERATED {supported}                                        OPTIONAL,
    ...
}

PowSav-ParametersFRX-Diff-r16 ::=    SEQUENCE {
    maxBW-Preference-r16                      ENUMERATED {supported}                                        OPTIONAL,
    maxMIMO-LayerPreference-r16               ENUMERATED {supported}                                        OPTIONAL,
    ...
}

PowSav-ParametersFR2-2-r17 ::=      SEQUENCE {
    maxBW-Preference-r17                      ENUMERATED {supported}                                        OPTIONAL,
    maxMIMO-LayerPreference-r17               ENUMERATED {supported}                                        OPTIONAL,
    ...
}

-- TAG-POWSAV-PARAMETERS-STOP
-- ASN1STOP
```

– *ProcessingParameters*

The IE *ProcessingParameters* is used to indicate PDSCH/PUSCH processing capabilities supported by the UE.

ProcessingParameters information element

```
-- ASN1START
-- TAG-PROCESSINGPARAMETERS-START

ProcessingParameters ::=        SEQUENCE {
    fallback                        ENUMERATED {sc, cap1-only},
```

```
    differentTB-PerSlot             SEQUENCE {
        upto1                         NumberOfCarriers                  OPTIONAL,
        upto2                         NumberOfCarriers                  OPTIONAL,
        upto4                         NumberOfCarriers                  OPTIONAL,
        upto7                         NumberOfCarriers                  OPTIONAL
    }                                                                   OPTIONAL
}

NumberOfCarriers ::=    INTEGER (1..16)

-- TAG-PROCESSINGPARAMETERS-STOP
-- ASN1STOP
```

– *PRS-ProcessingCapabilityOutsideMGinPPWperType*

The IE *PRS-ProcessingCapabilityOutsideMGinPPWperType* is used to indicate DL PRS Processing Capability outside MG capabilities supported by the UE.

***PRS-ProcessingCapabilityOutsideMGinPPWperType* information element**

```
-- ASN1START
-- TAG-PRS-PROCESSINGCAPABILITYOUTSIDEMGINPPWPERType-START

PRS-ProcessingCapabilityOutsideMGinPPWperType-r17 ::= SEQUENCE {
    prsProcessingType-r17                               ENUMERATED {type1A, type1B, type2},
    ppw-dl-PRS-BufferType-r17                           ENUMERATED {type1, type2, ...},
    ppw-durationOfPRS-Processing-r17                    CHOICE {
        ppw-durationOfPRS-Processing1-r17                   SEQUENCE {
            ppw-durationOfPRS-ProcessingSymbolsN-r17            ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms4, ms6, ms8, ms12,
                                                                            ms16, ms20, ms25, ms30, ms32, ms35, ms40, ms45, ms50},
            ppw-durationOfPRS-ProcessingSymbolsT-r17            ENUMERATED {ms1, ms2, ms4, ms8, ms16, ms20, ms30, ms40, ms80,
                                                                            ms160, ms320, ms640, ms1280}
        },
        ppw-durationOfPRS-Processing2-r17                   SEQUENCE {
            ppw-durationOfPRS-ProcessingSymbolsN2-r17            ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms3, ms4, ms5,
                                                                            ms6, ms8, ms12},
            ppw-durationOfPRS-ProcessingSymbolsT2-r17            ENUMERATED {ms4, ms5, ms6, ms8}
        }
    }                                                                                                                   OPTIONAL,
    ppw-maxNumOfDL-PRS-ResProcessedPerSlot-r17          SEQUENCE {
        scs15-r17                                           ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
        scs30-r17                                           ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
        scs60-r17                                           ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
        scs120-r17                                          ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}    OPTIONAL,
        ...
    },
    ppw-maxNumOfDL-Bandwidth-r17                        CHOICE {
        fr1-r17                                             ENUMERATED {mhz5, mhz10, mhz20, mhz40, mhz50, mhz80, mhz100},
        fr2-r17                                             ENUMERATED {mhz50, mhz100, mhz200, mhz400}
    }                                                                                                                   OPTIONAL
}
```

```
-- TAG-PRS-PROCESSINGCAPABILITYOUTSIDEMGINPPWPERType-STOP
-- ASN1STOP
```

– *RAT-Type*

The IE *RAT-Type* is used to indicate the radio access technology (RAT), including NR, of the requested/transferred UE capabilities.

RAT-Type information element

```
-- ASN1START
-- TAG-RAT-TYPE-START

RAT-Type ::= ENUMERATED {nr, eutra-nr, eutra, utra-fdd-v1610, ...}

-- TAG-RAT-TYPE-STOP
-- ASN1STOP
```

– *RedCapParameters*

The IE *RedCapParameters* is used to indicate the UE capabilities supported by RedCap UEs.

RedCapParameters information element

```
-- ASN1START
-- TAG-REDCAPPARAMETERS-START

RedCapParameters-r17::=                 SEQUENCE {
    -- R1 28-1: RedCap UE
    supportOfRedCap-r17                     ENUMERATED {supported}                          OPTIONAL,
    supportOf16DRB-RedCap-r17               ENUMERATED {supported}                          OPTIONAL
}

RedCapParameters-v1740::=               SEQUENCE {
    ncd-SSB-ForRedCapInitialBWP-SDT-r17     ENUMERATED {supported}                          OPTIONAL
}

-- TAG-REDCAPPARAMETERS-STOP
-- ASN1STOP
```

– *RF-Parameters*

The IE *RF-Parameters* is used to convey RF-related capabilities for NR operation.

RF-Parameters information element

```
-- ASN1START
-- TAG-RF-PARAMETERS-START

RF-Parameters ::=                               SEQUENCE {
    supportedBandListNR                             SEQUENCE (SIZE (1..maxBands)) OF BandNR,
    supportedBandCombinationList                    BandCombinationList                         OPTIONAL,
    appliedFreqBandListFilter                       FreqBandList                                OPTIONAL,
    ...,
    [[
    supportedBandCombinationList-v1540              BandCombinationList-v1540                   OPTIONAL,
    srs-SwitchingTimeRequested                      ENUMERATED {true}                           OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1550              BandCombinationList-v1550                   OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1560              BandCombinationList-v1560                   OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1610              BandCombinationList-v1610                   OPTIONAL,
    supportedBandCombinationListSidelinkEUTRA-NR-r16    BandCombinationListSidelinkEUTRA-NR-r16     OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-r16     BandCombinationList-UplinkTxSwitch-r16      OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1630              BandCombinationList-v1630                   OPTIONAL,
    supportedBandCombinationListSidelinkEUTRA-NR-v1630  BandCombinationListSidelinkEUTRA-NR-v1630   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1630   BandCombinationList-UplinkTxSwitch-v1630    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1640              BandCombinationList-v1640                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1640   BandCombinationList-UplinkTxSwitch-v1640    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1650              BandCombinationList-v1650                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1650   BandCombinationList-UplinkTxSwitch-v1650    OPTIONAL
    ]],
    [[
    extendedBand-n77-r16                            ENUMERATED {supported}                      OPTIONAL
    ]],
    [[
    supportedBandCombinationList-UplinkTxSwitch-v1670   BandCombinationList-UplinkTxSwitch-v1670    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1680              BandCombinationList-v1680                   OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1690              BandCombinationList-v1690                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1690   BandCombinationList-UplinkTxSwitch-v1690    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1700              BandCombinationList-v1700                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1700   BandCombinationList-UplinkTxSwitch-v1700    OPTIONAL,
```

```
    supportedBandCombinationListSL-RelayDiscovery-r17   OCTET STRING                                OPTIONAL,  -- Contains PC5
BandCombinationListSidelinkNR-r16
    supportedBandCombinationListSL-NonRelayDiscovery-r17 OCTET STRING                               OPTIONAL,  -- Contains PC5
BandCombinationListSidelinkNR-r16
    supportedBandCombinationListSidelinkEUTRA-NR-v1710  BandCombinationListSidelinkEUTRA-NR-v1710   OPTIONAL,
    sidelinkRequested-r17                               ENUMERATED {true}                           OPTIONAL,
    extendedBand-n77-2-r17                              ENUMERATED {supported}                      OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1720                  BandCombinationList-v1720                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1720   BandCombinationList-UplinkTxSwitch-v1720    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1730                  BandCombinationList-v1730                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1730   BandCombinationList-UplinkTxSwitch-v1730    OPTIONAL,
    supportedBandCombinationListSL-RelayDiscovery-v1730 BandCombinationListSL-Discovery-r17         OPTIONAL,
    supportedBandCombinationListSL-NonRelayDiscovery-v1730 BandCombinationListSL-Discovery-r17      OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1740                  BandCombinationList-v1740                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1740   BandCombinationList-UplinkTxSwitch-v1740    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1760                  BandCombinationList-v1760                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1760   BandCombinationList-UplinkTxSwitch-v1760    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1770                  BandCombinationList-v1770                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1770   BandCombinationList-UplinkTxSwitch-v1770    OPTIONAL
    ]]

}

RF-Parameters-v15g0 ::=                   SEQUENCE {
    supportedBandCombinationList-v15g0        BandCombinationList-v15g0                 OPTIONAL
}

RF-Parameters-v16a0 ::=                           SEQUENCE {
    supportedBandCombinationList-v16a0                BandCombinationList-v16a0                 OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v16a0  BandCombinationList-UplinkTxSwitch-v16a0   OPTIONAL
}

RF-Parameters-v16c0 ::=                           SEQUENCE {
    supportedBandListNR-v16c0                         SEQUENCE (SIZE (1..maxBands)) OF BandNR-v16c0
}

BandNR ::=                            SEQUENCE {
    bandNR                                FreqBandIndicatorNR,
    modifiedMPR-Behaviour                 BIT STRING (SIZE (8))                       OPTIONAL,
    mimo-ParametersPerBand                MIMO-ParametersPerBand                      OPTIONAL,
    extendedCP                            ENUMERATED {supported}                      OPTIONAL,
    multipleTCI                           ENUMERATED {supported}                      OPTIONAL,
    bwp-WithoutRestriction                ENUMERATED {supported}                      OPTIONAL,
    bwp-SameNumerology                    ENUMERATED {upto2, upto4}                   OPTIONAL,
```

```
    bwp-DiffNumerology                  ENUMERATED {upto4}                          OPTIONAL,
    crossCarrierScheduling-SameSCS      ENUMERATED {supported}                      OPTIONAL,
    pdsch-256QAM-FR2                    ENUMERATED {supported}                      OPTIONAL,
    pusch-256QAM                        ENUMERATED {supported}                      OPTIONAL,
    ue-PowerClass                       ENUMERATED {pc1, pc2, pc3, pc4}             OPTIONAL,
    rateMatchingLTE-CRS                 ENUMERATED {supported}                      OPTIONAL,
    channelBWs-DL                       CHOICE {
        fr1                                 SEQUENCE {
            scs-15kHz                           BIT STRING (SIZE (10))                  OPTIONAL,
            scs-30kHz                           BIT STRING (SIZE (10))                  OPTIONAL,
            scs-60kHz                           BIT STRING (SIZE (10))                  OPTIONAL
        },
        fr2                                 SEQUENCE {
            scs-60kHz                           BIT STRING (SIZE (3))                   OPTIONAL,
            scs-120kHz                          BIT STRING (SIZE (3))                   OPTIONAL
        }
    }                                                                               OPTIONAL,
    channelBWs-UL                       CHOICE {
        fr1                                 SEQUENCE {
            scs-15kHz                           BIT STRING (SIZE (10))                  OPTIONAL,
            scs-30kHz                           BIT STRING (SIZE (10))                  OPTIONAL,
            scs-60kHz                           BIT STRING (SIZE (10))                  OPTIONAL
        },
        fr2                                 SEQUENCE {
            scs-60kHz                           BIT STRING (SIZE (3))                   OPTIONAL,
            scs-120kHz                          BIT STRING (SIZE (3))                   OPTIONAL
        }
    }                                                                               OPTIONAL,
    ...,
    [[
    maxUplinkDutyCycle-PC2-FR1                  ENUMERATED {n60, n70, n80, n90, n100}   OPTIONAL
    ]],
    [[
    pucch-SpatialRelInfoMAC-CE          ENUMERATED {supported}                      OPTIONAL,
    powerBoosting-pi2BPSK               ENUMERATED {supported}                      OPTIONAL
    ]],
    [[
    maxUplinkDutyCycle-FR2          ENUMERATED {n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100}     OPTIONAL
    ]],
    [[
    channelBWs-DL-v1590                 CHOICE {
        fr1                                 SEQUENCE {
            scs-15kHz                           BIT STRING (SIZE (16))              OPTIONAL,
            scs-30kHz                           BIT STRING (SIZE (16))              OPTIONAL,
            scs-60kHz                           BIT STRING (SIZE (16))              OPTIONAL
        },
        fr2                                 SEQUENCE {
            scs-60kHz                           BIT STRING (SIZE (8))               OPTIONAL,
            scs-120kHz                          BIT STRING (SIZE (8))               OPTIONAL
        }
    }                                                                               OPTIONAL,
    channelBWs-UL-v1590                 CHOICE {
        fr1                                 SEQUENCE {
            scs-15kHz                           BIT STRING (SIZE (16))              OPTIONAL,
```

```
        scs-30kHz                           BIT STRING (SIZE (16))              OPTIONAL,
        scs-60kHz                           BIT STRING (SIZE (16))              OPTIONAL
    },
    fr2                                 SEQUENCE {
        scs-60kHz                           BIT STRING (SIZE (8))               OPTIONAL,
        scs-120kHz                          BIT STRING (SIZE (8))               OPTIONAL
    }
}                                                                               OPTIONAL
]],
[[
asymmetricBandwidthCombinationSet     BIT STRING (SIZE (1..32))          OPTIONAL
]],
[[
-- R1 10: NR-unlicensed
sharedSpectrumChAccessParamsPerBand-r16 SharedSpectrumChAccessParamsPerBand-r16 OPTIONAL,
-- R1 11-7b: Independent cancellation of the overlapping PUSCHs in an intra-band UL CA
cancelOverlappingPUSCH-r16              ENUMERATED {supported}                  OPTIONAL,
-- R1 14-1: Multiple LTE-CRS rate matching patterns
multipleRateMatchingEUTRA-CRS-r16       SEQUENCE {
    maxNumberPatterns-r16               INTEGER (2..6),
    maxNumberNon-OverlapPatterns-r16    INTEGER (1..3)
}                                                                               OPTIONAL,
-- R1 14-1a: Two LTE-CRS overlapping rate matching patterns within a part of NR carrier using 15 kHz overlapping with a LTE carrier
overlapRateMatchingEUTRA-CRS-r16        ENUMERATED {supported}                  OPTIONAL,
-- R1 14-2: PDSCH Type B mapping of length 9 and 10 OFDM symbols
pdsch-MappingTypeB-Alt-r16              ENUMERATED {supported}                  OPTIONAL,
-- R1 14-3: One slot periodic TRS configuration for FR1
oneSlotPeriodicTRS-r16                  ENUMERATED {supported}                  OPTIONAL,
olpc-SRS-Pos-r16                        OLPC-SRS-Pos-r16                        OPTIONAL,
spatialRelationsSRS-Pos-r16             SpatialRelationsSRS-Pos-r16             OPTIONAL,
simulSRS-MIMO-TransWithinBand-r16       ENUMERATED {n2}                         OPTIONAL,
channelBW-DL-IAB-r16                    CHOICE {
    fr1-100mhz                              SEQUENCE {
        scs-15kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-30kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-60kHz                               ENUMERATED {supported}          OPTIONAL
    },
    fr2-200mhz                              SEQUENCE {
        scs-60kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-120kHz                              ENUMERATED {supported}          OPTIONAL
    }
}                                                                               OPTIONAL,
channelBW-UL-IAB-r16                    CHOICE {
    fr1-100mhz                              SEQUENCE {
        scs-15kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-30kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-60kHz                               ENUMERATED {supported}          OPTIONAL
    },
    fr2-200mhz                              SEQUENCE {
        scs-60kHz                               ENUMERATED {supported}          OPTIONAL,
        scs-120kHz                              ENUMERATED {supported}          OPTIONAL
    }
}                                                                               OPTIONAL,
rasterShift7dot5-IAB-r16                ENUMERATED {supported}                  OPTIONAL,
```

```
    ue-PowerClass-v1610                     ENUMERATED {pc1dot5}                    OPTIONAL,
    condHandover-r16                        ENUMERATED {supported}                  OPTIONAL,
    condHandoverFailure-r16                 ENUMERATED {supported}                  OPTIONAL,
    condHandoverTwoTriggerEvents-r16        ENUMERATED {supported}                  OPTIONAL,
    condPSCellChange-r16                    ENUMERATED {supported}                  OPTIONAL,
    condPSCellChangeTwoTriggerEvents-r16    ENUMERATED {supported}                  OPTIONAL,
    mpr-PowerBoost-FR2-r16                  ENUMERATED {supported}                  OPTIONAL,

    -- R1 11-9: Multiple active configured grant configurations for a BWP of a serving cell
    activeConfiguredGrant-r16               SEQUENCE {
    maxNumberConfigsPerBWP-r16                  ENUMERATED {n1, n2, n4, n8, n12},
    maxNumberConfigsAllCC-r16                   INTEGER (2..32)
    }                                                                               OPTIONAL,
    -- R1 11-9a: Joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell
    jointReleaseConfiguredGrantType2-r16    ENUMERATED {supported}                  OPTIONAL,
    -- R1 12-2: Multiple SPS configurations
    sps-r16                                 SEQUENCE {
    maxNumberConfigsPerBWP-r16                  INTEGER (1..8),
    maxNumberConfigsAllCC-r16                   INTEGER (2..32)
    }                                                                               OPTIONAL,
    -- R1 12-2a: Joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell
    jointReleaseSPS-r16                     ENUMERATED {supported}                  OPTIONAL,
    -- R1 13-19: Simultaneous positioning SRS and MIMO SRS transmission within a band across multiple CCs
    simulSRS-TransWithinBand-r16            ENUMERATED {n2}                         OPTIONAL,
    trs-AdditionalBandwidth-r16             ENUMERATED {trs-AddBW-Set1, trs-AddBW-Set2}  OPTIONAL,
    handoverIntraF-IAB-r16                  ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    -- R1 22-5a: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for intra-band UL CA
    -- R1 22-5c: Simultaneous transmission of SRS for antenna switching and SRS for antenna switching for intra-band UL CA
    simulTX-SRS-AntSwitchingIntraBandUL-CA-r16  SimulSRS-ForAntennaSwitching-r16        OPTIONAL,
    -- R1 10: NR-unlicensed
    sharedSpectrumChAccessParamsPerBand-v1630   SharedSpectrumChAccessParamsPerBand-v1630   OPTIONAL
    ]],
    [[
    handoverUTRA-FDD-r16                    ENUMERATED {supported}                  OPTIONAL,
    -- R4 7-4: Report the shorter transient capability supported by the UE: 2, 4 or 7us
    enhancedUL-TransientPeriod-r16          ENUMERATED {us2, us4, us7}              OPTIONAL,
    sharedSpectrumChAccessParamsPerBand-v1640 SharedSpectrumChAccessParamsPerBand-v1640    OPTIONAL
    ]],
    [[
    type1-PUSCH-RepetitionMultiSlots-v1650  ENUMERATED {supported}                  OPTIONAL,
    type2-PUSCH-RepetitionMultiSlots-v1650  ENUMERATED {supported}                  OPTIONAL,
    pusch-RepetitionMultiSlots-v1650        ENUMERATED {supported}                  OPTIONAL,
    configuredUL-GrantType1-v1650           ENUMERATED {supported}                  OPTIONAL,
    configuredUL-GrantType2-v1650           ENUMERATED {supported}                  OPTIONAL,
    sharedSpectrumChAccessParamsPerBand-v1650 SharedSpectrumChAccessParamsPerBand-v1650    OPTIONAL
    ]],
    [[
    enhancedSkipUplinkTxConfigured-v1660    ENUMERATED {supported}                  OPTIONAL,
    enhancedSkipUplinkTxDynamic-v1660       ENUMERATED {supported}                  OPTIONAL
    ]],
    [[
    maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16  ENUMERATED {n10, n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100}   OPTIONAL,
```

```
txDiversity-r16                          ENUMERATED {supported}                      OPTIONAL
]],
[[
 -- R1 36-1: Support of 1024QAM for PDSCH for FR1
pdsch-1024QAM-FR1-r17                    ENUMERATED {supported}                      OPTIONAL,
 -- R4 22-1 support of FR2 HST operation
ue-PowerClass-v1700                      ENUMERATED {pc5, pc6, pc7}                  OPTIONAL,
-- R1 24: NR extension to 71GHz (FR2-2)
fr2-2-AccessParamsPerBand-r17            FR2-2-AccessParamsPerBand-r17               OPTIONAL,
rlm-Relaxation-r17                       ENUMERATED {supported}                      OPTIONAL,
bfd-Relaxation-r17                       ENUMERATED {supported}                      OPTIONAL,
cg-SDT-r17                               ENUMERATED {supported}                      OPTIONAL,
locationBasedCondHandover-r17            ENUMERATED {supported}                      OPTIONAL,
timeBasedCondHandover-r17                ENUMERATED {supported}                      OPTIONAL,
eventA4BasedCondHandover-r17             ENUMERATED {supported}                      OPTIONAL,
mn-InitiatedCondPSCellChangeNRDC-r17     ENUMERATED {supported}                      OPTIONAL,
sn-InitiatedCondPSCellChangeNRDC-r17     ENUMERATED {supported}                      OPTIONAL,
-- R1 29-3a: PDCCH skipping
pdcch-SkippingWithoutSSSG-r17            ENUMERATED {supported}                      OPTIONAL,
-- R1 29-3b: 2 search space sets group switching
sssg-Switching-1BitInd-r17               ENUMERATED {supported}                      OPTIONAL,
-- R1 29-3c: 3 search space sets group switching
sssg-Switching-2BitInd-r17               ENUMERATED {supported}                      OPTIONAL,
-- R1 29-3d: 2 search space sets group switching with PDCCH skipping
pdcch-SkippingWithSSSG-r17               ENUMERATED {supported}                      OPTIONAL,
-- R1 29-3e: Support Search space set group switching capability 2 for FR1
searchSpaceSetGrp-switchCap2-r17         ENUMERATED {supported}                      OPTIONAL,
-- R1 26-1: Uplink Time and Frequency pre-compensation and timing relationship enhancements
uplinkPreCompensation-r17                ENUMERATED {supported}                      OPTIONAL,
-- R1 26-4: UE reporting of information related to TA pre-compensation
uplink-TA-Reporting-r17                  ENUMERATED {supported}                      OPTIONAL,
-- R1 26-5: Increasing the number of HARQ processes
max-HARQ-ProcessNumber-r17               ENUMERATED {u16d32, u32d16, u32d32}         OPTIONAL,
-- R1 26-6: Type-2 HARQ codebook enhancement
type2-HARQ-Codebook-r17                  ENUMERATED {supported}                      OPTIONAL,
-- R1 26-6a: Type-1 HARQ codebook enhancement
type1-HARQ-Codebook-r17                  ENUMERATED {supported}                      OPTIONAL,
-- R1 26-6b: Type-3 HARQ codebook enhancement
type3-HARQ-Codebook-r17                  ENUMERATED {supported}                      OPTIONAL,
-- R1 26-9: UE-specific K_offset
ue-specific-K-Offset-r17                 ENUMERATED {supported}                      OPTIONAL,
-- R1 24-1f: Multiple PDSCH scheduling by single DCI for 120kHz in FR2-1
multiPDSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported}                     OPTIONAL,
-- R1 24-1g: Multiple PUSCH scheduling by single DCI for 120kHz in FR2-1
multiPUSCH-SingleDCI-FR2-1-SCS-120kHz-r17 ENUMERATED {supported}                     OPTIONAL,
-- R4 14-4: Parallel PRS measurements in RRC_INACTIVE state, FR1/FR2 diff
parallelPRS-MeasRRC-Inactive-r17         ENUMERATED {supported}                      OPTIONAL,
-- R1 27-1-2: Support of UE-TxTEGs for UL TDOA
nr-UE-TxTEG-ID-MaxSupport-r17            ENUMERATED {n1, n2, n3, n4, n6, n8}         OPTIONAL,
-- R1 27-17: PRS processing in RRC_INACTIVE
prs-ProcessingRRC-Inactive-r17           ENUMERATED {supported}                      OPTIONAL,
-- R1 27-3-2: DL PRS measurement outside MG and in a PRS processing window
prs-ProcessingWindowType1A-r17           ENUMERATED {option1, option2, option3}      OPTIONAL,
prs-ProcessingWindowType1B-r17           ENUMERATED {option1, option2, option3}      OPTIONAL,
```

```
prs-ProcessingWindowType2-r17             ENUMERATED {option1, option2, option3}       OPTIONAL,
-- R1 27-15: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP
srs-AllPosResourcesRRC-Inactive-r17       SRS-AllPosResourcesRRC-Inactive-r17          OPTIONAL,
-- R1 27-16: OLPC for positioning SRS in RRC_INACTIVE state - gNB
olpc-SRS-PosRRC-Inactive-r17              OLPC-SRS-Pos-r16                             OPTIONAL,
-- R1 27-19: Spatial relation for positioning SRS in RRC_INACTIVE state - gNB
spatialRelationsSRS-PosRRC-Inactive-r17   SpatialRelationsSRS-Pos-r16                  OPTIONAL,
-- R1 30-1: Increased maximum number of PUSCH Type A repetitions
maxNumberPUSCH-TypeA-Repetition-r17        ENUMERATED {supported}                       OPTIONAL,
-- R1 30-2: PUSCH Type A repetitions based on available slots
puschTypeA-RepetitionsAvailSlot-r17       ENUMERATED {supported}                       OPTIONAL,
-- R1 30-3: TB processing over multi-slot PUSCH
tb-ProcessingMultiSlotPUSCH-r17           ENUMERATED {supported}                       OPTIONAL,
-- R1 30-3a: Repetition of TB processing over multi-slot PUSCH
tb-ProcessingRepMultiSlotPUSCH-r17        ENUMERATED {supported}                       OPTIONAL,
-- R1 30-4: The maximum duration for DM-RS bundling
maxDurationDMRS-Bundling-r17              SEQUENCE {
    fdd-r17                                   ENUMERATED {n4, n8, n16, n32}            OPTIONAL,
    tdd-r17                                   ENUMERATED {n2, n4, n8, n16}             OPTIONAL
}                                                                                      OPTIONAL,
-- R1 30-6: Repetition of PUSCH transmission scheduled by RAR UL grant and DCI format 0_0 with CRC scrambled by TC-RNTI
pusch-RepetitionMsg3-r17                  ENUMERATED {supported}                       OPTIONAL,
sharedSpectrumChAccessParamsPerBand-v1710 SharedSpectrumChAccessParamsPerBand-v1710    OPTIONAL,
-- R4 25-2: Parallel measurements on cells belonging to a different NGSO satellite than a serving satellite without scheduling restrictions
-- on normal operations with the serving cell
parallelMeasurementWithoutRestriction-r17 ENUMERATED {supported}                       OPTIONAL,
-- R4 25-5: Parallel measurements on multiple NGSO satellites within a SMTC
maxNumber-NGSO-SatellitesWithinOneSMTC-r17 ENUMERATED {n1, n2, n3, n4}                 OPTIONAL,
-- R1 26-10: K1 range extension
k1-RangeExtension-r17                     ENUMERATED {supported}                       OPTIONAL,
-- R1 35-1: Aperiodic CSI-RS for tracking for fast SCell activation
aperiodicCSI-RS-FastScellActivation-r17   SEQUENCE {
    maxNumberAperiodicCSI-RS-PerCC-r17        ENUMERATED {n8, n16, n32, n48, n64, n128, n255},
    maxNumberAperiodicCSI-RS-AcrossCCs-r17    ENUMERATED {n8, n16, n32, n64, n128, n256, n512, n1024}
}                                                                                      OPTIONAL,
-- R1 35-2: Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth
aperiodicCSI-RS-AdditionalBandwidth-r17   ENUMERATED {addBW-Set1, addBW-Set2}          OPTIONAL,
-- R1 28-1a: RRC-configured DL BWP without CD-SSB or NCD-SSB
bwp-WithoutCD-SSB-OrNCD-SSB-RedCap-r17    ENUMERATED {supported}                       OPTIONAL,
-- R1 28-3: Half-duplex FDD operation type A for RedCap UE
halfDuplexFDD-TypeA-RedCap-r17            ENUMERATED {supported}                       OPTIONAL,
 -- R1 27-15b: Positioning SRS transmission in RRC_INACTIVE state configured outside initial UL BWP
posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 OPTIONAL,
 -- R4 15-3 UE support of CBW for 480kHz SCS
channelBWs-DL-SCS-480kHz-FR2-2-r17        BIT STRING (SIZE (8))                        OPTIONAL,
channelBWs-UL-SCS-480kHz-FR2-2-r17        BIT STRING (SIZE (8))                        OPTIONAL,
-- R4 15-4 UE support of CBW for 960kHz SCS
channelBWs-DL-SCS-960kHz-FR2-2-r17        BIT STRING (SIZE (8))                        OPTIONAL,
channelBWs-UL-SCS-960kHz-FR2-2-r17        BIT STRING (SIZE (8))                        OPTIONAL,
-- R4 17-1 UL gap for Tx power management
ul-GapFR2-r17                             ENUMERATED {supported}                       OPTIONAL,
-- R1 25-4: One-shot HARQ ACK feedback triggered by DCI format 1_2
oneShotHARQ-feedbackTriggeredByDCI-1-2-r17 ENUMERATED {supported}                      OPTIONAL,
-- R1 25-5: PHY priority handling for one-shot HARQ ACK feedback
```

```
    oneShotHARQ-feedbackPhy-Priority-r17      ENUMERATED {supported}                        OPTIONAL,
    -- R1 25-6: Enhanced type 3 HARQ-ACK codebook feedback
    enhancedType3-HARQ-CodebookFeedback-r17   SEQUENCE {
        enhancedType3-HARQ-Codebooks-r17          ENUMERATED {n1, n2, n4, n8},
        maxNumberPUCCH-Transmissions-r17          ENUMERATED {n1, n2, n3, n4, n5, n6, n7}
    }                                                                                       OPTIONAL,
    -- R1 25-7: Triggered HARQ-ACK codebook re-transmission
    triggeredHARQ-CodebookRetx-r17              SEQUENCE {
        minHARQ-Retx-Offset-r17                   ENUMERATED {n-7, n-5, n-3, n-1, n1},
        maxHARQ-Retx-Offset-r17                   ENUMERATED {n4, n6, n8, n10, n12, n14, n16, n18, n20, n22, n24}
    }                                                                                       OPTIONAL
    ]],
    [[
    -- R4 22-2 support of one shot large UL timing adjustment
    ue-OneShotUL-TimingAdj-r17                    ENUMERATED {supported}                    OPTIONAL,
    -- R1 25-2: Repetitions for PUCCH format 0, and 2 over multiple slots with K = 2, 4, 8
    pucch-Repetition-F0-2-r17                     ENUMERATED {supported}                    OPTIONAL,
    -- R1 25-11a: 4-bits subband CQI for NTN and unlicensed
    cqi-4-BitsSubbandNTN-SharedSpectrumChAccess-r17   ENUMERATED {supported}                OPTIONAL,
    -- R1 25-16: HARQ-ACK with different priorities multiplexing on a PUCCH/PUSCH
    mux-HARQ-ACK-DiffPriorities-r17               ENUMERATED {supported}                    OPTIONAL,
    -- R1 25-20a: Propagation delay compensation based on Rel-15 TA procedure for NTN and unlicensed
    ta-BasedPDC-NTN-SharedSpectrumChAccess-r17    ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-2b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast
    ack-NACK-FeedbackForMulticastWithDCI-Enabler-r17  ENUMERATED {supported}                OPTIONAL,
    -- R1 33-2e: Multiple G-RNTIs for group-common PDSCHs
    maxNumberG-RNTI-r17                           INTEGER (2..8)                            OPTIONAL,
    -- R1 33-2f: Dynamic multicast with DCI format 4_2
    dynamicMulticastDCI-Format4-2-r17             ENUMERATED {supported}                    OPTIONAL,
    -- R1 33-2i: Supported maximal modulation order for multicast PDSCH
    maxModulationOrderForMulticast-r17            CHOICE {
        fr1-r17                                       ENUMERATED {qam256, qam1024},
        fr2-r17                                       ENUMERATED {qam64, qam256}
    }                                                                                                                   OPTIONAL,
    -- R1 33-3-1: Dynamic Slot-level repetition for group-common PDSCH for TN and licensed
    dynamicSlotRepetitionMulticastTN-NonSharedSpectrumChAccess-r17  ENUMERATED {n8, n16}                                OPTIONAL,
    -- R1 33-3-1a: Dynamic Slot-level repetition for group-common PDSCH for NTN and unlicensed
    dynamicSlotRepetitionMulticastNTN-SharedSpectrumChAccess-r17    ENUMERATED {n8, n16}                                OPTIONAL,
    -- R1 33-4-1: DCI-based enabling/disabling NACK-only based feedback for dynamic scheduling for multicast
    nack-OnlyFeedbackForMulticastWithDCI-Enabler-r17              ENUMERATED {supported}                                OPTIONAL,
    -- R1 33-5-1b: DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast
    ack-NACK-FeedbackForSPS-MulticastWithDCI-Enabler-r17          ENUMERATED {supported}                                OPTIONAL,
    -- R1 33-5-1h: Multiple G-CS-RNTIs for SPS group-common PDSCHs
    maxNumberG-CS-RNTI-r17                                        INTEGER (2..8)                                        OPTIONAL,
    -- R1 33-10: Support group-common PDSCH RE-level rate matching for multicast
    re-LevelRateMatchingForMulticast-r17                          ENUMERATED {supported}                                OPTIONAL,
     -- R1 36-1a: Support of 1024QAM for PDSCH with maximum 2 MIMO layers for FR1
    pdsch-1024QAM-2MIMO-FR1-r17                                   ENUMERATED {supported}                                OPTIONAL,
     -- R4 14-3 PRS measurement without MG
    prs-MeasurementWithoutMG-r17                                  ENUMERATED {cpLength, quarterSymbol, halfSymbol, halfSlot} OPTIONAL,
    -- R4 25-7: The number of target LEO satellites the UE can monitor per carrier
    maxNumber-LEO-SatellitesPerCarrier-r17                        INTEGER (3..4)                                        OPTIONAL,
    -- R1 27-3-3 DL PRS Processing Capability outside MG - buffering capability
    prs-ProcessingCapabilityOutsideMGinPPW-r17    SEQUENCE (SIZE(1..3)) OF PRS-ProcessingCapabilityOutsideMGinPPWperType-r17   OPTIONAL,
```

```
    -- R1 27-15a: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP with semi-persistent SRS
    srs-SemiPersistent-PosResourcesRRC-Inactive-r17                 SEQUENCE {
        maxNumOfSemiPersistentSRSposResources-r17                       ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
        maxNumOfSemiPersistentSRSposResourcesPerSlot-r17                ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
    }                                                                                                               OPTIONAL,
    -- R2: UE support of CBW for 120kHz SCS
    channelBWs-DL-SCS-120kHz-FR2-2-r17                              BIT STRING (SIZE (8))                           OPTIONAL,
    channelBWs-UL-SCS-120kHz-FR2-2-r17                              BIT STRING (SIZE (8))                           OPTIONAL
    ]],
    [[
    -- R1 30-4a: DM-RS bundling for PUSCH repetition type A
    dmrs-BundlingPUSCH-RepTypeA-r17                                 ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4b: DM-RS bundling for PUSCH repetition type B
    dmrs-BundlingPUSCH-RepTypeB-r17                                 ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4c: DM-RS bundling for TB processing over multi-slot PUSCH
    dmrs-BundlingPUSCH-multiSlot-r17                                ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4d: DMRS bundling for PUCCH repetitions
    dmrs-BundlingPUCCH-Rep-r17                                      ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4e: Enhanced inter-slot frequency hopping with inter-slot bundling for PUSCH
    interSlotFreqHopInterSlotBundlingPUSCH-r17                      ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4f: Enhanced inter-slot frequency hopping for PUCCH repetitions with DMRS bundling
    interSlotFreqHopPUCCH-r17                                       ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4g: Restart DM-RS bundling
    dmrs-BundlingRestart-r17                                        ENUMERATED {supported}                          OPTIONAL,
    -- R1 30-4h: DM-RS bundling for non-back-to-back transmission
    dmrs-BundlingNonBackToBackTX-r17                                ENUMERATED {supported}                          OPTIONAL
    ]],
    [[
    -- R1 33-5-1e: Dynamic Slot-level repetition for SPS group-common PDSCH for multicast
    maxDynamicSlotRepetitionForSPS-Multicast-r17                    ENUMERATED {n8, n16}                            OPTIONAL,
    -- R1 33-5-1g: DCI-based enabling/disabling NACK-only based feedback for SPS group-common PDSCH for multicast
    nack-OnlyFeedbackForSPS-MulticastWithDCI-Enabler-r17            ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-5-1i: Multicast SPS scheduling with DCI format 4_2
    sps-MulticastDCI-Format4-2-r17                                  ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-5-2: Multiple SPS group-common PDSCH configuration on PCell
    sps-MulticastMultiConfig-r17                                    INTEGER (1..8)                                  OPTIONAL,
    -- R1 33-6-1: DL priority indication for multicast in DCI
    priorityIndicatorInDCI-Multicast-r17                            ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-6-1a: DL priority configuration for SPS multicast
    priorityIndicatorInDCI-SPS-Multicast-r17                        ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-6-2: Two HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different priorities
    -- for unicast and multicast at a UE
    twoHARQ-ACK-CodebookForUnicastAndMulticast-r17                  ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-6-3: More than one PUCCH for HARQ-ACK transmission for multicast or for unicast and multicast within a slot
    multiPUCCH-HARQ-ACK-ForMulticastUnicast-r17                     ENUMERATED {supported}                          OPTIONAL,
    -- R1 33-9: Supporting unicast PDCCH to release SPS group-common PDSCH
    releaseSPS-MulticastWithCS-RNTI-r17                             ENUMERATED {supported}                          OPTIONAL
    ]]
}

BandNR-v16c0 ::=                                                SEQUENCE {
    pusch-RepetitionTypeA-v16c0                                     ENUMERATED {supported}                          OPTIONAL,
    ...
}
```

```
-- TAG-RF-PARAMETERS-STOP
-- ASN1STOP
```

***RF-Parameters* field descriptions**
appliedFreqBandListFilter In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10].
supportedBandCombinationList A list of band combinations that the UE supports for NR (and NR-DC, if requested). The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10].
supportedBandCombinationListSidelinkEUTRA-NR A list of band combinations that the UE supports for NR sidelink communication only, for joint NR sidelink communication and V2X sidelink communication, or for V2X sidelink communication only. The UE does not include this field if the UE capability is requested by E-UTRAN (see TS 36.331[10]) and the network request includes the field *eutra-nr-only*.
supportedBandCombinationListSL-NonRelayDiscovery A list of band combinations that the UE supports for NR sidelink non-relay discovery. The encoding is defined in PC5 *BandCombinationListSidelinkNR-r16.*
supportedBandCombinationListSL-RelayDiscovery A list of band combinations that the UE supports for NR sidelink relay discovery. The encoding is defined in PC5 *BandCombinationListSidelinkNR-r16.*
supportedBandCombinationList-UplinkTxSwitch A list of band combinations that the UE supports dynamic uplink Tx switching for NR UL CA and SUL. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10].
supportedBandListNR A list of NR bands supported by the UE. If *supportedBandListNR-v16c0* is included, the UE shall include the same number of entries, and listed in the same order, as in *supportedBandListNR* (without suffix).

– *RF-ParametersMRDC*

The IE *RF-ParametersMRDC* is used to convey RF related capabilities for MR-DC.

***RF-ParametersMRDC* information element**

```
-- ASN1START
-- TAG-RF-PARAMETERSMRDC-START

RF-ParametersMRDC ::=                   SEQUENCE {
    supportedBandCombinationList            BandCombinationList                         OPTIONAL,
    appliedFreqBandListFilter               FreqBandList                                OPTIONAL,
    ...,
    [[
    srs-SwitchingTimeRequested              ENUMERATED {true}                           OPTIONAL,
    supportedBandCombinationList-v1540      BandCombinationList-v1540                   OPTIONAL
    ]],
```

```
    [[
    supportedBandCombinationList-v1550      BandCombinationList-v1550                       OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1560      BandCombinationList-v1560                       OPTIONAL,
    supportedBandCombinationListNEDC-Only   BandCombinationList                             OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1570      BandCombinationList-v1570                       OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1580      BandCombinationList-v1580                       OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1590      BandCombinationList-v1590                       OPTIONAL
    ]],
    [[
    supportedBandCombinationListNEDC-Only-v15a0    SEQUENCE {
        supportedBandCombinationList-v1540      BandCombinationList-v1540                   OPTIONAL,
        supportedBandCombinationList-v1560      BandCombinationList-v1560                   OPTIONAL,
        supportedBandCombinationList-v1570      BandCombinationList-v1570                   OPTIONAL,
        supportedBandCombinationList-v1580      BandCombinationList-v1580                   OPTIONAL,
        supportedBandCombinationList-v1590      BandCombinationList-v1590                   OPTIONAL
    }                                                                                       OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1610      BandCombinationList-v1610                       OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1610   BandCombinationList-v1610                 OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-r16 BandCombinationList-UplinkTxSwitch-r16  OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1630                  BandCombinationList-v1630                   OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1630         BandCombinationList-v1630                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1630   BandCombinationList-UplinkTxSwitch-v1630    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1640                  BandCombinationList-v1640                   OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1640         BandCombinationList-v1640                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1640   BandCombinationList-UplinkTxSwitch-v1640    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-UplinkTxSwitch-v1670   BandCombinationList-UplinkTxSwitch-v1670    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1700                  BandCombinationList-v1700                   OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1700   BandCombinationList-UplinkTxSwitch-v1700    OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1720                  BandCombinationList-v1720                   OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1720         SEQUENCE {
        supportedBandCombinationList-v1700                  BandCombinationList-v1700               OPTIONAL,
        supportedBandCombinationList-v1720                  BandCombinationList-v1720               OPTIONAL
    }                                                                                               OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1720   BandCombinationList-UplinkTxSwitch-v1720    OPTIONAL
```

```
    ]],
    [[
    supportedBandCombinationList-v1730                  BandCombinationList-v1730                  OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1730         BandCombinationList-v1730                  OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1730   BandCombinationList-UplinkTxSwitch-v1730   OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1740                  BandCombinationList-v1740                  OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1740         BandCombinationList-v1740                  OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1740   BandCombinationList-UplinkTxSwitch-v1740   OPTIONAL
    ]],
    [[
    supportedBandCombinationList-v1770                  BandCombinationList-v1770                  OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1770   BandCombinationList-UplinkTxSwitch-v1770   OPTIONAL
    ]]
}

RF-ParametersMRDC-v15g0 ::=                     SEQUENCE {
    supportedBandCombinationList-v15g0              BandCombinationList-v15g0       OPTIONAL,
    supportedBandCombinationListNEDC-Only-v15g0     BandCombinationList-v15g0       OPTIONAL
}

RF-ParametersMRDC-v15n0 ::=                     SEQUENCE {
supportedBandCombinationList-v15n0                  BandCombinationList-v15n0                  OPTIONAL
}

RF-ParametersMRDC-v16e0 ::=                     SEQUENCE {
supportedBandCombinationList-UplinkTxSwitch-v16e0   BandCombinationList-UplinkTxSwitch-v16e0   OPTIONAL
}

-- TAG-RF-PARAMETERSMRDC-STOP
-- ASN1STOP
```

***RF-ParametersMRDC* field descriptions**
appliedFreqBandListFilter In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*.
supportedBandCombinationList A list of band combinations that the UE supports for (NG)EN-DC, or both (NG)EN-DC and NE-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE.
supportedBandCombinationListNEDC-Only, supportedBandCombinationListNEDC-Only-v1610 A list of band combinations that the UE supports only for NE-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE.
supportedBandCombinationList-UplinkTxSwitch A list of band combinations that the UE supports dynamic UL Tx switching for (NG)EN-DC. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-MRDC-Capability* IE.

– *RLC-Parameters*

The IE *RLC-Parameters* is used to convey capabilities related to RLC.

RLC-Parameters information element

```
-- ASN1START
-- TAG-RLC-PARAMETERS-START

RLC-Parameters ::= SEQUENCE {
    am-WithShortSN                  ENUMERATED {supported}  OPTIONAL,
    um-WithShortSN                  ENUMERATED {supported}  OPTIONAL,
    um-WithLongSN                   ENUMERATED {supported}  OPTIONAL,
    ...,
    [[
    extendedT-PollRetransmit-r16    ENUMERATED {supported}  OPTIONAL,
    extendedT-StatusProhibit-r16    ENUMERATED {supported}  OPTIONAL
    ]],
    [[
    am-WithLongSN-RedCap-r17        ENUMERATED {supported}  OPTIONAL
    ]]
}

-- TAG-RLC-PARAMETERS-STOP
-- ASN1STOP
```

– *SDAP-Parameters*

The IE *SDAP-Parameters* is used to convey capabilities related to SDAP.

SDAP-Parameters information element

```
-- ASN1START
-- TAG-SDAP-PARAMETERS-START

SDAP-Parameters ::= SEQUENCE {
    as-ReflectiveQoS                ENUMERATED {true}               OPTIONAL,
    ...,
    [[
    sdap-QOS-IAB-r16              ENUMERATED {supported}       OPTIONAL,
    sdapHeaderIAB-r16             ENUMERATED {supported}       OPTIONAL
    ]]

}

-- TAG-SDAP-PARAMETERS-STOP
-- ASN1STOP
```

– *SidelinkParameters*

The IE *SidelinkParameters* is used to convey capabilities related to NR and V2X sidelink communications.

SidelinkParameters information element

```
-- ASN1START
-- TAG-SIDELINKPARAMETERS-START

SidelinkParameters-r16 ::=    SEQUENCE {
    sidelinkParametersNR-r16                SidelinkParametersNR-r16                                    OPTIONAL,
    sidelinkParametersEUTRA-r16             SidelinkParametersEUTRA-r16                                 OPTIONAL
}

SidelinkParametersNR-r16 ::= SEQUENCE {
    rlc-ParametersSidelink-r16              RLC-ParametersSidelink-r16                                  OPTIONAL,
    mac-ParametersSidelink-r16              MAC-ParametersSidelink-r16                                  OPTIONAL,
    fdd-Add-UE-Sidelink-Capabilities-r16    UE-SidelinkCapabilityAddXDD-Mode-r16                        OPTIONAL,
    tdd-Add-UE-Sidelink-Capabilities-r16    UE-SidelinkCapabilityAddXDD-Mode-r16                        OPTIONAL,
    supportedBandListSidelink-r16           SEQUENCE (SIZE (1..maxBands)) OF BandSidelink-r16           OPTIONAL,
    ...,
    [[
    relayParameters-r17                     RelayParameters-r17                                         OPTIONAL
    ]],
    [[
    -- R1 32-x: Use of new P0 parameters for open loop power control
    p0-OLPC-Sidelink-r17                    ENUMERATED {supported}                                      OPTIONAL
    ]]
}

SidelinkParametersEUTRA-r16 ::= SEQUENCE {
    sl-ParametersEUTRA1-r16                 OCTET STRING                                                OPTIONAL,
    sl-ParametersEUTRA2-r16                 OCTET STRING                                                OPTIONAL,
    sl-ParametersEUTRA3-r16                 OCTET STRING                                                OPTIONAL,
    supportedBandListSidelinkEUTRA-r16      SEQUENCE (SIZE (1..maxBandsEUTRA)) OF BandSidelinkEUTRA-r16 OPTIONAL,
    ...
}

RLC-ParametersSidelink-r16 ::= SEQUENCE {
    am-WithLongSN-Sidelink-r16              ENUMERATED {supported}                                      OPTIONAL,
    um-WithLongSN-Sidelink-r16              ENUMERATED {supported}                                      OPTIONAL,
    ...
}

MAC-ParametersSidelink-r16 ::= SEQUENCE {
    mac-ParametersSidelinkCommon-r16        MAC-ParametersSidelinkCommon-r16                            OPTIONAL,
    mac-ParametersSidelinkXDD-Diff-r16      MAC-ParametersSidelinkXDD-Diff-r16                          OPTIONAL,
    ...
}

UE-SidelinkCapabilityAddXDD-Mode-r16 ::=  SEQUENCE {
    mac-ParametersSidelinkXDD-Diff-r16      MAC-ParametersSidelinkXDD-Diff-r16                          OPTIONAL
}
```

```
MAC-ParametersSidelinkCommon-r16 ::= SEQUENCE {
    lcp-RestrictionSidelink-r16             ENUMERATED {supported}                  OPTIONAL,
    multipleConfiguredGrantsSidelink-r16    ENUMERATED {supported}                  OPTIONAL,
    ...,
    [[
    drx-OnSidelink-r17                      ENUMERATED {supported}                  OPTIONAL
    ]]
}

MAC-ParametersSidelinkXDD-Diff-r16 ::=  SEQUENCE {
    multipleSR-ConfigurationsSidelink-r16   ENUMERATED {supported}                  OPTIONAL,
    logicalChannelSR-DelayTimerSidelink-r16 ENUMERATED {supported}                  OPTIONAL,
    ...
}

BandSidelinkEUTRA-r16 ::=               SEQUENCE {
    freqBandSidelinkEUTRA-r16               FreqBandIndicatorEUTRA,
    -- R1 15-7: Transmitting LTE sidelink mode 3 scheduled by NR Uu
    gnb-ScheduledMode3SidelinkEUTRA-r16     SEQUENCE {
        gnb-ScheduledMode3DelaySidelinkEUTRA-r16 ENUMERATED {ms0, ms0dot25, ms0dot5, ms0dot625, ms0dot75, ms1,
                                                             ms1dot25, ms1dot5, ms1dot75, ms2, ms2dot5, ms3, ms4,
                                                             ms5, ms6, ms8, ms10, ms20}
    }                                                                               OPTIONAL,
    -- R1 15-9: Transmitting LTE sidelink mode 4 configured by NR Uu
    gnb-ScheduledMode4SidelinkEUTRA-r16     ENUMERATED {supported}                  OPTIONAL
}

BandSidelink-r16 ::=  SEQUENCE {
    freqBandSidelink-r16                        FreqBandIndicatorNR,
    --15-1
    sl-Reception-r16                            SEQUENCE {
        harq-RxProcessSidelink-r16                  ENUMERATED {n16, n24, n32, n48, n64},
        pscch-RxSidelink-r16                        ENUMERATED {value1, value2},
        scs-CP-PatternRxSidelink-r16                CHOICE {
            fr1-r16                                     SEQUENCE {
                scs-15kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL,
                scs-30kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL,
                scs-60kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL
            },
            fr2-r16                                     SEQUENCE {
                scs-60kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL,
                scs-120kHz-r16                              BIT STRING (SIZE (16))      OPTIONAL
            }
        }                                                                               OPTIONAL,
        extendedCP-RxSidelink-r16                   ENUMERATED {supported}              OPTIONAL
    }                                                                                   OPTIONAL,
    --15-2
    sl-TransmissionMode1-r16                    SEQUENCE {
        harq-TxProcessModeOneSidelink-r16           ENUMERATED {n8, n16},
        scs-CP-PatternTxSidelinkModeOne-r16         CHOICE {
            fr1-r16                                     SEQUENCE {
                scs-15kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL,
                scs-30kHz-r16                               BIT STRING (SIZE (16))      OPTIONAL,
```

```
            scs-60kHz-r16                           BIT STRING (SIZE (16))              OPTIONAL
        },
        fr2-r16                                 SEQUENCE {
            scs-60kHz-r16                           BIT STRING (SIZE (16))              OPTIONAL,
            scs-120kHz-r16                          BIT STRING (SIZE (16))              OPTIONAL
        }
    },
    extendedCP-TxSidelink-r16                   ENUMERATED {supported}                  OPTIONAL,
    harq-ReportOnPUCCH-r16                      ENUMERATED {supported}                  OPTIONAL
}                                                                                       OPTIONAL,
--15-4
sync-Sidelink-r16                           SEQUENCE {
    gNB-Sync-r16                                ENUMERATED {supported}                  OPTIONAL,
    gNB-GNSS-UE-SyncWithPriorityOnGNB-ENB-r16   ENUMERATED {supported}                  OPTIONAL,
    gNB-GNSS-UE-SyncWithPriorityOnGNSS-r16      ENUMERATED {supported}                  OPTIONAL
}                                                                                       OPTIONAL,
--15-10
sl-Tx-256QAM-r16                            ENUMERATED {supported}                      OPTIONAL,
--15-11
psfch-FormatZeroSidelink-r16                SEQUENCE {
    psfch-RxNumber                              ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64},
    psfch-TxNumber                              ENUMERATED {n4, n8, n16}
}                                                                                       OPTIONAL,
--15-12
lowSE-64QAM-MCS-TableSidelink-r16           ENUMERATED {supported}                      OPTIONAL,
--15-15
enb-sync-Sidelink-r16                       ENUMERATED {supported}                      OPTIONAL,
...,
[[
--15-3
sl-TransmissionMode2-r16                    SEQUENCE {
    harq-TxProcessModeTwoSidelink-r16            ENUMERATED {n8, n16},
    scs-CP-PatternTxSidelinkModeTwo-r16         ENUMERATED {supported}                  OPTIONAL,
    dl-openLoopPC-Sidelink-r16                  ENUMERATED {supported}                  OPTIONAL
}                                                                                       OPTIONAL,
--15-5
congestionControlSidelink-r16               SEQUENCE {
    cbr-ReportSidelink-r16                      ENUMERATED {supported}                  OPTIONAL,
    cbr-CR-TimeLimitSidelink-r16                ENUMERATED {time1, time2}
}                                                                                       OPTIONAL,
--15-22
fewerSymbolSlotSidelink-r16                 ENUMERATED {supported}                      OPTIONAL,
--15-23
sl-openLoopPC-RSRP-ReportSidelink-r16       ENUMERATED {supported}                      OPTIONAL,
--13-1
sl-Rx-256QAM-r16                            ENUMERATED {supported}                      OPTIONAL
]],
[[
ue-PowerClassSidelink-r16                       ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}
                                                                                                                OPTIONAL
]],
[[
--32-4a
sl-TransmissionMode2-RandomResourceSelection-r17 SEQUENCE {
```

```
        harq-TxProcessModeTwoSidelink-r17             ENUMERATED {n8, n16},
        scs-CP-PatternTxSidelinkModeTwo-r17               CHOICE {
            fr1-r17                                           SEQUENCE {
                scs-15kHz-r17                                     BIT STRING (SIZE (16))          OPTIONAL,
                scs-30kHz-r17                                     BIT STRING (SIZE (16))          OPTIONAL,
                scs-60kHz-r17                                     BIT STRING (SIZE (16))          OPTIONAL
            },
            fr2-r17                                           SEQUENCE {
                scs-60kHz-r17                                     BIT STRING (SIZE (16))          OPTIONAL,
                scs-120kHz-r17                                    BIT STRING (SIZE (16))          OPTIONAL
            }
        }                                                                                         OPTIONAL,
        extendedCP-Mode2Random-r17                    ENUMERATED {supported}                      OPTIONAL,
        dl-openLoopPC-Sidelink-r17                    ENUMERATED {supported}                          OPTIONAL
    }                                                                                             OPTIONAL,
    --32-4b
    sync-Sidelink-v1710                           SEQUENCE {
        sync-GNSS-r17                                 ENUMERATED {supported}                      OPTIONAL,
        gNB-Sync-r17                                  ENUMERATED {supported}                      OPTIONAL,
        gNB-GNSS-UE-SyncWithPriorityOnGNB-ENB-r17     ENUMERATED {supported}                      OPTIONAL,
        gNB-GNSS-UE-SyncWithPriorityOnGNSS-r17        ENUMERATED {supported}                      OPTIONAL
    }                                                                                             OPTIONAL,
    --32-4c
    enb-sync-Sidelink-v1710                       ENUMERATED {supported}                          OPTIONAL,
    --32-5a-2
    rx-IUC-Scheme1-PreferredMode2Sidelink-r17     ENUMERATED {supported}                          OPTIONAL,
    --32-5a-3
    rx-IUC-Scheme1-NonPreferredMode2Sidelink-r17  ENUMERATED {supported}                          OPTIONAL,
    --32-5b-2
    rx-IUC-Scheme2-Mode2Sidelink-r17              ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
    --32-6-1
    rx-IUC-Scheme1-SCI-r17                        ENUMERATED {supported}                          OPTIONAL,
    --32-6-2
    rx-IUC-Scheme1-SCI-ExplicitReq-r17            ENUMERATED {supported}                          OPTIONAL
    ]]
}

RelayParameters-r17 ::= SEQUENCE {
    relayUE-Operation-L2-r17                      ENUMERATED {supported}                              OPTIONAL,
    remoteUE-Operation-L2-r17                     ENUMERATED {supported}                              OPTIONAL,
    remoteUE-PathSwitchToIdleInactiveRelay-r17    ENUMERATED {supported}                          OPTIONAL,
    ...
}

-- TAG-SIDELINKPARAMETERS-STOP
-- ASN1STOP
```

***SidelinkParametersEUTRA* field descriptions**
sl-ParametersEUTRA1, sl-ParametersEUTRA2, sl-ParametersEUTRA3 This field includes IE of *SL-Parameters-v1430* (where *v2x-eNB-Scheduled-r14* and *V2X-SupportedBandCombination-r14* shall not be included), *SL-Parameters-v1530* (where *V2X-SupportedBandCombination-r1530* shall not be included) and *SL-Parameters-v1540* respectively defined in 36.331 [10]. It is used for reporting the per-UE capability for V2X sidelink communication.

– *SimultaneousRxTxPerBandPair*

The IE *SimultaneousRxTxPerBandPair* contains the simultaneous Rx/Tx UE capability for each band pair in a band combination.

SimultaneousRxTxPerBandPair information element

```
-- ASN1START
-- TAG-SIMULTANEOUSRXTXPERBANDPAIR-START

SimultaneousRxTxPerBandPair ::=            BIT STRING (SIZE (3..496))

-- TAG-SIMULTANEOUSRXTXPERBANDPAIR-STOP
-- ASN1STOP
```

– *SON-Parameters*

The IE *SON-Parameters* contains SON related parameters.

SON-Parameters information element

```
-- ASN1START
-- TAG-SON-PARAMETERS-START

SON-Parameters-r16 ::= SEQUENCE {
    rach-Report-r16        ENUMERATED {supported}    OPTIONAL,
    ...,
    [[
    rlfReportCHO-r17       ENUMERATED {supported}    OPTIONAL,
    rlfReportDAPS-r17      ENUMERATED {supported}    OPTIONAL,
    success-HO-Report-r17  ENUMERATED {supported}    OPTIONAL,
    twoStepRACH-Report-r17 ENUMERATED {supported}    OPTIONAL,
    pscell-MHI-Report-r17  ENUMERATED {supported}    OPTIONAL,
    onDemandSI-Report-r17  ENUMERATED {supported}    OPTIONAL
    ]]
}

-- TAG-SON-PARAMETERS-STOP
-- ASN1STOP
```

– *SpatialRelationsSRS-Pos*

The IE *SpatialRelationsSRS-Pos* is used to convey spatial relation for SRS for positioning related parameters.

SpatialRelationsSRS-Pos information element

```
-- ASN1START
-- TAG-SPATIALRELATIONSSRS-POS-START

SpatialRelationsSRS-Pos-r16 ::=                   SEQUENCE {
    spatialRelation-SRS-PosBasedOnSSB-Serving-r16      ENUMERATED {supported}               OPTIONAL,
    spatialRelation-SRS-PosBasedOnCSI-RS-Serving-r16   ENUMERATED {supported}               OPTIONAL,
    spatialRelation-SRS-PosBasedOnPRS-Serving-r16      ENUMERATED {supported}               OPTIONAL,
    spatialRelation-SRS-PosBasedOnSRS-r16              ENUMERATED {supported}               OPTIONAL,
    spatialRelation-SRS-PosBasedOnSSB-Neigh-r16        ENUMERATED {supported}               OPTIONAL,
    spatialRelation-SRS-PosBasedOnPRS-Neigh-r16        ENUMERATED {supported}               OPTIONAL
}

--TAG-SPATIALRELATIONSSRS-POS-STOP
-- ASN1STOP
```

– *SRS-AllPosResourcesRRC-Inactive*

The IE *SRS-AllPosResourcesRRC-Inactive* is used to convey SRS positioning related parameters specific for a certain band.

SRS-AllPosResourcesRRC-Inactive information element

```
-- ASN1START
-- TAG-SRS-ALLPOSRESOURCESRRC-INACTIVE-START

SRS-AllPosResourcesRRC-Inactive-r17 ::=            SEQUENCE {
    srs-PosResourcesRRC-Inactive-r17                   SEQUENCE {
    -- R1 27-15: Positioning SRS transmission in RRC_INACTIVE state for initial UL BWP
        maxNumberSRS-PosResourceSetPerBWP-r17              ENUMERATED {n1, n2, n4, n8, n12, n16},
        maxNumberSRS-PosResourcesPerBWP-r17                ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
        maxNumberSRS-ResourcesPerBWP-PerSlot-r17           ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
        maxNumberPeriodicSRS-PosResourcesPerBWP-r17        ENUMERATED {n1, n2, n4, n8, n16, n32, n64},
        maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r17 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},
        dummy1                                             ENUMERATED {n1, n2, n4, n8, n16, n32, n64 },
        dummy2                                             ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}
    }
}

-- TAG-SRS-ALLPOSRESOURCESRRC-INACTIVE-STOP
-- ASN1STOP
```

***SRS-AllPosResourcesRRC-Inactive* field descriptions**
dummy1, dummy2
The fields are not used in the specification and the network ignores the received values.

– *SRS-SwitchingTimeNR*

The IE *SRS-SwitchingTimeNR* is used to indicate the SRS carrier switching time supported by the UE for one NR band pair.

SRS-SwitchingTimeNR information element

```
-- ASN1START
-- TAG-SRS-SWITCHINGTIMENR-START

SRS-SwitchingTimeNR ::= SEQUENCE {
    switchingTimeDL         ENUMERATED {n0us, n30us, n100us, n140us, n200us, n300us, n500us, n900us}  OPTIONAL,
    switchingTimeUL         ENUMERATED {n0us, n30us, n100us, n140us, n200us, n300us, n500us, n900us}  OPTIONAL
}

-- TAG-SRS-SWITCHINGTIMENR-STOP
-- ASN1STOP
```

– *SRS-SwitchingTimeEUTRA*

The IE *SRS-SwitchingTimeEUTRA* is used to indicate the SRS carrier switching time supported by the UE for one E-UTRA band pair.

SRS-SwitchingTimeEUTRA information element

```
-- ASN1START
-- TAG-SRS-SWITCHINGTIMEEUTRA-START

SRS-SwitchingTimeEUTRA ::= SEQUENCE {
    switchingTimeDL            ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3, n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5, n7}
                                                                                                  OPTIONAL,
    switchingTimeUL            ENUMERATED {n0, n0dot5, n1, n1dot5, n2, n2dot5, n3, n3dot5, n4, n4dot5, n5, n5dot5, n6, n6dot5, n7}
                                                                                                  OPTIONAL
}
-- TAG-SRS-SWITCHINGTIMEEUTRA-STOP
-- ASN1STOP
```

– *SupportedBandwidth*

The IE *SupportedBandwidth* is used to indicate the channel bandwidth supported by the UE on one carrier of a band of a band combination.

SupportedBandwidth information element

```
-- ASN1START
-- TAG-SUPPORTEDBANDWIDTH-START

SupportedBandwidth ::=      CHOICE {
    fr1                         ENUMERATED {mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100},
    fr2                         ENUMERATED {mhz50, mhz100, mhz200, mhz400}
}

SupportedBandwidth-v1700 ::= CHOICE {
    fr1-r17    ENUMERATED {mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz35, mhz40, mhz45, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100},
    fr2-r17    ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz800, mhz1600, mhz2000}
}

-- TAG-SUPPORTEDBANDWIDTH-STOP
-- ASN1STOP
```

– *UE-BasedPerfMeas-Parameters*

The IE *UE-BasedPerfMeas-Parameters* contains UE-based performance measurement parameters.

UE-BasedPerfMeas-Parameters information element

```
-- ASN1START
-- TAG-UE-BASEDPERFMEAS-PARAMETERS-START

UE-BasedPerfMeas-Parameters-r16 ::= SEQUENCE {
    barometerMeasReport-r16      ENUMERATED {supported}        OPTIONAL,
    immMeasBT-r16                ENUMERATED {supported}        OPTIONAL,
    immMeasWLAN-r16              ENUMERATED {supported}        OPTIONAL,
    loggedMeasBT-r16             ENUMERATED {supported}        OPTIONAL,
    loggedMeasurements-r16       ENUMERATED {supported}        OPTIONAL,
    loggedMeasWLAN-r16           ENUMERATED {supported}        OPTIONAL,
    orientationMeasReport-r16    ENUMERATED {supported}        OPTIONAL,
    speedMeasReport-r16          ENUMERATED {supported}        OPTIONAL,
    gnss-Location-r16            ENUMERATED {supported}        OPTIONAL,
    ulPDCP-Delay-r16             ENUMERATED {supported}        OPTIONAL,
    ...,
    [[
    sigBasedLogMDT-OverrideProtect-r17 ENUMERATED {supported}  OPTIONAL,
    multipleCEF-Report-r17             ENUMERATED {supported}  OPTIONAL,
    excessPacketDelay-r17              ENUMERATED {supported}  OPTIONAL,
    earlyMeasLog-r17                   ENUMERATED {supported}  OPTIONAL
    ]]
}

-- TAG-UE-BASEDPERFMEAS-PARAMETERS-STOP
-- ASN1STOP
```

– *UE-CapabilityRAT-ContainerList*

The IE *UE-CapabilityRAT-ContainerList* contains a list of radio access technology specific capability containers.

UE-CapabilityRAT-ContainerList information element

```
-- ASN1START
-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-START

UE-CapabilityRAT-ContainerList ::=    SEQUENCE (SIZE (0..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::=        SEQUENCE {
    rat-Type                              RAT-Type,
    ue-CapabilityRAT-Container            OCTET STRING
}

-- TAG-UE-CAPABILITYRAT-CONTAINERLIST-STOP
-- ASN1STOP
```

***UE-CapabilityRAT-ContainerList* field descriptions**
ue-CapabilityRAT-Container
Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT: For *rat-Type* set to *nr*: the encoding of UE capabilities is defined in *UE-NR-Capability*. For *rat-Type* set to *eutra-nr*: the encoding of UE capabilities is defined in *UE-MRDC-Capability*. For *rat-Type* set to *eutra*: the encoding of UE capabilities is defined in *UE-EUTRA-Capability* specified in TS 36.331 [10]. For *rat-Type* set to *utra-fdd*: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [45].

– *UE-CapabilityRAT-RequestList*

The IE *UE-CapabilityRAT-RequestList* is used to request UE capabilities for one or more RATs from the UE.

UE-CapabilityRAT-RequestList information element

```
-- ASN1START
-- TAG-UE-CAPABILITYRAT-REQUESTLIST-START

UE-CapabilityRAT-RequestList ::=        SEQUENCE (SIZE (1..maxRAT-CapabilityContainers)) OF UE-CapabilityRAT-Request

UE-CapabilityRAT-Request ::=            SEQUENCE {
    rat-Type                                RAT-Type,
    capabilityRequestFilter                 OCTET STRING                    OPTIONAL,   -- Need N
    ...
}

-- TAG-UE-CAPABILITYRAT-REQUESTLIST-STOP
-- ASN1STOP
```

UE-CapabilityRAT-Request field descriptions
capabilityRequestFilter Information by which the network requests the UE to filter the UE capabilities. For *rat-Type* set to *nr* or *eutra-nr*: the encoding of the *capabilityRequestFilter* is defined in *UE-CapabilityRequestFilterNR*. For *rat-Type* set to *eutra*: the encoding of the *capabilityRequestFilter* is defined by *UECapabilityEnquiry* message defined in TS36.331 [10], in which *RAT-Type* in *UE-CapabilityRequest* includes only '*eutra*'.
rat-Type The RAT type for which the NW requests UE capabilities.

– *UE-CapabilityRequestFilterCommon*

The IE *UE-CapabilityRequestFilterCommon* is used to request filtered UE capabilities. The filter is common for all capability containers that are requested.

UE-CapabilityRequestFilterCommon information element

```
-- ASN1START
-- TAG-UE-CAPABILITYREQUESTFILTERCOMMON-START

UE-CapabilityRequestFilterCommon ::=            SEQUENCE {
    mrdc-Request                                SEQUENCE {
        omitEN-DC                                   ENUMERATED {true}                   OPTIONAL,    -- Need N
        includeNR-DC                                ENUMERATED {true}                   OPTIONAL,    -- Need N
        includeNE-DC                                ENUMERATED {true}                   OPTIONAL     -- Need N
    }                                                                                   OPTIONAL,        -- Need N
    ...,
    [[
    codebookTypeRequest-r16         SEQUENCE {
        type1-SinglePanel-r16           ENUMERATED {true}                               OPTIONAL,    -- Need N
        type1-MultiPanel-r16            ENUMERATED {true}                               OPTIONAL,    -- Need N
        type2-r16                       ENUMERATED {true}                               OPTIONAL,    -- Need N
        type2-PortSelection-r16         ENUMERATED {true}                               OPTIONAL     -- Need N
    }                                                                                   OPTIONAL,    -- Need N
    uplinkTxSwitchRequest-r16       ENUMERATED {true}                                   OPTIONAL     -- Need N
    ]],
    [[
    requestedCellGrouping-r16       SEQUENCE (SIZE (1..maxCellGroupings-r16)) OF CellGrouping-r16    OPTIONAL    -- Cond NRDC
    ]],
    [[
    fallbackGroupFiveRequest-r17    ENUMERATED {true}                                   OPTIONAL     -- Need N
    ]]
}

CellGrouping-r16 ::=    SEQUENCE {
    mcg-r16                 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR,
    scg-r16                 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR,
    mode-r16                ENUMERATED {sync, async}
}

-- TAG-UE-CAPABILITYREQUESTFILTERCOMMON-STOP
-- ASN1STOP
```

UE-CapabilityRequestFilterCommon field descriptions
codebookTypeRequest Only if this field is present, the UE includes *SupportedCSI-RS-Resource* supported for the codebook type(s) requested within this field (i.e. type I single/multi-panel, type II and type II port selection) into *codebookVariantsList*, *codebookParametersPerBand* and *codebookParametersPerBC*. If this field is present and none of the codebook types is requested within this field (i.e. empty field), the UE includes *SupportedCSI-RS-Resource* supported for all codebook types into *codebookVariantsList*, *codebookParametersPerBand* and *codebookParametersPerBC*.
fallbackGroupFiveRequest Only if this field is present, the UE supporting FR2 CA bandwidth class from fallback group 5 shall include band combinations with FR2 CA bandwidth class from fallback group 5, and shall omit band combinations with FR2 CA bandwidth class from fallback group 2 or 3 (see TS 38.101-2 [39]) with same or lower capabilities.
includeNE-DC Only if this field is present, the UE supporting NE-DC shall indicate support for NE-DC in band combinations and include feature set combinations which are applicable to NE-DC. Band combinations supporting both NE-DC and (NG)EN-DC shall be included in *supportedBandCombinationList*, band combinations supporting only NE-DC shall be included in *supportedBandCombinationListNEDC-Only*.
includeNR-DC Only if this field is present, the UE supporting NR-DC shall indicate support for NR-DC in band combinations and include feature set combinations which are applicable to NR-DC.
mode The mode of NR-DC operation that the NW is interested in for this cell grouping. The value *sync* means that the UE only indicates NR-DC support for band combinations for which it supports synchronous NR-DC with the requested cell grouping. The value *async* means that the UE only indicates NR-DC support for band combinations for which it supports asynchronous NR-DC with the requested cell grouping.
omitEN-DC Only if this field is present, the UE shall omit band combinations and feature set combinations which are only applicable to (NG)EN-DC.
requestedCellGrouping The NR-DC cell groupings that the NW is interested in, i.e., the bands that it might use in an MCG and the bands that it might use in an SCG. Only if this field is present, the UE indicates NR-DC support for band combinations for which it supports the requested cell grouping, i.e., in which it supports at least one of the *mcg* bands on MCG and at least one of the *scg* bands on the SCG. In its *supportedBandCombinationList*, the UE indicates which of its NR-DC band combinations supports which of the requested cell groupings. The first element in this list is referred to by ID#0, the second by ID#1 and so on. If this field is absent, the UE only includes band combinations for which it supports NR-DC with only FR1 bands in MCG and only FR2 bands in SCG. Example 1: *requestedCellGrouping* is set to *mcg*=[n1, n7, n41, n66] and *scg*=[n78, n261]. This assumes that the NW would always use CA among n1, n7, n41 and n66 (depending on which are deployed on a given site) whereas with n78 and/or n261 the NW may need to use DC. With this filter a UE may report a band combination n1A-n7A-n78A for NR-DC only if it supports that serving cells for n1 and n7 are in the MCG and a serving cell for n78 is in the SCG. The UE may also report a band combination n41C-n261M for NR-DC provided that it supports a serving cell for n41 in the MCG and a serving cell for n261 in the SCG. Example 2: One *requestedCellGrouping* is set to *mcg*=[n1, n7, n41, n66] and s*cg*=[n78, n261] and another *requestedCellGrouping* is set to *mcg*=[n1, n7, n66] and s*cg*=[n41, n78, n261]. This assumes that the NW uses sometimes CA among n1, n7, n41 and n66 (as in example 1) and sometimes CA among n1, n7 and n66 but DC towards one or several of n41, n78, n261. If a UE supports n1A-n41A-n78A only if n41A and n78A are in the same cell group, this UE may only indicate cell grouping ID#1 (not #0) in its BC.
uplinkTxSwitchRequest Only if this field is present, the UE supporting dynamic UL Tx switching shall indicate support for UL Tx switching in band combinations which are applicable to inter-band UL CA, SUL and (NG)EN-DC.

Conditional Presence	Explanation
NRDC	The field is optionally present, Need N, if *includeNR-DC* is included. It is absent otherwise.

– *UE-CapabilityRequestFilterNR*

The IE *UE-CapabilityRequestFilterNR* is used to request filtered UE capabilities.

UE-CapabilityRequestFilterNR information element

```
-- ASN1START
-- TAG-UE-CAPABILITYREQUESTFILTERNR-START

UE-CapabilityRequestFilterNR ::=            SEQUENCE {
    frequencyBandListFilter                     FreqBandList                          OPTIONAL,   -- Need N
    nonCriticalExtension                        UE-CapabilityRequestFilterNR-v1540    OPTIONAL
}

UE-CapabilityRequestFilterNR-v1540 ::=      SEQUENCE {
    srs-SwitchingTimeRequest                    ENUMERATED {true}                     OPTIONAL,  -- Need N
    nonCriticalExtension                        UE-CapabilityRequestFilterNR-v1710    OPTIONAL
}

UE-CapabilityRequestFilterNR-v1710 ::=      SEQUENCE {
    sidelinkRequest-r17                         ENUMERATED {true}                     OPTIONAL,  -- Need N
    nonCriticalExtension                        SEQUENCE {}                           OPTIONAL
}

-- TAG-UE-CAPABILITYREQUESTFILTERNR-STOP
-- ASN1STOP
```

– *UE-MRDC-Capability*

The IE *UE-MRDC-Capability* is used to convey the UE Radio Access Capability Parameters for MR-DC, see TS 38.306 [26].

UE-MRDC-Capability information element

```
-- ASN1START
-- TAG-UE-MRDC-CAPABILITY-START

UE-MRDC-Capability ::=              SEQUENCE {
    measAndMobParametersMRDC            MeasAndMobParametersMRDC                                        OPTIONAL,
    phy-ParametersMRDC-v1530            Phy-ParametersMRDC                                              OPTIONAL,
    rf-ParametersMRDC                   RF-ParametersMRDC,
    generalParametersMRDC               GeneralParametersMRDC-XDD-Diff                                  OPTIONAL,
    fdd-Add-UE-MRDC-Capabilities        UE-MRDC-CapabilityAddXDD-Mode                                   OPTIONAL,
    tdd-Add-UE-MRDC-Capabilities        UE-MRDC-CapabilityAddXDD-Mode                                   OPTIONAL,
    fr1-Add-UE-MRDC-Capabilities        UE-MRDC-CapabilityAddFRX-Mode                                   OPTIONAL,
    fr2-Add-UE-MRDC-Capabilities        UE-MRDC-CapabilityAddFRX-Mode                                   OPTIONAL,
    featureSetCombinations              SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination   OPTIONAL,
    pdcp-ParametersMRDC-v1530           PDCP-ParametersMRDC                                             OPTIONAL,
    lateNonCriticalExtension            OCTET STRING (CONTAINING UE-MRDC-Capability-v15g0)              OPTIONAL,
    nonCriticalExtension                UE-MRDC-Capability-v1560                                        OPTIONAL
}
```

```
-- Regular non-critical extensions:
UE-MRDC-Capability-v1560 ::=        SEQUENCE {
    receivedFilters                     OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)                OPTIONAL,
    measAndMobParametersMRDC-v1560      MeasAndMobParametersMRDC-v1560                                         OPTIONAL,
    fdd-Add-UE-MRDC-Capabilities-v1560  UE-MRDC-CapabilityAddXDD-Mode-v1560                                    OPTIONAL,
    tdd-Add-UE-MRDC-Capabilities-v1560  UE-MRDC-CapabilityAddXDD-Mode-v1560                                    OPTIONAL,
    nonCriticalExtension                UE-MRDC-Capability-v1610                                               OPTIONAL
}

UE-MRDC-Capability-v1610 ::=        SEQUENCE {
    measAndMobParametersMRDC-v1610      MeasAndMobParametersMRDC-v1610                                         OPTIONAL,
    generalParametersMRDC-v1610         GeneralParametersMRDC-v1610                                            OPTIONAL,
    pdcp-ParametersMRDC-v1610           PDCP-ParametersMRDC-v1610                                              OPTIONAL,
    nonCriticalExtension                UE-MRDC-Capability-v1700                                               OPTIONAL
}

UE-MRDC-Capability-v1700 ::=        SEQUENCE {
    measAndMobParametersMRDC-v1700      MeasAndMobParametersMRDC-v1700,
    nonCriticalExtension                UE-MRDC-Capability-v1730                                               OPTIONAL
}

UE-MRDC-Capability-v1730 ::=        SEQUENCE {
    measAndMobParametersMRDC-v1730      MeasAndMobParametersMRDC-v1730                                         OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                                                            OPTIONAL
}

-- Late non-critical extensions:
UE-MRDC-Capability-v15g0 ::=        SEQUENCE {
    rf-ParametersMRDC-v15g0             RF-ParametersMRDC-v15g0                                                OPTIONAL,
    nonCriticalExtension                UE-MRDC-Capability-v15n0                                               OPTIONAL
}

UE-MRDC-Capability-v15n0 ::=        SEQUENCE {
    rf-ParametersMRDC-v15n0             RF-ParametersMRDC-v15n0                                                OPTIONAL,
-- Following field is only for REL-15 late non-critical extensions
    lateNonCriticalExtension            OCTET STRING                                                           OPTIONAL,
    nonCriticalExtension                UE-MRDC-Capability-v16e0                                               OPTIONAL
}

UE-MRDC-Capability-v16e0 ::=        SEQUENCE {
    rf-ParametersMRDC-v16e0             RF-ParametersMRDC-v16e0                                                OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                                                            OPTIONAL
}

UE-MRDC-CapabilityAddXDD-Mode ::=   SEQUENCE {
    measAndMobParametersMRDC-XDD-Diff       MeasAndMobParametersMRDC-XDD-Diff                                  OPTIONAL,
    generalParametersMRDC-XDD-Diff          GeneralParametersMRDC-XDD-Diff                                     OPTIONAL
}

UE-MRDC-CapabilityAddXDD-Mode-v1560 ::=    SEQUENCE {
    measAndMobParametersMRDC-XDD-Diff-v1560    MeasAndMobParametersMRDC-XDD-Diff-v1560                        OPTIONAL
}
```

```
UE-MRDC-CapabilityAddFRX-Mode ::=   SEQUENCE {
    measAndMobParametersMRDC-FRX-Diff       MeasAndMobParametersMRDC-FRX-Diff
}


GeneralParametersMRDC-XDD-Diff ::= SEQUENCE {
    splitSRB-WithOneUL-Path             ENUMERATED {supported}                                  OPTIONAL,
    splitDRB-withUL-Both-MCG-SCG        ENUMERATED {supported}                                  OPTIONAL,
    srb3                                ENUMERATED {supported}                                  OPTIONAL,
    dummy                               ENUMERATED {supported}                                  OPTIONAL,
    ...
}

GeneralParametersMRDC-v1610 ::= SEQUENCE {
    f1c-OverEUTRA-r16                   ENUMERATED {supported}                                  OPTIONAL
}

-- TAG-UE-MRDC-CAPABILITY-STOP
-- ASN1STOP
```

***UE-MRDC-Capability* field descriptions**
featureSetCombinations   A list of *FeatureSetCombination*:s for *supportedBandCombinationList* and *supportedBandCombinationListNEDC-Only* in *UE-MRDC-Capability*. The *FeatureSetDownlink*:s and *FeatureSetUplink*:s referred to from these *FeatureSetCombination*:s are defined in the *featureSets* list in *UE-NR-Capability*.

– *UE-NR-Capability*

The IE *UE-NR-Capability* is used to convey the NR UE Radio Access Capability Parameters, see TS 38.306 [26].

***UE-NR-Capability* information element**

```
-- ASN1START
-- TAG-UE-NR-CAPABILITY-START

UE-NR-Capability ::=            SEQUENCE {
    accessStratumRelease            AccessStratumRelease,
    pdcp-Parameters                 PDCP-Parameters,
    rlc-Parameters                  RLC-Parameters                                          OPTIONAL,
    mac-Parameters                  MAC-Parameters                                          OPTIONAL,
    phy-Parameters                  Phy-Parameters,
    rf-Parameters                   RF-Parameters,
    measAndMobParameters            MeasAndMobParameters                                    OPTIONAL,
    fdd-Add-UE-NR-Capabilities      UE-NR-CapabilityAddXDD-Mode                             OPTIONAL,
    tdd-Add-UE-NR-Capabilities      UE-NR-CapabilityAddXDD-Mode                             OPTIONAL,
    fr1-Add-UE-NR-Capabilities      UE-NR-CapabilityAddFRX-Mode                             OPTIONAL,
    fr2-Add-UE-NR-Capabilities      UE-NR-CapabilityAddFRX-Mode                             OPTIONAL,
    featureSets                     FeatureSets                                             OPTIONAL,
    featureSetCombinations          SEQUENCE (SIZE (1..maxFeatureSetCombinations)) OF FeatureSetCombination         OPTIONAL,
    lateNonCriticalExtension        OCTET STRING (CONTAINING UE-NR-Capability-v15c0)        OPTIONAL,
```

```
    nonCriticalExtension            UE-NR-Capability-v1530                                  OPTIONAL
}

