

ETSI TS 138 331 V18.1.0 (2024-05)



**5G;
NR;
Radio Resource Control (RRC);
Protocol specification
(3GPP TS 38.331 version 18.1.0 Release 18)**



Reference

RTS/TSGR-0238331vi10

Keywords

5G

ETSI

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Sous-Préfecture de Grasse (06) N° w061004871

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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".
- [76] 3GPP TS 23.256: "Support of Uncrewed Aerial Systems (UAS) connectivity, identification and tracking; Stage 2".
- [77] 3GPP TS 38.355: "NR; Sidelink Positioning Protocol (SLPP); Protocol Specification".
- [78] 3GPP TS 24.588: "Technical Specification Group Core Network and Terminals; Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

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].

2Rx XR UE: Two antenna port XR UE as specified in TS 38.101-1 [15].

A2X communication: A communication to support A2X services leveraging PC5 reference points, as defined in TS 23.256 [76]. A2X services are realized by various types of A2X applications, e.g., BRID or DAA.

Additional RLC bearer: If the sidelink PDCP entity is associated with two sidelink RLC entities, the additional RLC bearer is the RLC bearer configured by *sl-RLC-BearerToAddModListSizeExt* in *sl-ConfigDedicatedNR*, or *sl-RLC-BearerConfigListSizeExt* in *SIB12* or in *SidelinkPreconfigNR*.

Aerial UE: UE performing Aerial UE communication, as defined in TS 38.300 [2], clause 16.18 and TS 23.256 [76].

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.

Data Burst: A set of multiple PDUs generated and sent by the application in a short period of time, as defined in TS 23.501 [32].

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.

eRedCap UE: A UE with enhanced reduced capabilities as specified in clause 4.2.22.1 in TS 38.306 [26].

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.

Candidate configuration: A configuration part of an *RRCReconfiguration* message associated with a candidate cell, e.g., for LTM or subsequent CPAC. A candidate configuration can be a complete candidate configuration or a delta configuration relatively to a reference configuration.

Reference configuration: A configuration provided by the network to the UE that is common, within the same cell group, to a group of configured non-complete candidate configurations.

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

Mobile IAB-MT: mobile IAB-node function that terminates the Uu interface to the parent node using the procedures and behaviours specified for UEs unless stated otherwise. The mobile IAB-MT uses the same procedures and behaviours specified for the IAB-MT, unless explicitly stated otherwise.

Mobile IAB-node: RAN node that supports NR access links to UEs and an NR backhaul link to a parent node, and that can conduct physical mobility across the RAN area. The mobile IAB-node function used in 38-series of 3GPP Specifications corresponds to the MBSR function defined in TS 23.501 [32]. The mobile IAB-node uses the same procedures and behaviours specified for the IAB-node, unless explicitly stated otherwise.

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.

Multi-path: Mode of operation of a UE in RRC_CONNECTED configured with one direct path on which the UE connects to gNB using NR Uu, and one indirect path on which the UE connects to the same gNB via another UE using PC5 unicast link or Non-3GPP Connection.

MP remote UE: A UE configured with Multi-path. When the connectivity of indirect path is PC5 unicast link, the MP remote UE is acting as a L2 U2N Remote UE. When the connectivity of indirect path is Non-3GPP Connection, the MP remote UE is acting as a N3C remote UE.

MP relay UE: A UE that provides connectivity of indirect path to a MP remote UE. When the connectivity is PC5 unicast link, the MP relay UE is acting as a L2 U2N Relay UE. When the connectivity is Non-3GPP Connection, the MP relay UE is acting as a N3C relay UE.

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*.

N3C indirect path: In Multi-path, the indirect path using Non-3GPP Connection between remote UE and relay UE.

NR sidelink communication: AS functionality enabling at least V2X Communication as defined in TS 23.287 [55] and/or A2X Communication as defined in TS 23.256 [76] and/or ProSe Communication (including ProSe UE-to-Network Relay, non-Relay communication and ProSe UE-to-UE 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, ProSe UE-to-Network Relay discovery and ProSe UE-to-UE 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.

NR sidelink positioning: AS functionality which determines geographical or relative location and possibly velocity of a target UE or ranging via PC5 interface using SL-PRS transmission and reception as defined in TS 38.305 [73] and TS 38.355 [77].

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, or between L2 U2U Remote UE and L2 U2U Relay UE, which is used to transport packets over PC5 for L2 UE-to-Network relay or L2 UE-to-UE relay.

PDU Set: one or more PDUs carrying the payload of one unit of information generated at the application level (e.g. frame(s) or video slice(s) for XR Services), as defined in TS 23.501 [32].