-- Regular non-critical Rel-15 extensions:
UE-NR-Capability-v1530 ::=              SEQUENCE {
    fdd-Add-UE-NR-Capabilities-v1530        UE-NR-CapabilityAddXDD-Mode-v1530               OPTIONAL,
    tdd-Add-UE-NR-Capabilities-v1530        UE-NR-CapabilityAddXDD-Mode-v1530               OPTIONAL,
    dummy                                   ENUMERATED {supported}                          OPTIONAL,
    interRAT-Parameters                     InterRAT-Parameters                             OPTIONAL,
    inactiveState                           ENUMERATED {supported}                          OPTIONAL,
    delayBudgetReporting                    ENUMERATED {supported}                          OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1540                          OPTIONAL
}

UE-NR-Capability-v1540 ::=              SEQUENCE {
    sdap-Parameters                         SDAP-Parameters                                 OPTIONAL,
    overheatingInd                          ENUMERATED {supported}                          OPTIONAL,
    ims-Parameters                          IMS-Parameters                                  OPTIONAL,
    fr1-Add-UE-NR-Capabilities-v1540        UE-NR-CapabilityAddFRX-Mode-v1540               OPTIONAL,
    fr2-Add-UE-NR-Capabilities-v1540        UE-NR-CapabilityAddFRX-Mode-v1540               OPTIONAL,
    fr1-fr2-Add-UE-NR-Capabilities          UE-NR-CapabilityAddFRX-Mode                     OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1550                          OPTIONAL
}

UE-NR-Capability-v1550 ::=              SEQUENCE {
    reducedCP-Latency                       ENUMERATED {supported}                          OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1560                          OPTIONAL
}

UE-NR-Capability-v1560 ::=              SEQUENCE {
    nrdc-Parameters                         NRDC-Parameters                                 OPTIONAL,
    receivedFilters                         OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs)  OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1570                          OPTIONAL
}

UE-NR-Capability-v1570 ::=              SEQUENCE {
    nrdc-Parameters-v1570                   NRDC-Parameters-v1570                           OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1610                          OPTIONAL
}

-- Late non-critical Rel-15 extensions:
UE-NR-Capability-v15c0 ::=              SEQUENCE {
    nrdc-Parameters-v15c0                   NRDC-Parameters-v15c0                           OPTIONAL,
    partialFR2-FallbackRX-Req               ENUMERATED {true}                               OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v15g0                          OPTIONAL
}

UE-NR-Capability-v15g0 ::=              SEQUENCE {
    rf-Parameters-v15g0                     RF-Parameters-v15g0                             OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v15j0                          OPTIONAL
}

UE-NR-Capability-v15j0 ::=              SEQUENCE {
    -- Following field is only for REL-15 late non-critical extensions
```

```
    lateNonCriticalExtension                OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v16a0                          OPTIONAL
}

-- Regular non-critical Rel-16 extensions:
UE-NR-Capability-v1610 ::=              SEQUENCE {
    inDeviceCoexInd-r16                     ENUMERATED {supported}                          OPTIONAL,
    dl-DedicatedMessageSegmentation-r16     ENUMERATED {supported}                          OPTIONAL,
    nrdc-Parameters-v1610                   NRDC-Parameters-v1610                           OPTIONAL,
    powSav-Parameters-r16                   PowSav-Parameters-r16                           OPTIONAL,
    fr1-Add-UE-NR-Capabilities-v1610        UE-NR-CapabilityAddFRX-Mode-v1610               OPTIONAL,
    fr2-Add-UE-NR-Capabilities-v1610        UE-NR-CapabilityAddFRX-Mode-v1610               OPTIONAL,
    bh-RLF-Indication-r16                   ENUMERATED {supported}                          OPTIONAL,
    directSN-AdditionFirstRRC-IAB-r16       ENUMERATED {supported}                          OPTIONAL,
    bap-Parameters-r16                      BAP-Parameters-r16                              OPTIONAL,
    referenceTimeProvision-r16              ENUMERATED {supported}                          OPTIONAL,
    sidelinkParameters-r16                  SidelinkParameters-r16                          OPTIONAL,
    highSpeedParameters-r16                 HighSpeedParameters-r16                         OPTIONAL,
    mac-Parameters-v1610                    MAC-Parameters-v1610                            OPTIONAL,
    mcgRLF-RecoveryViaSCG-r16               ENUMERATED {supported}                          OPTIONAL,
    resumeWithStoredMCG-SCells-r16          ENUMERATED {supported}                          OPTIONAL,
    resumeWithStoredSCG-r16                 ENUMERATED {supported}                          OPTIONAL,
    resumeWithSCG-Config-r16                ENUMERATED {supported}                          OPTIONAL,
    ue-BasedPerfMeas-Parameters-r16         UE-BasedPerfMeas-Parameters-r16                 OPTIONAL,
    son-Parameters-r16                      SON-Parameters-r16                              OPTIONAL,
    onDemandSIB-Connected-r16               ENUMERATED {supported}                          OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1640                          OPTIONAL
}

UE-NR-Capability-v1640 ::=              SEQUENCE {
    redirectAtResumeByNAS-r16               ENUMERATED {supported}                          OPTIONAL,
    phy-ParametersSharedSpectrumChAccess-r16  Phy-ParametersSharedSpectrumChAccess-r16      OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1650                          OPTIONAL
}

UE-NR-Capability-v1650 ::=              SEQUENCE {
    mpsPriorityIndication-r16               ENUMERATED {supported}                          OPTIONAL,
    highSpeedParameters-v1650               HighSpeedParameters-v1650                       OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1690                          OPTIONAL
}

UE-NR-Capability-v1690 ::=              SEQUENCE {
    ul-RRC-Segmentation-r16                 ENUMERATED {supported}                          OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1700                          OPTIONAL
}

-- Late non-critical extensions from Rel-16 onwards:
UE-NR-Capability-v16a0 ::=              SEQUENCE {
    phy-Parameters-v16a0                    Phy-Parameters-v16a0                            OPTIONAL,
    rf-Parameters-v16a0                     RF-Parameters-v16a0                             OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v16c0                          OPTIONAL
}

UE-NR-Capability-v16c0 ::=              SEQUENCE {
```

```
    rf-Parameters-v16c0                     RF-Parameters-v16c0                                 OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v16d0                              OPTIONAL
}

UE-NR-Capability-v16d0 ::=              SEQUENCE {
    featureSets-v16d0                       FeatureSets-v16d0                                   OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                         OPTIONAL
}

-- Regular non-critical Rel-17 extensions:
UE-NR-Capability-v1700 ::=              SEQUENCE {
    inactiveStatePO-Determination-r17       ENUMERATED {supported}                              OPTIONAL,
    highSpeedParameters-v1700               HighSpeedParameters-v1700                           OPTIONAL,
    powSav-Parameters-v1700                 PowSav-Parameters-v1700                             OPTIONAL,
    mac-Parameters-v1700                    MAC-Parameters-v1700                                OPTIONAL,
    ims-Parameters-v1700                    IMS-Parameters-v1700                                OPTIONAL,
    measAndMobParameters-v1700              MeasAndMobParameters-v1700,
    appLayerMeasParameters-r17              AppLayerMeasParameters-r17                          OPTIONAL,
    redCapParameters-r17                    RedCapParameters-r17                                OPTIONAL,
    ra-SDT-r17                              ENUMERATED {supported}                              OPTIONAL,
    srb-SDT-r17                             ENUMERATED {supported}                              OPTIONAL,
    gNB-SideRTT-BasedPDC-r17                ENUMERATED {supported}                              OPTIONAL,
    bh-RLF-DetectionRecovery-Indication-r17 ENUMERATED {supported}                              OPTIONAL,
    nrdc-Parameters-v1700                   NRDC-Parameters-v1700                               OPTIONAL,
    bap-Parameters-v1700                    BAP-Parameters-v1700                                OPTIONAL,
    musim-GapPreference-r17                 ENUMERATED {supported}                              OPTIONAL,
    musimLeaveConnected-r17                 ENUMERATED {supported}                              OPTIONAL,
    mbs-Parameters-r17                      MBS-Parameters-r17,
    nonTerrestrialNetwork-r17               ENUMERATED {supported}                              OPTIONAL,
    ntn-ScenarioSupport-r17                 ENUMERATED {gso, ngso}                              OPTIONAL,
    sliceInfoforCellReselection-r17         ENUMERATED {supported}                              OPTIONAL,
    ue-RadioPagingInfo-r17                  UE-RadioPagingInfo-r17                              OPTIONAL,
    -- R4 17-2 UL gap pattern for Tx power management
    ul-GapFR2-Pattern-r17                   BIT STRING (SIZE (4))                               OPTIONAL,
    ntn-Parameters-r17                      NTN-Parameters-r17                                  OPTIONAL,
    nonCriticalExtension                    UE-NR-Capability-v1740                              OPTIONAL
}

UE-NR-Capability-v1740 ::=              SEQUENCE {
    redCapParameters-v1740                  RedCapParameters-v1740,
    nonCriticalExtension                    UE-NR-Capability-v1750                              OPTIONAL
}

UE-NR-Capability-v1750 ::=              SEQUENCE {
    crossCarrierSchedulingConfigurationRelease-r17  ENUMERATED {supported}                      OPTIONAL,
    nonCriticalExtension                            SEQUENCE {}                                 OPTIONAL
}

UE-NR-CapabilityAddXDD-Mode ::=         SEQUENCE {
    phy-ParametersXDD-Diff                  Phy-ParametersXDD-Diff                              OPTIONAL,
    mac-ParametersXDD-Diff                  MAC-ParametersXDD-Diff                              OPTIONAL,
    measAndMobParametersXDD-Diff            MeasAndMobParametersXDD-Diff                        OPTIONAL
}
```

```
UE-NR-CapabilityAddXDD-Mode-v1530 ::=    SEQUENCE {
    eutra-ParametersXDD-Diff                EUTRA-ParametersXDD-Diff
}

UE-NR-CapabilityAddFRX-Mode ::=          SEQUENCE {
    phy-ParametersFRX-Diff                  Phy-ParametersFRX-Diff                  OPTIONAL,
    measAndMobParametersFRX-Diff            MeasAndMobParametersFRX-Diff            OPTIONAL
}

UE-NR-CapabilityAddFRX-Mode-v1540 ::=    SEQUENCE {
    ims-ParametersFRX-Diff                  IMS-ParametersFRX-Diff                  OPTIONAL
}

UE-NR-CapabilityAddFRX-Mode-v1610 ::=    SEQUENCE {
    powSav-ParametersFRX-Diff-r16           PowSav-ParametersFRX-Diff-r16           OPTIONAL,
    mac-ParametersFRX-Diff-r16              MAC-ParametersFRX-Diff-r16              OPTIONAL
}

BAP-Parameters-r16 ::=                   SEQUENCE {
    flowControlBH-RLC-ChannelBased-r16      ENUMERATED {supported}                  OPTIONAL,
    flowControlRouting-ID-Based-r16         ENUMERATED {supported}                  OPTIONAL
}

BAP-Parameters-v1700 ::=                 SEQUENCE {
    bapHeaderRewriting-Rerouting-r17        ENUMERATED {supported}                  OPTIONAL,
    bapHeaderRewriting-Routing-r17          ENUMERATED {supported}                  OPTIONAL
}

MBS-Parameters-r17 ::=                   SEQUENCE {
    maxMRB-Add-r17                          INTEGER (1..16)                         OPTIONAL
}

-- TAG-UE-NR-CAPABILITY-STOP
-- ASN1STOP
```

***UE-NR-Capability* field descriptions**
featureSetCombinations A list of *FeatureSetCombination:s* for *supportedBandCombinationList* in *UE-NR-Capability*. The *FeatureSetDownlink:s* and *FeatureSetUplink:s* referred to from these *FeatureSetCombination:s* are defined in the *featureSets* list in *UE-NR-Capability*.

UE-NR-Capability-v1540 field descriptions
fr1-fr2-Add-UE-NR-Capabilities This instance of *UE-NR-CapabilityAddFRX-Mode* does not include any other fields than *csi-RS-IM-ReceptionForFeedback*/ *csi-RS-ProcFrameworkForSRS*/ *csi-ReportFramework*.

– *UE-RadioPagingInfo*

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

UE-RadioPagingInfo information element

```
-- ASN1START
-- TAG-UE-RADIOPAGINGINFO-START

UE-RadioPagingInfo-r17 ::=            SEQUENCE {
    -- R1 29-1: Paging enhancement
    pei-SubgroupingSupportBandList-r17    SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR    OPTIONAL,
    ...
}

-- TAG-UE-RADIOPAGINGINFO-STOP
-- ASN1STOP
```

– *SharedSpectrumChAccessParamsPerBand*

The IE *SharedSpectrumChAccessParamsPerBand* is used to convey shared channel access related parameters specific for a certain frequency band (not per feature set or band combination).

SharedSpectrumChAccessParamsPerBand information element

```
-- ASN1START
-- TAG-SHAREDSPECTRUMCHACCESSPARAMSPERBAND-START

SharedSpectrumChAccessParamsPerBand-r16 ::=          SEQUENCE {

    -- R1 10-1: UL channel access for dynamic channel access mode
    ul-DynamicChAccess-r16                           ENUMERATED {supported}           OPTIONAL,
    -- R1 10-1a: UL channel access for semi-static channel access mode
    ul-Semi-StaticChAccess-r16                       ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2: SSB-based RRM for dynamic channel access mode
    ssb-RRM-DynamicChAccess-r16                      ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2a: SSB-based RRM for semi-static channel access mode
    ssb-RRM-Semi-StaticChAccess-r16                  ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2b: MIB reading on unlicensed cell
    mib-Acquisition-r16                              ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2c: SSB-based RLM for dynamic channel access mode
    ssb-RLM-DynamicChAccess-r16                      ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2d: SSB-based RLM for semi-static channel access mode
    ssb-RLM-Semi-StaticChAccess-r16                  ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2e: SIB1 reception on unlicensed cell
    sib1-Acquisition-r16                             ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2f: Support monitoring of extended RAR window
    extRA-ResponseWindow-r16                         ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2g: SSB-based BFD/CBD for dynamic channel access mode
    ssb-BFD-CBD-dynamicChannelAccess-r16             ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2h: SSB-based BFD/CBD for semi-static channel access mode
    ssb-BFD-CBD-semi-staticChannelAccess-r16         ENUMERATED {supported}           OPTIONAL,
    -- R1 10-2i: CSI-RS-based BFD/CBD for NR-U
    csi-RS-BFD-CBD-r16                               ENUMERATED {supported}           OPTIONAL,
```

```
        -- R1 10-7: UL channel access for 10 MHz SCell
        ul-ChannelBW-SCell-10mhz-r16                    ENUMERATED {supported}          OPTIONAL,
        -- R1 10-10: RSSI and channel occupancy measurement and reporting
        rssi-ChannelOccupancyReporting-r16              ENUMERATED {supported}          OPTIONAL,
        -- R1 10-11:SRS starting position at any OFDM symbol in a slot
        srs-StartAnyOFDM-Symbol-r16                     ENUMERATED {supported}          OPTIONAL,
        -- R1 10-20: Support search space set configuration with freqMonitorLocation-r16
        searchSpaceFreqMonitorLocation-r16              INTEGER (1..5)                  OPTIONAL,
        -- R1 10-20a: Support coreset configuration with rb-Offset
        coreset-RB-Offset-r16                           ENUMERATED {supported}          OPTIONAL,
        -- R1 10-23:CGI reading on unlicensed cell for ANR functionality
        cgi-Acquisition-r16                             ENUMERATED {supported}          OPTIONAL,
        -- R1 10-25: Enable configured UL transmissions when DCI 2_0 is configured but not detected
        configuredUL-Tx-r16                              ENUMERATED {supported}          OPTIONAL,
        -- R1 10-27: Wideband PRACH
        prach-Wideband-r16                              ENUMERATED {supported}          OPTIONAL,
        -- R1 10-29: Support available RB set indicator field in DCI 2_0
        dci-AvailableRB-Set-r16                         ENUMERATED {supported}          OPTIONAL,
        -- R1 10-30: Support channel occupancy duration indicator field in DCI 2_0
        dci-ChOccupancyDuration-r16                     ENUMERATED {supported}          OPTIONAL,
        -- R1 10-8: Type B PDSCH length {3, 5, 6, 8, 9, 10, 11, 12, 13} without DMRS shift due to CRS collision
        typeB-PDSCH-length-r16                          ENUMERATED {supported}          OPTIONAL,
        -- R1 10-9: Search space set group switching with explicit DCI 2_0 bit field trigger or with implicit PDCCH decoding with DCI 2_0 monitoring
        searchSpaceSwitchWithDCI-r16                    ENUMERATED {supported}          OPTIONAL,
        -- R1 10-9b: Search space set group switching with implicit PDCCH decoding without DCI 2_0 monitoring
        searchSpaceSwitchWithoutDCI-r16                 ENUMERATED {supported}          OPTIONAL,
        -- R1 10-9d: Support Search space set group switching capability 2
        searchSpaceSwitchCapability2-r16                ENUMERATED {supported}          OPTIONAL,
        -- R1 10-14: Non-numerical PDSCH to HARQ-ACK timing
        non-numericalPDSCH-HARQ-timing-r16              ENUMERATED {supported}          OPTIONAL,
        -- R1 10-15: Enhanced dynamic HARQ codebook
        enhancedDynamicHARQ-codebook-r16                ENUMERATED {supported}          OPTIONAL,
        -- R1 10-16: One-shot HARQ ACK feedback
        oneShotHARQ-feedback-r16                        ENUMERATED {supported}          OPTIONAL,
        -- R1 10-17: Multi-PUSCH UL grant
        multiPUSCH-UL-grant-r16                         ENUMERATED {supported}          OPTIONAL,
        -- R1 10-26: CSI-RS based RLM for NR-U
        csi-RS-RLM-r16                                  ENUMERATED {supported}          OPTIONAL,
        dummy                                          ENUMERATED {supported}          OPTIONAL,
        -- R1 10-31: Support of P/SP-CSI-RS reception with CSI-RS-ValidationWith-DCI-r16 configured
        periodicAndSemi-PersistentCSI-RS-r16            ENUMERATED {supported}          OPTIONAL,
        -- R1 10-3: PRB interlace mapping for PUSCH
        pusch-PRB-interlace-r16                         ENUMERATED {supported}          OPTIONAL,
        -- R1 10-3a: PRB interlace mapping for PUCCH
        pucch-F0-F1-PRB-Interlace-r16                   ENUMERATED {supported}          OPTIONAL,
        -- R1 10-12: OCC for PRB interlace mapping for PF2 and PF3
        occ-PRB-PF2-PF3-r16                             ENUMERATED {supported}          OPTIONAL,
        -- R1 10-13a: Extended CP range of more than one symbol for CG-PUSCH
        extCP-rangeCG-PUSCH-r16                         ENUMERATED {supported}          OPTIONAL,
        -- R1 10-18: Configured grant with retransmission in CG resources
        configuredGrantWithReTx-r16                     ENUMERATED {supported}          OPTIONAL,
        -- R1 10-21a: Support using ED threshold given by gNB for UL to DL COT sharing
        ed-Threshold-r16                                ENUMERATED {supported}          OPTIONAL,
        -- R1 10-21b: Support UL to DL COT sharing
```

```
    ul-DL-COT-Sharing-r16                           ENUMERATED {supported}          OPTIONAL,
    -- R1 10-24: CG-UCI multiplexing with HARQ ACK
    mux-CG-UCI-HARQ-ACK-r16                         ENUMERATED {supported}          OPTIONAL,
    -- R1 10-28: Configured grant with Rel-16 enhanced resource configuration
    cg-resourceConfig-r16                           ENUMERATED {supported}          OPTIONAL
}

SharedSpectrumChAccessParamsPerBand-v1630 ::=       SEQUENCE {
    -- R4 4-1: DL reception in intra-carrier guardband
    dl-ReceptionIntraCellGuardband-r16              ENUMERATED {supported}          OPTIONAL,
    -- R4 4-2: DL reception when gNB does not transmit on all RB sets of a carrier as a result of LBT
    dl-ReceptionLBT-subsetRB-r16                    ENUMERATED {supported}          OPTIONAL
}

SharedSpectrumChAccessParamsPerBand-v1640 ::=       SEQUENCE {
    -- 10-26b(1-4): CSI-RS based RRM measurement with associated SS-block
    csi-RSRP-AndRSRQ-MeasWithSSB-r16                ENUMERATED {supported}          OPTIONAL,
    -- 10-26c(1-5): CSI-RS based RRM measurement without associated SS-block
    csi-RSRP-AndRSRQ-MeasWithoutSSB-r16             ENUMERATED {supported}          OPTIONAL,
    -- 10-26d(1-6): CSI-RS based RS-SINR measurement
    csi-SINR-Meas-r16                               ENUMERATED {supported}          OPTIONAL,
    -- 10-26e(1-8): RLM based on a mix of SS block and CSI-RS signals within active BWP
    ssb-AndCSI-RS-RLM-r16                           ENUMERATED {supported}          OPTIONAL,
    -- 10-26f(1-9): CSI-RS based contention free RA for HO
    csi-RS-CFRA-ForHO-r16                           ENUMERATED {supported}          OPTIONAL
}

SharedSpectrumChAccessParamsPerBand-v1650 ::=       SEQUENCE {
    -- Extension of R1 10-9 capability to configure up to 16 instead of 4 cells or cell groups, respectively
    extendedSearchSpaceSwitchWithDCI-r16            ENUMERATED {supported}          OPTIONAL
}

SharedSpectrumChAccessParamsPerBand-v1710 ::=    SEQUENCE {
    -- R1 25-12: UE initiated semi-static channel occupancy with dependent configurations
    ul-Semi-StaticChAccessDependentConfig-r17       ENUMERATED {supported}          OPTIONAL,
    -- R1 25-13: UE initiated semi-static channel occupancy with independent configurations
    ul-Semi-StaticChAccessIndependentConfig-r17     ENUMERATED {supported}          OPTIONAL
}

-- TAG-SHAREDSPECTRUMCHACCESSPARAMSPERBAND-STOP
-- ASN1STOP
```

6.3.4 Other information elements

– *AbsoluteTimeInfo*

The IE *AbsoluteTimeInfo* indicates an absolute time in a format YY-MM-DD HH:MM:SS and using BCD encoding. The first/ leftmost bit of the bit string contains the most significant bit of the most significant digit of the year and so on.

AbsoluteTimeInfo information element

```
-- ASN1START
-- TAG-ABSOLUTETIMEINFO-START

AbsoluteTimeInfo-r16 ::= BIT STRING (SIZE (48))

-- TAG-ABSOLUTETIMEINFO-STOP
-- ASN1STOP
```

– *AppLayerMeasConfig*

The IE *AppLayerMeasConfig* indicates configuration of application layer measurements.

AppLayerMeasConfig information element

```
-- ASN1START
-- TAG-APPLAYERMEASCONFIG-START

AppLayerMeasConfig-r17 ::=          SEQUENCE {
    measConfigAppLayerToAddModList-r17   SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasConfigAppLayer-r17     OPTIONAL, -- Need N
    measConfigAppLayerToReleaseList-r17  SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasConfigAppLayerId-r17   OPTIONAL, -- Need N
    rrc-SegAllowed-r17                   ENUMERATED {enabled}                                                       OPTIONAL, -- Need R
    ...
}

MeasConfigAppLayer-r17 ::=          SEQUENCE {
    measConfigAppLayerId-r17             MeasConfigAppLayerId-r17,
    measConfigAppLayerContainer-r17      OCTET STRING (SIZE (1..8000))                                              OPTIONAL, -- Need N
    serviceType-r17                      ENUMERATED {streaming, mtsi, vr, spare5, spare4, spare3, spare2, spare1}   OPTIONAL, -- Need M
    pauseReporting-r17                   BOOLEAN                                                                    OPTIONAL, -- Need M
    transmissionOfSessionStartStop-r17   BOOLEAN                                                                    OPTIONAL, -- Need M
    ran-VisibleParameters-r17            SetupRelease {RAN-VisibleParameters-r17}                                   OPTIONAL, -- Cond ServiceType
    ...
}

RAN-VisibleParameters-r17 ::=       SEQUENCE {
    ran-VisiblePeriodicity-r17           ENUMERATED {ms120, ms240, ms480, ms640, ms1024}                            OPTIONAL, -- Need S
    numberOfBufferLevelEntries-r17       INTEGER (1..8)                                                             OPTIONAL, -- Need R
    reportPlayoutDelayForMediaStartup-r17 BOOLEAN                                                                   OPTIONAL, -- Need M
    ...
```

```
}

-- TAG-APPLAYERMEASCONFIG-STOP
-- ASN1STOP
```

***AppLayerMeasConfig* field descriptions**
measConfigAppLayerContainer The field contains configuration of application layer measurements, see Annex L (normative) in TS 26.247 [68], clause 16.5 in TS 26.114 [69] and TS 26.118 [70].
pauseReporting The field indicates whether the transmission of *measReportAppLayerContainer* is paused or not. Value *true* indicates the transmission of *measReportAppLayerContainer* is paused; value *false* indicates the transmission of *measReportAppLayerContainer* is not paused.
ran-VisibleParameters The field indicates whether RAN visible application layer measurements shall be reported or not.
rrc-SegAllowed This field indicates that RRC segmentation of *MeasurementReportAppLayer* is enabled. It may be present only if the UE supports RRC segmentation of the *MeasurementReportAppLayer* message in UL**.**
serviceType Indicates the type of application layer measurement. Value *streaming* indicates Quality of Experience Measurement Collection for streaming services (see TS 26.247 [68]), value *mtsi* indicates Quality of Experience Measurement Collection for MTSI (see TS 26.114 [69]) and value *vr* indicates Quality of Experience Measurement Collection for VR service (see TS 26.118 [70]). The network always configures *serviceType* when application layer measurements are initially configured and at *fullConfig*.
transmissionOfSessionStartStop Value *true* indicates that the UE shall transmit indications when the measurement session in the application layer starts and stops. Value *false* indicates that the UE shall not transmit any session status indications. The UE transmits a session start indication upon configuration of this field set to value *true* if a session already has started in the application layer.

***RAN-VisibleParameters* field descriptions**
numberOfBufferLevelEntries The field contains the maximum number of buffer level entries that can be reported for RAN visible application layer measurements. This field is also used by application layer to calculate the interval of RAN visible buffer level measurement, which is equal to the periodicity of RAN visible application layer measurements reporting divided by *numberOfBufferLevelEntries*.
ran-VisiblePeriodicity The field indicates the periodicity of RAN visible application layer measurements reporting. Value *ms120* indicates 120 ms, value *ms240* indicates 240 ms and so on. If this field is absent, the periodicity of RAN visible application layer measurements reporting is the same as the reporting periodicity indicated in *measConfigAppLayerContainer.*
reportPlayoutDelayForMediaStartup The field indicates whether the UE shall report Playout Delay for Media Startup for RAN visible application layer measurements.

Conditional Presence	Explanation
ServiceType	This field is optionally present, Need M, when *serviceType* is set to *streaming* or *vr*. Otherwise, it is absent.

– *AreaConfiguration*

The *AreaConfiguration* indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in *plmn-IdentityList* stored in *VarLogMeasReport*.

AreaConfiguration information element

```
-- ASN1START
-- TAG-AREACONFIGURATION-START

AreaConfiguration-r16 ::=        SEQUENCE {
    areaConfig-r16                   AreaConfig-r16,
    interFreqTargetList-r16          SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16              OPTIONAL  -- Need R
}

AreaConfiguration-r17 ::=      SEQUENCE {
    areaConfig-r17                   AreaConfig-r16                                                      OPTIONAL, -- Need R
    interFreqTargetList-r17          SEQUENCE(SIZE (1..maxFreq)) OF InterFreqTargetInfo-r16              OPTIONAL  -- Need R
}

AreaConfig-r16 ::=     CHOICE {
    cellGlobalIdList-r16             CellGlobalIdList-r16,
    trackingAreaCodeList-r16         TrackingAreaCodeList-r16,
    trackingAreaIdentityList-r16     TrackingAreaIdentityList-r16
}

InterFreqTargetInfo-r16    ::=   SEQUENCE {
    dl-CarrierFreq-r16               ARFCN-ValueNR,
    cellList-r16                     SEQUENCE (SIZE (1..32)) OF  PhysCellId  OPTIONAL      -- Need R
}

CellGlobalIdList-r16 ::=         SEQUENCE (SIZE (1..32)) OF CGI-Info-Logging-r16

TrackingAreaCodeList-r16 ::=     SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

TrackingAreaIdentityList-r16 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaIdentity-r16

TrackingAreaIdentity-r16 ::=     SEQUENCE {
    plmn-Identity-r16                PLMN-Identity,
    trackingAreaCode-r16             TrackingAreaCode
}

-- TAG-AREACONFIGURATION-STOP
-- ASN1STOP
```

AreaConfiguration field descriptions
InterFreqTargetInfo   If configured, it indicates the neighbouring frequency and cells for which UE is requested to perform measurement logging. It can include sync raster or non-sync raster frequencies.

– *BT-NameList*

The IE *BT-NameList* is used to indicate the names of the Bluetooth beacon which the UE is configured to measure.

BT-NameList information element

```
-- ASN1START
-- TAG-BTNAMELIST-START

BT-NameList-r16 ::=               SEQUENCE (SIZE (1..maxBT-Name-r16)) OF BT-Name-r16

BT-Name-r16 ::=                   OCTET STRING (SIZE (1..248))

-- TAG-BTNAMELIST-STOP
-- ASN1STOP
```

***BT-NameList* field descriptions**
bt-Name   If configured, the UE only performs Bluetooth measurements according to the names identified. For each name, it refers to LOCAL NAME defined in Bluetooth specification [51].

– *DedicatedInfoF1c*

The IE *DedicatedInfoF1c* is used to transfer IAB-DU specific F1-C related information between the network and the IAB node. The carried information consists of F1AP message encapsulated in SCTP/IP or F1-C related (SCTP)/IP packet, see TS 38.472 [64]. The RRC layer is transparent for this information.

DedicatedInfoF1c information element

```
-- ASN1START
-- TAG-DEDICATEDINFOF1C-START

DedicatedInfoF1c-r17 ::=        OCTET STRING

-- TAG-DEDICATEDINFOF1C-STOP
-- ASN1STOP
```

– *EUTRA-AllowedMeasBandwidth*

The IE *EUTRA-AllowedMeasBandwidth* is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" in TS 36.104 [33]. The values *mbw6*, *mbw15*, *mbw25*, *mbw50*, *mbw75*, *mbw100* indicate 6, 15, 25, 50, 75 and 100 resource blocks, respectively.

EUTRA-AllowedMeasBandwidth information element

```
-- ASN1START
-- TAG-EUTRA-ALLOWEDMEASBANDWIDTH-START

EUTRA-AllowedMeasBandwidth ::=              ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}

-- TAG-EUTRA-ALLOWEDMEASBANDWIDTH-STOP
-- ASN1STOP
```

– *EUTRA-MBSFN-SubframeConfigList*

The IE *EUTRA-MBSFN-SubframeConfigList* is used to define an E-UTRA MBSFN subframe pattern (for the purpose of NR rate matching).

EUTRA-MBSFN-SubframeConfigList information element

```
-- ASN1START
-- TAG-EUTRA-MBSFN-SUBFRAMECONFIGLIST-START

EUTRA-MBSFN-SubframeConfigList ::= SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF EUTRA-MBSFN-SubframeConfig

EUTRA-MBSFN-SubframeConfig ::=      SEQUENCE {
    radioframeAllocationPeriod          ENUMERATED {n1, n2, n4, n8, n16, n32},
    radioframeAllocationOffset          INTEGER (0..7),
    subframeAllocation1                 CHOICE {
        oneFrame                            BIT STRING (SIZE(6)),
        fourFrames                          BIT STRING (SIZE(24))
    },
    subframeAllocation2                 CHOICE {
        oneFrame                            BIT STRING (SIZE(2)),
        fourFrames                          BIT STRING (SIZE(8))
    }                                                                                   OPTIONAL,   -- Need R
    ...
}

-- TAG-EUTRA-MBSFN-SUBFRAMECONFIGLIST-STOP
-- ASN1STOP
```

***EUTRA-MBSFN-SubframeConfig* field descriptions**
radioframeAllocationOffset Field as defined in *MBSFN-SubframeConfig* in TS 36.331 [10].
radioframeAllocationPeriod Field as defined in *MBSFN-SubframeConfig* in TS 36.331 [10], where *SFN* refers to the SFN of the NR serving cell.
subframeAllocation1 Field as defined in *MBSFN-SubframeConfig* in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the *E-UTRA-MBSFN-SubframeConfig* is provided.
subframeAllocation2 Field as defined in *MBSFN-SubframeConfig-v1430* in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the *E-UTRA-MBSFN-SubframeConfig* is provided.

– *EUTRA-MultiBandInfoList*

The IE *EUTRA-MultiBandInfoList* indicates the list of frequency bands in addition to the band represented by *CarrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission*.

EUTRA-MultiBandInfoList information element

```
-- ASN1START
-- TAG-EUTRA-MULTIBANDINFOLIST-START

EUTRA-MultiBandInfoList ::=     SEQUENCE (SIZE (1..maxMultiBands)) OF EUTRA-MultiBandInfo

EUTRA-MultiBandInfo ::=         SEQUENCE {
    eutra-FreqBandIndicator         FreqBandIndicatorEUTRA,
    eutra-NS-PmaxList               EUTRA-NS-PmaxList                       OPTIONAL    -- Need R
}

-- TAG-EUTRA-MULTIBANDINFOLIST-STOP
-- ASN1STOP
```

– *EUTRA-NS-PmaxList*

The IE *EUTRA-NS-PmaxList* concerns a list of *additionalPmax* and *additionalSpectrumEmission*, as defined in TS 36.101 [22], table 6.2.4-1 for UEs neither in CE nor BL UEs and TS 36.101 [22], table 6.2.4E-1 for UEs in CE or BL UEs, for a given frequency band.

EUTRA-NS-PmaxList information element

```
-- ASN1START
-- TAG-EUTRA-NS-PMAXLIST-START

EUTRA-NS-PmaxList ::=               SEQUENCE (SIZE (1..maxEUTRA-NS-Pmax)) OF EUTRA-NS-PmaxValue

EUTRA-NS-PmaxValue ::=              SEQUENCE {
```

```
    additionalPmax                  INTEGER (-30..33)                   OPTIONAL,   -- Need R
    additionalSpectrumEmission      INTEGER (1..288)                    OPTIONAL    -- Need R
}

-- TAG-EUTRA-NS-PMAXLIST-STOP
-- ASN1STOP
```

– *EUTRA-PhysCellId*

The IE *EUTRA-PhysCellId* is used to indicate the physical layer identity of the cell, as defined in TS 36.211 [31].

EUTRA-PhysCellId information element

```
-- ASN1START
-- TAG-EUTRA-PHYSCELLID-START

EUTRA-PhysCellId ::=                INTEGER (0..503)

-- TAG-EUTRA-PHYSCELLID-STOP
-- ASN1STOP
```

– *EUTRA-PhysCellIdRange*

The IE *EUTRA-PhysCellIdRange* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *EUTRA-PhysCellIdRange*, NW may configure overlapping ranges of physical cell identities.

EUTRA-PhysCellIdRange information element

```
-- ASN1START
-- TAG-EUTRA-PHYSCELLIDRANGE-START

EUTRA-PhysCellIdRange ::=       SEQUENCE {
    start                           EUTRA-PhysCellId,
    range                           ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64, n84, n96,
                                                n128, n168, n252, n504, spare2, spare1}                 OPTIONAL    -- Need N
}

-- TAG-EUTRA-PHYSCELLIDRANGE-STOP
-- ASN1STOP
```

– *EUTRA-PresenceAntennaPort1*

The IE *EUTRA-PresenceAntennaPort1* is used to indicate whether all the neighbouring cells use Antenna Port 1. When set to *true*, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.

EUTRA-PresenceAntennaPort1 information element

```
-- ASN1START
-- TAG-EUTRA-PRESENCEANTENNAPORT1-START

EUTRA-PresenceAntennaPort1 ::=              BOOLEAN

-- TAG-EUTRA-PRESENCEANTENNAPORT1-STOP
-- ASN1STOP
```

– *EUTRA-Q-OffsetRange*

The IE *EUTRA-Q-OffsetRange* is used to indicate a cell, or frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB. Value *dB-24* corresponds to -24 dB, value *dB-22* corresponds to -22 dB and so on.

EUTRA-Q-OffsetRange information element

```
-- ASN1START
-- TAG-EUTRA-Q-OFFSETRANGE-START

EUTRA-Q-OffsetRange ::=                     ENUMERATED {
                                                dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
                                                dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
                                                dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
                                                dB6, dB8, dB10, dB12, dB14, dB16, dB18,
                                                dB20, dB22, dB24}

-- TAG-EUTRA-Q-OFFSETRANGE-STOP
-- ASN1STOP
```

– *IAB-IP-Address*

The IE *IAB-IP-Address* is used to indicate the IP address/prefix.

IAB-IP-Address information element

```
-- ASN1START
-- TAG-IABIPADDRESS-START

IAB-IP-Address-r16 ::=  CHOICE {
    iPv4-Address-r16                BIT STRING (SIZE(32)),
```

```
    iPv6-Address-r16                BIT STRING (SIZE(128)),
    iPv6-Prefix-r16                 BIT STRING (SIZE(64)),
    ...
}

-- TAG-IABIPADDRESS-STOP
-- ASN1STOP
```

***IAB-IP-Address* field descriptions**
iPv4-Address   This field is used to provide the allocated IPv4 address.
iPv6-Address   This field is used to provide the allocated IPv6 address.
iPv6-Prefix   This field is used to provide the allocated IPv6 prefix.

– *IAB-IP-AddressIndex*

The IE *IAB-IP-AddressIndex* is used to identify a configuration of an IP address.

IAB-IP-AddressIndex information element

```
-- ASN1START
-- TAG-IABIPADDRESSINDEX-START

IAB-IP-AddressIndex-r16 ::= INTEGER (1..maxIAB-IP-Address-r16)

-- TAG-IABIPADDRESSINDEX-STOP
-- ASN1STOP
```

– *IAB-IP-Usage*

The IE *IAB-IP-Usage* is used to indicate the usage of the assigned IP address/prefix.

IAB-IP-Usage information element

```
-- ASN1START
-- TAG-IAB-IP-USAGE-START

IAB-IP-Usage-r16 ::= ENUMERATED {f1-C, f1-U, non-F1, spare}

-- TAG-IAB-IP-USAGE-STOP
-- ASN1STOP
```

– *LoggingDuration*

The *LoggingDuration* indicates the duration for which UE is requested to perform measurement logging. Value min10 corresponds to 10 minutes, value min20 corresponds to 20 minutes and so on.

LoggingDuration information element

```
-- ASN1START
-- TAG-LOGGINGDURATION-START

LoggingDuration-r16 ::=   ENUMERATED {
                              min10, min20, min40, min60, min90, min120, spare2, spare1}

-- TAG-LOGGINGDURATION-STOP
-- ASN1STOP
```

– *LoggingInterval*

The *LoggingInterval* indicates the periodicity for logging measurement results. Value ms1280 corresponds to 1.28s, value ms2560 corresponds to 2.56s and so on. Value infinity means it is equal to the configured value of the *LoggingDuration* IE.

LoggingInterval information element

```
-- ASN1START
-- TAG-LOGGINGINTERVAL-START

LoggingInterval-r16 ::=   ENUMERATED {
                              ms320, ms640, ms1280, ms2560, ms5120, ms10240, ms20480,
                              ms30720, ms40960, ms61440 , infinity}

-- TAG-LOGGINGINTERVAL-STOP
-- ASN1STOP
```

– *LogMeasResultListBT*

The IE *LogMeasResultListBT* covers measured results for Bluetooth.

LogMeasResultListBT information element

```
-- ASN1START
-- TAG-LOGMEASRESULTLISTBT-START

LogMeasResultListBT-r16 ::= SEQUENCE (SIZE (1..maxBT-IdReport-r16)) OF LogMeasResultBT-r16

LogMeasResultBT-r16 ::= SEQUENCE {
    bt-Addr-r16             BIT STRING (SIZE (48)),
```

```
    rssi-BT-r16             INTEGER (-128..127)       OPTIONAL,
    ...
}

-- TAG-LOGMEASRESULTLISTBT-STOP
-- ASN1STOP
```

***LogMeasResultListBT* field descriptions**
bt-Addr This field indicates the Bluetooth public address of the Bluetooth beacon as defined in TS 37.355 [49].
rssi-BT This field provides the beacon received signal strength indicator (RSSI) in dBm as defined in TS 37.355 [49].

– *LogMeasResultListWLAN*

The IE *LogMeasResultListWLAN* covers measured results for WLAN.

LogMeasResultListWLAN information element

```
-- ASN1START
-- TAG-LOGMEASRESULTLISTWLAN-START

LogMeasResultListWLAN-r16 ::=    SEQUENCE (SIZE (1..maxWLAN-Id-Report-r16)) OF LogMeasResultWLAN-r16

LogMeasResultWLAN-r16 ::=        SEQUENCE {
    wlan-Identifiers-r16             WLAN-Identifiers-r16,
    rssiWLAN-r16                     WLAN-RSSI-Range-r16          OPTIONAL,
    rtt-WLAN-r16                     WLAN-RTT-r16                 OPTIONAL,
    ...
}

WLAN-Identifiers-r16 ::=         SEQUENCE {
    ssid-r16                         OCTET STRING (SIZE (1..32))  OPTIONAL,
    bssid-r16                        OCTET STRING (SIZE (6))      OPTIONAL,
    hessid-r16                       OCTET STRING (SIZE (6))      OPTIONAL,
    ...
}

WLAN-RSSI-Range-r16 ::= INTEGER(0..141)

WLAN-RTT-r16 ::=                 SEQUENCE {
    rttValue-r16                     INTEGER (0..16777215),
    rttUnits-r16                     ENUMERATED {
                                         microseconds,
                                         hundredsofnanoseconds,
                                         tensofnanoseconds,
                                         nanoseconds,
                                         tenthsofnanoseconds,
                                         ...},
```

```
    rttAccuracy-r16                 INTEGER (0..255)            OPTIONAL,
    ...
}

-- TAG-LOGMEASRESULTLISTWLAN-STOP
-- ASN1STOP
```

***LogMeasResultListWLAN* field descriptions**
Bssid   Basic Service Set Identifier (BSSID) defined in IEEE 802.11-2012 [50].
Hessid   Homogenous Extended Service Set Identifier (HESSID) defined in IEEE 802.11-2012 [50].
rssiWLAN   Measured WLAN RSSI result in dBm. The IE WLAN-RSSI-Range specifies the value range used in WLAN RSSI measurements and thresholds. Integer value for WLAN RSSI measurements is according to mapping table in TS 36.133 [40]. Value 0 corresponds to –infinity, value 1 to -100dBm, value 2 to -99dBm, and so on (i.e. in steps of 1dBm) until value 140, which corresponds to 39dBm, while value 141 corresponds to +infinity.
rtt-WLAN   This field provides the measured roundtrip time between the target device and WLAN AP and optionally the accuracy expressed as the standard deviation of the delay. Units for each of these are 1000ns, 100ns, 10ns, 1ns, and 0.1ns as defined in TS 37.355 [49].
rttValue   This field specifies the Round Trip Time (RTT) measurement between the target device and WLAN AP in units given by the field rttUnits as defined in TS 37.355 [49].
rttUnits   This field specifies the Units for the fields rttValue and rttAccuracy. The available Units are 1000ns, 100ns, 10ns, 1ns, and 0.1ns as defined in TS 37.355 [49].
rttAccuracy   This field provides the estimated accuracy of the provided rttValue expressed as the standard deviation in units given by the field rttUnits as defined in TS 37.355 [49].
Ssid   Service Set Identifier (SSID) defined in IEEE 802.11-2012 [50].
Wlan-Identifiers   Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.

– *MeasConfigAppLayerId*

The IE *MeasConfigAppLayerId* identifies the application layer measurement.

***MeasConfigAppLayerId* information element**

```
-- ASN1START
-- TAG-MEASCONFIGAPPLAYERID-START

MeasConfigAppLayerId-r17 ::= INTEGER (0..maxNrofAppLayerMeas-1-r17)

-- TAG-MEASCONFIGAPPLAYERID-STOP
-- ASN1STOP
```

– *OtherConfig*

The IE *OtherConfig* contains configuration related to miscellaneous other configurations.

OtherConfig information element

```
-- ASN1START
-- TAG-OTHERCONFIG-START

OtherConfig ::=                 SEQUENCE {
    delayBudgetReportingConfig  CHOICE{
        release                 NULL,
        setup                   SEQUENCE{
            delayBudgetReportingProhibitTimer   ENUMERATED {s0, s0dot4, s0dot8, s1dot6, s3, s6, s12, s30}
        }
    }                                                                                   OPTIONAL        -- Need M
}

OtherConfig-v1540 ::=           SEQUENCE {
    overheatingAssistanceConfig     SetupRelease {OverheatingAssistanceConfig}          OPTIONAL, -- Need M
    ...
}

OtherConfig-v1610 ::=                   SEQUENCE {
    idc-AssistanceConfig-r16                SetupRelease {IDC-AssistanceConfig-r16}                 OPTIONAL, -- Need M
    drx-PreferenceConfig-r16                SetupRelease {DRX-PreferenceConfig-r16}                 OPTIONAL, -- Need M
    maxBW-PreferenceConfig-r16              SetupRelease {MaxBW-PreferenceConfig-r16}               OPTIONAL, -- Need M
    maxCC-PreferenceConfig-r16              SetupRelease {MaxCC-PreferenceConfig-r16}               OPTIONAL, -- Need M
    maxMIMO-LayerPreferenceConfig-r16       SetupRelease {MaxMIMO-LayerPreferenceConfig-r16}        OPTIONAL, -- Need M
    minSchedulingOffsetPreferenceConfig-r16 SetupRelease {MinSchedulingOffsetPreferenceConfig-r16}  OPTIONAL, -- Need M
    releasePreferenceConfig-r16             SetupRelease {ReleasePreferenceConfig-r16}              OPTIONAL, -- Need M
    referenceTimePreferenceReporting-r16    ENUMERATED {true}                                       OPTIONAL, -- Need R
    btNameList-r16                          SetupRelease {BT-NameList-r16}                          OPTIONAL, -- Need M
    wlanNameList-r16                        SetupRelease {WLAN-NameList-r16}                        OPTIONAL, -- Need M
    sensorNameList-r16                      SetupRelease {Sensor-NameList-r16}                      OPTIONAL, -- Need M
    obtainCommonLocation-r16                ENUMERATED {true}                                       OPTIONAL, -- Need R
    sl-AssistanceConfigNR-r16               ENUMERATED{true}                                        OPTIONAL  -- Need R
}

OtherConfig-v1700 ::=                   SEQUENCE {
    ul-GapFR2-PreferenceConfig-r17          ENUMERATED {true}                                       OPTIONAL, -- Need R
    musim-GapAssistanceConfig-r17           SetupRelease {MUSIM-GapAssistanceConfig-r17}            OPTIONAL, -- Need M
    musim-LeaveAssistanceConfig-r17         SetupRelease {MUSIM-LeaveAssistanceConfig-r17}          OPTIONAL, -- Need M
    successHO-Config-r17                    SetupRelease {SuccessHO-Config-r17}                     OPTIONAL, -- Need M
    maxBW-PreferenceConfigFR2-2-r17         ENUMERATED {true}                                       OPTIONAL, -- Cond maxBW
    maxMIMO-LayerPreferenceConfigFR2-2-r17  ENUMERATED {true}                                       OPTIONAL, -- Cond maxMIMO
    minSchedulingOffsetPreferenceConfigExt-r17  ENUMERATED {true}                                   OPTIONAL, -- Cond minOffset
    rlm-RelaxationReportingConfig-r17       SetupRelease {RLM-RelaxationReportingConfig-r17}        OPTIONAL, -- Need M
    bfd-RelaxationReportingConfig-r17       SetupRelease {BFD-RelaxationReportingConfig-r17}        OPTIONAL, -- Need M
    scg-DeactivationPreferenceConfig-r17    SetupRelease {SCG-DeactivationPreferenceConfig-r17}     OPTIONAL, -- Cond SCG
    rrm-MeasRelaxationReportingConfig-r17   SetupRelease {RRM-MeasRelaxationReportingConfig-r17}    OPTIONAL, -- Need M
    propDelayDiffReportConfig-r17           SetupRelease {PropDelayDiffReportConfig-r17}            OPTIONAL  -- Need M
}
```

```
CandidateServingFreqListNR-r16 ::= SEQUENCE (SIZE (1..maxFreqIDC-r16)) OF ARFCN-ValueNR

MUSIM-GapAssistanceConfig-r17 ::= SEQUENCE {
    musim-GapProhibitTimer-r17        ENUMERATED {s0, s0dot1, s0dot2, s0dot3, s0dot4, s0dot5, s1, s2, s3, s4, s5, s6, s7, s8, s9, s10}
}

MUSIM-LeaveAssistanceConfig-r17 ::=     SEQUENCE {
    musim-LeaveWithoutResponseTimer-r17     ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, spare2, spare1}
}

SuccessHO-Config-r17 ::=                SEQUENCE {
    thresholdPercentageT304-r17             ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}      OPTIONAL, --Need R
    thresholdPercentageT310-r17             ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}      OPTIONAL, --Need R
    thresholdPercentageT312-r17             ENUMERATED {p20, p40, p60, p80, spare4, spare3, spare2, spare1}         OPTIONAL, --Need R
    sourceDAPS-FailureReporting-r17         ENUMERATED {true}                                                       OPTIONAL, --Need R
    ...
}

OverheatingAssistanceConfig ::= SEQUENCE {
    overheatingIndicationProhibitTimer    ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                          s60, s90, s120, s300, s600, spare3, spare2, spare1}
}

IDC-AssistanceConfig-r16 ::=    SEQUENCE {
    candidateServingFreqListNR-r16  CandidateServingFreqListNR-r16                  OPTIONAL, -- Need R
    ...
}

DRX-PreferenceConfig-r16 ::=          SEQUENCE {
    drx-PreferenceProhibitTimer-r16       ENUMERATED {
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
}

MaxBW-PreferenceConfig-r16 ::=        SEQUENCE {
    maxBW-PreferenceProhibitTimer-r16     ENUMERATED {
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
}

MaxCC-PreferenceConfig-r16 ::=        SEQUENCE {
    maxCC-PreferenceProhibitTimer-r16     ENUMERATED {
                                              s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                              s8, s9, s10, s20, s30, spare2, spare1}
}

MaxMIMO-LayerPreferenceConfig-r16 ::= SEQUENCE {
    maxMIMO-LayerPreferenceProhibitTimer-r16 ENUMERATED {
                                                 s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                                 s8, s9, s10, s20, s30, spare2, spare1}
}

MinSchedulingOffsetPreferenceConfig-r16 ::=   SEQUENCE {
```

```
    minSchedulingOffsetPreferenceProhibitTimer-r16 ENUMERATED {
                                                s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                                s8, s9, s10, s20, s30, spare2, spare1}
}

ReleasePreferenceConfig-r16 ::=       SEQUENCE {
    releasePreferenceProhibitTimer-r16    ENUMERATED {
                                            s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
                                            s8, s9, s10, s20, s30, infinity, spare1},
    connectedReporting                    ENUMERATED {true}                                         OPTIONAL  -- Need R
}

RLM-RelaxationReportingConfig-r17 ::= SEQUENCE {
    rlm-RelaxtionReportingProhibitTimer   ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                          s60, s90, s120, s300, s600, infinity, spare2, spare1}
}

BFD-RelaxationReportingConfig-r17 ::= SEQUENCE {
    bfd-RelaxtionReportingProhibitTimer   ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                          s60, s90, s120, s300, s600, infinity, spare2, spare1}
}

SCG-DeactivationPreferenceConfig-r17 ::=       SEQUENCE {
    scg-DeactivationPreferenceProhibitTimer-r17    ENUMERATED {
                                                s0, s1, s2, s4, s8, s10, s15, s30,
                                                s60, s120, s180, s240, s300, s600, s900, s1800}
}

RRM-MeasRelaxationReportingConfig-r17 ::= SEQUENCE {
    s-SearchDeltaP-Stationary-r17             ENUMERATED {dB2, dB3, dB6, dB9, dB12, dB15, spare2, spare1},
    t-SearchDeltaP-Stationary-r17             ENUMERATED {s5, s10, s20, s30, s60, s120, s180, s240, s300, spare7, spare6, spare5,
                                                          spare4, spare3, spare2, spare1}
}

PropDelayDiffReportConfig-r17 ::= SEQUENCE {
    threshPropDelayDiff-r17           ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5, ms6 ,ms7, ms8, ms9, ms10, spare5,
                                                  spare4, spare3, spare2, spare1}               OPTIONAL,   -- Need M
    neighCellInfoList-r17             SEQUENCE (SIZE (1..maxCellNTN-r17)) OF NeighbourCellInfo-r17        OPTIONAL    -- Need M
}

NeighbourCellInfo-r17  ::= SEQUENCE {
epochTime-r17                 EpochTime-r17,
ephemerisInfo-r17             EphemerisInfo-r17
}

-- TAG-OTHERCONFIG-STOP
-- ASN1STOP
```

***OtherConfig* field descriptions**
bfd-RelaxationReportingConfig Configuration for the UE to report the relaxation state of BFD measurements.
btNameList Configuration for the UE to report measurements from specific Bluetooth beacons. NG-RAN configures the field if *includeBT-Meas* is configured for one or more measurements.
candidateServingFreqListNR Indicates for each candidate NR serving cells, the center frequency around which UE is requested to report IDC issues.
connectedReporting Indicates that the UE can report a preference to remain in RRC_CONNECTED state following a report to leave RRC_CONNECTED state. If absent, the UE cannot report a preference to stay in RRC_CONNECTED state.
delayBudgetReportingProhibitTimer Prohibit timer for delay budget reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot4* means prohibit timer is set to 0.4 seconds, and so on.
drx-PreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's DRX preferences for power saving.
drx-PreferenceProhibitTimer Prohibit timer for DRX preferences assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.
idc-AssistanceConfig Configuration for the UE to report assistance information to inform the gNB about UE detected IDC problem.
maxBW-PreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving.
maxBW-PreferenceProhibitTimer Prohibit timer for preferred bandwidth assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.
maxCC-PreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of carriers for power saving.
maxBW-PreferenceConfigFR2-2 Configuration for the UE to report assistance information to inform the gNB about the UE's preferred bandwidth for power saving for FR2-2.
maxCC-PreferenceProhibitTimer Prohibit timer for preferred number of carriers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.
maxMIMO-LayerPreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving.
maxMIMO-LayerPreferenceConfigFR2-2 Configuration for the UE to report assistance information to inform the gNB about the UE's preferred number of MIMO layers for power saving for FR2-2.
maxMIMO-LayerPreferenceProhibitTimer Prohibit timer for preferred number of number of MIMO layers assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.
minSchedulingOffsetPreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving.
minSchedulingOffsetPreferenceConfigExt Configuration for the UE to report assistance information to inform the gNB about the UE's preferred *minimumSchedulingOffset* value for cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.
minSchedulingOffsetPreferenceProhibitTimer Prohibit timer for preferred *minimumSchedulingOffset* assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.

musim-GapAssistanceConfig Configuration for the UE to report assistance information for gap preference.
musim-GapProhibitTimer Prohibit timer for MUSIM assistance information reporting for gap preference.
musim-LeaveAssistanceConfig Configuration for the UE to report assistance information for leaving RRC_CONNECTED for MUSIM purpose.
musim-LeaveWithoutResponseTimer Indicates the timer for the UE to enter RRC_IDLE for MUSIM purpose as defined in clause 5.3.8.6.
obtainCommonLocation Requests the UE to attempt to have detailed location information available using GNSS. NR configures the field if *includeCommonLocationInfo* is configured for one or more measurements.
overheatingAssistanceConfig Configuration for the UE to report assistance information to inform the gNB about UE detected internal overheating.
overheatingIndicationProhibitTimer Prohibit timer for overheating assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on.
propDelayDiffReportConfig Configuration for the UE to report service link propagation delay difference between serving cell and neighbour cell(s).
referenceTimePreferenceReporting If present, the field indicates the UE is configured to provide reference time assistance information.
releasePreferenceConfig Configuration for the UE to report assistance information to inform the gNB about the UE's preference to leave RRC_CONNECTED state.
rlm-RelaxationReportingConfig Configuration for the UE to report the relaxation state of RLM measurements.
releasePreferenceProhibitTimer Prohibit timer for release preference assistance information reporting. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s0dot5* means prohibit timer is set to 0.5 seconds, value *s1* means prohibit timer is set to 1 second and so on. Value *infinity* means that once a UE has reported a release preference, the UE cannot report a release preference again during the RRC connection.
s-SearchDeltaP-Stationary Parameter "$S_{SearchDeltaP\text{-}StationaryConnected}$" in 5.7.4.4. Value dB2 corresponds to 2 dB, dB3 corresponds to 3 dB and so on.
scg-DeactivationPreferenceConfig Configuration of the UE to indicate its preference for SCG deactivation.
scg -StatePreferenceProhibitTimer Prohibit timer for UE indication of its preference for SCG deactivation. Value in seconds. Value *s0* means prohibit timer is set to 0 seconds, value *s1* means prohibit timer is set to 1 second and so on.
sensorNameList Configuration for the UE to report measurements from specific sensors. NG-RAN configures the field if *includeSensor-Meas* is configured for one or more measurements.
sl-AssistanceConfigNR Indicate whether UE is configured to provide configured grant assistance information for NR sidelink communication.
sourceDAPS-FailureReporting This field indicates whether the UE shall generate the SHR upon successfully completing the DAPS handover to the target cell and if a radio link failure was experienced in the source PCell while executing the DAPS handover. This field is set in the *otherConfig* configured by the source cell of the DAPS handover.
successHO-Config Configuration for the UE to report the successful handover information to the network.
t-SearchDeltaP-Stationary Parameter "$T_{SearchDeltaP\text{-}StationaryConnected}$" in 5.7.4.4. Value in seconds. Value s5 means 5 seconds, value s10 means 10 seconds and so on.

thresholdPercentageT304 This field indicates the threshold for the ratio in percentage between the elapsed T304 timer and the configured value of the T304 timer. Value *p40* corresponds to 40%, value *p60* corresponds to 60% and so on. This field is set in the *otherConfig* configured by the target cell of the handover.
thresholdPercentageT310 This field indicates the threshold for the ratio in percentage between the elapsed T310 timer and the configured value of the T310 timer. Value *p40* corresponds to 40%, value *p60* corresponds to 60% and so on. This field is set in the *otherConfig* configured by the source cell of the handover.
thresholdPercentageT312 This field indicates the threshold for the ratio in percentage between the elapsed T312 timer and the configured value(s) of the T312 timer. Value *p20* corresponds to 20%, value *p40* corresponds to 40% and so on. This field is set in the *otherConfig* configured by the source cell of the handover.
threshPropDelayDiff Threshold for one-way service link propagation delay difference report as specified in 5.7.4.2.
ul-GapFR2-PreferenceConfig Indicates whether UE is configured to request for FR2 UL gap activation/deactivation and preferred FR2 UL gap pattern.
wlanNameList Configuration for the UE to report measurements from specific WLAN APs. NG-RAN configures the field if *includeWLAN-Meas* is configured for one or more measurements.

***NeighbourCellInfo* field descriptions**
epochTime Indicates the epoch time used along with the *ephemerisInfo* to derive the propagation delay difference for the associated neighbour cell. The UE considers epoch time, indicated by the SFN and sub-frame number in this field, to be the frame nearest to the frame in which the message indicating the epoch time is received. This field is used based on the timing of the serving cell, i.e. the SFN and sub-frame number indicated in this field refers to the SFN and sub-frame of the serving cell.

Conditional Presence	Explanation
maxBW	This field is optionally present, need R, if *maxBW-PreferenceConfig-r16* is setup; otherwise it is absent, need R.
maxMIMO	This field is optionally present, need R, if *maxMIMO-LayerPreferenceConfig-r16* is setup; otherwise it is absent, need R.
minOffset	This field is optionally present, need R, if *minSchedulingOffsetPreferenceConfig-r16* is setup; otherwise it is absent, need R.
SCG	This field is optionally present, need M, in an *RRCReconfiguration* message not within *mrdc-SecondaryCellGroup* and received, either via SRB3 within *DLInformationTransferMRDC* or via SRB1. Otherwise, it is absent.

– *PhysCellIdUTRA-FDD*

The IE *PhysCellIdUTRA-FDD* is used to indicate the physical layer identity of the cell, i.e. the primary scrambling code, as defined in TS 25.331 [45].

PhysCellIdUTRA-FDD information element

```
-- ASN1START
-- TAG-PHYSCELLIDUTRA-FDD-START

PhysCellIdUTRA-FDD-r16 ::=        INTEGER (0..511)

-- TAG-PHYSCELLIDUTRA-FDD-STOP
-- ASN1STOP
```

– *RRC-TransactionIdentifier*

The IE *RRC-TransactionIdentifier* is used, together with the message type, for the identification of an RRC procedure (transaction).

RRC-TransactionIdentifier information element

```
-- ASN1START
-- TAG-RRC-TRANSACTIONIDENTIFIER-START

RRC-TransactionIdentifier ::=       INTEGER (0..3)

-- TAG-RRC-TRANSACTIONIDENTIFIER-STOP
-- ASN1STOP
```

– *Sensor-NameList*

The IE *Sensor-NameList* is used to indicate the names of the sensors which the UE is configured to measure.

Sensor-NameList information element

```
-- ASN1START
-- TAG-SENSORNAMELIST-START

Sensor-NameList-r16 ::= SEQUENCE {
    measUncomBarPre-r16     ENUMERATED {true}           OPTIONAL,  -- Need R
    measUeSpeed             ENUMERATED {true}           OPTIONAL,  -- Need R
    measUeOrientation       ENUMERATED {true}           OPTIONAL   -- Need R
}

-- TAG-SENSORNAMELIST-STOP
-- ASN1STOP
```

***Sensor-NameList* field descriptions**
measUncomBarPre If configured, the UE reports the uncompensated Barometric pressure measurement as defined in TS 37.355 [49].
measUeSpeed If configured, the UE reports the UE speed measurement as defined in TS 37.355 [49].
measUeOrientation If configured, the UE reports the UE orientation information as defined in TS 37.355 [49].

– *TraceReference*

The *TraceReference* contains parameter Trace Reference as defined in TS 32.422 [52].

TraceReference information element

```
-- ASN1START
-- TAG-TRACEREFERENCE-START

TraceReference-r16 ::= SEQUENCE {
    plmn-Identity-r16      PLMN-Identity,
    traceId-r16            OCTET STRING (SIZE (3))
}

-- TAG-TRACEREFERENCE-STOP
-- ASN1STOP
```

– *UE-MeasurementsAvailable*

The IE *UE-MeasurementsAvailable* is used to indicate all relevant available indicators for UE measurements.

UE-MeasurementsAvailable information element

```
-- ASN1START
-- TAG-UE-MeasurementsAvailable-START

UE-MeasurementsAvailable-r16 ::=             SEQUENCE {
    logMeasAvailable-r16                        ENUMERATED {true}              OPTIONAL,
    logMeasAvailableBT-r16                      ENUMERATED {true}              OPTIONAL,
    logMeasAvailableWLAN-r16                    ENUMERATED {true}              OPTIONAL,
    connEstFailInfoAvailable-r16                ENUMERATED {true}              OPTIONAL,
    rlf-InfoAvailable-r16                       ENUMERATED {true}              OPTIONAL,
    ...,
    [[
    successHO-InfoAvailable-r17                 ENUMERATED {true}              OPTIONAL,
    sigLogMeasConfigAvailable-r17               BOOLEAN                        OPTIONAL
    ]]
}

-- TAG-UE-MeasurementsAvailable-STOP
-- ASN1STOP
```

– *UTRA-FDD-Q-OffsetRange*

The IE *UTRA-FDD-Q-OffsetRange* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value is in dB. Value *dB-24* corresponds to -24 dB, value *dB-22* corresponds to -22 dB and so on.

***UTRA-FDD-Q-OffsetRange* information element**

```
-- ASN1START
-- TAG-UTRA-FDD-Q-OFFSETRANGE-START

UTRA-FDD-Q-OffsetRange-r16 ::=              ENUMERATED {
                                                dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
                                                dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
                                                dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
                                                dB6, dB8, dB10, dB12, dB14, dB16, dB18,
                                                dB20, dB22, dB24}

-- TAG-UTRA-FDD-Q-OFFSETRANGE-STOP
-- ASN1STOP
```

– *VisitedCellInfoList*

The IE *VisitedCellInfoList* includes the mobility history information of maximum of 16 most recently visited primary cells or time spent in any cell selection state and/or camped on any cell state in NR or E-UTRA and, in case of Dual Connectivity, the mobility history information of *maxPSCellHistory* most recently visited primary secondary cell group cells across all the primary cells included in the *VisitedCellInfoList*. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE, RRC_INACTIVE and RRC_CONNECTED states for NR and RRC_IDLE and RRC_CONNECTED for E-UTRA.

***VisitedCellInfoList* information element**

```
-- ASN1START
-- TAG-VISITEDCELLINFOLIST-START

VisitedCellInfoList-r16 ::= SEQUENCE (SIZE (1..maxCellHistory-r16)) OF VisitedCellInfo-r16

VisitedCellInfo-r16 ::=  SEQUENCE {
    visitedCellId-r16        CHOICE {
        nr-CellId-r16            CHOICE {
            cgi-Info                CGI-Info-Logging-r16,
            pci-arfcn-r16           PCI-ARFCN-NR-r16
        },
        eutra-CellId-r16         CHOICE {
            cellGlobalId-r16        CGI-InfoEUTRA,
            pci-arfcn-r16               PCI-ARFCN-EUTRA-r16
        }
    }                                       OPTIONAL,
    timeSpent-r16            INTEGER (0..4095),
    ...,
    [[
    visitedPSCellInfoListReport-r17    VisitedPSCellInfoList-r17                  OPTIONAL
    ]]
}

VisitedPSCellInfoList-r17 ::= SEQUENCE (SIZE (1..maxPSCellHistory-r17)) OF VisitedPSCellInfo-r17

VisitedPSCellInfo-r17 ::=    SEQUENCE {
```

```
    visitedCellId-r17           CHOICE {
        nr-CellId-r17               CHOICE {
            cgi-Info-r17                CGI-Info-Logging-r16,
            pci-arfcn-r17               PCI-ARFCN-NR-r16
        },
        eutra-CellId-r17        CHOICE {
            cellGlobalId-r17        CGI-InfoEUTRALogging,
            pci-arfcn-r17           PCI-ARFCN-EUTRA-r16
        }
    }                                                   OPTIONAL,
    timeSpent-r17           INTEGER (0..4095),
    ...
}

-- TAG-VISITEDCELLINFOLIST-STOP
-- ASN1STOP
```

***VisitedCellInfoList* field descriptions**
timeSpent   This field indicates the duration of stay in the cell or in any cell selection state and/or camped on any cell state in NR or E-UTRA approximated to the closest second. If included in *VisitedPSCellInfo*, it indicates the duration of stay in the PSCell or without any PSCell. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.
visitedCellId   This field indicates the visited cell id including NR and E-UTRA cells.

– *WLAN-NameList*

The IE *WLAN-NameList* is used to indicate the names of the WLAN AP for which the UE is configured to measure.

WLAN-NameList information element

```
-- ASN1START
-- TAG-WLANNAMELIST-START

WLAN-NameList-r16 ::= SEQUENCE (SIZE (1..maxWLAN-Name-r16)) OF WLAN-Name-r16

WLAN-Name-r16 ::= OCTET STRING (SIZE (1..32))

-- ASN1STOP
-- TAG-WLANNAMELIST-STOP
```

***WLAN-NameList* field descriptions**
WLAN-Name   If configured, the UE only performs WLAN measurements according to the names identified. For each name, it refers to Service Set Identifier (SSID) defined in IEEE 802.11-2012 [50].

6.3.5 Sidelink information elements

– *SL-BWP-Config*

The IE *SL-BWP-Config* is used to configure the UE specific NR sidelink communication/discovery on one particular sidelink bandwidth part.

SL-BWP-Config information element

```
-- ASN1START
-- TAG-SL-BWP-CONFIG-START

SL-BWP-Config-r16 ::=                   SEQUENCE {
    sl-BWP-Id                               BWP-Id,
    sl-BWP-Generic-r16                      SL-BWP-Generic-r16                                  OPTIONAL,    -- Need M
    sl-BWP-PoolConfig-r16                   SL-BWP-PoolConfig-r16                               OPTIONAL,    -- Need M
    ...,
    [[
    sl-BWP-PoolConfigPS-r17             SetupRelease {SL-BWP-PoolConfig-r16}                    OPTIONAL,    -- Need M
    sl-BWP-DiscPoolConfig-r17           SetupRelease {SL-BWP-DiscPoolConfig-r17}                OPTIONAL     -- Need M
    ]]
}

SL-BWP-Generic-r16 ::=                  SEQUENCE {
    sl-BWP-r16                              BWP                                                 OPTIONAL,    -- Need M
    sl-LengthSymbols-r16                    ENUMERATED {sym7, sym8, sym9, sym10, sym11, sym12, sym13, sym14}   OPTIONAL,    -- Need M
    sl-StartSymbol-r16                      ENUMERATED {sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7}        OPTIONAL,    -- Need M
    sl-PSBCH-Config-r16                     SetupRelease {SL-PSBCH-Config-r16}                  OPTIONAL,    -- Need M
    sl-TxDirectCurrentLocation-r16          INTEGER (0..3301)                                   OPTIONAL,    -- Need M
    ...
}

-- TAG-SL-BWP-CONFIG-STOP
-- ASN1STOP
```

***SL-BWP-Config* field descriptions**
sl-BWP-DiscPoolConfig This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. *maxNrofRXPool-r16/maxNrofTXPool-r16*).
sl-BWP-Generic This field indicates the generic parameters on the configured sidelink BWP.
sl-BWP-PoolConfig This field indicates the resource pool configurations on the configured sidelink BWP.
sl-BWP-Id An identifier for this sidelink bandwidth part.
sl-BWP-PoolConfigPS This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*.

***SL-BWP-Generic* field descriptions**
sl-LengthSymbols
This field indicates the number of symbols used for sidelink in a slot without S-SSB. A single value can be (pre)configured per sidelink bandwidth part.
sl-StartSymbol
This field indicates the starting symbol used for sidelink in a slot without S-SSB. A single value can be (pre)configured per sidelink bandwidth part.
sl-TxDirectCurrentLocation
The sidelink Tx/Rx Direct Current location for the carrier. Only values in the value range of this field between 0 and 3299, which indicate the subcarrier index within the carrier corresponding to the numerology of the corresponding sidelink BWP and value 3300, which indicates "Outside the carrier" and value 3301, which indicates "Undetermined position within the carrier" are used in this version of the specification.

– *SL-BWP-ConfigCommon*

The IE *SL-BWP-ConfigCommon* is used to configure the cell-specific configuration information on one particular sidelink bandwidth part.

***SL-BWP-ConfigCommon* information element**

```
-- ASN1START
-- TAG-SL-BWP-CONFIGCOMMON-START

SL-BWP-ConfigCommon-r16 ::=             SEQUENCE {
    sl-BWP-Generic-r16                      SL-BWP-Generic-r16                                  OPTIONAL,    -- Need R
    sl-BWP-PoolConfigCommon-r16             SL-BWP-PoolConfigCommon-r16                         OPTIONAL,    -- Need R
    ...,
    [[
    sl-BWP-PoolConfigCommonPS-r17           SL-BWP-PoolConfigCommon-r16                         OPTIONAL,    -- Need R
    sl-BWP-DiscPoolConfigCommon-r17         SL-BWP-DiscPoolConfigCommon-r17                     OPTIONAL     -- Need R
    ]]
}

-- TAG-SL-BWP-CONFIGCOMMON-STOP
-- ASN1STOP
```

***SL-BWP-ConfigCommon* field descriptions**
sl-BWP-DiscPoolConfigCommon
This field indicates the NR sidelink discovery dedicated resource pool configurations on the configured sidelink BWP. The total number of Rx/Tx resource pools configured for communication and discovery does not exceed the maximum number of Rx/Tx resource pool for NR sidelink communication (i.e. *maxNrofRXPool-r16/maxNrofTXPool-r16*).
sl-BWP-Generic
This field indicates the generic parameters on the configured sidelink BWP.
sl-BWP-PoolConfigCommon
This field indicates the resource pool configurations on the configured sidelink BWP.
sl-BWP-PoolConfigCommonPS
This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include *sl-TxPoolExceptional*.

– *SL-BWP-DiscPoolConfig*

The IE *SL-BWP-DiscPoolConfig* is used to configure UE specific NR sidelink discovery dedicated resource pool.

SL-BWP-DiscPoolConfig information element

```
-- ASN1START
-- TAG-SL-BWP-DISCPOOLCONFIG-START

SL-BWP-DiscPoolConfig-r17 ::=        SEQUENCE {
    sl-DiscRxPool-r17                    SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16        OPTIONAL,    -- Cond HO
    sl-DiscTxPoolSelected-r17            SL-TxPoolDedicated-r16                                               OPTIONAL,    -- Need M
    sl-DiscTxPoolScheduling-r17          SL-TxPoolDedicated-r16                                               OPTIONAL     -- Need N
}

-- TAG-SL-BWP-DISCPOOLCONFIG-STOP
-- ASN1STOP
```

SL-BWP-DiscPoolConfig field descriptions
sl-DiscTxPoolScheduling
Indicates the resources by which the UE is allowed to transmit NR sidelink discover based on network scheduling on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.
When this field is configured together with *sl-TxPoolScheduling*, the resource pool index (which is used in DCI Format 3_0 in TS 38.212 [17], clause 7.3.1.4.1) is defined as 0, 1, …, x-1 for the resource pools included in the *sl-TxPoolScheduling*, and x, x+1, …, x+y-1 for the resource pools included in *sl-DiscTxPoolScheduling*, where x is the number of the resource pools in *sl-TxPoolScheduling*, and y is the number of resource pools in *sl-DiscTxPoolScheduling*.

Conditional Presence	Explanation
HO	This field is optionally present, need M, in an *RRCReconfiguration* message including *reconfigurationWithSync*; otherwise it is absent, need M.

– *SL-BWP-DiscPoolConfigCommon*

The IE *SL-BWP-DiscPoolConfigCommon* is used to configure the cell-specific NR sidelink discovery dedicated resource pool.

SL-BWP-DiscPoolConfigCommon information element

```
-- ASN1START
-- TAG-SL-BWP-DISCPOOLCONFIGCOMMON-START

SL-BWP-DiscPoolConfigCommon-r17 ::= SEQUENCE {
    sl-DiscRxPool-r17                   SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16        OPTIONAL,    -- Need R
    sl-DiscTxPoolSelected-r17           SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16  OPTIONAL,    -- Need R
    ...
}
```

```
-- TAG-SL-BWP-DISCPOOLCONFIGCOMMON-STOP
-- ASN1STOP
```

– *SL-BWP-PoolConfig*

The IE *SL-BWP-PoolConfig* is used to configure NR sidelink communication resource pool.

SL-BWP-PoolConfig information element

```
-- ASN1START
-- TAG-SL-BWP-POOLCONFIG-START

SL-BWP-PoolConfig-r16 ::=        SEQUENCE {
    sl-RxPool-r16                    SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16        OPTIONAL,    -- Cond HO
    sl-TxPoolSelectedNormal-r16      SL-TxPoolDedicated-r16                                               OPTIONAL,    -- Need M
    sl-TxPoolScheduling-r16          SL-TxPoolDedicated-r16                                               OPTIONAL,    -- Need N
    sl-TxPoolExceptional-r16         SL-ResourcePoolConfig-r16                                            OPTIONAL     -- Need M
}

SL-TxPoolDedicated-r16 ::=       SEQUENCE {
    sl-PoolToReleaseList-r16         SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolID-r16      OPTIONAL,    -- Need N
    sl-PoolToAddModList-r16          SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16  OPTIONAL     -- Need N
}

SL-ResourcePoolConfig-r16 ::=    SEQUENCE {
    sl-ResourcePoolID-r16            SL-ResourcePoolID-r16,
    sl-ResourcePool-r16              SL-ResourcePool-r16                                                  OPTIONAL    -- Need M
}

SL-ResourcePoolID-r16 ::=        INTEGER (1..maxNrofPoolID-r16)

-- TAG-SL-BWP-POOLCONFIG-STOP
-- ASN1STOP
```

***SL-BWP-PoolConfig* field descriptions**
sl-RxPool Indicates the receiving resource pool on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception. If the field is included, it replaces any previous list, i.e. all the entries of the list are replaced and each of the *SL-ResourcePool* entries is considered to be newly created.
sl-TxPoolExceptional Indicates the resources by which the UE is allowed to perform NR sidelink transmission in exceptional conditions on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.
sl-TxPoolScheduling Indicates the resources by which the UE is allowed to perform NR sidelink transmission based on network scheduling on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.
sl-TxPoolSelectedNormal Indicates the resources by which the UE is allowed to perform NR sidelink transmission by UE autonomous resource selection on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception.

Conditional Presence	Explanation
HO	This field is optionally present, need M, in an *RRCReconfiguration* message including *reconfigurationWithSync*; otherwise it is absent, Need M.

– *SL-BWP-PoolConfigCommon*

The IE *SL-BWP-PoolConfigCommon* is used to configure the cell-specific NR sidelink communication resource pool.

***SL-BWP-PoolConfigCommon* information element**

```
-- ASN1START
-- TAG-SL-BWP-POOLCONFIGCOMMON-START

SL-BWP-PoolConfigCommon-r16 ::=      SEQUENCE {
    sl-RxPool-r16                        SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-ResourcePool-r16         OPTIONAL,     -- Need R
    sl-TxPoolSelectedNormal-r16          SEQUENCE (SIZE (1..maxNrofTXPool-r16)) OF SL-ResourcePoolConfig-r16   OPTIONAL,     -- Need R
    sl-TxPoolExceptional-r16             SL-ResourcePoolConfig-r16                                             OPTIONAL      -- Need R
}

-- TAG-SL-BWP-POOLCONFIGCOMMON-STOP
-- ASN1STOP
```

***SL-BWP-PoolConfigCommon* field descriptions**
sl-TxPoolExceptional Indicates the resources by which the UE is allowed to perform NR sidelink transmission in exceptional conditions on the configured BWP. For the PSFCH related configuration, if configured, will be used for PSFCH transmission/reception. This field is not present when *SL-BWP-PoolConfigCommon* is included in *SidelinkPreconfigNR*.

– *SL-CBR-PriorityTxConfigList*

The IE *SL-CBR-PriorityTxConfigList* indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations provided in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by an index to the entry of the CBR range configuration in *sl-CBR-RangeConfigList*, and priority ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available, and MCS range for the MCS tables used in the resource pool.

SL-CBR-PriorityTxConfigList information element

```
-- ASN1START
-- TAG-SL-CBR-PRIORITYTXCONFIGLIST-START

SL-CBR-PriorityTxConfigList-r16 ::= SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndex-r16

SL-CBR-PriorityTxConfigList-v1650 ::= SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndex-v1650

SL-PriorityTxConfigIndex-r16 ::=    SEQUENCE {
    sl-PriorityThreshold-r16            INTEGER (1..8)                                          OPTIONAL,    -- Need M
    sl-DefaultTxConfigIndex-r16         INTEGER (0..maxCBR-Level-1-r16)                         OPTIONAL,    -- Need M
    sl-CBR-ConfigIndex-r16              INTEGER (0..maxCBR-Config-1-r16)                        OPTIONAL,    -- Need M
    sl-Tx-ConfigIndexList-r16           SEQUENCE (SIZE (1.. maxCBR-Level-r16)) OF SL-TxConfigIndex-r16   OPTIONAL     -- Need M
}

SL-PriorityTxConfigIndex-v1650 ::=  SEQUENCE {
    sl-MCS-RangeList-r16                SEQUENCE (SIZE (1..maxCBR-Level-r16)) OF SL-MinMaxMCS-List-r16    OPTIONAL     -- Need M
}

SL-TxConfigIndex-r16 ::=            INTEGER (0..maxTxConfig-1-r16)

-- TAG-SL-CBR-PRIORITYTXCONFIGLIST-STOP
-- ASN1STOP
```

***SL-CBR-PriorityTxConfigList* field descriptions**
sl-CBR-ConfigIndex Indicates the CBR ranges to be used by an index to the entry of the CBR range configuration in *sl-CBR-RangeConfigList*.
sl-DefaultTxConfigIndex Indicates the PSSCH transmission parameters to be used by the UEs which do not have available CBR measurement results, by means of an index to the corresponding entry in *sl-Tx-ConfigIndexList*. Value 0 indicates the first entry in *sl-Tx-ConfigIndexList*. The field is ignored if the UE has available CBR measurement results.
sl-MCS-RangeList Indicates the minimum MCS value and maximum MCS value for the associated MCS table(s). UE shall ignore the minimum MCS value and maximum MCS value used for table of 64QAM indicated in *SL-CBR-PriorityTxConfigList-r16* if *SL-CBR-PriorityTxConfigList-v1650* is present.
sl-PriorityThreshold Indicates the upper bound of priority range which is associated with the configurations in *sl-CBR-ConfigIndex* and in *sl-Tx-ConfigIndexList*. The upper bounds of the priority ranges are configured in ascending order for consecutive entries of *SL-PriorityTxConfigIndex* in *SL-CBR-PriorityTxConfigList*. For the first entry of *SL-PriorityTxConfigIndex*, the lower bound of the priority range is 1.
SL-CBR-PriorityTxConfigList-v1650 If included, it includes the same number of entries, and listed in the same order, as in *SL-CBR-PriorityTxConfigList-r16*.

– *SL-CBR-CommonTxConfigList*

The IE *SL-CBR-CommonTxConfigList* indicates the list of PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number, CR limit) in *sl-CBR-PSSCH-TxConfigList*, and the list of CBR ranges in *sl-CBR-RangeConfigList*, to configure congestion control to the UE for sidelink communication.

***SL-CBR-CommonTxConfigList* information element**

```
-- ASN1START
-- TAG-SL-CBR-COMMONTXCONFIGLIST-START

SL-CBR-CommonTxConfigList-r16 ::=     SEQUENCE {
    sl-CBR-RangeConfigList-r16            SEQUENCE (SIZE (1..maxCBR-Config-r16)) OF SL-CBR-LevelsConfig-r16     OPTIONAL,   -- Need M
    sl-CBR-PSSCH-TxConfigList-r16         SEQUENCE (SIZE (1.. maxTxConfig-r16)) OF SL-CBR-PSSCH-TxConfig-r16    OPTIONAL    -- Need M
}

SL-CBR-LevelsConfig-r16 ::=           SEQUENCE (SIZE (1..maxCBR-Level-r16)) OF SL-CBR-r16

SL-CBR-PSSCH-TxConfig-r16 ::=         SEQUENCE {
    sl-CR-Limit-r16                       INTEGER(0..10000)                                                     OPTIONAL,   -- Need M
    sl-TxParameters-r16                   SL-PSSCH-TxParameters-r16                                             OPTIONAL    -- Need M
}

SL-CBR-r16 ::=                        INTEGER (0..100)

-- TAG-SL-CBR-COMMONTXCONFIGLIST-STOP
-- ASN1STOP
```

***SL-CBR-CommonTxConfigList* field descriptions**
sl-CBR-RangeConfigList Each entry in *sl-CBR-RangeConfigList* is *SL-CBR-LevelsConfig* containing the list of CBR ranges. The values within each *SL-CBR-LevelsConfig* indicate the upper bound of the each CBR range (and implicitly indicate the lower bound of next CBR range) and are configured in ascending order. For the first CBR range of each *SL-CBR-LevelsConfig*, the lower bound of the CBR range is 0. Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.
sl-CR-Limit Indicates the maximum limit on the occupancy ratio. Value 0 corresponds to 0, value 1 to 0.0001, value 2 to 0.0002, and so on (i.e. in steps of 0.0001) until value 10000, which corresponds to 1.
sl-CBR-PSSCH-TxConfigList Indicates the list of available PSSCH transmission parameters (such as MCS, sub-channel number, retransmission number and CR limit) configurations.
sl-TxParameters Indicates PSSCH transmission parameters.

– *SL-ConfigDedicatedNR*

The IE *SL-ConfigDedicatedNR* specifies the dedicated configuration information for NR sidelink communication/discovery.

SL-ConfigDedicatedNR information element

```
-- ASN1START
-- TAG-SL-CONFIGDEDICATEDNR-START

SL-ConfigDedicatedNR-r16 ::=          SEQUENCE {
    sl-PHY-MAC-RLC-Config-r16             SL-PHY-MAC-RLC-Config-r16                                       OPTIONAL,    -- Need M
    sl-RadioBearerToReleaseList-r16       SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-Uu-ConfigIndex-r16 OPTIONAL,    -- Need N
    sl-RadioBearerToAddModList-r16        SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16 OPTIONAL,    -- Need N
    sl-MeasConfigInfoToReleaseList-r16    SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIndex-r16 OPTIONAL,    -- Need N
    sl-MeasConfigInfoToAddModList-r16     SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-MeasConfigInfo-r16 OPTIONAL,    -- Need N
    t400-r16                              ENUMERATED {ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL,    -- Need M
    ...,
    [[
    sl-PHY-MAC-RLC-Config-v1700           SetupRelease { SL-PHY-MAC-RLC-Config-v1700 }                    OPTIONAL,    -- Need M
    sl-DiscConfig-r17                     SetupRelease { SL-DiscConfig-r17}                               OPTIONAL     -- Need M
    ]]
}

SL-DestinationIndex-r16  ::=              INTEGER (0..maxNrofSL-Dest-1-r16)

SL-PHY-MAC-RLC-Config-r16::=          SEQUENCE {
    sl-ScheduledConfig-r16                SetupRelease { SL-ScheduledConfig-r16 }                         OPTIONAL,    -- Need M
    sl-UE-SelectedConfig-r16              SetupRelease { SL-UE-SelectedConfig-r16 }                       OPTIONAL,    -- Need M
    sl-FreqInfoToReleaseList-r16          SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-Freq-Id-r16        OPTIONAL,    -- Need N
    sl-FreqInfoToAddModList-r16           SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfig-r16     OPTIONAL,    -- Need N
    sl-RLC-BearerToReleaseList-r16        SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfigIndex-r16 OPTIONAL,    -- Need N
    sl-RLC-BearerToAddModList-r16         SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16  OPTIONAL,    -- Need N
    sl-MaxNumConsecutiveDTX-r16           ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32}                   OPTIONAL,    -- Need M
    sl-CSI-Acquisition-r16                ENUMERATED {enabled}                                            OPTIONAL,    -- Need R
    sl-CSI-SchedulingRequestId-r16        SetupRelease {SchedulingRequestId}                              OPTIONAL,    -- Need M
    sl-SSB-PriorityNR-r16                 INTEGER (1..8)                                                  OPTIONAL,    -- Need R
    networkControlledSyncTx-r16           ENUMERATED {on, off}                                            OPTIONAL     -- Need M
}

SL-PHY-MAC-RLC-Config-v1700 ::=       SEQUENCE {
    sl-DRX-Config-r17                     SL-DRX-Config-r17                                               OPTIONAL,    -- Need M
    sl-RLC-ChannelToReleaseList-r17       SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelID-r17     OPTIONAL, -- Cond L2U2N
    sl-RLC-ChannelToAddModList-r17        SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelConfig-r17 OPTIONAL, -- Cond L2U2N
    ...
}

SL-DiscConfig-r17::=                  SEQUENCE {
    sl-RelayUE-Config-r17                 SetupRelease { SL-RelayUE-Config-r17}                           OPTIONAL, -- Cond L2RelayUE
    sl-RemoteUE-Config-r17                SetupRelease { SL-RemoteUE-Config-r17}                          OPTIONAL  -- Cond L2RemoteUE
}

-- TAG-SL-CONFIGDEDICATEDNR-STOP
-- ASN1STOP
```

***SL-ConfigDedicatedNR* field descriptions**
sl-MeasConfigInfoToAddModList This field indicates the RSRP measurement configurations for unicast destinations to add and/or modify.
sl-MeasConfigInfoToReleaseList This field indicates the RSRP measurement configurations for unicast destinations to remove.
sl-PHY-MAC-RLC-Config This field indicates the lower layer sidelink radio bearer configurations.
sl-RadioBearerToAddModList This field indicates one or multiple sidelink radio bearer configurations to add and/or modify. This field is not configured to the PC5 connection used for L2 U2N relay operation.
sl-RadioBearerToReleaseList This field indicates one or multiple sidelink radio bearer configurations to remove. This field is not configured to the PC5 connection used for L2 U2N relay operation.

***SL-PHY-MAC-RLC-Config* field descriptions**
networkControlledSyncTx This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value *on* indicates the UE to transmit synchronisation information while value *off* indicates the UE to not transmit such information.
sl-DRX-Config This field indicates the sidelink DRX configuration(s) for unicast, groupcast and/or broadcast communication, as specified in TS 38.321 [3].
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-FreqInfoToAddModList This field indicates the NR sidelink communication configuration on some carrier frequency (ies) to add and/or modify. In this release, only one entry can be configured in the list.
sl-FreqInfoToReleaseList This field indicates the NR sidelink communication configuration on some carrier frequency (ies) to remove. In this release, only one entry can be configured in the list.
sl-RLC-BearerToAddModList This field indicates one or multiple sidelink RLC bearer configurations to add and/or modify.
sl-RLC-BearerToReleaseList This field indicates one or multiple sidelink RLC bearer configurations to remove.
sl-RLC-ChannelToAddModList This field indicates one or multiple PC5 Relay RLC Channel configurations to add and/or modify. Each PC5 Relay RLC channel configuration provided by network to L2 U2N Relay UE is uniquely associated with one L2 U2N Remote UE.
sl-RLC-ChannelToReleaseList This field indicates one or multiple PC5 Relay RLC Channel configurations to remove.
sl-ScheduledConfig Indicates the configuration for UE to transmit NR sidelink communication based on network scheduling. This field is not configured simultaneously with sl-UE-SelectedConfig. This field is not configured to a L2 U2N Remote UE.
sl-UE-SelectedConfig Indicates the configuration used for UE autonomous resource selection. This field is not configured simultaneously with *sl-ScheduledConfig*.
sl-CSI-Acquisition Indicates whether CSI reporting is enabled in sidelink unicast. If the field is absent, sidelink CSI reporting is disabled.
sl-CSI-SchedulingRequestId If present, it indicates the scheduling request configuration applicable for Sidelink CSI Reporting MAC CE and Sidelink DRX Command MAC CE, as specified in TS 38.321 [3].
sl-SSB-PriorityNR This field indicates the priority of NR sidelink SSB transmission and reception.

Conditional Presence	Explanation
L2RelayUE	For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent.
L2RemoteUE	For L2 U2N Remote UE, the field is optionally present, Need M. Otherwise, it is absent.
L2U2N	The field is optional present for L2 U2N Relay UE and L2 U2N Remote UE, need N. Otherwise, it is absent.

– *SL-ConfiguredGrantConfig*

The IE *SL-ConfiguredGrantConfig* specifies the configured grant configuration information for NR sidelink communication.

SL-ConfiguredGrantConfig information element

```
-- ASN1START
-- TAG-SL-CONFIGUREDGRANTCONFIG-START

SL-ConfiguredGrantConfig-r16 ::=          SEQUENCE {
    sl-ConfigIndexCG-r16                      SL-ConfigIndexCG-r16,
    sl-PeriodCG-r16                           SL-PeriodCG-r16                                   OPTIONAL, -- Need M
    sl-NrOfHARQ-Processes-r16                 INTEGER (1..16)                                   OPTIONAL, -- Need M
    sl-HARQ-ProcID-offset-r16                 INTEGER (0..15)                                   OPTIONAL, -- Need M
    sl-CG-MaxTransNumList-r16                 SL-CG-MaxTransNumList-r16                         OPTIONAL, -- Need M
    rrc-ConfiguredSidelinkGrant-r16           SEQUENCE {
        sl-TimeResourceCG-Type1-r16               INTEGER (0..496)                              OPTIONAL, -- Need M
        sl-StartSubchannelCG-Type1-r16            INTEGER (0..26)                               OPTIONAL, -- Need M
        sl-FreqResourceCG-Type1-r16               INTEGER (0..6929)                             OPTIONAL, -- Need M
        sl-TimeOffsetCG-Type1-r16                 INTEGER (0..7999)                             OPTIONAL, -- Need R
        sl-N1PUCCH-AN-r16                         PUCCH-ResourceId                              OPTIONAL, -- Need M
        sl-PSFCH-ToPUCCH-CG-Type1-r16             INTEGER (0..15)                               OPTIONAL, -- Need M
        sl-ResourcePoolID-r16                     SL-ResourcePoolID-r16                         OPTIONAL, -- Need M
        sl-TimeReferenceSFN-Type1-r16             ENUMERATED {sfn512}                           OPTIONAL  -- Need S
    }                                                                                           OPTIONAL, -- Need M
    ...,
    [[
    sl-N1PUCCH-AN-Type2-r16                   PUCCH-ResourceId                                  OPTIONAL  -- Need M
    ]]
}

SL-ConfigIndexCG-r16 ::=          INTEGER (0..maxNrofCG-SL-1-r16)

SL-CG-MaxTransNumList-r16 ::=     SEQUENCE (SIZE (1..8)) OF SL-CG-MaxTransNum-r16

SL-CG-MaxTransNum-r16 ::=                 SEQUENCE {
    sl-Priority-r16                           INTEGER (1..8),
    sl-MaxTransNum-r16                        INTEGER (1..32)
}

SL-PeriodCG-r16 ::=            CHOICE{
    sl-PeriodCG1-r16               ENUMERATED {ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000, spare6,
                                               spare5, spare4, spare3, spare2, spare1},
    sl-PeriodCG2-r16               INTEGER (1..99)
}

-- TAG-SL-CONFIGUREDGRANTCONFIG-STOP
-- ASN1STOP
```

***SL-ConfiguredGrantConfig* field descriptions**
rrc-ConfiguredSidelinkGrant Configuration for "sidelink configured grant" transmission with fully RRC-configured SL grant (Type1). If this field is not configured, the UE uses SL grant configured by DCI addressed to SL-CS-RNTI (Type2).
sl-ConfigIndexCG This field indicates the ID to identify sidelink configured grant.
sl-CG-MaxTransNumList This field indicates the maximum number of times that a TB can be transmitted using the resources provided by the sidelink configured grant. *sl-Priority* corresponds to the logical channel priority.
sl-FreqResourceCG-Type1 Indicates the frequency resource location of sidelink configured grant type 1. An index giving valid combinations of one or two starting sub-channel and length (jointly encoded) as resource indicator value (RIV), as defined in TS 38.214 [19].
sl-HARQ-ProcID-Offset Indicates the offset used in deriving the HARQ process ID for sidelink configured grant type 1 or sidelink configured grant type 2, see TS 38.321 [3], clause 5.8.3.
sl-N1PUCCH-AN This field indicates the PUCCH resource for HARQ feedback for sidelink configured grant type 1. The actual PUCCH-Resource is configured in *sl-PUCCH-Config* and referred to by its ID.
sl-N1PUCCH-AN-Type2 This field indicates the PUCCH resource for HARQ feedback for PSCCH/PSSCH transmissions without a corresponding PDCCH on sidelink configured grant type 2. The actual PUCCH-Resource is configured in *sl-PUCCH-Config* and referred to by its ID.
sl-NrOfHARQ-Processes This field indicates the number of HARQ processes configured for a specific sidelink configured grant. It applies for both type 1 and type 2.
sl-PeriodCG This field indicates the period of sidelink configured grant in the unit of ms.
sl-PSFCH-ToPUCCH-CG-Type1 This field, for sidelink configured grant type 1, indicates slot offset between the PSFCH associated with the last PSSCH resource of each period and the PUCCH occasion used for reporting sidelink HARQ.
sl-ResourcePoolID Indicates the resource pool in which the sidelink configured grant type 1 is applied.
sl-StartSubchannelCG-Type1 This field indicates the starting sub-channel of sidelink configured grant type 1. An index giving valid sub-channel index.
sl-TimeOffsetCG-Type1 This field indicates the slot offset with respect to logical slot defined by *sl-TimeReferenceSFN-Type1*, as specified in TS 38.321 [3].
sl-TimeReferenceSFN-Type1 Indicates SFN used for determination of the offset of a resource in time domain. If it is present, the UE uses the 1st logical slot of associated resource pool after the starting time of the closest SFN with the indicated number preceding the reception of the sidelink configured grant configuration type 1 as reference logical slot, see TS 38.321 [3], clause 5.8.3. If it is not present, the reference SFN is 0.
sl-TimeResourceCG-Type1 This field indicates the time resource location of sidelink configured grant type 1. An index giving valid combinations of up to two slot positions (jointly encoded) as time resource indicator value (TRIV), as defined in TS 38.212 [17].

– *SL-DestinationIdentity*

The IE *SL-DestinationIdentity* is used to identify a destination of a NR sidelink communication.

***SL-DestinationIdentity* information element**

```
-- ASN1START
-- TAG-SL-DESTINATIONIDENTITY-START

SL-DestinationIdentity-r16 ::=          BIT STRING (SIZE (24))

-- TAG-SL-DESTINATIONIDENTITY-STOP
-- ASN1STOP
```

– *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-ConfigGC-BC-r17                  SL-DRX-ConfigGC-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-ConfigGC-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-ConfigGC-BC*

The IE *SL-DRX-ConfigGC-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 (TS 24.554 [72]).

SL-DRX-ConfigGC-BC information element

```
-- ASN1START
-- TAG-SL-DRX-CONFIGGC-BC-START

SL-DRX-ConfigGC-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-CONFIGGC-BC-STOP
-- ASN1STOP
```

***SL-DRX-ConfigGC-BC* field descriptions**
sl-DefaultDRX-GC-BC 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], ProSe Direct Link Establishment Request message and discovery message as described in TS 24.554 [72].
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 sidelink 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 feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). *sl-DRX-GC-HARQ-RTT-Timer2* is used for HARQ feedback disabled sidelink retransmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s).
sl-DRX-GC-Generic Indicates a sidelink DRX configuration for groupcast communication, 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 sidelink 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-ConfigUC*

The IE *SL-DRX-ConfigUC* is used to configure sidelink DRX related parameters for unicast communication.

***SL-DRX-ConfigUC* information element**

```
-- ASN1START
-- TAG-DRX-CONFIGUC-START

SL-DRX-ConfigUC-r17 ::=                 SEQUENCE {
    sl-drx-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-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-HARQ-RTT-Timer1-r17          ENUMERATED {sl0, sl1, sl2, sl4, spare4, spare3, spare2, spare1}     OPTIONAL,   -- Need M
    sl-drx-HARQ-RTT-Timer2-r17          ENUMERATED {sl0, sl1, sl2, sl4, spare4, spare3, spare2, spare1}     OPTIONAL,   -- Need M
    sl-drx-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},
    sl-drx-CycleStartOffset-r17     CHOICE {
        ms10                            INTEGER(0..9),
        ms20                            INTEGER(0..19),
        ms32                            INTEGER(0..31),
        ms40                            INTEGER(0..39),
        ms60                            INTEGER(0..59),
        ms64                            INTEGER(0..63),
        ms70                            INTEGER(0..69),
        ms80                            INTEGER(0..79),
        ms128                           INTEGER(0..127),
        ms160                           INTEGER(0..159),
        ms256                           INTEGER(0..255),
        ms320                           INTEGER(0..319),
        ms512                           INTEGER(0..511),
        ms640                           INTEGER(0..639),
        ms1024                          INTEGER(0..1023),
        ms1280                          INTEGER(0..1279),
        ms2048                          INTEGER(0..2047),
        ms2560                          INTEGER(0..2559),
        ms5120                          INTEGER(0..5119),
        ms10240                         INTEGER(0..10239)
    },
    sl-drx-SlotOffset                   INTEGER (0..31)
}

-- TAG-SL-DRX-CONFIGUC-STOP
-- ASN1STOP
```

***SL-DRX-ConfigUC* field descriptions**
sl-drx-CycleStartOffset Sidelink *drx-Cycle* in ms and sidelink *drx-StartOffset* in multiples of 1 ms.
sl-drx-HARQ-RTT-Timer1, sl-drx-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-HARQ-RTT-Timer1* is used for HARQ feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). *sl-drx-HARQ-RTT-Timer2* is used for HARQ feedback disabled sidelink retransmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s).
sl-drx-InactivityTimer Value in number of slot lengths of the BWP where the transport block was received, sl0 corresponds to 0, sl1 corresponds to 1 slot, sl2 corresponds to 2 slots, and so on.
sl-drx-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-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.
sl-drx-SlotOffset Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

– *SL-DRX-ConfigUC-SemiStatic*

The IE *SL-DRX-ConfigUC-SemiStatic* is used to indicate the semi-static sidelink DRX related parameters for unicast communication.

***SL-DRX-ConfigUC*-SemiStatic information element**

```
-- ASN1START
-- TAG-DRX-CONFIGUCSEMISTATIC-START

SL-DRX-ConfigUC-SemiStatic-r17 ::=          SEQUENCE {
    sl-drx-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-CycleStartOffset-r17                 CHOICE {
        ms10                                        INTEGER(0..9),
        ms20                                        INTEGER(0..19),
        ms32                                        INTEGER(0..31),
        ms40                                        INTEGER(0..39),
        ms60                                        INTEGER(0..59),
        ms64                                        INTEGER(0..63),
        ms70                                        INTEGER(0..69),
        ms80                                        INTEGER(0..79),
        ms128                                       INTEGER(0..127),
        ms160                                       INTEGER(0..159),
        ms256                                       INTEGER(0..255),
        ms320                                       INTEGER(0..319),
        ms512                                       INTEGER(0..511),
```

```
        ms640                                   INTEGER(0..639),
        ms1024                                  INTEGER(0..1023),
        ms1280                                  INTEGER(0..1279),
        ms2048                                  INTEGER(0..2047),
        ms2560                                  INTEGER(0..2559),
        ms5120                                  INTEGER(0..5119),
        ms10240                                 INTEGER(0..10239)
    },
    sl-drx-SlotOffset-r17                   INTEGER (0..31)
}

-- TAG-SL-DRX-CONFIGUCSEMISTATIC-STOP
-- ASN1STOP
```

– *SL-FreqConfig*

The IE *SL-FreqConfig* specifies the dedicated configuration information on one particular carrier frequency for NR sidelink communication.

SL-FreqConfig information element

```
-- ASN1START
-- TAG-SL-FREQCONFIG-START

SL-FreqConfig-r16 ::=               SEQUENCE {
    sl-Freq-Id-r16                      SL-Freq-Id-r16,
    sl-SCS-SpecificCarrierList-r16      SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    sl-AbsoluteFrequencyPointA-r16      ARFCN-ValueNR                                       OPTIONAL,  -- Need M
    sl-AbsoluteFrequencySSB-r16         ARFCN-ValueNR                                       OPTIONAL,  -- Need R
    frequencyShift7p5khzSL-r16          ENUMERATED {true}                                   OPTIONAL,  -- Cond V2X-SL-Shared
    valueN-r16                          INTEGER (-1..1),
    sl-BWP-ToReleaseList-r16            SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF BWP-Id   OPTIONAL,  -- Need N
    sl-BWP-ToAddModList-r16             SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF SL-BWP-Config-r16    OPTIONAL,  -- Need N
    sl-SyncConfigList-r16               SL-SyncConfigList-r16                               OPTIONAL,  -- Need M
    sl-SyncPriority-r16                 ENUMERATED {gnss, gnbEnb}                           OPTIONAL   -- Need M
}

SL-Freq-Id-r16 ::=                      INTEGER (1.. maxNrofFreqSL-r16)

-- TAG-SL-FREQCONFIG-STOP
-- ASN1STOP
```

***SL-FreqConfig* field descriptions**
frequencyShift7p5khzSL Enable the NR SL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.
sl-AbsoluteFrequencyPointA Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.
sl-AbsoluteFrequencySSB Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.
sl-BWP-ToAddModList This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration is to be added or reconfigured. In this release, only one BWP is allowed to be configured for NR sidelink communication.
sl-BWP-ToReleaseList This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration is to be released.
sl-Freq-Id This field indicates the identity of the dedicated configuration information on the carrier frequency for NR sidelink communication.
sl-SCS-SpecificCarrierList A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A. The UE uses the configuration provided in this field only for the purpose of channel bandwidth and location determination. In this release, only one *SCS-SpecificCarrier* is allowed to be configured for NR sidelink communication.
sl-SyncPriority This field indicates synchronization priority order, as specified in clause 5.8.6.
valueN Indicate the NR SL transmission with a valueN *5kHz shift to the LTE raster. (see TS 38.101-1 [15], clause 5.4E.2).

Conditional Presence	Explanation
V2X-SL-Shared	This field is mandatory present if the carrier frequency configured for NR sidelink communication is shared by V2X sidelink communication. It is absent, Need R, otherwise.

– *SL-FreqConfigCommon*

The IE *SL-FreqConfigCommon* specifies the cell-specific configuration information on one particular carrier frequency for NR sidelink communication.

***SL-FreqConfigCommon* information element**

```
-- ASN1START
-- TAG-SL-FREQCONFIGCOMMON-START

SL-FreqConfigCommon-r16 ::=      SEQUENCE {
    sl-SCS-SpecificCarrierList-r16   SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
    sl-AbsoluteFrequencyPointA-r16   ARFCN-ValueNR,
    sl-AbsoluteFrequencySSB-r16      ARFCN-ValueNR                                                  OPTIONAL, -- Need R
    frequencyShift7p5khzSL-r16       ENUMERATED {true}                                              OPTIONAL, -- Cond V2X-SL-Shared
    valueN-r16                       INTEGER (-1..1),
    sl-BWP-List-r16                  SEQUENCE (SIZE (1..maxNrofSL-BWPs-r16)) OF SL-BWP-ConfigCommon-r16  OPTIONAL, -- Need R
    sl-SyncPriority-r16              ENUMERATED {gnss, gnbEnb}                                      OPTIONAL, -- Need R
    sl-NbAsSync-r16                  BOOLEAN                                                        OPTIONAL, -- Need R
```

```
    sl-SyncConfigList-r16           SL-SyncConfigList-r16                                   OPTIONAL, -- Need R
    ...
}
-- TAG-SL-FREQCONFIGCOMMON-STOP
-- ASN1STOP
```

***SL-FreqConfigCommon* field descriptions**
frequencyShift7p5khzSL Enable the NR SL transmission with a 7.5 kHz shift to the LTE raster. If the field is absent, the frequency shift is disabled.
sl-AbsoluteFrequencyPointA Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.
sl-AbsoluteFrequencySSB Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.
sl-BWP-List This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration. In this release, only one BWP is allowed to be configured for NR sidelink communication.
sl-NbAsSync This field indicates whether the network can be selected as synchronization reference directly/indirectly only, if *sl-SyncPriority* is set to gnss. If this field is set to TRUE, the network is enabled to be selected as synchronization reference directly/indirectly. The field is only present in *SidelinkPreconfigNR*. Otherwise it is absent.
sl-SyncPriority This field indicates synchronization priority order, as specified in clause 5.8.6..
sl-SyncConfigList This field indicates the configuration by which the UE is allowed to receive and transmit synchronisation information for NR sidelink communication. Network configures *sl-SyncConfig* including *txParameters* when configuring UEs to transmit synchronisation information. If this field is configured in *SL-PreconfigurationNR-r16*, only one entry is configured in *sl-SyncConfigList*.
valueN Indicate the NR SL transmission with a valueN *5kHz shift to the LTE raster (see TS 38.101-1 [15], clause 5.4E.2).

Conditional Presence	Explanation
V2X-SL-Shared	This field is mandatory present if the carrier frequency configured for NR sidelink communication is shared by V2X sidelink communication. It is absent, Need R, otherwise.

– *SL-InterUE-CoordinationConfig*

The IE *SL-InterUE-CoordinationConfig* is used to configure the sidelink inter-UE coordination (between a UE, UE-A, and a peer UE, UE-B) parameters.

***SL-InterUE-CoordinationConfig* information element**

```
-- ASN1START
-- TAG-SL-INTERUE-COORDINATIONCONFIG-START

SL-InterUE-CoordinationConfig-r17 ::=     SEQUENCE {
    sl-InterUE-CoordinationScheme1-r17        SL-InterUE-CoordinationScheme1-r17                    OPTIONAL,   -- Need M
    sl-InterUE-CoordinationScheme2-r17        SL-InterUE-CoordinationScheme2-r17                    OPTIONAL,   -- Need M
```

```
    ...
}

SL-InterUE-CoordinationScheme1-r17 ::=    SEQUENCE {
    sl-IUC-Explicit-r17                       ENUMERATED {enabled, disabled}                                        OPTIONAL,   -- Need M
    sl-IUC-Condition-r17                      ENUMERATED {enabled, disabled}                                        OPTIONAL,   -- Need M
    sl-Condition1-A-2-r17                     ENUMERATED {disabled}                                                 OPTIONAL,   -- Need M
    sl-ThresholdRSRP-Condition1-B-1-Option1List-r17  SEQUENCE (SIZE (1..8)) OF SL-ThresholdRSRP-Condition1-B-1-r17 OPTIONAL,   -- Need M
    sl-ThresholdRSRP-Condition1-B-1-Option2List-r17  SEQUENCE (SIZE (1..8)) OF SL-ThresholdRSRP-Condition1-B-1-r17 OPTIONAL,   -- Need M
    sl-ContainerCoordInfo-r17                 ENUMERATED {enabled, disabled}                                        OPTIONAL,   -- Need M
    sl-ContainerRequest-r17                   ENUMERATED {enabled, disabled}                                        OPTIONAL,   -- Need M
    sl-TriggerConditionCoordInfo-r17          INTEGER (0..1)                                                        OPTIONAL,   -- Need M
    sl-TriggerConditionRequest-r17            INTEGER (0..1)                                                        OPTIONAL,   -- Need M
    sl-PriorityCoordInfoExplicit-r17          INTEGER (1..8)                                                        OPTIONAL,   -- Need M
    sl-PriorityCoordInfoCondition-r17         INTEGER (1..8)                                                        OPTIONAL,   -- Need M
    sl-PriorityRequest-r17                    INTEGER (1..8)                                                        OPTIONAL,   -- Need M
    sl-PriorityPreferredResourceSet-r17       INTEGER (1..8)                                                        OPTIONAL,   -- Need M
    sl-MaxSlotOffsetTRIV-r17                  INTEGER (1..8000)                                                     OPTIONAL,   -- Need M
    sl-NumSubCH-PreferredResourceSet-r17      INTEGER (1..27)                                                       OPTIONAL,   -- Need M
    sl-ReservedPeriodPreferredResourceSet-r17 INTEGER (1..16)                                                       OPTIONAL,   -- Need M
    sl-DetermineResourceType-r17              ENUMERATED {uea, ueb}                                                 OPTIONAL,   -- Need M
    ...
}

SL-InterUE-CoordinationScheme2-r17 ::=    SEQUENCE {
    sl-IUC-Scheme2-r17                        ENUMERATED {enabled}                                                  OPTIONAL,   -- Need R
    sl-RB-SetPSFCH-r17                        BIT STRING (SIZE (10..275))                                           OPTIONAL,   -- Need M
    sl-TypeUE-A-r17                           ENUMERATED {enabled}                                                  OPTIONAL,   -- Need R
    sl-PSFCH-Occasion-r17                     INTEGER (0..1)                                                        OPTIONAL,   -- Need M
    sl-SlotLevelResourceExclusion-r17         ENUMERATED {enabled}                                                  OPTIONAL,   -- Need R
    sl-OptionForCondition2-A-1-r17            INTEGER (0..1)                                                        OPTIONAL,   -- Need M
    sl-IndicationUE-B-r17                     ENUMERATED {enabled, disabled}                                        OPTIONAL,   -- Need M
    ...,
    [[
    sl-DeltaRSRP-Thresh-v1720                 INTEGER (-30..30)                                                     OPTIONAL    -- Need M
    ]]
}


SL-ThresholdRSRP-Condition1-B-1-r17 ::=   SEQUENCE {
    sl-Priority-r17                           INTEGER (1..8),
    sl-ThresholdRSRP-Condition1-B-1-r17       INTEGER (0..66)
}

-- TAG-SL-INTERUE-COORDINATIONCONFIG-STOP
-- ASN1STOP
```

SL-InterUE-CoordinationScheme1 **field descriptions**
sl-Condition1-A-2
Indicates disabling the use of condition of excluding from preferred resource set resource(s) in slot(s) where UE-A, when it is intended receiver of UE-B, does not expect to perform SL reception from UE-B due to half duplex operation.
sl-ContainerCoordInfo
Indicates whether a SCI format 2-C can be used as the container of inter-UE coordination information transmission from UE-A to UE-B in Scheme 1 in addition to using MAC CE.
sl-ContainerRequest
Indicates whether a SCI format 2-C can be used as the container of an explicit request for inter-UE coordination information transmission from UE-B to UE-A in Scheme 1 in addition to using MAC CE.
sl-DetermineResourceType
Indicates how to determine the resource set type to be provided by inter-UE coordination information transmission. Value "*uea*" means the resource set type is determined by UE-A's implementation. Value "*ueb*" means the resource set type is determined by UE-B's request.
sl-IUC-Condition
Indicates whether inter-UE coordination information triggered by a condition is enabled or not other than explicit request reception.
sl-IUC-Explicit
Indicates whether inter-UE coordination information triggered by an explicit request is enabled or not.
sl-MaxSlotOffsetTRIV
Indicates the maximum value of logical slot offset with respect to a reference slot that is used for representing the first resource location of each TRIV to indicate the set of resources in Scheme 1 as specified in TS 38.214 [19].
sl-NumSubCH-PreferredResousrceSet
Indicates the number of sub-channels used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition other than explicit request reception.
sl-PriorityCoordInfoCondition
Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC MAC CE, triggered by a condition other than explicit request reception in Scheme 1. The priority value of IUC MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".
sl-PriorityCoordInfoExplicit
Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC MAC CE, triggered by an explicit request in Scheme 1. The priority value of IUC MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".
sl-PriorityPreferredResourceSet
Indicates the priority value used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition other than explicit request reception.
sl-PriorityRequest
Parameter used to determine the priority values for the purpose defined in TS 38.213 [13] and TS 38.214 [19] including, the priority value for sensing and candidate resource (re-)selection for transmitting the TB carrying the IUC request MAC CE and the priority value in the SCI Format 1-A corresponding to the TB carrying the IUC request MAC CE, in an explicit request for inter-UE coordination information in Scheme 1. The priority value of IUC request MAC CE used in LCP procedure (see TS 38.321 [3]) is fixed as "1".
sl-ReservedPeriodPreferredResourceSet
Indicates the resource reservation interval used for determining the preferred resource set in Scheme 1 when the inter-UE coordination information transmission is triggered by a condition, by means of an index to the corresponding entry of *sl-ResourceReservePeriodList-r16*.
sl-TriggerConditionCoordInfo
Indicates the additional alternative trigger condition of inter-UE coordination information triggered by a condition rather than request reception in Scheme-1 from UE-A to UE-B. Value 0 means inter-UE coordination information is triggered by UE-A's implementation. Value 1 means inter-UE coordination information can be triggered only when UE-A has data to be transmitted together with the inter-UE coordination information to UE-B.

sl-TriggerConditionRequest Indicates the trigger condition of an explicit request from UE-B to UE-A. Value 0 means the explicit request is triggered by UE-B's implementation. Value 1 means the explicit request can be triggered only when UE-B has data to be transmitted to UE-A.
sl-ThresholdRSRP-Condition1-B-1-Option1List Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) whose RSRP measurement is larger than it as the set of resource(s) non-preferred for UE-B's transmission for Condition 1-B-1 of Scheme 1, as specified in TS 38.214 [19]. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.
sl-ThresholdRSRP-Condition1-B-1-Option2List Indicates the RSRP threshold used to determine reserved resource(s) of other UE(s) whose RSRP measurement is smaller than it as the set of resource(s) non-preferred for UE-B's transmission for Condition 1-B-1 of Scheme 1, as specified in TS 38.214 [19]. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

SL-InterUE-CoordinationScheme2 **field descriptions**
sl-DeltaRSRP-Thresh Indicates the RSRP threshold delta value corresponding to *deltaRSRPThresh* specified in clause 16.3.0 of TS 38.213 [13] and used to determine reserved resource(s) of other UE(s). Value in dB. Only even values (step size 2) allowed.
sl-IndicationUE-B Indicates whether to enable or disable the usage of 1 LSB of reserved bits of a SCI format 1-A to indicate of whether UE scheduling a conflict TB can be UE-B or not.
sl-IUC-Scheme2 Indicates whether inter-UE coordination Scheme 2 is enabled or not.
sl-OptionForCondition2-A-1 Indicates the RSRP threshold used to consider additional criteria for condition 2-A-1. Value 0 corresponds to using the RSRP threshold according to the priorities included in the SCI, UE uses thresholds *sl-Thres-RSRP-List*, in its resource pool configuration *sl-UE-SelectedConfigRP*, corresponding to *ThresPSSCH-RSRP-List* specified in clause 16.3.0 of TS 38.213 [13]. Value 1 corresponds to using a (pre)configured RSRP threshold delta value *sl-DeltaRSRP-Thresh,* corresponding to *deltaRSRPThresh* specified in clause 16.3.0 of TS 38.213 [13].
sl-PSFCH-Occasion Indicates the reference slot from which a PSFCH occasion for inter-UE coordination information transmission is derived. Value 0 corresponds to the slot where UE-B's SCI is transmitted and value 1 corresponds to the slot where expected/potential resource conflict occurs on PSSCH resource indicated by UE-B's SCI.
sl-RB-SetPSFCH Indicates the set of PRBs that are actually used for inter-UE coordination information transmission and reception in Scheme 2. The leftmost bit of the bitmap refers to the lowest RB index in the resource pool, and so on.
sl-SlotLevelResourceExclusion Indicates that physical layer of UE-B reports resources in a slot including the next reserved resource indicated by the corresponding UE-B's SCI to higher layer.
sl-TypeUE-A Indicates that a non-destination UE of a TB transmitted by UE-B can be UE-A which sends inter-UE coordination information to UE-B, when UE-A is a destination UE of another TB conflicting with the TB transmitted by UE-B.

– *SL-LogicalChannelConfig*

The IE *SL-LogicalChannelConfig* is used to configure the sidelink logical channel parameters.

SL-LogicalChannelConfig **information element**

```
-- ASN1START
```

```
-- TAG-SL-LOGICALCHANNELCONFIG-START

SL-LogicalChannelConfig-r16 ::=            SEQUENCE {
    sl-Priority-r16                            INTEGER (1..8),
    sl-PrioritisedBitRate-r16                  ENUMERATED {kBps0, kBps8, kBps16, kBps32, kBps64, kBps128, kBps256, kBps512,
                                               kBps1024, kBps2048, kBps4096, kBps8192, kBps16384, kBps32768, kBps65536, infinity},
    sl-BucketSizeDuration-r16                  ENUMERATED {ms5, ms10, ms20, ms50, ms100, ms150, ms300, ms500, ms1000,
                                               spare7, spare6, spare5, spare4, spare3,spare2, spare1},
    sl-ConfiguredGrantType1Allowed-r16          ENUMERATED {true}                                                   OPTIONAL,   -- Need R
    sl-HARQ-FeedbackEnabled-r16                ENUMERATED {enabled, disabled }                                     OPTIONAL,   -- Need R
    sl-AllowedCG-List-r16                      SEQUENCE (SIZE (0.. maxNrofCG-SL-1-r16)) OF SL-ConfigIndexCG-r16
                                                                                                                   OPTIONAL,   -- Need R
    sl-AllowedSCS-List-r16                     SEQUENCE (SIZE (1..maxSCSs)) OF SubcarrierSpacing                   OPTIONAL,   -- Need R
    sl-MaxPUSCH-Duration-r16                   ENUMERATED {ms0p02, ms0p04, ms0p0625, ms0p125, ms0p25, ms0p5, spare2, spare1}
                                                                                                                   OPTIONAL,   -- Need R
    sl-LogicalChannelGroup-r16                 INTEGER (0..maxLCG-ID)                                              OPTIONAL,   -- Need R
    sl-SchedulingRequestId-r16                 SchedulingRequestId                                                 OPTIONAL,   -- Need R
    sl-LogicalChannelSR-DelayTimerApplied-r16  BOOLEAN                                                             OPTIONAL,   -- Need R
    ...
}
-- TAG-SL-LOGICALCHANNELCONFIG-STOP
-- ASN1STOP
```

***SL-LogicalChannelConfig field* descriptions**
sl-AllowedCG-List This restriction applies only when the SL grant is a configured grant. If present, SL MAC SDUs from this logical channel can only be mapped to the indicated configured grant configuration. If the size of the sequence is zero, then SL MAC SDUs from this logical channel cannot be mapped to any configured grant configurations. If the field is not present, SL MAC SDUs from this logical channel can be mapped to any configured grant configurations. If the field *sl-ConfiguredGrantType1Allowed* is present, only those sidelink configured grant type 1 configurations indicated in this sequence are allowed for use by this sidelink logical channel; otherwise, this sequence shall not include any sidelink configured grant type 1 configuration. Corresponds to "sl-AllowedCG-List" as specified in TS 38.321 [3].
sl-AllowedSCS-List If present, indicate the numerology of UL-SCH resources that this sidelink logical channel is mapped to, when checking the SR trigger condition. Corresponds to ' sl-AllowedSCS-List' in TS 38.321 [3].
sl-BucketSizeDuration Value in ms. *ms5* corresponds to 5 ms, value *ms10* corresponds to 10 ms, and so on.
sl-ConfiguredGrantType1Allowed If present and set to true, or if the capability *lcp-RestrictionSidelink* as specified in TS 38.306 [26] is not indicated, SL MAC SDUs from this sidelink logical channel can be transmitted on a sidelink configured grant type 1. Otherwise, SL MAC SDUs from this logical channel cannot be transmitted on a sidelink configured grant type 1. Corresponds to 'sl-configuredGrantType1Allowed' in TS 38.321 [3].
sl-HARQ-FeedbackEnabled Network always includes this field. It indicates the HARQ feedback enabled/disabled restriction in LCP for this sidelink logical channel. If set to *enabled*, the sidelink logical channel will be multiplexed only with a logical channel which enabling the HARQ feedback. If set to *disabled*, the sidelink logical channel cannot be multiplexed with a logical channel which enabling the HARQ feedback. Corresponds to 'sl-HARQ-FeedbackEnabled' in TS 38.321 [3]. If this field of at least one sidelink logical channel for the UE is set to enabled, *sl-PSFCH-Config* should be mandatory present in configuration *SL-ResourcePool* of at least one of the sidelink resource pools.
sl-LogicalChannelGroup ID of the sidelink logical channel group, as specified in TS 38.321 [3], which the sidelink logical channel belongs to.
sl-LogicalChannelSR-DelayTimerApplied Indicates whether to apply the delay timer for SR transmission for this sidelink logical channel. Set to false if *logicalChannelSR-DelayTimer* is not included in *sl-BSR-Config*.
sl-MaxPUSCH-Duration If present, indicate the maximum PUSCH duration of UL-SCH resources that this sidelink logical channel is mapped to, when checking the SR trigger condition. Corresponds to "sl-MaxPUSCH-Duration" in TS 38.321 [3].
sl-PrioritisedBitRate Value in kiloBytes/s. Value *kBps0* corresponds to 0 kiloBytes/s, value *kBps8* corresponds to 8 kiloBytes/s, value *kBps16* corresponds to 16 kiloBytes/s, and so on.
sl-Priority Sidelink logical channel priority, as specified in TS 38.321 [3].
sl-SchedulingRequestId If present, it indicates the scheduling request configuration applicable for this sidelink logical channel, as specified in TS 38.321 [3].

– *SL-L2RelayUE-Config*

The IE *SL-L2RelayUE-Config* is used to configure L2 U2N relay operation related configurations used by L2 U2N Relay UE.

***SL-L2RelayUE-Config* information element**

```
-- ASN1START
-- TAG-SL-L2RELAYUE-CONFIG-START

SL-L2RelayUE-Config-r17 ::=        SEQUENCE {
    sl-RemoteUE-ToAddModList-r17       SEQUENCE (SIZE (1..maxNrofRemoteUE-r17)) OF SL-RemoteUE-ToAddMod-r17    OPTIONAL,    -- Need N
```

```
    sl-RemoteUE-ToReleaseList-r17      SEQUENCE (SIZE (1..maxNrofRemoteUE-r17)) OF SL-DestinationIdentity-r16  OPTIONAL,    -- Need N
    ...
}

SL-RemoteUE-ToAddMod-r17 ::=       SEQUENCE {
    sl-L2IdentityRemote-r17            SL-DestinationIdentity-r16,
    sl-SRAP-ConfigRelay-r17            SL-SRAP-Config-r17                                          OPTIONAL,    -- Need M
    ...
}

-- TAG-SL-L2RELAYUE-CONFIG-STOP
-- ASN1STOP
```

***SL-L2RelayUE-Config* field descriptions**
sl-RemoteUE-ToAddModList List of L2 U2N Remote UEs to be added and modified to the L2 U2N Relay UE.
sl-RemoteUE-ToReleaseList List of L2 U2N Remote UEs to be released by the L2 U2N Relay UE.

– *SL-L2RemoteUE-Config*

The IE *SL-L2RemoteUE-Config* is used to configure L2 U2N relay operation related configurations used by L2 U2N Remote UE.

***SL-L2RemoteUE-Config* information element**

```
-- ASN1START
-- TAG-SL-L2REMOTEUE-CONFIG-START

SL-L2RemoteUE-Config-r17 ::=      SEQUENCE {
    sl-SRAP-ConfigRemote-r17          SL-SRAP-Config-r17                                  OPTIONAL,  --Need M
    sl-UEIdentityRemote-r17           RNTI-Value                                          OPTIONAL, -- Cond FirstRRCReconfig
    ...
}
-- TAG-SL-L2REMOTEUE-CONFIG-STOP
-- ASN1STOP
```

***SL-L2RemoteUE-Config* field descriptions**
sl-SRAP-ConfigRemote Indicates SRAP configuration used for L2 U2N Remote UE.
sl-UEIdentityRemote Indicates the C-RNTI to the L2 U2N Remote UE.

Conditional Presence	Explanation
FirstRRCReconfig	This field is mandatory present in the first *RRCReconfiguration*. Otherwise the field is absent.

– *SL-MeasConfigCommon*

The IE *SL-MeasConfigCommon* is used to set the cell specific SL RSRP measurement configurations for unicast destinations.

SL-MeasConfigCommon information element

```
-- ASN1START
-- TAG-SL-MEASCONFIGCOMMON-START

SL-MeasConfigCommon-r16 ::=          SEQUENCE {
    sl-MeasObjectListCommon-r16          SL-MeasObjectList-r16                                  OPTIONAL,   -- Need R
    sl-ReportConfigListCommon-r16        SL-ReportConfigList-r16                                OPTIONAL,   -- Need R
    sl-MeasIdListCommon-r16              SL-MeasIdList-r16                                      OPTIONAL,   -- Need R
    sl-QuantityConfigCommon-r16          SL-QuantityConfig-r16                                  OPTIONAL,   -- Need R
    ...
}

-- TAG-SL-MEASCONFIGCOMMON-STOP
-- ASN1STOP
```

***SL-MeasConfigCommon* field descriptions**
sl-MeasIdListCommon List of sidelink measurement identities
sl-MeasObjectListCommon List of sidelink measurement objects.
sl-QuantityConfigCommon Indicates the layer 3 filtering coefficient for sidelink measurement.
sl-ReportConfigListCommon List of sidelink measurement reporting configurations.

– *SL-MeasConfigInfo*

The IE *SL-MeasConfigInfo* is used to set RSRP measurement configurations for unicast destinations.

SL-MeasConfigInfo information element

```
-- ASN1START
-- TAG-SL-MEASCONFIGINFO-START

SL-MeasConfigInfo-r16 ::=           SEQUENCE {
    sl-DestinationIndex-r16             SL-DestinationIndex-r16,
    sl-MeasConfig-r16                   SL-MeasConfig-r16,
    ...
}

SL-MeasConfig-r16 ::=               SEQUENCE {
    sl-MeasObjectToRemoveList-r16       SL-MeasObjectToRemoveList-r16                          OPTIONAL,   -- Need N
```

```
    sl-MeasObjectToAddModList-r16       SL-MeasObjectList-r16                                   OPTIONAL,   -- Need N
    sl-ReportConfigToRemoveList-r16     SL-ReportConfigToRemoveList-r16                         OPTIONAL,   -- Need N
    sl-ReportConfigToAddModList-r16     SL-ReportConfigList-r16                                 OPTIONAL,   -- Need N
    sl-MeasIdToRemoveList-r16           SL-MeasIdToRemoveList-r16                               OPTIONAL,   -- Need N
    sl-MeasIdToAddModList-r16           SL-MeasIdList-r16                                       OPTIONAL,   -- Need N
    sl-QuantityConfig-r16               SL-QuantityConfig-r16                                   OPTIONAL,   -- Need M
    ...
}

SL-MeasObjectToRemoveList-r16 ::=   SEQUENCE (SIZE (1..maxNrofSL-ObjectId-r16)) OF SL-MeasObjectId-r16

SL-ReportConfigToRemoveList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-ReportConfigId-r16)) OF SL-ReportConfigId-r16

SL-MeasIdToRemoveList-r16 ::=       SEQUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF SL-MeasId-r16

-- TAG-SL-MEASCONFIGINFO-STOP
-- ASN1STOP
```

***SL-MeasConfigInfo* field descriptions**
sl-MeasIdToAddModList List of sidelink measurement identities to add and/or modify.
sl-MeasIdToRemoveList List of sidelink measurement identities to remove.
sl-MeasObjectToAddModList List of sidelink measurement objects to add and/or modify.
sl-MeasObjectToRemoveList List of sidelink measurement objects to remove.
sl-QuantityConfig Indicates the layer 3 filtering coefficient for sidelink measurement.
sl-ReportConfigToAddModList List of sidelink measurement reporting configurations to add and/or modify.
sl-ReportConfigToRemoveList List of sidelink measurement reporting configurations to remove.

– *SL-MeasIdList*

The IE *SL-MeasIdList* concerns a list of SL measurement identities to add or modify for a destination, with for each entry the *sl-MeasId*, the associated *sl-MeasObjectId* and the associated *sl-ReportConfigId*.

SL-MeasIdList information element

```
-- ASN1START
-- TAG-SL-MEASIDLIST-START

SL-MeasIdList-r16 ::=               SEQUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF SL-MeasIdInfo-r16

SL-MeasIdInfo-r16 ::=               SEQUENCE {
```

```
    sl-MeasId-r16                       SL-MeasId-r16,
    sl-MeasObjectId-r16                 SL-MeasObjectId-r16,
    sl-ReportConfigId-r16               SL-ReportConfigId-r16,
    ...
}

SL-MeasId-r16 ::=                   INTEGER (1..maxNrofSL-MeasId-r16)

-- TAG-SL-MEASIDLIST-STOP
-- ASN1STOP
```

– *SL-MeasObjectList*

The IE *SL-MeasObjectList* concerns a list of SL measurement objects to add or modify for a destination.

SL-MeasObjectList information element

```
-- ASN1START
-- TAG-SL-MEASOBJECTLIST-START

SL-MeasObjectList-r16 ::=               SEQUENCE (SIZE (1..maxNrofSL-ObjectId-r16)) OF SL-MeasObjectInfo-r16

SL-MeasObjectInfo-r16 ::=               SEQUENCE {
    sl-MeasObjectId-r16                     SL-MeasObjectId-r16,
    sl-MeasObject-r16                       SL-MeasObject-r16,
    ...
}

SL-MeasObjectId-r16 ::=                 INTEGER (1..maxNrofSL-ObjectId-r16)

SL-MeasObject-r16 ::=                   SEQUENCE {
    frequencyInfoSL-r16                     ARFCN-ValueNR,
    ...
}

-- TAG-SL-MEASOBJECTLIST-STOP
-- ASN1STOP
```

***SL-MeasObjectList* field descriptions**
frequencyInfoSL It indicates the lowest usable subcarrier on the carrier where SL RSRP is measured, determined according to *sl-AbsoluteFrequencyPointA* in IE *SL-FreqConfig/SL-FreqConfigCommon* and *offsetToCarrier* in IE *SCS-SpecificCarrier* configured for *sl-SCS-SpecificCarrierList* in IE *SL-FreqConfig/SL-FreqConfigCommon*. See TS 38.211 [16], clause 8.2.5.
sl-MeasObjectId It is used to identify a sidelink measurement object configuration.
sl-MeasObject It specifies information applicable for sidelink DMRS measurement.

– *SL-PagingIdentityRemoteUE*

The IE *SL-PagingIdentityRemoteUE* includes the Remote UE's paging UE ID.

SL-PagingIdentityRemoteUE information element

```
-- ASN1START
-- TAG-SL-PAGINGIDENTITYREMOTEUE-START

SL-PagingIdentityRemoteUE-r17 ::=  SEQUENCE {
    ng-5G-S-TMSI-r17                    NG-5G-S-TMSI,
    fullI-RNTI-r17                      I-RNTI-Value                    OPTIONAL    -- Need R
}

-- TAG-SL-PAGINGIDENTITYREMOTEUE-STOP
-- ASN1STOP
```

– *SL-PBPS-CPS-Config*

The IE *SL-PBPS-CPS-Config* specifies the operation information for a resource pool which can be (pre-)configured to enable full sensing only, partial sensing only, random resource selection only, or any combination(s) thereof.

SL-PBPS-CPS-Config information element

```
-- ASN1START
-- TAG-SL-PBPS-CPS-CONFIG-START

SL-PBPS-CPS-Config-r17 ::=              SEQUENCE {
sl-AllowedResourceSelectionConfig-r17   ENUMERATED {c1, c2, c3, c4, c5, c6, c7}                 OPTIONAL,   -- Need M
sl-MinNumCandidateSlotsPeriodic-r17     INTEGER (1..32)                                         OPTIONAL,   -- Need M
sl-PBPS-OccasionReservePeriodList-r17   SEQUENCE (SIZE (1..16)) OF INTEGER (1..16)             OPTIONAL,   -- Need M
sl-Additional-PBPS-Occasion-r17         ENUMERATED { monitored }                                OPTIONAL,   -- Need M
sl-CPS-WindowPeriodic-r17               INTEGER (5..30)                                         OPTIONAL,   -- Need M
sl-MinNumCandidateSlotsAperiodic-r17    INTEGER (1..32)                                         OPTIONAL,   -- Need M
sl-MinNumRssiMeasurementSlots-r17       INTEGER (1..800)                                        OPTIONAL,   -- Need M
sl-DefaultCBR-RandomSelection-r17       INTEGER (0..100)                                        OPTIONAL,   -- Need M
sl-DefaultCBR-PartialSensing-r17        INTEGER (0..100)                                        OPTIONAL,   -- Need M
sl-CPS-WindowAperiodic-r17              INTEGER (0..30)                                         OPTIONAL,   -- Need M
sl-PartialSensingInactiveTime-r17       ENUMERATED { enabled, disabled }                        OPTIONAL,   -- Need M
    ...
}

-- TAG-SL-PBPS-CPS-CONFIG-STOP
-- ASN1STOP
```

***SL-PBPS-CPS-Config* field descriptions**
sl-Additional-PBPS-Occasion Indicates that UE additionally monitors periodic sensing occasions that correspond to a set of values. (see TS 38.214 [19], clause 8.1.4).
sl-AllowedResourceSelectionConfig Indicates the allowed resource selection mechanism(s), i.e. full sensing only, partial sensing only, random resource selection only, or any combination(s) thereof. (see TS 38.214 [19], clause 8.1.4). Only c1, c4 , c5 or c7 can be configured for a Rel-16 resource pool. If this field is not configured for a resource pool included in *sl-TxPoolSelectedNormal*, only full sensing is allowed in the corresponding resource pool. c1: only full sensing allowed c2: only partial sensing allowed c3: only random selection allowed c4: full sensing+random selection allowed c5: full sensing+ partial sensing allowed c6: partial sensing + random selection allowed c7: full sensing+ partial sensing + random selection allowed.
sl-CPS-WindowAperiodic Parameter that indicates the minimum size of contiguous partial sensing window in logical slot units for a resource (re)selection procedure and re-evaluation/pre-emption checking triggered by aperiodic transmission. (see TS 38.214 [19], clause 8.1.4). If not configured, the size of contiguous partial sensing window in logical slot units is 31.
sl-CPS-WindowPeriodic Indicates the size of contiguous partial sensing window in logical slot units when UE performs periodic-based and contiguous partial sensing for a resource (re)selection procedure triggered by periodic transmission. If not configured, the size of contiguous partial sensing window in logical slot units is 31.
sl-DefaultCBR-PartialSensing Indicates default value of SL CBR measurement for a UE that is configured to perform partial sensing by its higher layer (including when SL DRX is configured) if the number of SL RSSI measurement slots over CBR measurement window is below *sl-MinNumRssiMeasurementSlots*, (see TS 38.214 [19], clause 8.1.6). Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.
sl-DefaultCBR-RandomSelection Indicates default value of CBR measurement for a UE that performs random resource selection if no SL CBR measurement result over SL CBR measurement window, (see TS 38.214 [19], clause 8.1.6). Value 0 corresponds to 0, value 1 to 0.01, value 2 to 0.02, and so on.
sl-MinNumCandidateSlotsAperiodic Indicates the minimum number of Y' slots that are included in the possible candidate resources corresponding to periodic-based partial sensing and/or contiguous partial sensing for resource (re)selection triggered by aperiodic transmission. (see TS 38.214 [19], clause 8.1.4).
sl-MinNumCandidateSlotsPeriodic Indicates the minimum number of Y slots that are included in the possible candidate resources corresponding to periodic-based partial sensing for resource (re)selection triggered by periodic transmission. (see TS 38.214 [19], clause 8.1.4).
sl-MinNumRssiMeasurementSlots Indicates a threshold for a minimum number of SL RSSI measurement slots over CBR measurement window for which the SL RSSI is measured for a UE that is configured to perform partial sensing by its higher layer (including when SL DRX is configured). (see TS 38.214 [19], clause 8.1.6).
sl-PartialSensingInactiveTime Indicates whether or not UE is required to perform SL reception of PSCCH and RSRP measurement for partial sensing on slots in SL DRX inactive time when partial sensing is configured by its higher layer. (see TS 38.214 [19], clause 8.1.4).
sl-PBPS-OccasionReservePeriodList Indicates the subset of periodicity values from *sl-ResourceReservePeriodList* used to determine periodic sensing occasions in periodic-based partial sensing, by means of an index to the corresponding entry in *sl-ResourceReservePeriodList-r16*. If not configured, all periodicity values from *sl-ResourceReservePeriodList* are used to determine periodic sensing occasions in periodic-based partial sensing (see TS 38.214 [19], clause 8.1.4).

– *SL-PDCP-Config*

The IE *SL-PDCP-Config* is used to set the configurable PDCP parameters for a sidelink radio bearer.

SL-PDCP-Config information element

```
-- ASN1START
-- TAG-SL-PDCP-CONFIG-START

SL-PDCP-Config-r16 ::=      SEQUENCE {
    sl-DiscardTimer-r16         ENUMERATED {ms3, ms10, ms20, ms25, ms30, ms40, ms50, ms60, ms75, ms100, ms150, ms200,
                                ms250, ms300, ms500, ms750, ms1500, infinity}                                   OPTIONAL, -- Cond Setup
    sl-PDCP-SN-Size-r16         ENUMERATED {len12bits, len18bits}                                               OPTIONAL, -- Cond Setup2
    sl-OutOfOrderDelivery       ENUMERATED { true }                                                             OPTIONAL,    -- Need R
    ...
}

-- TAG-SL-PDCP-CONFIG-STOP
-- ASN1STOP
```

***SL-PDCP-Config* field descriptions**
sl-DiscardTimer Value in ms of *discardTimer* specified in TS 38.323 [5]. Value *ms50* corresponds to 50 ms, value *ms100* corresponds to 100 ms and so on.
sl-OutOfOrderDelivery Indicates whether or not outOfOrderDelivery specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established.
sl-PDCP-SN-Size PDCP sequence number size for unicast NR sidelink communication, 12 or 18 bits, as specified in TS 38.323 [5]. For groupcast and broadcast NR sidelink communication, only 12 bits is applicable, as specified in 9.1.1.5.

Conditional Presence	Explanation
Setup	The field is mandatory present in case of sidelink DRB setup via dedicated signaling and in case of sidelink DRB configuration via system information and pre-configuration; otherwise the field is optionally present, need M.
Setup2	The field is mandatory present in case of sidelink DRB setup via dedicated signaling and in case of sidelink DRB configuration via system information and pre-configuration for RLC-AM and RLC-UM for unicast NR sidelink communication; otherwise the field is not present, Need M.

– *SL-PSBCH-Config*

The IE *SL-PSBCH-Config* indicates PSBCH transmission parameters on each sidelink bandwidth part.

SL-PSBCH-Config information element

```
-- ASN1START
```

```
-- TAG-SL-PSBCH-CONFIG-START

SL-PSBCH-Config-r16 ::= SEQUENCE {
    dl-P0-PSBCH-r16         INTEGER (-16..15)                                                                   OPTIONAL,    -- Need M
    dl-Alpha-PSBCH-r16      ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}   OPTIONAL,    -- Need M
    ...,
    [[
    dl-P0-PSBCH-r17         INTEGER (-202..24)                                                                  OPTIONAL     -- Need M
    ]]
}

-- TAG-SL-PSBCH-CONFIG-STOP
-- ASN1STOP
```

***SL-PSBCH-Config* field descriptions**
dl-Alpha-PSBCH Indicates alpha value for DL pathloss based power control for PSBCH. When the field is not configured the UE applies the value 1.
dl-P0-PSBCH Indicates P0 value for DL pathloss based power control for PSBCH. If not configured, DL pathloss based power control is disabled for PSBCH. When *dl-P0-PSBCH-r17* is configured, the UE ignores *dl-P0-PSBCH-r16*. A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSBCH when *dl-P0-PSBCH* is configured.

– *SL-PSSCH-TxConfigList*

The IE *SL-PSSCH-TxConfigList* indicates PSSCH transmission parameters. When lower layers select parameters from the range indicated in IE *SL-PSSCH-TxConfigList*, the UE considers both configurations in IE *SL-PSSCH-TxConfigList* and the CBR-dependent configurations represented in IE *SL-CBR-PriorityTxConfigList*. Only one IE *SL-PSSCH-TxConfig* is provided per *SL-TypeTxSync*.

***SL-PSSCH-TxConfigList* information element**

```
-- ASN1START
-- TAG-SL-PSSCH-TXCONFIGLIST-START

SL-PSSCH-TxConfigList-r16 ::=    SEQUENCE (SIZE (1..maxPSSCH-TxConfig-r16)) OF SL-PSSCH-TxConfig-r16

SL-PSSCH-TxConfig-r16 ::=        SEQUENCE {
    sl-TypeTxSync-r16               SL-TypeTxSync-r16                                   OPTIONAL,    -- Need R
    sl-ThresUE-Speed-r16            ENUMERATED {kmph60, kmph80, kmph100, kmph120,
                                                kmph140, kmph160, kmph180, kmph200},
    sl-ParametersAboveThres-r16     SL-PSSCH-TxParameters-r16,
    sl-ParametersBelowThres-r16     SL-PSSCH-TxParameters-r16,
    ...,
    [[
    sl-ParametersAboveThres-v1650   SL-MinMaxMCS-List-r16                               OPTIONAL,    -- Need R
    sl-ParametersBelowThres-v1650   SL-MinMaxMCS-List-r16                               OPTIONAL     -- Need R
    ]]
}
```

```
SL-PSSCH-TxParameters-r16 ::=    SEQUENCE {
    sl-MinMCS-PSSCH-r16              INTEGER (0..27),
    sl-MaxMCS-PSSCH-r16              INTEGER (0..31),
    sl-MinSubChannelNumPSSCH-r16     INTEGER (1..27),
    sl-MaxSubchannelNumPSSCH-r16     INTEGER (1..27),
    sl-MaxTxTransNumPSSCH-r16        INTEGER (1..32),
    sl-MaxTxPower-r16                SL-TxPower-r16                                  OPTIONAL    -- Cond CBR
}

-- TAG-SL-PSSCH-TXCONFIGLIST-STOP
-- ASN1STOP
```

***SL-PSSCH-TxConfigList* field descriptions**
sl-MaxTxTransNumPSSCH Indicates the maximum transmission number (including new transmission and retransmission) for PSSCH.
sl-MaxTxPower This field indicates the maximum transmission power for transmission on PSSCH and PSCCH.
sl-MinMCS-PSSCH, sl-MaxMCS-PSSCH This field indicates the minimum and maximum MCS values used for transmissions on PSSCH. The UE shall ignore the minimum and maximum MCS values used for the associated MCS table(s) in *sl-ParametersAboveThres-r16* and *sl-ParametersBelowThres-r16* if *sl-ParametersAboveThres-v1650* and *sl-ParametersBelowThres-v1650* are present, respectively.
sl-MinSubChannelNumPSSCH, sl-MaxSubChannelNumPSSCH This field indicates the minimum and maximum number of sub-channels which may be used for transmissions on PSSCH.
sl-TypeTxSync This field indicates the synchronization reference type. For configurations by the eNB/gNB, only *gnbEnb* can be configured; and for pre-configuration or when this field is absent, the configuration is applicable for all synchronization reference types.
sl-ThresUE-Speed This field indicates a UE absolute speed threshold.

Conditional Presence	Explanation
CBR	The field is optionally present, Need R, when the IE *SL-PSSCH-TxParameters* is present in *SL-CBR-CommonTxConfigList, SL-UE-SelectedConfig, SIB12* or *SidelinkPreconfigNR*; otherwise the field is not present, need R.

– *SL-QoS-FlowIdentity*

The IE *SL-QoS-FlowIdentity* is used to identify a sidelink QoS flow.

***SL-QoS-FlowIdentity* information element**

```
-- ASN1START
-- TAG-SL-QOS-FLOWIDENTITY-START

SL-QoS-FlowIdentity-r16 ::=                 INTEGER (1..maxNrofSL-QFIs-r16)
```

```
-- TAG-SL-QOS-FLOWIDENTITY-STOP
-- ASN1STOP
```

– *SL-QoS-Profile*

The IE *SL-QoS-Profile* is used to give the QoS parameters for a sidelink QoS flow. Need codes or conditions specified for *SL-QoS-Profile* do not apply, in case *SL-QoS-Profile* is included in *SidelinkUEInformationNR*.

SL-QoS-Profile information element

```
-- ASN1START
-- TAG-SL-QOS-PROFILE-START

SL-QoS-Profile-r16 ::=          SEQUENCE {
    sl-PQI-r16                      SL-PQI-r16                                              OPTIONAL,   -- Need R
    sl-GFBR-r16                     INTEGER (0..4000000000)                                 OPTIONAL,   -- Need R
    sl-MFBR-r16                     INTEGER (0..4000000000)                                 OPTIONAL,   -- Need R
    sl-Range-r16                    INTEGER (1..1000)                                       OPTIONAL,   -- Need R
    ...
}

SL-PQI-r16 ::=                  CHOICE {
    sl-StandardizedPQI-r16          INTEGER (0..255),
    sl-Non-StandardizedPQI-r16      SEQUENCE {
        sl-ResourceType-r16             ENUMERATED {gbr, non-GBR, delayCriticalGBR, spare1}     OPTIONAL,   -- Need R
        sl-PriorityLevel-r16            INTEGER (1..8)                                          OPTIONAL,   -- Need R
        sl-PacketDelayBudget-r16        INTEGER (0..1023)                                       OPTIONAL,   -- Need R
        sl-PacketErrorRate-r16          INTEGER (0..9)                                          OPTIONAL,   -- Need R
        sl-AveragingWindow-r16          INTEGER (0..4095)                                       OPTIONAL,   -- Need R
        sl-MaxDataBurstVolume-r16       INTEGER (0..4095)                                       OPTIONAL,   -- Need R
    ...
   }
}

-- TAG-SL-QOS-PROFILE-STOP
-- ASN1STOP
```

***SL-QoS-Profile* field descriptions**
sl-GFBR Indicate the guaranteed bit rate for a GBR QoS flow. The unit is: Kbit/s
sl-MFBR Indicate the maximum bit rate for a GBR QoS flow. The unit is: Kbit/s
sl-PQI This field indicates either the PQI for standardized PQI or non-standardized QoS parameters.
sl-Range This field indicates the range parameter of the Qos flow, as defined in clause 5.4.1.1.1, TS 23.287 [55]. It is present only for groupcast. The unit is meter.

***SL-PQI* field descriptions**
sl-AveragingWindow Indicates the Averaging Window for a QoS flow, and applies to GBR QoS flows only. Unit: ms. The default value of the IE is 2000ms.
sl-MaxDataBurstVolume Indicates the Maximum Data Burst Volume for a QoS flow, and applies to delay critical GBR QoS flows only. Unit: byte.
sl-PacketDelayBudget Indicates the Packet Delay Budget for a QoS flow. Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.
sl-PacketErrorRate Indicates the Packet Error Rate for a QoS flow. The packet error rate is expressed as Scalar x 10-k where k is the Exponent.
sl-PriorityLevel Indicates the Priority Level for a QoS flow. Values ordered in decreasing order of priority, i.e. with 1 as the highest priority and 8 as the lowest priority.
sl-StandardizedPQI Indicate the PQI for standardized PQI.

– *SL-QuantityConfig*

The IE *SL-QuantityConfig* specifies the layer 3 filtering coefficients for NR SL RSRP measurement for a destination.

***SL-QuantityConfig* information element**

```
-- ASN1START
-- TAG-SL-QUANTITYCONFIG-START

SL-QuantityConfig-r16 ::=               SEQUENCE {
    sl-FilterCoefficientDMRS-r16            FilterCoefficient                           DEFAULT fc4,
    ...
}

-- TAG-SL-QuantityConfig-STOP
-- ASN1STOP
```

***SL-QuantityConfig* field descriptions**
sl-FilterCoefficientDMRS DMRS based L3 filter configuration: Specifies L3 filter configuration for sidelink RSRP measurement result from the L1 fiter(s), as defined in TS 38.215 [9].

– *SL-RadioBearerConfig*

The IE *SL-RadioBearerConfig* specifies the sidelink DRB configuration information for NR sidelink communication.

***SL-RadioBearerConfig* information element**

```
-- ASN1START
```

```
-- TAG-SL-RADIOBEARERCONFIG-START

SL-RadioBearerConfig-r16 ::=     SEQUENCE {
    slrb-Uu-ConfigIndex-r16          SLRB-Uu-ConfigIndex-r16,
    sl-SDAP-Config-r16               SL-SDAP-Config-r16                                          OPTIONAL,    -- Cond SLRBSetup
    sl-PDCP-Config-r16               SL-PDCP-Config-r16                                          OPTIONAL,    -- Cond SLRBSetup
    sl-TransRange-r16                ENUMERATED {m20, m50, m80, m100, m120, m150, m180, m200, m220, m250, m270, m300, m350, m370,
                                                 m400, m420, m450, m480, m500, m550, m600, m700, m1000, spare9, spare8, spare7, spare6,
                                                 spare5, spare4, spare3, spare2, spare1}         OPTIONAL,    -- Need R
    ...
}

-- TAG-SL-RADIOBEARERCONFIG-STOP
-- ASN1STOP
```

***SL-RadioBearerConfig* field descriptions**
sl-PDCP-Config This field indicates the PDCP parameters for the sidelink DRB.
sl-SDAP-Config This field indicates how to map sidelink QoS flows to sidelink DRB.
slrb-Uu-ConfigIndex This field indicates the index of sidelink DRB configuration.
sl-TransRange This field indicates the transmission range of the sidelink DRB. The unit is meter.

Conditional Presence	Explanation
SLRBSetup	The field is mandatory present in case of sidelink DRB setup via the dedicated signalling and in case of sidelink DRB configuration via system information and pre-configuration; otherwise the field is optionally present, need M.

– *SL-RelayUE-Config*

The IE *SL-RelayUE-Config* specifies the configuration information for NR sidelink U2N Relay UE.

***SL-RelayUE-Config* information element**

```
-- ASN1START
-- TAG-SL-RELAYUE-CONFIG-START

SL-RelayUE-Config-r17::=          SEQUENCE {
    threshHighRelay-r17               RSRP-Range                        OPTIONAL,     -- Need R
    threshLowRelay-r17                RSRP-Range                        OPTIONAL,     -- Need R
    hystMaxRelay-r17                  Hysteresis                        OPTIONAL,     -- Cond ThreshHighRelay
    hystMinRelay-r17                  Hysteresis                        OPTIONAL      -- Cond ThreshLowRelay
}

-- TAG-SL-RELAYUE-CONFIG-STOP
```

```
-- ASN1STOP
```

***SL-RelayUE-Config* field descriptions**
threshHighRelay Indicates the upper threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N relay UE operation.
threshLowRelay Indicates the lower threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N relay UE operation.

Conditional Presence	Explanation
ThreshHighRelay	This field is mandatory present if threshHighRelay is included. Otherwise, the field is absent, Need R.
ThreshLowRelay	This field is mandatory present if threshLowRelay is included. Otherwise, the field is absent, Need R.

– *SL-RemoteUE-Config*

The IE *SL-RemoteUE-Config* specifies the configuration information for NR sidelink U2N Remote UE.

***SL-RemoteUE-Config* information element**

```
-- ASN1START
-- TAG-SL-REMOTEUE-CONFIG-START

SL-RemoteUE-Config-r17::=           SEQUENCE {
    threshHighRemote-r17                RSRP-Range                          OPTIONAL,     -- Need R
    hystMaxRemote-r17                   Hysteresis                          OPTIONAL,     -- Cond ThreshHighRemote
    sl-ReselectionConfig-r17            SL-ReselectionConfig-r17            OPTIONAL      -- Need R
}

SL-ReselectionConfig-r17::=         SEQUENCE {
    sl-RSRP-Thresh-r17                  SL-RSRP-Range-r16                   OPTIONAL,     -- Need R
    sl-FilterCoefficientRSRP-r17        FilterCoefficient                   OPTIONAL,     -- Need R
    sl-HystMin-r17                      Hysteresis                          OPTIONAL      -- Cond SL-RSRP-Thresh
}

-- TAG-SL-REMOTEUE-CONFIG-STOP
-- ASN1STOP
```

***SL-RemoteUE-Config* field descriptions**
sl-ReselectionConfig Includes the parameters used by the U2N remote UE when selecting/ reselecting a U2N relay UE.
thresHighRemote Indicates the threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N remote UE operation.

***SL-ReselectionConfig* field descriptions**
sl-FilterCoefficientRSRP
Specifies L3 filter coefficient for SL communication/ discovery RSRP measurement results from L1 filter.
sl-RSRP-Thresh
Indicates the threshold of SL communication/ discovery RSRP for a U2N remote UE to perform relay UE selection/ reselection.

Conditional Presence	Explanation
SL-RSRP-Thresh	This field is mandatory present if *sl-RSRP-Thresh* is included. Otherwise, the field is absent, Need R.
ThreshHighRemote	This field is mandatory present if threshHighRemote is included. Otherwise, the field is absent, Need R.

– *SL-ReportConfigList*

The IE *SL-ReportConfigList* concerns a list of SL measurement reporting configurations to add or modify for a destination.

***SL-ReportConfigList* information element**

```
-- ASN1START
-- TAG-SL-REPORTCONFIGLIST-START

SL-ReportConfigList-r16 ::=           SEQUENCE (SIZE (1..maxNrofSL-ReportConfigId-r16)) OF SL-ReportConfigInfo-r16

SL-ReportConfigInfo-r16 ::=           SEQUENCE {
    sl-ReportConfigId-r16                     SL-ReportConfigId-r16,
    sl-ReportConfig-r16                       SL-ReportConfig-r16,
    ...
}

SL-ReportConfigId-r16 ::=             INTEGER (1..maxNrofSL-ReportConfigId-r16)

SL-ReportConfig-r16 ::=               SEQUENCE {
    sl-ReportType-r16                     CHOICE {
        sl-Periodical-r16                     SL-PeriodicalReportConfig-r16,
        sl-EventTriggered-r16                 SL-EventTriggerConfig-r16,
        ...
    },
    ...
}

SL-PeriodicalReportConfig-r16 ::=     SEQUENCE {
    sl-ReportInterval-r16                 ReportInterval,
    sl-ReportAmount-r16                   ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    sl-ReportQuantity-r16                 SL-MeasReportQuantity-r16,
    sl-RS-Type-r16                        SL-RS-Type-r16,
    ...
}

SL-EventTriggerConfig-r16 ::=        SEQUENCE {
    sl-EventId-r16                       CHOICE {
```

```
        eventS1-r16                         SEQUENCE {
            s1-Threshold-r16                    SL-MeasTriggerQuantity-r16,
            sl-ReportOnLeave-r16                BOOLEAN,
            sl-Hysteresis-r16                   Hysteresis,
            sl-TimeToTrigger-r16                TimeToTrigger,
            ...
        },
        eventS2-r16                         SEQUENCE {
            s2-Threshold-r16                    SL-MeasTriggerQuantity-r16,
            sl-ReportOnLeave-r16                BOOLEAN,
            sl-Hysteresis-r16                   Hysteresis,
            sl-TimeToTrigger-r16                TimeToTrigger,
            ...
        },
        ...
    },
    sl-ReportInterval-r16               ReportInterval,
    sl-ReportAmount-r16                     ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    sl-ReportQuantity-r16                   SL-MeasReportQuantity-r16,
    sl-RS-Type-r16                          SL-RS-Type-r16,
    ...
}

SL-MeasReportQuantity-r16 ::=       CHOICE {
    sl-RSRP-r16                         BOOLEAN,
    ...
}

SL-MeasTriggerQuantity-r16 ::=      CHOICE {
    sl-RSRP-r16                         RSRP-Range,
    ...
}

SL-RS-Type-r16 ::=                  ENUMERATED {dmrs, spare3, spare2, spare1}

-- TAG-SL-REPORTCONFIGLIST-STOP
-- ASN1STOP
```

***SL-ReportConfig* field descriptions**
sl-ReportType
Type of the configured sidelink measurement report.

***SL-EventTriggerConfig* field descriptions**
sl-EventId Choice of sidelink measurement event triggered reporting criteria.
sl-ReportAmount Number of sidelink measurement reports applicable for *sl-EventTriggered* report type.
sl-ReportInterval Indicates the interval between periodical reports (i.e., when *sl-ReportAmount* exceeds 1) for *sl-EventTriggered* report type.
sl-ReportOnLeave indicates whether or not the UE shall initiate the sidelink measurement reporting procedure when the leaving condition is met for a frequency in *sl-FrequencyTriggeredList*, as specified in 5.8.10.4.1.
sl-ReportQuantity The sidelink measurement quantities to be included in the sidelink measurement report.
sl-TimeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a sidelink measurement report.
sN-Threshold Threshold used for events S1 and S2 specified in clauses 5.8.10.4.2 and 5.8.10.4.3, respectively.

***SL-PeriodicalReportConfig* field descriptions**
sl-ReportAmount Number of sidelink measurement reports applicable for *sl-Periodical* report type.
sl-ReportInterval Indicates the interval between periodical reports (i.e., when *sl-ReportAmount* exceeds 1) for *sl-Periodical* report type.
sl-ReportQuantity The sidelink measurement quantities to be included in the sidelink measurement report.

– *SL-ResourcePool*

The IE *SL-ResourcePool* specifies the configuration information for NR sidelink communication resource pool.

***SL-ResourcePool* information element**

```
-- ASN1START
-- TAG-SL-RESOURCEPOOL-START

SL-ResourcePool-r16 ::=             SEQUENCE {
    sl-PSCCH-Config-r16                 SetupRelease { SL-PSCCH-Config-r16 }                                OPTIONAL,   -- Need M
    sl-PSSCH-Config-r16                 SetupRelease { SL-PSSCH-Config-r16 }                                OPTIONAL,   -- Need M
    sl-PSFCH-Config-r16                 SetupRelease { SL-PSFCH-Config-r16 }                                OPTIONAL,   -- Need M
    sl-SyncAllowed-r16                  SL-SyncAllowed-r16                                                  OPTIONAL,   -- Need M
    sl-SubchannelSize-r16               ENUMERATED {n10, n12, n15, n20, n25, n50, n75, n100}                OPTIONAL,   -- Need M
    dummy                               INTEGER (10..160)                                                   OPTIONAL,   -- Need M
    sl-StartRB-Subchannel-r16           INTEGER (0..265)                                                    OPTIONAL,   -- Need M
    sl-NumSubchannel-r16                INTEGER (1..27)                                                     OPTIONAL,   -- Need M
    sl-Additional-MCS-Table-r16         ENUMERATED {qam256, qam64LowSE, qam256-qam64LowSE }                 OPTIONAL,   -- Need M
    sl-ThreshS-RSSI-CBR-r16             INTEGER (0..45)                                                     OPTIONAL,   -- Need M
    sl-TimeWindowSizeCBR-r16            ENUMERATED {ms100, slot100}                                         OPTIONAL,   -- Need M
```

```
    sl-TimeWindowSizeCR-r16             ENUMERATED {ms1000, slot1000}                                   OPTIONAL,   -- Need M
    sl-PTRS-Config-r16                  SL-PTRS-Config-r16                                              OPTIONAL,    -- Need M
    sl-UE-SelectedConfigRP-r16          SL-UE-SelectedConfigRP-r16                                      OPTIONAL,   -- Need M
    sl-RxParametersNcell-r16            SEQUENCE {
        sl-TDD-Configuration-r16            TDD-UL-DL-ConfigCommon                                      OPTIONAL,   -- Need M
        sl-SyncConfigIndex-r16              INTEGER (0..15)
    }                                                                                                   OPTIONAL,   -- Need M
    sl-ZoneConfigMCR-List-r16           SEQUENCE (SIZE (16)) OF SL-ZoneConfigMCR-r16                    OPTIONAL,   -- Need M
    sl-FilterCoefficient-r16            FilterCoefficient                                               OPTIONAL,   -- Need M
    sl-RB-Number-r16                    INTEGER (10..275)                                               OPTIONAL,   -- Need M
    sl-PreemptionEnable-r16             ENUMERATED {enabled, pl1, pl2, pl3, pl4, pl5, pl6, pl7, pl8}    OPTIONAL,   -- Need R
    sl-PriorityThreshold-UL-URLLC-r16   INTEGER (1..9)                                                  OPTIONAL,   -- Need M
    sl-PriorityThreshold-r16            INTEGER (1..9)                                                  OPTIONAL,   -- Need M
    sl-X-Overhead-r16                   ENUMERATED {n0,n3, n6, n9}                                      OPTIONAL,   -- Need S
    sl-PowerControl-r16                 SL-PowerControl-r16                                             OPTIONAL,   -- Need M
    sl-TxPercentageList-r16             SL-TxPercentageList-r16                                         OPTIONAL,   -- Need M
    sl-MinMaxMCS-List-r16               SL-MinMaxMCS-List-r16                                           OPTIONAL,   -- Need M
    ...,
    [[
    sl-TimeResource-r16                 BIT STRING (SIZE (10..160))                                     OPTIONAL    -- Need M
    ]],
    [[
    sl-PBPS-CPS-Config-r17              SetupRelease { SL-PBPS-CPS-Config-r17 }                         OPTIONAL,   -- Need M
    sl-InterUE-CoordinationConfig-r17   SetupRelease { SL-InterUE-CoordinationConfig-r17 }              OPTIONAL    -- Need M
    ]]
}

SL-ZoneConfigMCR-r16 ::=                SEQUENCE {
    sl-ZoneConfigMCR-Index-r16              INTEGER (0..15),
    sl-TransRange-r16                       ENUMERATED {m20, m50, m80, m100, m120, m150, m180, m200, m220, m250, m270, m300, m350,
                                                        m370, m400, m420, m450, m480, m500, m550, m600, m700, m1000, spare9, spare8,
                                                        spare7, spare6, spare5, spare4, spare3, spare2, spare1}
                                                                                                        OPTIONAL,   -- Need M
    sl-ZoneConfig-r16                       SL-ZoneConfig-r16                                           OPTIONAL,   -- Need M
    ...
}

SL-SyncAllowed-r16 ::=                  SEQUENCE {
    gnss-Sync-r16                           ENUMERATED {true}                                           OPTIONAL,   -- Need R
    gnbEnb-Sync-r16                         ENUMERATED {true}                                           OPTIONAL,   -- Need R
    ue-Sync-r16                             ENUMERATED {true}                                           OPTIONAL    -- Need R
}

SL-PSCCH-Config-r16 ::=                 SEQUENCE {
    sl-TimeResourcePSCCH-r16                ENUMERATED {n2, n3}                                         OPTIONAL,   -- Need M
    sl-FreqResourcePSCCH-r16                ENUMERATED {n10,n12, n15, n20, n25}                         OPTIONAL,   -- Need M
    sl-DMRS-ScrambleID-r16                  INTEGER (0..65535)                                          OPTIONAL,   -- Need M
    sl-NumReservedBits-r16                  INTEGER (2..4)                                              OPTIONAL,   -- Need M
   ...
}

SL-PSSCH-Config-r16 ::=                 SEQUENCE {
    sl-PSSCH-DMRS-TimePatternList-r16       SEQUENCE (SIZE (1..3)) OF INTEGER (2..4)                    OPTIONAL,   -- Need M
    sl-BetaOffsets2ndSCI-r16                SEQUENCE (SIZE (4)) OF SL-BetaOffsets-r16                   OPTIONAL,   -- Need M
```

```
    sl-Scaling-r16                      ENUMERATED {f0p5, f0p65, f0p8, f1}                  OPTIONAL,   -- Need M
    ...
}

SL-PSFCH-Config-r16 ::=             SEQUENCE {
    sl-PSFCH-Period-r16                 ENUMERATED {sl0, sl1, sl2, sl4}                     OPTIONAL,   -- Need M
    sl-PSFCH-RB-Set-r16                 BIT STRING (SIZE (10..275))                         OPTIONAL,   -- Need M
    sl-NumMuxCS-Pair-r16                ENUMERATED {n1, n2, n3, n6}                         OPTIONAL,   -- Need M
    sl-MinTimeGapPSFCH-r16              ENUMERATED {sl2, sl3}                               OPTIONAL,   -- Need M
    sl-PSFCH-HopID-r16                  INTEGER (0..1023)                                   OPTIONAL,   -- Need M
    sl-PSFCH-CandidateResourceType-r16  ENUMERATED {startSubCH, allocSubCH}                 OPTIONAL,   -- Need M
    ...
}
SL-PTRS-Config-r16 ::=              SEQUENCE {
    sl-PTRS-FreqDensity-r16             SEQUENCE (SIZE (2)) OF INTEGER (1..276)             OPTIONAL,   -- Need M
    sl-PTRS-TimeDensity-r16             SEQUENCE (SIZE (3)) OF INTEGER (0..29)              OPTIONAL,   -- Need M
    sl-PTRS-RE-Offset-r16               ENUMERATED {offset01, offset10, offset11}           OPTIONAL,   -- Need M
    ...
}