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.

SL indirect path: In Multi-path, the indirect path using PC5 unicast link between remote UE and relay UE.

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 DRB: In MR-DC, a DRB that supports transmission via MCG and SCG, as well as duplication of PDCP PDUs as defined in TS 37.340 [41]; or in MP, a DRB that supports transmission via direct path and indirect path, as well as duplication of PDCP PDUs.

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]; or in MP, a SRB that supports transmission via direct path and indirect path, as well as duplication of PDCP PDUs.

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.

U2U Relay UE: A UE that provides functionality to support connectivity between two U2U Remote UEs.

U2U Remote UE: A UE that communicates with other UEs via a U2U 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 or for indirect path in case of MP.

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
A2X	Aircraft-to-Everything
ACK	Acknowledgement
AM	Acknowledged Mode
ARQ	Automatic Repeat Request
AS	Access Stratum
ASN.1	Abstract Syntax Notation One
ATG	Air to Ground
BAP	Backhaul Adaptation Protocol
BCD	Binary Coded Decimal
BFD	Beam Failure Detection
BH	Backhaul
BLER	Block Error Rate
BRID	Broadcast Remote Identification
BSR	Buffer Status Report
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
CPAC	Conditional PSCell Addition or Change
CPC	Conditional PSCell Change
C-RNTI	Cell RNTI
CSI	Channel State Information
DAA	Detect And Avoid
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

DSR	Delay Status Report
DTCH	Dedicated Traffic Channel
DTX	Discontinuous Transmission
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
LTM	L1/L2 Triggered Mobility
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
MO-SDT	Mobile Originated SDT
MPE	Maximum Permissible Exposure
MP	Multi-path
MRB	MBS Radio Bearer
MR-DC	Multi-Radio Dual Connectivity
MTCH	MBS Traffic Channel
MT-SDT	Mobile Terminated SDT
MTSI	Multimedia Telephony Service for IMS
MUSIM	Multi-Universal Subscriber Identity Module
N3C	Non-3GPP Connection
N/A	Not Applicable
NCR	Network-Controlled Repeater
NCR-Fwd	NCR Forwarding
NCR-MT	NCR Mobile Termination
NE-DC	NR E-UTRA Dual Connectivity
NES	Network Energy Savings

(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
PSI	PDU Set Importance
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
SL-PRS	Sidelink Positioning Reference Signal
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
TDCP	Time Domain Channel Property
TDD	Time Division Duplex
TEG	Timing Error Group
TM	Transparent Mode
TMGI	Temporary Mobile Group Identity

TN	Terrestrial Network
TSS	Timing Synchronization Status.
U2N	UE-to-Network
U2U	UE-to-UE
UDC	Uplink Data Compression
UE	User Equipment
UL	Uplink
UM	Unacknowledged Mode
UP	User Plane
VR	Virtual Reality
VSAT	Very Small Aperture Terminal
XR	eXtended 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 and/or a DRX for PTM transmission of MBS multicast;
 - 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);
 - While T319a is running, monitors control channels associated with the shared data channel to determine if data is scheduled for it;
 - While T319a is not running, 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 T319a is not running, 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;
 - If configured for MBS multicast reception in RRC_INACTIVE, acquires multicast MCCH change notification and MBS multicast 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;
 - At lower layers, the UE may be configured with a cell specific cell DTX/DRX;
 - 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, or between a source L2 U2N Relay UE and a target L2 U2N Relay UE;
 - Network controlled MP operation.
 - 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 and/or L2 U2N relay 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.

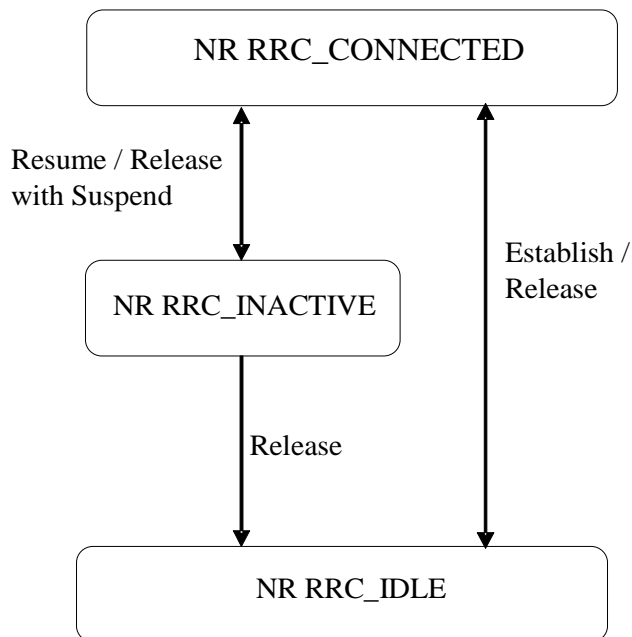


Figure 4.2.1-1: UE state machine and state transitions in NR

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.

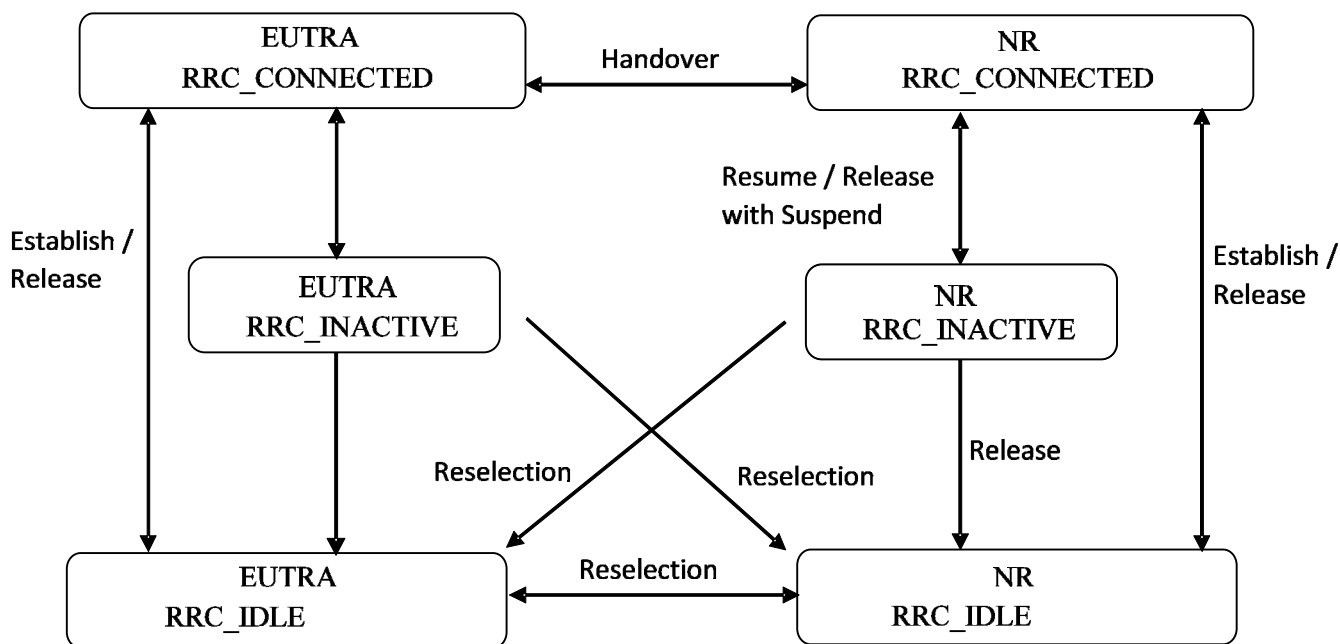


Figure 4.2.1-2: UE state machine and state transitions between NR/5GC, E-UTRA/EPC and E-UTRA/5GC

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

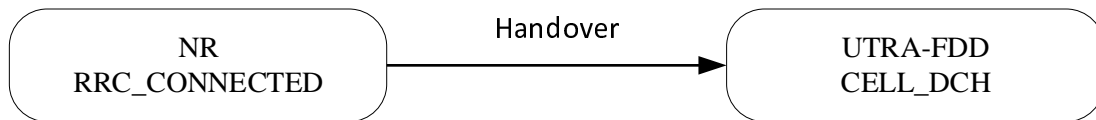


Figure 4.2.1-3: Mobility procedure supported between NR/5GC and UTRA-FDD

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 (except SRB0 of L2 U2N Remote UE);
- 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 (except SRB1 of L2 U2N Remote UE);
- SRB2 is for NAS messages and for RRC messages which include logged measurement information, all using DCCH logical channel (except SRB2 of L2 U2N Remote UE). 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.
- SRB5 is for RRC messages which include application layer measurement report information, all using DCCH logical channel. SRB5 has a lower priority than SRB1 and SRB3 and can only be configured by the SN serving the SCG when the UE is in NR-DC, 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, SRB4 and SRB5, 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 as well as MP in both SRB1 and SRB2 (split SRB is not supported for SRB0, SRB3, SRB4 and SRB5).