SL-UE-SelectedConfigRP-r16 ::=      SEQUENCE {
    sl-CBR-PriorityTxConfigList-r16     SL-CBR-PriorityTxConfigList-r16                     OPTIONAL,   -- Need M
    sl-Thres-RSRP-List-r16              SL-Thres-RSRP-List-r16                              OPTIONAL,   -- Need M
    sl-MultiReserveResource-r16         ENUMERATED {enabled}                                OPTIONAL,   -- Need M
    sl-MaxNumPerReserve-r16             ENUMERATED {n2, n3}                                 OPTIONAL,   -- Need M
    sl-SensingWindow-r16                ENUMERATED {ms100, ms1100}                          OPTIONAL,   -- Need M
    sl-SelectionWindowList-r16          SL-SelectionWindowList-r16                          OPTIONAL,   -- Need M
    sl-ResourceReservePeriodList-r16    SEQUENCE (SIZE (1..16)) OF SL-ResourceReservePeriod-r16 OPTIONAL, -- Need M
    sl-RS-ForSensing-r16                ENUMERATED {pscch, pssch},
    ...,
    [[
    sl-CBR-PriorityTxConfigList-v1650   SL-CBR-PriorityTxConfigList-v1650                   OPTIONAL    -- Need M
    ]]
}

SL-ResourceReservePeriod-r16 ::=    CHOICE {
    sl-ResourceReservePeriod1-r16       ENUMERATED {ms0, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},
    sl-ResourceReservePeriod2-r16       INTEGER (1..99)
}

SL-SelectionWindowList-r16 ::=      SEQUENCE (SIZE (8)) OF SL-SelectionWindowConfig-r16

SL-SelectionWindowConfig-r16 ::=    SEQUENCE {
    sl-Priority-r16                     INTEGER (1..8),
    sl-SelectionWindow-r16              ENUMERATED {n1, n5, n10, n20}
}

SL-TxPercentageList-r16 ::=         SEQUENCE (SIZE (8)) OF SL-TxPercentageConfig-r16

SL-TxPercentageConfig-r16 ::=       SEQUENCE {
    sl-Priority-r16                     INTEGER (1..8),
    sl-TxPercentage-r16                 ENUMERATED {p20, p35, p50}
}
```

```
SL-MinMaxMCS-List-r16 ::=              SEQUENCE (SIZE (1..3)) OF SL-MinMaxMCS-Config-r16

SL-MinMaxMCS-Config-r16 ::=            SEQUENCE {
    sl-MCS-Table-r16                       ENUMERATED {qam64, qam256, qam64LowSE},
    sl-MinMCS-PSSCH-r16                    INTEGER (0..27),
    sl-MaxMCS-PSSCH-r16                    INTEGER (0..31)
}

SL-BetaOffsets-r16 ::=                 INTEGER (0..31)

SL-PowerControl-r16 ::=    SEQUENCE {
    sl-MaxTransPower-r16       INTEGER (-30..33),
    sl-Alpha-PSSCH-PSCCH-r16   ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL,   -- Need M
    dl-Alpha-PSSCH-PSCCH-r16   ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL,   -- Need S
    sl-P0-PSSCH-PSCCH-r16      INTEGER (-16..15)                                                                  OPTIONAL,   -- Need S
    dl-P0-PSSCH-PSCCH-r16      INTEGER (-16..15)                                                                  OPTIONAL,   -- Need M
    dl-Alpha-PSFCH-r16         ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL,   -- Need S
    dl-P0-PSFCH-r16            INTEGER (-16..15)                                                                  OPTIONAL,   -- Need M
    ...,
    [[
    dl-P0-PSSCH-PSCCH-r17      INTEGER (-202..24)                                                                 OPTIONAL,   -- Need M
    sl-P0-PSSCH-PSCCH-r17      INTEGER (-202..24)                                                                 OPTIONAL,   -- Need S
    dl-P0-PSFCH-r17            INTEGER (-202..24)                                                                 OPTIONAL    -- Need M
    ]]
}

-- TAG-SL-RESOURCEPOOL-STOP
-- ASN1STOP
```

***SL-ZoneConfigMCR* field descriptions**
sl-TransRange Indicates the communication range requirement for the corresponding *sl-ZoneConfigMCR-Index*. The unit is meter.
sl-ZoneConfig Indicates the zone configuration for the corresponding *sl-ZoneConfigMCR-Index*.
sl-ZoneConfigMCR-Index Indicates the codepoint of the communication range requirement field in SCI.

***SL-ResourcePool* field descriptions**
dummy This field is not used in the specification. If received it shall be ignored by the UE.
sl-Additional-MCS-Table Indicates the MCS table(s) additionally used in the resource pool. 64QAM table is (pre-)configured as default. Zero, one or two can be additionally (pre-)configured using the 256QAM and/or low-SE MCS tables. If two MCS tables are indicated, 256QAM MCS table is the 1st table and qam64lowSE MCS table is the 2nd table as specified in TS 38.214 [19], clause 8.1.3.1.
sl-FilterCoefficient This field indicates the filtering coefficient for long-term measurement and reference signal power derivation used for sidelink open-loop power control.
sl-InterUE-CoordinationConfig Indicates the configured sidelink inter-UE coordination parameters.
sl-NumSubchannel Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only.
sl-PBPS-CPS-Config Indicates the allowed resource allocation schemes of full sensing only, partial sensing only, random resource selection only, or any combination(s), and the related configuration for power saving resource allocation schemes. This field is absent for *sl-TxPoolExceptional*.
sl-PreemptionEnable Indicates whether pre-emption is disabled or enabled in a resource pool. If the field is present and the value is *pl1*, *pl2*, and so on (but not *enabled*), it means that pre-emption is enabled and a priority level p_preemption is configured. If the field is present and the value is *enabled*, the pre-emption is enabled (but p_preemption is not configured) and pre-emption is applicable to all levels.
sl-PriorityThreshold-UL-URLLC Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 1 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 1 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0.
sl-PriorityThreshold Indicates the threshold used to determine whether NR sidelink transmission is prioritized over uplink transmission of priority index 0 as specified in TS 38.213[13], clause 16.2.4.3, or whether PUCCH transmission carrying SL HARQ is prioritized over PUCCH transmission carrying UCI of priority index 0 if they overlap in time as specified in TS 38.213 [13], clause 9.2.5.0.
sl-RB-Number Indicates the number of PRBs in the corresponding resource pool, which consists of contiguous PRBs only. The remaining RB cannot be used (See TS 38.214[19], clause 8).
sl-StartRB-Subchannel Indicates the lowest RB index of the subchannel with the lowest index in the resource pool with respect to the lowest RB index of a SL BWP.
sl-SubchannelSize Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB.
sl-SyncAllowed Indicates the allowed synchronization reference(s) which is (are) allowed to use the configured resource pool.
sl-SyncConfigIndex Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry *SL-SyncConfigList* of in *SIB12* for NR sidelink communication.
sl-TDD-Configuration Indicates the TDD configuration associated with the reception pool of the cell indicated by *sl-SyncConfigIndex*.
sl-ThreshS-RSSI-CBR Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the CBR measurement. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to (-112 + n*2) dBm, and so on.
sl-TimeResource Indicates the bitmap of the resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle.

sl-TimeWindowSizeCBR Indicates the time window size for CBR measurement.
sl-TimeWindowSizeCR Indicates the time window size for CR evaluation.
sl-TxPercentageList Indicates the portion of candidate single-slot PSSCH resources over the total resources. Value p20 corresponds to 20%, and so on.
sl-X-Overhead Accounts for overhead from CSI-RS, PT-RS. If the field is absent, the UE applies value *n0* (see TS 38.214 [19], clause 5.1.3.2).

SL-SyncAllowed **field descriptions**
gnbEnb-Sync If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to eNB or gNB (i.e., synchronized to a reference UE which is directly synchronized to eNB or gNB).
gnss-Sync If configured, the (pre-) configured resources can be used if the UE is directly or indirectly synchronized to GNSS (i.e., synchronized to a reference UE which is directly synchronized to GNSS).
ue-Sync If configured, the (pre-) configured resources can be used if the UE is synchronized to a reference UE which is not synchronized to eNB, gNB and GNSS directly or indirectly.

SL-PSCCH-Config **field descriptions**
sl-FreqResourcePSCCH Indicates the number of PRBs for PSCCH in a resource pool where it is not greater than the number PRBs of the subchannel.
sl-DMRS-ScrambleID Indicates the initialization value for PSCCH DMRS scrambling.
sl-NumReservedBits Indicates the number of reserved bits in first stage SCI.
sl-TimeResourcePSCCH Indicates the number of symbols of PSCCH in a resource pool.

SL-PSSCH-Config **field descriptions**
sl-BetaOffsets2ndSCI Indicates candidates of beta-offset values to determine the number of coded modulation symbols for second stage SCI. The value indicates the index of Table 9.3-2 of TS 38.213 [13].
sl-PSSCH-DMRS-TimePatternList Indicates the set of PSSCH DMRS time domain patterns in terms of PSSCH DMRS symbols in a slot that can be used in the resource pool.
sl-Scaling Indicates a scaling factor to limit the number of resource elements assigned to the second stage SCI on PSSCH. Value *f0p5* corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on.

***SL-PSFCH-Config* field descriptions**
sl-MinTimeGapPSFCH The minimum time gap between PSFCH and the associated PSSCH in the unit of slots.
sl-NumMuxCS-Pair Indicates the number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB.
sl-PSFCH-CandidateResourceType Indicates the number of PSFCH resources available for multiplexing HARQ-ACK information in a PSFCH transmission (see TS 38.213 [13], clause 16.3).
sl-PSFCH-HopID Scrambling ID for sequence hopping of the PSFCH used in the resource pool.
sl-PSFCH-Period Indicates the period of PSFCH resource in the unit of slots within this resource pool. If set to *sl0*, no resource for PSFCH, and HARQ feedback for all transmissions in the resource pool is disabled.
sl-PSFCH-RB-Set Indicates the set of PRBs that are actually used for PSFCH transmission and reception. The leftmost bit of the bitmap refers to the lowest RB index in the resource pool, and so on. Value 0 in the bitmap indicates that the corresponding PRB is not used for PSFCH transmission and reception while value 1 indicates that the corresponding PRB is used for PSFCH transmission and reception (see TS 38.213 [13]).

***SL-PTRS-Config* field descriptions**
sl-PTRS-FreqDensity Presence and frequency density of SL PT-RS as a function of scheduled BW. If the field is not configured, the UE uses K_PT-RS = 2
sl-PTRS-TimeDensity Presence and time density of SL PT-RS as a function of MCS. If the field is not configured, the UE uses L_PT-RS = 1
sl-PTRS-RE-Offset Indicates the subcarrier offset for SL PT-RS . If the field is not configured, the UE applies the value *offset00* (see TS 38.211 [16], clause 8.4.1.2.2).

***SL-UE-SelectedConfigRP* field descriptions**
sl-CBR-PriorityTxConfigList Indicates the mapping between PSSCH transmission parameter (such as MCS, PRB number, retransmission number, CR limit) sets by using the indexes of the configurations in *sl-CBR-PSSCH-TxConfigList*, CBR ranges by using the indexes to the entry of the CBR range configurations in *sl-CBR-RangeConfigList*, and priority ranges. It also indicates the default PSSCH transmission parameters to be used when CBR measurement results are not available, and MCS range for the MCS tables used in the resource pool. The field *sl-CBR-PriorityTxConfigList-v1650* is present only when *sl-CBR-PriorityTxConfigList-r16* is configured.
sl-MaxNumPerReserve Indicates the maximum number of reserved PSCCH/PSSCH resources that can be indicated by an SCI.
sl-MultiReserveResource Indicates if it is allowed to reserve a sidelink resource for an initial transmission of a TB by an SCI associated with a different TB, based on sensing and resource selection procedure.
sl-ResourceReservePeriodList Set of possible resource reservation period allowed in the resource pool in the unit of ms. Up to 16 values can be configured per resource pool. The value *ms0* is always configured.
sl-RS-ForSensing Indicates whether DMRS of PSCCH or PSSCH is used for L1 RSRP measurement in the sensing operation.
sl-SensingWindow Parameter that indicates the start of the sensing window.
sl-SelectionWindowList Parameter that determines the end of the selection window in the resource selection for a TB with respect to priority indicated in SCI. Value n1 corresponds to $1*2^{\mu}$, value n5 corresponds to $5*2^{\mu}$, and so on, where μ = 0,1,2,3 refers to SCS 15,30,60,120 kHz respectively.
sl-Thres-RSRP-List Indicates a list of 64 thresholds, and the threshold should be selected based on the priority in the decoded SCI and the priority in the SCI to be transmitted. A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH/PSCCH RSRP in the associated data resource is above a threshold.

***SL-PowerControl* field descriptions**
sl-MaxTransPower Indicates the maximum value of the UE's sidelink transmission power on this resource pool when the sidelink transmission is performed only on this resource pool. The unit is dBm. If the sidelink transmission is PSFCH, and multiple resource pools are used, the maximum transmission power for PSFCH is configured as sum of fields *sl-maxTransPower* over multiple resource pools, as specified in TS 38.101-1 [15].
sl-Alpha-PSSCH-PSCCH Indicates alpha value for sidelink pathloss based power control for PSCCH/PSSCH when *sl-P0-PSSCH-PSCCH* is configured. When the field is absent the UE applies the value 1.
sl-P0-PSSCH-PSCCH Indicates P0 value for sidelink pathloss based power control for PSCCH/PSSCH. If not configured, sidelink pathloss based power control is disabled for PSCCH/PSSCH. When *sl-P0-PSSCH-PSCCH-r17* is configured, the UE ignores *sl-P0-PSSCH-PSCCH-r16*.
dl-Alpha-PSSCH-PSCCH Indicates alpha value for downlink pathloss based power control for PSCCH/PSSCH when *dl-P0-PSSCH-PSCCH* is configured. When the field is absent the UE applies the value 1.
dl-P0-PSSCH-PSCCH Indicates P0 value for downlink pathloss based power control for PSCCH/PSSCH. If not configured, downlink pathloss based power control is disabled for PSCCH/PSSCH. When *dl-P0-PSSCH-PSCCH-r17* is configured, the UE ignores *dl-P0-PSSCH-PSCCH-r16*. A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSCCH/PSSCH when *dl-P0-PSSCH-PSCCH* is configured.
dl-Alpha-PSFCH Indicates alpha value for downlink pathloss based power control for PSFCH when *dl-P0-PSFCH* is configured. When the field is absent the UE applies the value 1. For resource pools configured with PSFCH resources overlapping in time, this field is either not configured in any of the resource pools or configured with the same value for all the resource pools.
dl-P0-PSFCH Indicates P0 value for downlink pathloss based power control for PSFCH. If not configured, downlink pathloss based power control is disabled for PSFCH. When *dl-P0-PSFCH-r17* is configured, the UE ignores *dl-P0-PSFCH-r16.* For resource pools configured with PSFCH resources overlapping in time, this field is either not configured in any of the resource pools or configured with the same value for all the resource pools. A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSFCH when *dl-P0-PSFCH* is configured.

***SL-MinMaxMCS-Config* field descriptions**
sl-MaxMCS-PSSCH Indicates the maximum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values.
sl-MinMCS-PSSCH Indicates the minimum MCS value when using the associated MCS table. If no MCS is configured, UE autonomously selects MCS from the full range of values.

– *SL-RLC-BearerConfig*

The IE *SL-RLC-BearerConfig* specifies the SL RLC bearer configuration information for NR sidelink communication.

***SL-RLC-BearerConfig* information element**

```
-- ASN1START
-- TAG-SL-RLC-BEARERCONFIG-START

SL-RLC-BearerConfig-r16 ::=                 SEQUENCE {
```

```
    sl-RLC-BearerConfigIndex-r16            SL-RLC-BearerConfigIndex-r16,
    sl-ServedRadioBearer-r16                SLRB-Uu-ConfigIndex-r16                 OPTIONAL,   -- Cond LCH-SetupOnly
    sl-RLC-Config-r16                       SL-RLC-Config-r16                       OPTIONAL,   -- Cond LCH-Setup
    sl-MAC-LogicalChannelConfig-r16         SL-LogicalChannelConfig-r16             OPTIONAL,   -- Cond LCH-Setup
    ...
}

-- TAG-SL-RLC-BEARERCONFIG-STOP
-- ASN1STOP
```

***SL-RLC-BearerConfig* field descriptions**
sl-MAC-LogicalChannelConfig The field is used to configure MAC SL logical channel parameters.
sl-RLC-BearerConfigIndex The index of the RLC bearer configuration.
sl-RLC-Config Determines the RLC mode (UM, AM) and provides corresponding parameters.
sl-ServedRadioBearer Associates the sidelink RLC Bearer with a sidelink DRB. It indicates the index of SL radio bearer configuration, which is corresponding to the RLC bearer configuration.

Conditional Presence	Explanation
LCH-Setup	The field is mandatory present upon creation of a new sidelink logical channel via the dedicated signalling and in case of sidelink DRB configuration via system information and pre-configuration; otherwise the field is optionally present, Need M.
LCH-SetupOnly	This field is mandatory present upon creation of a new sidelink logical channel via the dedicated signalling and in case of sidelink DRB configuration via system information and pre-configuration. Otherwise, it is absent, Need M.

– *SL-RLC-BearerConfigIndex*

The IE *SL-RLC-BearerConfigIndex* is used to identify a SL RLC bearer configuration.

***SL-RLC-BearerConfigIndex* information element**

```
-- ASN1START
-- TAG-SL-RLC-BEARERCONFIGINDEX-START

SL-RLC-BearerConfigIndex-r16 ::=                INTEGER (1..maxSL-LCID-r16)

-- TAG-RLC-BEARERCONFIGINDEX-STOP
-- ASN1STOP
```

– *SL-RLC-ChannelConfig*

The IE *SL-RLC-ChannelConfig* specifies the configuration information for PC5 Relay RLC channel between L2 U2N Relay UE and L2 U2N Remote UE.

SL-RLC-ChannelConfig information element

```
-- ASN1START
-- TAG-SL-RLC-RLC-CHANNEL-CONFIG-START

SL-RLC-ChannelConfig-r17 ::=                SEQUENCE {
    sl-RLC-ChannelID-r17                        SL-RLC-ChannelID-r17,
    sl-RLC-Config-r17                           SL-RLC-Config-r16                           OPTIONAL,   -- Need M
    sl-MAC-LogicalChannelConfig-r17             SL-LogicalChannelConfig-r16                 OPTIONAL,   -- Need M
    sl-PacketDelayBudget-r17                    INTEGER (0..1023)                           OPTIONAL,   -- Need M
    ...}

-- TAG-SL-RLC-CHANNEL-CONFIG-STOP
-- ASN1STOP
```

***SL-RLC-ChannelConfig* field descriptions**
sl-MAC-LogicalChannelConfig The field is used to configure MAC SL logical channel parameters.
sl-RLC-ChannelID Indicates the PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE.
sl-RLC-Config Determines the RLC mode (UM, AM) and provides corresponding parameters.
sl-PacketDelayBudget Indicates the Packet Delay Budget for a PC5 Relay RLC channel. Upper bound value for the delay that a packet may experience expressed in unit of 0.5ms.

– *SL-RLC-ChannelID*

The IE *SL-RLC-ChannelID* is used to identify a PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE.

SL-RLC-ChannelID information element

```
-- ASN1START
-- TAG-SL-RLC-CHANNELID-START

SL-RLC-ChannelID-r17 ::=    INTEGER (1..maxSL-LCID-r16)

-- TAG-SL-RLC-CHANNELID-STOP
-- ASN1STOP
```

– *SL-RLC-Config*

The IE *SL-RLC-Config* is used to specify the RLC configuration of sidelink DRB. RLC AM configuration is only applicable to the unicast NR sidelink communication.

SL-RLC-Config information element

```
-- ASN1START
-- TAG-SL-RLC-CONFIG-START

SL-RLC-Config-r16 ::=                       CHOICE {
    sl-AM-RLC-r16                               SEQUENCE {
        sl-SN-FieldLengthAM-r16                     SN-FieldLengthAM                        OPTIONAL,   -- Cond SLRBSetup
        sl-T-PollRetransmit-r16                     T-PollRetransmit,
        sl-PollPDU-r16                                  PollPDU,
        sl-PollByte-r16                                 PollByte,
        sl-MaxRetxThreshold-r16                         ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 },
    ...
    },
    sl-UM-RLC-r16                               SEQUENCE {
        sl-SN-FieldLengthUM-r16                     SN-FieldLengthUM                        OPTIONAL,    -- Cond SLRBSetup
    ...
    },
    ...
}

-- TAG-SL-RLC-CONFIG-STOP
-- ASN1STOP
```

SL-RLC-Config field descriptions
sl-MaxRetxThreshold Parameter value of *maxRetxThreshold* for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value *t1* corresponds to 1 retransmission, value *t2* corresponds to 2 retransmissions and so on.
sl-PollByte Parameter value of *pollByte* for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value *kB25* corresponds to 25 kBytes, value *kB50* corresponds to 50 kBytes and so on. *infinity* corresponds to an infinite amount of kBytes.
sl-PollPDU Parameter value of *pollPDU* for RLC AM for NR sidelink communications, seeTS 38.322 [4]. Value *p4* corresponds to 4 PDUs, value *p8* corresponds to 8 PDUs and so on. *infinity* corresponds to an infinite number of PDUs.
sl-SN-FieldLength This field indicates the RLC SN field size for NR sidelink communication, see TS 38.322 [4]. For groupcast and broadcast, only value *size6* (6 bits) is configured for the field *sl-SN-FieldLengthUM*.
sl-T-PollRetransmit Timer value of *t-PollRetransmit* for RLC AM for NR sidelink communications, see TS 38.322 [4], in milliseconds. Value *ms5* means 5 ms, value *ms10* means 10 ms and so on.

Conditional Presence	Explanation
SLRBSetup	The field is mandatory present in case of sidelink DRB setup via the dedicated signalling and in case of sidelink DRB configuration via system information and pre-configuration; otherwise the field is optionally present, need M.

– *SL-ScheduledConfig*

The IE *SL-ScheduledConfig* specifies sidelink communication configurations used for network scheduled NR sidelink communication.

SL-ScheduledConfig information element

```
-- ASN1START
-- TAG-SL-SCHEDULEDCONFIG-START

SL-ScheduledConfig-r16 ::=                  SEQUENCE {
    sl-RNTI-r16                                 RNTI-Value,
    mac-MainConfigSL-r16                        MAC-MainConfigSL-r16                                OPTIONAL,    -- Need M
    sl-CS-RNTI-r16                              RNTI-Value                                          OPTIONAL,    -- Need M
    sl-PSFCH-ToPUCCH-r16                        SEQUENCE (SIZE (1..8)) OF INTEGER (0..15)           OPTIONAL,    -- Need M
    sl-ConfiguredGrantConfigList-r16            SL-ConfiguredGrantConfigList-r16                    OPTIONAL,    -- Need M
    ...,
    [[
    sl-DCI-ToSL-Trans-r16                       SEQUENCE (SIZE (1..8)) OF INTEGER (1..32)           OPTIONAL     -- Need M
    ]]
}

MAC-MainConfigSL-r16 ::=                    SEQUENCE {
    sl-BSR-Config-r16                           BSR-Config                                      OPTIONAL,    -- Need M
    ul-PrioritizationThres-r16                  INTEGER (1..16)                                 OPTIONAL,    -- Need M
    sl-PrioritizationThres-r16                  INTEGER (1..8)                                  OPTIONAL,    -- Need M
    ...
}

SL-ConfiguredGrantConfigList-r16 ::=        SEQUENCE {
    sl-ConfiguredGrantConfigToReleaseList-r16  SEQUENCE (SIZE (1..maxNrofCG-SL-r16)) OF SL-ConfigIndexCG-r16         OPTIONAL, -- Need N
    sl-ConfiguredGrantConfigToAddModList-r16   SEQUENCE (SIZE (1..maxNrofCG-SL-r16)) OF SL-ConfiguredGrantConfig-r16 OPTIONAL  -- Need N
}

-- TAG-SL-SCHEDULEDCONFIG-STOP
-- ASN1STOP
```

***SL-ScheduledConfig* field descriptions**
sl-CS-RNTI Indicate the RNTI used to scramble CRC of DCI format 3_0, see TS 38.321 [3].
sl-DCI-ToSL-Trans Indicate the time gap between DCI reception and the first sidelink transmission scheduled by the DCI (see TS 38.214 [19], clause 8.1.2.1). Value 1 included in this field corresponds to 1 slot, value 2 corresponds to 2 slots and so on, based on the numerology of sidelink BWP.
sl-PSFCH-ToPUCCH For dynamic grant and configured grant type 2, this field configures the values (in number of slot lengths) of the PSFCH to PUCCH gap. The field PSFCH-to-HARQ_feedback timing indicator in DCI format 3_0 selects one of the configured values of the PSFCH to PUCCH gap.
sl-RNTI Indicate the SL-RNTI used for monitoring the network scheduling to transmit NR sidelink communication (i.e. the mode 1).

***MAC-MainConfigSL* field descriptions**
sl-BSR-Config This field is to configure the sidelink buffer status report.
sl-PrioritizationThres Indicates the SL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.
ul-PrioritizationThres Indicates the UL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

– *SL-SDAP-Config*

The IE *SL-SDAP-Config* is used to set the configurable SDAP parameters for a Sidelink DRB.

***SL-SDAP-Config* information element**

```
-- ASN1START
-- TAG-SL-SDAP-CONFIG-START

SL-SDAP-Config-r16 ::=                  SEQUENCE {
    sl-SDAP-Header-r16                      ENUMERATED {present, absent},
    sl-DefaultRB-r16                        BOOLEAN,
    sl-MappedQoS-Flows-r16                  CHOICE {
        sl-MappedQoS-FlowsList-r16              SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-Profile-r16,
        sl-MappedQoS-FlowsListDedicated-r16     SL-MappedQoS-FlowsListDedicated-r16
    }                                                                                       OPTIONAL,   -- Need M
    sl-CastType-r16                         ENUMERATED {broadcast, groupcast, unicast, spare1}  OPTIONAL,   -- Need M
    ...
}

SL-MappedQoS-FlowsListDedicated-r16 ::= SEQUENCE {
    sl-MappedQoS-FlowsToAddList-r16         SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-FlowIdentity-r16  OPTIONAL,    -- Need N
    sl-MappedQoS-FlowsToReleaseList-r16      SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-FlowIdentity-r16  OPTIONAL     -- Need N
}
```

```
-- TAG-SL-SDAP-CONFIG-STOP
-- ASN1STOP
```

***SL-SDAP-Config* field descriptions**
sl-DefaultRB Indicates whether or not this is the default sidelink DRB for this NR sidelink communication transmission destination. Among all configured instances of *SL-SDAP-Config* for this destination, this field shall be set to *true* in at most one instance of *SL-SDAP-Config* and to *false* in all other instances.
sl-MappedQoS-Flows Indicates QoS flows to be mapped to the sidelink DRB. If the field is included in dedicated signalling, it is set to *sl-MappedQoS-FlowsListDedicated*; otherwise, it is set to *sl-MappedQoS-FlowsList*.
sl-MappedQoS-FlowsList Indicates the list of QoS profiles of the NR sidelink communication transmission destination mapped to this sidelink DRB.
sl-MappedQoS-FlowsToAddList Indicates the list of SL QoS flows ID of the NR sidelink communication transmission destination to be additionally mapped to this sidelink DRB.
sl-MappedQoS-FlowsToReleaseList Indicates the list of SL QoS flows ID of the NR sidelink communication transmission destination to be released from existing QoS flow to SLRB mapping of this sidelink DRB.
sl-SDAP-Header Indicates whether or not a SDAP header is present on this sidelink DRB. The field cannot be changed after a sidelink DRB is established. This field is set to present if the field *sl-DefaultRB* is set to *true*.

– *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.

– *SL-SourceIdentity*

The IE *SL-SourceIdentity* is used to identify a source of a NR sidelink communication.

SL-SourceIdentity information element

```
-- ASN1START
-- TAG-SL-SOURCEIDENTITY-START

SL-SourceIdentity-r17 ::=   BIT STRING (SIZE (24))

-- TAG-SL-SOURCEIDENTITY-STOP
-- ASN1STOP
```

– *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 mappings between the bearer identity of the L2 U2N Remote UE and the egress RLC channel as specified in TS 38.351 [66] to be added or modified.
sl-MappingToReleaseList Indicates the list of mappings between the bearer identity of the L2 U2N Remote UE and the egress RLC channel as specified in TS 38.351 [66] 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 for uplink transmissions at the L2 U2N Relay UE.
sl-EgressRLC-ChannelPC5 Indicates the egress RLC channel on PC5 Hop for downlink transmissions at the L2 U2N Relay UE and for uplink transmissions at the L2 U2N Remote UE.

Conditional Presence	Explanation
L2RelayUE	For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent.

– *SL-SyncConfig*

The IE *SL-SyncConfig* specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink communication.

***SL-SyncConfig* information element**

```
-- ASN1START
-- TAG-SL-SYNCCONFIG-START

SL-SyncConfigList-r16 ::=          SEQUENCE (SIZE (1..maxSL-SyncConfig-r16)) OF SL-SyncConfig-r16

SL-SyncConfig-r16 ::=              SEQUENCE {
    sl-SyncRefMinHyst-r16              ENUMERATED {dB0, dB3, dB6, dB9, dB12}                    OPTIONAL,    -- Need R
    sl-SyncRefDiffHyst-r16             ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf}             OPTIONAL,    -- Need R
    sl-filterCoefficient-r16           FilterCoefficient                                        OPTIONAL,    -- Need R
    sl-SSB-TimeAllocation1-r16         SL-SSB-TimeAllocation-r16                                OPTIONAL,    -- Need R
    sl-SSB-TimeAllocation2-r16         SL-SSB-TimeAllocation-r16                                OPTIONAL,    -- Need R
    sl-SSB-TimeAllocation3-r16         SL-SSB-TimeAllocation-r16                                OPTIONAL,    -- Need R
    sl-SSID-r16                        INTEGER (0..671)                                         OPTIONAL,    -- Need R
    txParameters-r16                   SEQUENCE {
        syncTxThreshIC-r16                 SL-RSRP-Range-r16                                    OPTIONAL,    -- Need R
```

```
        syncTxThreshOoC-r16             SL-RSRP-Range-r16                                   OPTIONAL,    -- Need R
        syncInfoReserved-r16            BIT STRING (SIZE (2))                               OPTIONAL     -- Need R
    },
    gnss-Sync-r16                   ENUMERATED {true}                                       OPTIONAL,    -- Need R
    ...
}

SL-RSRP-Range-r16 ::=               INTEGER (0..13)

SL-SSB-TimeAllocation-r16 ::=       SEQUENCE {
    sl-NumSSB-WithinPeriod-r16          ENUMERATED {n1, n2, n4, n8, n16, n32, n64}          OPTIONAL,    -- Need R
    sl-TimeOffsetSSB-r16                INTEGER (0..1279)                                   OPTIONAL,    -- Need R
    sl-TimeInterval-r16                 INTEGER (0..639)                                    OPTIONAL     -- Need R
}

-- TAG-SL-SYNCCONFIG-STOP
-- ASN1STOP
```

***SL-SyncConfig* field descriptions**
gnss-Sync If configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to GNSS. If not configured, the synchronization configuration is used for SLSS transmission/reception when the UE is synchronized to eNB/gNB.
sl-SyncRefMinHyst Hysteresis when evaluating a SyncRef UE using absolute comparison.
sl-SyncRefDiffHyst Hysteresis when evaluating a SyncRef UE using relative comparison.
sl-NumSSB-WithinPeriod Indicates the number of sidelink SSB transmissions within one sidelink SSB period. The applicable values are related to the subcarrier spacing and frequency as follows: FR1, SCS = 15 kHz: 1 FR1, SCS = 30 kHz: 1, 2 FR1, SCS = 60 kHz: 1, 2, 4 FR2, SCS = 60 kHz: 1, 2, 4, 8, 16, 32 FR2, SCS = 120 kHz: 1, 2, 4, 8, 16, 32, 64
sl-TimeOffsetSSB Indicates the slot offset from the start of sidelink SSB period to the first sidelink SSB.
sl-TimeInterval Indicates the slot interval between neighboring sidelink SSBs. This value is applicable when there are more than one sidelink SSBs within one sidelink SSB period.
sl-SSID Indicates the ID of sidelink synchronization signal associated with different synchronization priorities.
syncInfoReserved Reserved for future use.
syncTxThreshIC, syncTxThreshOoC Indicates the thresholds used while in coverage and out of coverage, respectively. Value 0 corresponds to -infinity, value 1 to -115 dBm, value 2 to -110 dBm, and so on (i.e. in steps of 5 dBm) until value 12, which corresponds to -60 dBm, while value 13 corresponds to +infinity.

– *SL-Thres-RSRP-List*

IE *SL-Thres-RSRP-List* indicates a threshold used for sensing based UE autonomous resource selection (see TS 38.215 [9]). A resource is excluded if it is indicated or reserved by a decoded SCI and PSSCH/PSCCH RSRP in the associated data resource is above the threshold defined by IE *SL-Thres-RSRP-List*. Value 0 corresponds to minus infinity dBm, value 1 corresponds to -128dBm, value 2 corresponds to -126dBm, value n corresponds to (-128 + (n-1)*2) dBm and so on, value 66 corresponds to infinity dBm.

SL-Thres-RSRP-List information element

```
-- ASN1START
-- TAG-SL-THRES-RSRP-LIST-START

SL-Thres-RSRP-List-r16 ::=    SEQUENCE (SIZE (64)) OF SL-Thres-RSRP-r16

SL-Thres-RSRP-r16 ::=         INTEGER (0..66)

-- TAG-SL-THRES-RSRP-LIST-STOP
-- ASN1STOP
```

– *SL-TxPower*

The IE *SL-TxPower* is used to limit the UE's sidelink transmission power on a carrier frequency. The unit is dBm. Value minusinfinity corresponds to –infinity.

SL-TxPower information element

```
-- ASN1START
-- TAG-SL-TXPOWER-START

SL-TxPower-r16 ::=                  CHOICE{
    minusinfinity-r16                   NULL,
    txPower-r16                         INTEGER (-30..33)
}

-- TAG-SL-TXPOWER-STOP
-- ASN1STOP
```

– *SL-TypeTxSync*

The IE *SL-TypeTxSync* indicates the synchronization reference type.

SL-TypeTxSync information element

```
-- ASN1START
-- TAG-SL-TYPETXSYNC-START

SL-TypeTxSync-r16 ::=                   ENUMERATED {gnss, gnbEnb, ue}
```

```
-- TAG-SL-TYPETXSYNC-STOP
-- ASN1STOP
```

– SL-UE-SelectedConfig

IE *SL-UE-SelectedConfig* specifies sidelink communication configurations used for UE autonomous resource selection.

SL-UE-SelectedConfig information element

```
-- ASN1START
-- TAG-SL-UE-SELECTEDCONFIG-START

SL-UE-SelectedConfig-r16 ::=                SEQUENCE {
    sl-PSSCH-TxConfigList-r16                   SL-PSSCH-TxConfigList-r16                                   OPTIONAL,    -- Need R
    sl-ProbResourceKeep-r16                     ENUMERATED {v0, v0dot2, v0dot4, v0dot6, v0dot8}             OPTIONAL,    -- Need R
    sl-ReselectAfter-r16                        ENUMERATED {n1, n2, n3, n4, n5, n6, n7, n8, n9}             OPTIONAL,    -- Need R
    sl-CBR-CommonTxConfigList-r16               SL-CBR-CommonTxConfigList-r16                               OPTIONAL,    -- Need R
    ul-PrioritizationThres-r16                  INTEGER (1..16)                                             OPTIONAL,    -- Need R
    sl-PrioritizationThres-r16                  INTEGER (1..8)                                              OPTIONAL,    -- Need R
    ...
}

-- TAG-SL-UE-SELECTEDCONFIG-STOP
-- ASN1STOP
```

***SL-UE-SelectedConfig* field descriptions**
sl-PrioritizationThres Indicates the SL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.
sl-ProbResourceKeep Indicates the probability with which the UE keeps the current resource when the resource reselection counter reaches zero for sensing based UE autonomous resource selection (see TS 38.321 [3]).
sl-PSSCH-TxConfigList Indicates PSSCH TX parameters such as MCS, sub-channel number, retransmission number, associated to different UE absolute speeds and different synchronization reference types for UE autonomous resource selection.
sl-ReselectAfter Indicates the number of consecutive skipped transmissions before triggering resource reselection for sidelink communication (see TS 38.321 [3]).
ul-PrioritizationThres Indicates the UL priority threshold, which is used to determine whether SL TX is prioritized over UL TX, as specified in TS 38.321 [3]. Network does not configure the *sl-PrioritizationThres* and the *ul-PrioritizationThres* to the UE separately.

– SL-ZoneConfig

The IE *SL-ZoneConfig* is used to configure the zone ID related parameters.

***SL-ZoneConfig* information element**

```
-- ASN1START
-- TAG-SL-ZONECONFIG-START

SL-ZoneConfig-r16 ::=              SEQUENCE {
    sl-ZoneLength-r16                  ENUMERATED { m5, m10, m20, m30, m40, m50, spare2, spare1},
    ...
}

-- TAG-SL-ZONECONFIG-STOP
-- ASN1STOP
```

***SL-ZoneConfig* field descriptions**
sl-ZoneLength Indicates the length of each geographic zone.

– *SLRB-Uu-ConfigIndex*

The IE *SLRB-Uu-ConfigIndex* is used to identify a sidelink DRB configuration from the network side.

***SLRB-Uu-ConfigIndex* information element**

```
-- ASN1START
-- TAG-SLRB-UU-CONFIGINDEX-START

SLRB-Uu-ConfigIndex-r16 ::=                 INTEGER (1..maxNrofSLRB-r16)

-- TAG-SLRB-UU-CONFIGINDEX-STOP
-- ASN1STOP
```

6.3.6 MBS information elements

– *CarrierFreqListMBS*

The IE *CarrierFreqListMBS* is used to inform network of the frequencies on which the UE is receiving or interested to receive MBS broadcast service via a broadcast MRB.

***CarrierFreqListMBS* information element**

```
-- ASN1START
-- TAG-CARRIERFREQLISTMBS-START

CarrierFreqListMBS-r17 ::=      SEQUENCE (SIZE (1..maxFreqMBS-r17)) OF ARFCN-ValueNR
```

```
-- TAG-CARRIERFREQLISTMBS-STOP
-- ASN1STOP
```

– *CFR-ConfigMCCH-MTCH*

The IE *CFR-ConfigMCCH-MTCH* is used to configure the common frequency resource used for MCCH and MTCH reception.

CFR-ConfigMCCH-MTCH information element

```
-- ASN1START
-- TAG-CFR-CONFIGMCCH-MTCH-START

CFR-ConfigMCCH-MTCH-r17 ::= SEQUENCE {
    locationAndBandwidthBroadcast-r17          LocationAndBandwidthBroadcast-r17  OPTIONAL,  -- Need S
    pdsch-ConfigMCCH-r17                       PDSCH-ConfigBroadcast-r17          OPTIONAL,  -- Need S
    commonControlResourceSetExt-r17            ControlResourceSet                 OPTIONAL   -- Cond NotSIB1CommonControlResource
}

LocationAndBandwidthBroadcast-r17 ::= CHOICE {
    sameAsSib1ConfiguredLocationAndBW          NULL,
    locationAndBandwidth                       INTEGER (0..37949)
}

-- TAG-CFR-CONFIGMCCH-MTCH-STOP
-- ASN1STOP
```

***CFR-ConfigMCCH-MTCH* field descriptions**
commonControlResourceSetExt An additional common control resource set which may be configured and used for *searchSpaceMCCH*/*searchSpaceMTCH* or UE-specific search space in the BWP where *searchSpaceMCCH* is configured. It is contained in the bandwidth of the CFR for broadcast and larger than CORESET#0.
locationAndBandwidthBroadcast Indicates starting PRB and the number of PRBs of CFR used for MCCH and MTCH reception. Value *sameAsSib1ConfiguredLocationAndBW* means the CFR for broadcast has the same location and size as the *locationAndBandwidth* for initial BWP configured in SIB1. Value *locationAndBandwidth* is used to configure CFR with bandwidth that is larger than and fully contains the bandwidth for the initial DL BWP configured in SIB1 and CORESET#0. The value of the field shall be interpreted as defined in TS 38.214 [19] with assumptions as described in TS 38.213 [13]. If the field is absent, the CFR for broadcast has the same location and size as CORESET#0.
pdsch-ConfigMCCH Indicates PDSCH parameters used for MCCH transmission. If the field is absent, PDSCH parameters used for MCCH are the same as those of PDSCH configuration provided in *initialDownlinkBWP* in *SIB1*.

Conditional Presence	Explanation
NotSIB1CommonControlResource	The field is optional present in case *commonControlResourceSet* is not configured in SIB1, Need R, otherwise it is absent.

– *DRX-ConfigPTM*

The IE *DRX-Config-PTM* is used to configure DRX related parameters for PTM transmission as specified in TS 38.321 [3].

DRX-Config-PTM information element

```
-- ASN1START
-- TAG-DRX-CONFIGPTM-START

DRX-ConfigPTM-r17 ::=             SEQUENCE {
    drx-onDurationTimerPTM-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
        }
    },
    drx-InactivityTimerPTM-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
    },
    drx-HARQ-RTT-TimerDL-PTM-r17      INTEGER (0..56)                     OPTIONAL,  -- Cond HARQFeedback
    drx-RetransmissionTimerDL-PTM-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
    }                                                                     OPTIONAL,   -- Cond HARQFeedback
    drx-LongCycleStartOffsetPTM-r17   CHOICE {
        ms10                              INTEGER(0..9),
        ms20                              INTEGER(0..19),
        ms32                              INTEGER(0..31),
        ms40                              INTEGER(0..39),
        ms60                              INTEGER(0..59),
        ms64                              INTEGER(0..63),
        ms70                              INTEGER(0..69),
        ms80                              INTEGER(0..79),
        ms128                             INTEGER(0..127),
        ms160                             INTEGER(0..159),
        ms256                             INTEGER(0..255),
        ms320                             INTEGER(0..319),
        ms512                             INTEGER(0..511),
        ms640                             INTEGER(0..639),
        ms1024                            INTEGER(0..1023),
        ms1280                            INTEGER(0..1279),
        ms2048                            INTEGER(0..2047),
        ms2560                            INTEGER(0..2559),
        ms5120                            INTEGER(0..5119),
        ms10240                           INTEGER(0..10239)
    },
    drx-SlotOffsetPTM-r17             INTEGER (0..31)
}
```

```
-- TAG-DRX-CONFIGPTM-STOP
-- ASN1STOP
```

***DRX-Config-PTM* field descriptions**
drx-HARQ-RTT-Timer-DL-PTM Value in number of symbols of the CFR where the transport block was received.
drx-InactivityTimerPTM Value in multiple integers of 1 ms. *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on.
drx-LongCycleStartOffsetPTM *drx-LongCycle-PTM* in ms and *drx-StartOffset-PTM* in multiples of 1 ms.
drx-onDurationTimerPTM 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.
drx-RetransmissionTimer-DL-PTM Value in number of slot lengths of the CFR 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.
drx-SlotOffsetPTM Value in 1/32 ms. Value 0 corresponds to 0 ms, value 1 corresponds to 1/32 ms, value 2 corresponds to 2/32 ms, and so on.

Conditional Presence	Explanation
HARQFeedback	The field is mandatory present if HARQ feedback is enabled for a G-RNTI/G-CS-RNTI associated with this DRX configuration. It is absent otherwise.

– *MBS-NeighbourCellList*

The IE *MBS-NeighbourCellList* indicates a list of neighbour cells where ongoing MBS sessions provided via broadcast MRB in the current cell may also be provided, as indicated in the *mtch-NeighbourCell*.

MBS-NeighbourCellList information element

```
-- ASN1START
-- TAG-MBS-NEIGHBOURCELLLIST-START

MBS-NeighbourCellList-r17 ::=     SEQUENCE (SIZE (0..maxNeighCellMBS-r17)) OF MBS-NeighbourCell-r17

MBS-NeighbourCell-r17 ::=         SEQUENCE {
    physCellId-r17                    PhysCellId,
    carrierFreq-r17                   ARFCN-ValueNR                                 OPTIONAL  -- Need S
}

-- TAG-MBS-NEIGHBOURCELLLIST-STOP
-- ASN1STOP
```

***MBS-NeighbourCellList* field descriptions**
carrierFreq   Indicates the frequency of the neighbour cell indicated by *physCellId*. Absence of the IE means that the neighbour cell is on the same frequency as the current cell.

– *MBS-ServiceList*

The IE *MBS- ServiceList* is used to inform the network of the MBS services that the UE is receiving or interested to receive.

MBS-ServiceList information element

```
-- ASN1START
-- TAG-MBS-SERVICELIST-START

MBS-ServiceList-r17 ::=         SEQUENCE (SIZE (1..maxNrofMBS-ServiceListPerUE-r17)) OF MBS-ServiceInfo-r17

MBS-ServiceInfo-r17 ::=         SEQUENCE {
    tmgi-r17                        TMGI-r17
}

-- TAG-MBS-SERVICELIST-STOP
-- ASN1STOP
```

– *MBS-SessionInfoList*

The IE *MBS-SessionInfoList* provides the list of ongoing MBS broadcast sessions transmitted via broadcast MRB and, for each MBS broadcast session, the associated G-RNTI and scheduling information.

MBS-SessionInfoList information element

```
-- ASN1START
-- TAG-MBS-SESSIONINFOLIST-START

MBS-SessionInfoList-r17 ::=      SEQUENCE (SIZE (1..maxNrofMBS-Session-r17)) OF MBS-SessionInfo-r17

MBS-SessionInfo-r17 ::=          SEQUENCE {
    mbs-SessionId-r17               TMGI-r17,
    g-RNTI-r17                      RNTI-Value,
    mrb-ListBroadcast-r17           MRB-ListBroadcast-r17,
    mtch-SchedulingInfo-r17         DRX-ConfigPTM-Index-r17                     OPTIONAL, -- Need S
    mtch-NeighbourCell-r17          BIT STRING (SIZE(maxNeighCellMBS-r17))      OPTIONAL, -- Need S
    pdsch-ConfigIndex-r17           PDSCH-ConfigIndex-r17                       OPTIONAL, -- Need S
    mtch-SSB-MappingWindowIndex-r17 MTCH-SSB-MappingWindowIndex-r17             OPTIONAL  -- Cond MTCH-Mapping
}

DRX-ConfigPTM-Index-r17 ::=          INTEGER (0..maxNrofDRX-ConfigPTM-1-r17)

PDSCH-ConfigIndex-r17  ::=           INTEGER (0..maxNrofPDSCH-ConfigPTM-1-r17)
```

```
MTCH-SSB-MappingWindowIndex-r17  ::= INTEGER (0..maxNrofMTCH-SSB-MappingWindow-1-r17)

MRB-ListBroadcast-r17 ::=            SEQUENCE (SIZE (1..maxNrofMRB-Broadcast-r17)) OF MRB-InfoBroadcast-r17

MRB-InfoBroadcast-r17 ::=            SEQUENCE {
    pdcp-Config-r17                      MRB-PDCP-ConfigBroadcast-r17,
    rlc-Config-r17                       MRB-RLC-ConfigBroadcast-r17,
    ...
}

MRB-PDCP-ConfigBroadcast-r17 ::=     SEQUENCE {
    pdcp-SN-SizeDL-r17                   ENUMERATED {len12bits}                  OPTIONAL, -- Need S
    headerCompression-r17                CHOICE {
        notUsed                              NULL,
        rohc                                 SEQUENCE {
            maxCID-r17                           INTEGER (1..16)             DEFAULT 15,
            profiles-r17                         SEQUENCE {
                profile0x0000-r17                    BOOLEAN,
                profile0x0001-r17                    BOOLEAN,
                profile0x0002-r17                    BOOLEAN
           }
        }
    },
    t-Reordering-r17                     ENUMERATED {ms1, ms10, ms40, ms160, ms500, ms1000, ms1250, ms2750}    OPTIONAL -- Need S
}

MRB-RLC-ConfigBroadcast-r17 ::=      SEQUENCE {
    logicalChannelIdentity-r17           LogicalChannelIdentity,
    sn-FieldLength-r17                   ENUMERATED {size6}                      OPTIONAL, -- Need S
    t-Reassembly-r17                     T-Reassembly                            OPTIONAL  -- Need S
}

-- TAG-MBS-SESSIONINFOLIST-STOP
-- ASN1STOP
```

***MBS-SessionInfoList* field descriptions**
g-RNTI G-RNTI used to scramble the scheduling and transmission of MTCH.
headerCompression If *rohc* is configured, the UE shall apply the configured ROHC profile(s) in downlink.
mbs-SessionId Indicates an identifier of the MBS session provided by the MTCH.
mrb-listBroadcast A list of broadcast MRBs to which the associated broadcast MBS session is mapped to.
mtch-neighbourCell Indicates neighbour cells which provide this service on MTCH. The first bit is set to 1 if the service is provided on MTCH in the first cell in *mbs-NeighbourCellList*, otherwise it is set to 0. The second bit is set to 1 if the service is provided on MTCH in the second cell in *mbs-NeighbourCellList*, and so on. If the service is not available in any neighbouring cell and *mbs-NeighbourCellList* is signalled, the network sets all bits in this field to 0. The field is absent when *mbs-NeighbourCellList* is absent or an empty *mbs-NeighbourCellList* is signalled. If this field is absent when *mbs-NeighbourCellList* is absent or a non-empty *mbs-NeighbourCellList* is signalled, the related service may or may not be available in any neighbouring cell, i.e. the UE cannot determine the presence or absence of an MBS service in neighbouring cells based on the absence of this field. If this field is absent and an empty *mbs-NeighbourCellList* is signalled, then the UE shall assume that MBS broadcast services signalled in *mbs-SessionInfoList* in the *MBSBroadcastConfiguration* message are not provided in any neighbour cell.
mtch-schedulingInfo Indicates the index of DRX configuration entry in *drx-ConfigPTM-List* that is used for scheduling the MTCH. The value 0 corresponds to the first entry in *drx-ConfigPTM-List*, the value 1 corresponds to the second entry in *drx-ConfigPTM-List* and so on. In case *mtch-schedulingInfo* is absent for a G-RNTI (i.e. no PTM DRX), the UE shall monitor for PDCCH scrambled with G-RNTI in any slot according to the search space configured for MTCH [see TS 38.213 [13], clause 10.1].
mtch-SSB-MappingWindowIndex Indicates the index of *MTCH-SSB-MappingWindowCycleOffset* configuration entry in *MTCH-SSB-MappingWindowList*. The value 0 corresponds to the first entry in *MTCH-SSB-MappingWindowList*, the value 1 corresponds to the second entry in *MTCH-SSB-MappingWindowList* and so on. This field is set to the same value for all MBS sessions mapped to the same G-RNTI.
pdcp-SN-SizeDL Indicates that PDCP sequence number size of 12 bits is used, as specified in TS 38.323 [5]. When the field is absent the UE applies the value as specified in 9.1.1.7.
pdschConfigIndex Indicates the index of PDSCH configuration entry in *pdschConfigList* for MTCH. Value 0 corresponds to the first entry in *pdschConfigList*, the value 1 corresponds to the second entry in *pdschConfigList* and so on. When the field is absent the UE applies the first entry in pdschConfigList for MTCH.
sn-FieldLength Indicates that the RLC SN field size of 6 bits is used, see TS 38.322 [4]. When the field is absent the UE applies the value as specified in 9.1.1.7.
t-Reassembly Timer for reassembly in TS 38.322 [4], in milliseconds. Value ms0 means 0 ms, value ms5 means 5 ms and so on. When the field is absent the UE applies the value in specified in 9.1.1.7.
t-Reordering Value in ms of t-Reordering specified in TS 38.323 [5]. Value ms1 corresponds to 1 ms, value ms10 corresponds to 10 ms, and so on. When the field is absent the UE applies the value as specified in 9.1.1.7.

Conditional Presence	Explanation
MTCH-Mapping	The field is mandatory present if the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in SIB1 is more than 1, and *searchspaceMTCH* is not set to zero (including the case where *searchSpaceMTCH* is absent and *searchSpaceMCCH* is not set to zero). Otherwise, it is absent, Need R.

– *MTCH-SSB-MappingWindowList*

The IE *MTCH-SSB-MappingWindowList* is used to configure MTCH PDCCH ocassions to SSB mapping window related periodic and offset parameters.

MTCH-SSB-MappingWindowList information element

```
-- ASN1START
-- TAG-MTCH-SSB-MAPPINGWINDOWLIST-START

MTCH-SSB-MappingWindowList-r17 ::= SEQUENCE (SIZE (1..maxNrofMTCH-SSB-MappingWindow-r17)) OF MTCH-SSB-MappingWindowCycleOffset-r17

MTCH-SSB-MappingWindowCycleOffset-r17 ::= CHOICE {
    ms10                                    INTEGER(0..9),
    ms20                                    INTEGER(0..19),
    ms32                                    INTEGER(0..31),
    ms64                                    INTEGER(0..63),
    ms128                                   INTEGER(0..127),
    ms256                                   INTEGER(0..255)
}

-- TAG-MTCH-SSB-MAPPINGWINDOWLIST-STOP
-- ASN1STOP
```

MTCH-SSB-MappingWindowList field descriptions
MTCH-SSB-MappingWindowCycleOffset
Indicates the *cycle* and *offset* for MTCH PDCCH ocassions to SSB mapping. Values in unit of ms. *ms10* corresponds to cycle of 10 ms with corresponding offset between 0 and 9 ms, value *ms20* corresponds to cycle of 20 ms with corresponding offset between 0 and 19 ms, and so on. The mapping window starts at a subframe in a SFN where [(SFN number × 10) + subframe number] modulo (*cycle*) = *offset.* PDCCH monitoring occasions for MTCH in a mapping window which are not overlapping with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered starting from 1 in the maping window. The [x×N+K]th PDCCH monitoring occasion for MTCH in this mapping 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 MTCH to SSB mapping transmission window/N). The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes.

– *PDSCH-ConfigBroadcast*

The IE *PDSCH-ConfigBroadcast* is used to configure parameters for acquiring the PDSCH for MCCH and MTCH.

PDSCH-ConfigBroadcast information element

```
-- ASN1START
-- TAG-PDSCH-CONFIGBROADCAST-START

PDSCH-ConfigBroadcast-r17 ::= SEQUENCE {
    pdschConfigList-r17                 SEQUENCE (SIZE (1..maxNrofPDSCH-ConfigPTM-r17) ) OF PDSCH-ConfigPTM-r17,
    pdsch-TimeDomainAllocationList-r17  PDSCH-TimeDomainResourceAllocationList-r16                  OPTIONAL,   -- Need R
    rateMatchPatternToAddModList-r17    SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern   OPTIONAL,   -- Need R
```

```
    lte-CRS-ToMatchAround-r17           RateMatchPatternLTE-CRS                                 OPTIONAL,   -- Need R
    mcs-Table-r17                       ENUMERATED {qam256, qam64LowSE}                         OPTIONAL,   -- Need S
    xOverhead-r17                       ENUMERATED {xOh6, xOh12, xOh18}                         OPTIONAL    -- Need S
}

PDSCH-ConfigPTM-r17 ::= SEQUENCE {
    dataScramblingIdentityPDSCH-r17     INTEGER (0..1023)       OPTIONAL,   -- Need S
    dmrs-ScramblingID0-r17              INTEGER (0..65535)      OPTIONAL,   -- Need S
    pdsch-AggregationFactor-r17         ENUMERATED {n2, n4, n8} OPTIONAL    -- Need S
}

-- TAG-PDSCH-CONFIGBROADCAST-STOP
-- ASN1STOP
```

***PDSCH-ConfigBroadcast* field descriptions**
lte-CRS-ToMatchAround Parameters to determine an LTE CRS pattern that the UE shall rate match around.
pdschConfigList List of PDSCH parameters which can be configured per G-RNTI. Only one entity is allowed to be configured if included in SIB20.
pdsch-TimeDomainAllocationList List of time-domain configurations for timing of DL assignment to DL data. The field *pdsch-TimeDomainAllocationList* applies to DCI format 4_0 (see table 5.1.2.1.1-1 in TS 38.214 [19]). When the field is absent, the UE follows PDSCH time domain resource allocation determination rule as specified in TS 38.214 [19], clause 5.1.2.1.1.
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 (see TS 38.214 [19], clause 5.1.4.1).
mcs-Table Indicates which MCS table the UE shall use for PDSCH. If the field is absent the UE applies the value 64QAM. The field *mcs-Table* applies to DCI format 4_0 with CRC scrambled by MCCH-RNTI/G-RNTI (see TS 38.214 [19], clause 5.1.3.1).
xOverhead Accounts for an overhead from CSI-RS, CORESET, etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19], clause 5.1.3.2).

***PDSCH-ConfigPTM* field descriptions**
dataScramblingIdentityPDSCH Identifier(s) used to initialize data scrambling (c_init) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. When the field is absent the UE applies the value physCellId configured for this serving cell.
dmrs-ScramblingID0 DL DMRS scrambling initialization (see TS 38.211 [16], clause 7.4.1.1.1). When the field is absent the UE applies the value *physCellId* configured for this serving cell.
pdsch-AggregationFactor Number of repetitions for dynamic scheduling of MBS broadcast data for MTCH PDSCH (see TS 38.214 [19], clause 5.1.2.1). When the field is absent the UE applies the value 1.

– *TMGI*

The IE *TMGI* is used to identify the MBS session.

***TMGI* information element**

```
-- ASN1START
-- TAG-TMGI-START

TMGI-r17 ::=                    SEQUENCE {
    plmn-Id-r17                     CHOICE {
        plmn-Index                      INTEGER (1..maxPLMN),
        explicitValue                   PLMN-Identity
    },
    serviceId-r17                   OCTET STRING (SIZE (3))
}

-- TAG-TMGI-STOP
-- ASN1STOP
```

***TMGI* field descriptions**
plmn-Index PLMN index or NPN index according to the *plmn-IdentityInfoList* and *npn-IdentityInfoList* fields included in *SIB1*. If this field is included in the *MRB-ToAddMod-r17*, the UE translates the *plmn-Index* into the PLMN Identity or SNPN Identity based on the configuration in *SIB1* (which is the *SIB1* of the target cell in case of handover). The *explicitValue* is not used for MBS service(s) of an SNPN.
serviceId Uniquely identifies the identity of an MBS service within a PLMN. The field contains octet 3- 5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [38]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on.

6.4 RRC multiplicity and type constraint values

– Multiplicity and type constraint definitions

```
-- ASN1START
-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-START

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}
maxTwoPUCCH-Grp-ConfigList-r17          INTEGER ::= 16      -- Maximum number of supported configuration(s) of {primary PUCCH group
                                                            -- config, secondary PUCCH group config} for PUCCH cell switching
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
maxNrofCondCells-1-r17                  INTEGER ::= 7       -- Max number of conditional candidate SpCells minus 1
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
maxNrofDL-AllocationsExt-r17            INTEGER ::= 64      -- Maximum number of PDSCH time domain resource allocations for multi-PDSCH
                                                            -- scheduling
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 ::= 39      -- Max number of Search Space links minus 1
maxNrofBFDResourcePerSet-r17            INTEGER ::= 64      -- Max number of reference 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
maxNrofPathlossReferenceRSs-r17         INTEGER ::= 64      -- Maximum number of RSs used as pathloss reference for PUSCH, PUCCH, SRS
                                                            -- power control for unified TCI state operation
```

```
maxNrofPathlossReferenceRSs-1-r17       INTEGER ::= 63      -- Maximum number of RSs used as pathloss reference for PUSCH, PUCCH, SRS
                                                            -- power control for unified TCI state operation minus 1
maxNrofNAICS-Entries                    INTEGER ::= 8       -- Maximum number of supported NAICS capability set
maxBands                                INTEGER ::= 1024    -- Maximum number of supported bands in UE capability.
maxBandsMRDC                            INTEGER ::= 1280
maxBandsEUTRA                           INTEGER ::= 256
maxCellReport                           INTEGER ::= 8
maxDRB                                  INTEGER ::= 29      -- Maximum number of DRBs (that can be added in DRB-ToAddModList).
maxFreq                                 INTEGER ::= 8       -- Max number of frequencies.
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 fetype2R1 and fetype2R2
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
maxNrofCC-Group-r17                     INTEGER ::= 16      -- Maximum number of CC groups for DC location report
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 Preconfigured PRS processing windows per DL BWP
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
maxNrofPagingSubgroups-r17              INTEGER ::= 8       -- Maximum number of paging subgroups per paging occasion
maxNrofPUCCH-ResourceGroups-1-r16       INTEGER ::= 3
maxNrofReqComDC-Location-r17            INTEGER ::= 128     -- Maximum number of requested carriers/BWPs combinations for DC location
                                                            -- report
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
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
maxNrofPdcch-BlindDetectionMixed-1-r16  INTEGER ::= 7       -- Maximum number of combinations of mixed Rel-16 and Rel-15 PDCCH
                                                            -- monitoring capabilities minus 1
maxNrofPdcch-BlindDetection-r17         INTEGER ::= 16      -- Maximum number of combinations of PDCCH blind detection monitoring
                                                            -- capabilities

-- TAG-MULTIPLICITY-AND-TYPE-CONSTRAINT-DEFINITIONS-STOP
-- ASN1STOP
```

– End of NR-RRC-Definitions

```
-- ASN1START

END

-- ASN1STOP
```

6.5 Short Message

Short Messages can be transmitted on PDCCH using P-RNTI with or without associated *Paging* message using Short Message field in DCI format 1_0 (see TS 38.212 [17], clause 7.3.1.2.1).

Table 6.5-1 defines Short Messages. Bit 1 is the most significant bit.

Table 6.5-1: Short Messages

Bit	Short Message
1	***systemInfoModification*** If set to 1: indication of a BCCH modification other than *SIB6*, *SIB7*, *SIB8* and *posSIBs*.
2	***etwsAndCmasIndication*** If set to 1: indication of an ETWS primary notification and/or an ETWS secondary notification and/or a CMAS notification.
3	***stopPagingMonitoring*** This bit can be used for only operation with shared spectrum channel access and if *nrofPDCCH-MonitoringOccasionPerSSB-InPO* is present. If set to 1: indication that the UE may stop monitoring PDCCH occasion(s) for paging in this Paging Occasion as specified in TS 38.304 [20], clause 7.1.
4	***systemInfoModification-eDRX*** If set to 1: indication of a BCCH modification other than *SIB6*, *SIB7*, *SIB8* and *posSIB*s. This indication applies only to UEs using IDLE eDRX cycle longer than the BCCH modification period.
5 – 8	Not used in this release of the specification, and shall be ignored by UE if received.

6.6 PC5 RRC messages

6.6.1 General message structure

– *PC5-RRC-Definitions*

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

```
-- ASN1START
-- TAG-PC5-RRC-DEFINITIONS-START

PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    CellAccessRelatedInfo,
    SetupRelease,
    RRC-TransactionIdentifier,
    SN-FieldLengthAM,
    SN-FieldLengthUM,
    LogicalChannelIdentity,
    maxNrofSLRB-r16,
    maxNrofSL-RxInfoSet-r17,
    maxNrofSL-QFIs-r16,
    maxNrofSL-QFIsPerDest-r16,
    PagingCycle,
    PagingRecord,
    RSRP-Range,
    SL-MeasConfig-r16,
    SL-MeasId-r16,
    FreqBandList,
    FreqBandIndicatorNR,
    maxNrofRelayMeas-r17,
    maxSimultaneousBands,
    maxBandComb,
    maxBands,
    maxSIB-MessagePlus1-r17,
    maxSL-LCID-r16,
    BandParametersSidelink-r16,
    RLC-ParametersSidelink-r16,
    SIB1,
    SL-DRX-ConfigUC-r17,
    SL-DRX-ConfigUC-SemiStatic-r17,
    SL-PagingIdentityRemoteUE-r17,
    SL-RLC-ChannelID-r17,
    SL-SourceIdentity-r17,
    SystemInformation
FROM NR-RRC-Definitions;
```

```
-- TAG-PC5-RRC-DEFINITIONS-STOP
-- ASN1STOP
```

– SBCCH-SL-BCH-Message

The *SBCCH-SL-BCH-Message* class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

```
-- ASN1START
-- TAG-SBCCH-SL-BCH-MESSAGE-START

SBCCH-SL-BCH-Message ::= SEQUENCE {
    message                 SBCCH-SL-BCH-MessageType
}

SBCCH-SL-BCH-MessageType::=     CHOICE {
    c1                              CHOICE {
        masterInformationBlockSidelink              MasterInformationBlockSidelink,
        spare1 NULL
    },
    messageClassExtension   SEQUENCE {}
}

-- TAG-SBCCH-SL-BCH-MESSAGE-STOP
-- ASN1STOP
```

– SCCH-Message

The *SCCH-Message* class is the set of PC5-RRC messages that may be sent from the UE to the UE for unicast of NR sidelink communication on SCCH logical channel.

```
-- ASN1START
-- TAG-SCCH-MESSAGE-START

SCCH-Message ::=            SEQUENCE {
    message                         SCCH-MessageType
}

SCCH-MessageType ::=        CHOICE {
    c1                              CHOICE {
        measurementReportSidelink              MeasurementReportSidelink,
        rrcReconfigurationSidelink             RRCReconfigurationSidelink,
        rrcReconfigurationCompleteSidelink     RRCReconfigurationCompleteSidelink,
        rrcReconfigurationFailureSidelink      RRCReconfigurationFailureSidelink,
        ueCapabilityEnquirySidelink            UECapabilityEnquirySidelink,
        ueCapabilityInformationSidelink        UECapabilityInformationSidelink,
        uuMessageTransferSidelink-r17          UuMessageTransferSidelink-r17,
        remoteUEInformationSidelink-r17        RemoteUEInformationSidelink-r17
    },
    messageClassExtension           CHOICE {
        c2                              CHOICE {
```

```
            notificationMessageSidelink-r17 NotificationMessageSidelink-r17,
            ueAssistanceInformationSidelink-r17 UEAssistanceInformationSidelink-r17,
            spare6 NULL, spare5 NULL, spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL
        },
        messageClassExtensionFuture-r17    SEQUENCE {}
    }
}

-- TAG-SCCH-MESSAGE-STOP
-- ASN1STOP
```

6.6.2 Message definitions

– *MasterInformationBlockSidelink*

The *MasterInformationBlockSidelink* includes the system information transmitted by a UE via SL-BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: SBCCH

Direction: UE to UE

MasterInformationBlockSidelink

```
-- ASN1START
-- TAG-MASTERINFORMATIONBLOCKSIDELINK-START

MasterInformationBlockSidelink ::=          SEQUENCE {
    sl-TDD-Config-r16                           BIT STRING (SIZE (12)),
    inCoverage-r16                              BOOLEAN,
    directFrameNumber-r16                       BIT STRING (SIZE (10)),
    slotIndex-r16                               BIT STRING (SIZE (7)),
    reservedBits-r16                            BIT STRING (SIZE (2))
}

-- TAG-MASTERINFORMATIONBLOCKSIDELINK-STOP
-- ASN1STOP
```

***MasterInformationBlockSidelink* field descriptions**
directFrameNumber Indicates the frame number in which S-SSB transmitted.
inCoverage Value true indicates that the UE transmitting the *MasterInformationBlockSidelink* is in network coverage, or UE selects GNSS timing as the synchronization reference source.
slotIndex Indicates the slot index in which S-SSB transmitted.

– *MeasurementReportSidelink*

The *MeasurementReportSidelink* message is used for the indication of measurement results of NR sidelink.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

MeasurementReportSidelink message

```
-- ASN1START
-- TAG-MEASUREMENTREPORTSIDELINK-START

MeasurementReportSidelink ::=                SEQUENCE {
    criticalExtensions                           CHOICE {
        measurementReportSidelink-r16                MeasurementReportSidelink-r16-IEs,
        criticalExtensionsFuture                     SEQUENCE {}
    }
}

MeasurementReportSidelink-r16-IEs ::=        SEQUENCE {
    sl-MeasResults-r16                           SL-MeasResults-r16,
    lateNonCriticalExtension                     OCTET STRING                                    OPTIONAL,
    nonCriticalExtension                         SEQUENCE{}                                      OPTIONAL
}

SL-MeasResults-r16 ::=                       SEQUENCE {
    sl-MeasId-r16                                SL-MeasId-r16,
    sl-MeasResult-r16                            SL-MeasResult-r16,
    ...
}

SL-MeasResult-r16 ::=                        SEQUENCE {
    sl-ResultDMRS-r16                            SL-MeasQuantityResult-r16                       OPTIONAL,
    ...
}
```

```
SL-MeasQuantityResult-r16 ::=               SEQUENCE {
    sl-RSRP-r16                                 RSRP-Range                                      OPTIONAL,
    ...
}

SL-MeasResultListRelay-r17 ::=              SEQUENCE (SIZE (1..maxNrofRelayMeas-r17)) OF SL-MeasResultRelay-r17

SL-MeasResultRelay-r17 ::=                  SEQUENCE {
    cellIdentity-r17                            CellAccessRelatedInfo,
    sl-RelayUE-Identity-r17                     SL-SourceIdentity-r17,
    sl-MeasResult-r17                           SL-MeasResult-r16,
    ...
}

-- TAG-MEASUREMENTREPORTSIDELINK-STOP
-- ASN1STOP
```

***MeasurementReportSidelink* field descriptions**
sl-MeasId Identifies the sidelink measurement identity for which the reporting is being performed.
sl-MeasResult Measured RSRP results of a unicast destination.

– *NotificationMessageSidelink*

The *NotificationMessageSidelink* message is used to send notification message from U2N Relay UE to the connected U2N Remote UE.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: U2N Relay UE to U2N Remote UE

***NotificationMessageSidelink* message**

```
-- ASN1START
-- TAG-NOTIFICATIONMESSAGESIDELINK-START

NotificationMessageSidelink-r17 ::=       SEQUENCE {
    criticalExtensions                        CHOICE {
        notificationMessageSidelink-r17           NotificationMessageSidelink-r17-IEs,
        criticalExtensionsFuture                  SEQUENCE {}
    }
}

NotificationMessageSidelink-r17-IEs ::=   SEQUENCE {
```

```
    indicationType-r17                      ENUMERATED {
                                                relayUE-Uu-RLF, relayUE-HO, relayUE-CellReselection,
                                                relayUE-Uu-RRC-Failure
                                            }                                   OPTIONAL,   -- Need N
    lateNonCriticalExtension                OCTET STRING                        OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                         OPTIONAL
}

-- TAG-NOTIFICATIONMESSAGESIDELINK -STOP
-- ASN1STOP
```

– *RemoteUEInformationSidelink*

The *RemoteUEInformationSidelink* message is used to request SIB(s) or provide paging related information as specified in clause 5.8.9.8.1.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2N Remote UE to L2 U2N Relay UE

RemoteUEInformationSidelink message

```
-- ASN1START
-- TAG-REMOTEUEINFORMATIONSIDELINK-START

RemoteUEInformationSidelink-r17 ::=         SEQUENCE {
    criticalExtensions                          CHOICE {
        remoteUEInformationSidelink-r17             RemoteUEInformationSidelink-r17-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

RemoteUEInformationSidelink-r17-IEs ::=     SEQUENCE {
    sl-RequestedSIB-List-r17                    SetupRelease { SL-RequestedSIB-List-r17}        OPTIONAL, -- Need M
    sl-PagingInfo-RemoteUE-r17                  SetupRelease { SL-PagingInfo-RemoteUE-r17}        OPTIONAL, -- Need M
    lateNonCriticalExtension                    OCTET STRING                                      OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                                       OPTIONAL
}

SL-RequestedSIB-List-r17 ::=              SEQUENCE (SIZE (maxSIB-MessagePlus1-r17)) OF SL-SIB-ReqInfo-r17

SL-PagingInfo-RemoteUE-r17 ::=              SEQUENCE {
    sl-PagingIdentityRemoteUE-r17               SL-PagingIdentityRemoteUE-r17,
    sl-PagingCycleRemoteUE-r17                  PagingCycle                                       OPTIONAL  -- Need M
}

SL-SIB-ReqInfo-r17 ::=                  ENUMERATED { sib1, sib2, sib3, sib4, sib5, sib6, sib7, sib8, sib9, sib10, sib11, sib12, sib13,
```

```
                                                    sib14, sib15, sib16, sib17, sib18, sib19, sib20, sib21, sibNotReq11, sibNotReq10, sibNotReq9,
                                                    sibNotReq8, sibNotReq7, sibNotReq6, sibNotReq5, sibNotReq4, sibNotReq3, sibNotReq2,
sibNotReq1, ... }

-- TAG-REMOTEUEINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

***RemoteUEInformationSidelink-IEs* field descriptions**
sl-RequestedSIB-List Contains a list of requested SIBs.
SL-SIB-ReqInfo Indicates the requested SIB type. Values sibNotReq11, sibNotReq10, …, sibNotReq1 shall be ignored by L2 U2N relay UE (i.e., no SIB requested).
sl-PagingInfo-RemoteUE Indicates the paging information used by L2 U2N Relay UE to perform the connected L2 U2N Remote UE's paging monitoring.
sl-PagingIdentityRemoteUE Indicates the L2 U2N Remote UE's paging UE ID.
sl-PagingCycleRemoteUE Indicates the L2 U2N Remote UE's UE specific DRX cycle as the minimum value of the one provided by upper layers (if configured) and the one provided by RRC layer (if configured). Value rf32 corresponds to 32 radio frames, value rf64 corresponds to 64 radio frames and so on.

– *RRCReconfigurationSidelink*

The *RRCReconfigurationSidelink* message is the command to AS configuration of the PC5 RRC connection. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

***RRCReconfigurationSidelink* message**

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONSIDELINK-START

RRCReconfigurationSidelink ::=          SEQUENCE {
    rrc-TransactionIdentifier-r16           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        rrcReconfigurationSidelink-r16          RRCReconfigurationSidelink-r16-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

RRCReconfigurationSidelink-r16-IEs ::=  SEQUENCE {
    slrb-ConfigToAddModList-r16             SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-Config-r16             OPTIONAL, -- Need N
```

```
    slrb-ConfigToReleaseList-r16            SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SLRB-PC5-ConfigIndex-r16    OPTIONAL, -- Need N
    sl-MeasConfig-r16                       SetupRelease {SL-MeasConfig-r16}                                    OPTIONAL, -- Need M
    sl-CSI-RS-Config-r16                    SetupRelease {SL-CSI-RS-Config-r16}                                 OPTIONAL, -- Need M
    sl-ResetConfig-r16                      ENUMERATED {true}                                                   OPTIONAL, -- Need N
    sl-LatencyBoundCSI-Report-r16           INTEGER (3..160)                                                    OPTIONAL, -- Need M
    lateNonCriticalExtension                OCTET STRING                                                        OPTIONAL,
    nonCriticalExtension                    RRCReconfigurationSidelink-v1700-IEs                                OPTIONAL
}

RRCReconfigurationSidelink-v1700-IEs ::= SEQUENCE {
    sl-DRX-ConfigUC-PC5-r17                 SetupRelease { SL-DRX-ConfigUC-r17 }                                OPTIONAL, -- Need M
    sl-LatencyBoundIUC-Report-r17           SetupRelease { SL-LatencyBoundIUC-Report-r17 }                      OPTIONAL, -- Need M
    sl-RLC-ChannelToReleaseListPC5-r17      SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelID-r17         OPTIONAL, -- Need N
    sl-RLC-ChannelToAddModListPC5-r17       SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-ChannelConfigPC5-r17  OPTIONAL, -- Need N
    nonCriticalExtension                    SEQUENCE {}                                                         OPTIONAL
}

SL-LatencyBoundIUC-Report-r17::=            INTEGER (3..160)

SLRB-Config-r16::=                      SEQUENCE {
    slrb-PC5-ConfigIndex-r16                SLRB-PC5-ConfigIndex-r16,
    sl-SDAP-ConfigPC5-r16                   SL-SDAP-ConfigPC5-r16                                               OPTIONAL, -- Need M
    sl-PDCP-ConfigPC5-r16                   SL-PDCP-ConfigPC5-r16                                               OPTIONAL, -- Need M
    sl-RLC-ConfigPC5-r16                    SL-RLC-ConfigPC5-r16                                                OPTIONAL, -- Need M
    sl-MAC-LogicalChannelConfigPC5-r16      SL-LogicalChannelConfigPC5-r16                                      OPTIONAL, -- Need M
    ...
}

SLRB-PC5-ConfigIndex-r16 ::=            INTEGER (1..maxNrofSLRB-r16)

SL-SDAP-ConfigPC5-r16 ::=               SEQUENCE {
    sl-MappedQoS-FlowsToAddList-r16         SEQUENCE (SIZE (1.. maxNrofSL-QFIsPerDest-r16)) OF SL-PQFI-r16      OPTIONAL, -- Need N
    sl-MappedQoS-FlowsToReleaseList-r16     SEQUENCE (SIZE (1.. maxNrofSL-QFIsPerDest-r16)) OF SL-PQFI-r16      OPTIONAL, -- Need N
    sl-SDAP-Header-r16                      ENUMERATED {present, absent},
    ...
}

SL-PDCP-ConfigPC5-r16 ::=               SEQUENCE {
    sl-PDCP-SN-Size-r16                     ENUMERATED {len12bits, len18bits}                                   OPTIONAL, -- Need M
    sl-OutOfOrderDelivery-r16               ENUMERATED { true }                                                 OPTIONAL,  -- Need R
    ...
}

SL-RLC-ConfigPC5-r16 ::=                CHOICE {
    sl-AM-RLC-r16                           SEQUENCE {
        sl-SN-FieldLengthAM-r16                 SN-FieldLengthAM                                                OPTIONAL, -- Need M
        ...
    },
    sl-UM-Bi-Directional-RLC-r16            SEQUENCE {
        sl-SN-FieldLengthUM-r16                 SN-FieldLengthUM                                                OPTIONAL, -- Need M
        ...
    },
    sl-UM-Uni-Directional-RLC-r16           SEQUENCE {
        sl-SN-FieldLengthUM-r16                 SN-FieldLengthUM                                                OPTIONAL, -- Need M
```

```
        ...
    }
}

SL-LogicalChannelConfigPC5-r16 ::=      SEQUENCE {
    sl-LogicalChannelIdentity-r16           LogicalChannelIdentity,
    ...
}

SL-PQFI-r16 ::=                         INTEGER (1..64)

SL-CSI-RS-Config-r16 ::=                SEQUENCE {
    sl-CSI-RS-FreqAllocation-r16            CHOICE {
        sl-OneAntennaPort-r16                   BIT STRING (SIZE (12)),
        sl-TwoAntennaPort-r16                   BIT STRING (SIZE (6))
    }                                                                       OPTIONAL, -- Need M
    sl-CSI-RS-FirstSymbol-r16               INTEGER (3..12)                 OPTIONAL, -- Need M
    ...
}

SL-RLC-ChannelConfigPC5-r17::=          SEQUENCE {
    sl-RLC-ChannelID-PC5-r17                SL-RLC-ChannelID-r17,
    sl-RLC-ConfigPC5-r17                    SL-RLC-ConfigPC5-r16            OPTIONAL, -- Need M
    sl-MAC-LogicalChannelConfigPC5-r17      SL-LogicalChannelConfigPC5-r16  OPTIONAL, -- Need M
    ...
}

-- TAG-RRCRECONFIGURATIONSIDELINK-STOP
-- ASN1STOP
```

***RRCReconfigurationSidelink* field descriptions**
sl-CSI-RS-FreqAllocation Indicates the frequency domain position for sidelink CSI-RS.
sl-CSI-RS-FirstSymbol Indicates the position of first symbol of sidelink CSI-RS.
sl-DRX-ConfigUC-PC5 Indicates the NR sidelink DRX configuration for unicast communication, as specified in TS 38.321 [3]
sl-LatencyBoundCSI-Report Indicates the latency bound of SL CSI report from the associated SL CSI triggering in terms of number of slots.
sl-LatencyBoundIUC-Report Indicates the latency bound of SL Inter-UE coordination report from the associated SL Inter-UE coordination explicit request triggering in terms of number of slots.
sl-LogicalChannelIdentity Indicates the identity of the sidelink logical channel.
sl-MappedQoS-FlowsToAddList Indicate the QoS flows to be mapped to the configured sidelink DRB. Each entry is indicated by the *SL-PQFI*, which is used between UEs, as defined in TS 23.287 [55].
sl-MappedQoS-FlowsToReleaseList Indicate the QoS flows to be released from the configured sidelink DRB. Each entry is indicated by the *SL-PQFI*, which is used between UEs, as defined in TS 23.287 [55].
sl-MeasConfig Indicates the sidelink measurement configuration for the unicast destination.
sl-OutOfOrderDelivery Indicates whether or not outOfOrderDelivery specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the sidelink radio bearer is established.
sl-PDCP-SN-Size Indicates the PDCP SN size of the configured sidelink DRB.
sl-Resetconfig Indicates that the full configuration should be applicable for the *RRCReconfigurationSidelink* message.
sl-SDAP-Header Indicates whether or not a SDAP header is present on this sidelink DRB.

– *RRCReconfigurationCompleteSidelink*

The *RRCReconfigurationCompleteSidelink* message is used to confirm the successful completion of a PC5 RRC AS reconfiguration. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

***RRCReconfigurationCompleteSidelink* message**

```
-- ASN1START
```

```
-- TAG-RRCRECONFIGURATIONCOMPLETESIDELINK-START

RRCReconfigurationCompleteSidelink ::=          SEQUENCE {
    rrc-TransactionIdentifier-r16                   RRC-TransactionIdentifier,
    criticalExtensions                              CHOICE {
        rrcReconfigurationCompleteSidelink-r16          RRCReconfigurationCompleteSidelink-r16-IEs,
        criticalExtensionsFuture                        SEQUENCE {}
    }
}

RRCReconfigurationCompleteSidelink-r16-IEs ::= SEQUENCE {
    lateNonCriticalExtension                        OCTET STRING                                        OPTIONAL,
    nonCriticalExtension                            RRCReconfigurationCompleteSidelink-v1710-IEs        OPTIONAL
}

RRCReconfigurationCompleteSidelink-v1710-IEs ::=    SEQUENCE {
    dummy                                           ENUMERATED {true},
    nonCriticalExtension                            RRCReconfigurationCompleteSidelink-v1720-IEs        OPTIONAL
}


RRCReconfigurationCompleteSidelink-v1720-IEs ::=    SEQUENCE {
    sl-DRX-ConfigReject-v1720                       ENUMERATED {true}                                   OPTIONAL,
    nonCriticalExtension                            SEQUENCE {}                                         OPTIONAL
}

-- TAG-RRCRECONFIGURATIONCOMPLETESIDELINK-STOP
-- ASN1STOP
```

***RRCReconfigurationCompleteSidelink* field descriptions**
dummy This field is not used in the specification. The UE shall not include this field. If received it shall be ignored by the peer UE.
sl-DRX-ConfigReject Indicates the rejection of sidelink DRX configuration received from the peer UE for the corresponding NR sidelink unicast communication.

– *RRCReconfigurationFailureSidelink*

The *RRCReconfigurationFailureSidelink* message is used to indicate the failure of a PC5 RRC AS reconfiguration. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

RRCReconfigurationFailureSidelink message

```
-- ASN1START
-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-START

RRCReconfigurationFailureSidelink ::=         SEQUENCE {
    rrc-TransactionIdentifier-r16                 RRC-TransactionIdentifier,
    criticalExtensions                            CHOICE {
        rrcReconfigurationFailureSidelink-r16         RRCReconfigurationFailureSidelink-r16-IEs,
        criticalExtensionsFuture                      SEQUENCE {}
    }
}

RRCReconfigurationFailureSidelink-r16-IEs ::= SEQUENCE {
    lateNonCriticalExtension                      OCTET STRING                                          OPTIONAL,
    nonCriticalExtension                          SEQUENCE {}                                           OPTIONAL
}

-- TAG-RRCRECONFIGURATIONFAILURESIDELINK-STOP
-- ASN1STOP
```

– *UEAssistanceInformationSidelink*

The *UEAssistanceInformationSidelink* message may include sidelink DRX assistance information used to determine the sidelink DRX configuration.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

UEAssistanceInformationSidelink message

```
-- ASN1START
-- TAG-UEASSISTANCEINFORMATIONSIDELINK-START

UEAssistanceInformationSidelink-r17 ::=       SEQUENCE {
    criticalExtensions                            CHOICE {
        ueAssistanceInformationSidelink-r17           UEAssistanceInformationSidelink-r17-IEs,
        criticalExtensionsFuture                      SEQUENCE {}
    }
}

UEAssistanceInformationSidelink-r17-IEs ::=   SEQUENCE {
    sl-PreferredDRX-ConfigList-r17                SEQUENCE (SIZE (1..maxNrofSL-RxInfoSet-r17)) OF SL-DRX-ConfigUC-SemiStatic-r17
                                                                                                        OPTIONAL, -- Need R
    lateNonCriticalExtension                      OCTET STRING                                          OPTIONAL,
```

```
    nonCriticalExtension                    SEQUENCE {}                                 OPTIONAL
}

-- TAG-UEASSISTANCEINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

***UEAssistanceInformationSidelink* field descriptions**
sl-PreferredDRX-ConfigList   Indicates a list of the reference sidelink DRX configurations provided by a UE to a peer UE for determining the sidelink DRX configuration.