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 or from a source L2 U2N Relay UE to a target L2 U2N Relay UE, 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);
- In case of MP, path management including e.g. addition/modification/release of indirect path;
- 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.
- Configuration of SRAP entity and PC5 Relay RLC channels for the support of L2 U2U relay operation.
- 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.
- Configuration of side control information for NCR-node.

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 *systemInformationAreaID*;
- 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

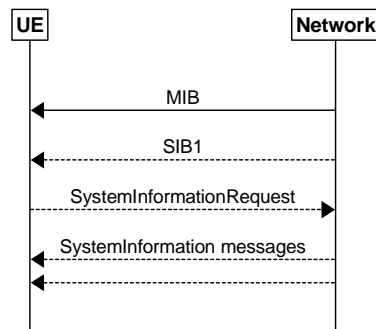


Figure 5.2.2.1-1: System information acquisition

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), *SIB19* (if UE is accessing NR via NTN access) and *SIB22* (for ATG 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 satellite switch with resynchronization, 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 (when MP is not configured) 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 *valueTag* 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 *valueTag* 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 $\text{SFN mod } m = 0$, 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 $(\text{H-SFN} * 1024 + \text{SFN}) \text{ mod } m = 0$.

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 $\text{H-SFN mod } 1024 = 0$.

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 5.8.9.3.

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 $[x \times N + K]^{\text{th}}$ PDCCH monitoring occasion (s) for SI message in SI-window corresponds to the K^{th} transmitted SSB, where $x = 0, 1, \dots, X-1$, $K = 1, 2, \dots, N$, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to $\text{CEIL}(\text{number of PDCCH monitoring occasions in SI-window}/N)$. 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 $\text{SFN} \bmod T = \text{FLOOR}(x/N)$, 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 38.211 [16];
 - 2> else if the concerned SI message is configured in the *schedulingInfoList2*:
 - 3> determine the integer value $x = (\text{si-WindowPosition} - 1) \times w$, 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 $\text{SFN} \bmod T = \text{FLOOR}(x/N)$, 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 38.211 [16];
- 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 $\text{SFN} \bmod T = \text{FLOOR}(x/N)$, 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 38.211 [16];
- 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 $\text{SFN} \bmod T = \text{FLOOR}(x/N) + 8$, 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 38.211 [16];
- 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-MSG1-Repetition* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *si-RequestConfigSUL-MSG1-Repetition* 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) associated with the applicable MSG1 repetition number in *si-RequestConfigSUL-MSG1-Repetition* 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 an (e)RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigRedCap-MSG1-Repetition* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *si-RequestConfigRedCap-MSG1-Repetition* 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) associated with the applicable MSG1 repetition number in *si-RequestConfigRedCap-MSG1-Repetition* 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 *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 an (e)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 neither a RedCap nor an eRedCap UE and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigMSG1-Repetition* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *si-RequestConfigMSG1-Repetition* are met; or
 - 2> if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *si-RequestConfigMSG1-*

Repetition and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *si-RequestConfigMSG1-Repetition* are 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) associated with the applicable MSG1 repetition number in 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 if the UE is neither a RedCap nor an eRedCap 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 an (e)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 *si-SchedulingInfo* containing *posSI-RequestConfigSUL-MSG1-Repetition* and criteria to select supplementary uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *posSI-RequestConfigSUL-MSG1-Repetition* 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) associated with the applicable MSG1 repetition number in *posSI-RequestConfigSUL-MSG1-Repetition* 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 an (e)RedCap UE and if *initialUplinkBWP-RedCap* is configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *posSI-RequestConfigRedCap-MSG1-Repetition* and criteria to select normal uplink as defined in TS 38.321[3], clause 5.1.1 is met and if criteria to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *posSI-RequestConfigRedCap-MSG1-Repetition* 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) associated with the applicable MSG1 repetition number in *posSI-RequestConfigRedCap-MSG1-Repetition* 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 *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 an (e)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 neither a RedCap nor an eRedCap UE and if *SIB1* includes *si-SchedulingInfo* containing *posSI-RequestConfigMSG1-Repetition* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *posSI-RequestConfigMSG1-Repetition* are met; or
 - 2> if the UE is an (e)RedCap UE and if *initialUplinkBWP-RedCap* is not configured in *UplinkConfigCommonSIB* and if *SIB1* includes *si-SchedulingInfo* containing *posSI-RequestConfigMSG1-Repetition* and criteria to select normal uplink and to apply MSG1 repetition as defined in TS 38.321[3], clause 5.1.1e for the concerned *posSI-RequestConfigMSG1-Repetition* are 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) associated with the applicable MSG1 repetition number in *posSI-RequestConfigMSG1-Repetition* 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 if the UE is neither a RedCap nor an eRedCap 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 an (e)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 UE does not support *nes-CellDTX-DRX*; and

2> if the access is not for ATG or the UE is not capable of ATG; and

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

3> if the UE is an (e)RedCap UE or a 2Rx XR UE and if *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*, *pdccch-ConfigSIB1*, *subCarrierSpacingCommon*, *ssb-SubcarrierOffset* and *dmrs-TypeA-Position*.

NOTE 1: A UE capable of NTN access should acquire *SIB1* to determine whether the cell is an NTN cell.

NOTE 2: A UE capable of ATG access should acquire *SIB1* to determine whether the cell is an ATG cell.

NOTE 3: A UE indicating any of the values in *nes-CellDTX-DRX* should acquire *SIB1* to determine the cell barring status when the *cellBarred* in *MIB* is set to *barred*.

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:

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

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], upon which the procedure ends;

- 3> if the UE is a fixed VSAT UE and the *cellBarredFixedVSAT* in the acquired *SIB1* is set to *barred* or the *cellBarredFixedVSAT* is not included in the acquired *SIB1*, or
- 3> if the UE is a mobile VSAT UE and the *cellBarredMobileVSAT* in the acquired *SIB1* is set to *barred* or the *cellBarredMobileVSAT* is not included in the acquired *SIB1*:
 - 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], upon which the procedure ends;
- 1> if the access is for ATG:
 - 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 *cellBarredATG* in the acquired *SIB1* is set to *barred* or the *cellBarredATG* 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 UE is a 2Rx XR UE and is in RRC_IDLE or in RRC_INACTIVE, or if the 2Rx XR UE is in RRC_CONNECTED while *T311* is running:
 - 2> if the *cellBarred2RxXR* is present in the acquired *SIB1*:
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> if the *intraFreqReselection2RxXR* is present in the acquired *SIB1*:
 - 4> perform barring based on *intraFreqReselection2RxXR* as specified in TS 38.304 [20] upon which the procedure ends;
 - 3> else:
 - 4> perform barring as if *intraFreqReselection2RxXR* is set to allowed upon which the procedure ends;
- 1> if the UE supports *nes-CellDTX-DRX* and it is in RRC_IDLE or in RRC_INACTIVE, or if the UE supporting *nes-CellDTX-DRX* is in RRC_CONNECTED while *T311* is running:

- 2> if *cellBarred* in the acquired *MIB* is set to *barred*:
 - 3> if *cellBarredNES* is absent in the acquired *SIB1*:
 - 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], upon which the procedure ends;
- 1> if the UE is an eRedCap UE and it is in RRC_IDLE or in RRC_INACTIVE, or if the eRedCap UE is in RRC_CONNECTED while *T311* is running:
 - 2> if *intraFreqReselection-eRedCap* is not present in *SIB1*:
 - 3> consider the cell as barred in accordance with TS 38.304 [20];
 - 3> perform barring as if *intraFreqReselection-eRedCap* is set to allowed upon which the procedure ends;
 - 2> else:
 - 3> if the *cellBarred-eRedCap1Rx* is present in the acquired *SIB1* and is set to *barred* and the UE is equipped with 1 Rx branch; or
 - 3> if the *cellBarred-eRedCap2Rx* 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 *intraFreqReselection-eRedCap* 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* or *frequencyBandListAerial* for downlink for TDD, or one or more of the frequency bands indicated in the *frequencyBandList* or *frequencyBandListAerial* 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* or *nr-NS-PmaxListAerial* 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 (e)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 (e)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 (e)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 (e)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 neither a RedCap nor an eRedCap UE, or for TDD if the UE is an (e)RedCap UE, or for FDD if the UE is an (e)RedCap UE and *halfDuplexRedCapAllowed* is present, or if the UE is an (e)RedCap UE and the (e)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 but not a mobile 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 nor SNPN of the equivalent SNPN list:
 - 4> consider the cell as barred in accordance with TS 38.304 [20];
- 3> else if UE is NCR-MT and if *ncr-Support* is not provided:
 - 4> consider the cell as barred in accordance with TS 38.304 [20];
- 3> else if UE is a mobile IAB-MT and if *mobileIAB-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 nor SNPN of the equivalent SNPN list:
 - 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 (e)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 (e)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 (e)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 (e)RedCap UE, of the RedCap-specific initial downlink BWP if configured;