– *UECapabilityEnquirySidelink*

The *UECapabilityEnquirySidelink* message is used to request UE sidelink capabilities. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

***UECapabilityEnquirySidelink* message**

```
-- ASN1START
-- TAG-UECAPABILITYENQUIRYSIDELINK-START

UECapabilityEnquirySidelink ::=         SEQUENCE {
    rrc-TransactionIdentifier-r16           RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        ueCapabilityEnquirySidelink-r16         UECapabilityEnquirySidelink-r16-IEs,
        criticalExtensionsFuture                SEQUENCE {}
    }
}

UECapabilityEnquirySidelink-r16-IEs ::= SEQUENCE {
    frequencyBandListFilterSidelink-r16     FreqBandList                                OPTIONAL, -- Need N
    ue-CapabilityInformationSidelink-r16    OCTET STRING                                OPTIONAL, -- Need N
    lateNonCriticalExtension                OCTET STRING                                OPTIONAL,
    nonCriticalExtension                    SEQUENCE{}                                  OPTIONAL
}

-- TAG-UECAPABILITYENQUIRYSIDELINK-STOP
-- ASN1STOP
```

***UECapabilityEnquirySidelink-IEs* field descriptions**
frequencyBandListFilterSidelink This field is used to indicate frequency bands for which the peer UE is requested to provide supported bands and band combinations for NR sidelink communications. The UE always provides this field.
ue-CapabilityInformationSidelink This field indicates the *UECapabilityInformationSidelink* message to provide the UE sidelink capability, which can be optionally sent together with *UECapabilityEnquirySidelink*.

– *UECapabilityInformationSidelink*

The *UECapabilityInformationSidelink* message is used to transfer UE radio access capabilities. It is only applied to unicast of NR sidelink communication.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: UE to UE

***UECapabilityInformationSidelink* message**

```
-- ASN1START
-- TAG-UECAPABILITYINFORMATIONSIDELINK-START

UECapabilityInformationSidelink ::=         SEQUENCE {
    rrc-TransactionIdentifier-r16               RRC-TransactionIdentifier,
    criticalExtensions                          CHOICE {
        ueCapabilityInformationSidelink-r16         UECapabilityInformationSidelink-r16-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
}

UECapabilityInformationSidelink-r16-IEs ::= SEQUENCE {
    accessStratumReleaseSidelink-r16            AccessStratumReleaseSidelink-r16,
    pdcp-ParametersSidelink-r16                 PDCP-ParametersSidelink-r16                                 OPTIONAL,
    rlc-ParametersSidelink-r16                  RLC-ParametersSidelink-r16                                  OPTIONAL,
    supportedBandCombinationListSidelinkNR-r16  BandCombinationListSidelinkNR-r16                           OPTIONAL,
    supportedBandListSidelink-r16               SEQUENCE (SIZE (1..maxBands)) OF BandSidelinkPC5-r16        OPTIONAL,
    appliedFreqBandListFilter-r16               FreqBandList                                                OPTIONAL,
    lateNonCriticalExtension                    OCTET STRING                                                OPTIONAL,
    nonCriticalExtension                        UECapabilityInformationSidelink-v1700-IEs                   OPTIONAL
}

UECapabilityInformationSidelink-v1700-IEs ::= SEQUENCE {
    mac-ParametersSidelink-r17                  MAC-ParametersSidelink-r17                                  OPTIONAL,
    supportedBandCombinationListSidelinkNR-v1710  BandCombinationListSidelinkNR-v1710                       OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                                                 OPTIONAL
}
```

```
MAC-ParametersSidelink-r17 ::= SEQUENCE {
    drx-OnSidelink-r17                          ENUMERATED {supported}                                          OPTIONAL,
    ...
}

AccessStratumReleaseSidelink-r16 ::= ENUMERATED { rel16, rel17, spare6, spare5, spare4, spare3, spare2, spare1, ... }

PDCP-ParametersSidelink-r16 ::= SEQUENCE {
    outOfOrderDeliverySidelink-r16              ENUMERATED {supported}      OPTIONAL,
    ...
}

BandCombinationListSidelinkNR-r16 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkNR-r16

BandCombinationListSidelinkNR-v1710 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationParametersSidelinkNR-v1710

BandCombinationParametersSidelinkNR-r16 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelink-r16

BandCombinationParametersSidelinkNR-v1710 ::= SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParametersSidelink-v1710

BandParametersSidelink-v1710 ::=    SEQUENCE {
    --32-5a-1
    tx-IUC-Scheme1-Mode2Sidelink-r17    ENUMERATED {supported}                  OPTIONAL,
    --32-5b-1
    tx-IUC-Scheme2-Mode2Sidelink-r17    ENUMERATED {n4, n8, n16}                OPTIONAL
}

BandSidelinkPC5-r16 ::=           SEQUENCE {
    freqBandSidelink-r16              FreqBandIndicatorNR,
    --15-1
    sl-Reception-r16                  SEQUENCE {
        harq-RxProcessSidelink-r16        ENUMERATED {n16, n24, n32, n64},
        pscch-RxSidelink-r16              ENUMERATED {value1, value2},
        scs-CP-PatternRxSidelink-r16      CHOICE {
            fr1-r16                           SEQUENCE {
                scs-15kHz-r16                     BIT STRING (SIZE (16))                  OPTIONAL,
                scs-30kHz-r16                     BIT STRING (SIZE (16))                  OPTIONAL,
                scs-60kHz-r16                     BIT STRING (SIZE (16))                  OPTIONAL
            },
            fr2-r16                           SEQUENCE {
                scs-60kHz-r16                     BIT STRING (SIZE (16))                  OPTIONAL,
                scs-120kHz-r16                    BIT STRING (SIZE (16))                  OPTIONAL
            }
        }                                                                                 OPTIONAL,
        extendedCP-RxSidelink-r16         ENUMERATED {supported}                          OPTIONAL
    }                                                                                     OPTIONAL,
    --15-10
    sl-Tx-256QAM-r16                  ENUMERATED {supported}                              OPTIONAL,
    --15-12
    lowSE-64QAM-MCS-TableSidelink-r16 ENUMERATED {supported}                              OPTIONAL,
    ...,
    [[
    --15-14
    csi-ReportSidelink-r16                SEQUENCE {
```

```
        csi-RS-PortsSidelink-r16            ENUMERATED {p1, p2}
    }                                                                       OPTIONAL,
    --15-19
    rankTwoReception-r16                ENUMERATED {supported}              OPTIONAL,
    --15-23
    sl-openLoopPC-RSRP-ReportSidelink-r16 ENUMERATED {supported}            OPTIONAL,
    --13-1
    sl-Rx-256QAM-r16                    ENUMERATED {supported}              OPTIONAL
    ]],
    [[
    --32-5a-2
    rx-IUC-Scheme1-PreferredMode2Sidelink-r17     ENUMERATED {supported}    OPTIONAL,
    --32-5a-3
    rx-IUC-Scheme1-NonPreferredMode2Sidelink-r17  ENUMERATED {supported}    OPTIONAL,
    --32-5b-2
    rx-IUC-Scheme2-Mode2Sidelink-r17              ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64} OPTIONAL,
    --32-6-1
    rx-IUC-Scheme1-SCI-r17                        ENUMERATED {supported}    OPTIONAL,
    --32-6-2
    rx-IUC-Scheme1-SCI-ExplicitReq-r17            ENUMERATED {supported}    OPTIONAL,
    --32-7
    scheme2-ConflictDeterminationRSRP-r17         ENUMERATED {supported}    OPTIONAL
    ]]
}

-- TAG-UECAPABILITYINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

– *UuMessageTransferSidelink*

The *UuMessageTransferSidelink* message is used for the sidelink transfer of Paging message and System Information messages.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2N Relay UE to L2 U2N Remote UE

UuMessageTransferSidelink message

```
-- ASN1START
-- TAG-UUMESSAGETRANSFERSIDELINK-START

UuMessageTransferSidelink-r17 ::=           SEQUENCE {
    criticalExtensions                          CHOICE {
        uuMessageTransferSidelink-r17               UuMessageTransferSidelink-r17-IEs,
        criticalExtensionsFuture                    SEQUENCE {}
    }
```

```
}

UuMessageTransferSidelink-r17-IEs ::=       SEQUENCE {
    sl-PagingDelivery-r17                       OCTET STRING (CONTAINING PagingRecord)                  OPTIONAL,   -- Need N
    sl-SIB1-Delivery-r17                        OCTET STRING (CONTAINING SIB1)                          OPTIONAL,   -- Need N
    sl-SystemInformationDelivery-r17            OCTET STRING (CONTAINING SystemInformation)             OPTIONAL,   -- Need N
    lateNonCriticalExtension                    OCTET STRING                                            OPTIONAL,
    nonCriticalExtension                        SEQUENCE {}                                             OPTIONAL
}

-- TAG-UUMESSAGETRANSFERSIDELINK-STOP
-- ASN1STOP
```

***UuMessageTransferSidelink-IEs* field descriptions**
sl-PagingDelivery This field is used to transfer PagingRecord relevant to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.
sl-SIB1-Delivery This field is used to transfer SIB1 to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.
sl-SystemInformationDelivery This field is used to transfer SIBs to the L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE.

– End of PC5-RRC-Definitions

```
-- ASN1START

END

-- ASN1STOP
```

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.

Timer	Start	Stop	At expiry
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

Timer	Start	Stop	At expiry
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.

Timer	Start	Stop	At expiry
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 *reportType* 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 *reportType* 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 *reportType* 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 *reportType* 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.

Timer	Start	Stop	At expiry
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.

Timer	Start	Stop	At expiry
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.

Timer	Start	Stop	At expiry
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 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.

Timer	Start	Stop	At expiry
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, or upon reception of *RRCReconfiguration* message for the target cell including *reconfigurationWithSync*, or upon conditional reconfiguration execution i.e. when applying a stored *RRCReconfiguration* message for the target cell including *reconfigurationWithSync.*	Stop T430, if it is running, for the source cell upon reception of *RRCReconfiguration* message including *reconfigurationWithSync*, or upon conditional reconfiguration execution i.e. when applying a stored *RRCReconfiguration* message including *reconfigurationWithSync.*	Perform the actions as specified in 5.2.2.6.

7.1.2 Timer handling

When the UE applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

7.2 Counters

Counter	Reset	Incremented	When reaching max value
N310	Upon reception of "in-sync" indication from lower layers; upon receiving *RRCReconfiguration* with *reconfigurationWithSync* for that cell group; upon initiating the connection re-establishment procedure.	Upon reception of "out-of-sync" from lower layer while the timer T310 is stopped.	Start timer T310
N311	Upon reception of "out-of-sync" indication from lower layers; upon receiving *RRCReconfiguration* with *reconfigurationWithSync* for that cell group; upon initiating the connection re-establishment procedure.	Upon reception of the "in-sync" from lower layer while the timer T310 is running.	Stop the timer T310.

7.3 Constants

Constant	Usage
N310	Maximum number of consecutive "out-of-sync" indications for the SpCell received from lower layers
N311	Maximum number of consecutive "in-sync" indications for the SpCell received from lower layers

7.4 UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

– *NR-UE-Variables*

This ASN.1 segment is the start of the NR UE variable definitions.

```
-- ASN1START
-- NR-UE-VARIABLES-START

NR-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    AreaConfiguration-r17,
    ARFCN-ValueNR,
    CellIdentity,
    EUTRA-PhysCellId,
    maxCEFReport-r17,
    MeasId,
    MeasIdToAddModList,
    MeasIdleCarrierEUTRA-r16,
    MeasIdleCarrierNR-r16,
    MeasResultIdleEUTRA-r16,
    MeasResultIdleNR-r16,
    MeasObjectToAddModList,
    PhysCellId,
    RNTI-Value,
    ReportConfigToAddModList,
    RSRP-Range,
    SL-MeasId-r16,
    SL-MeasIdList-r16,
    SL-MeasObjectList-r16,
    SL-ReportConfigList-r16,
    SL-QuantityConfig-r16,
    Tx-PoolMeasList-r16,
    QuantityConfig,
    maxNrofCellMeas,
    maxNrofMeasId,
    maxFreqIdle-r16,
    PhysCellIdUTRA-FDD-r16,
    ValidityAreaList-r16,
    CondReconfigToAddModList-r16,
    ConnEstFailReport-r16,
    LoggingDuration-r16,
    LoggingInterval-r16,
    LogMeasInfoList-r16,
    LogMeasInfo-r16,
    RA-Report-r16,
    RLF-Report-r16,
    TraceReference-r16,
    WLAN-Identifiers-r16,
    WLAN-NameList-r16,
    BT-NameList-r16,
    PLMN-Identity,
    maxNrofRelayMeas-r17,
    maxPLMN,
    RA-ReportList-r16,
    VisitedCellInfoList-r16,
    AbsoluteTimeInfo-r16,
```

```
    LoggedEventTriggerConfig-r16,
    LoggedPeriodicalReportConfig-r16,
    Sensor-NameList-r16,
    SL-SourceIdentity-r17,
    SuccessHO-Report-r17,
    PLMN-IdentityList2-r16,
    AreaConfiguration-r16,
    maxNrofSL-MeasId-r16,
    maxNrofFreqSL-r16,
    maxNrofCLI-RSSI-Resources-r16,
    maxNrofCLI-SRS-Resources-r16,
    RSSI-ResourceId-r16,
    SRS-ResourceId,
    VisitedPSCellInfoList-r17
FROM NR-RRC-Definitions;

-- NR-UE-VARIABLES-STOP
-- ASN1STOP
```

– *VarConditionalReconfig*

The UE variable *VarConditionalReconfig* includes the accumulated configuration of the conditional handover, conditional PSCell addition or conditional PSCell change configurations including the pointers to conditional handover, conditional PSCell addition or conditional PSCell change execution condition (associated *measId*(s)) and the stored target candidate SpCell *RRCReconfiguration*.

VarConditionalReconfig UE variable

```
-- ASN1START
-- TAG-VARCONDITIONALRECONFIG-START

VarConditionalReconfig ::=     SEQUENCE {
    condReconfigList              CondReconfigToAddModList-r16        OPTIONAL
}

-- TAG-VARCONDITIONALRECONFIG-STOP
-- ASN1STOP
```

– *VarConnEstFailReport*

The UE variable *VarConnEstFailReport* includes the connection establishment failure and/or connection resume failure information.

***VarConnEstFailReport* UE variable**

```
-- ASN1START
-- TAG-VARCONNESTFAILREPORT-START

VarConnEstFailReport-r16 ::= SEQUENCE {
```

```
    connEstFailReport-r16       ConnEstFailReport-r16,
    plmn-Identity-r16           PLMN-Identity
}

-- TAG-VARCONNESTFAILREPORT-STOP
-- ASN1STOP
```

– *VarConnEstFailReportList*

The UE variable *VarConnEstFailReportList* includes a list of the connection establishment failure and/or connection resume failure information.

VarConnEstFailReportList UE variable

```
-- ASN1START
-- TAG-VARCONNESTFAILREPORTLIST-START

VarConnEstFailReportList-r17 ::= SEQUENCE {
    connEstFailReportList-r17       SEQUENCE (SIZE (1..maxCEFReport-r17)) OF VarConnEstFailReport-r16
}

-- TAG-VARCONNESTFAILREPORTLIST-STOP
-- ASN1STOP
```

– *VarLogMeasConfig*

The UE variable *VarLogMeasConfig* includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, RRC_INACTIVE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements. The UE performs logging of measurements only while in RRC_IDLE and RRC_INACTIVE.

VarLogMeasConfig UE variable

```
-- ASN1START
-- TAG-VARLOGMEASCONFIG-START

VarLogMeasConfig-r16-IEs ::= SEQUENCE {
    areaConfiguration-r16       AreaConfiguration-r16       OPTIONAL,
    bt-NameList-r16             BT-NameList-r16             OPTIONAL,
    wlan-NameList-r16           WLAN-NameList-r16           OPTIONAL,
    sensor-NameList-r16         Sensor-NameList-r16         OPTIONAL,
    loggingDuration-r16         LoggingDuration-r16,
    reportType                  CHOICE {
        periodical                  LoggedPeriodicalReportConfig-r16,
        eventTriggered              LoggedEventTriggerConfig-r16
    },
    earlyMeasIndication-r17     ENUMERATED {true}           OPTIONAL,
    areaConfiguration-r17       AreaConfiguration-r17       OPTIONAL
}
-- TAG-VARLOGMEASCONFIG-STOP
```

```
-- ASN1STOP
```

– *VarLogMeasReport*

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

***VarLogMeasReport* UE variable**

```
-- ASN1START
-- TAG-VARLOGMEASREPORT-START

VarLogMeasReport-r16 ::=     SEQUENCE {
    absoluteTimeInfo-r16         AbsoluteTimeInfo-r16,
    traceReference-r16           TraceReference-r16,
    traceRecordingSessionRef-r16 OCTET STRING (SIZE (2)),
    tce-Id-r16                   OCTET STRING (SIZE (1)),
    logMeasInfoList-r16          LogMeasInfoList-r16,
    plmn-IdentityList-r16        PLMN-IdentityList2-r16,
    sigLoggedMeasType-r17        ENUMERATED {true}
}

-- TAG-VARLOGMEASREPORT-STOP
-- ASN1STOP
```

– *VarMeasConfig*

The UE variable *VarMeasConfig* includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

VarMeasConfig UE variable

```
-- ASN1START
-- TAG-VARMEASCONFIG-START

VarMeasConfig ::=                   SEQUENCE {
    -- Measurement identities
    measIdList                          MeasIdToAddModList                OPTIONAL,
    -- Measurement objects
    measObjectList                      MeasObjectToAddModList            OPTIONAL,
    -- Reporting configurations
    reportConfigList                    ReportConfigToAddModList          OPTIONAL,
    -- Other parameters
    quantityConfig                      QuantityConfig                    OPTIONAL,
    s-MeasureConfig                         CHOICE {
        ssb-RSRP                                RSRP-Range,
        csi-RSRP                                RSRP-Range
    }                                                                     OPTIONAL
```

```
}

-- TAG-VARMEASCONFIG-STOP
-- ASN1STOP
```

– *VarMeasConfigSL*

The UE variable *VarMeasConfigSL* includes the accumulated configuration of the NR sidelink measurements to be performed by the UE of unicast destination.

***VarMeasConfigSL UE* variable**

```
-- ASN1START
-- TAG-VARMEASCONFIGSL-START

VarMeasConfigSL-r16 ::=                     SEQUENCE {
    -- NR sidelink measurement identities
    sl-MeasIdList-r16                           SL-MeasIdList-r16                       OPTIONAL,
    -- NR sidelink measurement objects
    sl-MeasObjectList-r16                       SL-MeasObjectList-r16                   OPTIONAL,
    -- NR sidelink reporting configurations
    sl-ReportConfigList-r16                     SL-ReportConfigList-r16                 OPTIONAL,
    -- Other parameters
    sl-QuantityConfig-r16                       SL-QuantityConfig-r16                   OPTIONAL
}

-- TAG-VARMEASCONFIGSL-STOP
-- ASN1STOP
```

– *VarMeasIdleConfig*

The UE variable *VarMeasIdleConfig* includes the configuration of the measurements to be performed by the UE while in RRC_IDLE or RRC_INACTIVE for NR inter-frequency and inter-RAT (i.e. EUTRA) measurements.

***VarMeasIdleConfig UE* variable**

```
-- ASN1START
-- TAG-VARMEASIDLECONFIG-START

VarMeasIdleConfig-r16 ::=     SEQUENCE {
    measIdleCarrierListNR-r16     SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16               OPTIONAL,
    measIdleCarrierListEUTRA-r16  SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierEUTRA-r16            OPTIONAL,
    measIdleDuration-r16          ENUMERATED {sec10, sec30, sec60, sec120, sec180, sec240, sec300, spare},
    validityAreaList-r16          ValidityAreaList-r16                                                        OPTIONAL
}

-- TAG-VARMEASIDLECONFIG-STOP
-- ASN1STOP
```

– *VarMeasIdleReport*

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

***VarMeasIdleReport UE* variable**

```
-- ASN1START
-- TAG-VARMEASIDLEREPORT-START

VarMeasIdleReport-r16 ::=    SEQUENCE {
    measReportIdleNR-r16         MeasResultIdleNR-r16                  OPTIONAL,
    measReportIdleEUTRA-r16      MeasResultIdleEUTRA-r16               OPTIONAL
}

-- TAG-VARMEASIDLEREPORT-STOP
-- ASN1STOP
```

– *VarMeasReportList*

The UE variable *VarMeasReportList* includes information about the measurements for which the triggering conditions have been met.

VarMeasReportList UE variable

```
-- ASN1START
-- TAG-VARMEASREPORTLIST-START

VarMeasReportList ::=              SEQUENCE (SIZE (1..maxNrofMeasId)) OF VarMeasReport

VarMeasReport ::=                  SEQUENCE {
    -- List of measurement that have been triggered
    measId                             MeasId,
    cellsTriggeredList                 CellsTriggeredList             OPTIONAL,
    numberOfReportsSent                INTEGER,
    cli-TriggeredList-r16              CLI-TriggeredList-r16          OPTIONAL,
    tx-PoolMeasToAddModListNR-r16      Tx-PoolMeasList-r16            OPTIONAL,
    relaysTriggeredList-r17            RelaysTriggeredList-r17        OPTIONAL
}

CellsTriggeredList ::=             SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CHOICE {
    physCellId                         PhysCellId,
    physCellIdEUTRA                    EUTRA-PhysCellId,
    physCellIdUTRA-FDD-r16             PhysCellIdUTRA-FDD-r16
    }

CLI-TriggeredList-r16 ::=          CHOICE {
    srs-RSRP-TriggeredList-r16         SRS-RSRP-TriggeredList-r16,
    cli-RSSI-TriggeredList-r16         CLI-RSSI-TriggeredList-r16
```

```
    }

SRS-RSRP-TriggeredList-r16 ::=      SEQUENCE (SIZE (1.. maxNrofCLI-SRS-Resources-r16)) OF SRS-ResourceId

CLI-RSSI-TriggeredList-r16 ::=      SEQUENCE (SIZE (1.. maxNrofCLI-RSSI-Resources-r16)) OF RSSI-ResourceId-r16

RelaysTriggeredList-r17 ::=         SEQUENCE (SIZE (1.. maxNrofRelayMeas-r17)) OF SL-SourceIdentity-r17

-- TAG-VARMEASREPORTLIST-STOP
-- ASN1STOP
```

– *VarMeasReportListSL*

The UE variable *VarMeasReportListSL* includes information about the NR sidelink measurements for which the triggering conditions have been met.

VarMeasReportListSL UE variable

```
-- ASN1START
-- TAG-VARMEASREPORTLISTSL-START

VarMeasReportListSL-r16 ::=              SEQUENCE (SIZE (1..maxNrofSL-MeasId-r16)) OF VarMeasReportSL-r16

VarMeasReportSL-r16 ::=                  SEQUENCE {
    -- List of NR sidelink measurement that have been triggered
    sl-MeasId-r16                            SL-MeasId-r16,
    sl-FrequencyTriggeredList-r16            SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF ARFCN-ValueNR             OPTIONAL,
    sl-NumberOfReportsSent-r16               INTEGER
}

-- TAG-VARMEASREPORTLISTSL-STOP
-- ASN1STOP
```

– *VarMobilityHistoryReport*

The UE variable *VarMobilityHistoryReport* includes the mobility history information.

VarMobilityHistoryReport UE variable

```
-- ASN1START
-- TAG-VARMOBILITYHISTORYREPORT-START

VarMobilityHistoryReport-r16 ::= VisitedCellInfoList-r16

VarMobilityHistoryReport-r17 ::= SEQUENCE {
    visitedCellInfoList-r16          VisitedCellInfoList-r16,
    visitedPSCellInfoListReport-r17  VisitedPSCellInfoList-r17        OPTIONAL
}
```

```
-- TAG-VARMOBILITYHISTORYREPORT-STOP
-- ASN1STOP
```

– *VarPendingRNA-Update*

The UE variable *VarPendingRNA-Update* indicates whether there is a pending RNA update procedure or not. The setting of this BOOLEAN variable to *true* means that there is a pending RNA Update procedure.

VarPendingRNA-Update UE variable

```
-- ASN1START
-- TAG-VARPENDINGRNA-UPDATE-START

VarPendingRNA-Update ::=                SEQUENCE {
    pendingRNA-Update                BOOLEAN                        OPTIONAL
}

-- TAG-VARPENDINGRNA-UPDATE-STOP
-- ASN1STOP
```

– *VarRA-Report*

The UE variable *VarRA-Report* includes the random-access related information.

***VarRA-Report* UE variable**

```
-- ASN1START
-- TAG-VARRA-REPORT-START

VarRA-Report-r16 ::=      SEQUENCE {
    ra-ReportList-r16         RA-ReportList-r16,
    plmn-IdentityList-r16     PLMN-IdentityList-r16
}

PLMN-IdentityList-r16 ::= SEQUENCE (SIZE (1..maxPLMN)) OF PLMN-Identity

-- TAG-VARRA-REPORT-STOP
-- ASN1STOP
```

– *VarResumeMAC-Input*

The UE variable *VarResumeMAC-Input* specifies the input used to generate the *resumeMAC-I* during RRC Connection Resume procedure.

***VarResumeMAC-Input* variable**

```
-- ASN1START
-- TAG-VARRESUMEMAC-INPUT-START

VarResumeMAC-Input  ::=     SEQUENCE {
    sourcePhysCellId                    PhysCellId,
    targetCellIdentity                  CellIdentity,
    source-c-RNTI                       RNTI-Value
}

-- TAG-VARRESUMEMAC-INPUT-STOP
-- ASN1STOP
```

***VarResumeMAC-Input* field descriptions**
targetCellIdentity An input variable used to calculate the *resumeMAC-I*. Set to the *cellIdentity* of the first *PLMN-Identity* included in the *PLMN-IdentityInfoList* broadcasted in *SIB1* of the target cell i.e. the cell the UE is trying to resume.
source-c-RNTI Set to C-RNTI that the UE had in the PCell it was connected to prior to suspension of the RRC connection.
sourcePhysCellId Set to the physical cell identity of the PCell the UE was connected to prior to suspension of the RRC connection.

– *VarRLF-Report*

The UE variable *VarRLF-Report* includes the radio link failure information or handover failure information.

***VarRLF-Report* UE variable**

```
-- ASN1START
-- TAG-VARRLF-REPORT-START

VarRLF-Report-r16 ::=    SEQUENCE {
    rlf-Report-r16           RLF-Report-r16,
    plmn-IdentityList-r16    PLMN-IdentityList2-r16
}

-- TAG-VARRLF-REPORT-STOP
-- ASN1STOP
```

– *VarShortMAC-Input*

The UE variable *VarShortMAC-Input* specifies the input used to generate the *shortMAC-I* during RRC Connection Reestablishment procedure.

***VarShortMAC-Input* variable**

```
-- ASN1START
-- TAG-VARSHORTMAC-INPUT-START

VarShortMAC-Input   ::=                 SEQUENCE {
    sourcePhysCellId                        PhysCellId,
    targetCellIdentity                      CellIdentity,
    source-c-RNTI                           RNTI-Value
}

-- TAG-VARSHORTMAC-INPUT-STOP
-- ASN1STOP
```

***VarShortMAC-Input* field descriptions**
targetCellIdentity An input variable used to calculate the *shortMAC-I*. Set to the *cellIdentity* of the first *PLMN-Identity* in the *PLMN-IdentityInfoList* broadcasted in *SIB1* of the target cell i.e. the cell the UE is trying to reestablish the connection.
source-c-RNTI Set to C-RNTI that the UE had in the PCell it was connected to prior to the reestablishment.
sourcePhysCellId Set to the physical cell identity of the PCell the UE was connected to prior to the reestablishment.

– *VarSuccessHO-Report*

The UE variable *VarSuccessHO-Report* includes the successful handover information.

***VarSccessHO-Report* variable**

```
-- ASN1START
-- TAG-VARSUCCESSHO-Report-START

VarSuccessHO-Report-r17-IEs ::= SEQUENCE {
    successHO-Report-r17            SuccessHO-Report-r17,
    plmn-IdentityList-r17           PLMN-IdentityList2-r16
}
-- TAG-VARSUCCESSHO-Report-STOP
-- ASN1STOP
```

– End of *NR-UE-Variables*

```
-- ASN1START

END

-- ASN1STOP
```

8 Protocol data unit abstract syntax

8.1 General

The RRC PDU contents in clause 6 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [6] and X.681 [7]. Transfer syntax for RRC PDUs is derived from their ASN.1 definitions by use of Packed Encoding Rules, unaligned as specified in ITU-T Rec. X.691 [8].

The following encoding rules apply in addition to what has been specified in X.691:

- When a bit string value is placed in a bit-field as specified in 15.6 to 15.11 in X.691, the leading bit of the bit string value shall be placed in the leading bit of the bit-field, and the trailing bit of the bit string value shall be placed in the trailing bit of the bit-field;

NOTE: The terms 'leading bit' and 'trailing bit' are defined in ITU-T Rec. X.680. When using the 'bstring' notation, the leading bit of the bit string value is on the left, and the trailing bit of the bit string value is on the right.

- When decoding types constrained with the ASN.1 Contents Constraint ("CONTAINING"), automatic decoding of the contained type should not be performed because errors in the decoding of the contained type should not cause the decoding of the entire RRC message PDU to fail. It is recommended that the decoder first decodes the outer PDU type that contains the OCTET STRING or BIT STRING with the Contents Constraint, and then decodes the contained type that is nested within the OCTET STRING or BIT STRING as a separate step;

- When decoding a) RRC message PDUs, b) BIT STRING constrained with a Contents Constraint, or c) OCTET STRING constrained with a Contents Constraint, PER decoders are required to never report an error if there are extraneous zero or non-zero bits at the end of the encoded RRC message PDU, BIT STRING or OCTET STRING.

8.2 Structure of encoded RRC messages

An RRC PDU, which is the bit string that is exchanged between peer entities/across the radio interface contains the basic production as defined in X.691.

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH or CCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the PDCP SDU and onwards; and

- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU shall be represented as the first bit in the RLC SDU and onwards; and

- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit of the RRC PDU and onwards; and

- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description) as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty extensions;
- A transmitter compliant with this version of the specification shall set spare bits to zero.

8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to PCCH and BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.

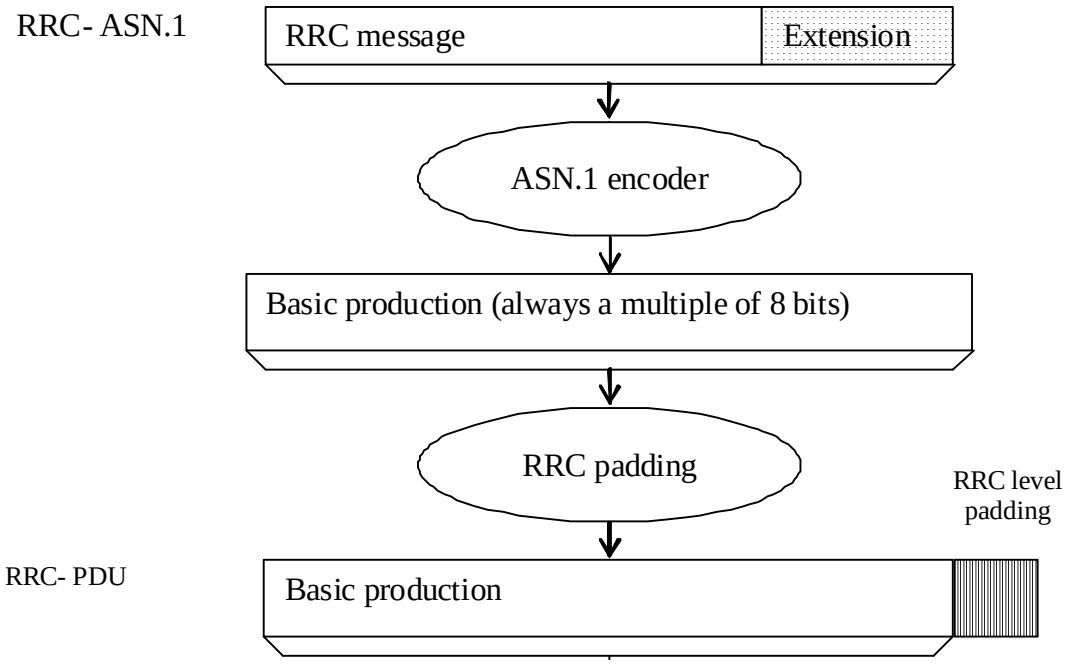

Figure 8.5-1: RRC level padding

9 Specified and default radio configurations

Specified and default configurations are configurations of which the details are specified in the standard. Specified configurations are fixed while default configurations can be modified using dedicated signalling. The default value for the parameters not listed in following clauses shall be set such as the corresponding features are not configured, i.e. *release* or *false* unless explicitly stated otherwise.

NOTE: The UE applies the default values specified in the field description of ASN.1 parameters only when the parent IE is present. Hence, the UE does not apply all default values in field descriptions when it applies the "default radio configuration" in accordance with this clause.

9.1 Specified configurations

9.1.1 Logical channel configurations

9.1.1.1 BCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration	Not used		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.2 CCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration			
>priority	1	Highest priority	
>prioritisedBitRate	infinity		
>bucketSizeDuration	ms1000		
>logicalChannelGroup	0		

9.1.1.3 PCCH configuration

Parameters

Name	Value	Semantics description	Ver
SDAP configuration	Not used		
PDCP configuration	Not used		
RLC configuration	TM		
Logical channel configuration	Not used		

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.4 SCCH configuration

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of PC5-RRC message. The SL-SRB using this SCCH configuration is named as SL-SRB3.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	Undefined	Selected by the receiving UE, up to UE implementation	
>*pdcp-SN-Size*	12		
RLC configuration		AM RLC	
>*sn-FieldLength*	12		
>*t-Reassembly*	Undefined	Selected by the receiving UE, up to UE implementation	
>*t-PollRetransmit*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollPDU*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollByte*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*maxRetxThreshold*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*t-StatusProhibit*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	3		
MAC configuration			
>*priority*	1		
>*prioritisedBitRate*	infinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>*sl-HARQ-FeedbackEnabled*	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified of NR sidelink communication, which is used for the sidelink signalling radio bearer of unprotected PC5-S message (e.g. Direct Link Establishment Request, TS 24.587 [57] or Prose Direct Link Establishment Request, TS 24.554 [72]). The SL-SRB using this SCCH configuration is named as SL-SRB0.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	Undefined	Selected by the receiving UE, up to UE implementation	
>*pdcp-SN-Size*	12		
RLC configuration		UM RLC	
>*sn-FieldLength*	6		
>*t-Reassembly*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	0		
MAC configuration			
>*priority*	1		
>*prioritisedBitRate*	infinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>*sl-HARQ-FeedbackEnabled*	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of PC5-S message establishing PC5-S security (e.g. Direct Link Security Mode Command and Direct Link Security Mode Complete, TS 24.587 [57] or ProSe Direct Link Security Mode Command and ProSe Direct Link Security Mode Complete, TS 24.554 [72]). The SL-SRB using this SCCH configuration is named as SL-SRB1.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	Undefined	Selected by the receiving UE, up to UE implementation	
>*pdcp-SN-Size*	12		
RLC configuration		AM RLC	
>*sn-FieldLength*	12		
>*t-Reassembly*	Undefined	Selected by the receiving UE, up to UE implementation	
>*t-PollRetransmit*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollPDU*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollByte*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*maxRetxThreshold*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*t-StatusProhibit*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	1		
MAC configuration			
>*priority*	1		
>*prioritisedBitRate*	infinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>*sl-HARQ-FeedbackEnabled*	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for unicast of NR sidelink communication, which is used for the sidelink signalling radio bearer of protected PC5-S message except Direct Link Security Mode Complete, TS 24.587 [57] or Prose Direct Link Security Mode Complete, TS 24.554 [72]. The SL-SRB using this SCCH configuration is named as SL-SRB2.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	Undefined	Selected by the receiving UE, up to UE implementation	
>*pdcp-SN-Size*	12		
RLC configuration		AM RLC	
>*sn-FieldLength*	12		
>*t-Reassembly*	Undefined	Selected by the receiving UE, up to UE implementation	
>*t-PollRetransmit*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollPDU*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollByte*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*maxRetxThreshold*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*t-StatusProhibit*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	2		
MAC configuration			
>*priority*	1		
>*prioritisedBitRate*	infinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>*sl-HARQ-FeedbackEnabled*	Undefined	Selected by the transmitting UE, up to UE implementation	

Parameters that are specified for NR sidelink discovery, which is used for the sidelink signalling radio bearer of NR sidelink discovery messages (e.g., Announcement message, Solicitation message and Response message, see TS 23.304 [65]). The SL-SRB using this SCCH configuration is named as SL-SRB4.

Name	Value	Semantics description	Ver
PDCP configuration			
>t-Reordering	Undefined	Selected by the receiving UE, up to UE implementation	
>pdcp-SN-Size	12		
RLC configuration		UM RLC	
>*sn-FieldLength*	6		
>t-Reassembly	Undefined	Selected by the receiving UE, up to UE implementation	
>logicalChannelIdentity	58		
MAC configuration			
>*priority*	1		
>*prioritisedBitRate*	infinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
>*sl-HARQ-FeedbackEnabled*	disabled	HARQ feedback is not supported for NR sidelink discovery transmission	

Parameters that are specified for NR sidelink L2 U2N Relay operations, which is used for the PC5 Relay RLC channel for Remote UE's SRB0 message transmission/reception. The PC5 Relay RLC channel using this configuration is named as SL-RLC0.

Name	Value	Semantics description	Ver
RLC configuration		AM	
>*sn-FieldLength*	12		
>*t-Reassembly*	Undefined	Selected by the receving UE, up to UE implementation	
>*t-PollRetransmit*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollPDU*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollByte*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*maxRetxThreshold*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*t-StatusProhibit*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	56		
MAC configuration			
>*priority*	1		
>*proritisedBitRate*	Inifinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network. The scheduling request configuration is not applicable to L2 U2N Remote UE.	
>*sl-HARQ-FeedbackEnabled*	Undefined	Selected by the transmitting UE, up to UE implementation	

9.1.1.5 STCH configuration

Parameters that are specified for NR sidelink communication, which is used for the sidelink data radio bearer.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	Undefined	Selected by the receiving UE, up to UE implementation	
>*pdcp-SN-Size*	12	For broadcast and groupcast of NR sidelink communication	
>*maxCID*	15	For broadcast and groupcast of NR sidelink communication	
>*profiles*			
RLC configuration		For broadcast and groupcast of NR sidelink communication, uni-directional UM RLC UM window size is set to 32	
>*t-Reassembly*	Undefined	Selected by the receiving UE, up to Up to UE implementation	
>*sn-FieldLength*	6	For broadcast and groupcast of NR sidelink communication	
>*logicalChannelIdentity*	Undefined	Selected by the transmitting UE, up to UE implementation	
MAC configuration			
>*priority*			

9.1.1.6 MCCH configuration

Parameters that are specified for MCCH.

Name	Value	Semantics description	Ver
RLC configuration		UM RLC	
>*sn-FieldLength*	6		
>*t-Reassembly*	ms0		

9.1.1.7 MTCH configuration for MBS broadcast

Parameters that are specified for MBS broadcast MTCH.

Name	Value	Semantics description	Ver
PDCP configuration			
>*t-Reordering*	ms0		
>*pdcp-SN-SizeDL*	18		
RLC configuration		UM RLC	
>*sn-FieldLength*	12		
>*t-Reassembly*	ms0		

9.1.2 Void

9.2 Default radio configurations

The following clauses only list default values for REL-15 parameters included in protocol version v15.3.0. For all fields introduced in a later protocol version, the default value is "released" or "false" unless explicitly specified otherwise. If the UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version of those fields with only default values.

NOTE 1: In general, the signalling should preferably support a "release" option for fields introduced after v15.3.0. The "value not applicable" should be used restrictively, mainly limited to for fields which value is relevant only if another field is set to a value other than its default.

NOTE 2: For parameters in *ServingCellConfig*, the default values are specified in the corresponding specification.

9.2.1 Default SRB configurations

Parameters

Name	Value			Semantics description	Ver
	SRB1	SRB2	SRB3		
PDCP-Config *>t-Reordering*	 infinity				
RLC-Config CHOICE	Am				
ul-AM-RLC *>sn-FieldLength* *>t-PollRetransmit* *>pollPDU* *>pollByte* *>maxRetxThreshold*	 size12 ms45 infinity infinity t8				
dl-AM-RLC *>sn-FieldLength* *>t-Reassembly* *>t-StatusProhibit*	 size12 ms35 ms0				
logicalChannelIdentity	1	2	3		
LogicalChannelConfig					
>priority	1	3	1		
>prioritisedBitRate	infinity				
>logicalChannelGroup	0				

9.2.2 Default MAC Cell Group configuration

Parameters

Name	Value	Semantics description	Ver
MAC Cell Group configuration			
bsr-Config			
>periodicBSR-Timer	sf10		
>retxBSR-Timer	sf80		
phr-Config			
>phr-PeriodicTimer	sf10		
>phr-ProhibitTimer	sf10		
>phr-Tx-PowerFactorChange	dB1		

9.2.3 Default values timers and constants

Parameters

Name	Value	Semantics description	Ver
t310	ms1000		
n310	n1		
t311	ms30000		
n311	n1		

9.2.4 Default PC5 Relay RLC Channel

Parameters of the PC5 Relay RLC Channel used for Remote UE's SRB1 RRC message transmission and reception. The PC5 Relay RLC Channel using this configuration is named as SL-RLC1.

Name	Value	Semantics description	Ver
RLC configuration		AM	
>*sn-FieldLength*	12		
>*t-Reassembly*	Undefined	Selected by the receving UE, up to UE implementation	
>*t-PollRetransmit*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollPDU*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*pollByte*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*maxRetxThreshold*	Undefined	Selected by the transmitting UE, up to UE implementation	
>*t-StatusProhibit*	Undefined	Selected by the receiving UE, up to UE implementation	
>*logicalChannelIdentity*	57		
MAC configuration			
>*priority*	1		
>*proritisedBitRate*	Inifinity		
>*logicalChannelGroup*	0		
>*schedulingRequestId*	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	

9.2.5 Default SRAP configurations

Parameters that are used for reception of Remote UE's *RRCResume*, *RRCRelease* in response to an *RRCResumeRequest/RRCResumeRequest1* and *RRCReestablishment* messages.

Name	Value	Semantics description	Ver
SL SRAP Config			
>*sl-LocalIdentity*	Undefined	SRAP PDUs with any local identity will be submitted to the SRB1 PDCP entity.	
>*sl-RemoteUE-RB-Identity*	SRB1		

9.3 Sidelink pre-configured parameters

This ASN.1 segment is the start of the NR definitions of pre-configured sidelink parameters.

– *NR-Sidelink-Preconf*

```
-- ASN1START
-- TAG-NR-SIDELINK-PRECONF-DEFINITIONS-START

NR-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    SL-RemoteUE-Config-r17,
    SL-DRX-ConfigGC-BC-r17,
    SL-FreqConfigCommon-r16,
    SL-RadioBearerConfig-r16,
    SL-RLC-BearerConfig-r16,
    SL-EUTRA-AnchorCarrierFreqList-r16,
    SL-NR-AnchorCarrierFreqList-r16,
    SL-MeasConfigCommon-r16,
    SL-UE-SelectedConfig-r16,
    TDD-UL-DL-ConfigCommon,
    maxNrofFreqSL-r16,
    maxNrofSLRB-r16,
    maxSL-LCID-r16
FROM NR-RRC-Definitions;

-- TAG-NR-SIDELINK-PRECONF-DEFINITIONS-STOP
-- ASN1STOP
```

– *SL-PreconfigurationNR*

The IE *SL-PreconfigurationNR* includes the sidelink pre-configured parameters used for NR sidelink communication. Need codes or conditions specified for subfields in *SL-PreconfigurationNR* do not apply.

SL-PreconfigurationNR information elements

```
-- ASN1START
-- TAG-SL-PRECONFIGURATIONNR-START

SL-PreconfigurationNR-r16 ::=            SEQUENCE {
    sidelinkPreconfigNR-r16                  SidelinkPreconfigNR-r16,
    ...
}
```

```
SidelinkPreconfigNR-r16 ::=                 SEQUENCE {
    sl-PreconfigFreqInfoList-r16                SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16     OPTIONAL,
    sl-PreconfigNR-AnchorCarrierFreqList-r16    SL-NR-AnchorCarrierFreqList-r16                                       OPTIONAL,
    sl-PreconfigEUTRA-AnchorCarrierFreqList-r16 SL-EUTRA-AnchorCarrierFreqList-r16                                    OPTIONAL,
    sl-RadioBearerPreConfigList-r16             SEQUENCE (SIZE (1..maxNrofSLRB-r16)) OF SL-RadioBearerConfig-r16      OPTIONAL,
    sl-RLC-BearerPreConfigList-r16              SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16        OPTIONAL,
    sl-MeasPreConfig-r16                        SL-MeasConfigCommon-r16                                               OPTIONAL,
    sl-OffsetDFN-r16                            INTEGER (1..1000)                                                     OPTIONAL,
    t400-r16                                    ENUMERATED{ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000} OPTIONAL,
    sl-MaxNumConsecutiveDTX-r16                 ENUMERATED {n1, n2, n3, n4, n6, n8, n16, n32}                         OPTIONAL,
    sl-SSB-PriorityNR-r16                       INTEGER (1..8)                                                        OPTIONAL,
    sl-PreconfigGeneral-r16                     SL-PreconfigGeneral-r16                                               OPTIONAL,
    sl-UE-SelectedPreConfig-r16                 SL-UE-SelectedConfig-r16                                              OPTIONAL,
    sl-CSI-Acquisition-r16                      ENUMERATED {enabled}                                                  OPTIONAL,
    sl-RoHC-Profiles-r16                        SL-RoHC-Profiles-r16                                                  OPTIONAL,
    sl-MaxCID-r16                               INTEGER (1..16383)                                                    DEFAULT 15,
    ...,
    [[
    sl-DRX-PreConfigGC-BC-r17                   SL-DRX-ConfigGC-BC-r17                                              OPTIONAL,
    sl-TxProfileList-r17                        SL-TxProfileList-r17                                                  OPTIONAL,
    sl-PreconfigDiscConfig-r17                  SL-RemoteUE-Config-r17                                                OPTIONAL
    ]]
}

SL-TxProfileList-r17 ::=                    SEQUENCE (SIZE (1..256)) OF SL-TxProfile-r17

SL-TxProfile-r17 ::=                        ENUMERATED {drx-Compatible, drx-Incompatible, spare6, spare5, spare4, spare3,spare2, spare1}

SL-PreconfigGeneral-r16 ::=                 SEQUENCE {
    sl-TDD-Configuration-r16                    TDD-UL-DL-ConfigCommon                                                OPTIONAL,
    reservedBits-r16                            BIT STRING (SIZE (2))                                                 OPTIONAL,
    ...
}

SL-RoHC-Profiles-r16 ::=                SEQUENCE {
    profile0x0001-r16                       BOOLEAN,
    profile0x0002-r16                       BOOLEAN,
    profile0x0003-r16                       BOOLEAN,
    profile0x0004-r16                       BOOLEAN,
    profile0x0006-r16                       BOOLEAN,
    profile0x0101-r16                       BOOLEAN,
    profile0x0102-r16                       BOOLEAN,
    profile0x0103-r16                       BOOLEAN,
    profile0x0104-r16                       BOOLEAN
}

-- TAG-SL-PRECONFIGURATIONNR-STOP
-- ASN1STOP
```

***SL-PreconfigurationNR* field descriptions**
sl-DRX-PreConfig-GC-BC This field indicates the sidelink DRX configuration for groupcast and broadcast communication, as specified in TS 38.321 [3].
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. If the field is absent, no offset is applied.
sl-PreconfigDiscConfig This field indicates the configuration for discovery message transmission used by NR sidelink U2N Remote UE.
sl-PreconfigEUTRA-AnchorCarrierFreqList This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configuration.
sl-PreconfigFreqInfoList This field indicates the NR sidelink communication and/ or NR sidelink discovery configuration some carrier frequency(ies). In this release, only one *SL-FreqConfig* can be configured in the list.
sl-PreconfigNR-AnchorCarrierFreqList This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication configuration.
sl-RadioBearerPreConfigList This field indicates one or multiple sidelink radio bearer configurations.
sl-RLC-BearerPreConfigList This field indicates one or multiple sidelink RLC bearer configurations.
sl-RoHC-Profiles This field indicates the supported RoHC profiles for NR sidelink communications.
sl-SSB-PriorityNR This field indicates the priority of NR sidelink SSB transmission and reception.
sl-TxProfileList List of one or multiple Tx profiles, indicating the compatibility of supporting SL DRX as specified in TS 38.321 [3]. It is up to the UE implementation whether/how to apply this field.

– *End of NR-Sidelink-Preconf*

```
-- ASN1START

END

-- ASN1STOP
```

9.4 Radio Information Related to Discovery Message

This clause specifies RRC information elements that are transferred in Discovery Message.

– *SL-AccessInfo-L2U2N*

The IE *SL-AccessInfo-L2U2N* includes the radio information included in Discovery Message used for L2 U2N relay operation.

SL-AccessInfo-L2U2N information elements

```
-- ASN1START
-- TAG-SL-ACCESSINFO-L2U2N-START

NR-Sidelink-DiscoveryMessage DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
IMPORTS
    CellAccessRelatedInfo,
    SL-ServingCellInfo-r17
FROM NR-RRC-Definitions;

SL-AccessInfo-L2U2N-r17 ::=             SEQUENCE {
    cellAccessRelatedInfo-r17               CellAccessRelatedInfo,
    sl-ServingCellInfo-r17                  SL-ServingCellInfo-r17,
    ...
}

END

-- TAG-SL-ACCESSINFO-L2U2N-STOP
-- ASN1STOP
```

10 Generic error handling

10.1 General

The generic error handling defined in the subsequent clauses applies unless explicitly specified otherwise e.g. within the procedure specific error handling.

The UE shall consider a value as not comprehended when it is set:

- to an extended value that is not defined in the version of the transfer syntax supported by the UE;
- to a spare or reserved value unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/reserved value.

The UE shall consider a field as not comprehended when it is defined:

- as spare or reserved unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/reserved field.

10.2 ASN.1 violation or encoding error

The UE shall:

1> when receiving an RRC message on the BCCH, CCCH, PCCH, MCCH or a PC5 RRC message on SBCCH for which the abstract syntax is invalid [6]:

2> ignore the message.

NOTE: This clause applies in case one or more fields is set to a value, other than a spare, reserved or extended value, not defined in this version of the transfer syntax. E.g. in the case the UE receives value 12 for a field defined as INTEGER (1..11). In cases like this, it may not be possible to reliably detect which field is in the error hence the error handling is at the message level.

10.3 Field set to a not comprehended value

The UE shall, when receiving an RRC message or PC5 RRC message on any logical channel:

1> if the message includes a field that has a value that the UE does not comprehend:

2> if a default value is defined for this field:

3> treat the message while using the default value defined for this field;

2> else if the concerned field is optional:

3> treat the message as if the field were absent and in accordance with the need code for absence of the concerned field;

2> else:

3> treat the message as if the field were absent and in accordance with clause 10.4.

10.4 Mandatory field missing

The UE shall:

1> if the message includes a field that is mandatory to include in the message (e.g. because conditions for mandatory presence are fulfilled) and that field is absent or treated as absent:

2> if the RRC message was not received on DCCH or CCCH; or

2> if the PC5 RRC message was not received on SCCH:

3> if the field concerns a (sub-field of) an entry of a list (i.e. a SEQUENCE OF):

4> treat the list as if the entry including the missing or not comprehended field was absent;

3> else if the field concerns a sub-field of another field, referred to as the 'parent' field i.e. the field that is one nesting level up compared to the erroneous field:

4> consider the 'parent' field to be set to a not comprehended value;

4> apply the generic error handling to the subsequent 'parent' field(s), until reaching the top nesting level i.e. the message level;

3> else (field at message level):

4> ignore the message.

NOTE 1: The error handling defined in these clauses implies that the UE ignores a message with the message type or version set to a not comprehended value.

NOTE 2: The nested error handling for messages received on logical channels other than DCCH, CCCH and SCCH applies for errors in extensions also, even for errors that can be regarded as invalid network operation e.g. the network not observing conditional presence.

NOTE 3: UE behaviour on receipt of an RRC message on DCCH or CCCH or a PC5 RRC message on SCCH that does not include a field that is mandatory (e.g. because conditions for mandatory presence are fulfilled) is unspecified.

The following ASN.1 further clarifies the levels applicable in case of nested error handling for errors in extension fields.

```
-- /example/ ASN1START

-- Example with extension addition group

ItemInfoList ::=                    SEQUENCE (SIZE (1..max)) OFItemInfo

ItemInfo ::=                        SEQUENCE {
    itemIdentity                        INTEGER (1..max),
    field1                              Field1,
    field2                              Field2                  OPTIONAL,           -- Need N
    ...
    [[
    field3-r9                       Field3-r9               OPTIONAL,               -- Cond Cond1
    field4-r9                       Field4-r9               OPTIONAL                -- Need N
    ]]
}

-- Example with traditional non-critical extension (empty sequence)

BroadcastInfoBlock1 ::=             SEQUENCE {
    itemIdentity                        INTEGER (1..max),
    field1                              Field1,
    field2                              Field2                  OPTIONAL,           -- Need N
    nonCriticalExtension                BroadcastInfoBlock1-v940-IEs    OPTIONAL
}

BroadcastInfoBlock1-v940-IEs::= SEQUENCE {
    field3-r9                           Field3-r9               OPTIONAL,           -- Cond Cond1
    field4-r9                           Field4-r9               OPTIONAL,           -- Need N
    nonCriticalExtension                SEQUENCE {}             OPTIONAL            -- Need S
}

-- ASN1STOP
```

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension addition group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of *field3* would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing *field3* and *field4*);

- a traditional *nonCriticalExtension* is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, an error regarding the conditionality of *field3* would result in the entire *BroadcastInfoBlock1* to be ignored (rather than just the non-critical extension containing *field3* and *field4*).

10.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

1> if the message includes a field that the UE does not comprehend:

2> treat the rest of the message as if the field was absent.

NOTE: This clause does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in clause 10.3.

11 Radio information related interactions between network nodes

11.1 General

This clause specifies RRC messages that are transferred between network nodes. These RRC messages may be transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar characteristics as the RRC messages that are transferred across the NR radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

11.2 Inter-node RRC messages

11.2.1 General

This clause specifies RRC messages that are sent either across the X2-, Xn- or the NG-interface, either to or from the gNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

```
-- ASN1START
-- TAG-NR-INTER-NODE-DEFINITIONS-START

NR-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ARFCN-ValueNR,
    ARFCN-ValueEUTRA,
    CellIdentity,
    CGI-InfoEUTRA,
    CGI-InfoNR,
    CondReconfigExecCondSCG-r17,
    CSI-RS-Index,
    CSI-RS-CellMobility,
    DRX-Config,
    EUTRA-PhysCellId,
    FeatureSetDownlinkPerCC-Id,
    FeatureSetUplinkPerCC-Id,
    FreqBandIndicatorNR,
    GapConfig,
    maxBandComb,
    maxBands,
    maxBandsEUTRA,
    maxCellSFTD,
    maxFeatureSetsPerBand,
    maxFreq,
    maxFreqIDC-MRDC,
```

```
    maxNrofCombIDC,
    maxNrofCondCells-r16,
    maxNrofCondCells-1-r17,
    maxNrofPhysicalResourceBlocks,
    maxNrofSCells,
    maxNrofServingCells,
    maxNrofServingCells-1,
    maxNrofServingCellsEUTRA,
    maxNrofIndexesToReport,
    maxSimultaneousBands,
    MBSInterestIndication-r17,
    MeasQuantityResults,
    MeasResultCellListSFTD-EUTRA,
    MeasResultCellListSFTD-NR,
    MeasResultList2NR,
    MeasResultSCG-Failure,
    MeasResultServFreqListEUTRA-SCG,
    NeedForGapsInfoNR-r16,
    NeedForGapNCSG-InfoNR-r17,
    NeedForGapNCSG-InfoEUTRA-r17,
    OverheatingAssistance,
    OverheatingAssistance-r17,
    P-Max,
    PhysCellId,
    RadioBearerConfig,
    RAN-NotificationAreaInfo,
    RRCReconfiguration,
    ServCellIndex,
    SetupRelease,
    SSB-Index,
    SSB-MTC,
    SSB-ToMeasure,
    SS-RSSI-Measurement,
    ShortMAC-I,
    SubcarrierSpacing,
    UEAssistanceInformation,
    UE-CapabilityRAT-ContainerList,
    maxNrofCLI-RSSI-Resources-r16,
    maxNrofCLI-SRS-Resources-r16,
    RSSI-ResourceId-r16,
    SDT-Config-r17,
    SidelinkUEInformationNR-r16,
    SRS-ResourceId,
    UE-RadioPagingInfo-r17
FROM NR-RRC-Definitions;

-- TAG-NR-INTER-NODE-DEFINITIONS-STOP
-- ASN1STOP
```

11.2.2 Message definitions

– *CG-CandidateList*

This message is used to transfer the SCG radio configuration for one or more candidate cells for Conditional PSCell Addition (CPA) or Conditional PSCell Change (CPC) as generated by the candidate target SgNB.

Direction: Secondary gNB to master gNB or eNB.

CG-CandidateList message

```
-- ASN1START
-- TAG-CG-CANDIDATELIST-START

CG-CandidateList ::=                SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            cg-CandidateList-r17                CG-CandidateList-r17-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

CG-CandidateList-r17-IEs ::=        SEQUENCE {
    cg-CandidateToAddModList-r17        SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CG-CandidateInfo-r17    OPTIONAL,
    cg-CandidateToReleaseList-r17       SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CG-CandidateInfoId-r17  OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                                                          OPTIONAL
}

CG-CandidateInfo-r17 ::=            SEQUENCE {
    cg-CandidateInfoId-r17              CG-CandidateInfoId-r17,
    candidateCG-Config-r17             OCTET STRING (CONTAINING CG-Config)
}

CG-CandidateInfoId-r17::=           SEQUENCE {
    ssbFrequency-r17                    ARFCN-ValueNR,
    physCellId-r17                      PhysCellId
}

-- TAG-CG-CANDIDATELIST-STOP
-- ASN1STOP
```

***CG-CandidateList* field descriptions**
cg-CandidateToAddModList
Contains information regarding candidate target cells to be added or modified for Conditional PSCell Addition (CPA) or Conditional PSCell Change (CPC) from the candidate target secondary node to the master node.
cg-CandidateToReleaseList
Contains information regarding candidate target cells for CPA or CPC to be removed from the candidate target secondary node to the master node. This list is not used in CPA or CPC preparation.

***CG-CandidateInfo* field descriptions**
cg-CandidateInfoId
SSB frequency and Physical Cell Identity of the candidate target cell.
candidateCG-Config
CG-Config message corresponding to the cell indicated by *cg-CandidateInfoId*.

– *HandoverCommand*

This message is used to transfer the handover command as generated by the target gNB.

Direction: target gNB to source gNB/source RAN.

***HandoverCommand* message**

```
-- ASN1START
-- TAG-HANDOVER-COMMAND-START

HandoverCommand ::=                 SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            handoverCommand                     HandoverCommand-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

HandoverCommand-IEs ::=             SEQUENCE {
    handoverCommandMessage              OCTET STRING (CONTAINING RRCReconfiguration),
    nonCriticalExtension                SEQUENCE {}                                         OPTIONAL
}

-- TAG-HANDOVER-COMMAND-STOP
-- ASN1STOP
```

***HandoverCommand* field descriptions**
handoverCommandMessage
Contains the *RRCReconfiguration* message used to perform handover within NR or handover to NR, as generated (entirely) by the target gNB.

– *HandoverPreparationInformation*

This message is used to transfer the NR RRC information used by the target gNB during handover preparation or UE context retrieval, e.g. in case of resume or re-establishment, including UE capability information. This message is also used for transferring the information between the CU and DU.

Direction: source gNB/source RAN to target gNB or CU to DU.

***HandoverPreparationInformation* message**

```
-- ASN1START
-- TAG-HANDOVER-PREPARATION-INFORMATION-START

HandoverPreparationInformation ::=      SEQUENCE {
    criticalExtensions                      CHOICE {
        c1                                      CHOICE{
            handoverPreparationInformation          HandoverPreparationInformation-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

HandoverPreparationInformation-IEs ::=  SEQUENCE {
    ue-CapabilityRAT-List                   UE-CapabilityRAT-ContainerList,
    sourceConfig                            AS-Config                                       OPTIONAL, -- Cond HO
    rrm-Config                              RRM-Config                                      OPTIONAL,
    as-Context                              AS-Context                                      OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                     OPTIONAL
}

AS-Config ::=                           SEQUENCE {
    rrcReconfiguration                      OCTET STRING (CONTAINING RRCReconfiguration),
    ...,
    [[
    sourceRB-SN-Config                      OCTET STRING (CONTAINING RadioBearerConfig)     OPTIONAL,
    sourceSCG-NR-Config                     OCTET STRING (CONTAINING RRCReconfiguration)    OPTIONAL,
    sourceSCG-EUTRA-Config                  OCTET STRING                                    OPTIONAL
    ]],
    [[
    sourceSCG-Configured                    ENUMERATED {true}                               OPTIONAL
    ]],
    [[
    sdt-Config-r17                          SDT-Config-r17                                  OPTIONAL
    ]]
}
```

```
AS-Context ::=                          SEQUENCE {
    reestablishmentInfo                     ReestablishmentInfo                                 OPTIONAL,
    configRestrictInfo                      ConfigRestrictInfoSCG                               OPTIONAL,
    ...,
    [[  ran-NotificationAreaInfo            RAN-NotificationAreaInfo                            OPTIONAL
    ]],
    [[  ueAssistanceInformation             OCTET STRING (CONTAINING UEAssistanceInformation)    OPTIONAL    -- Cond HO2
    ]],
    [[
    selectedBandCombinationSN               BandCombinationInfoSN                               OPTIONAL
    ]],
    [[
    configRestrictInfoDAPS-r16              ConfigRestrictInfoDAPS-r16                          OPTIONAL,
    sidelinkUEInformationNR-r16             OCTET STRING                                        OPTIONAL,
    sidelinkUEInformationEUTRA-r16          OCTET STRING                                        OPTIONAL,
    ueAssistanceInformationEUTRA-r16        OCTET STRING                                        OPTIONAL,
    ueAssistanceInformationSCG-r16          OCTET STRING (CONTAINING UEAssistanceInformation)    OPTIONAL,    -- Cond HO2
    needForGapsInfoNR-r16                   NeedForGapsInfoNR-r16                               OPTIONAL
    ]],
    [[
    configRestrictInfoDAPS-v1640            ConfigRestrictInfoDAPS-v1640                        OPTIONAL
    ]],
    [[
    needForGapNCSG-InfoNR-r17               NeedForGapNCSG-InfoNR-r17                           OPTIONAL,
    needForGapNCSG-InfoEUTRA-r17            NeedForGapNCSG-InfoEUTRA-r17                        OPTIONAL,
    mbsInterestIndication-r17               OCTET STRING (CONTAINING MBSInterestIndication-r17) OPTIONAL
    ]]
}

ConfigRestrictInfoDAPS-r16 ::=          SEQUENCE {
    powerCoordination-r16                   SEQUENCE {
        p-DAPS-Source-r16                       P-Max,
        p-DAPS-Target-r16                       P-Max,
        uplinkPowerSharingDAPS-Mode-r16          ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic }
    }                                                                                           OPTIONAL
}

ConfigRestrictInfoDAPS-v1640 ::=    SEQUENCE {
    sourceFeatureSetPerDownlinkCC-r16   FeatureSetDownlinkPerCC-Id,
    sourceFeatureSetPerUplinkCC-r16     FeatureSetUplinkPerCC-Id
}

ReestablishmentInfo ::=             SEQUENCE {
    sourcePhysCellId                        PhysCellId,
    targetCellShortMAC-I                    ShortMAC-I,
    additionalReestabInfoList               ReestabNCellInfoList                            OPTIONAL
}

ReestabNCellInfoList ::=             SEQUENCE ( SIZE (1..maxCellPrep) ) OF ReestabNCellInfo

ReestabNCellInfo::= SEQUENCE{
    cellIdentity                            CellIdentity,
    key-gNodeB-Star                         BIT STRING (SIZE (256)),
    shortMAC-I                              ShortMAC-I
```

```
}

RRM-Config ::=              SEQUENCE {
    ue-InactiveTime             ENUMERATED {
                                    s1, s2, s3, s5, s7, s10, s15, s20,
                                    s25, s30, s40, s50, min1, min1s20, min1s40,
                                    min2, min2s30, min3, min3s30, min4, min5, min6,
                                    min7, min8, min9, min10, min12, min14, min17, min20,
                                    min24, min28, min33, min38, min44, min50, hr1,
                                    hr1min30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6,
                                    hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2,
                                    day2hr12, day3, day4, day5, day7, day10, day14, day19,
                                    day24, day30, dayMoreThan30}                            OPTIONAL,
    candidateCellInfoList       MeasResultList2NR                                           OPTIONAL,
    ...,
    [[
    candidateCellInfoListSN-EUTRA      MeasResultServFreqListEUTRA-SCG                      OPTIONAL
    ]]
}

-- TAG-HANDOVER-PREPARATION-INFORMATION-STOP
-- ASN1STOP
```

***HandoverPreparationInformation* field descriptions**
as-Context Local RAN context required by the target gNB or DU.
rrm-Config Local RAN context used mainly for RRM purposes.
sourceConfig The radio resource configuration as used in the source cell.
ue-CapabilityRAT-List The UE radio access related capabilities concerning RATs supported by the UE. A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.
ue-InactiveTime Duration while UE has not received or transmitted any user data. Thus the timer is still running in case e.g., UE measures the neighbour cells for the HO purpose. Value *s1* corresponds to 1 second, *s2* corresponds to 2 seconds and so on. Value *min1* corresponds to 1 minute, value *min1s20* corresponds to 1 minute and 20 seconds, value *min1s40* corresponds to 1 minute and 40 seconds and so on. Value *hr1* corresponds to 1 hour, *hr1min30* corresponds to 1 hour and 30 minutes and so on.

***AS-Config* field descriptions**
rrcReconfiguration Contains the *RRCReconfiguration* configuration as generated entirely by the MN. If the *TMGI-r17* is included in the *MRB-ToAddMod-r17* in the *RadioBearerConfig*, the *plmn-Index* is replaced by the PLMN ID, if needed.
sdt-Config Contains the IE *SDT-Config* as generated entirely by the last serving gNB. This field is only used during the SDT procedure and the RNA update procedure with UE context relocation as defined in TS 38.300 [2], clause 18.2 and 9.2.2.5 respectively.
sourceRB-SN-Config Contains the IE *RadioBearerConfig* as generated entirely by the SN. This field is only used when the UE is configured with SN terminated RB(s).
sourceSCG-Configured Value *true* indicates that the UE is configured with NR or EUTRA SCG in source configuration. The field is only used in NR-DC and NE-DC and is included only if the fields *sourceSCG-NR-Config* and *sourceSCG-EUTRA-Config* are absent.
sourceSCG-EUTRA-Config Contains the current dedicated SCG configuration in *RRCConnectionReconfiguration* message as specified in TS 36.331 [10] and generated entirely by the SN. In this version of the specification, the E-UTRA *RRCConnectionReconfiguration* message can only include the field *scg-Configuration* . This field is only used in NE-DC.
sourceSCG-NR-Config Contains the current dedicated SCG configuration in *RRCReconfiguration* message as generated entirely by the SN. In this version of the specification, the *RRCReconfiguration* message can only include fields *secondaryCellGroup* and *measConfig*. This field is only used in NR-DC.

***AS-Context* field descriptions**
configRestrictInfoDAPS Includes fields for which source cell explicitly indicates the restriction to be observed by target cell during DAPS handover.
mbsInterestIndication Includes the information last reported by the UE in the NR *MBSInterestIndication* message, where the *plmn-Index* (if included by the UE in *tmgi*) is replaced by the PLMN ID, if needed. A TMGI for which the *plmn-Index* points to a non-serving SNPN is removed from the NR *MBSInterestIndication* message.
needForGapsInfoNR Includes measurement gap requirement information of the UE for NR target bands.
selectedBandCombinationSN Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC.
sidelinkUEInformationEUTRA This field includes *SidelinkUEInformation* IE as specified in TS 36.331 [10].
sidelinkUEInformationNR This field includes *SidelinkUEInformationNR* IE.
ueAssistanceInformation Includes for each UE assistance feature the information last reported by the UE, if any.
ueAssistanceInformationSCG Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR *UEAssistanceInformation* message for the SCG, if any.

***ConfigRestrictInfoDAPS* field descriptions**
sourceFeatureSetPerUplinkCC/sourceFeatureSetPerDownlinkCC Indicates an index referring to the position of the *FeatureSetUplinkPerCC*/*FeatureSetDownlinkPerCC* selected by source in the *featureSetsUplinkPerCC*/*featureSetsDownlinkPerCC*.

***RRM-Config* field descriptions**
candidateCellInfoList A list of the best cells on each frequency for which measurement information was available
candidateCellInfoListSN-EUTRA A list of EUTRA cells including serving cells and best neighbour cells on each serving frequency, for which measurement results were available. This field is only used in NE-DC.

Conditional Presence	Explanation
HO	The field is mandatory present in case of handover within NR or UE context retrieval, e.g. in case of resume or re-establishment. The field is optionally present in case of handover from E-UTRA/5GC. Otherwise the field is absent.
HO2	The field is optionally present in case of handover within NR; otherwise the field is absent.

NOTE 1: The following table indicates per source RAT whether RAT capabilities are included or not.

Source RAT	NR capabilities	E-UTRA capabilities	MR-DC capabilities	UTRA capabilities
NR	May be included if UE Radio Capability ID as specified in 23.502 [43] is used for the UE. Included otherwise.	May be included	May be included	May be included, ignored by gNB if received
E-UTRAN	May be included if UE Radio Capability ID as specified in 23.502 [43] is used for the UE. Included otherwise.	May be included	May be included	May be included, ignored by gNB if received

NOTE 2: The following table indicates, in case of inter-RAT handover from E-UTRA, which additional IEs are included or not:

Source system	sourceConfig	rrm-Config	as-Context
E-UTRA/EPC	Not included	May be included	Not included
E-UTRA/5GC	May be included, but only *radioBearerConfig* is included in the *RRCReconfiguration*.	May be included	Not included

– *CG-Config*

This message is used to transfer the SCG radio configuration as generated by the SgNB or SeNB. It can also be used by a CU to request a DU to perform certain actions, e.g. to request the DU to perform a new lower layer configuration.

Direction: Secondary gNB or eNB to master gNB or eNB, alternatively CU to DU.

***CG-Config* message**

```
-- ASN1START
```

```
-- TAG-CG-CONFIG-START

CG-Config ::=                   SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            cg-Config                           CG-Config-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

CG-Config-IEs ::=                   SEQUENCE {
    scg-CellGroupConfig                 OCTET STRING (CONTAINING RRCReconfiguration)    OPTIONAL,
    scg-RB-Config                       OCTET STRING (CONTAINING RadioBearerConfig)     OPTIONAL,
    configRestrictModReq                ConfigRestrictModReqSCG                         OPTIONAL,
    drx-InfoSCG                         DRX-Info                                        OPTIONAL,
    candidateCellInfoListSN             OCTET STRING (CONTAINING MeasResultList2NR)     OPTIONAL,
    measConfigSN                        MeasConfigSN                                    OPTIONAL,
    selectedBandCombination             BandCombinationInfoSN                           OPTIONAL,
    fr-InfoListSCG                      FR-InfoList                                     OPTIONAL,
    candidateServingFreqListNR          CandidateServingFreqListNR                      OPTIONAL,
    nonCriticalExtension                CG-Config-v1540-IEs                             OPTIONAL
}

CG-Config-v1540-IEs ::=             SEQUENCE {
    pSCellFrequency                     ARFCN-ValueNR                                   OPTIONAL,
    reportCGI-RequestNR                 SEQUENCE {
        requestedCellInfo                   SEQUENCE {
            ssbFrequency                        ARFCN-ValueNR,
            cellForWhichToReportCGI             PhysCellId
        }                                                                               OPTIONAL
    }                                                                                   OPTIONAL,
    ph-InfoSCG                          PH-TypeListSCG                                  OPTIONAL,
    nonCriticalExtension                CG-Config-v1560-IEs                             OPTIONAL
}

CG-Config-v1560-IEs ::=             SEQUENCE {
    pSCellFrequencyEUTRA                ARFCN-ValueEUTRA                                OPTIONAL,
    scg-CellGroupConfigEUTRA            OCTET STRING                                    OPTIONAL,
    candidateCellInfoListSN-EUTRA       OCTET STRING                                    OPTIONAL,
    candidateServingFreqListEUTRA       CandidateServingFreqListEUTRA                   OPTIONAL,
    needForGaps                         ENUMERATED {true}                               OPTIONAL,
    drx-ConfigSCG                       DRX-Config                                      OPTIONAL,
    reportCGI-RequestEUTRA              SEQUENCE {
        requestedCellInfoEUTRA              SEQUENCE {
            eutraFrequency                          ARFCN-ValueEUTRA,
            cellForWhichToReportCGI-EUTRA           EUTRA-PhysCellId
        }                                                                               OPTIONAL
    }                                                                                   OPTIONAL,
    nonCriticalExtension                CG-Config-v1590-IEs                             OPTIONAL
}

CG-Config-v1590-IEs ::=             SEQUENCE {
```

```
    scellFrequenciesSN-NR               SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF  ARFCN-ValueNR          OPTIONAL,
    scellFrequenciesSN-EUTRA            SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF  ARFCN-ValueEUTRA       OPTIONAL,
    nonCriticalExtension                CG-Config-v1610-IEs                                                     OPTIONAL
}

CG-Config-v1610-IEs ::=             SEQUENCE {
    drx-InfoSCG2                        DRX-Info2                                       OPTIONAL,
    nonCriticalExtension                CG-Config-v1620-IEs                             OPTIONAL
}

CG-Config-v1620-IEs ::=             SEQUENCE {
    ueAssistanceInformationSCG-r16      OCTET STRING (CONTAINING UEAssistanceInformation)  OPTIONAL,
    nonCriticalExtension                CG-Config-v1630-IEs                               OPTIONAL
}

CG-Config-v1630-IEs ::=             SEQUENCE {
    selectedToffset-r16                 T-Offset-r16                                    OPTIONAL,
    nonCriticalExtension                CG-Config-v1640-IEs                             OPTIONAL
}

CG-Config-v1640-IEs ::=             SEQUENCE {
    servCellInfoListSCG-NR-r16          ServCellInfoListSCG-NR-r16                      OPTIONAL,
    servCellInfoListSCG-EUTRA-r16       ServCellInfoListSCG-EUTRA-r16                   OPTIONAL,
    nonCriticalExtension                CG-Config-v1700-IEs                             OPTIONAL
}

CG-Config-v1700-IEs ::=             SEQUENCE {
    candidateCellInfoListCPC-r17        CandidateCellInfoListCPC-r17                    OPTIONAL,
    twoPHRModeSCG-r17                   ENUMERATED {enabled}                            OPTIONAL,
    nonCriticalExtension                CG-Config-v1730-IEs                             OPTIONAL
}

CG-Config-v1730-IEs ::=             SEQUENCE {
    fr1-Carriers-SCG-r17                INTEGER (1..32)                                 OPTIONAL,
    fr2-Carriers-SCG-r17                INTEGER (1..32)                                 OPTIONAL,
    nonCriticalExtension                SEQUENCE {}                                     OPTIONAL
}

ServCellInfoListSCG-NR-r16 ::=      SEQUENCE (SIZE (1.. maxNrofServingCells)) OF  ServCellInfoXCG-NR-r16

ServCellInfoXCG-NR-r16 ::=          SEQUENCE {
    dl-FreqInfo-NR-r16                  FrequencyConfig-NR-r16                          OPTIONAL,
    ul-FreqInfo-NR-r16                  FrequencyConfig-NR-r16                          OPTIONAL, -- Cond FDD
    ...
}

FrequencyConfig-NR-r16 ::=          SEQUENCE {
    freqBandIndicatorNR-r16             FreqBandIndicatorNR,
    carrierCenterFreq-NR-r16            ARFCN-ValueNR,
    carrierBandwidth-NR-r16             INTEGER (1..maxNrofPhysicalResourceBlocks),
    subcarrierSpacing-NR-r16            SubcarrierSpacing
}

ServCellInfoListSCG-EUTRA-r16 ::=   SEQUENCE (SIZE (1.. maxNrofServingCellsEUTRA)) OF ServCellInfoXCG-EUTRA-r16
```

```
ServCellInfoXCG-EUTRA-r16 ::=       SEQUENCE {
    dl-CarrierFreq-EUTRA-r16            ARFCN-ValueEUTRA                                OPTIONAL,
    ul-CarrierFreq-EUTRA-r16            ARFCN-ValueEUTRA                                OPTIONAL, -- Cond FDD
    transmissionBandwidth-EUTRA-r16     TransmissionBandwidth-EUTRA-r16                 OPTIONAL,
    ...
}

TransmissionBandwidth-EUTRA-r16 ::= ENUMERATED {rb6, rb15, rb25, rb50, rb75, rb100}

PH-TypeListSCG ::=                  SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoSCG

PH-InfoSCG ::=                      SEQUENCE {
    servCellIndex                       ServCellIndex,
    ph-Uplink                           PH-UplinkCarrierSCG,
    ph-SupplementaryUplink              PH-UplinkCarrierSCG                             OPTIONAL,
    ...,
    [[
    twoSRS-PUSCH-Repetition-r17         ENUMERATED{enabled}                             OPTIONAL
    ]]
}

PH-UplinkCarrierSCG ::=             SEQUENCE{
    ph-Type1or3                         ENUMERATED {type1, type3},
    ...
}

MeasConfigSN ::=                    SEQUENCE {
    measuredFrequenciesSN               SEQUENCE (SIZE (1..maxMeasFreqsSN)) OF NR-FreqInfo  OPTIONAL,
    ...
}

NR-FreqInfo ::=                     SEQUENCE {
    measuredFrequency                   ARFCN-ValueNR                                   OPTIONAL,
    ...
}

ConfigRestrictModReqSCG ::=         SEQUENCE {
    requestedBC-MRDC                    BandCombinationInfoSN                           OPTIONAL,
    requestedP-MaxFR1                   P-Max                                           OPTIONAL,
    ...,
    [[
    requestedPDCCH-BlindDetectionSCG    INTEGER (1..15)                                 OPTIONAL,
    requestedP-MaxEUTRA                 P-Max                                           OPTIONAL
    ]],
    [[
    requestedP-MaxFR2-r16               P-Max                                           OPTIONAL,
    requestedMaxInterFreqMeasIdSCG-r16  INTEGER(1..maxMeasIdentitiesMN)                 OPTIONAL,
    requestedMaxIntraFreqMeasIdSCG-r16  INTEGER(1..maxMeasIdentitiesMN)                 OPTIONAL,
    requestedToffset-r16                T-Offset-r16                                    OPTIONAL
    ]],
    [[
    reservedResourceConfigNRDC-r17      ResourceConfigNRDC-r17                          OPTIONAL
    ]]
```

```
}

BandCombinationIndex ::= INTEGER (1..maxBandComb)

BandCombinationInfoSN ::=           SEQUENCE {
    bandCombinationIndex                BandCombinationIndex,
    requestedFeatureSets                FeatureSetEntryIndex
}

FR-InfoList ::= SEQUENCE (SIZE (1..maxNrofServingCells-1)) OF FR-Info

FR-Info ::= SEQUENCE {
    servCellIndex       ServCellIndex,
    fr-Type             ENUMERATED {fr1, fr2}
}

CandidateServingFreqListNR ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueNR

CandidateServingFreqListEUTRA ::= SEQUENCE (SIZE (1.. maxFreqIDC-MRDC)) OF ARFCN-ValueEUTRA

T-Offset-r16 ::= ENUMERATED {ms0dot5, ms0dot75, ms1, ms1dot5, ms2, ms2dot5, ms3, spare1}

CandidateCellInfoListCPC-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellInfo-r17

CandidateCellInfo-r17 ::=       SEQUENCE {
    ssbFrequency-r17                ARFCN-ValueNR,
    candidateList-r17               SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF CandidateCell-r17
}