4> if the UE is aerial UE and it supports at least one frequency band in the *frequencyBandListAerial*, for FDD from *frequencyBandListAerial* for uplink, or for TDD from *frequencyBandListAerial* for downlink, for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxListAerial*:

- 5> select the first frequency band in the *frequencyBandListAerial*, for FDD from *frequencyBandListAerial* for uplink, or for TDD from *frequencyBandListAerial* for downlink, which the UE supports and for which the UE supports at least one of the *additionalSpectrumEmission* values in *nr-NS-PmaxListAerial*;

4> else:

- 5> 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 (e)RedCap UEs in FDD, 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;

5> if configured to receive MBS multicast in RRC_INACTIVE and not indicated to stop monitoring G-RNTI for at least one MBS multicast session:

6> if SIB24 is not scheduled in SIB1 in the new cell after cell selection or cell reselection:

7> initiate an RRC connection resume procedure for multicast reception as specified in 5.3.13.1d;

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

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

- 4> forward the *UAC-AccessCategoryI-SelectionAssistanceInfo* or *UAC-ACI-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> if the UE is aerial UE and it supports at least one *additionalSpectrumEmission* values in *nr-NS-PmaxListAerial* within *frequencyBandListAerial* in *uplinkConfigCommon* for FDD or in *downlinkConfigCommon* for TDD:
 - 5> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *nr-NS-PmaxListAerial* within *frequencyBandListAerial* in *uplinkConfigCommon* for FDD or in *downlinkConfigCommon* for TDD;
- 4> else:
 - 5> 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* or *nr-NS-PmaxListAerial*:
 - 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 neither a RedCap nor an eRedCap UE, or for TDD if the UE is an (e)RedCap UE, or for FDD if the UE is an (e)RedCap UE and *halfDuplexRedCapAllowed* is present, or if the UE is an (e)RedCap UE and the (e)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 (e)RedCap UEs in FDD, 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, or *intraFreqReselection-eRedCap* for eRedCap UEs, or *intraFreqReselection2RxXR* for 2Rx XR 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*; or
 - 2> if, for the entry in *frequencyBandListAerial* 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-PmaxListAerial* within the *frequencyBandListAerial*:
 - 3> if the UE is aerial UE and it supports at least one *additionalSpectrumEmission* values in *nr-NS-PmaxListAerial* within the *frequencyBandListAerial*:
 - 4> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *nr-NS-PmaxListAerial* within *frequencyBandListAerial*;
 - 3> else:
 - 4> 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* or *nr-NS-PmaxListAerial*:
 - 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 neither a RedCap nor an eRedCap UE nor 2Rx XR UE; or
 - 3> if the UE is a RedCap UE and the *interFreqCarrierFreqList-v1700* is absent; or
 - 3> if the UE is an eRedCap UE and the *interFreqCarrierFreqList-v1800* is absent; or
 - 3> if the UE is a 2Rx XR UE and the *interFreqCarrierFreqList-v1800* is absent; or
 - 3> if the UE is a RedCap UE and *redCapAccessAllowed* is present in *interFreqCarrierFreqList-v1700*; or
 - 3> if the UE is an eRedCap UE and *eRedCapAccessAllowed* is present in *interFreqCarrierFreqList-v1800*; or
 - 3> if the UE is a 2Rx XR UE and *accessAllowed2RxXR* is present in *interFreqCarrierFreqList-v1800*:
 - 4> select the first frequency band in the *frequencyBandList* (or for aerial UE *frequencyBandListAerial*), 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* (or for aerial UE *nr-NS-PmaxListAerial*), if present:
 - 4> if, the frequency band selected by the UE in *frequencyBandList* or *frequencyBandListAerial* 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*; or
 - 5> if, for the selected frequency band, the UE supports at least one *additionalSpectrumEmission* in the *nr-NS-PmaxListAerial* within the *frequencyBandListAerial*:
 - 6> if the UE is aerial UE and it supports at least one *additionalSpectrumEmission* values in *nr-NS-PmaxListAerial* within the *frequencyBandListAerial*:
 - 7> apply the first listed *additionalSpectrumEmission* which it supports among the values included in *nr-NS-PmaxListAerial* within *frequencyBandListAerial*;
 - 6> else:
 - 7> 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* or *nr-NS-PmaxListAerial*:
 - 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 *serialNumber*, or of both *messageIdentifier* and *serialNumber* 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 *referenceTimeInfo*, the UE may perform the related actions in clause 5.7.1.3 except for ignoring all further *referenceTimeInfo* received in *SIB9*.