CandidateCell-r17 ::=           SEQUENCE {
    physCellId-r17                  PhysCellId,
    condExecutionCondSCG-r17        OCTET STRING (CONTAINING CondReconfigExecCondSCG-r17)              OPTIONAL
}

-- TAG-CG-CONFIG-STOP
-- ASN1STOP
```

***CG-Config* field descriptions**
candidateCellInfoListCPC Contains information regarding candidate target cells for Conditional PSCell Change (CPC) that the source secondary gNB suggests the target secondary gNB to consider configuring for CPC.
candidateCellInfoListSN Contains information regarding cells that the source secondary node suggests the target secondary gNB to consider configuring.
candidateCellInfoListSN-EUTRA Includes the *MeasResultList3EUTRA* as specified in TS 36.331 [10]. Contains information regarding cells that the source secondary node suggests the target secondary eNB to consider configuring. This field is only used in NE-DC.
candidateServingFreqListNR, candidateServingFreqListEUTRA Indicates frequencies of candidate serving cells for In-Device Co-existence Indication (see TS 36.331 [10]).
configRestrictModReq Used by SN to request changes to SCG configuration restrictions previously set by MN to ensure UE capabilities are respected. E.g. can be used to request configuring an NR band combination whose use MN has previously forbidden. SN only includes this field in SN-initiated procedures.
drx-ConfigSCG This field contains the complete DRX configuration of the SCG. This field is only used in NR-DC.
drx-InfoSCG This field contains the DRX long and short cycle configuration of the SCG. This field is used in (NG)EN-DC and NE-DC.
drx-InfoSCG2 This field contains the drx-onDurationTimer configuration of the SCG. This field is only used in (NG)EN-DC.
fr-InfoListSCG Contains information of FR information of serving cells that include PScell and SCells configured in SCG.
fr1-Carriers-SCG, fr2-Carriers-SCG Indicates the number of FR1 or FR2 serving cells configured in SCG.
measuredFrequenciesSN Used by SN to indicate a list of frequencies measured by the UE.
needForGaps In NE-DC, indicates whether the SN requests gNB to configure measurements gaps.
ph-InfoSCG Power headroom information in SCG that is needed in the reception of PHR MAC CE of MCG
ph-SupplementaryUplink Power headroom information for supplementary uplink. In the case of (NG)EN-DC and NR-DC, this field is only present when two UL carriers are configured for a serving cell and one UL carrier reports type1 PH while the other reports type 3 PH.
ph-Type1or3 Type of power headroom for a certain serving cell in SCG (PSCell and activated SCells). Value *type1* refers to type 1 power headroom, value *type3* refers to type 3 power headroom. (See TS 38.321 [3]).
ph-Uplink Power headroom information for uplink.
pSCellFrequency, pSCellFrequencyEUTRA Indicates the frequency of PSCell in NR (i.e., *pSCellFrequency*) or E-UTRA (i.e., *pSCellFrequencyEUTRA*). In this version of the specification, *pSCellFrequency* is not used in NE-DC whereas *pSCellFrequencyEUTRA* is only used in NE-DC. *pSCellFrequency* indicates the *absoluteFrequencySSB*.
reportCGI-RequestNR, reportCGI-RequestEUTRA Used by SN to indicate to MN about configuring *reportCGI* procedure. The request may optionally contain information about the cell for which SN intends to configure *reportCGI* procedure. In this version of the specification, the *reportCGI-RequestNR* is used in (NG)EN-DC and NR-DC whereas *reportCGI-RequestEUTRA* is used only for NE-DC.

requestedBC-MRDC
Used to request configuring a band combination and corresponding feature sets which are forbidden to use by MN (i.e. outside of the *allowedBC-ListMRDC*) to allow re-negotiation of the UE capabilities for SCG configuration.

reservedResourceConfigNRDC
Used to request or indicate the maximum number of resources reserved for the SCG. This field is only used in NR-DC.

requestedMaxInterFreqMeasIdSCG
Used to request the maximum number of allowed measurement identities to configure for inter-frequency measurement. This field is only used in NR-DC.

requestedMaxIntraFreqMeasIdSCG
Used to request the maximum number of allowed measurement identities to configure for intra-frequency measurement on each serving frequency.

requestedPDCCH-BlindDetectionSCG
Requested value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG.

requestedP-MaxEUTRA
Requested value for the maximum power for the serving cells the UE can use in E-UTRA SCG. This field is only used in NE-DC.

requestedP-MaxFR1
Requested value for the maximum power for the serving cells on frequency range 1 (FR1) in this secondary cell group (see TS 38.104 [12]) the UE can use in NR SCG.

requestedP-MaxFR2
Requested value for the maximum power for the serving cells on frequency range 2 (FR2) in this secondary cell group the UE can use in NR SCG. This field is only used in NR-DC.

requestedToffset
Requests the new value for the time offset restriction used by the SN for scheduling SCG transmissions (i.e. $T^{max}_{proc,SCG}$, see TS 38.213 [13]). This field is used in NR-DC only when the fields *nrdc-PC-mode-FR1-r16* or *nrdc-PC-mode-FR2-r16* are set to dynamic. Value ms0dot5 corresponds to 0.5 ms, value ms0dot75 corresponds to 0.75 ms, value ms1 corresponds to 1ms and so on.

scellFrequenciesSN-EUTRA, scellFrequenciesSN-NR
Indicates the frequency of all SCells with SSB configured in SCG. The field *scellFrequenciesSN-EUTRA* is used in NE-DC; the field *scellFrequenciesSN-NR* is used in (NG)EN-DC and NR-DC. In (NG)EN-DC, the field is optionally provided to the MN. *scellFrequenciesSN-NR* indicates *absoluteFrequencySSB*.

scg-CellGroupConfig
Contains the *RRCReconfiguration* message (containing only *secondaryCellGroup* and/or *measConfig* and/or *otherConfig* and/or *conditionalReconfiguration* and/or *bap-Config* and/or *iab-IP-AddressConfigurationList*):

- to be sent to the UE, used upon SCG establishment or modification (only when the SCG is not released by the SN), as generated (entirely) by the (target) SgNB. In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 6 e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG configuration of the UE, when provided in response to a query from MN, or in SN triggered SN change in order to enable delta signaling by the target SN, or in SN triggered modification procedure in order to coordinate CHO or MN-initiated CPC with SCG reconfigurations (see TS 38.423 [35]). In this case, the SN sets the *RRCReconfiguration* message in accordance with clause 11.2.3.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered modification procedure in order to coordinate CHO or MN-initiated CPC with SCG reconfigurations (see TS 38.423 [35]) nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG (re)configuration towards the UE. The field is also absent upon an SCG release triggered by the SN. This field is not applicable in NE-DC.

scg-CellGroupConfigEUTRA
Includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration*:

- to be sent to the UE, used to (re-)configure the SCG configuration upon SCG establishment or modification (only when the SCG is not released by the SN), as generated (entirely) by the (target) SeNB. In this case, the SN sets the *scg-Configuration* within the EUTRA *RRCConnectionReconfiguration* message in accordance with clause 6 in TS 36.331 [10] e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG configuration of the UE, when provided in response to a query from MN, or in SN triggered SN change in order to enable delta signalling by the target SN.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG (re)configuration towards the UE. The field is also absent upon an SCG release triggered by the SN. This field is only used in NE-DC.

scg-RB-Config
Contains the IE *RadioBearerConfig*:

- to be sent to the UE, used to (re-)configure the SCG RB configuration upon SCG establishment or modification, as generated (entirely) by the (target) SgNB or SeNB. In this case, the SN sets the *RadioBearerConfig* in accordance with clause 6, e.g. regarding the "Need" or "Cond" statements.

or

- including the current SCG RB configuration of the UE, when provided in response to a query from MN or in SN triggered SN change or in SN triggered SN release or bearer type change between SN terminated bearer to MN terminated bearer in order to enable delta signaling by the MN or target SN. In this case, the SN sets the *RadioBearerConfig* in accordance with clause 11.2.3.

The field is absent if neither SCG (re)configuration nor SCG configuration query nor SN triggered SN change nor SN triggered SN release is performed, e.g. at inter-node capability/configuration coordination which does not result in SCG RB (re)configuration.

selectedBandCombination
Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC. The SN should inform the MN with this field whenever the band combination and/or feature set it selected for the SCG changes (i.e. even if the new selection concerns a band combination and/or feature set that is allowed by the *allowedBC-ListMRDC*)

selectedToffset
Indicates the value used by the SN for scheduling SCG transmissions (i.e. $T_{proc,SCG}^{max}$, see TS 38.213 [13]). This field is used in NR-DC only when the fields *nrdc-PC-mode-FR1-r16* or *nrdc-PC-mode-FR2-r16* are set to dynamic. The SN can only indicate a value that is less than or equal to *maxToffset* received from MN. This field is used in NR-DC only when MN has included the field *maxToffset* in *CG-ConfigInfo*. Value *ms0dot5* corresponds to 0.5 ms, value *ms0dot75* corresponds to 0.75 ms, value *ms1* corresponds to 1ms and so on.

servCellInfoListSCG-EUTRA
Indicates the carrier frequency and the transmission bandwidth of the serving cell(s) in the SCG in intra-band NE-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in NE-DC.

servCellInfoListSCG-NR
Indicates the frequency band indicator, carrier center frequency, UE specific channel bandwidth and SCS of the serving cell(s) in the SCG in intra-band (NG)EN-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in (NG)EN-DC.

twoPHRModeSCG
Indicates if the power headroom for SCG shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.

twoSRS-PUSCH-Repetition Indicates whether the indicated serving cell is configured for PUSCH repetition corresponding to two SRS resource sets configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'.
transmissionBandwidth-EUTRA Indicates the transmission bandwidth on an E-UTRA carrier frequency as defined by the parameter Transmission Bandwidth Configuration "NRB" TS 36.104 [33]. The values rb6, rb15, rb25, rb50, rb75, rb100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.
ueAssistanceInformationSCG Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR *UEAssistanceInformation* message for the SCG, if any.

***BandCombinationInfoSN* field descriptions**
bandCombinationIndex In case of NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. In case of (NG)EN-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationList-UplinkTxSwitch*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationList-UplinkTxSwitch* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList-UplinkTxSwitch* increased by the number of entries in *supportedBandCombinationList*.
requestedFeatureSets The position in the *FeatureSetCombination* which identifies one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination

Conditional Presence	Explanation
FDD	This field is mandatory present if dl-FreqInfo-NR is included and concerns an FDD carrier; otherwise the field is absent.

– *CG-ConfigInfo*

This message is used by master eNB or gNB to request the SgNB or SeNB to perform certain actions e.g. to establish, modify or release an SCG. The message may include additional information e.g. to assist the SgNB or SeNB to set the SCG configuration. It can also be used by a CU to request a DU to perform certain actions, e.g. to establish, or modify an MCG or SCG.

Direction: Master eNB or gNB to secondary gNB or eNB, alternatively CU to DU.

***CG-ConfigInfo* message**

```
-- ASN1START
-- TAG-CG-CONFIG-INFO-START

CG-ConfigInfo ::=               SEQUENCE {
    criticalExtensions              CHOICE {
        c1                              CHOICE{
            cg-ConfigInfo                   CG-ConfigInfo-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
```

```
        criticalExtensionsFuture        SEQUENCE {}
    }
}

CG-ConfigInfo-IEs ::=           SEQUENCE {
    ue-CapabilityInfo               OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList)         OPTIONAL,-- Cond SN-AddMod
    candidateCellInfoListMN         MeasResultList2NR                                                OPTIONAL,
    candidateCellInfoListSN         OCTET STRING (CONTAINING MeasResultList2NR)                      OPTIONAL,
    measResultCellListSFTD-NR       MeasResultCellListSFTD-NR                                        OPTIONAL,
    scgFailureInfo                  SEQUENCE {
        failureType                     ENUMERATED { t310-Expiry, randomAccessProblem,
                                                     rlc-MaxNumRetx, synchReconfigFailure-SCG,
                                                     scg-reconfigFailure,
                                                     srb3-IntegrityFailure},
        measResultSCG                   OCTET STRING (CONTAINING MeasResultSCG-Failure)
    }                                                                                                OPTIONAL,
    configRestrictInfo              ConfigRestrictInfoSCG                                            OPTIONAL,
    drx-InfoMCG                     DRX-Info                                                         OPTIONAL,
    measConfigMN                    MeasConfigMN                                                     OPTIONAL,
    sourceConfigSCG                 OCTET STRING (CONTAINING RRCReconfiguration)                     OPTIONAL,
    scg-RB-Config                   OCTET STRING (CONTAINING RadioBearerConfig)                      OPTIONAL,
    mcg-RB-Config                   OCTET STRING (CONTAINING RadioBearerConfig)                      OPTIONAL,
    mrdc-AssistanceInfo             MRDC-AssistanceInfo                                              OPTIONAL,
    nonCriticalExtension            CG-ConfigInfo-v1540-IEs                                          OPTIONAL
}

CG-ConfigInfo-v1540-IEs ::=     SEQUENCE {
    ph-InfoMCG                      PH-TypeListMCG                                                   OPTIONAL,
    measResultReportCGI             SEQUENCE {
        ssbFrequency                    ARFCN-ValueNR,
        cellForWhichToReportCGI         PhysCellId,
        cgi-Info                        CGI-InfoNR
    }                                                                                                OPTIONAL,
    nonCriticalExtension            CG-ConfigInfo-v1560-IEs                                          OPTIONAL
}

CG-ConfigInfo-v1560-IEs ::=  SEQUENCE {
    candidateCellInfoListMN-EUTRA       OCTET STRING                                                 OPTIONAL,
    candidateCellInfoListSN-EUTRA       OCTET STRING                                                 OPTIONAL,
    sourceConfigSCG-EUTRA               OCTET STRING                                                 OPTIONAL,
    scgFailureInfoEUTRA                 SEQUENCE {
        failureTypeEUTRA                    ENUMERATED { t313-Expiry, randomAccessProblem,
                                                         rlc-MaxNumRetx, scg-ChangeFailure},
        measResultSCG-EUTRA                 OCTET STRING
    }                                                                                                OPTIONAL,
    drx-ConfigMCG                       DRX-Config                                                   OPTIONAL,
    measResultReportCGI-EUTRA               SEQUENCE {
        eutraFrequency                      ARFCN-ValueEUTRA,
        cellForWhichToReportCGI-EUTRA           EUTRA-PhysCellId,
        cgi-InfoEUTRA                           CGI-InfoEUTRA
    }                                                                                                OPTIONAL,
    measResultCellListSFTD-EUTRA        MeasResultCellListSFTD-EUTRA                                 OPTIONAL,
    fr-InfoListMCG                      FR-InfoList                                                  OPTIONAL,
    nonCriticalExtension                CG-ConfigInfo-v1570-IEs                                      OPTIONAL
```

```
}

CG-ConfigInfo-v1570-IEs ::=  SEQUENCE {
    sftdFrequencyList-NR               SFTD-FrequencyList-NR                                    OPTIONAL,
    sftdFrequencyList-EUTRA            SFTD-FrequencyList-EUTRA                                 OPTIONAL,
    nonCriticalExtension               CG-ConfigInfo-v1590-IEs                                  OPTIONAL
}

CG-ConfigInfo-v1590-IEs ::=  SEQUENCE {
    servFrequenciesMN-NR            SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF  ARFCN-ValueNR     OPTIONAL,
    nonCriticalExtension            CG-ConfigInfo-v1610-IEs                                  OPTIONAL
}

CG-ConfigInfo-v1610-IEs ::=  SEQUENCE {
    drx-InfoMCG2                DRX-Info2                                                    OPTIONAL,
    alignedDRX-Indication       ENUMERATED {true}                                            OPTIONAL,
    scgFailureInfo-r16                  SEQUENCE {
        failureType-r16                     ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
                                                         t312-Expiry-r16, bh-RLF-r16,
                                                         beamFailure-r17, spare3, spare2, spare1},
        measResultSCG-r16                   OCTET STRING (CONTAINING MeasResultSCG-Failure)
    }                                                                                        OPTIONAL,
    dummy1                                  SEQUENCE {
        failureTypeEUTRA-r16                    ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
                                                         t312-Expiry-r16, spare5,
                                                                  spare4, spare3, spare2, spare1},
        measResultSCG-EUTRA-r16                 OCTET STRING
    }                                                                                        OPTIONAL,
    sidelinkUEInformationNR-r16     OCTET STRING (CONTAINING SidelinkUEInformationNR-r16)        OPTIONAL,
    sidelinkUEInformationEUTRA-r16  OCTET STRING                                             OPTIONAL,
    nonCriticalExtension            CG-ConfigInfo-v1620-IEs                                  OPTIONAL
}

CG-ConfigInfo-v1620-IEs ::=             SEQUENCE {
    ueAssistanceInformationSourceSCG-r16    OCTET STRING (CONTAINING UEAssistanceInformation)    OPTIONAL,
    nonCriticalExtension                    CG-ConfigInfo-v1640-IEs                              OPTIONAL
}

CG-ConfigInfo-v1640-IEs ::=             SEQUENCE {
    servCellInfoListMCG-NR-r16              ServCellInfoListMCG-NR-r16                  OPTIONAL,
    servCellInfoListMCG-EUTRA-r16           ServCellInfoListMCG-EUTRA-r16               OPTIONAL,
    nonCriticalExtension                    CG-ConfigInfo-v1700-IEs                     OPTIONAL
}

CG-ConfigInfo-v1700-IEs ::=             SEQUENCE {
    candidateCellListCPC-r17                CandidateCellListCPC-r17                    OPTIONAL,
    twoPHRModeMCG-r17                       ENUMERATED {enabled}                        OPTIONAL,
    lowMobilityEvaluationConnectedInPCell-r17 ENUMERATED {enabled}                      OPTIONAL,
    nonCriticalExtension                    CG-ConfigInfo-v1730-IEs                     OPTIONAL
}

CG-ConfigInfo-v1730-IEs ::=             SEQUENCE {
    fr1-Carriers-MCG-r17                    INTEGER (1..32)                             OPTIONAL,
    fr2-Carriers-MCG-r17                    INTEGER (1..32)                             OPTIONAL,
```

```
    nonCriticalExtension                SEQUENCE {}                                 OPTIONAL
}

ServCellInfoListMCG-NR-r16 ::=          SEQUENCE (SIZE (1.. maxNrofServingCells)) OF  ServCellInfoXCG-NR-r16

ServCellInfoListMCG-EUTRA-r16 ::=       SEQUENCE (SIZE (1.. maxNrofServingCellsEUTRA)) OF ServCellInfoXCG-EUTRA-r16

SFTD-FrequencyList-NR ::=               SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueNR

SFTD-FrequencyList-EUTRA ::=            SEQUENCE (SIZE (1..maxCellSFTD)) OF ARFCN-ValueEUTRA

ConfigRestrictInfoSCG ::=       SEQUENCE {
    allowedBC-ListMRDC              BandCombinationInfoList                                 OPTIONAL,
    powerCoordination-FR1               SEQUENCE {
        p-maxNR-FR1                     P-Max                                               OPTIONAL,
        p-maxEUTRA                      P-Max                                               OPTIONAL,
        p-maxUE-FR1                     P-Max                                               OPTIONAL
    }                                                                                       OPTIONAL,
    servCellIndexRangeSCG           SEQUENCE {
        lowBound                        ServCellIndex,
        upBound                         ServCellIndex
    }                                                                                       OPTIONAL,   -- Cond SN-AddMod
    maxMeasFreqsSCG                     INTEGER(1..maxMeasFreqsMN)                          OPTIONAL,
    dummy                               INTEGER(1..maxMeasIdentitiesMN)                     OPTIONAL,
    ...,
    [[
    selectedBandEntriesMNList       SEQUENCE (SIZE (1..maxBandComb)) OF SelectedBandEntriesMN   OPTIONAL,
    pdcch-BlindDetectionSCG         INTEGER (1..15)                                         OPTIONAL,
    maxNumberROHC-ContextSessionsSN INTEGER(0.. 16384)                                      OPTIONAL
    ]],
    [[
    maxIntraFreqMeasIdentitiesSCG    INTEGER(1..maxMeasIdentitiesMN)                        OPTIONAL,
    maxInterFreqMeasIdentitiesSCG    INTEGER(1..maxMeasIdentitiesMN)                        OPTIONAL
    ]],
    [[
    p-maxNR-FR1-MCG-r16              P-Max                                                  OPTIONAL,
    powerCoordination-FR2-r16        SEQUENCE {
        p-maxNR-FR2-MCG-r16              P-Max                                              OPTIONAL,
        p-maxNR-FR2-SCG-r16              P-Max                                              OPTIONAL,
        p-maxUE-FR2-r16                  P-Max                                              OPTIONAL
    }                                                                                       OPTIONAL,
    nrdc-PC-mode-FR1-r16    ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic}      OPTIONAL,
    nrdc-PC-mode-FR2-r16    ENUMERATED {semi-static-mode1, semi-static-mode2, dynamic}      OPTIONAL,
    maxMeasSRS-ResourceSCG-r16      INTEGER(0..maxNrofCLI-SRS-Resources-r16)                OPTIONAL,
    maxMeasCLI-ResourceSCG-r16      INTEGER(0..maxNrofCLI-RSSI-Resources-r16)               OPTIONAL,
    maxNumberEHC-ContextsSN-r16     INTEGER(0..65536)                                       OPTIONAL,
    allowedReducedConfigForOverheating-r16      OverheatingAssistance                       OPTIONAL,
    maxToffset-r16                  T-Offset-r16                                            OPTIONAL
    ]],
    [[
    allowedReducedConfigForOverheating-r17      OverheatingAssistance-r17                   OPTIONAL,
    maxNumberUDC-DRB-r17            INTEGER(0..2)                                           OPTIONAL,
    maxNumberCPCCandidates-r17      INTEGER(0..maxNrofCondCells-1-r17)                      OPTIONAL
    ]],
```

```
    [[
    allowedResourceConfigNRDC-r17    ResourceConfigNRDC-r17                                    OPTIONAL
    ]]
}

SelectedBandEntriesMN ::=       SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandEntryIndex

BandEntryIndex ::=              INTEGER (0.. maxNrofServingCells)

PH-TypeListMCG ::=              SEQUENCE (SIZE (1..maxNrofServingCells)) OF PH-InfoMCG

PH-InfoMCG ::=                  SEQUENCE {
    servCellIndex                       ServCellIndex,
    ph-Uplink                           PH-UplinkCarrierMCG,
    ph-SupplementaryUplink              PH-UplinkCarrierMCG                                   OPTIONAL,
    ...,
    [[
    twoSRS-PUSCH-Repetition-r17         ENUMERATED{enabled}                                   OPTIONAL
    ]]
}

PH-UplinkCarrierMCG ::=         SEQUENCE{
    ph-Type1or3                         ENUMERATED {type1, type3},
    ...
}

BandCombinationInfoList ::=     SEQUENCE (SIZE (1..maxBandComb)) OF BandCombinationInfo

BandCombinationInfo ::=         SEQUENCE {
    bandCombinationIndex            BandCombinationIndex,
    allowedFeatureSetsList          SEQUENCE (SIZE (1..maxFeatureSetsPerBand)) OF FeatureSetEntryIndex
}

FeatureSetEntryIndex ::=        INTEGER (1.. maxFeatureSetsPerBand)

DRX-Info ::=                    SEQUENCE {
    drx-LongCycleStartOffset        CHOICE {
        ms10                            INTEGER(0..9),
        ms20                            INTEGER(0..19),
        ms32                            INTEGER(0..31),
        ms40                            INTEGER(0..39),
        ms60                            INTEGER(0..59),
        ms64                            INTEGER(0..63),
        ms70                            INTEGER(0..69),
        ms80                            INTEGER(0..79),
        ms128                           INTEGER(0..127),
        ms160                           INTEGER(0..159),
        ms256                           INTEGER(0..255),
        ms320                           INTEGER(0..319),
        ms512                           INTEGER(0..511),
        ms640                           INTEGER(0..639),
        ms1024                          INTEGER(0..1023),
        ms1280                          INTEGER(0..1279),
        ms2048                          INTEGER(0..2047),
```

```
        ms2560                          INTEGER(0..2559),
        ms5120                          INTEGER(0..5119),
        ms10240                         INTEGER(0..10239)
    },
    shortDRX                            SEQUENCE {
        drx-ShortCycle                      ENUMERATED  {
                                                ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30, ms32,
                                                ms35, ms40, ms64, ms80, ms128, ms160, ms256, ms320, ms512, ms640, spare9,
                                                spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1 },
        drx-ShortCycleTimer                 INTEGER (1..16)
    }                                                                               OPTIONAL
}

DRX-Info2 ::=           SEQUENCE {
    drx-onDurationTimer     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 }
                            }
}

MeasConfigMN ::= SEQUENCE {
    measuredFrequenciesMN               SEQUENCE (SIZE (1..maxMeasFreqsMN)) OF NR-FreqInfo      OPTIONAL,
    measGapConfig                       SetupRelease { GapConfig }                              OPTIONAL,
    gapPurpose                          ENUMERATED {perUE, perFR1}                              OPTIONAL,
    ...,
    [[
    measGapConfigFR2                    SetupRelease { GapConfig }                              OPTIONAL
    ]],
    [[
    interFreqNoGap-r16                  ENUMERATED {true}                                       OPTIONAL
    ]]
}

MRDC-AssistanceInfo ::= SEQUENCE {
    affectedCarrierFreqCombInfoListMRDC     SEQUENCE (SIZE (1..maxNrofCombIDC)) OF AffectedCarrierFreqCombInfoMRDC,
    ...,
    [[
    overheatingAssistanceSCG-r16            OCTET STRING (CONTAINING OverheatingAssistance)     OPTIONAL
    ]],
    [[
    overheatingAssistanceSCG-FR2-2-r17      OCTET STRING (CONTAINING OverheatingAssistance-r17) OPTIONAL
    ]]
}

AffectedCarrierFreqCombInfoMRDC ::= SEQUENCE {
    victimSystemType                    VictimSystemType,
    interferenceDirectionMRDC           ENUMERATED {eutra-nr, nr, other, utra-nr-other, nr-other, spare3, spare2, spare1},
    affectedCarrierFreqCombMRDC         SEQUENCE    {
        affectedCarrierFreqCombEUTRA        AffectedCarrierFreqCombEUTRA                        OPTIONAL,
        affectedCarrierFreqCombNR           AffectedCarrierFreqCombNR
    }                                                                               OPTIONAL
```

```
}

VictimSystemType ::= SEQUENCE {
    gps                         ENUMERATED {true}              OPTIONAL,
    glonass                     ENUMERATED {true}              OPTIONAL,
    bds                         ENUMERATED {true}              OPTIONAL,
    galileo                     ENUMERATED {true}              OPTIONAL,
    wlan                        ENUMERATED {true}              OPTIONAL,
    bluetooth                   ENUMERATED {true}              OPTIONAL
}

AffectedCarrierFreqCombEUTRA ::= SEQUENCE (SIZE (1..maxNrofServingCellsEUTRA)) OF ARFCN-ValueEUTRA

AffectedCarrierFreqCombNR ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF ARFCN-ValueNR

CandidateCellListCPC-r17 ::= SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellCPC-r17

CandidateCellCPC-r17 ::=           SEQUENCE {
    ssbFrequency-r17                ARFCN-ValueNR,
    candidateCellList-r17           SEQUENCE (SIZE (1..maxNrofCondCells-r16)) OF PhysCellId
}

-- TAG-CG-CONFIG-INFO-STOP
-- ASN1STOP
```

***CG-ConfigInfo* field descriptions**
alignedDRX-Indication This field is signalled upon MN triggered CGI reporting by the UE that requires aligned DRX configurations between the MCG and the SCG (i.e. same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN).
allowedBC-ListMRDC A list of indices referring to band combinations in MR-DC capabilities from which SN is allowed to select the SCG band combination. Each entry refers to: - a band combination numbered according to *supportedBandCombinationList* and *supportedBandCombinationList-UplinkTxSwitch* in the *UE-MRDC-Capability* (in case of (NG)EN-DC), or according to *supportedBandCombinationList* and *supportedBandCombinationListNEDC-Only* in the *UE-MRDC-Capability* (in case of NE-DC), or according to *supportedBandCombinationList* in the UE-NR-Capability (in case of NR-DC), - and the Feature Sets allowed for each band entry. All MR-DC band combinations indicated by this field comprise the MCG band combination, which is a superset of the MCG band(s) selected by MN.
allowedReducedConfigForOverheating Indicates the reduced configuration that the SCG is allowed to configure. *reducedMaxCCs* in *allowedReducedConfigForOverheating* indicates the maximum number of downlink/uplink PSCell/SCells that the SCG is allowed to configure. This field is used in (NG)EN-DC and NR-DC. *reducedMaxBW-FR1* and *reducedMaxBW-FR2* in *allowedReducedConfigForOverheating* indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR1 and FR2-1, respectively that the SCG is allowed to configure. *reducedMaxBW-FR2-2* in *allowedReducedConfigForOverheating-r17* indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC. *reducedMaxMIMO-LayersFR1* and *reducedMaxMIMO-LayersFR2* in *allowedReducedConfigForOverheating* indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR1 and FR2-1, respectively that the SCG is allowed to configure. *reducedMaxMIMO-LayersFR2-2* in *allowedReducedConfigForOverheating-r17* indicates the maximum number of downlink/uplink MIMO layers of each serving cell operating on FR2-2 that the SCG is allowed to configure. This field is only used in NR-DC.
allowedResourceConfigNRDC Used to indicate the maximum number of resources reserved for the SCG. This field is only used in NR-DC.
candidateCellInfoListMN, ***candidateCellInfoListSN*** Contains information regarding cells that the master node or the source node suggests the target gNB or DU to consider configuring. In case of MN initiated CPA or CPC, the field *candidateCellInfoListMN* contains information regarding cells that the MN suggests the candidate target secondary node to consider configuring for MN initiated CPA or CPC. For (NG)EN-DC, including CSI-RS measurement results in *candidateCellInfoListMN* is not supported in this version of the specification. For NR-DC, including SSB and/or CSI-RS measurement results in *candidateCellInfoListMN* is supported.
candidateCellInfoListMN-EUTRA, ***candidateCellInfoListSN-EUTRA*** Includes the *MeasResultList3EUTRA* as specified in TS 36.331 [10]. Contains information regarding cells that the master node or the source node suggests the target secondary eNB to consider configuring. These fields are only used in NE-DC.
candidateCellListCPC Contains information regarding cells that the source secondary node suggests the candidate target secondary node to consider configuring for SN initiated Conditional PSCell Change (CPC).
configRestrictInfo Includes fields for which SgNB is explicitly indicated to observe a configuration restriction.
drx-ConfigMCG This field contains the complete DRX configuration of the MCG. This field is only used in NR-DC.
drx-InfoMCG This field contains the DRX long and short cycle configuration of the MCG. This field is used in (NG)EN-DC and NE-DC.
drx-InfoMCG2 This field contains the *drx-onDurationTimer* configuration of the MCG. This field is only used in (NG)EN-DC.
dummy, dummy1 These fields are not used in the specification and SN ignores the received value(s).

fr-InfoListMCG Contains information of FR information of serving cells that include PCell and SCell(s) configured in MCG.
fr1-Carriers-MCG, fr2-Carriers-MCG Indicates the number of FR1 or FR2 serving cells configured in MCG.
interFreqNoGap Indicates that the field *interFrequencyConfig-NoGap-r16* has been included within the *MeasConfig* IE generated by the MN.
lowMobilityEvaluationConnectedInPCell Indicates if low mobility criterion has been configured in NR PCell.
maxInterFreqMeasIdentitiesSCG Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for inter-frequency measurement. The maximum value for this field is 10. If the field is absent, the SCG is allowed to configure inter-frequency measurements up to the maximum value. This field is only used in NR-DC.
maxIntraFreqMeasIdentitiesSCG Indicates the maximum number of allowed measurement identities that the SCG is allowed to configure for intra-frequency measurement on each serving frequency. The maximum value for this field is 9 (in case of (NG)EN-DC or NR-DC) or 10 (in case of NE-DC). If the field is absent, the SCG is allowed to configure intra-frequency measurements up to the maximum value on each serving frequency.
maxMeasCLI-ResourceSCG Indicates the maximum number of CLI RSSI resources that the SCG is allowed to configure.
maxMeasFreqsSCG Indicates the maximum number of NR inter-frequency carriers the SN is allowed to configure with PSCell for measurements.
maxMeasSRS-ResourceSCG Indicates the maximum number of SRS resources that the SCG is allowed to configure for CLI measurement.
maxNumberCPCCandidates Indicates the maximum numbers of conditional reconfigurations the SN is allowed to configure for SN initiated CPC. Value 0 indicates that the SN is not allowed to configure SN initiated CPC. If the field is absent, the SN is allowed to configure up to *maxNrofCondCells-r16* conditional reconfigurations for SN-initiated CPC.
maxNumberROHC-ContextSessionsSN Indicates the maximum number of ROHC context sessions allowed to SN terminated bearer, excluding context sessions that leave all headers uncompressed.
maxNumberEHC-ContextsSN Indicates the maximum number of EHC contexts allowed to the SN terminated bearer. The field indicates the number of contexts in addition to CID = "all zeros", as specified in TS 38.323 [5].
maxNumberUDC-DRB Indicates the maximum number of UDC DRBs allowed to SN terminated bearer. This field is used in NGEN-DC, NR-DC and NE-DC.
maxToffset Indicates the maximum Toffset value the SN is allowed to use for scheduling SCG transmissions (see TS 38.213 [13]). This field is used in NR-DC only when the fields *nrdc-PC-mode-FR1-r16* or *nrdc-PC-mode-FR2-r16* are set to dynamic. Value *ms0dot5* corresponds to 0.5 ms, value *ms0dot75* corresponds to 0.75 ms, value *ms1* corresponds to 1 ms and so on.
measuredFrequenciesMN Used by MN to indicate a list of frequencies measured by the UE.
measGapConfig Indicates the FR1 and perUE measurement gap configuration configured by MN.
measGapConfigFR2 Indicates the FR2 measurement gap configuration configured by MN.
mcg-RB-Config Contains all of the fields in the IE *RadioBearerConfig* used in MN, used by the SN to support delta configuration to UE (i.e. when MN does not use full configuration option), for bearer type change between MN terminated bearer with NR PDCP to SN terminated bearer. It is also used to indicate the PDCP duplication related information for MN terminated split bearer (whether duplication is configured and if so, whether it is initially activated) in SN Addition/Modification procedure. Otherwise, this field is absent.

measResultReportCGI, measResultReportCGI-EUTRA Used by MN to provide SN with CGI-Info for the cell as per SN's request. In this version of the specification, the *measResultReportCGI* is used for (NG)EN-DC and NR-DC and the *measResultReportCGI-EUTRA* is used only for NE-DC.
measResultSCG-EUTRA This field includes the *MeasResultSCG-FailureMRDC* IE as specified in TS 36.331 [10]. This field is only used in NE-DC.
measResultSFTD-EUTRA SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC. This field is only used in NE-DC.
mrdc-AssistanceInfo Contains the IDC assistance information for MR-DC reported by the UE (see TS 36.331 [10]).
nrdc-PC-mode-FR1 Indicates the uplink power sharing mode that the UE uses in NR-DC FR1 (see TS 38.213 [13], clause 7.6).
nrdc-PC-mode-FR2 Indicates the uplink power sharing mode that the UE uses in NR-DC FR2 (see TS 38.213 [13], clause 7.6).
overheatingAssistanceSCG Contains the UE's preference on reduced configuration for NR SCG to address overheating. This field is only used in (NG)EN-DC.
overheatingAssistanceSCG-FR2-2 Contains the UE's preference on reduced configuration for NR SCG on FR2-2 to address overheating. This field is only used in (NG)EN-DC.
p-maxEUTRA Indicates the maximum total transmit power to be used by the UE in the E-UTRA cell group (see TS 36.104 [33]). This field is used in (NG)EN-DC and NE-DC.
p-maxNR-FR1 For (NG)EN-DC and NE-DC, the field indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]). For NR-DC, it indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR SCG.
p-maxUE-FR1 Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 1 (FR1).
p-maxNR-FR1-MCG Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 1 (FR1) (see TS 38.104 [12]) the UE can use in NR MCG. This field is only used in NR-DC.
p-maxNR-FR2-SCG Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR SCG.
p-maxUE-FR2 Indicates the maximum total transmit power to be used by the UE across all serving cells in frequency range 2 (FR2).
p-maxNR-FR2-MCG Indicates the maximum total transmit power to be used by the UE in the NR cell group across all serving cells in frequency range 2 (FR2) (see TS 38.104 [12]) the UE can use in NR MCG.
pdcch-BlindDetectionSCG Indicates the maximum value of the reference number of cells for PDCCH blind detection allowed to be configured for the SCG.
ph-InfoMCG Power headroom information in MCG that is needed in the reception of PHR MAC CE in SCG.
ph-SupplementaryUplink Power headroom information for supplementary uplink. For UE in (NG)EN-DC, this field is absent.
ph-Type1or3 Type of power headroom for a serving cell in MCG (PCell and activated SCells). *type1* refers to type 1 power headroom, *type3* refers to type 3 power headroom. (See TS 38.321 [3]).

ph-Uplink Power headroom information for uplink.
powerCoordination-FR1 Indicates the maximum power that the UE can use in FR1.
powerCoordination-FR2 Indicates the maximum power that the UE can use in frequency range 2 (FR2). This field is only used in NR-DC.
scgFailureInfo Contains SCG failure type and measurement results. In case the sender has no measurement results available, the sender may include one empty entry (i.e. without any optional fields present) in *measResultPerMOList*. This field is used in (NG)EN-DC and NR-DC.
scg-RB-Config Contains all of the fields in the IE RadioBearerConfig used in SN, used to allow the target SN to use delta configuration to the UE, e.g. during SN change. The field is signalled upon change of SN unless MN uses full configuration option. Otherwise, the field is absent.
selectedBandEntriesMNList A list of indices referring to the position of a band entry selected by the MN, in each band combination entry in *allowedBC-ListMRDC* IE. *BandEntryIndex* 0 identifies the first band in the *bandList* of the *BandCombination*, *BandEntryIndex* 1 identifies the second band in the *bandList* of the *BandCombination*, and so on. This *selectedBandEntriesMNList* includes the same number of entries, and listed in the same order as in *allowedBC-ListMRDC*. The SN uses this information to determine which bands out of the NR band combinations in *allowedBC-ListMRDC* it can configure in SCG in NR-DC. The SN can use this information to determine for which band pair(s) it should check *SimultaneousRxTxPerBandPair*.
servCellIndexRangeSCG Range of serving cell indices that SN is allowed to configure for SCG serving cells.
servCellInfoListMCG-EUTRA Indicates the carrier frequency and the transmission bandwidth of the serving cell(s) in the MCG in intra-band (NG)EN-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in (NG)EN-DC.
servCellInfoListMCG-NR Indicates the frequency band indicator, carrier center frequency, UE specific channel bandwidth and SCS of the serving cell(s) in the MCG in intra-band NE-DC. The field is needed when MN and SN operate serving cells in the same band for either contiguous or non-contiguous intra-band band combination or LTE NR inter-band band combinations where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [34]) in NE-DC.
servFrequenciesMN-NR Indicates the frequency of all serving cells that include PCell and SCell(s) with SSB configured in MCG. This field is only used in NR-DC. *servFrequenciesMN-NR* indicates *absoluteFrequencySSB*.
sftdFrequencyList-NR Includes a list of SSB frequencies. Each entry identifies the SSB frequency of a PSCell, which corresponds to one *MeasResultCellSFTD-NR* entry in the *MeasResultCellListSFTD-NR*.
sftdFrequencyList-EUTRA Includes a list of E-UTRA frequencies. Each entry identifies the carrier frequency of a PSCell, which corresponds to one *MeasResultSFTD-EUTRA* entry in the *MeasResultCellListSFTD-EUTRA*.
sidelinkUEInformationEUTRA This field contains the E-UTRA *SidelinkUEInformation* message as specified in TS 36.331 [10].
sidelinkUEInformationNR This field contains the NR *SidelinkUEInformationNR* message.
sourceConfigSCG Includes all of the current SCG configurations used by the target SN to build delta configuration to be sent to UE, e.g. during SN change. The field contains the *RRCReconfiguration* message, i.e. including *secondaryCellGroup* and *measConfig*. The field is signalled upon change of SN, unless MN uses full configuration option. Otherwise, the field is absent.

sourceConfigSCG-EUTRA Includes the E-UTRA *RRCConnectionReconfiguration* message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field *scg-Configuration.* In this version of the specification, this field is absent when master gNB uses full configuration option. This field is only used in NE-DC.
twoPHRModeMCG Indicates if the power headroom for MCG shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not.
twoSRS-PUSCH-Repetition Indicates whether the indicated serving cell is configured for PUSCH repetition corresponding to two SRS resource sets configured in either *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage 'codebook' or 'noncodebook'.
ueAssistanceInformationSourceSCG Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR *UEAssistanceInformation* message for the source SCG, if any.
ue-CapabilityInfo Contains the IE *UE-CapabilityRAT-ContainerList* supported by the UE (see NOTE 3). A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.

***BandCombinationInfo* field descriptions**
allowedFeatureSetsList Defines a subset of the entries in a *FeatureSetCombination*. Each index identifies a position in the *FeatureSetCombination*, which corresponds to one *FeatureSetUplink*/*Downlink* for each band entry in the associated band combination.
bandCombinationIndex In case of NR-DC, this field indicates the position of a band combination in the *supportedBandCombinationList*. In case of NE-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationListNEDC-Only*. In case of (NG)EN-DC, this field indicates the position of a band combination in the *supportedBandCombinationList* and/or *supportedBandCombinationList-UplinkTxSwitch*. Band combination entries in *supportedBandCombinationList* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationListNEDC-Only* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationListNEDC-Only* increased by the number of entries in *supportedBandCombinationList*. Band combination entries in *supportedBandCombinationList-UplinkTxSwitch* are referred by an index which corresponds to the position of a band combination in the *supportedBandCombinationList-UplinkTxSwitch* increased by the number of entries in *supportedBandCombinationList*.

Conditional Presence	Explanation
SN-AddMod	The field is mandatory present upon SN addition and SN change. It is optionally present upon SN modification and inter-MN handover without SN change. Otherwise, the field is absent.

NOTE 3: The following table indicates per MN RAT and SN RAT whether RAT capabilities are included or not in *ue-CapabilityInfo*.

MN RAT	SN RAT	NR capabilities	E-UTRA capabilities	MR-DC capabilities
E-UTRA	NR	Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise	Not included	Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise
NR	E-UTRA	Not included	Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise	Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise
NR	NR	Need not be included if the UE Radio Capability ID as specified in 23.502 [43] is used. Included otherwise	Not included	Not included

– *MeasurementTimingConfiguration*

The *MeasurementTimingConfiguration* message is used to convey assistance information for measurement timing.

Direction: en-gNB to eNB, eNB to en-gNB, gNB to gNB, ng-eNB to gNB, gNB to ng-eNB, ng-eNB to ng-eNB, gNB DU to gNB CU, and gNB CU to gNB DU.

MeasurementTimingConfiguration message

```
-- ASN1START
-- TAG-MEASUREMENT-TIMING-CONFIGURATION-START

MeasurementTimingConfiguration ::=      SEQUENCE {
    criticalExtensions                      CHOICE {
        c1                                      CHOICE{
            measTimingConf                          MeasurementTimingConfiguration-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture        SEQUENCE {}
    }
}

MeasurementTimingConfiguration-IEs ::=  SEQUENCE {
    measTiming                              MeasTimingList                                  OPTIONAL,
    nonCriticalExtension                    MeasurementTimingConfiguration-v1550-IEs        OPTIONAL
}

MeasurementTimingConfiguration-v1550-IEs ::= SEQUENCE {
    campOnFirstSSB                              BOOLEAN,
    psCellOnlyOnFirstSSB                        BOOLEAN,
    nonCriticalExtension                        MeasurementTimingConfiguration-v1610-IEs    OPTIONAL
}

MeasurementTimingConfiguration-v1610-IEs ::=  SEQUENCE {
    csi-RS-Config-r16                           SEQUENCE {
        csi-RS-SubcarrierSpacing-r16                SubcarrierSpacing,
```

```
        csi-RS-CellMobility-r16                     CSI-RS-CellMobility,
        refSSBFreq-r16                              ARFCN-ValueNR
    },
    nonCriticalExtension                        SEQUENCE {}                                 OPTIONAL
}

MeasTimingList ::= SEQUENCE (SIZE (1..maxMeasFreqsMN)) OF MeasTiming

MeasTiming ::= SEQUENCE {
    frequencyAndTiming                      SEQUENCE {
        carrierFreq                             ARFCN-ValueNR,
        ssbSubcarrierSpacing                    SubcarrierSpacing,
        ssb-MeasurementTimingConfiguration      SSB-MTC,
        ss-RSSI-Measurement                     SS-RSSI-Measurement                         OPTIONAL
    }                                                                                       OPTIONAL,
    ...,
    [[
    ssb-ToMeasure                           SSB-ToMeasure                               OPTIONAL,
    physCellId                              PhysCellId                                  OPTIONAL
    ]]
}

-- TAG-MEASUREMENT-TIMING-CONFIGURATION-STOP
-- ASN1STOP
```

***MeasTiming* field descriptions**
carrierFreq, ssbSubcarrierSpacing
Indicates the frequency and subcarrier spacing of the SS block of the cell for which this message is included, or of other SS blocks within the same carrier.
ssb-MeasurementTimingConfiguration
Indicates the SMTC which can be used to search for SSB of the cell for which the message is included. When the message is included in "Served NR Cell Information" (see TS 36.423 [37]), "Served Cell Information NR" (see TS 38.423 [35]), or "Served Cell Information" (see TS 38.473 [36]), the timing is based on the cell for which the message is included. When the message is included in "NR Neighbour Information" (see TS 36.423 [37]), or "Served Cell Information" (see TS 38.423 [35]), the timing is based on the cell indicated in the "Served NR Cell Information" or "Served Cell Information NR" with which the "NR Neighbour Information" or "Neighbour Information NR" is provided. When the message is included in "CU to DU RRC Information", the timing is based on the cell indicated by SpCell ID with which the message is included. If the field is provided by an NTN cell, the offset (derived from parameter *periodicityAndOffset*) is based on the assumption that the NTN payload to gNB propagation delay of the cell for which the message is included equals to 0 ms.
ss-RSSI-Measurement
Provides the configuration which can be used for RSSI measurements of the cell for which the message is included.

***MeasurementTimingConfiguration* field descriptions**
campOnFirstSSB Value *true* indicates that the SSB indicated in the first instance of *MeasTiming* in the *measTiming* list can be used for camping and for a PCell configuration (i.e. in *spCellConfigCommon* of the *masterCellGroup*).
csi-RS-CellMobility Indicates the CSI-RS configuration of the cell for which this message is included. The timing of the CSI-RS resources is based on the SSB indicated by *refSSBFreq*.
csi-RS-SubcarrierSpacing Indicates the subcarrier spacing of the CSI-RS resources included in *csi-rs-CellMobility*.
measTiming A list of SMTC information, SSB RSSI measurement information and associated NR frequency exchanged via EN-DC X2 Setup, EN-DC Configuration Update, Xn Setup and NG-RAN Node Configuration Update procedures, or F1 messages between gNB DU and gNB CU.
physCellId Physical Cell Identity of the SSB on the ARFCN indicated by *carrierFreq*.
psCellOnlyOnFirstSSB Value *true* indicates that only the SSB indicated in the first instance of *MeasTiming* in the *measTiming* list can be used for a PSCell configuration (i.e. in *spCellConfigCommon* of the *secondaryCellGroup*).
ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]).

– *UERadioPagingInformation*

This message is used to transfer radio paging information, covering both upload to and download from the 5GC, and between gNBs.

Direction: gNB to/ from 5GC and gNB to/from gNB

***UERadioPagingInformation* message**

```
-- ASN1START
-- TAG-UE-RADIO-PAGING-INFORMATION-START

UERadioPagingInformation ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            ueRadioPagingInformation            UERadioPagingInformation-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UERadioPagingInformation-IEs ::=    SEQUENCE {
    supportedBandListNRForPaging        SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR    OPTIONAL,
    nonCriticalExtension                UERadioPagingInformation-v15e0-IEs                      OPTIONAL
}

UERadioPagingInformation-v15e0-IEs ::= SEQUENCE {
```

```
    dl-SchedulingOffset-PDSCH-TypeA-FDD-FR1     ENUMERATED {supported}          OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeA-TDD-FR1     ENUMERATED {supported}          OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeA-TDD-FR2     ENUMERATED {supported}          OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB-FDD-FR1     ENUMERATED {supported}          OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB-TDD-FR1     ENUMERATED {supported}          OPTIONAL,
    dl-SchedulingOffset-PDSCH-TypeB-TDD-FR2     ENUMERATED {supported}          OPTIONAL,
    nonCriticalExtension                UERadioPagingInformation-v1700-IEs          OPTIONAL
}

UERadioPagingInformation-v1700-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r17                  OCTET STRING (CONTAINING UE-RadioPagingInfo-r17)     OPTIONAL,
    inactiveStatePO-Determination-r17       ENUMERATED {supported}                               OPTIONAL,
    numberOfRxRedCap-r17                    ENUMERATED {one, two}                                OPTIONAL,
    halfDuplexFDD-TypeA-RedCap-r17          SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL,
    nonCriticalExtension                    SEQUENCE {}                                          OPTIONAL
}

-- TAG-UE-RADIO-PAGING-INFORMATION-STOP
-- ASN1STOP
```

***UERadioPagingInformation* field descriptions**
supportedBandListNRForPaging Indicates the UE supported NR frequency bands which are derived by the gNB from *UE-NR-Capability*.
dl-SchedulingOffset-PDSCH-TypeA-FDD-FR1 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in FDD FR1.
dl-SchedulingOffset-PDSCH-TypeA-TDD-FR1 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in TDD FR1.
dl-SchedulingOffset-PDSCH-TypeA-TDD-FR2 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type A in TDD FR2.
dl-SchedulingOffset-PDSCH-TypeB-FDD-FR1 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in FDD FR1.
dl-SchedulingOffset-PDSCH-TypeB-TDD-FR1 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in TDD FR1.
dl-SchedulingOffset-PDSCH-TypeB-TDD-FR2 Indicates whether the UE supports DL scheduling slot offset (K0) greater than 0 for PDSCH mapping type B in TDD FR2.
halfDuplexFDD-TypeA-RedCap Indicates whether the RedCap UE only supports half-duplex operation for FDD in the indicated band(s).
inactiveStatePO-Determination Indicates whether the UE supports to use the same i_s to determine PO in RRC_INACTIVE state as in RRC_IDLE state.
numberOfRxRedCap Indicates the number of Rx branches supported by a RedCap UE.
ue-RadioPagingInfo The field is used to transfer UE capability information used for paging. The gNB generates the ue-RadioPagingInfo and the contained UE capability information is absent when not supported by the UE.

– *UERadioAccessCapabilityInformation*

This message is used to transfer UE radio access capability information, covering both upload to and download from the 5GC.

Direction: ng-eNB or gNB to/ from 5GC

UERadioAccessCapabilityInformation message

```
-- ASN1START
-- TAG-UE-RADIO-ACCESS-CAPABILITY-INFORMATION-START

UERadioAccessCapabilityInformation ::= SEQUENCE {
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            ueRadioAccessCapabilityInformation    UERadioAccessCapabilityInformation-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

UERadioAccessCapabilityInformation-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo              OCTET STRING (CONTAINING UE-CapabilityRAT-ContainerList),
    nonCriticalExtension                      SEQUENCE {}                                                 OPTIONAL
}

-- TAG-UE-RADIO-ACCESS-CAPABILITY-INFORMATION-STOP
-- ASN1STOP
```

UERadioAccessCapabilityInformation-IEs field descriptions
ue-RadioAccessCapabilityInfo   Including NR, MR-DC, E-UTRA radio access capabilities. A gNB that retrieves MRDC related capability containers ensures that the set of included MRDC containers is consistent w.r.t. the feature set related information.

11.2.3 Mandatory information in inter-node RRC messages

For the *AS-Config* transferred within the *HandoverPreparationInformation*:

- The source node shall include all fields necessary to reflect the current AS configuration of the UE, except for the fields *sourceSCG-NR-Config*, *sourceSCG-EUTRA-Config* and *sourceRB-SN-Config*, which can be omitted in case the source MN did not receive the latest configuration from the source SN. For *RRCReconfiguration* included in the field *rrcReconfiguration*, *ReconfigurationWithSync* is included with only the mandatory subfields (e.g. *newUE-Identity* and *t304*) and *ServingCellConfigCommon*;

- Need codes or conditions specified for subfields according to IEs defined in clause 6 do not apply. I.e. some fields shall be included regardless of the "Need" or "Cond" e.g. *discardTimer*;

- Based on the received AS configuration, the target node can indicate the delta (difference) to the current AS configuration (as included in *HandoverCommand*)to the UE. The fields *newUE-Identity* and *t304* included in *ReconfigurationWithSync* are not used for delta configuration purpose.

The *candidateCellInfoListSN*(*-EUTRA*) in *CG-Config* and the *candidateCellInfoListMN*(*-EUTRA*)/*candidateCellInfoListSN*(*-EUTRA*) in *CG-ConfigInfo* need not be included in procedures that do not involve a change of node.

For fields *scg-CellGroupConfig*, *scg-CellGroupConfigEUTRA* and *scg-RB-Config* in *CG-Config* (sent upon SN initiated SN change or other conditions as specified in field descriptions) and fields *mcg-RB-Config*, *scg-RB-Config* and *sourceConfigSCG* in *CG-ConfigInfo* (sent upon change of SN):

- The source node shall include all fields necessary to reflect the current AS configuration of the UE, unless stated otherwise in the field description. For *RRCReconfiguration* included in the field *scg-CellGroupConfig in CG-Config*, *ReconfigurationWithSync* is included with only the mandatory subfields (e.g. *newUE-Identity* and *t304*) and *ServingCellConfigCommon*;

- Need codes or conditions specified for subfields according to IEs defined in clause 6 do not apply;

- Based on the received AS configuration, the target node can indicate the delta (difference) as compared to the current AS configuration to the UE. The fields *newUE-Identity* and *t304* in *ReconfigurationWithSync* are always included by the target node, i.e. they are not used for delta configuration purpose to UE.

For fields in *CG-Config* and *CG-ConfigInfo* listed below, absence of the field means that the receiver maintains the values informed via the previous message. Note that every time there is a change in the configuration covered by a listed field, the MN or SN shall include the field and it shall provide the full configuration provided by that field unless stated otherwise. Otherwise, if there is no change, the field can be omitted:

- *configRestrictInfo*;

- *gapPurpose;*

- *measGapConfig* (for which delta signaling applies);

- *measGapConfigFR2* (for which delta signaling applies);

- *measResultCellListSFTD*;

- *measResultSFTD-EUTRA*;

- *sftdFrequencyList-EUTRA*;

- *sftdFrequencyList-NR;*

- *ue-CapabilityInfo;*

- *servFrequenciesMN-NR.*

For other fields in CG-Config and CG-ConfigInfo, the sender shall always signal the appropriate value even if same as indicated in the previous inter-node message, unless explicitly stated otherwise.

11.3 Inter-node RRC information element definitions

– *ResourceConfigNRDC*

The IE is used to indicate or request the maximum values that can be used by the SCG in NR-DC, with each value equal to or lower than the value of the corresponding field in the UE capability, as reported by the UE, unless specified otherwise.

ResourceConfigNRDC information element

```
-- ASN1START
-- TAG-RESOURCECONFIGNRDC-START

ResourceConfigNRDC-r17 ::= SEQUENCE {
    fr1-ResourceConfig-r17                  ResourceConfigPerFR-r17                         OPTIONAL,
    fr2-ResourceConfig-r17                  ResourceConfigPerFR-r17                         OPTIONAL,
    maxNumberResAcrossCC-AcrossFR-r17       INTEGER (0..256)                                OPTIONAL,
    ...
}

ResourceConfigPerFR-r17 ::= SEQUENCE {
    bm-MaxNumberCSI-RS-Resource-r17         INTEGER (0..64)                                 OPTIONAL,
    bm-MaxNumberAperiodicCSI-RS-Resource-r17 INTEGER (0..64)                                OPTIONAL,
    cg-MaxNumberConfigsAllCC-r17            INTEGER (0..32)                                 OPTIONAL,
    maxNumberCSI-RS-BFD-r17                 INTEGER (0..64)                                 OPTIONAL,
    maxNumberCSI-RS-SSB-CBD-r17             INTEGER (0..256)                                OPTIONAL,
    maxNumberSSB-BFD-r17                    INTEGER (0..64)                                 OPTIONAL,
    sps-MaxNumberConfigsAllCC-r17           INTEGER (0..32)                                 OPTIONAL,
    trs-MaxConfResourceSetsAllCC-r17        INTEGER (0..256)                                OPTIONAL,
    ...
}

-- TAG-RESOURCECONFIGNRDC-STOP
-- ASN1STOP
```

ResourceConfigNRDC field descriptions
fr1-ResourceConfig, fr2-ResourceConfig Indicates the maximum number of resources that SCG is allowed to configure for FR1/FR2, respectively.
maxNumberResAcrossCC-AcrossFR Indicates the maximum number of configured CSI-RS resources. Corresponds to the UE capability *maxNumberResAcrossCC-AcrossFR-r16* in *maxTotalResourcesForAcrossFreqRanges-r16*.

***ResourceConfigPerFR* field descriptions**
bm-MaxNumberAperiodicCSI-RS-Resource Indicates the maximum number of aperiodic CSI-RS resources that the SCG is allowed to configure for the UE to measure L1-RSRP. Corresponds to the UE capability *maxNumberAperiodicCSI-RS-Resource* in *beamManagementSSB-CSI-RS*.
bm-MaxNumberCSI-RS-Resource Indicates the maximum total number of NZP-CSI-RS resources that can be configured for the UE to measure L1-RSRP. Corresponds to the UE capability *maxNumberCSI-RS-Resource* in *beamManagementSSB-CSI-RS*.
cg-MaxNumberConfigsAllCC Indicates the maximum number of active configured grant configurations. Corresponds to the UE capability *maxNumberConfigsAllCC-r16* in *activeConfiguredGrant-r16*.
maxNumberCSI-RS-BFD Indicates the maximal number of different CSI-RS resources for the UE to monitor PDCCH quality. Corresponds to the UE capability *maxNumberCSI-RS-BFD*.
maxNumberCSI-RS-SSB-CBD Indicates the maximal number of different CSI-RS (and/or SSB) resources for new beam identifications. Corresponds to the UE capability *maxNumberCSI-RS-SSB-CBD*.
maxNumberSSB-BFD Indicates the maximal number of different SSBs for the UE to monitor PDCCH quality. Corresponds to the UE capability *maxNumberSSB-BFD*.
sps-MaxNumberConfigsAllCC Indicates the maximum number of SPS configurations. Corresponds to the UE capability *maxNumberConfigsAllCC-r16* in *sps-r16*.
trs-MaxConfResourceSetsAllCC Indicates the maximum configured CSI-RS for tracking (i.e. TRS) resource sets. Corresponds to the UE capability *maxConfiguredResourceSetsAllCC* in *csi-RS-ForTracking*.

11.4 Inter-node RRC multiplicity and type constraint values

– Multiplicity and type constraints definitions

```
-- ASN1START
-- TAG-NR-MULTIPLICITY-AND-CONSTRAINTS-START

maxMeasFreqsMN              INTEGER ::= 32  -- Maximum number of MN-configured measurement frequencies
maxMeasFreqsSN              INTEGER ::= 32  -- Maximum number of SN-configured measurement frequencies
maxMeasIdentitiesMN         INTEGER ::= 62  -- Maximum number of measurement identities that a UE can be configured with
maxCellPrep                 INTEGER ::= 32  -- Maximum number of cells prepared for handover

-- TAG-NR-MULTIPLICITY-AND-CONSTRAINTS-STOP
-- ASN1STOP
```

– *End of NR-InterNodeDefinitions*

```
-- ASN1START
-- TAG-NR-INTER-NODE-DEFINITIONS-END-START

END

-- TAG-NR-INTER-NODE-DEFINITIONS-END-STOP
-- ASN1STOP
```

12 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following tables. The performance requirement is expressed as the time in [ms] from the end of reception of the network -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> network response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation). In case the RRC procedure triggers BWP switching, the RRC procedure delay is the value defined in the following table plus the BWP switching delay defined in TS 38.133 [14], clause 8.6.3.

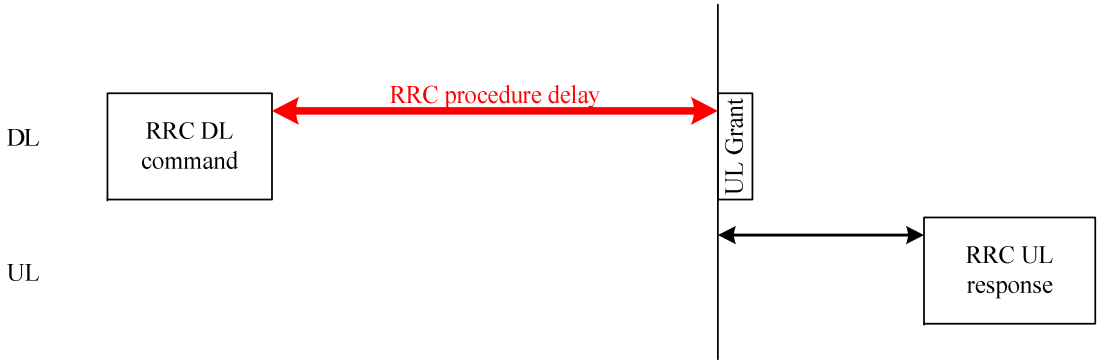

Figure 12.1-1: Illustration of RRC procedure delay

Table 12.1-1: UE performance requirements for RRC procedures for UEs

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
RRC Connection Control Procedures				
RRC reconfiguration	*RRCReconfiguration*	*RRCReconfigurationComplete*	10	
RRC reconfiguration (scell addition/release)	*RRCReconfiguration*	*RRCReconfigurationComplete*	16	
RRC reconfiguration (LTE/NR SCG establishment/ modification/ release)	*RRCReconfiguration*	*RRCReconfigurationComplete*	16	
RRC reconfiguration (Intra-NR mobility with LTE/NR SCG establishment/ modification/ release)	*RRCReconfiguration*	*RRCReconfigurationComplete*	16	
RRC reconfiguration	*DLDedicatedMessage Segment*	*RRCReconfigurationComplete*	16+(Nseg -1)*10	Nseg is number of RRC segments
RRC setup	*RRCSetup*	*RRCSetupComplete*	10	
RRC Release	*RRCRelease*		NA	
RRC re-establishment	*RRCReestablishment*	*RRCReestablishmentComplete*	10	

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
RRC resume	*RRCResume*	*RRCResumeComplete*	6 or 10	Value=6 applies for a UE supporting reduced CP latency for the case of RRCResume message only including MAC and PHY configuration, reestablishPDCP and reestablishRLC for SRB2, multicast MRB(s) and DRB(s), and no DRX, SPS, configured grant, CA or MIMO re-configuration will be triggered by this message. Further, the UL grant for transmission of *RRCResumeComplete* and the data is transmitted over common search space with DCI format 0_0. In this scenario, the RRC procedure delay [ms] can extend beyond the reception of the UL grant, up to 7 ms. For other cases, Value = 10 applies.
RRC resume (MCG SCell addition/restoration/release)	*RRCResume*	*RRCResumeComplete*	16	
RRC resume (SCG establishment/ restoration/release)	*RRCResume*	*RRCResumeComplete*	16	
RRC resume	*DLDedicatedMessageSegment*	*RRCResumeComplete*	16+(Nseg -1)*10	Nseg is number of RRC segments
Initial AS security activation	*SecurityModeCommand*	*SecurityModeComplete/SecurityModeFailure*	5	
Inter RAT mobility				

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
Handover to NR	*RRCReconfiguration (sent by other RAT)*	*RRCReconfigurationComplete*	NA	The performance of this procedure is specified in TS 36.133 [40] clauses 5.3.4.2, 5.3.4A.2 and 5.3.5.2 in case of handover from E-UTRA to NR.
Handover from NR	*MobilityFromNRCommand*		NA	The performance of this procedure is specified in TS 38.133 [14], clauses 6.1.2.1.2 and 6.1.2.2.2.
Other procedures				
UE assistance information		*UEAssistanceInformation*	NA	
UE capability transfer	*UECapabilityEnquiry*	*UECapabilityInformation*	80	
UE capability transfer	*UECapabilityEnquiry*	*ULDedicatedMessageSegment*	80	
Counter check	*CounterCheck*	*CounterCheckResponse*	5	
UE information	*UEInformationRequest*	*UEInformationResponse*	15	
DL Information transfer MR-DC	*DLInformationTransferMRDC*		NA	The UE shall apply the performance requirements of the RRC message included within the DLInformationTransferMRDC message.
IAB other information		*IABOtherInformation*	NA	
Sidelink UE information		*SidelinkUEInformationNR*	NA	
UE Positioning assistance information		*UEPositioningAssistanceInfo*	NA	

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

A.1 Introduction

The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

A.2 Procedural specification

A.2.1 General principles

The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU clause e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are sent to the network i.e. this may also be covered by the PDU specification.

A.2.2 More detailed aspects

The following more detailed conventions should be used:

- Bullets:
  - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
  - All bullets, including the last one in a clause, should end with a semi-colon i.e. an ';.
- Conditions:
  - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1, or cond2.

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 clauses

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [6], X.681 [7].

The complete ASN.1 code is divided into a number of ASN.1 clauses in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 clause begins with the following:

- a first text paragraph consisting entirely of an *ASN.1 start tag*, which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters);
- a second text paragraph consisting entirely of a *block start tag* is included, which consists of a double hyphen followed by a single space and the text string "TAG-NAME-START" (in all upper case letters), where the "NAME" refers to the main name of the paragraph (in all upper-case letters).

Similarly, each ASN.1 clause ends with the following:

- a first text paragraph consisting entirely of a *blockstop tag*, which consists of a double hyphen followed by a single space and the text string "TAG-NAME-STOP" (in all upper-case letters), where the "NAME" refers to the main name of the paragraph (in all upper-case letters);
- a second text paragraph consisting entirely of an *ASN.1 stop tag*, which consists of a double hyphen followed by a singlespace and the text "ASN1STOP" (in all upper case letters).

This results in the following tags:

```
-- ASN1START
-- TAG-NAME-START

-- TAG-NAME-STOP
-- ASN1STOP
```

The text paragraphs containing either of the start and stop tags should not contain any ASN.1 code significant for the complete description of the RRC PDU contents. The complete ASN.1 code may be extracted by copying all the text paragraphs between an ASN.1 start tag and the following ASN.1 stop tag in the order they appear, throughout the specification.

NOTE: A typical procedure for extraction of the complete ASN.1 code consists of a first step where the entire RRC PDU contents description (ultimately the entire specification) is saved into a plain text (ASCII) file format, followed by a second step where the actual extraction takes place, based on the occurrence of the ASN.1 start and stop tags.

A.3.1.2 ASN.1 identifier naming conventions

The naming of identifiers (i.e., the ASN.1 field and type identifiers) should be based on the following guidelines:

- Message (PDU) identifiers should be ordinary mixed case without hyphenation. These identifiers, *e.g.*, the *RRCConnectionModificationCommand*, should be used for reference in the procedure text. Abbreviations should be avoided in these identifiers and abbreviated forms of these identifiers should not be used.

- Type identifiers other than PDU identifiers should be ordinary mixed case, with hyphenation used to set off acronyms only where an adjacent letter is a capital, *e.g.*, *EstablishmentCause*, *SelectedPLMN* (not *Selected-PLMN*, since the "d" in "Selected" is lowercase), *InitialUE-Identity* and *MeasSFN-SFN-TimeDifference*.

- Field identifiers shall start with a lowercase letter and use mixed case thereafter, *e.g.*, *establishmentCause*. If a field identifier begins with an acronym (which would normally be in upper case), the entire acronym is lowercase (*plmn-Identity*, not *pLMN-Identity*). The acronym is set off with a hyphen (*ue-Identity*, not *ueIdentity*), in order to facilitate a consistent search pattern with corresponding type identifiers.

- Identifiers should convey the meaning of the identifier and should avoid adding unnecessary postfixes (e.g. abstractions like 'Info') for the name.

- Identifiers that are likely to be keywords of some language, especially widely used languages, such as C++ or Java, should be avoided to the extent possible.

- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.

- *For future extension:* When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/or type. A suffix of the form "-rX" is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, *e.g.*, *Foo-r9* for the Rel-9 version of the ASN.1 type *Foo*. A suffix of the form "-rXb" is used for the first revision of a field that it appears in the same release (X) as the original version of the field, "-rXc" for a second intra-release revision and so on. A suffix of the form "-vXYZ" is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see clause A.4), e.g., *AnElement-v10b0* for the extension of the ASN.1 type *AnElement* introduced in version 10.11.0 of the specification. A number *0...9, 10, 11, etc.* is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters *a, b, c, etc.* are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffices are not used, unless there is a clear need to distinguish the extension from the original field.

- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. *MeasObjectUTRA*, *ConfigCommon*. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.

- It should be avoided to use field identifiers with the same name within the elements of a CHOICE, including using a CHOICE inside a SEQUENCE (to avoid certain compiler errors).

Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

Abbreviation	Abbreviated word
Config	Configuration
DL	Downlink
Ext	Extension
Freq	Frequency
Id	Identity
Ind	Indication
Meas	Measurement
MIB	MasterInformationBlock
Neigh	Neighbour(ing)
Param(s)	Parameter(s)
Phys	Physical
PCI	Physical Cell Id
Proc	Process
Reconfig	Reconfiguration
Reest	Re-establishment
Req	Request
Rx	Reception
Sched	Scheduling
SIB	SystemInformationBlock
Sync	Synchronisation
Thr	Threshold
Tx	Transmission
UL	Uplink

NOTE: The table A.3.1.2.1-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field identifier of the referenced type. The ASN.1 field and type identifiers used in text references should be in the *italic font style*. The "do not check spelling and grammar" attribute in Word should be set. Quotation marks (i.e., "") should not be used around the ASN.1 field or type identifier.

A reference to an RRC PDU should be made using the corresponding ASN.1 field identifier followed by the word "message", e.g., a reference to the *RRCRelease* message.

A reference to a specific part of an RRC PDU, or to a specific part of any other ASN.1 type, should be made using the corresponding ASN.1 field identifier followed by the word "field", e.g., a reference to the *prioritisedBitRate* field in the example below.

```
-- /example/ ASN1START

LogicalChannelConfig ::=            SEQUENCE {
    ul-SpecificParameters               SEQUENCE {
        priority                            Priority,
```

```
        prioritisedBitRate                  PrioritisedBitRate,
        bucketSizeDuration                  BucketSizeDuration,
        logicalChannelGroup                 INTEGER (0..3)
    }       OPTIONAL
}

-- ASN1STOP
```

NOTE: All the ASN.1 start tags in the ASN.1 clauses, used as examples in this annex to the specification, are deliberately distorted, in order not to include them when the ASN.1 description of the RRC PDU contents is extracted from the specification.

A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym "IE", e.g., a reference to the IE *LogicalChannelConfig* in the example above.

References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., 'if the *status* field is set to value *true*'.

A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```
-- /example/ ASN1START

DL-DCCH-Message ::= SEQUENCE {
    message                 DL-DCCH-MessageType
}

DL-DCCH-MessageType ::= CHOICE {
    c1                      CHOICE {
        dlInformationTransfer                   DLInformationTransfer,
        handoverFromEUTRAPreparationRequest     HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand                MobilityFromEUTRACommand,
        rrcConnectionReconfiguration            RRCConnectionReconfiguration,
        rrcConnectionRelease                    RRCConnectionRelease,
        securityModeCommand                     SecurityModeCommand,
        ueCapabilityEnquiry                     UECapabilityEnquiry,
        spare1 NULL
    },
    messageClassExtension   SEQUENCE {}
}

-- ASN1STOP
```

A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level *c1* CHOICE.

Spare alternatives (i.e., *spare1* in this case) may be included within the *c1* CHOICE to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the *messageClassExtension* alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 clause similar to the one shown in the example below.

```
-- /example/ ASN1START

RRCConnectionReconfiguration ::=    SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        c1                                  CHOICE{
            rrcConnectionReconfiguration-r8     RRCConnectionReconfiguration-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
    -- Enter the IEs here.
    ...
}

-- ASN1STOP
```

Hooks for *critical* and *non-critical* extension should normally be included in the PDU type specification. How these hooks are used is further described in clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level *c1* CHOICE. Spare alternatives (i.e., *spare3* down to *spare1* in this case) may be included within the *c1* CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.

Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the *criticalExtensionsFuture* in the outer level CHOICE.

In PDU types where critical extension is not expected in the future releases of the protocol, the inner level *c1* CHOICE and the spare alternatives may be excluded, as shown in the example below.

```
-- /example/ ASN1START
```

```
RRCConnectionReconfigurationComplete ::= SEQUENCE {
    rrc-TransactionIdentifier           RRC-TransactionIdentifier,
    criticalExtensions                  CHOICE {
        rrcConnectionReconfigurationComplete-r8
                                            RRCConnectionReconfigurationComplete-r8-IEs,
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
    -- Enter the fields here.
    ...
}

-- ASN1STOP
```

Non-critical extensions are characterised by the addition of new information to the original specification of the PDU type. If not comprehended, a non-critical extension may be skipped by the decoder, whilst the decoder is still able to complete the decoding of the comprehended parts of the PDU contents.

Non-critical extensions at locations other than the end of the message or other than at the end of a field contained in a BIT or OCTET STRING are facilitated by use of the ASN.1 extension marker "...". The original specification of a PDU type should normally include the extension marker at the end of the sequence of information elements contained.

Non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING may be facilitated by use of an empty sequence that is marked OPTIONAL e.g. as shown in the following example:

```
-- /example/ ASN1START

RRCMessage-r8-IEs ::=                   SEQUENCE {
    field1                                  InformationElement1,
    field2                                  InformationElement2,

    nonCriticalExtension                    SEQUENCE {}                     OPTIONAL
}

-- ASN1STOP
```

The ASN.1 clause specifying the contents of a PDU type may be followed by a *field description* table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

***%PDU-TypeIdentifier%* field descriptions**
%field identifier% Field description.
%field identifier% Field description.

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a *field identifier* (in ***bold and italic*** font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 clause similar to the one shown in the example below.

```
-- /example/ ASN1START

PRACH-ConfigSIB ::=                 SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo
}

PRACH-Config ::=                    SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo                    OPTIONAL    -- Need N
}

PRACH-ConfigInfo ::=                SEQUENCE {
    prach-ConfigIndex                   ENUMERATED {ffs},
    highSpeedFlag                       ENUMERATED {ffs},
    zeroCorrelationZoneConfig           ENUMERATED {ffs}
}

-- ASN1STOP
```

IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons e.g. to break down a ASN.1 definition in to smaller pieces.

A group of closely related IE type definitions, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in this example, are preferably placed together in a common ASN.1 clause. The IE type identifiers should in this case have a common base, defined as the *generic type identifier*. It may be complemented by a suffix to distinguish the different variants. The "*PRACH-Config*" is the generic type identifier in this example, and the "*SIB*" suffix is added to distinguish the variant. The clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for *critical* or *non-critical* extension of the protocol (see clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 clause defining the original. A suffix is added to the type identifier, using the naming conventions defined in clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE *PRACH-ConfigInfo* in the example above, may be included in the ASN.1 clause and be referenced in the other IE types defined in the same ASN.1 clause. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code.

There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE *PRACH-ConfigInfo*, should not be referenced directly from other ASN.1 clauses in the RRC specification. An IE type which is referenced in more than one ASN.1 clause should be defined in a separate clause, with a separate heading and a separate ASN.1 clause (possibly as one in a set of closely related IE types, like the IEs *PRACH-ConfigSIB* and *PRACH-Config* in the example above). Such IE types are also referred to as 'global IEs'.

NOTE: Referring to an IE type, that is defined as a local IE type in the context of another ASN.1 clause, does not generate an ASN.1 compilation error. Nevertheless, using a locally defined IE type in that way makes the IE type definition difficult to find, as it would not be visible at an outline level of the specification. It should be avoided.

The ASN.1 clause specifying the contents of one or more IE types, like in the example above, may be followed by a *field description* table, where a further description of, e.g., the semantic properties of the fields of the information elements may be included. This table may be absent, similar as indicated in clause A.3.3 for the specification of the PDU type. The general format of the *field description* table is the same as shown in clause A.3.3 for the specification of the PDU type.

A.3.5 Fields with optional presence

A field with optional presence may be declared with the keyword DEFAULT. It identifies a default value to be assumed, if the sender does not include a value for that field in the encoding:

```
-- /example/ ASN1START

PreambleInfo ::=                    SEQUENCE {
    numberOfRA-Preambles                INTEGER (1..64)                     DEFAULT 1,
    ...
}

-- ASN1STOP
```

Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:

```
-- /example/ ASN1START

PRACH-Config ::=                    SEQUENCE {
    rootSequenceIndex                   INTEGER (0..1023),
    prach-ConfigInfo                    PRACH-ConfigInfo                    OPTIONAL    -- Need N
}

-- ASN1STOP
```

The semantics of an optionally present field, in the case it is omitted, should be indicated at the end of the paragraph including the keyword OPTIONAL, using a short comment text with a need code. The need code includes the keyword "Need", followed by one of the predefined semantics tags (S, M, N or R) defined in clause 6.1. If the semantics tag S is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 clause, or in procedure text.

The addition of OPTIONAL keywords for capability groups is based on the following guideline. If there is more than one field in the lower level IE, then OPTIONAL keyword is added at the group level. If there is only one field in the lower level IE, OPTIONAL keyword is not added at the group level.

A.3.6 Fields with conditional presence

A field with conditional presence is declared with the keyword OPTIONAL. In addition, a short comment text shall be included at the end of the paragraph including the keyword OPTIONAL. The comment text includes the keyword "Cond", followed by a condition tag associated with the field ("UL" in this example):

```
-- /example/ ASN1START

LogicalChannelConfig ::=            SEQUENCE {
    ul-SpecificParameters               SEQUENCE {
        priority                            INTEGER (0),
        ...
    }       OPTIONAL                                                        -- Cond UL
}

-- ASN1STOP
```

When conditionally present fields are included in an ASN.1 clause, the field description table after the ASN.1 clause shall be followed by a *conditional presence* table. The conditional presence table specifies the conditions for including the fields with conditional presence in the particular ASN.1 clause.

Conditional presence	Explanation
UL	Specification of the conditions for including the field associated with the condition tag = "UL". Semantics in case of optional presence under certain conditions may also be specified.

The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in *italic* font style), which links the fields with a condition tag in the ASN.1 clause to an entry in the table. The second column (heading: "Explanation") contains a text specification of the conditions and requirements for the presence of the field. The second column may also include semantics, in case of an optional presence of the field, under certain conditions i.e. using the same predefined tags as defined for optional fields in A.3.5.

Conditional presence should primarily be used when presence of a field depends on the presence and/or value of other fields within the same message. If the presence of a field depends on whether another feature/function has been configured, while this function can be configured independently e.g. by another message and/or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 clause does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

```
-- /example/ ASN1START

PLMN-IdentityInfoList ::=           SEQUENCE (SIZE (1..6)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::=               SEQUENCE {
    plmn-Identity                       PLMN-Identity,
    cellReservedForOperatorUse          ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

rather than as in the following (bad) example, which may cause generated code to contain types with unpredictable names:

```
-- /bad example/ ASN1START

PLMN-IdentityList ::=                   SEQUENCE (SIZE (1..6)) OF SEQUENCE {
    plmn-Identity                           PLMN-Identity,
    cellReservedForOperatorUse              ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

A.3.8 Guidelines on use of parameterised SetupRelease type

The usage of the parameterised *SetupRelease* type is like a function call in programming languages where the element type parameter is passed as a parameter. The parameterised type only implies a textual change in abstract syntax where all references to the parameterised type are replaced by the compiler with the release/setup choice. Two examples of the usage are shown below:

```
-- /example/ ASN1START

RRCMessage-rX-IEs ::= SEQUENCE {
    field-rX              SetupRelease { IE-rX }                OPTIONAL,      --  Need M
    ...
}


RRCMessage-rX-IEs ::= SEQUENCE {
    field-rX              SetupRelease { Element-rX }
}                                                               OPTIONAL,       -- Need M

Element-rX ::= SEQUENCE {
    field1-rX                 IE1-rX,
    field2-rX                 IE2-rX                            OPTIONAL        -- Need N
}                                                                   OPTIONAL,   -- Need M

-- /example/ ASN1STOP
```

The *SetupRelease* is always be used with only named IEs, i.e. the example below is not allowed:

```
-- /example/ ASN1START

RRCMessage-rX-IEs ::= SEQUENCE {
    field-rX       SetupRelease { SEQUENCE {   -- Unnamed SEQUENCEs are not allowed!
            field1-rX                  IE1-rX,
            field2-rX                  IE2-rX                          OPTIONAL        -- Need N
        }
    }                                                                      OPTIONAL,   -- Need M
}

-- /example/ ASN1STOP
```

If a field defined using the parameterized SetupRelease type requires procedural text, the field is referred to using the values defined for the type itself, namely, "setup" and "release". For example, procedural text for field-rX above could be as follows:

1> if *field-rX* is set to "setup":

2> do something;

1> else (*field-rX* is set to "release"):

2> release *field-rX* (if appropriate).

A.3.9 Guidelines on use of ToAddModList and ToReleaseList

In order to benefit from delta signalling when modifying lists with many and/or large elements, so-called add/mod- and release- lists should be used. Instead of a single list containing all elements of the list, the ASN.1 provides two lists. One list is used to convey the actual elements that are to be added to the list or modified in the list. The second list conveys only the identities (IDs) of the list elements that are to be released from the list. In other words, the ASN.1 defines only means to signal modifications to a list maintained in the receiver (typically the UE). An example is provided below:

```
-- /example/ ASN1START

AnExampleIE ::=         SEQUENCE {
    elementsToAddModList    SEQUENCE (SIZE (1..maxNrofElements)) OF Element                                 OPTIONAL,   --  Need N
    elementsToReleaseList   SEQUENCE (SIZE (1..maxNrofElements)) OF ElementId                              OPTIONAL,   --  Need N
    ...
}

Element ::=             SEQUENCE {
    elementId               ElementId,
    aField                  INTEG ER (0..16777215),
    anotherField            OCTET STRING,
    ...
}
```

```
ElementId ::=           INTEGER (0..maxNrofElements-1)

maxNrofElements         INTEGER ::= 50
maxNrofElements-1       INTEGER ::= 49

-- /example/ ASN1STOP
```

As can be seen, the elements of the list must contain an identity (INTEGER) that identifies the elements unambiguously upon addition, modification and removal. It is recommended to define an IE for that identifier (here ElementId) so that it can be used both for a field inside the element as well as in the *elementsToReleaseList*.

Both lists should be made OPTIONAL and flagged as "Need N". The need code reflects that the UE does not maintain the received lists as such but rather updates its configuration using the information therein. In other words, it is not possible to provide via delta signalling an update to a previously signalled *elementsToAddModList* or elementsToReleaseList (which Need M would imply). The update is always in relation to the UE's internal configuration.

Note that the release of a field (a list element as well as any other field) releases all its sub-fields (sub-fields configured by elementsToAddModList and any other sub-field).

If no procedural text is provided for a set of ToAddModList and ToReleaseList, the following generic procedure applies:

The UE shall:

1> for each *ElementId* in the *elementsToReleaseList*,:

2> if the current UE configuration includes an *Element* with the given *ElementId*:

3> release the *Element* from the current UE configuration;

1> for each *Element* in the *elementsToAddModList*:

2> if the current UE configuration includes an *Element* with the given *ElementId*:

3> modify the configured *Element* in accordance with the received *Element*;

2> else:

3> add received *Element* to the UE configuration.

A.3.10 Guidelines on use of lists (without ToAddModList and ToReleaseList)

As per clause 6.1.3, when using lists without the ToAddModList and ToReleaseList structure, the contents of the lists are always replaced. To illustrate this, an example is provided below:

```
-- /example/ ASN1START
-- TAG_EXAMPLE_LISTS_START

AnExampleIE ::=         SEQUENCE {
```

```
    elementList             SEQUENCE (SIZE (1..maxNrofElements)) OF Element                                 OPTIONAL,   --  Need M
    ...,
    [[
    elementListExt-v2030    SEQUENCE (SIZE (1..maxNrofElementsExt)) OF Element                              OPTIONAL,   --  Need M
    ]]
}

Element ::=         SEQUENCE {
    useFeatureX         BOOLEAN,
    aField              INTEGER (0..127)                                                                    OPTIONAL,   --  Need M
    anotherField        INTEGER (0..127)                                                                    OPTIONAL,   --  Need R
    ...
}

maxNrofElements         INTEGER ::= 8
maxNrofElements-1       INTEGER ::= 7
maxNrofElementsExt      INTEGER ::= 8
maxNrofElementsExt-1    INTEGER ::= 7

-- TAG_EXAMPLE_LISTS_STOP
-- /example/ ASN1STOP
```

As can be seen, the *elementList* list itself uses Need M, but each list entry *Element* contains mandatory, Need M and Need R fields. If the list is first signalled to UE with 3 entries, and subsequently again with 2 entries, UE shall retain only the latter list, i.e. the list with 2 elements will completely replace the list with 3 elements. That also means that the field *aField* will be treated as if it was newly created, i.e. network must include it if it wishes UE to utilize the field even if it was previously signalled. This also implies that the Need M field (*aField*) will be treated in the same way as the Need R field (*anotherField*), i.e. delta signalling is not applied and the network has to signal the field to ensure UE does not release the value (which is why Need M should not normally be used in the entries of these lists).

A.4 Extension of the PDU specifications

A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

A.4.2 Critical extension of messages and fields

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name *criticalExtensions*, with two values, *c1* and *criticalExtensionsFuture*. The *criticalExtensionsFuture* branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "*MessageName-rX-IEs*" (e.g., "*RRCConnectionReconfiguration-r8-IEs*") or "*spareX*", with the spare values having type NULL. The "-rX-IEs" structures contain the *complete* structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelihood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

```
-- /example/ ASN1START                  -- Original release

RRCMessage ::=                          SEQUENCE {
    rrc-TransactionIdentifier               RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        c1                                      CHOICE{
            rrcMessage-r8                           RRCMessage-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture                SEQUENCE {}
    }
}

-- ASN1STOP
```

```
-- /example/ ASN1START                  -- Later release

RRCMessage ::=                          SEQUENCE {
    rrc-TransactionIdentifier               RRC-TransactionIdentifier,
    criticalExtensions                          CHOICE {
        c1                                          CHOICE{
            rrcMessage-r8                               RRCMessage-r8-IEs,
            rrcMessage-r10                              RRCMessage-r10-IEs,
            rrcMessage-r11                              RRCMessage-r11-IEs,
            rrcMessage-r14                              RRCMessage-r14-IEs
        },
        later                                       CHOICE {
            c2                                          CHOICE{
                rrcMessage-r16                              RRCMessage-r16-IEs,
                spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            },
            criticalExtensionsFuture                SEQUENCE {}
        }
    }
}

-- ASN1STOP
```

It is important to note that critical extensions may also be used at the level of individual fields i.e. a field may be replaced by a critically extended version. When sending the extended version, the original version may also be included (e.g. original field is mandatory, E-UTRAN is unaware if UE supports the extended version). In such cases, a UE supporting both versions may be required to ignore the original field. The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release.

```
-- /example/ ASN1START                  -- Original release

RRCMessage ::=                          SEQUENCE {
    rrc-TransactionIdentifier               RRC-TransactionIdentifier,
    criticalExtensions                      CHOICE {
        c1                                      CHOICE{
            rrcMessage-r8                           RRCMessage-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture            SEQUENCE {}
    }
}

RRCMessage-rN-IEs ::= SEQUENCE {
    field1-rN                           ENUMERATED {
                                            value1, value2, value3, value4}     OPTIONAL,   -- Need N
    field2-rN                           InformationElement2-rN                  OPTIONAL,   -- Need N
    nonCriticalExtension                RRCConnectionReconfiguration-vMxy-IEs   OPTIONAL
}

RRCConnectionReconfiguration-vMxy-IEs ::= SEQUENCE {
    field2-rM                               InformationElement2-rM          OPTIONAL, -- Cond NoField2rN
    nonCriticalExtension                    SEQUENCE {}                     OPTIONAL
```

```
}

-- ASN1STOP
```

Conditional presence	Explanation
NoField2rN	The field is optionally present, need N, if field2-rN is absent. Otherwise the field is absent

Finally, it is noted that a critical extension may be introduced in the same release as the one in which the original field was introduced e.g. to correct an essential ASN.1 error. In such cases a UE capability may be introduced, to assist the network in deciding whether or not to use the critical extension.

In the case of list fields (SEQUENCE OF types in ASN.1) using the ToAddMod/ToRelease construction, the use of critical extensions to increase the size of a list should be avoided; that is, replacing the original list field by a new field also used to signal entries previously covered by the original field (i.e. extensions done according to the following example) should be avoided:

```
-- /example/ ASN1START                  -- Discouraged example

ContainingStructure ::=                 SEQUENCE {
    listElementToAddModList                 SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement         OPTIONAL,     -- Need N
    ...,
    [[
    listElementToAddModList-rN              SEQUENCE (SIZE (1..maxNrofListElements-rN)) OF ListElement      OPTIONAL      -- Need N
    ]]
}-- ASN1STOP
```

Instead, a non-critical list extension mechanism should typically be used, such that the extension field only adds the new entries of the list. This approach is further described in clause A.4.3.6.

If the critical extension mechanism for a list is used, it should be clarified in the field description that the two versions of the list are not configured together, and that the network should release the contents of the original version when configuring the replacement version.

A.4.3 Non-critical extension of messages

A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.
- The extension marker ("...") is the primary non-critical extension mechanism that is used but empty sequences may be used if length determinant is not required. Examples of cases where a length determinant is not required:
  - at the end of a message;

  - at the end of a structure contained in a BIT STRING or OCTET STRING.

- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/ functional perspective (referred to as the '*default extension location*').

- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.

- In specific cases it may be preferable to place extensions elsewhere (referred to as the '*actual extension location*') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message.

- In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.

- In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 clause as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not always be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 clause.

A.4.3.2 Further guidelines

Further to the general principles defined in the previous clause, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE:

  - Extension markers are primarily, but not exclusively, introduced at the higher nesting levels.

  - Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list).

  - Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT.

  - Extension markers are also used for size critical messages (i.e. messages on BCCH, BR-BCCH, PCCH and CCCH), although introduced somewhat more carefully.

  - The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.

- Extension markers within ENUMERATED:

  - Spare values may be used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit, given that the use of spare values in a later Release is possible without any error cases.

  - A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".

- Extension markers within CHOICE:

- Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.

- A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message/ of a field contained in an OCTET or BIT STRING:

- When a nonCriticalExtension is actually used, a "Need" code should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" code when the field is not actually used either.

Further, more general, guidelines:

- In case a need code is not provided for a group, a "Need" code is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

A.4.3.3 Typical example of evolution of IE with local extensions

The following example illustrates the use of the extension marker for a number of elementary cases (sequence, enumerated, choice). The example also illustrates how the IE may be revised in case the critical extension mechanism is used.

NOTE In case there is a need to support further extensions of release n while the ASN.1 of release (n+1) has been frozen, without requiring the release n receiver to support decoding of release (n+1) extensions, more advanced mechanisms are needed e.g. including multiple extension markers.

```
-- /example/ ASN1START

InformationElement1 ::=             SEQUENCE {
    field1                              ENUMERATED {
                                            value1, value2, value3, value4-v880,
                                            ..., value5-v960 },
    field2                              CHOICE {
        field2a                             BOOLEAN,
        field2b                             InformationElement2b,
        ...,
        field2c-v960                        InformationElement2c-r9
    },
    ...,
    [[
    field3-r9                           InformationElement3-r9      OPTIONAL        -- Need R
    ]],
    [[
    field3-v9a0                         InformationElement3-v9a0    OPTIONAL,       -- Need R
    field4-r9                           InformationElement4         OPTIONAL        -- Need R
    ]]
}

InformationElement1-r10 ::=         SEQUENCE {
    field1                              ENUMERATED {
                                            value1, value2, value3, value4-v880,
```

```
                                        value5-v960, value6-v1170, spare2, spare1, ... },
    field2                              CHOICE {
        field2a                             BOOLEAN,
        field2b                             InformationElement2b,
        field2c-v960                        InformationElement2c-r9,
        ...,
        field2d-v12b0                       INTEGER (0..63)
    },
    field3-r9                           InformationElement3-r10         OPTIONAL,   -- Need R
    field4-r9                           InformationElement4             OPTIONAL,   -- Need R
    field5-r10                          BOOLEAN,
    field6-r10                          InformationElement6-r10         OPTIONAL,   -- Need R
    ...,
    [[
    field3-v1170                        InformationElement3-v1170       OPTIONAL    -- Need R
    ]]
}

-- ASN1STOP
```

Some remarks regarding the extensions of *InformationElement1* as shown in the above example:

– The *InformationElement1* is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE *InformationElement1* (i.e. *InformationElement1-r10*) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.

– The *value4-v880* is replacing a spare value defined in the original protocol version for *field1*. Likewise *value6-v1170* replaces *spare3* that was originally defined in the r10 version of *field1*.

– Within the critically extended release 10 version of *InformationElement1*, the names of the original fields/IEs are not changed, unless there is a real need to distinguish them from other fields/IEs. E.g. the *field1* and *InformationElement4* were defined in the original protocol version (release 8) and hence not tagged. Moreover, the *field3-r9* is introduced in release 9 and not re-tagged; although, the *InformationElement3* is also critically extended and therefore tagged *InformationElement3-r10* in the release 10 version of InformationElement1.

A.4.3.4 Typical examples of non critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

```
-- /example/ ASN1START

RRCMessage-r8-IEs ::=           SEQUENCE {
    field1                          InformationElement1,
    field2                          InformationElement2,
    field3                          InformationElement3             OPTIONAL,   -- Need N
    nonCriticalExtension            RRCMessage-v860-IEs             OPTIONAL
}
```

```
RRCMessage-v860-IEs ::=         SEQUENCE {
    field4-v860                     InformationElement4                 OPTIONAL,   -- Need S
    field5-v860                     BOOLEAN                             OPTIONAL,   -- Cond C54
    nonCriticalExtension            RRCMessage-v940-IEs                 OPTIONAL
}

RRCMessage-v940-IEs ::=         SEQUENCE {
    field6-v940                     InformationElement6-r9              OPTIONAL,   -- Need R
    nonCriticalExtensions           SEQUENCE {}                         OPTIONAL
}

-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

– The *InformationElement4* is introduced in the original version of the protocol (release 8) and hence no suffix is used.

A.4.3.5 Examples of non-critical extensions not placed at the default extension location

The following example illustrates the use of non-critical extensions in case an extension is not placed at the default extension location.

– *ParentIE-WithEM*

The IE *ParentIE-WithEM*is an example of a high level IE including the extension marker (EM). The root encoding of this IE includes two lower level IEs *ChildIE1-WithoutEM* and *ChildIE2-WithoutEM* which not include the extension marker. Consequently, non-critical extensions of the Child-IEs have to be included at the level of the Parent-IE.

The example illustrates how the two extension IEs *ChildIE1-WithoutEM-vNx0* and *ChildIE2-WithoutEM-vNx0* (both in release N) are used to connect non-critical extensions with a default extension location in the lower level IEs to the actual extension location in this IE.

***ParentIE-WithEM* information element**

```
-- /example/ ASN1START

ParentIE-WithEM ::=             SEQUENCE {
    -- Root encoding, including:
    childIE1-WithoutEM              ChildIE1-WithoutEM          OPTIONAL,       -- Need N
    childIE2-WithoutEM              ChildIE2-WithoutEM          OPTIONAL,       -- Need N
    ...,
    [[
    childIE1-WithoutEM-vNx0         ChildIE1-WithoutEM-vNx0     OPTIONAL,       -- Need N
    childIE2-WithoutEM-vNx0         ChildIE2-WithoutEM-vNx0     OPTIONAL        -- Need N
    ]]
}

-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:

- The fields *childIEx-WithoutEM-vNx0* may not really need to be optional (depends on what is defined at the next lower level).
- In general, especially when there are several nesting levels, fields should be marked as optional only when there is a clear reason.

– *ChildIE1-WithoutEM*

The IE *ChildIE1-WithoutEM* is an example of a lower level IE, used to control certain radio configurations including a configurable feature which can be setup or released using the local IE *ChIE1-ConfigurableFeature*. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature. The example is based on the following assumptions:

- When initially configuring as well as when modifying the new field, the original fields of the configurable feature have to be provided also i.e. as if the extended ones were present within the setup branch of this feature.
- When the configurable feature is released, the new field should be released also.
- When omitting the original fields of the configurable feature the UE continues using the existing values (which is used to optimise the signalling for features that typically continue unchanged upon handover).
- When omitting the new field of the configurable feature the UE releases the existing values and discontinues the associated functionality (which may be used to support release of unsupported functionality upon handover to an eNB supporting an earlier protocol version).

The above assumptions, which affect the use of conditions and need codes, may not always apply. Hence, the example should not be re-used blindly.

ChildIE1-WithoutEM information element

```
-- /example/ ASN1START

ChildIE1-WithoutEM ::=              SEQUENCE {
    -- Root encoding, including:
    chIE1-ConfigurableFeature           ChIE1-ConfigurableFeature       OPTIONAL        -- Need N
}

ChildIE1-WithoutEM-vNx0 ::=     SEQUENCE {
    chIE1-ConfigurableFeature-vNx0      ChIE1-ConfigurableFeature-vNx0  OPTIONAL    -- Cond ConfigF
}

ChIE1-ConfigurableFeature ::=       CHOICE {
    release                             NULL,
    setup                               SEQUENCE {
        -- Root encoding
    }
}

ChIE1-ConfigurableFeature-vNx0 ::=  SEQUENCE {
    chIE1-NewField-rN                   INTEGER (0..31)
}
```

```
-- ASN1STOP
```

Conditional presence	Explanation
ConfigF	The field is optional present, need R, in case of chIE1-ConfigurableFeature is included and set to "setup"; otherwise the field is absent and the UE shall delete any existing value for this field.

– *ChildIE2-WithoutEM*

The IE *ChildIE2-WithoutEM* is an example of a lower level IE, typically used to control certain radio configurations. The example illustrates how the new field *chIE1-NewField* is added in release N to the configuration of the configurable feature.

***ChildIE2-WithoutEM* information element**

```
-- /example/ ASN1START

ChildIE2-WithoutEM ::=              CHOICE {
    release                             NULL,
    setup                               SEQUENCE {
        -- Root encoding
    }
}

ChildIE2-WithoutEM-vNx0 ::=         SEQUENCE {
    chIE2-NewField-rN                   INTEGER (0..31)                 OPTIONAL    -- Cond ConfigF
}

-- ASN1STOP
```

Conditional presence	Explanation
ConfigF	The field is optional present, need R, in case of chIE2-ConfigurableFeature is included and set to "setup"; otherwise the field is absent and the UE shall delete any existing value for this field.

A.4.3.6 Non-critical extensions of lists with ToAddMod/ToRelease

When the size of a list using the ToAddMod/ToRelease construction is extended and/or fields are added to the list element structure, the list should be non-critically extended in accordance with the following general principles:

– When only the size of the list is extended, this extension is reflected in a non-critical extension of the list, with a "SizeExt" suffix added to the end of the field name (before the -vNxy suffix). The differential size of the extended list uses the suffix "Diff". A new ToRelease list is needed, and its range should include only the increase in list size. In many cases, extending the list size will also require an extended list element ID type to account for the increased size of the list; in these cases the element type will need to be extended to include the extended element ID, resulting in a more complex extension (see example 3 for further discussion of this case). The field

description table should indicate that the UE considers the original list and the extension list as a single list; thus entries added with the original list can be modified by the extension list (or removed by the extension of the ToRelease list), or vice versa. The result is as shown in the following example:

```
-- /example 1/ ASN1START

ContainingStructure ::=             SEQUENCE {
    listElementToAddModList             SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement             OPTIONAL,    -- Need N
    listElementToReleaseList            SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId           OPTIONAL,    -- Need N
    ...,
    [[
    -- Non-critical extension lists
    listElementToAddModListSizeExt-vNxy  SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElement      OPTIONAL,    -- Need N
    listElementToReleaseListSizeExt-vNxy SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId    OPTIONAL     -- Need N
    ]]
}
-- ASN1STOP
```

– When fields are added to the list element structure, an extension marker should normally be used if available. If no extension marker is available or if overhead or other considerations prevent using the extension marker, an extension structure should be created for the new fields, with the suffix "Ext" added to the end of the field name and the element structure type name (before the -vNxy suffix), and a parallel ToAddMod list introduced to hold the new structures, also with the "Ext" suffix. The field description table should indicate that the parallel list contains the same number of entries, and in the same order, as the original list. No new ToRelease list is typically needed (unless the list element ID type changes). It should typically be ensured that the contained fields in the "Ext" elements are releasable without release and add of the entire list element; this can, for instance, be ensured by having the new fields be OPTIONAL Need R. If multiple extensions of the same list are needed, the version suffix should distinguish the lists (e.g. *listElementToAddModListExt-vNwz* added after *listElementToAddModListExt-vNxy*). The result is as shown in the following example:

```
-- /example 2/ ASN1START

ContainingStructure ::=             SEQUENCE {
    listElementToAddModList             SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement             OPTIONAL,    -- Need N
    listElementToReleaseList            SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId           OPTIONAL,    -- Need N
    ...,
    [[
    -- Parallel list
    listElementToAddModListExt-vNxy     SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vNxy     OPTIONAL     -- Need N
    ]],
    [[
    -- Second parallel list from a later spec version
    listElementToAddModListExt-vNwz     SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vNwz     OPTIONAL    -- Need N
    ]]
}

ListElement ::=                      SEQUENCE {
    elementId                           ListElementId,
    field1                              INTEGER (0..3),
    field2                              ENUMERATED { value1, value2, value3 }
}
```

```
ListElementExt-vNxy ::=             SEQUENCE {
    field3-rN                           BIT STRING (SIZE (8))                                   OPTIONAL     -- Need R
}

ListElementExt-vNwz ::=             SEQUENCE {
    field4-rN                           INTEGER (0..255)                                        OPTIONAL     -- Need R
}
-- ASN1STOP
```

– When the size of a list is extended and fields are added to the list element structure, an extension marker should normally be used for the added fields if available, and the list extended with the non-critical mechanism as described in example 1 above. Note that if the list element ID type changes in this case, the new ID can be added after the extension marker, and the entries of the size-extended ToRelease list should have the type of the new ID (e.g. *ListElementId-vNxy*). If no extension marker is available or if overhead or other considerations prevent using the extension marker, an extension structure should be created for the new fields and a parallel list with ToAddMod introduced to hold the extension structures, as in the second example above, for entries of the original list and for entries of the extension list holding new entries. The field description table should indicate that the parallel list contains the same number of entries, and in the same order, as the concatenation of the original list and the extension list. An extended ToRelease list is needed, but no additional parallel ToRelease list is needed (i.e. there is no *listElementToReleaseListExt-vNxy* in the example below), as the original and extended ToRelease lists suffice to release any element of the combined list. The extended element ID type should be captured as a non-critical extension of the original element ID type, with the field description indicating that if the extended ID is present, the original ID is ignored. The result is as shown in the following example:

```
-- /example 3/ ASN1START

ContainingStructure ::=             SEQUENCE {
    listElementToAddModList              SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement               OPTIONAL,    -- Need N
    listElementToReleaseList             SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId             OPTIONAL,    -- Need N
    ...,
    [[
    -- Non-critical extension lists
    listElementToAddModListSizeExt-vNxy  SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElement          OPTIONAL,    -- Need N
    listElementToReleaseListSizeExt-vNxy SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId-vNxy   OPTIONAL,    -- Need N
    -- Parallel list with maxNrofListElements-rN = maxNrofListElements + maxNrofListElementsDiff-rN
    listElementToAddModListExt-vNxy      SEQUENCE (SIZE (1..maxNrofListElements-rN)) OF ListElementExt-vNxy      OPTIONAL     -- Need N
    ]]
}

ListElement ::=                     SEQUENCE {
    elementId                           ListElementId,
    field1                              INTEGER (0..3),
    field2                              ENUMERATED { value1, value2, value3 }
}

ListElementExt-vNxy ::=             SEQUENCE {
    -- Field description should indicate that if the elementId-vNxy is present, the elementId (without suffix) is ignored
    elementId-vNxy                      ListElementId-vNxy                                      OPTIONAL,    -- Need S
    field3-rN                           BIT STRING (SIZE (8))                                   OPTIONAL     -- Need R
}

ListElementId ::= INTEGER (0..maxNrofListElements-1)

ListElementId-vNxy ::= INTEGER (maxNrofListElements..maxNrofListElements-1-rN)
```

```
-- ASN1STOP
```

– When different extensions are made to a list in separate releases, the extension mechanisms described above may interact. In case fields are added in Rel-M (*listElementToAddModListExt-vMxy*) and later the list size is extended in Rel-N (*listElementToAddModListSizeExt-vNwz*), the size-extended list in Rel-N should be a single list extending the combination of *listElementToAddModList* and *listElementToAddModListExt-vMxy*. This requires creating a new type (*ListElement-rN*) to contain the combined fields of *ListElement* and *ListElementExt-vMxy*. A corresponding ToRelease list is needed. The result is as shown in the following example:

```
-- /example 4/ ASN1START

ContainingStructure ::=             SEQUENCE {
    listElementToAddModList             SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElement             OPTIONAL,    -- Need N
    listElementToReleaseList            SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementId           OPTIONAL,    -- Need N
    ...,
    [[
    -- Parallel list (Rel-M)
    listElementToAddModListExt-vMxy     SEQUENCE (SIZE (1..maxNrofListElements)) OF ListElementExt-vMxy     OPTIONAL     -- Need N
    ]],
    [[
    -- Size-extended list (Rel-N) with maxNrofListElements-rN = maxNrofListElements + maxNrofListElementsDiff-rN
    listElementToAddModListSizeExt-vNwz  SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElement-rN   OPTIONAL,    -- Need N
    listElementToReleaseListSizeExt-vNwz SEQUENCE (SIZE (1..maxNrofListElementsDiff-rN)) OF ListElementId-vNwz     OPTIONAL    -- Need N
    ]]
}

ListElement ::=                     SEQUENCE {
    elementId                           ListElementId,
    field1                              INTEGER (0..3),
    field2                              ENUMERATED { value1, value2, value3 }
}

ListElementExt-vMxy ::=             SEQUENCE {
    field3-rM                           BIT STRING (SIZE (8))                                           OPTIONAL     -- Need R
}

ListElement-rN ::=                  SEQUENCE {
    elementId-vNwz                      ListElementId-vNwz,
    field1                              INTEGER (0..3),
    field2                              ENUMERATED { value1, value2, value3 },
    field3-rN                           BIT STRING (SIZE (8))                                           OPTIONAL     -- Need R
}

ListElementId ::= INTEGER (0..maxNrofListElements-1)

ListElementId-vNwz ::= INTEGER (maxNrofListElements..maxNrofListElementsDiff-1-rN)
-- ASN1STOP
```

A.5 Guidelines regarding inclusion of transaction identifiers in RRC messages

The following rules provide guidance on which messages should include a Transaction identifier

1: DL messages on CCCH that move UE to RRC-Idle should not include the RRC transaction identifier.

2: All network initiated DL messages by default should include the RRC transaction identifier.

3: All UL messages that are direct response to a DL message with an RRC Transaction identifier should include the RRC Transaction identifier.

4: All UL messages that require a direct DL response message should include an RRC transaction identifier.

5: All UL messages that are not in response to a DL message nor require a corresponding response from the network should not include the RRC Transaction identifier.

A.6 Guidelines regarding use of need codes

The following rule provides guidance for determining need codes for optional downlink fields:

- if the field needs to be stored by the UE (i.e. maintained) when absent:
  - use Need M (=Maintain);
- else, if the field needs to be released by the UE when absent:
  - use Need R (=Release);
- else, if UE shall take no action when the field is absent (i.e. UE does not even need to maintain any existing value of the field):
  - use Need N (=None);
- else (UE behaviour upon absence does not fit any of the above conditions):
  - use Need S (=Specified);
  - specify the UE behaviour upon absence of the field in the procedural text or in the field description table.

A.7 Guidelines regarding use of conditions

Conditions are primarily used to specify network restrictions, for which the following types can be distinguished:

- Message Contents related constraints e.g. that a field B is mandatory present if the same message includes field A and when it is set value X.

- Configuration Constraints e.g. that a field D can only be signalled if field C is configured and set to value Y. (i.e. regardless of whether field C is present in the same message or previously configured).

The use of these conditions is illustrated by an example.

```
-- /example/ ASN1START

RRCMessage-IEs ::= SEQUENCE {
    fieldA                          FieldA                  OPTIONAL,   -- Need M
    fieldB                          FieldB                  OPTIONAL,   -- Cond FieldAsetToX
    fieldC                          FieldC                  OPTIONAL,   -- Need M
    fieldD                          FieldD                  OPTIONAL,   -- Cond FieldCsetToY
    nonCriticalExtension            SEQUENCE {}             OPTIONAL
}

-- /example/ ASN1STOP
```

Conditional presence	Explanation
FieldAsetToX	The field is mandatory present if fieldA is included and set to valueX. Otherwise the field is optionally present, need R.
FieldCsetToY	The field is optionally present, need M, if fieldC is configured and set to valueY. Otherwise the field is absent and the UE does not maintain the value

A.8 Miscellaneous

The following miscellaneous convention should be used:

- UE capabilities: TS 38.306 [26] specifies that the network should in general respect the UE's capabilities. Hence there is no need to include statement clarifying that the network, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases.

Annex B (informative): RRC Information

B.1 Protection of RRC messages

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

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

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

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

NA… Message can never be sent after AS security activation

Message	P	A-I	A-C	Comment
CounterCheck	-	-	-	
CounterCheckResponse	-	-	-	
DedicatedSIBRequest	+	-	-	
DLDedicatedMessageSegment	NOTE 1			
DLInformationTransfer	+	-	-	
DLInformationTransferMRDC	-	-	-	
FailureInformation	-	-	-	
LocationMeasurementIndication	-	-	-	
MCGFailureInformation	-	-	-	
MeasurementReportAppLayer	-	-	-	
MBSBroadcastConfiguration	+	+	+	
MBSInterestIndication	-	-	-	
MIB	+	+	+	
MeasurementReport	-	-	-	Measurement configuration may be sent prior to AS security activation. But: In order to protect privacy of UEs, *MeasurementReport* is only sent from the UE after successful AS security activation.
MobilityFromNRCommand	-	-	-	
Paging	+	+	+	
RRCReconfiguration	+	-	-	The message shall not be sent unprotected before AS security activation if it is used to perform handover or to establish SRB2, SRB4, multicast MRBs and DRBs.
RRCReconfigurationComplete	+	-	-	Unprotected, if sent as response to *RRCReconfiguration* which was sent before AS security activation.
RRCReestablishment	-	-	+	Integrity protection applied, but no ciphering.
RRCReestablishmentComplete	-	-	-	
RRCReestablishmentRequest	-	-	+	This message is not protected by PDCP operation. However, a *shortMAC-I* is included.
RRCReject	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
RRCRelease	+	-	-	Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected. *RRCRelease* message sent before AS security activation cannot include *deprioritisationReq, suspendConfig, redirectedCarrierInfo, cellReselectionPriorities* information fields.
RRCResume	-	-	-	
RRCResumeComplete	-	-	-	
RRCResumeRequest	-	-	+	This message is not protected by PDCP operation. However, a *resumeMAC-I* is included.
RRCResumeRequest1	-	-	+	This message is not protected by PDCP operation. However, a *resumeMAC-I* is included.
RRCSetup	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE or RRC_CONNECTED states, after the AS security is activated.
RRCSetupComplete	+	NA	NA	
RRCSetupRequest	+	NA	NA	
RRCSystemInfoRequest	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
SIB1	+	+	+	
SCGFailureInformation	-	-	-	
SCGFailureInformationEUTRA	-	-	-	
SecurityModeCommand	+	NA	NA	Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC).

Message	P	A-I	A-C	Comment
SecurityModeComplete	-	-	+	The message is sent after AS security activation. Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure.
SecurityModeFailure	+	NA	NA	Neither integrity protection nor ciphering applied.
SidelinkUEInformationNR	+	-	-	The message shall not be sent unprotected before AS security activation if *sl-CapabilityInformationSidelink* information field is included in the message.
SystemInformation	+	+	+	
UEAssistanceInformation	-	-	-	
UECapabilityEnquiry	+	-	-	The network should retrieve UE capabilities only after AS security activation.
UECapabilityInformation	+	-	-	
ULDedicatedMessageSegment	NOTE 1			
UEInformationRequest	-	-	-	
UEInformationResponse	-	-	-	In order to protect privacy of UEs, *UEInformationResponse* is only sent from the UE after successful security activation
UEPositioningAssistanceInfo	-	-	-	
ULInformationTransfer	+	-	-	
ULInformationTransferIRAT	NOTE 2			
ULInformationTransferMRDC	-	-	-	
NOTE 1: This message type carries segments of other RRC messages. The protection of an instance of this message is the same as for the message which this message is carrying. NOTE 2: This message type carries others RRC messages. The protection of an instance of this message is the same as for the message which this message is carrying.				

B.2 Description of BWP configuration options

There are two possible ways to configure BWP#0 (i.e. the initial BWP) for a UE:

1) Configure *BWP-DownlinkCommon* and *BWP-UplinkCommon* in *ServingCellConfigCommon*, but do not configure dedicated configurations in *BWP-DownlinkDedicated* or *BWP-UplinkDedicated* in *ServingCellConfig*.

2) Configure both *BWP-DownlinkCommon* and *BWP-UplinkCommon* in *ServingCellConfigCommon* and configure dedicated configurations in at least one of *BWP-DownlinkDedicated* or *BWP-UplinkDedicated* in *ServingCellConfig*.

The same way of configuration is used for UL BWP#0 and DL BWP#0 if both are configured.

With the first option (illustrated by figure B2-1 below), the BWP#0 is not considered to be an RRC-configured BWP, i.e., UE only supporting one BWP can still be configured with BWP#1 in addition to BWP#0 when using this configuration. The BWP#0 can still be used even if it does not have the dedicated configuration, albeit in a more limited manner since only the SIB1-defined configurations are available. For example, only DCI format 1_0 can be used with BWP#0 without dedicated configuration, so changing to another BWP requires RRCReconfiguration since DCI format 1_0 doesn't support DCI-based switching.

Figure B2-1: BWP#0 configuration without dedicated configuration

With the second option (illustrated by figure B2-2 below), the BWP#0 is considered to be an RRC-configured BWP, i.e. UE only supporting one BWP cannot be configured with BWP#1 in addition to BWP#0 when using this configuration. However, UE supporting more than one BWP can still switch to and from BWP#0 e.g. via DCI normally, and there are no explicit limitations to using the BWP#0 (compared to the first option).

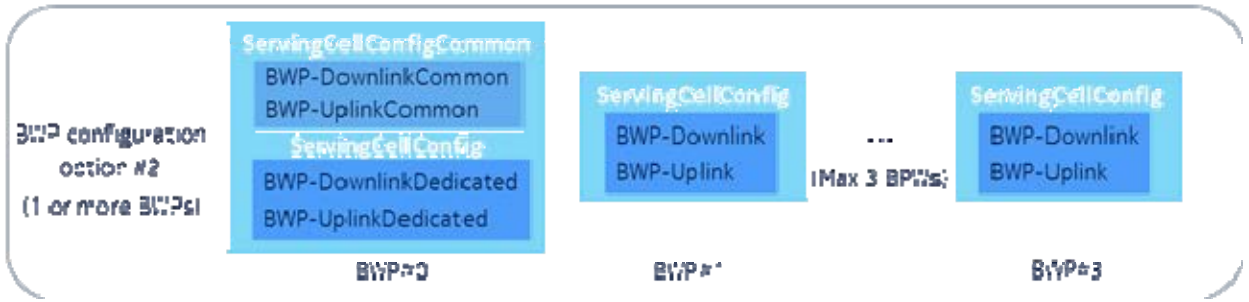

Figure B2-2: BWP#0 configuration with dedicated configuration

For BWP#0, the *BWP-DownlinkCommon* and *BWP-UplinkCommon* in *ServingCellConfigCommon* should match the parameters configured by MIB and SIB1 (if provided) in the corresponding serving cell.

If a RedCap-specific initial DL BWP is configured, for BWP switching, the BWP #0 always maps to the RedCap-specific initial DL BWP. If a RedCap-specific initial UL BWP is configured, for BWP switching on NUL, the BWP #0 always maps to the RedCap-specific initial UL BWP, for BWP switching on SUL, the BWP#0 always maps to the initial UL BWP.

Annex C (normative):List of CRs Containing Early Implementable Features and Corrections

This annex lists the Change Requests (CRs) whose changes may be implemented by a UE of an earlier release than which the CR was approved in (i.e. CRs that contain on their coversheets the sentence "Implementation of this CR from Rel-N will not cause interoperability issues").

Table C-1: List of CRs Containing Early Implementable Features and Corrections

TDoc Number (RP-xxxxxx): CR Title	CR Number(s)	CR Revision Number(s)	Earliest Implementable Release	Additional Information
RP-200335: Correction on usage of access category 2 for UAC for RNA update	1141	2	Release 15	
RP-201185: Introduction of signalling for high-speed train scenarios	1464	5	Release 15	
RP-201216: Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	1665	2	Release 15	Early implementation part is referring to the aspect covered by - R2-2006203: Extension of CSI-RS capabilities per codebook type - R2-2006360: Intraband EN_DC power class expansion for 29 dBm
RP-202768: UE behaviour when UL 7.5KHz shift is not supported	2107	2	Release 15	
RP-202790: Correction on uac-AccessCategory1-SelectionAssistanceInfo	2130	1	Release 15	
RP-211483: Clarification on the initiation of RNA update	2581	1	Release 15	
RP-201190: Introduction of eCall over IMS for NR	1670	-	Release 15	
RP-212598: Distinguishing support of extended band n77	2810	2	Release 15	
RP-213342: Duty cycle signalling for power class 1.5	2817	1	Release 15	
RP-213345: CR on 38.331 for introducing UE capability of txDiversity	2859	1	Release 15	
RP-220497: Introduction of function for RRM enhancements for Rel-17 NR FR1 HST	2898	2	Release 16	
RP-220838: Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	2901	1	Release 15	Early implementation part is referring to the aspect covered by: - R2-2203898: Introduction of BCS4 and BCS5 - R2-2203836: Introducing UE capability for power class 5 for FR2 FWA
RP-221721: CR on the CBM/IBM reporting-38331	2916	2	Release 16	
RP-221736: Distinguishing support of band n77 restrictions in Canada [n77 Canada]	3078	2	Release 15	

RP-222527: Correction to additionalSpectrumEmission for UL CA in n77 for the US	3476	-	Release 15	
RP-222527: Correction to additionalSpectrumEmission for UL CA in n77 for Canada	3478	-	Release 15	
RP-232570: Addition of extended number range for NS value	3900	6	Release 16	
RP-233888: Introduction of FR2 FBG2 CA BW classes	2867	6	Release 15	

Annex D (normative):UE requirements on ASN.1 comprehension

This clause specifies UE requirements regarding the ASN.1 transfer syntax support, i.e. the ASN.1 definitions to be comprehended by the UE.

A UE that indicates release X in field *accessStratumRelease* shall comprehend the entire transfer syntax (ASN.1) of release X, in particular at least the first version upon ASN.1 freeze. The UE is however not required to support dedicated signalling related transfer syntax associated with optional features it does not support.

In case a UE that indicates release X in field *accessStratumRelease* supports a feature specified in release Y, which is later than release X, (i.e. early UE implementation) additional requirements apply. The UE obviously also has to support the ASN.1 parts related to indicating support of the feature (in UE capabilities).

Critical extensions (dedicated signaling)

If the early implemented feature involves one or more critical extensions in dedicated signalling, the UE shall comprehend the parts of the transfer syntax (ASN.1) of release Y that are related to the feature implemented early. This, in particular, concerns the ASN.1 parts related to configuration of the feature.

If configuration of an early implemented feature introduced in release Y involves a message or field that has been critically extended, the UE shall support configuration of all features supported by the UE that are associated with sub-fields of this critical extension. Apart from the early implemented feature(s), the UE needs, however, not to support functionality beyond what is defined in the release the UE indicates in access stratum release.

Let's consider the example of a UE indicating value X in field *accessStratumRelease* that supports the features A1, A3, and A5, associated with fields *fieldA1*, *fieldA3* and *fieldA5* of *InformationElementA* (see ASN.1 below).

The feature A5 implemented early is associated with *fieldA5*, and can only be configured by the –rY version of *InformationElementA*. In such case, the UE should support configuration of all the features A1, A3 and A5 associated with fields *fieldA1*, *fieldA3* and *fieldA5* by the –rY version of *InformationElementA*.

If, however, one of the features was modified, e.g. the feature A3 associated with *fieldA3*, the network should assume the UE only supports the feature A3 according to the release it indicated in field *accessStratumRelease* (i.e. X).

The UE is neither required to support the additional code-point (*n80-vY0*) nor the additional sub-field (*fieldA3c-rY*).

```
InformationElementA-rX ::=      SEQUENCE {
    fieldA1-rX                      InformationElementA1-rX             OPTIONAL,   -- Need N
    fieldA2-rX                      InformationElementA2-rX             OPTIONAL,   -- Need R
    fieldA3-rX                      InformationElementA3-rX             OPTIONAL    -- Need R
}

InformationElementA-rY ::=      SEQUENCE {
    fieldA1-rY                      InformationElementA1-rX             OPTIONAL,   -- Need N
    fieldA2-rY                      InformationElementA2-rX             OPTIONAL,   -- Need R
    fieldA3-rY                      InformationElementA3-rY             OPTIONAL,   -- Need R
    fieldA4-rY                      InformationElementA4-rY             OPTIONAL,   -- Need R
    fieldA5-rY                      InformationElementA5-rY             OPTIONAL    -- Need R
}

InformationElementA3-rX ::= SEQUENCE {
    fieldA3a-rX                     InformationElementA3a-rX            OPTIONAL,   -- Need N
```

```
    fieldA3b-rX                     ENUMERATED {n10, n20, n40}              OPTIONAL    -- Need R
}

InformationElementA3-rY ::=    SEQUENCE {
    fieldA3a-rY                     InformationElementA3a-rX                OPTIONAL,   -- Need N
    fieldA3b-rY                     ENUMERATED {n10, n20, n40, n80-vY0}     OPTIONAL,   -- Need R
    fieldA3c-rY                     InformationElementA3c-rY                OPTIONAL    -- Need R
}
```

Non-critical extensions (dedicated and broadcast signaling)

If the early implemented feature involves one or more non-critical extensions, the UE shall comprehend the parts of the transfer syntax (ASN.1) of release Y that are related to the feature implemented early.

If the early implemented feature involves one or more non-critical extensions in dedicated signaling, the network does not include extensions introduced after the release X that are not the parts related to the feature which the UE indicates early support of in UE capabilities. The UE shall anyway comprehend the parts of the transfer syntax (ASN.1) which indicate absence of such extensions.

If the early implemented feature involves one or more non-critical extensions in system information, the SIB(s) containing the release Y fields related to the early implemented features may also include other extensions introduced after the release X that are not the parts related to the feature which the UE supports. The UE shall comprehend such intermediate fields (but again is not required to support the functionality associated with these intermediate fields, in case this concerns optional features not supported by the UE).

Annex E (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
04/2017	RAN2#97bis	R2-1703395					0.0.1
04/2017	RAN2#97bis	R2-1703922					0.0.2
05/2017	RAN2#98	R2-1705815					0.0.3
06/2017	RAN2#NR2	R2-1707187					0.0.4
08/2017	RAN2#99	R2-1708468					0.0.5
09/2017	RAN2#99bis	R2-1710557					0.1.0
11/2017	RAN2#100	R2-1713629					0.2.0
11/2017	RAN2#100	R2-1714126					0.3.0
12/2017	RAN2#100	R2-1714259					0.4.0
12/2017	RP#78	RP-172570				Submitted for Approval in RAN#78	1.0.0
12/2017	RP#78					Upgraded to Rel-15 (MCC)	15.0.0
03/2018	RP#79	RP-180479	0008	1	F	Corrections for EN-DC (Note: the clause numbering between 15.0.0 and 15.1.0 has changed in some cases).	15.1.0
06/2018	RP-80	RP-181326	0042	7	F	Miscellaneous EN-DC corrections	15.2.0
	RP-80					Correction: Duplicate Foreword clause removed & ASN.1 clauses touched up	15.2.1
09/2018	RP-81	RP-181942	0100	4	F	Introduction of SA	15.3.0
12/2018	RP-82	RP-182656	0179	3	F	Handling of Resume Failure	15.4.0
	RP-82	RP-182651	0187	1	F	Clarification on the presence of ra-ResponseWindow	15.4.0
	RP-82	RP-182656	0188	3	F	Addition of RAN specific Access Category	15.4.0
	RP-82	RP-182653	0199	2	F	CR for TS38.331 on MIB	15.4.0
	RP-82	RP-182653	0200	1	F	CR for TS38.331 on PDCCH-ConfigSIB	15.4.0
	RP-82	RP-182661	0202	2	F	Handling Cell Reselection during SI Request	15.4.0
	RP-82	RP-182649	0213	2	F	Corrections on security field descriptions	15.4.0
	RP-82	RP-182649	0216	2	F	Remain issue for T302	15.4.0
	RP-82	RP-182649	0219	1	F	[C204] Handling of timer T380	15.4.0
	RP-82	RP-182655	0229	2	F	Clarification on configured grant timer in 38.331	15.4.0
	RP-82	RP-182663	0232	2	F	CR for ServingCellConfigCommon in 38.331	15.4.0
	RP-82	RP-182659	0234	3	F	Introduction of cell level rate matching parameters in ServingCellConfig	15.4.0
	RP-82	RP-182650	0235	2	F	CR for introducing PSCell frequency in CG-Config	15.4.0
	RP-82	RP-182650	0236	2	F	CR for security handling for eLTE in 38.331	15.4.0
	RP-82	RP-182650	0237	1	F	Handling on simultaneously triggered NAS&AS events (I770)	15.4.0
	RP-82	RP-182650	0238	2	F	Handling on security keys for resume procedure (I774)	15.4.0
	RP-82	RP-182664	0239	5	F	RIL I556, I557, I558 on RB handling when resuming	15.4.0
	RP-82	RP-182650	0242	2	F	Security for RRC connection release	15.4.0
	RP-82	RP-182650	0243	4	F	Corrections on reestablishment and security procedures	15.4.0
	RP-82	RP-182650	0244	1	F	RIL I118 on release case to upper layers for CN paging for a UE in RRC_INACTIVE	15.4.0
	RP-82	RP-182650	0246	2	F	CR on SI request procedure in TS38.331	15.4.0
	RP-82	RP-182650	0248	2	F	CR to 38331 on ul-DataSplitThreshold for SRB	15.4.0
	RP-82	RP-182652	0249	2	F	Clarification of guami-Type	15.4.0
	RP-82	RP-182652	0252	1	F	CR to 38.331 on Protection of RRC messages Table	15.4.0
	RP-82	RP-182663	0254	2	F	Access barring check after handover	15.4.0
	RP-82	RP-182663	0259	3	F	Stop of T390 and related UE actions	15.4.0
	RP-82	RP-182657	0260	4	F	Corrections for handover between NR and E-UTRA	15.4.0
	RP-82	RP-182738	0267	3	F	CR on ssb-ToMeasure in MeasurementTimingConfiguration	15.4.0
	RP-82	RP-182659	0269	3	F	Clarification of the applicability of 38.331 to EN-DC	15.4.0
	RP-82	RP-182654	0270	3	F	Clarification on the smtc signalled for intra-NR handover, PSCell change or SCell addition	15.4.0
	RP-82	RP-182654	0273	3	F	CR on fallback to the setup procedure	15.4.0

	RP-82	RP-182654	0275	1	F	Correction on cell sorting for periodical measurement reporting	15.4.0
	RP-82	RP-182660	0277	2	F	Measurement related actions upon re-establishment	15.4.0
	RP-82	RP-182654	0278	1	F	CR on threshold description for cell quality derivation	15.4.0
	RP-82	RP-182654	0282	1	F	CR to avoid unnecessary L3 filtered beam measurements	15.4.0
	RP-82	RP-182660	0283	2	F	CR on CGI reporting	15.4.0
	RP-82	RP-182660	0291	3	F	Additional UE capabilities for NR standalone	15.4.0
	RP-82	RP-182667	0294	4	F	NR RRC Processing Time	15.4.0
	RP-82	RP-182812	0295	5	F	Update of L1/RF capabilities	15.4.0
	RP-82	RP-182651	0296	2	F	UE configuration on re-establishment procedure	15.4.0
	RP-82	RP-182651	0298	2	F	SIB size limitation [M201]	15.4.0
	RP-82	RP-182651	0299	2	F	Correction on SRS-TPC-CommandConfig	15.4.0
	RP-82	RP-182651	0302	2	F	Clarification on counter check procedure	15.4.0
	RP-82	RP-182666	0307	4	F	CR on the Clarification for the Support of the Delay Budget Report in NR	15.4.0
	RP-82	RP-182666	0320	3	F	ssb-PositionsInBurst correction	15.4.0
	RP-82	RP-182666	0325	3	F	Barring behaviour when SIB1 reception fails	15.4.0
	RP-82	RP-182666	0329	5	F	System Information Storing and Validity Clarifications and Corrections	15.4.0
	RP-82	RP-182666	0330	3	F	SIBs required before initiating connection	15.4.0
	RP-82	RP-182652	0333	1	F	On contens of measObjectEUTRA	15.4.0
	RP-82	RP-182654	0335	2	F	A3 and A5 corrections – neighbouring cell definition	15.4.0
	RP-82	RP-182650	0339	2	F	SI reception in RRC Connected mode (RIL#II611)	15.4.0
	RP-82	RP-182650	0340	2	F	Miscellaneous corrections on SI procedures	15.4.0
	RP-82	RP-182652	0342	1	F	On RRM measurements related procedual text corrections	15.4.0
	RP-82	RP-182651	0344	1	F	Clarification for absense of nr-NS-PmaxList IE	15.4.0
	RP-82	RP-182652	0345	2	F	Clarification on paging in connected mode	15.4.0
	RP-82	RP-182651	0350	2	F	ASN.1 correction to fr-InfoListSCG in CG-Config	15.4.0
	RP-82	RP-182661	0355	2	F	Update of L2 capability parameters	15.4.0
	RP-82	RP-182651	0364	1	F	Procedures for full config at RRCResume	15.4.0
	RP-82	RP-182651	0365	2	F	Clarification of PDCP-Config field descriptions	15.4.0
	RP-82	RP-182653	0368	2	F	UE Context handling during handover to NR	15.4.0
	RP-82	RP-182652	0371	2	F	[E255] CR to 38.331 on corrections related to CGI reporting timer T321	15.4.0
	RP-82	RP-182655	0375	3	F	R2-1817981 CR to 38.331 on pendingRnaUpdate setting	15.4.0
	RP-82	RP-182653	0376	2	F	Introducing procedure for reporting RLC failures	15.4.0
	RP-82	RP-182654	0379	2	F	Correction of frequency band indication in MeasObjectNR	15.4.0
	RP-82	RP-182654	0382	2	F	RRC connection release triggered by upper layers	15.4.0
	RP-82	RP-182660	0384	3	F	Correction to configuration of measurement object	15.4.0
	RP-82	RP-182665	0388	3	F	Correction to 38331 in SRS-Config	15.4.0
	RP-82	RP-182657	0391	2	F	Correction for PowerControl-related issues	15.4.0
	RP-82	RP-182668	0395	4	F	Inter-band EN-DC Configured Output Power requirements	15.4.0
	RP-82	RP-182655	0396	2	F	E573 Configuration of SRB1 during Resume	15.4.0
	RP-82	RP-182655	0402	1	F	Triggers for abortion of RRC establishment	15.4.0
	RP-82	RP-182656	0406	2	F	Correction on CN type indication for Redirection from NR to E-UTRA	15.4.0
	RP-82	RP-182664	0409	4	F	Miscellaneous minor corrections	15.4.0
	RP-82	RP-182654	0410	1	F	Invalidation of L1 parameter nrofCQIsPerReport	15.4.0
	RP-82	RP-182654	0411	1	F	Clarifications on RNA update and CN registration (N023)	15.4.0
	RP-82	RP-182666	0412	3	F	Missing optionality bit in CG-ConfigInfo	15.4.0
	RP-82	RP-182662	0414	2	F	Clarification for the implementation of UE feature list item 6-1 (BWP op1)	15.4.0
	RP-82	RP-182654	0417	1	F	Clarification on ssb-PositionsInBurst	15.4.0
	RP-82	RP-182667	0418	3	F	Correction to commonControlResourceSet	15.4.0
	RP-82	RP-182667	0420	2	F	Correction to TDD configuration in SIB1	15.4.0
	RP-82	RP-182668	0421	5	F	Clarification on handling of default parameters	15.4.0
	RP-82	RP-182663	0429	2	F	SRB3 integrity protection failure handling	15.4.0
	RP-82	RP-182653	0431	2	F	Corrections to the field decriptions of System Information	15.4.0
	RP-82	RP-182653	0434	1	F	Correction to SI provision in connected mode	15.4.0
	RP-82	RP-182661	0436	3	F	PDCCH Monitoring Occasions in SI Window	15.4.0
	RP-82	RP-182655	0438	3	F	CR on SI Message Acquisition	15.4.0
	RP-82	RP-182652	0439	1	F	Update of nas-SecurityParamFromNR according to LS from SA3	15.4.0
	RP-82	RP-182652	0445	2	F	Correction to Default MAC Cell Group configuration	15.4.0
	RP-82	RP-182652	0447	1	F	Correction to missing field descriptions of PLMN Identity	15.4.0
	RP-82	RP-182657	0448	2	F	Introducing PDCP suspend procedure	15.4.0
	RP-82	RP-182657	0449	2	F	Correction to PDCP statusReportRequired	15.4.0
	RP-82	RP-182664	0454	3	F	CR to 38.331 on the ambiguity of targetCellIdentity in Resume/Reestablishment MAC-I calculation	15.4.0
	RP-82	RP-182655	0457	1	F	Corrections on P-Max description	15.4.0
	RP-82	RP-182651	0460	2	F	Clarification on Configuration of multiplePHR for EN-DC and NR-CA	15.4.0
	RP-82	RP-182656	0469	2	F	Correction on conditional presence of PCellOnly	15.4.0
	RP-82	RP-182657	0474	4	F	Introduction of power boosting indicator for pi2BPSK waveform	15.4.0
	RP-82	RP-182655	0475	1	F	Correction on the allowedBC-ListMRDC	15.4.0
	RP-82	RP-182649	0476	2	F	Removal of restriction on RB removal and addition	15.4.0
	RP-82	RP-182649	0482	2	F	Correction to full configuration	15.4.0
	RP-82	RP-182661	0492	3	F	CR on MeasurementTimingConfiguration	15.4.0
	RP-82	RP-182654	0502	1	F	Bandwidth configuration for initial BWP	15.4.0

	RP-82	RP-182664	0503	4	F	CORESET#0 configuration when SIB1 is not broadcast	15.4.0
	RP-82	RP-182663	0506	1	F	Correction on the behaviors with cell reselection while T302 is running	15.4.0
	RP-82	RP-182661	0509	2	F	Correction on SDAP reconfiguration handling	15.4.0
	RP-82	RP-182663	0510	1	F	Clarification for the UE behaviour in camped normally and camped on any cell states	15.4.0
	RP-82	RP-182663	0514	2	F	Correction to description of parameter Ns nAndPagingFrameOffset	15.4.0
	RP-82	RP-182649	0515	-	F	Correction to description of parameter Ns	15.4.0
	RP-82	RP-182661	0516	1	F	CR on UE behaviour after SI Acquisition Failure	15.4.0
	RP-82	RP-182662	0518	1	F	CR on PUCCH-ConfigCommon	15.4.0
	RP-82	RP-182662	0520	1	F	Clarifications on receiving RRCReject without wait timer	15.4.0
	RP-82	RP-182665	0522	1	F	CR on powerControlOffset	15.4.0
	RP-82	RP-182664	0524	2	F	Correction to configuration of firstPDCCH-MonitoringOccasionOfPO	15.4.0
	RP-82	RP-182660	0539	1	F	R on PCCH-Config	15.4.0
	RP-82	RP-182649	0541	-	F	Clarification to no barring configuration for Implicit UAC	15.4.0
	RP-82	RP-182649	0542	-	F	Correction to Access Category and barring config determination for implicit access barring	15.4.0
	RP-82	RP-182664	0543	2	F	Per serving cell MIMO layer configuration	15.4.0
	RP-82	RP-182661	0545	1	F	Correction to reconfiguration with sync	15.4.0
	RP-82	RP-182659	0552	1	F	Correction for SSB power	15.4.0
	RP-82	RP-182659	0554	1	F	Corrections on SearchSpace configuration	15.4.0
	RP-82	RP-182665	0558	1	F	Correction for TCI state in ControlResourceSet	15.4.0
	RP-82	RP-182663	0560	1	F	CR for the optional configuration of subbandSize	15.4.0
	RP-82	RP-182650	0562	-	F	Correction on ShortMAC-I description in 38.331	15.4.0
	RP-82	RP-182661	0567	1	F	CR to the field descriptions of System Information	15.4.0
	RP-82	RP-182650	0569	-	F	Clarification on SRB3 release	15.4.0
	RP-82	RP-182650	0570	-	F	Avoiding security risk for RLC UM bearers during termination point change	15.4.0
	RP-82	RP-182660	0571	1	F	MO configuration with SSB SCS for a given SSB frequency	15.4.0
	RP-82	RP-182663	0572	1	F	Barring alleviation for emergency service	15.4.0
	RP-82	RP-182664	0575	1	F	Corrections for security configurations during setup of SRB1	15.4.0
	RP-82	RP-182660	0577	1	F	Clarification of UE behaviour when frequencyBandList is absent in SIB4	15.4.0
	RP-82	RP-182661	0578	2	F	Handling of missing fields in SIB1	15.4.0
	RP-82	RP-182659	0580	1	F	Correction to ControlResourceSetZero	15.4.0
	RP-82	RP-182667	0582	2	F	Full configuration for inter-RAT handover	15.4.0
	RP-82	RP-182664	0587	1	F	Corrections on number of RadioLinkMonitoringRS condifuration	15.4.0
	RP-82	RP-182659	0591	1	F	Clarification on phr-Type2OtherCell	15.4.0
	RP-82	RP-182667	0594	2	F	Addition of PCI in MeasTiming	15.4.0
	RP-82	RP-182667	0600	5	F	Clarifications to SIBs requiring request procedure	15.4.0
	RP-82	RP-182659	0601	1	F	Correction for support of initial downlink BWP	15.4.0
	RP-82	RP-182657	0602	1	F	Miscellaneous corrections related to idle mode SIBs	15.4.0
	RP-82	RP-182657	0603	1	F	Correction for missing fields in SIB2 and SIB4	15.4.0
	RP-82	RP-182657	0604	2	F	Correction to Q-QualMin value range	15.4.0
	RP-82	RP-182663	0616	1	F	Clarification of cell reselection during resume procedure	15.4.0
	RP-82	RP-182663	0617	1	F	Determination of Access Identities for RRC-triggered Access Attempts	15.4.0
	RP-82	RP-182663	0618	1	F	CR to 38.331 on stopping of timer T390 upon reception of RRCRelease	15.4.0
	RP-82	RP-182840	0620	3	F	CR on MN/SN coordination for report CGI procedure	15.4.0
	RP-82	RP-182666	0624	2	F	CR to 38.331 on aligning I-RNTI terminology in paging and SuspendConfig (Alt.2)	15.4.0
	RP-82	RP-182665	0627	2	F	CR to 38.331 on IRAT Cell reselection in RRC_INACTIVE	15.4.0
	RP-82	RP-182662	0638	1	F	CR for pendingRnaUpdate set	15.4.0
	RP-82	RP-182665	0640	2	F	Corrections on BWP ID	15.4.0
	RP-82	RP-182664	0643	1	F	Inter-frequency handover capability	15.4.0
	RP-82	RP-182659	0646	1	F	Search space configuration for DCI format 2_0 monitoring	15.4.0
	RP-82	RP-182739	0647	3	F	Correction on power headroom configuration exchange	15.4.0
	RP-82	RP-182665	0649	2	F	UE capability on PA architecture	15.4.0
	RP-82	RP-182662	0654	1	F	CR on pdsch-TimeDomainAllocationList and pusch-TimeDomainAllocationList	15.4.0
	RP-82	RP-182664	0655	1	F	Correction on the SSB based RACH configuration	15.4.0
	RP-82	RP-182659	0656	1	F	CR on starting bit of Format 2-3	15.4.0
	RP-82	RP-182663	0660	1	C	CR on wait timer in RRC release	15.4.0
	RP-82	RP-182662	0664	1	F	SCell release at RRC Reestablishment	15.4.0
	RP-82	RP-182663	0665	1	F	Clean up of SRB1 terminology	15.4.0
	RP-82	RP-182662	0670	1	F	Correction on the size of PUCCH resource ID	15.4.0
	RP-82	RP-182667	0673	3	F	CR to 38.331 on Integrity Check failure at RRC Reestablishment	15.4.0
	RP-82	RP-182661	0680	1	F	Correction on SI message acquisition timing	15.4.0
	RP-82	RP-182653	0682	-	F	Add t-ReselectionNR-SF in SIB2	15.4.0
	RP-82	RP-182654	0683	-	F	freqBandIndicatorNR correction in MultiFrequencyBandListNR-SIB	15.4.0
	RP-82	RP-182658	0684	2	F	Corrections to CellSelectionInfo in SIB1 and SIB4	15.4.0
	RP-82	RP-182654	0686	-	F	Correction on the field description of DRX timers	15.4.0
	RP-82	RP-182661	0687	1	F	Correction on DC subcarrier usage in SetupComplete message	15.4.0
	RP-82	RP-182665	0688	3	F	Various carrier frequency definiton corrections	15.4.0
	RP-82	RP-182661	0689	1	F	CR on signaling contiguous and non-contiguous EN-DC capability	15.4.0
	RP-82	RP-182654	0692	-	F	Update of the usage of QCL type-C	15.4.0

	RP-82	RP-182659	0694	1	F	Cleanup of references to L1 specifications	15.4.0
	RP-82	RP-182660	0695	1	F	Correction of MeasResultEUTRA	15.4.0
	RP-82	RP-182660	0696	1	F	Missing need code for refFreqCSI-RS	15.4.0
	RP-82	RP-182661	0697	2	F	Missing procedure text in RRC Reconfiguration	15.4.0
	RP-82	RP-182781	0700	3	F	Correction to UE capability procedures in 38.331	15.4.0
	RP-82	RP-182667	0701	1	F	Correction to aperiodicTriggeringOffset	15.4.0
	RP-82	RP-182664	0709	1	F	CR to 38.331 on including serving cell measurements	15.4.0
	RP-82	RP-182660	0711	1	F	CR to 38.331 on associatedSSB	15.4.0
	RP-82	RP-182662	0714	1	F	CR on 38.331 for RRCResumeRequest and RRCResumeRequest1 and protection of RRCResumeRequest1	15.4.0
	RP-82	RP-182667	0715	2	F	Correction for reporting of NR serving cell measurements when rsType is missing	15.4.0
	RP-82	RP-182656	0719	1	F	Clarification of the values for RangeToBestCell	15.4.0
	RP-82	RP-182668	0721	2	F	CR on handling of timer T380	15.4.0
	RP-82	RP-182662	0723	2	F	CR on supporting signalling only connection	15.4.0
	RP-82	RP-182838	0725	3	F	Signalling introduction of SRS switching capability	15.4.0
	RP-82	RP-182667	0729	3	B	CR on signalling introduction of UE overheating support in NR SA scenario	15.4.0
	RP-82	RP-182856	0730	4	F	CR on SRS antenna switching	15.4.0
	RP-82	RP-182660	0731	1	F	Correction to offsetToPointA	15.4.0
	RP-82	RP-182655	0732	-	F	Correction to cell selection parameters	15.4.0
	RP-82	RP-182665	0746	2	F	CR to 38.331 on stopping T302 and UE related actions	15.4.0
	RP-82	RP-182666	0750	2	F	Correction on indication for user plane resource release	15.4.0
	RP-82	RP-182662	0767	1	F	Correction on the terminology scg-ChangeFailure	15.4.0
	RP-82	RP-182661	0768	1	F	Correction on default configuration	15.4.0
	RP-82	RP-182660	0772	1	F	Clarification of measurement object for beam reporting for NR cells	15.4.0
	RP-82	RP-182667	0773	3	F	CR to 38.331 on UE AS Context definition – Include suspendConfig	15.4.0
	RP-82	RP-182661	0778	1	F	CR to 38.331 on HO support in Setup Procedure	15.4.0
	RP-82	RP-182656	0781	-	F	CR on description of k0	15.4.0
	RP-82	RP-182666	0783	2	F	CR to 38.331 on removing FFS of locationInfo	15.4.0
	RP-82	RP-182661	0787	-	F	Clarification on MIB Acquisition	15.4.0
	RP-82	RP-182662	0788	-	F	CR to 38331 on release after completion of inter-RAT HO	15.4.0
	RP-82	RP-182662	0789	-	F	CR to 38.331 on rbg-Size in PDSCH-Config, PUSCH-Config and ConfiguredGrantConfig	15.4.0
	RP-82	RP-182657	0790	-	F	Advanced processing time configuration for PDSCH and PUSCH	15.4.0
	RP-82	RP-182896	0791	2	F	UE specific channel bandwidth signaling	15.4.0

03/2019	RP-83	RP-190541	0416	4	F	Clarification on hopping parameters for PUSCH	15.5.0
	RP-83	RP-190541	0593	2	F	Removal of creation of MCG MAC entity	15.5.0
	RP-83	RP-190633	0792	1	F	Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS	15.5.0
	RP-83	RP-190541	0796	2	F	Correction on Mapping between SSBs and PDCCH Monitoring Occasions in SI Window	15.5.0
	RP-83	RP-190541	0797	2	F	Correction to SI Reqeust Procedure	15.5.0
	RP-83	RP-190546	0798	2	F	CR to 38.331 on clarification of reportCGI	15.5.0
	RP-83	RP-190545	0799	2	F	Describing mandatory/optional information in inter-node RRC messages	15.5.0
	RP-83	RP-190541	0800	1	F	Search space configuration for cross carrier scheduling	15.5.0
	RP-83	RP-190542	0803	1	F	Clarification on FeatureSetCombinationId zero value	15.5.0
	RP-83	RP-190546	0805	2	F	Clarification on UE Capability Request Filtering	15.5.0
	RP-83	RP-190545	0807	3	F	Miscellaneous non-controversial corrections	15.5.0
	RP-83	RP-190541	0808	2	F	CR to 38.331 on MAC configuration	15.5.0
	RP-83	RP-190543	0810	2	F	Correction to SCG failiure	15.5.0
	RP-83	RP-190540	0811	1	F	Clarifying handling of parent and child IE need nodes	15.5.0
	RP-83	RP-190544	0812	2	F	Clarification to channel bandwidth signalling	15.5.0
	RP-83	RP-190541	0813	1	F	Clarifications to BWP configuration options	15.5.0
	RP-83	RP-190543	0822	2	F	Correction to EUTRA-MBSFN-SubframeConfig	15.5.0
	RP-83	RP-190545	0823	2	F	Clarification on dedicated serving cell configuration in Re-establishment	15.5.0
	RP-83	RP-190541	0828	2	F	Clarification on the BWP id configuration	15.5.0
	RP-83	RP-190541	0836	1	F	Upon entering a new PLMN which is in the list of EPLMNs in RRC INACTIVE state	15.5.0
	RP-83	RP-190546	0843	1	F	EUTRA UE capability filtering in NR UE capability enquiry	15.5.0
	RP-83	RP-190543	0847	2	F	Correction to SIB1 transmission during handover	15.5.0
	RP-83	RP-190545	0850	2	F	Clarification to monitoring occasion of PWS notification	15.5.0
	RP-83	RP-190541	0853	1	F	HandoverPreparationInformation for CU/DU	15.5.0
	RP-83	RP-190542	0855	1	F	CR to introduce simultaneousRxDataSSB-DiffNumerology for NR SA	15.5.0
	RP-83	RP-190550	0858	-	F	Condition on integrity protection for DRB	15.5.0
	RP-83	RP-190544	0860	2	F	Handling on UE Inactive AS context upon resume	15.5.0
	RP-83	RP-190542	0861	1	F	Miscellaneous Corrections for INACTIVE	15.5.0
	RP-83	RP-190542	0864	1	F	Correction on RRC processing delay	15.5.0
	RP-83	RP-190540	0865	-	F	Dummify the ue-BeamLockFunction IE	15.5.0
	RP-83	RP-190545	0866	2	F	Further update of Need codes	15.5.0
	RP-83	RP-190541	0867	1	F	Corrections to reestablishment procedure	15.5.0
	RP-83	RP-190545	0868	2	F	CR on use of positioning measurement gaps for subframe and slot timing detection towards E-UTRA	15.5.0
	RP-83	RP-190542	0876	2	F	Barring alleviation when T302 or T390 is stopped	15.5.0
	RP-83	RP-190544	0877	2	F	Correction on smtc configuration in NR SCell addition procedure	15.5.0
	RP-83	RP-190543	0884	2	F	Correction on the configuration for transform preceding of PUSCH	15.5.0
	RP-83	RP-190543	0896	2	F	Correction to Need Codes in system information	15.5.0
	RP-83	RP-190541	0897	1	F	Corrections on drb-ContinueROHC	15.5.0
	RP-83	RP-190541	0898	1	F	Correction on outOfOrderDelivery	15.5.0
	RP-83	RP-190542	0902	1	F	Corrections on radio link failure related actions	15.5.0
	RP-83	RP-190541	0904	1	F	Clarification for SIB validity	15.5.0
	RP-83	RP-190540	0905	-	F	Corrections to MFBI	15.5.0
	RP-83	RP-190542	0912	1	F	CR on clarification on the description of NIA0	15.5.0
	RP-83	RP-190542	0913	1	F	CR on the number of bits of downlink NAS COUNT value	15.5.0
	RP-83	RP-190541	0920	1	F	CR to 38.331 for not supporting different quantities for thresholds in Event A5 and B2	15.5.0
	RP-83	RP-190544	0922	2	F	CR on SSB type indication	15.5.0
	RP-83	RP-190545	0923	2	F	Correction for measurements of serving cells without SSB or without CSI-RS	15.5.0
	RP-83	RP-190540	0930	-	F	CR on introduction of UE assistance information in inter-node message	15.5.0
	RP-83	RP-190540	0931	-	F	CR on description of SRS carrier switching	15.5.0
	RP-83	RP-190542	0932	1	F	Clarification on the relation between CA configuration and supported featureset combination_Option1	15.5.0
	RP-83	RP-190545	0935	2	F	Unification of EN-DC terminology	15.5.0
	RP-83	RP-190550	0938	-	F	PDCP re-establishment during SRB modification for EUTRA/5GC	15.5.0
	RP-83	RP-190541	0939	1	F	The support of drb-ContinueROHC	15.5.0
	RP-83	RP-190541	0948	1	F	Correction on PTRS port index	15.5.0
	RP-83	RP-190541	0956	1	F	CR on the supplementaryUplink and uplinkConfig	15.5.0
	RP-83	RP-190545	0963	2	F	Correction on MIB acquisition upon Reconfiguration with Sync	15.5.0
	RP-83	RP-190543	0967	2	F	Qoffset for inter-RAT cell reselection	15.5.0
	RP-83	RP-190541	0975	1	F	Correction on SI scheduling	15.5.0
	RP-83	RP-190543	0976	2	F	Correction of uac-AccessCategory1-SelectionAssistanceInfo field description	15.5.0
	RP-83	RP-190546	0978	3	F	Correction on going to RRC_IDLE upon inter-RAT cell reselection in RRC_INACTIVE	15.5.0
	RP-83	RP-190543	0981	2	F	Clarification on nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation	15.5.0
	RP-83	RP-190543	0984	3	F	Correction on compilation of featureSets for NR container	15.5.0
	RP-83	RP-190540	0985	-	F	Enable and disable of security at DRB setup	15.5.0

	RP-83	RP-190545	0986	2	F	Clarification on TCI state ID	15.5.0
	RP-83	RP-190544	0987	-	F	Clarification for random access on SUL	15.5.0
	RP-83	RP-190545	0988	1	F	Correction on supportedBandwidthCombinationSetEUTRA-v1530 usage	15.5.0
	RP-83	RP-190544	0989	-	F	CR on Processing delay requirements for RRC Resume procedures in TS 38.331	15.5.0
04/2019	RP-83					MCC: Formatting error correction (missing carriage return) in the end of clause 5.3.5.11.	15.5.1
06/2019	RP-84	RP-191379	0906	5	F	Reconfig with sync terminology	15.6.0
	RP-84	RP-191378	0916	5	B	Introduction of late drop NGEN-DC, NE-DC and NR-DC	15.6.0
	RP-84	RP-191374	0996	2	F	Correction to the need code of some fields in SIB2	15.6.0
	RP-84	RP-191377	1003	3	F	Clarification for handling of suspendConfig	15.6.0
	RP-84	RP-191377	1005	3	F	Reporting of serving cell and best neighbour cell and sorting of beam	15.6.0
	RP-84	RP-191377	1011	1	F	On T321 timer related informative text correction	15.6.0
	RP-84	RP-191377	1013	1	C	CR to direct current report for UL and SUL	15.6.0
	RP-84	RP-191380	1014	1	F	Correction on storing UE AS Inactive Context	15.6.0
	RP-84	RP-191373	1015	-	F	Correction on ReconfigurationWithSync	15.6.0
	RP-84	RP-191380	1016	2	F	Correction on Handover from NR to EUTRAN	15.6.0
	RP-84	RP-191373	1018	-	F	Introduction of additional UE capability on HARQ-ACK multiplexing on PUSCH	15.6.0
	RP-84	RP-191378	1019	1	F	Correction on bar indication of emergency service (access category 2)	15.6.0
	RP-84	RP-191373	1020	-	F	Correction on UE configuration for RRC Resume procedure	15.6.0
	RP-84	RP-191373	1021	-	F	RRC release with suspend configuration and inter-RAT redirection	15.6.0
	RP-84	RP-191373	1022	-	F	RRC Reconfiguration via SRB3 in EN-DC	15.6.0
	RP-84	RP-191373	1023	-	F	Corrections on RLC bearer setup	15.6.0
	RP-84	RP-191373	1024	-	F	Clarification to Permitted MaxCID for ROHC and Uplink-Only ROHC	15.6.0
	RP-84	RP-191373	1025	-	F	Coordination of ROHC capability for MR-DC	15.6.0
	RP-84	RP-191373	1026	-	F	Correction on the rlmInSyncOutOfSyncThreshold	15.6.0
	RP-84	RP-191373	1027	-	F	Correction on description of tci-PresentInDCI	15.6.0
	RP-84	RP-191374	1031	-	F	RRC processing delay for UE capability transfer	15.6.0
	RP-84	RP-191377	1032	1	F	Handling of SMTC configuration	15.6.0
	RP-84	RP-191378	1033	1	F	Clarification on filters used to generate FeatureSets (38.331)	15.6.0
	RP-84	RP-191374	1034	-	F	Correction of behavior for eutra-nr-only	15.6.0
	RP-84	RP-191377	1038	1	F	Clarification on CSI-RS resource configuration in MO	15.6.0
	RP-84	RP-191378	1039	2	F	Update on usage of Need codes	15.6.0
	RP-84	RP-191377	1040	1	F	Ignore additional fields in RRC Release message before security activation	15.6.0
	RP-84	RP-191374	1041	-	F	Correction on use of Null algorithm for DRBs during emergency calls in LSM	15.6.0
	RP-84	RP-191380	1042	2	F	NR changes for FullConfig for Inter-RAT intra-system HO	15.6.0
	RP-84	RP-191376	1043	2	F	Monitoring of short messages with multi-beams	15.6.0
	RP-84	RP-191377	1045	1	F	Clarification of commonControlResourceSet frequency reference point	15.6.0
	RP-84	RP-191379	1046	2	F	CR on capability of maxUplinkDutyCycle for FR2	15.6.0
	RP-84	RP-191374	1049	-	F	CR to subcarrierSpacing in RateMatchPattern and SCS-SpecificCarrier	15.6.0
	RP-84	RP-191377	1053	1	F	CR on transferring common configuration during handover and SN change	15.6.0
	RP-84	RP-191381	1054	2	F	Correction to barring alleviation	15.6.0
	RP-84	RP-191381	1055	3	F	UE behaviour on the cell without TAC	15.6.0
	RP-84	RP-191379	1058	2	F	Correction to RRC resume	15.6.0
	RP-84	RP-191376	1061	1	F	Corrections to inter-node messages	15.6.0
	RP-84	RP-191378	1063	1	F	Clarification on mandatory information in inter node RRC messages	15.6.0
	RP-84	RP-191374	1066	-	F	Correction to PWS reception	15.6.0
	RP-84	RP-191377	1068	1	F	Serving cell measurement handling with different rsType configuration scenarios	15.6.0
	RP-84	RP-191374	1069	-	F	On CGI reporting contents	15.6.0
	RP-84	RP-191374	1071	-	F	CR for 38.331 on security related corrections to UE and Network initiated RRC procedures to increase user's security and privacy	15.6.0
	RP-84	RP-191379	1072	3	F	Correction on the issue with NCP and ECP for RateMatchPattern	15.6.0
	RP-84	RP-191377	1075	1	F	Security protection of RRC messages	15.6.0
	RP-84	RP-191381	1076	1	F	Introduction of a new NR band for LTE/NR spectrum sharing in Band 41/n41	15.6.0
	RP-84	RP-191375	1077	-	F	Stop of T302 and T390 at reception of RRCRelease with waitTime	15.6.0
	RP-84	RP-191375	1078	-	F	Restriction of piggybacking of NAS PDUs	15.6.0
	RP-84	RP-191379	1079	3	F	Correction on intra-band fallback behavior with FeatureSetsPerCC	15.6.0
	RP-84	RP-191375	1081	-	F	Removal of spurious requirement on consistency of feature set combination IDs	15.6.0
	RP-84	RP-191381	1082	3	F	Miscellaneous non-controversial corrections Set II	15.6.0
	RP-84	RP-191377	1083	1	F	Correction to configuration of security in RadioBearerConfig	15.6.0
	RP-84	RP-191379	1086	2	F	CR to 38.331 on MeasurementTimingConfiguration	15.6.0
	RP-84	RP-191375	1088	-	F	Correction to the description of subcarrierspacing usage in ServingCellConfigCommon	15.6.0
	RP-84	RP-191375	1089	-	F	38.331 Clarfication on multiple TA capabilities	15.6.0
	RP-84	RP-191375	1091	-	F	Set beamCorrespondenceCA dummy	15.6.0
	RP-84	RP-191377	1092	1	F	Correction on Measurement Report Triggering for Periodical Report	15.6.0
	RP-84	RP-191375	1094	-	F	Correction on PDCP duplication configuration	15.6.0
	RP-84	RP-191375	1095	-	F	Correction on BWP configuration	15.6.0
	RP-84	RP-191377	1097	1	F	Correction on configuration of pucch-ResourceCommon	15.6.0

	RP-84	RP-191376	1098	1	F	Clarification of PUCCH reconfiguration on NR UL and SUL	15.6.0
	RP-84	RP-191375	1100	1	F	Correction on initial BWP configuration in DownlinkConfigCommon and UplinkConfigCommon	15.6.0
	RP-84	RP-191377	1101	1	F	Correction on PUCCH cell	15.6.0
	RP-84	RP-191377	1103	1	F	Correction on the pdcp-Config	15.6.0
	RP-84	RP-191379	1104	2	F	Correction on pathlossReferenceLinking	15.6.0
	RP-84	RP-191381	1106	2	F	Clarification of dedicated priority handling from RRC_INACTIVE to RRC_IDLE	15.6.0
	RP-84	RP-191375	1110	-	F	Clarification on sending condition for mcg-RB-Config	15.6.0
	RP-84	RP-191375	1111	-	F	Clarification of timing reference for CSI-RS resources	15.6.0
	RP-84	RP-191376	1113	-	F	Setting of resumeCause for NAS triggered event	15.6.0
	RP-84	RP-191376	1114	-	F	UE capability signalling for FD-MIMO processing capabilities for EN-DC	15.6.0
	RP-84	RP-191376	1115	-	F	Modified UE capability on different numerologies within the same PUCCH group	15.6.0
	RP-84	RP-191478	1116	2	F	Clarification to commonSearchSpaceList in PDCCH-ConfigCommon	15.6.0
	RP-84	RP-191589	1117	1	F	Removal of "Capability for aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS"	15.6.0
09/2019	RP-85	RP-192196	1120	1	C	Additional capability signalling for 1024QAM support	15.7.0
	RP-85	RP-192191	1121	1	F	Correction on TDD-UL-DL-Config	15.7.0
	RP-85	RP-192191	1122	1	F	Correction of the secondHopPRB Parameter	15.7.0
	RP-85	RP-192190	1123	-	F	RSRP reporting of SFTD measurement in NR-DC	15.7.0
	RP-85	RP-192191	1124	1	F	Small Corrections for System Information	15.7.0
	RP-85	RP-192194	1125	-	F	Corrections for Inter-node Messages	15.7.0
	RP-85	RP-192191	1126	1	F	Clarification of Layer 3 Filtering for E-UTRA	15.7.0
	RP-85	RP-192190	1127	-	F	Clarification on FailureInformation report for NE-DC	15.7.0
	RP-85	RP-192191	1136	1	F	Clarification to fullConfig in NR	15.7.0
	RP-85	RP-192190	1137	-	F	Updates for positioning measurement gaps for subframe and slot timing detection towards E-UTRA	15.7.0
	RP-85	RP-192191	1138	1	F	Clarification for enabling of configured PUSCH frequency hopping	15.7.0
	RP-85	RP-192191	1139	1	B	Introduction of SFTD measurement to neighbour cells for NR SA	15.7.0
	RP-85	RP-192192	1144	1	F	Corrections to 38.331 on SI-schedulingInfo	15.7.0
	RP-85	RP-192193	1148	2	F	Clarification on SRB2 and DRB configuration	15.7.0
	RP-85	RP-192191	1151	2	F	PDU session release indication to upper layers during Full Configuration	15.7.0
	RP-85	RP-192191	1160	1	F	Clarification on max payload of PUCCH-ResourceSet	15.7.0
	RP-85	RP-192191	1161	1	F	Clarification on PUSCH configuration	15.7.0
	RP-85	RP-192192	1167	1	F	Correction of condition HO-toNR and HO-Conn	15.7.0
	RP-85	RP-192192	1172	1	F	Clarifying UE capability freqHoppingPUCCH-F0-2 and freqHoppingPUCCH-F1-3-4	15.7.0
	RP-85	RP-192190	1173	1	F	Clarification on selectedBandCombination	15.7.0
	RP-85	RP-192193	1174	2	F	Clarifying handling of information elements on the F1 interface	15.7.0
	RP-85	RP-192192	1178	1	F	Correction of field descriptions in UE-CapabilityRequestFilterCommon (38.331)	15.7.0
	RP-85	RP-192190	1179	-	F	Clarification of ca-ParametersNR-forDC (38.331)	15.7.0
	RP-85	RP-192193	1183	2	F	Correction on reestablishRLC	15.7.0
	RP-85	RP-192191	1185	1	F	Correction on SFTD measurement configuration	15.7.0
	RP-85	RP-192193	1191	2	F	Handling of embedded RRC message in RRCReconfiguration procedure	15.7.0
	RP-85	RP-192192	1201	2	F	Clarification on definition of PUSCH-Less SCell	15.7.0
	RP-85	RP-192190	1204	-	F	Correction on non-critical extension for NRDC-Parameters	15.7.0
	RP-85	RP-192191	1208	1	F	Correction on UE actions upon going to RRC_IDLE	15.7.0
	RP-85	RP-192192	1211	1	F	Correction on the acquisition of MIB and SIB1 for re-establishment	15.7.0
	RP-85	RP-192192	1212	1	F	Correction on band selection in SIB1	15.7.0
	RP-85	RP-192193	1213	2	F	Correction on the actions uption reception of SIB2 and SIB4	15.7.0
	RP-85	RP-192193	1219	3	F	Miscellaneous non-controversial corrections Set III	15.7.0
	RP-85	RP-192194	1220	3	F	Channel Bandwidth validation upon SIB1 acquisition	15.7.0
	RP-85	RP-192193	1224	1	F	Correction of presence conditions for common PSCell parameters	15.7.0
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	RP-85	RP-192193	1232	2	F	Correction of field inclusion for inter-node message	15.7.0
	RP-85	RP-192192	1234	1	F	SFTD measurement information in CG-ConfigInfo	15.7.0
	RP-85	RP-192192	1235	1	F	Correction for UE context retrieval	15.7.0
	RP-85	RP-192190	1236	-	F	Correction on CGI measurements	15.7.0
	RP-85	RP-192191	1237	1	F	Corrections to SIB8 for CMAS geo-fencing	15.7.0
	RP-85	RP-192194	1242	3	F	Corrections on the condition of RBTermChange	15.7.0
	RP-85	RP-192192	1243	1	F	CR on clarification of aggregated bandwidth for overheating	15.7.0
	RP-85	RP-192190	1244	-	F	Clarification on the selectedBandEntriesMN - Understanding 1	15.7.0
	RP-85	RP-192194	1253	1	F	Correction on RRC connection release indication after handover	15.7.0
	RP-85	RP-192193	1254	2	F	Corrections on SIB1 configuration	15.7.0
	RP-85	RP-192191	1256	1	F	Correction on inter-RAT cell re-selection when UE is in RRC_IDLE	15.7.0
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	RP-85	RP-192193	1261	1	F	Correction on overheating indication	15.7.0
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	RP-86	RP-192934	1274	1	F	Correction on absence of gapPurpose	15.8.0
	RP-86	RP-192934	1278	1	F	Correction on field description of cellReselectionInfoCommon	15.8.0
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	RP-86	RP-192937	1308	3	F	Correction of SRB3 handling at full configuration (Alt2)	15.8.0
	RP-86	RP-192936	1309	2	F	Correction to integrity protection in DRB addition and modification	15.8.0
	RP-86	RP-192938	1323	3	F	Miscellaneous non-controversial corrections Set IV	15.8.0
	RP-86	RP-192935	1325	2	F	Presence and absence of TAC in NR cell	15.8.0
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	RP-86	RP-192934	1333	1	F	Correction on the Msg3 based on demand system information	15.8.0
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	RP-86	RP-192935	1337	1	F	Clarification on the feature set report in EUTRAN	15.8.0
	RP-86	RP-192934	1341	1	F	CR to 38.331 on CGI information	15.8.0
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	RP-86	RP-192934	1362	-	F	Configuration limitation for RRCRelease message in R15	15.8.0
	RP-86	RP-192937	1368	1	F	Correction to AS security key update	15.8.0
	RP-86	RP-192936	1369	1	F	Correction on the condition of RBTermChange	15.8.0
	RP-86	RP-192936	1375	1	F	Correction on the configuration of split SRB	15.8.0
	RP-86	RP-192934	1378	-	F	Correction on camping conditions	15.8.0
	RP-86	RP-192937	1379	1	F	Correction on CORESET location	15.8.0
	RP-86	RP-192938	1381	2	F	Correction to key derivation for the UE configured with sk-counter	15.8.0
	RP-86	RP-192936	1383	1	F	Correction on the pre-condition for reconfiguration with sync of SCG	15.8.0
	RP-86	RP-192935	1385	-	F	Correction on AS-Config	15.8.0
	RP-86	RP-192935	1387	-	F	Correction on measurement reporting in NR-DC	15.8.0
	RP-86	RP-192936	1389	1	F	Correction on SIB1 description	15.8.0
	RP-86	RP-192937	1402	1	F	Correction to Feature Set Combination and Band combination list for NR-DC (38.331)	15.8.0
	RP-86	RP-192937	1403	2	F	Security requirements for split PDU session (38.331)	15.8.0
	RP-86	RP-192938	1405	2	F	Correction of UE assistance information	15.8.0
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03/2020	RP-87	RP-200335	1272	3	F	Corrections on maxMeasIdentitiesSCG-NR in MR-DC	15.9.0
	RP-87	RP-200334	1409	2	F	CR on BWCS for inter-ENDC BC with intra-ENDC BC (38.331)	15.9.0
	RP-87	RP-200334	1410	4	F	CR to 38.331 on support of 70MHz channel bandwidth	15.9.0
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	RP-87	RP-200334	1444	1	F	Correction on removal of NR-DC and NE-DC band combinations when capabilityRequestFilterCommon is absent	15.9.0
	RP-87	RP-200334	1450	1	F	Correction on reporting of uplink TX direct current	15.9.0
	RP-87	RP-200334	1454	1	F	Corrections to the Location measurement indication procedure	15.9.0
	RP-87	RP-200334	1455	-	F	Introduction of provisions for late non-critical extensions	15.9.0
	RP-87	RP-200334	1460	1	F	Correction on p-maxNR-FR1 for NE-DC	15.9.0
	RP-87	RP-200334	1461	-	F	Correction on SFTD frequency list in INM	15.9.0
	RP-87	RP-200335	1472	2	F	Miscellaneous non-controversial corrections Set V	15.9.0
	RP-87	RP-200335	1475	1	F	Capability coordination for NE-DC	15.9.0
	RP-87	RP-200335	1483	2	F	CR on fallback BC reporting	15.9.0
	RP-87	RP-200334	1484	1	F	CR on overheating assistance reporting in handover case	15.9.0
	RP-87	RP-200334	1496	1	F	Correction on NZP-CSI-RS-ResourceSet	15.9.0
	RP-87	RP-200335	1501	1	F	UE capability of intra-band requirements for inter-band EN-DC/NE-DC	15.9.0
03/2020	RP-87	RP-200335	1141	2	F	Correction on usage of access category 2 for UAC for RNA update	16.0.0
	RP-87	RP-200358	1149	2	F	NAS handling error of nas-Container for security key derivation	16.0.0
	RP-87	RP-200356	1152	3	F	CR on capability of maxUplinkDutyCycle for inter-band EN-DC PC2 UE	16.0.0
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	RP-87	RP-200357	1218	3	B	Introduction of a second SMTC per frequency carrier in idle/inactive	16.0.0
	RP-87	RP-200358	1312	3	C	Introduction of voice fallback indication	16.0.0
	RP-87	RP-200358	1354	2	C	CR to 38.331 on CSI-RS inter-node message	16.0.0
	RP-87	RP-200335	1361	1	B	PRACH prioritization parameters for MPS and MCS	16.0.0
	RP-87	RP-200358	1433	2	B	Introduction of downgraded configuration for SRS antenna switching	16.0.0
	RP-87	RP-200355	1434	2	B	Introducing autonomous gap in CGI reporting	16.0.0
	RP-87	RP-200351	1441	1	B	Introduction of UECapabilityInformation segmentation in TS38.331	16.0.0
	RP-87	RP-200358	1443	1	B	Introduction of NR IDC solution	16.0.0