Upon receiving *SIB9* with *eventID-TSS*, the UE shall perform the actions below if requested by upper layers:

1> if *VarTSS-Info* has a *storedEventID*:

2> if the *storedEventID* within *VarTSS-Info* is different from the *eventID-TSS* received within *SIB9*:

3> notify upper layers that *clockQualityDetailsLevel* may have changed;

3> store the *eventID-TSS* received within *SIB9* as the *storedEventID* within *VarTSS-Info*;

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

4> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *NPN-IdentityInfoList* in *SIB1* as defined in TS 38.413 [42];

3> else:

4> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, and *PLMN-Identity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, as defined in TS 38.413 [42];

3> store the gNB identity derived from *SIB1* as the *storedGnbID* within *VarTSS-Info*.

2> else:

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

4> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *NPN-IdentityInfoList* in *SIB1* as defined in TS 38.413 [42];

3> else:

4> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, and *PLMN-Identity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, as defined in TS 38.413 [42];

3> if the *storedGnbID* within *VarTSS-Info* is different from the gNB identity derived from *SIB1*:

4> notify upper layers that *clockQualityDetailsLevel* may have changed;

4> store the gNB identity derived from *SIB1* as the *storedGnbID* within *VarTSS-Info*.

1> else:

2> store the *eventID-TSS* received within *SIB9* as the *storedEventID* within *VarTSS-Info*;

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

3> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *NPN-IdentityInfoList* in *SIB1* as defined in TS 38.413 [42];

2> else:

3> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, and *PLMN-Identity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, as defined in TS 38.413 [42];

- 2> store the gNB identity derived from *SIB1* as the *storedGnbID* value within *VarTSS-Info*;
- 2> notify upper layers that *clockQualityDetailsLevel* may have changed.

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/sl-FreqInfoListSizeExt* is included in *SIB12-IEs*:
 - 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/sl-FreqInfoListSizeExt*, as specified in 5.8.5;
 - 3> if configured to perform SL-PRS measurement:
 - 4> use the resource pool(s) indicated by *sl-RxPool* for SL-PRS measurement, as specified in 5.8.18.2;
 - 3> if configured to transmit SL-PRS:
 - 4> use the resource pool(s) indicated by *sl-TxPoolSelectedNormal*, or *sl-TxPoolExceptional* for for SL-PRS transmission, as specified in 5.8.18.3;
 - 4> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* for SL-PRS, as specified in 5.5.3.1;
 - 4> use the synchronization configuration parameters for NR sidelink positioning on frequencies included in *sl-FreqInfoList/sl-FreqInfoListSizeExt*, 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*; or
 - 4> if the UE is configured by upper layers to transmit NR sidelink L2 U2U relay discovery messages and *sl-L2U2U-Relay* is included in *SIB12*; or
 - 4> if the UE is configured by upper layers to transmit NR sidelink L3 U2U relay discovery messages and [gNB indication] 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;
 - 3> if *sl-RLC-BearerConfigListSizeExt* is included in *SIB12-IEs*:
 - 4> perform additional sidelink RLC bearer addition/modification/release as specified in 5.8.9.1a.5/5.8.9.1a.6;
- 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* in an NTN cell, the UE in RRC_CONNECTED shall:

- 1> start or restart T430 for serving cell with the timer value set to *ntn-UISyncValidityDuration* for the serving cell from the subframe indicated by *epochTime* for the serving cell;
- 1> if *SatSwitchWithReSync* and *t-Service* are included, and the UE supports hard satellite switch with resynchronization;
- 2> if *t-ServiceStart* is included and the UE supports soft satellite switch with resynchronization;

- 3> start acquiring DL synchronization with the SpCell served by the satellite indicated by *ntn-Config* in *SatSwitchWithReSync* between the time indicated by *t-ServiceStart* and the time indicated by *t-Service* for the serving cell.
- 2> perform the satellite switch with resynchronization as specified in 5.7.19 at the time indicated by *t-Service* for the serving cell.