	RP-87	RP-200350	1446	1	B	Introduction of SRVCC from 5G to 3G	16.0.0
	RP-87	RP-200341	1462	2	B	Introduction of on-demand SI procedure in RRC_CONNECTED	16.0.0
	RP-87	RP-200358	1465	1	B	Introduction of DL RRC segmentation	16.0.0
	RP-87	RP-200353	1468	1	B	Introducing the support of Non-Public Networks	16.0.0
	RP-87	RP-200344	1469	3	B	CR for 38.331 for Power Savings	16.0.0
	RP-87	RP-200349	1471	4	B	38.331 CR on Integrated Access and Backhaul for NR	16.0.0
	RP-87	RP-200348	1476	3	B	CR for 38.331 for CA&DC enh	16.0.0
	RP-87	RP-200341	1477	2	B	Introduction of NR operation with Shared Spectrum Access in RRC	16.0.0
	RP-87	RP-200347	1478	2	B	Introduction of NR mobility enhancement	16.0.0
	RP-87	RP-200335	1486	-	B	Introduction of additional RACH configurations for TDD FR1	16.0.0
	RP-87	RP-200343	1487	1	B	Introduction of NR eURLLC	16.0.0
	RP-87	RP-200354	1488	2	B	CR for introducing MDT and SON	16.0.0
	RP-87	RP-200357	1489	-	**C**	CR to 38.331 on DRX coordination	16.0.0
	RP-87	RP-200346	1493	1	**B**	Introduction of 5G V2X with NR sidelink	16.0.0
	RP-87	RP-200340	1494	2	**B**	Introduction of CLI handling and RIM in TS38.331	16.0.0
	RP-87	RP-200352	1498	1	**B**	Introduction of NR IIoT	16.0.0
	RP-87	RP-200342	1499	1	**B**	Introduction of 2-step RA	16.0.0
	RP-87	RP-200339	1500	2	**B**	Introduction of MIMO enhancements	16.0.0
	RP-87	RP-200359	1502	-	**B**	Recommended Bit Rate/Query for FLUS and MTSI	16.0.0
	RP-87	RP-200345	1504	2	**B**	Introduction of NR positioning	16.0.0
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07/2020	RP-88	RP-201191	1290	4	**C**	Missing reportAddNeighMeas in periodic measurement reporting	16.1.0
	RP-88	RP-201166	1453	6	**B**	Introduction of NeedForGap capability for NR measurement	16.1.0
	RP-88	RP-201185	1464	5	**B**	Introduction of signalling for high-speed train scenarios	16.1.0
	RP-88	RP-201191	1506	2	**F**	Corrections to PRACH prioritization procedure for MPS and MCS	16.1.0
	RP-88	RP-201182	1513	2	**F**	Finalization of the support of Non-Public Networks	16.1.0
	RP-88	RP-201172	1528	4	**F**	Miscellaneous corrections for NR-U	16.1.0
	RP-88	RP-201174	1540	2	**C**	CR for 38.331 for Power Savings	16.1.0
	RP-88	RP-201180	1553	3	**F**	Correction to transfer of UE capabilities at HO for RACS and minor ASN.1 correction (38.331)	16.1.0
	RP-88	RP-201161	1556	2	**A**	Clarification on avoiding keystream repeat due to COUNT reuse	16.1.0
	RP-88	RP-201178	1557	2	**F**	CR for 38.331 on CA/DC Enhancements	16.1.0
	RP-88	RP-201160	1560	2	**A**	SRS Capability report for SRS only Scell	16.1.0
	RP-88	RP-201160	1562	1	**A**	Correction to RequestedCapabilityCommon	16.1.0
	RP-88	RP-201187	1563	2	**A**	CR on introduction of BCS to asymmetric channel bandwidths (38.331)	16.1.0
	RP-88	RP-201159	1568	2	**A**	Correction on PUCCH configuration	16.1.0
	RP-88	RP-201176	1569	3	**F**	Miscellaneous corrections to 38.331 for V2X	16.1.0
	RP-88	RP-201160	1572	2	**A**	Correction on the need for reconfiguration with sync in (NG)EN-DC, NR-DC and NE-DC	16.1.0
	RP-88	RP-201160	1579	1	**A**	38331 CR(R16) on inter-RAT SFTD measurements	16.1.0
	RP-88	RP-201160	1587	1	**A**	Clarification on pdcp-Duplication at RRC Reconfiguration	16.1.0
	RP-88	RP-201188	1588	3	**F**	Correction to RRC spec for eURLLC	16.1.0
	RP-88	RP-201179	1590	4	**B**	Corrections to 38.331 for supporting IAB in NPN	16.1.0
	RP-88	RP-201177	1591	2	**F**	Corrections on NR mobility enhancements	16.1.0
	RP-88	RP-201175	1592	2	**B**	Introduction of RRC Positioning	16.1.0
	RP-88	RP-201166	1596	1	**F**	Band combination list for NE-DC (Cat-F)	16.1.0
	RP-88	RP-201159	1599	-	**A**	Avoiding security risk for RLC AM bearers during termination point change	16.1.0
	RP-88	RP-201161	1602	1	**A**	CR on SRS-CarrierSwitching	16.1.0
	RP-88	RP-201164	1603	1	**A**	CR on introduction of extended capabilities for NR-DC only BCs	16.1.0
	RP-88	RP-201165	1614	1	**A**	Clarification on the presence of ssb-perRACH-Occasion for the CSI-RS based CFRA	16.1.0
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	RP-88	RP-201159	1631	-	**A**	Clarification for SIB6, SIB7 and SIB8 acquisition during a measurement gap	16.1.0
	RP-88	RP-201198	1632	2	**C**	Introduction of secondary DRX group CR 38.331	16.1.0
	RP-88	RP-201164	1634	1	**A**	Correction to CORESET and PDCCH TCI state release	16.1.0
	RP-88	RP-201181	1641	-	**F**	Correction of NR IIoT	16.1.0
	RP-88	RP-201162	1644	1	**A**	Clarification on release and addition of the uplink for SCell	16.1.0
	RP-88	RP-201189	1645	-	**F**	CR on 38.331 for SRVCC from 5G to 3G	16.1.0
	RP-88	RP-201159	1649	-	**A**	Ambiguity in fr1-fr2-Add-UE-NR-Capabilities parameter	16.1.0
	RP-88	RP-201162	1656	1	**A**	Correction to measurement coordination in MR-DC	16.1.0
	RP-88	RP-201176	1657	1	**F**	Introduction of on-demand SIB(s) procedure in CONNECTED	16.1.0
	RP-88	RP-201164	1662	1	**A**	T310 handling during MobilityFromNR	16.1.0
	RP-88	RP-201173	1664	2	**F**	Corrections for 2-step Random Access Type	16.1.0
	RP-88	RP-201216	1665	2	**B**	Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.1.0
	RP-88	RP-201191	1666	1	**F**	Miscellaneous ASN.1 review corrections	16.1.0
	RP-88	RP-201166	1668	2	**F**	Miscellaneous non-controversial corrections Set V	16.1.0
	RP-88	RP-201184	1669	3	**F**	Corrections on MDT and SON in NR	16.1.0
	RP-88	RP-201190	1670	-	**C**	Introduction of eCall over IMS for NR	16.1.0
	RP-88	RP-201191	1671	1	**F**	38.331 CR for overheating in (NG)EN-DC and NR-DC	16.1.0
	RP-88	RP-201186	1673	1	**B**	Introduction of inter-frequency measurement without gap	16.1.0
	RP-88	RP-201164	1682	2	**A**	Correction on SRS antenna capability for carrier switching	16.1.0

	RP-88	RP-201161	1683	1	**A**	UE Capability Enhancement for FR1(TDD/FDD) / FR2 CA and DC	16.1.0
	RP-88	RP-201164	1687	1	**A**	Correction to re-sending UEAssistanceInformation upon reconfiguration w/ sync	16.1.0
	RP-88	RP-201170	1696	4	**F**	eMIMO corrections	16.1.0
	RP-88	RP-201166	1697	-	**F**	Corrections to SIB1 Processing	16.1.0
	RP-88	RP-201171	1700	-	**F**	Corrections for CLI	16.1.0
	RP-88	RP-201191	1703	1	**F**	Correction on MN-SN measurements coordination in INM	16.1.0
	RP-88	RP-201163	1707	-	**A**	SMTC Configuration for PSCell Addition for NR-DC (Option 2)	16.1.0
	RP-88	RP-201165	1711	1	**A**	Introduction of CGI reporting capabilities	16.1.0
	RP-88	RP-201191	1716	-	**B**	Aperiodic CSI-RS triggering with beam switching timing of 224 and 336	16.1.0
	RP-88	RP-201166	1717	1	**B**	Implementing confirmation of code block group based transmission	16.1.0
	RP-88	RP-201179	1718	1	**F**	Correction to TS 38.331 for IAB WI	16.1.0
	RP-88	RP-201183	1719	-	**B**	RRC configuration of supporting UL Tx switching	16.1.0
	RP-88	RP-201183	1720	-	**B**	UE capability of supporting UL Tx switching	16.1.0

09/2020	RP-89	RP-201929	1533	3	**F**	CLI configuration	16.2.0
	RP-89	RP-201922	1737	2	**F**	Corrections to failure type for MCGFailureInformation and SCGFailureInformation	16.2.0
	RP-89	RP-201937	1746	1	**A**	Clarification on CG-ConfigInfo for NR-DC and NE-DC	16.2.0
	RP-89	RP-201963	1747	1	**F**	Miscellaneous corrections for NR IIoT	16.2.0
	RP-89	RP-201937	1749	1	**A**	CR on SyncAndCellAdd condition	16.2.0
	RP-89	RP-201937	1751	1	**A**	CR to clarify UE behaviour after TAT expiry due to reconfigurationWithSync	16.2.0
	RP-89	RP-201930	1755	2	**F**	Handling of CPC in fast MCG recovery	16.2.0
	RP-89	RP-201986	1756	4	**B**	Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.2.0
	RP-89	RP-201989	1757	1	**F**	Minor corrections and update for RRC Positioning	16.2.0
	RP-89	RP-201938	1764	1	**F**	Correction on the Cross Carrier Scheduling Configuration	16.2.0
	RP-89	RP-201922	1768	2	**F**	Correction on the Configuration of sCellState for 38.331	16.2.0
	RP-89	RP-201930	1771	-	**F**	Minor Correction for Mobility Further Enhancement	16.2.0
	RP-89	RP-201989	1779	-	**F**	Corrections to acquisition of posSIB(s) in RRC_CONNECTED	16.2.0
	RP-89	RP-201989	1781	1	**F**	Corrections to handing posSIB-MappingInfo in SIB1	16.2.0
	RP-89	RP-201938	1787	1	**F**	SMTC Configuration for PSCell Addition and SN Change in NR-DC	16.2.0
	RP-89	RP-201923	1794	1	**F**	Corrections of RLF cause Signalling procedure	16.2.0
	RP-89	RP-201937	1800	1	**A**	CR on the BandCombination (R16)	16.2.0
	RP-89	RP-201922	1803	1	**F**	Adding enableDefaultBeamForCCS for cross-carrier scheduling with different SCS	16.2.0
	RP-89	RP-201927	1810	1	**F**	Correction on cross-RAT V2X functionality in TS 38.331	16.2.0
	RP-89	RP-201930	1818	-	**F**	Time misalignment in DAPS DRB configuration (Alt.2)	16.2.0
	RP-89	RP-201927	1820	2	**F**	Miscellaneous correction regarding on demand SIB in CONNECTED	16.2.0
	RP-89	RP-201927	1821	2	**F**	Redundant procedural text of on demand SIB in CONNECTED	16.2.0
	RP-89	RP-201922	1823	-	**F**	Correction to field condition on refFR2ServCellAsyncCA	16.2.0
	RP-89	RP-201930	1836	-	**F**	Corrections to Conditional Reconfiguration triggering	16.2.0
	RP-89	RP-201921	1844	3	**F**	RRC clarficiations for NR-U	16.2.0
	RP-89	RP-201930	1845	1	**F**	Clarification on TS38.331 for DAPS	16.2.0
	RP-89	RP-201930	1847	-	**F**	T312 handling during Mobility from NR	16.2.0
	RP-89	RP-201930	1850	2	**F**	Corretion on the RLF for NR DAPS	16.2.0
	RP-89	RP-201932	1852	1	**F**	Correction on beamSwitchTiming values of 224 and 336	16.2.0
	RP-89	RP-201930	1861	-	**F**	RLF in source cell during DAPS handover	16.2.0
	RP-89	RP-201929	1862	2	**F**	Misc. corrections CR for 38.331 for Power Savings	16.2.0
	RP-89	RP-201920	1863	3	**F**	Miscellaneous eMIMO corrections	16.2.0
	RP-89	RP-201922	1864	1	**F**	Missing fields for Toffset coordination in INM	16.2.0
	RP-89	RP-201922	1865	1	**F**	Misc corrections for Rel-16 DCCA	16.2.0
	RP-89	RP-201930	1866	-	**F**	Correction of field description for Mobility Enhancments	16.2.0
	RP-89	RP-201930	1868	1	**F**	Correction of description of CHO events for Mobility Enhancments	16.2.0
	RP-89	RP-201932	1869	1	**F**	ASN.1 corrections to maintain backwards compatibility	16.2.0
	RP-89	RP-201920	1870	1	**F**	Remaining ASN.1 review issues	16.2.0
	RP-89	RP-201938	1872	1	**A**	Miscellaneous non-controversial corrections Set VII	16.2.0
	RP-89	RP-201925	1873	1	**B**	Introduction of MPE reporting	16.2.0
	RP-89	RP-201930	1874	-	**F**	Corrections to Mobility Enahncements	16.2.0
	RP-89	RP-201937	1878	-	**A**	Clarification on scg-RB-Config	16.2.0
	RP-89	RP-201922	1879	1	**F**	Correction on storing SCG configuration in UE INACTIVE AS context	16.2.0
	RP-89	RP-201930	1886	-	**F**	Timer handling upon initiation of RRC re-establishment	16.2.0
	RP-89	RP-201930	1888	-	**F**	No support of DAPS HO for a CHO candidate cell	16.2.0
	RP-89	RP-201930	1898	-	**F**	Correction on TS38.331 for CHO	16.2.0
	RP-89	RP-201938	1908	1	**A**	Correction on UE assistance information transmission for handover case	16.2.0
	RP-89	RP-201931	1911	2	**F**	Correction on the UE Capability presence upon SN addition and SN change	16.2.0
	RP-89	RP-201928	1924	1	**F**	Correction on msgA-PUSCH-Config	16.2.0
	RP-89	RP-201989	1925	1	**F**	Introduction of PRS measurement gap	16.2.0
	RP-89	RP-201927	1930	1	**F**	Miscellaneous corrections on TS 38.331	16.2.0
	RP-89	RP-201930	1936	-	**F**	Correction on NR CHO	16.2.0
	RP-89	RP-201929	1937	1	**F**	Miscellaneous RRC corrections for NR eURLLC	16.2.0
	RP-89	RP-201932	1948	1	**F**	Correction on HO from NR to EN-DC	16.2.0
	RP-89	RP-201923	1952	1	**F**	Corrections on F1-C transfer path	16.2.0
	RP-89	RP-201923	1954	-	**F**	Corrections on default BH RLC channel	16.2.0
	RP-89	RP-201923	1955	1	**F**	Correction on the value range of BH-LogicalChannelIdentity-Ext	16.2.0
	RP-89	RP-201923	1956	-	**F**	Correction on cellReservedForOperatorUse	16.2.0
	RP-89	RP-201923	1957	1	**F**	Correction on SearchSpace configuration for IAB	16.2.0
	RP-89	RP-201923	1958	-	**F**	Corrections on the IAB-MT TDD resource configuration	16.2.0
	RP-89	RP-201932	1961	4	**B**	CR for Early Implementation in NR	16.2.0
	RP-89	RP-201932	1969	1	**F**	CR on UE behavior with E-UTRA cell selection upon mobility from NR failure for enhanced EPS voice fallback	16.2.0
	RP-89	RP-201930	1974	1	**F**	CR on drb-ContinueROHC for DAPS	16.2.0
	RP-89	RP-201921	1976	2	**F**	Miscellaneous corrections for NR-U	16.2.0
	RP-89	RP-201937	1979	1	**A**	Reconfiguring RoHC and setting the drb-ContinueROHC simultaneously	16.2.0
	RP-89	RP-201938	1986	1	**A**	Clarification on the SRB configuration for fullConfig during RRC Resume procedure	16.2.0
	RP-89	RP-201930	1989	2	**F**	Correction on field descrption of mrdc-SecondaryCellGroup in NR-DC	16.2.0

	RP-89	RP-201927	1991	2	**F**	CR to 38.331 on SLSS ID	16.2.0
	RP-89	RP-201927	1992	1	**F**	Correction on RRC parameters for 5G V2X with NR sidelink	16.2.0
	RP-89	RP-201922	1993	-	**F**	Correction on HARQ ACK spatial bundling configurations for secondary PUCCH group	16.2.0
	RP-89	RP-201924	1994	1	**F**	Update to IAB-MT capabilities	16.2.0
	RP-89	RP-201927	1995	-	**F**	Adding notes for joint success and failure in crossRAT SL	16.2.0
	RP-89	RP-201927	1997	-	**F**	Corrections on RAN1 related clarifications	16.2.0
	RP-89	RP-201931	1998	-	**D**	Editorial corrections on MDT and SON in NR	16.2.0
	RP-89	RP-201931	1999	-	**F**	Correction to MDT features	16.2.0
	RP-89	RP-201931	2000	-	**F**	Correction to SON features	16.2.0
	RP-89	RP-201928	2001	-	**F**	Corrections for NPNs	16.2.0
	RP-89	RP-201927	2002	-	**F**	Clarification on UL and SL priority thresholds	16.2.0
	RP-89	RP-201924	2003	-	**F**	Miscellaneous IAB Corrections	16.2.0
	RP-89	RP-201962	2007	1	**F**	Miscellaneous corrections on UL Tx switching	16.2.0
	RP-89	RP-201925	2008	-	**B**	Configuration for uplink power boosting via suspended IBE requirements	16.2.0
	RP-89	RP-201922	2009	-	**F**	NR-DC UE capabilities	16.2.0
	RP-89	RP-201927	2010	1	**F**	Correction on the calculation of CG occasion	16.2.0
12/2020	RP-90	RP-202775	1775	2	**F**	NR CA additional spectrum emission requirements	16.3.0
	RP-90	RP-202777	2017	-	**B**	Configuration for directional collision handling between reference cell and other cell for half-duplex operation in CA	16.3.0
	RP-90	RP-202773	2021	1	**F**	Clarification on referenceTimePreferenceReporting in RRC Reconfiguration Procedure	16.3.0
	RP-90	RP-202790	2029	-	**F**	Correction on UAI during handover	16.3.0
	RP-90	RP-202771	2038	1	**F**	Correction to PDSCH TDRA for DCI 1-2	16.3.0
	RP-90	RP-202789	2040	1	**A**	Correction for configuration of SRS Carrier Switching	16.3.0
	RP-90	RP-202767	2042	1	**F**	Correction to NR-U Energy Detection Threshold configuration	16.3.0
	RP-90	RP-202778	2051	1	**B**	Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2	16.3.0
	RP-90	RP-202767	2052	-	**F**	Correction of field description for ra-ResponseWindow	16.3.0
	RP-90	RP-202767	2055	-	**F**	Clarification on HARQ process sharing for CGs	16.3.0
	RP-90	RP-202790	2059	1	**A**	Corrections on the configurations of HARQ-ACK spatial bundling and CBG in 38.331	16.3.0
	RP-90	RP-202774	2061	1	**F**	Clarification on no support of CA, DC or multi-TRP with DAPS	16.3.0
	RP-90	RP-202790	2064	1	**A**	Corrections on PDCP duplication capability for NR-DC	16.3.0
	RP-90	RP-202790	2066	1	**F**	Clarification on SIB mapping to SI message	16.3.0
	RP-90	RP-202776	2075	1	**F**	UE assistance information for DRX preference	16.3.0
	RP-90	RP-202767	2091	1	**F**	Miscellaneous corrections for NR-U	16.3.0
	RP-90	RP-202768	2107	2	**F**	UE behaviour when UL 7.5KHz shift is not supported	16.3.0
	RP-90	RP-202772	2122	1	**F**	Correction on non-DRB for IAB-MT	16.3.0
	RP-90	RP-202772	2124	1	**F**	Corrections on BH RLC channel	16.3.0
	RP-90	RP-202772	2125	1	**F**	Corrections on RLF cause determination	16.3.0
	RP-90	RP-202790	2130	1	**F**	Correction on uac-AccessCategory1-SelectionAssistanceInfo	16.3.0
	RP-90	RP-202790	2134	2	**F**	Miscellaneous non-controversial corrections Set VIII	16.3.0
	RP-90	RP-202775	2142	2	**F**	Correction on field description of configuredGrantConfigType2DeactivationStateList	16.3.0
	RP-90	RP-202776	2145	1	**F**	Correction on RRC state preference	16.3.0
	RP-90	RP-202789	2146	1	**F**	Clarifications for the common search space on the active BWP	16.3.0
	RP-90	RP-202771	2149	1	**F**	Corrections to 2-Step RA	16.3.0
	RP-90	RP-202777	2151	-	**F**	Discarding of stored DL RRC message segments when UE transitions to RRC_IDLE	16.3.0
	RP-90	RP-202771	2159	-	**F**	Correction on BFD resource on SCell	16.3.0
	RP-90	RP-202770	2161	2	**F**	Misc corrections for Rel-16 DCCA	16.3.0
	RP-90	RP-202770	2163	-	**F**	Missing fields for Toffset coordination	16.3.0
	RP-90	RP-202770	2166	1	**F**	Processing delay requirements for DLInformationTransferMRDC	16.3.0
	RP-90	RP-202773	2175	1	**F**	Correction regarding reconfigure EHC	16.3.0
	RP-90	RP-202770	2178	-	**C**	Processing delay requirements for RRC resume	16.3.0
	RP-90	RP-202770	2180	1	**F**	Correction for fast MCG link recovery in (NG)EN-DC	16.3.0
	RP-90	RP-202771	2181	2	**F**	Correction on HARQ ACK/NACK feedback configuration	16.3.0
	RP-90	RP-202771	2182	2	**F**	Correction on slot based repetition	16.3.0
	RP-90	RP-202772	2184	1	**F**	RRC Miscellaneous Corrections	16.3.0
	RP-90	RP-202772	2192	1	**F**	Support of Rel-16 features for SCG in EN-DC and NR-DC	16.3.0
	RP-90	RP-202775	2198	1	**F**	Correction on acquisition of MIB and SIB1	16.3.0
	RP-90	RP-202775	2199	-	**F**	Correction on posSIB broadcastStatus	16.3.0
	RP-90	RP-202776	2215	-	**F**	Clarification on SRVCC handover	16.3.0
	RP-90	RP-202769	2230	1	**F**	Miscellaneous corrections on TS 38.331	16.3.0
	RP-90	RP-202771	2250	1	**C**	38331 CR for CSI-RS-ResourceConfigMobility	16.3.0
	RP-90	RP-202775	2254	-	**F**	Correction on T321 for autonomous gap based CGI in FR2	16.3.0
	RP-90	RP-202772	2265	-	**F**	Transmission suspension on BH RLC channel upon IAB-MT failure	16.3.0
	RP-90	RP-202790	2273	3	**A**	CR on TS 38.331 for LCP restriction of configured grant type 1	16.3.0
	RP-90	RP-202769	2274	-	**F**	Correction on RRC parameters for NR SL communication	16.3.0
	RP-90	RP-202771	2276	3	**F**	Introduction of capability bit for multi-CC simultaneous TCI activation with multi-TRP	16.3.0

	RP-90	RP-202771	2277	1	**F**	Selecting index for PLMN, SNPN and UAC parameters	16.3.0
	RP-90	RP-202775	2278	-	**F**	Positioning RRC updates for posSIB validity check and field description correction	16.3.0
	RP-90	RP-202774	2280	-	**F**	Miscellaneous corrections for conditional reconfiguration	16.3.0
	RP-90	RP-202774	2282	-	**F**	Miscellaneous corrections for DAPS (NR)	16.3.0
	RP-90	RP-202773	2284	1	**F**	Corrections for PDCP duplication introduced in IIoT	16.3.0
	RP-90	RP-202769	2285	-	**F**	Corrections on sidelink related RRC procedures	16.3.0
	RP-90	RP-202770	2287	-	**A**	Dummify UE capability of crossCarrierScheduling-OtherSCS	16.3.0
	RP-90	RP-202776	2293	-	**F**	RRC corrections on NR SON and MDT	16.3.0
	RP-90	RP-202770	2294	-	**F**	CR for Unaligned CA signalling in TS 38.331	16.3.0
	RP-90	RP-202767	2295	-	**F**	Name change of the UE capability for the extended RAR window monitoring	16.3.0
	RP-90	RP-202884	2297	-	**A**	CR to 38.331 on handling of fallbacks for FR2 CA	16.3.0
01/2021	RP-90					Corrected the extension marker in type PosSchedulingInfo-r16 so that it passes ASN.1 syntax check	16.3.1
03/2021	RP-91	RP-210693	2034	3	**F**	Corrections to acquisition of positioning SIBs	16.4.0
	RP-91	RP-210702	2036	3	**A**	Clarification to usage of ConfigRestrictModReqSCG	16.4.0
	RP-91	RP-210695	2147	1	**F**	Clarification for aperiodic CSI and secondary DRX group	16.4.0
	RP-91	RP-210701	2237	1	**A**	Clarification on P-max in FrequencyInfoUL in FR2	16.4.0
	RP-91	RP-210690	2298	1	**F**	Correction on the Handling of Reconfiguration within RRC Resume	16.4.0
	RP-91	RP-210690	2300	1	**F**	Clarification on Fast MCG Link Recovery	16.4.0
	RP-91	RP-210692	2301	1	**F**	CR on co-configuration of Rel-16 features	16.4.0
	RP-91	RP-210689	2302	2	**F**	Correction on reset configuration	16.4.0
	RP-91	RP-210689	2303	1	**F**	Clarification on the inter-frequency operation	16.4.0
	RP-91	RP-210694	2306	1	**F**	Correction on RSSI and channel occupancy measurements	16.4.0
	RP-91	RP-210689	2315	1	**F**	Correction on value range of sl-ConfigIndexCG and sl-HARQ-ProcID-offset	16.4.0
	RP-91	RP-210693	2317	1	**F**	Clarficiations on the required posSIB	16.4.0
	RP-91	RP-210697	2321	1	**F**	UE capability of NR to UTRA-FDD CELL_DCH CS handover	16.4.0
	RP-91	RP-210693	2322	-	**F**	Corrections on posSIB validity	16.4.0
	RP-91	RP-210694	2325	1	**F**	CR on 38.331 for power saving	16.4.0
	RP-91	RP-210701	2333	-	**A**	CR on SyncAndCellAdd condition	16.4.0
	RP-91	RP-210693	2341	1	**F**	RA report and Logged MDT Info extendibility	16.4.0
	RP-91	RP-210692	2346	1	**F**	Support of NUL and SUL during DAPS handover	16.4.0
	RP-91	RP-210694	2360	-	**F**	Clarification on NR-U RSSI measurement procedure	16.4.0
	RP-91	RP-210703	2371	-	**F**	Correction to measResultServingMOList impacting EN-DC	16.4.0
	RP-91	RP-210695	2377	2	**B**	Inter-node messaging for supporting intra-band EN-DC scenarios	16.4.0
	RP-91	RP-210692	2379	-	**F**	Dummifying intraFreqMultiUL-TransmissionDAPS-r16 capability	16.4.0
	RP-91	RP-210690	2384	-	**F**	HARQ-ACK codebook configuration for secondary PUCCH group	16.4.0
	RP-91	RP-210690	2385	1	**F**	Misc corrections for Rel-16 DCCA	16.4.0
	RP-91	RP-210694	2387	-	**F**	RRC corrections for NR-U	16.4.0
	RP-91	RP-210689	2391	3	**F**	Correction on SL configured grant type 1 validity under Uu RLF	16.4.0
	RP-91	RP-210692	2392	2	**F**	Inability to comply with conditional reconfiguration	16.4.0
	RP-91	RP-210691	2398	2	**F**	Miscellaneous corrections on IAB in 38.331	16.4.0
	RP-91	RP-210703	2400	1	**F**	Miscellaneous non-controversial corrections Set IX	16.4.0
	RP-91	RP-210695	2401	1	**F**	Correction on complete message at handover from NR to EN-DC	16.4.0
	RP-91	RP-210703	2402	1	**F**	Release with Redirect for connection resume triggered by NAS	16.4.0
	RP-91	RP-210691	2404	-	**F**	Correction on the configuration of Type 1 configured grant	16.4.0
	RP-91	RP-210703	2405	1	**F**	NR RRC processing time with segmentation	16.4.0
	RP-91	RP-210691	2407	1	**F**	Introduction of UE Capability and Configuration for SpCell BFR Enhancement	16.4.0
	RP-91	RP-210695	2414	2	**F**	ASN.1 guidelines for extension of lists using ToAddMod structure	16.4.0
	RP-91	RP-210692	2417	2	**F**	Corrections for DAPS Handover	16.4.0
	RP-91	RP-210689	2418	1	**F**	CR on measurement object modification	16.4.0
	RP-91	RP-210692	2419	1	**F**	Clarification on ULInformationTransferMRDC message	16.4.0
	RP-91	RP-210690	2422	1	**F**	Clarification on sCellState configuration upon SCell modification	16.4.0
	RP-91	RP-210691	2427	1	**F**	Corrections on BAP address and default BAP configuration	16.4.0
	RP-91	RP-210691	2428	2	**F**	Corrections on the default configuration with Need M	16.4.0
	RP-91	RP-210693	2429	1	**F**	Corrections on NR MDT and SON	16.4.0
	RP-91	RP-210693	2433	1	**F**	Clarification for SIBs scheduled in posSchedulingInfoList	16.4.0
	RP-91	RP-210690	2436	2	**F**	Correction on tci-PresentInDCI	16.4.0
	RP-91	RP-210689	2437	1	**F**	Miscellaneous corrections on TS 38.331	16.4.0
	RP-91	RP-210689	2440	2	**F**	Correction on C-RNTI replacement and conditions for 2-step RA	16.4.0
	RP-91	RP-210689	2445	1	**F**	Stop conditions of T320 in NR protocols	16.4.0
	RP-91	RP-210697	2447	1	**F**	CR on the Capability of PUCCH Transmissions for HARQ-ACK-38331	16.4.0
	RP-91	RP-210694	2448	1	**F**	UTRA capabilities forwarding in handover preparation	16.4.0
	RP-91	RP-210693	2449	1	**F**	Correction on SI window calculation for PosSIB	16.4.0
	RP-91	RP-210692	2450	-	**F**	[Post112-e][254][R16 MOB] Clarification of behaviour to avoid security risk in CHO based recovery after handover without key change failure	16.4.0
	RP-91	RP-210693	2457	-	**F**	Miscl corrections on SON and MDT	16.4.0
	RP-91	RP-210689	2458	-	**F**	Correction to 38.331 on intra-frequency reselection	16.4.0
	RP-91	RP-210689	2460	-	**F**	T400 expiry in timer table and protection of RRC messages	16.4.0
	RP-91	RP-210692	2461	-	**F**	Correction on NR Mobility Enhancement	16.4.0
	RP-91	RP-210690	2462	-	**F**	CR on serving cell reporting	16.4.0

	RP-91	RP-210697	2463	-	**F**	Capability for dormant BWP switching of multiple SCells	16.4.0
	RP-91	RP-210695	2466	-	**F**	Correction to PUSCH skipping with UCI without LCH-based prioritization	16.4.0
	RP-91	RP-210693	2467	-	**F**	Corrections on NR MDT and SON	16.4.0
	RP-91	RP-210692	2468	1	**F**	Correction on inter-node signalling for DAPS UE capability coordination	16.4.0
	RP-91	RP-210702	2469	-	**A**	Dummy the capability bit v2x-EUTRA	16.4.0
	RP-91	RP-210630	2470	1	**B**	Release-16 UE capabilities based on updated RAN1 and RAN4 feature lists	16.4.0
	RP-91	RP-210693	2471	-	**B**	Uplink Tx DC location reporting for two carrier uplink CA	16.4.0
	RP-91					MCC: replaced all "-v16xy" with "-v1640"	16.4.1
06/2021	RP-92	RP-211487	2413	6	**C**	Redirection with MPS Indication [Redirect_MPS_I]	16.5.0
	RP-92	RP-211474	2475	3	**F**	Corrections to the UE action upon SIB1 reception	16.5.0
	RP-92	RP-211470	2477	1	**F**	Correction on parameters of SL configured grant	16.5.0
	RP-92	RP-211474	2490	2	**F**	Corrections on the descriptions of SRS-Config	16.5.0
	RP-92	RP-211475	2494	2	**F**	Correction on T321 for autonomous gap based CGI reporting in LTE	16.5.0
	RP-92	RP-211482	2496	2	**A**	CR on RRC processing delay	16.5.0
	RP-92	RP-211475	2502	1	**F**	CR on the configuration restriction on DCI format 0_2/1_2 for unlicensed band (Option 1)	16.5.0
	RP-92	RP-211475	2505	2	**F**	Correction on description of ssb-PositionsInBurst in ServingCellConfigCommonSIB	16.5.0
	RP-92	RP-211475	2508	1	**F**	Correction on freqMonitorLocations	16.5.0
	RP-92	RP-211486	2516	3	**A**	Clean-up of INM procedure text	16.5.0
	RP-92	RP-211485	2519	3	**F**	Miscellaneous non-controversial corrections Set X	16.5.0
	RP-92	RP-211485	2527	3	**A**	Clarification on SCellIndex and servCellIndex	16.5.0
	RP-92	RP-211484	2531	2	**A**	Correction on firstActiveDownlinkBWP-Id	16.5.0
	RP-92	RP-211471	2534	3	**F**	Misc corrections for Rel-16 DCCA	16.5.0
	RP-92	RP-211483	2540	2	**F**	Correction on failureType in FailureReportSCG-EUTRA and scgFailureInfoEUTRA	16.5.0
	RP-92	RP-211471	2543	2	**F**	Clarification on NR SCG configuration within RRC Resume	16.5.0
	RP-92	RP-211484	2550	3	**A**	Clarification on SCS of active DL and UL BWP	16.5.0
	RP-92	RP-211470	2551	3	**F**	Miscellaneous corrections on TS 38.331 for NR V2X	16.5.0
	RP-92	RP-211470	2552	3	**F**	Corrections on TS 38.331 from the latest RAN1 decisions	16.5.0
	RP-92	RP-211485	2556	2	**A**	Clarification on RLC bearer handling in full configuration	16.5.0
	RP-92	RP-211472	2557	2	**F**	Miscellaenous corrections on BH RLC channel management for IAB-MT	16.5.0
	RP-92	RP-211475	2561	3	**F**	Correction on description of subCarrierSpacing in BWP	16.5.0
	RP-92	RP-211470	2562	2	**F**	Correction on releasing referenceTimePreferenceReporting and sl-AssistanceConfigNR	16.5.0
	RP-92	RP-211484	2564	3	**A**	Correction on T325	16.5.0
	RP-92	RP-211473	2565	2	**F**	Full configuration for CHO	16.5.0
	RP-92	RP-211485	2567	2	**A**	Abortion of RRC connection resume handling	16.5.0
	RP-92	RP-211470	2569	1	**F**	Transmission of UEAssistanceInformation or SidelinkUEInformationNR after conditional handover	16.5.0
	RP-92	RP-211483	2572	1	**A**	Clarification on SCellFrequencies	16.5.0
	RP-92	RP-211474	2574	1	**F**	Correction for the positioning SI offset and clarification on mapping of posSIB to SI	16.5.0
	RP-92	RP-211484	2579	2	**F**	UL Config Grant capability differentiation for FR1(TDD/FDD) / FR2	16.5.0
	RP-92	RP-211474	2580	2	**F**	Corrections on the UE capability of indication on supporting the extension of SRSresourceID	16.5.0
	RP-92	RP-211483	2581	1	**F**	Clarification on the initiation of RNA update	16.5.0
	RP-92	RP-211478	2585	3	**B**	Release-16 UE capabilities based on RAN1 and RAN4 feature lists	16.5.0
	RP-92	RP-211472	2586	-	**F**	Correction on repetition for L1-SINR	16.5.0
	RP-92	RP-211475	2590	-	**F**	Correction on reportSlotOffsetList	16.5.0
	RP-92	RP-211486	2598	1	**F**	Clarification on the Timing Reference of PSCell SMTC Configuration	16.5.0
	RP-92	RP-211478	2599	1	**F**	Introduction of the intra-NR and inter-RAT HST Capabilities and Configuration	16.5.0
	RP-92	RP-211475	2600	-	**F**	SSB-ToMeasure for NR-U	16.5.0
	RP-92	RP-211482	2602	-	**A**	Clarification on CGI reporting	16.5.0
	RP-92	RP-211471	2605	1	**F**	Miscellaneous Corrections to the SNPN	16.5.0
	RP-92	RP-211474	2609	-	**C**	Adding 400 Mhz and 600 MHz frequency separation classes	16.5.0
	RP-92	RP-211482	2615	-	**A**	Correction on CrossCarrierSchedulingConfig Introduced by Two PUCCH Group	16.5.0
	RP-92	RP-211473	2616	1	**F**	38.331 Correction on Failure Recovery via CHO for Inter-RAT Handover Failure	16.5.0
	RP-92	RP-211472	2619	1	**F**	Miscellaneous corrections on IAB	16.5.0
	RP-92	RP-211471	2626	-	**F**	Correction on RNA configuration for UE in SNPN access mode	16.5.0
	RP-92	RP-211470	2636	2	**F**	Correction of Sidelink Configured Grant Type 1 Usage During Handover	16.5.0
	RP-92	RP-211483	2639	-	A	Introduction of DL scheduling slot offset capabilities in UERadioPagingInformation	16.5.0
	RP-92	RP-211474	2644	2	F	Clarifications on the TRP definition for positioning	16.5.0
	RP-92	RP-211470	2647	1	F	Configuration of search spaces for scheduling SL transmissions	16.5.0
	RP-92	RP-211475	2652	1	F	Correction on description of msg1-SubcarrierSpacing in RACH-ConfigCommon	16.5.0
	RP-92	RP-211485	2667	1	A	Correction on flow remapping to an added DRB	16.5.0
	RP-92	RP-211483	2675	-	A	Clarification on the frequency deprioritisation	16.5.0

	RP-92	RP-211486	2686	1	A	Correction on A-CSI trigger state configuration	16.5.0
	RP-92	RP-211485	2690	1	A	RLC and PDCP Re-establishment upon RRC resume/reestablishment	16.5.0
	RP-92	RP-211471	2696	-	F	CR on CGI reporting for NPN-only cell	16.5.0
	RP-92	RP-211478	2699	-	A	Correction to ca-ParametersNR-ForDC	16.5.0
	RP-92	RP-211473	2700	-	F	Clarification on non-coexistence of CHO and DAPS	16.5.0
	RP-92	RP-211475	2702	-	F	Extending number of cells for search space switching trigger configuration	16.5.0
	RP-92	RP-211471	2703	2	C	NR-DC Cell Group capability filtering	16.5.0
	RP-92	RP-211478	2705	-	A	CR on the Fallback Band Combination Removing-R16	16.5.0
	RP-92	RP-211471	2706	-	F	SON-MDT Changes agreed in RAN2#114 meeting	16.5.0
09/2021	RP-93	RP-212444	2708	1	F	Correction on UL Skipping for PUSCH in Rel-16	16.6.0
	RP-93	RP-212442	2709	1	F	Corrections to SIB validity for NPN only cell	16.6.0
	RP-93	RP-212444	2714	-	F	Early implementation of eCall over IMS in NR	16.6.0
	RP-93	RP-212441	2715	1	F	Miscellaneous corrections on TS 38.331	16.6.0
	RP-93	RP-212443	2716	-	F	Corrections to intra-frequency cell reselection for MIB, SIB1 acquisition failure and TAC absence in SIB1	16.6.0
	RP-93	RP-212442	2723	1	F	Correction on TCI configuration for DCI format 1_2	16.6.0
	RP-93	RP-212442	2728	1	F	Correction to description of p0-AlphaSets	16.6.0
	RP-93	RP-212442	2746	1	F	Clarification on the NPN-IdentityInfoList	16.6.0
	RP-93	RP-212442	2752	1	F	Modification of measId for conditional reconfiguration	16.6.0
	RP-93	RP-212443	2754	1	F	MIB correction on subCarrierSpacingCommon	16.6.0
	RP-93	RP-212442	2760	-	F	Correction to 38.331 on the field description of msgA-TransMax	16.6.0
	RP-93	RP-212440	2763	2	F	Miscellaneous non-controversial corrections Set XI	16.6.0
	RP-93	RP-212441	2776	1	F	Corrections on RRC reconfiguration for fast MCG link recovery	16.6.0
	RP-93	RP-212442	2777	-	F	Correction on RepetitionSchemeConfig for eMIMO	16.6.0
	RP-93	RP-212438	2780	-	A	Correction on fallback band combination for SUL	16.6.0
	RP-93	RP-212439	2785	1	F	Clarification on RRC processing delay for HO from E-UTRA to NR	16.6.0
	RP-93	RP-212443	2789	1	F	CR for UE reporting Tx DC location info for the second PA	16.6.0
	RP-93	RP-212438	2793	-	A	Correction on inter-RAT measurement report triggering	16.6.0
	RP-93	RP-212439	2799	2	A	Correction on reconfigurationWithSync	16.6.0
	RP-93	RP-212442	2800	1	F	Correction to DAPS handover	16.6.0
	RP-93	RP-212442	2801	-	F	Corrections to pdsch-HARQ-ACK-CodeBookList	16.6.0
	RP-93	RP-212443	2802	-	F	SON-MDT Changes agreed in RAN2#115 meeting	16.6.0
	RP-93	RP-212442	2803	-	F	No support for CHO with SCG configuration	16.6.0
	RP-93	RP-212440	2804	2	F	CR to 38.331 on correcting Rel-15 failure type definition	16.6.0
	RP-93	RP-212442	2807	-	F	Handling of candidateBeamRSListExt-v1610 (option A1)	16.6.0
	RP-93	RP-212440	2808	-	F	FR1/FR2 differentiation for enhanced UL grant skipping capabilities	16.6.0
	RP-93	RP-212598	2810	2	C	Distinguishing support of extended band n77	16.6.0
12/2021	RP-94	RP-213341	2806	2	A	Simultaneous Rx/Tx UE capability per band pair	16.7.0
	RP-94	RP-213343	2814	1	F	Correction on msgA-SubcarrierSpacing	16.7.0
	RP-94	RP-213342	2815	1	F	Miscellaneous corrections on TS 38.331	16.7.0
	RP-94	RP-213342	2817	1	C	Duty cycle signalling for power class 1.5	16.7.0
	RP-94	RP-213344	2819	1	F	Correction for default value of rb-offset	16.7.0
	RP-94	RP-213343	2822	-	F	Correction on R16 UE capability of supportedSINR-meas-r16	16.7.0
	RP-94	RP-213344	2837	2	F	Correction on description of absoluteFrequencySSB	16.7.0
	RP-94	RP-213343	2842	1	F	Correction on condRRCReconfig field description	16.7.0
	RP-94	RP-213341	2844	1	F	Miscellaneous non-controversial corrections Set XII	16.7.0
	RP-94	RP-213343	2845	1	F	Correction to need code for drb-ContinueEHC-DL and drb-ContinueEHC-UL	16.7.0
	RP-94	RP-213343	2849	1	F	Extension of pathlossReferenceRSs	16.7.0
	RP-94	RP-213343	2857	1	F	Correction on supportNewDMRS-Port-r16 capability	16.7.0
	RP-94	RP-213343	2858	2	F	Correction on pucch-SpatialRelationInfoId-v1610	16.7.0
	RP-94	RP-213345	2859	1	C	CR on 38.331 for introducing UE capability of txDiversity	16.7.0
	RP-94	RP-213345	2862	-	F	CR on inter-frequency gapless measurement	16.7.0
	RP-94	RP-213344	2864	2	F	SON-MDT changes agreed in RAN2#116 meeting	16.7.0
03/2022	RP-95	RP-220835	2786	3	F	Adding UE capability of UL MIMO coherence for UL Tx switching	16.8.0
	RP-95	RP-220473	2874	1	F	Correction to RRC reconfiguration for IAB	16.8.0
	RP-95	RP-220835	2879	1	F	Addition of missing description on mobility support for 5G SRVCC to 3G	16.8.0
	RP-95	RP-220835	2880	1	F	Handling of ServingCellConfigCommon	16.8.0
	RP-95	RP-220835	2888	1	F	Correction on UL skipping with LCH Prioritization in Rel-16	16.8.0
	RP-95	RP-220835	2897	1	F	Correction on Positioning SRS	16.8.0
	RP-95	RP-220472	2900	1	F	Correction of NCC storage during re-establishment and Resume	16.8.0
	RP-95	RP-220473	2903	1	F	Miscellaneous corrections on TS 38.331	16.8.0
	RP-95	RP-220473	2911	-	F	Correction on conditional reconfiguraiton execution for only one triggered cell	16.8.0
	RP-95	RP-220473	2912	2	F	Introduction of sidelink power class capability indication	16.8.0
	RP-95	RP-220493	2917	1	F	Correction on inclusion of selectedPLMN-Identity in RRCResumeComplete	16.8.0
	RP-95	RP-220835	2929	1	F	Correction on invalid symbol pattern	16.8.0
	RP-95	RP-220472	2939	-	A	Clarification on SN initiated release of an SCG	16.8.0
	RP-95	RP-220473	2960	2	F	Clarification on HighSpeedConfig for HST	16.8.0
	RP-95	RP-220472	2969	-	F	Miscellaneous non-controversial corrections Set XIII	16.8.0
03/2022	RP-95	RP-220506	2459	2	D	Inclusive Language Review for TS 38.331	17.0.0
	RP-95	RP-220499	2465	2	C	Remove the maximum number of MIMO layers restrictions for SUL	17.0.0
	RP-95	RP-220486	2811	5	B	Introducing Enhancements to Integrated Access and Backhaul for NR	17.0.0

	RP-95	RP-220837	2846	1	B	Introduction of mobility-state-based cell reselection for NR HSDN [NR_HSDN]	17.0.0
	RP-95	RP-220492	2865	2	B	Introducing Enhancement of Data Collection for SON and MDT	17.0.0
	RP-95	RP-220477	2878	1	B	Introduction of NR dynamic spectrum sharing	17.0.0
	RP-95	RP-220837	2883	1	B	Introduction of MINT [MINT]	17.0.0
	RP-95	RP-220481	2887	1	B	Introduction of enhanced IIoT&URLLC support for NR	17.0.0
	RP-95	RP-220472	2889	1	F	Correction on PO determination for UE in inactive state	17.0.0
	RP-95	RP-220475	2891	2	B	Extending NR operation to 71 GHz	17.0.0
	RP-95	RP-220500	2893	1	B	Introduction of FR2 UL gap for Rel-17	17.0.0
	RP-95	RP-220497	2898	2	B	Introduction of function for RRM enhancements for Rel-17 NR FR1 HST	17.0.0
	RP-95	RP-220838	2901	1	B	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.0.0
	RP-95	RP-220476	2902	1	B	RRC CR for NR Sidelink enhancement	17.0.0
	RP-95	RP-220495	2904	1	B	Introducing support of UP IP for EPC connected architectures using NR PDCP	17.0.0
	RP-95	RP-220499	2909	1	B	RRC configuration for R17 UL Tx switching enhancement	17.0.0
	RP-95	RP-220491	2910	2	B	Introduction of SL relay	17.0.0
	RP-95	RP-220502	2913	2	B	Introduction of RRC signaling for measurement gap enhancement	17.0.0
	RP-95	RP-220488	2919	1	B	Introduction of NR RRC support for MUSIM	17.0.0
	RP-95	RP-220490	2921	1	B	NR RRC CR for RAN slicing	17.0.0
	RP-95	RP-220474	2923	1	B	Introduction of Release-17 feMIMO	17.0.0
	RP-95	RP-220961	2924	3	B	Introduction of ePowSav in TS 38.331	17.0.0
	RP-95	RP-220493	2925	1	B	Introducing NPN enhancements: Credentials Holder, UE Onboarding, and IMS emergency support in SNPNs	17.0.0
	RP-95	RP-220489	2927	-	B	Introduction of the support for UDC in NR	17.0.0
	RP-95	RP-220478	2928	2	B	Introduction of NR coverage enhancements in RRC	17.0.0
	RP-95	RP-220482	2930	2	B	Introduction of Release-17 NTN	17.0.0
	RP-95	RP-220498	2933	1	B	HST on FR2	17.0.0
	RP-95	RP-220487	2937	1	B	Introduction of SDT	17.0.0
	RP-95	RP-220496	2940	1	B	Introduction of DL 1024 QAM in NR	17.0.0
	RP-95	RP-220484	2949	1	B	Introduction of NR MBS into 38.331	17.0.0
	RP-95	RP-220836	2950	2	B	Introduction of RedCap	17.0.0
	RP-95	RP-220487	2951	1	B	Introduction of Common RACH Partitioning Aspects	17.0.0
	RP-95	RP-220479	2952	3	B	Introduction of Enhanced Positioning feature	17.0.0
	RP-95	RP-220853	2953	2	B	Explicit Indication of SI Scheduling window position [SI-SCHEDULING]	17.0.0
	RP-95	RP-220485	2954	2	B	Introduction of further multi-RAT dual-connectivity enhancements	17.0.0
	RP-95	RP-220494	2958	2	B	Introduction of QoE measurements in NR	17.0.0
06/2022	RP-96	RP-221736	2872	5	B	Early Measurements for EPS fallback [IdleMeaEPSFB]	17.1.0
	RP-96	RP-221721	2916	2	B	CR on the CBM/IBM reporting-38331	17.1.0
	RP-96	RP-221756	2998	2	B	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.1.0
	RP-96	RP-221730	3014	3	F	Correction of NR RRC support for MUSIM	17.1.0
	RP-96	RP-221720	3021	1	B	CR to TS 38.331 on Network assistant signalling for Rel-17 CRS interference mitigation	17.1.0
	RP-96	RP-221724	3039	1	F	Correction for NR coverage enhancements	17.1.0
	RP-96	RP-221719	3040	1	F	Corrections to TS 38.331 for RAN slicing	17.1.0
	RP-96	RP-221715	3055	5	F	RRC correction CR for 71 GHz	17.1.0
	RP-96	RP-221755	3057	1	F	Clarification and correction for measurement gap enhancement features	17.1.0
	RP-96	RP-221713	3061	1	A	Corrections on BAP entity release in MR DC release procedures in TS 38.331	17.1.0
	RP-96	RP-221736	3078	2	C	Distinguishing support of band n77 restrictions in Canada [n77 Canada]	17.1.0
	RP-96	RP-221736	3082	1	F	Extension of the time domain resource allocation indicator for CG type 1 with typeB repetition	17.1.0
	RP-96	RP-221712	3084	-	A	Correction on FR1-FR1 power control parameters of NR-DC	17.1.0
	RP-96	RP-221735	3086	2	F	Correction CR for QoE Measurement Collection in NR	17.1.0
	RP-96	RP-221717	3088	1	F	Correction for NR NTN WI	17.1.0
	RP-96	RP-221734	3089	1	F	Corrections for eNPN from RAN2#118	17.1.0
	RP-96	RP-221722	3090	2	F	Correction for feMIMO WI	17.1.0
	RP-96	RP-221726	3093	2	F	Correction for enhanced IIoT&URLLC support for NR	17.1.0
	RP-96	RP-221723	3094	-	F	Editorial correction for NR dynamic spectrum sharing	17.1.0
	RP-96	RP-221729	3100	2	F	SDT corrections	17.1.0
	RP-96	RP-221721	3110	1	F	Addressing FR2 UL gap RILs [Z151, Z152, A803, A804, A807, A808]	17.1.0
	RP-96	RP-221725	3121	2	F	Correction based upon Positioning RILs	17.1.0
	RP-96	RP-221736	3122	1	B	Introducing single-bit approach for MINT [MINT]	17.1.0
	RP-96	RP-221718	3134	2	F	Miscellaneous Rapporteur RRC corrections to IAB	17.1.0
	RP-96	RP-221733	3136	2	F	Miscellaneous rapporteur corrections for SON-MDT	17.1.0
	RP-96	RP-221728	3137	2	F	Corrections for further MRDC enhancements	17.1.0
	RP-96	RP-221754	3138	1	F	MBS corrections for TS 38.331	17.1.0
	RP-96	RP-221711	3142	-	A	Correction of Need Code in IE SearchSpace	17.1.0
	RP-96	RP-221756	3144	1	C	Adding UE capability of CSI reporting cross PUCCH SCell group	17.1.0
	RP-96	RP-221732	3145	2	F	Miscellaneous corrections for NR SL Relay	17.1.0
	RP-96	RP-221716	3151	1	F	Miscellaneous corrections for RedCap WI	17.1.0
	RP-96	RP-221727	3154	2	F	ePowSav corrections for 38.331	17.1.0
	RP-96	RP-221736	3164	2	F	ASN1 review general corrections	17.1.0
	RP-96	RP-221731	3170	1	F	Correction for NR UDC in 38.331	17.1.0
	RP-96	RP-221756	3176	-	A	New UE capability to limit PDCCH monitoring	17.1.0

	RP-96	RP-221729	3177	2	F	Correction for features applicable to RACH partitioning	17.1.0
	RP-96	RP-221756	3179	1	C	Introduction UE capability for CHO with SCG configuration [CHOwithDCkept]	17.1.0
	RP-96	RP-221736	3181	1	B	Introduction of gNB ID length reporting in the NR CGI report [gNB_ID_Length]	17.1.0
	RP-96	RP-221730	3182	-	F	Correction on UE behavior for NAS-based busy indication in RRC_INACTIVE	17.1.0
	RP-96	RP-221736	3183	-	C	Support of CHO with SCG configuration - 38331 [CHOwithDCkept]	17.1.0
	RP-96	RP-221712	3185	-	A	Miscellaneous corrections on TS 38.331 for NR V2X	17.1.0
	RP-96	RP-221714	3186	1	A	Clarification on the rmtc-Config-r16	17.1.0
	RP-96	RP-221728	3187	1	F	Corrections for TRS-based SCell activation	17.1.0
	RP-96	RP-221727	3190	-	A	Addressing inconsistency for RRM measurement rules	17.1.0
	RP-96	RP-221765	3193	-	A	Introduction of uplink RRC Segmentation capability	17.1.0
	RP-96	RP-221718	3194	1	B	Introducing IAB MAC CE Configurations in RRC	17.1.0
	RP-96	RP-221761	3195	-	F	Miscellaneous non-controversial corrections Set XIV	17.1.0
	RP-96	RP-221712	3197	-	A	Correction for the need code and conditions for optional fields in PC5 RRC message	17.1.0
	RP-96	RP-221563	3202	-	F	Correction on SL DRX configuration for SL Relay	17.1.0
	RP-96	RP-221794	3204	1	A	HARQ-ACK multiplexing on PUSCH in the absence of PUCCH	17.1.0
	RP-96	RP-221739	3205	1	F	Corrections for SL enhancements	17.1.0
09/2022	RP-97	RP-222524	3097	3	B	Introduction of DC location report for more than 2CCs	17.2.0
	RP-97	RP-222525	3237	3	F	Correction on RRC for 71GHz	17.2.0
	RP-97	RP-222527	3244	1	B	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.2.0
	RP-97	RP-222525	3254	1	F	Miscellaneous CR on TS 38.331 for ePowSav	17.2.0
	RP-97	RP-222519	3272	-	A	Correction to 38.331 on NPN-only cell	17.2.0
	RP-97	RP-222519	3281	1	A	NR-DC Power Control	17.2.0
	RP-97	RP-222516	3285	1	A	Corrections on s-MeasureConfig in NR	17.2.0
	RP-97	RP-222523	3289	2	F	MBS corrections for RRC	17.2.0
	RP-97	RP-222524	3303	2	F	Correction CR for QoE Measurement Collection in NR	17.2.0
	RP-97	RP-222523	3315	1	F	Correction for Simultaneous Transmission of SR and PUSCH	17.2.0
	RP-97	RP-222521	3321	1	A	Correction for SRS-PeriodicityAndOffset	17.2.0
	RP-97	RP-222522	3323	1	F	Miscellaneous corrections to NR coverage enhancements	17.2.0
	RP-97	RP-222523	3325	2	F	Corrections for Release-17 feMIMO	17.2.0
	RP-97	RP-222524	3326	2	F	Corrections for Release-17 NTN	17.2.0
	RP-97	RP-222525	3334	2	F	Corrections on TS 38.331 for RAN Slicing	17.2.0
	RP-97	RP-222525	3340	2	F	RRC corrections for SDT	17.2.0
	RP-97	RP-222518	3347	1	A	Miscellaneous CR on 38.331	17.2.0
	RP-97	RP-222524	3348	2	F	Miscellaneous corrections on TS 38.331 for SL enhancements	17.2.0
	RP-97	RP-222520	3350	-	A	Correction to add EHC context in UE Inactive AS context	17.2.0
	RP-97	RP-222523	3351	-	F	Correction to the field description of usage-pdc	17.2.0
	RP-97	RP-222524	3353	2	F	Miscellaneous correction for Positioning	17.2.0
	RP-97	RP-222523	3355	1	F	Rapporteur Miscellaneous RRC Corrections for eIAB	17.2.0
	RP-97	RP-222526	3359	3	F	Correction to MINT - applicableDisasterInfoList [MINT]	17.2.0
	RP-97	RP-222525	3362	1	F	Miscellaneous non-controversial corrections Set XV	17.2.0
	RP-97	RP-222520	3395	1	A	Correction of PUSCH repetition configuration	17.2.0
	RP-97	RP-222518	3397	1	A	Clarification of NULL security algorithm	17.2.0
	RP-97	RP-222525	3400	1	F	Miscellaneous corrections for RedCap WI	17.2.0
	RP-97	RP-222516	3407	1	A	Corrections on measurement report triggering	17.2.0
	RP-97	RP-222520	3417	1	A	Clarification on headerCompression for DAPS bearer	17.2.0
	RP-97	RP-222522	3422	2	F	Miscellaneous correction of NR RRC support for MUSIM	17.2.0
	RP-97	RP-222519	3424	1	A	Correction for PUSCH-PowerControl field descriptions for 2-step RACH	17.2.0
	RP-97	RP-222520	3430	1	A	Correction on PDCCH blind detection capability in CA	17.2.0
	RP-97	RP-222517	3438	1	A	CR on 38.331 for sn-FieldLength change for the case of bearer type change	17.2.0
	RP-97	RP-222523	3440	-	F	CR on 38.331 of field description in PUCCH-Config for PUCCH Carrier Switch	17.2.0
	RP-97	RP-222518	3451	1	A	Correction on Missing UE behavior on sidelink reset	17.2.0
	RP-97	RP-222516	3453	1	A	Clarification on codebookParametersPerBC parameter for extension of CSI-RS capabilities reporting	17.2.0
	RP-97	RP-222519	3455	1	A	Make PC1.5 an early implementation candidate	17.2.0
	RP-97	RP-222522	3459	3	F	Corrections for further MR-DC enhancements	17.2.0
	RP-97	RP-222525	3465	-	F	Correction on UE behaviour about UDC in RRC resume procedure	17.2.0
	RP-97	RP-222524	3466	1	F	RRC corrections for sidelink relay	17.2.0
	RP-97	RP-222522	3467	-	F	MsgA PUSCH resource release upon T304 expiry for SCG	17.2.0
	RP-97	RP-222525	3469	-	F	Correction for features applicable for common signalling for RACH Partitioning	17.2.0
	RP-97	RP-222523	3470	-	F	RRC Correction for SON MDT	17.2.0
	RP-97	RP-222524	3471	-	F	Correction on measurement gap enhancement configurations	17.2.0
	RP-97	RP-222521	3473	1	A	Correction on mpsPriorityIndication	17.2.0
	RP-97	RP-222524	3474	2	F	Correction for power-saving resource allocation	17.2.0
	RP-97	RP-222524	3475	-	F	Clarification on Joint Gap Configuration	17.2.0
	RP-97	RP-222527	3477	-	A	Correction to additionalSpectrumEmission for UL CA in n77 for the US	17.2.0
	RP-97	RP-222527	3478	-	F	Correction to additionalSpectrumEmission for UL CA in n77 for Canada	17.2.0
	RP-97	RP-222526	3479	-	B	Start drx-HARQ-RTT-TimerUL after last repetition [ulHARQ_RTT_Timer]	17.2.0
	RP-97	RP-222524	3480	-	F	Correction on maxNrofRemoteUE	17.2.0
	RP-97	RP-222522	3481	-	F	Corrections on CRS-IM network assistance information	17.2.0
	RP-97	RP-222553	3483	1	B	38.331 CR for introduction of MBS PDSCH FDM capabilities	17.2.0

12/2022	RP-98	RP-223404	3243	1	A	Correction to firstOFDMSymbolInTimeDomain	17.3.0
	RP-98	RP-223410	3276	5	F	FR2-2 and CCA configuration	17.3.0
	RP-98	RP-223414	3486	3	F	Correction to explicit indication of SI Scheduling window position [SI-SCHEDULING]	17.3.0
	RP-98	RP-223409	3497	2	F	CRS-IM default network configuration assumptions for MBSFN configuration in non-DSS scenario	17.3.0
	RP-98	RP-223406	3500	4	F	MBS corrections for RRC	17.3.0
	RP-98	RP-223410	3507	3	F	Clarification on the NR HST configuration	17.3.0
	RP-98	RP-223406	3532	1	A	Correction on LCID assignment for SL LCH	17.3.0
	RP-98	RP-223411	3534	5	F	Miscellaneous correction for Positioning	17.3.0
	RP-98	RP-223412	3541	3	F	Rapporteur CR on TS 38.331 for SL enhancements	17.3.0
	RP-98	RP-223414	3548	3	C	Correction on E-UTRA cell selection during emergency service fallback and EPS fallback for emergency call [CellSelection_EmergencyFallback]	17.3.0
	RP-98	RP-223412	3549	3	F	Miscellaneous RRC CR for SL relay	17.3.0
	RP-98	RP-223414	3557	2	F	Correction to disasterRoamingFromAnyPLMN [MINT]	17.3.0
	RP-98	RP-223409	3563	5	F	Corrections for further MR-DC enhancements	17.3.0
	RP-98	RP-223411	3568	3	F	Corrections to intra-band UL CA DC default location	17.3.0
	RP-98	RP-223410	3569	3	F	Corrections for Release-17 feMIMO	17.3.0
	RP-98	RP-223411	3570	2	F	Corrections for Release-17 NR NTN	17.3.0
	RP-98	RP-223414	3577	2	B	Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA [NC-PRACH-SimulTx]	17.3.0
	RP-98	RP-223410	3606	3	F	Correction to RRC for 71 GHz	17.3.0
	RP-98	RP-223413	3608	2	F	RRC corrections for SDT	17.3.0
	RP-98	RP-223410	3614	1	F	Correction to PDC in RRC	17.3.0
	RP-98	RP-223406	3619	1	A	Miscellaneous CR on 38.331	17.3.0
	RP-98	RP-223415	3621	2	B	Release-17 UE capabilities based on R1 and R4 feature lists (TS38.331)	17.3.0
	RP-98	RP-223410	3633	2	F	Clarification on the TCI assumption for RSSI measurement for FR2-2	17.3.0
	RP-98	RP-223404	3641	1	A	38.331 CR on the periodicity of the MIB	17.3.0
	RP-98	RP-223412	3656	2	F	Miscellaneous corrections on TS 38.331 for SL enhancements	17.3.0
	RP-98	RP-223404	3678	2	F	Miscellaneous non-controversial corrections Set XVI	17.3.0
	RP-98	RP-223413	3698	2	F	Corrections related to FeatureCombinationPreambles	17.3.0
	RP-98	RP-223411	3703	2	F	Correction CR for QoE measurements in NR	17.3.0
	RP-98	RP-223486	3704	2	C	Higher granularity for per-FR gap capability[MaxCCPerFRGap]	17.3.0
	RP-98	RP-223413	3709	1	F	CR on 38.331 for BFD relxation when two BFD-RS sets are configured	17.3.0
	RP-98	RP-223404	3711	2	A	Exclude the suspendConfig in the UE Inactive AS context	17.3.0
	RP-98	RP-223409	3723	-	F	Clarifications on DMRS bundling for NR Coverage Enhancements	17.3.0
	RP-98	RP-223411	3729	1	F	Corrections on VIRP configuration and gapPriority description	17.3.0
	RP-98	RP-223411	3732	1	F	Miscellaneous corrections for RedCap WI	17.3.0
	RP-98	RP-223412	3736	2	F	Clarification on the detemination of NSAG with the NSAG priority	17.3.0
	RP-98	RP-223413	3741	1	F	RLM and BFD relaxation reporting configurations are missed in the field description of otherConfig while being configured for SCG	17.3.0
	RP-98	RP-223406	3751	2	F	Correction on PUSCH configuration	17.3.0
	RP-98	RP-223407	3753	-	A	Correction on frequency hopping	17.3.0
	RP-98	RP-223407	3757	-	A	Clarification on the NR HST configuration	17.3.0
	RP-98	RP-223408	3760	2	A	Clarification on inter-frequency no gap measurements in NR-DC	17.3.0
	RP-98	RP-223409	3761	1	F	Correction to support repetition on PDSCH time domain resource allocation for DCI format 1-2	17.3.0
	RP-98	RP-223413	3764	-	F	RRC correction on update of last used cell	17.3.0
	RP-98	RP-223409	3768	-	F	Correction on re-establishment procedure while T346g is running	17.3.0
	RP-98	RP-223408	3770	1	F	RRC Correction for SON MDT	17.3.0
	RP-98	RP-223411	3771	-	F	Correction for RACH partitioning with both 2-step and 4-step RA configurations	17.3.0
03/2023	RP-99	RP-230690	3777	1	F	RRC correction on epochTime	17.4.0
	RP-99	RP-230691	3780	1	F	Corrections to control plane procedures for RedCap UEs	17.4.0
	RP-99	RP-230694	3786	-	F	Corrections to on-demand SI request	17.4.0
	RP-99	RP-230690	3795	1	F	IOT bit for inter satellite measurement (38.331)	17.4.0
	RP-99	RP-230691	3800	1	F	Correction on RACH configuration for RedCap	17.4.0
	RP-99	RP-230686	3805	1	A	Correction on T350 stop	17.4.0
	RP-99	RP-230692	3811	2	F	Clarification on ensuring valid version of SIB17	17.4.0
	RP-99	RP-230686	3816	1	A	Correction to usage of pusch-TimeDomainAllocation	17.4.0
	RP-99	RP-230693	3817	4	F	Corrections for SDT operation for REDCAP without CD-SSB	17.4.0
	RP-99	RP-230689	3818	1	F	CP corrections for NR operation to 71GHz	17.4.0
	RP-99	RP-230688	3819	1	F	SDT CP corrections	17.4.0
	RP-99	RP-230691	3820	-	F	Correction to RAN visible periodicity definition	17.4.0
	RP-99	RP-230690	3823	1	F	Clarification on measurement relaxation in NTN	17.4.0
	RP-99	RP-230689	3827	-	F	Channel Access Control for msg1/msgA in FR2-2	17.4.0
	RP-99	RP-230685	3830	-	A	Corrections for PUCCH SCell	17.4.0
	RP-99	RP-230685	3842	2	A	Clarification on RLC bearer re-association	17.4.0
	RP-99	RP-230688	3851	1	F	Miscellaneous correction of NR RRC support for MUSIM	17.4.0
	RP-99	RP-230686	3853	1	A	Correction on SRS for positioning	17.4.0
	RP-99	RP-230692	3854	1	F	Correction in Remote UE synchronization	17.4.0
	RP-99	RP-230691	3855	-	F	Clarification on QoE configuration for Layer-2 based UE-to-Network Relay	17.4.0

	RP-99	RP-230690	3861	-	F	Clarification on essential SIB19 for NR NTN	17.4.0
	RP-99	RP-230692	3865	1	F	Corrections on SL Relay	17.4.0
	RP-99	RP-230690	3868	-	F	Clarification on MBS neighbour cell list	17.4.0
	RP-99	RP-230691	3869	1	F	Corrections for eDRX on IDLE eDRX cycle	17.4.0
	RP-99	RP-230691	3870	-	F	Correction for hyperSFN on SI update	17.4.0
	RP-99	RP-230692	3874	-	F	Clarification on dl-P0-PSBCH, dl-P0-PSSCH-PSCCH and dl-P0-PSFCH for OoC Remote UE	17.4.0
	RP-99	RP-230691	3880	2	F	Correction on RRC configuration for RedCap	17.4.0
	RP-99	RP-230686	3883	1	A	Conditional inclusion of SBAS ID in posSIBs	17.4.0
	RP-99	RP-230689	3887	-	F	Correction on the field descriptions of nrofDownlinkSlots/nrofUplinkSlots	17.4.0
	RP-99	RP-230687	3890	2	A	Correction on UL RRC segmentation processing delay requirements	17.4.0
	RP-99	RP-230688	3891	2	F	RRC Configuration for Positioning Measurement Gap Activation/Deactivation Request MAC CE	17.4.0
	RP-99	RP-230694	3898	2	F	Miscellaneous non-controversial corrections Set XVII	17.4.0
	RP-99	RP-230691	3909	-	F	Correction to conditional presence of parameters for SRB4	17.4.0
	RP-99	RP-230689	3913	2	F	Corrections on feMIMO	17.4.0
	RP-99	RP-230691	3917	1	F	Correction on the filed descriptions of NeedForGaps in 38.331	17.4.0
	RP-99	RP-230685	3919	-	A	Band differentiation for capability pusch-RepetitionTypeA-r16	17.4.0
	RP-99	RP-230690	3920	-	F	CR to TS 38.331 on MBS neighbour cell list	17.4.0
	RP-99	RP-230687	3926	1	F	Correction to security protection requirement for ULDedicatedMessageSegment	17.4.0
	RP-99	RP-230689	3930	-	F	Correction on BWP for CSI-RS in TCI-State	17.4.0
	RP-99	RP-230692	3931	-	F	Corrections on 38.331	17.4.0
	RP-99	RP-230692	3932	-	F	Miscellaneous correction to SL Relay	17.4.0
	RP-99	RP-230690	3933	1	F	Miscellaneous RRC corrections for MBS	17.4.0
	RP-99	RP-230687	3935	1	A	Clarification that IAB-MT follows the UE behaviour for cell barring procedure as defined in TS 38.304	17.4.0
	RP-99	RP-230694	3936	-	F	Introducing deriveSSB-IndexFromCellInter capability for non-NCSG UEs	17.4.0
	RP-99	RP-230690	3937	-	F	Correction to PDD reporting	17.4.0
	RP-99	RP-230689	3938	-	F	Clarification on BFD-RS configuration	17.4.0
	RP-99	RP-230690	3940	-	F	Corrections on satellite ephemeris indication	17.4.0
	RP-99	RP-230689	3941	-	F	Corrections on the unified TCI-state configuration for cross cell referencing	17.4.0
	RP-99	RP-230690	3942	-	B	Release-17 MBS UE capabilities based on latest R1 feature list (TS 38.331)	17.4.0
	RP-99	RP-230689	3943	-	F	Rel.17 SON/MDT RRC Corrections	17.4.0
06/2023	RP-100	RP-231411	3894	4	A	SIB and PosSIB mappings to SI message	17.5.0
	RP-100	RP-231414	3946	3	F	Corrections on MBS Broadcast Configuration	17.5.0
	RP-100	RP-231414	3948	4	F	Correction to PDSCH Aggregation of MBS SPS	17.5.0
	RP-100	RP-231412	3956	2	F	Corrections on the figure of UE Positioning Assistance Information procedure	17.5.0
	RP-100	RP-231413	3961	2	F	Miscellaneous corrections for Ext71GHz	17.5.0
	RP-100	RP-231413	3964	2	F	Clarification for configured grant periodicity	17.5.0
	RP-100	RP-231414	3967	3	F	Corrections to paging for MBS	17.5.0
	RP-100	RP-231413	3968	2	F	Correction to RRC for 71 GHz on channel occupancy duration	17.5.0
	RP-100	RP-231414	3970	2	F	Correction on Need code of IE RLC-Config	17.5.0
	RP-100	RP-231415	3975	1	F	Correction on SI update for posSIB-r17	17.5.0
	RP-100	RP-231413	3977	2	F	Clarification to TS 38.331 on Enhanced BFR MAC CE for feMIMO	17.5.0
	RP-100	RP-231418	3979	3	F	Clarification on TN EUTRA capability reporting	17.5.0
	RP-100	RP-231410	3984	2	A	Clarification on RSSI measurement frequency	17.5.0
	RP-100	RP-231415	3988	2	F	Corrections on initial BWP configuration and NCD-SSB for RedCap	17.5.0
	RP-100	RP-231409	4001	3	A	Corrections on refServCellIndicator	17.5.0
	RP-100	RP-231418	4011	1	F	Correction on Event D1 for Rel-17 NTN	17.5.0
	RP-100	RP-231410	4013	2	A	Correction on the need code for secondary DRX group	17.5.0
	RP-100	RP-231414	4015	3	F	Correction to mtch-neighbourCell field description	17.5.0
	RP-100	RP-231415	4017	2	F	ResumeCause IE description correction	17.5.0
	RP-100	RP-231413	4020	3	F	Correction to timeSCGFailure	17.5.0
	RP-100	RP-231418	4021	3	F	Correction on missing referencing of the NTN spec in 38.331	17.5.0
	RP-100	RP-231418	4025	3	F	Correction on SMTC for NR NTN	17.5.0
	RP-100	RP-231414	4037	2	F	Corrections on MBS SPS configuration	17.5.0
	RP-100	RP-231418	4039	1	F	Clarification on T430 handling for target cell	17.5.0
	RP-100	RP-231418	4040	2	F	Correction on MIB configuration for NR NTN	17.5.0
	RP-100	RP-231414	4044	3	F	Miscellaneous RRC corrections for MBS	17.5.0
	RP-100	RP-231417	4050	2	F	Corrections to on-demand SI request	17.5.0
	RP-100	RP-231409	4053	2	A	Clarification on nas-SecurityParamFromNR field description	17.5.0
	RP-100	RP-231410	4060	3	A	Correction on pusch-RepetitionTypeB capability	17.5.0
	RP-100	RP-231416	4064	1	F	Miscellaneous corrections for SL relay	17.5.0
	RP-100	RP-231414	4065	4	F	Correction on Supporting MBS in SNPN	17.5.0
	RP-100	RP-231410	4068	1	A	Corrections including field description for transmission power	17.5.0
	RP-100	RP-231416	4069	1	F	Miscellaneous corrections on 38.331 for SL enhancements	17.5.0
	RP-100	RP-231415	4070	1	F	Clarification on applicability of slice-based RA	17.5.0
	RP-100	RP-231417	4071	1	F	Correction on measCyclePSCell used during SCG deactivation	17.5.0
	RP-100	RP-231413	4100	1	F	Corrections on R17 unified TCI framework	17.5.0
	RP-100	RP-231412	4101	1	F	Correction on scg-CellGroupConfig within RRC inter-node message	17.5.0

	RP-100	RP-231412	4102	-	F	Correction on PosSRS-RRC-Inactive-OutsideInitialUL-BWP	17.5.0
	RP-100	RP-231415	4107	1	F	Corrections on paging monitoring in eDRX	17.5.0
	RP-100	RP-231413	4110	-	F	Correction on timeSinceCHO-Reconfig in TS 38.331	17.5.0
	RP-100	RP-231418	4112	1	F	Different UE capability support between TN and NTN	17.5.0
	RP-100	RP-231416	4113	2	F	Sidelink discovery transmission upon reception of SIB12	17.5.0
	RP-100	RP-231415	4114	-	F	Control plane corrections for SDT	17.5.0
	RP-100	RP-231417	4117	2	F	Miscellaneous non-controversial corrections Set XVIII	17.5.0
	RP-100	RP-231418	4127	-	F	CR to 38.331 on Event D1	17.5.0
	RP-100	RP-231417	4132	2	A	Clarification on UAI for UL MIMO layers	17.5.0
	RP-100	RP-231416	4136	1	F	Corrections on deriving timer length of DRX timers for SL	17.5.0
	RP-100	RP-231416	4140	1	F	RRC corrections for SL Relay	17.5.0
	RP-100	RP-231410	4142	1	A	Correction to time domain resource assignment in NR-U	17.5.0
	RP-100	RP-231413	4144	1	F	Correction to RRC for 71GHz on scheduling and HARQ configuration for FR2-2	17.5.0
	RP-100	RP-231414	4147	1	F	Correction on gapAssociationPRS	17.5.0
	RP-100	RP-231413	4148	-	F	Correction on SCG failure scenario of MHI in TS 38.331	17.5.0
	RP-100	RP-231415	4154	-	F	Clarification on SDT configuration	17.5.0
	RP-100	RP-231411	4160	1	A	Clarification on reference cell for TCI state	17.5.0
	RP-100	RP-231414	4161	1	F	Correction for PLMN index in MCCH of SCell	17.5.0
	RP-100	RP-231418	4163	-	F	Correction on the description of kmac	17.5.0
	RP-100	RP-231415	4166	1	F	Correction on the applicable NSAG for slice based RA procedure	17.5.0
	RP-100	RP-231413	4167	-	F	Correction to the handling of RLF-Report after successful HO	17.5.0
	RP-100	RP-231417	4169	1	F	Support of releasing crossCarrierSchedulingConifig	17.5.0
	RP-100	RP-231416	4170	1	F	Clarification on remote UE reception of SIB1	17.5.0
	RP-100	RP-231416	4171	1	F	Handling of PC5 connection release during RRC re-establishment	17.5.0
	RP-100	RP-231411	4172	1	A	Correction on the release of logged measurement configuration as well as logged measurement information	17.5.0
	RP-100	RP-231411	4174	-	A	Correction to the setting of locationInfo in MeasResultSCG-Failure	17.5.0
09/2023	RP-101	RP-232570	3900	6	F	Addition of extended number range for NS value	17.6.0
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