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

5.2.2.4.24 Actions upon reception of *SIB22*

No UE requirements related to the contents of *SIB22* apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

5.2.2.4.25 Actions upon reception of *SIB23*

Upon receiving *SIB23*, the UE shall:

- 1> if the UE has stored at least one segment of *SIB23* and the value tag of *SIB23* 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 *SIB23-IEs* from the received segments;
- 2> if *sl-PosFreqInfoList* is included in *sl-PosConfigCommonNR*:
 - 3> if configured to perform SL-PRS measurement:
 - 4> use the resource pool(s) indicated by *sl-PRS-RxPool* for SL-PRS measurement, as specified in 5.8.18.2;
 - 3> if configured to transmit SL-PRS:
 - 4> use the resource pool(s) indicated by *sl-PRS-TxPoolSelectedNormal* or *sl-PRS-TxPoolExceptional* for SL-PRS transmission, as specified in 5.8.18.3;
 - 4> perform CBR measurement on the transmission resource pool(s) indicated by *sl-PRS-TxPoolSelectedNormal* or *sl-PRS-TxPoolExceptional* for SL-PRS transmission, as specified in 5.5.3.1;
 - 4> use the synchronization configuration parameters for NR sidelink positioning on frequencies included in *sl-PosFreqInfoList*, as specified in 5.8.5;

The UE should discard any stored segments for *SIB23* if the complete *SIB23* has not been assembled within a period of 3 hours. The UE shall discard any stored segments for *SIB23* upon cell (re-)selection.

5.2.2.4.26 Actions upon reception of *SIB24*

No UE requirements related to the contents of *SIB24* apply other than those specified elsewhere e.g., within procedures using the concerned system information, and/or within the corresponding field descriptions.

5.2.2.4.27 Actions upon reception of *SIB25*

No UE requirements related to the contents of *SIB25* 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, or *intraFreqReselection-eRedCap* for eRedCap UEs or *intraFreqReselection2RxXR* for 2Rx XR 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 if the UE is an eRedCap UE:
 - 4> perform barring as if *intraFreqReselection-eRedCap* is set to *allowed*;
 - 3> else if the UE is a 2Rx XR UE:
 - 4> perform barring as if *intraFreqReselection2RxXR* 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 1: 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).

NOTE 2: The *SIB22* is essential for ATG access. If UE is unable to acquire the *SIB22* for ATG 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 and NCR-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), SRB5 (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), SRB5 (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_{RRCCint}), one for the ciphering of RRC signalling (K_{RRCCenc}), 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_{RRCCint} , K_{RRCCenc} , 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 ($S-K_{gNB}$ 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

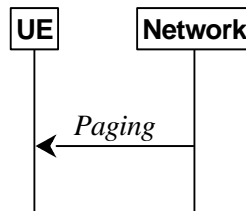


Figure 5.3.2.1-1: Paging

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;

NOTE 1: If the L2 U2N Relay UE supports the MUSIM feature, it can forward the paging cause to the connected L2 U2N Remote UE.

- 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 if *mt-SDT* indication was included in the paging message and if the conditions for initiating SDT for a resume procedure initiated in response to RAN paging according to 5.3.13.1b are fulfilled:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mt-SDT*;
 - 3> else:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set to *mt-Access*;

NOTE 2: If both conditions for initiating MT-SDT and MO-SDT according to 5.3.13.1b are fulfilled, UE may initiate RRC connection resumption procedure for MT-SDT or MO-SDT based on implementation.

NOTE 3: 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> if the UE is not configured to receive multicast in RRC_INACTIVE for at least one of the MBS sessions indicated by the *TMGI(s)* that the UE has joined; or

- 3> if *inactiveReceptionAllowed* is not included for at least one of the MBS sessions indicated by the *TMGI(s)* that the UE has joined:
 - 4> initiate the RRC connection resumption procedure according to 5.3.13 with *resumeCause* set as below:
 - 5> if the UE is configured by upper layers with Access Identity 1:
 - 6> set *resumeCause* to *mps-PriorityAccess*;
 - 5> else if the UE is configured by upper layers with Access Identity 2:
 - 6> set *resumeCause* to *mcs-PriorityAccess*;
 - 5> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:
 - 6> set *resumeCause* to *highPriorityAccess*;
 - 5> else:
 - 6> set *resumeCause* to *mt-Access*;
 - 3> else:
 - 4> start monitoring the G-RNTI(s), if configured, corresponding to the *TMGI(s)*;
 - 4> if the UE was notified to stop monitoring the G-RNTI(s) for all the joined multicast sessions that are configured for reception in *RRC_INACTIVE*:
 - 5> if multicast MCCH is present:
 - 6> start monitoring the Multicast MCCH-RNTI;
 - 6> acquire the *MBSMulticastConfiguration* message on multicast MCCH;
 - 4> else if the UE was notified to stop monitoring the G-RNTI for at least one multicast session for which the PTM configuration was not included in *RRCRelease* message:
 - 5> acquire the *MBSMulticastConfiguration* message on multicast MCCH;
 - 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> initiate 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

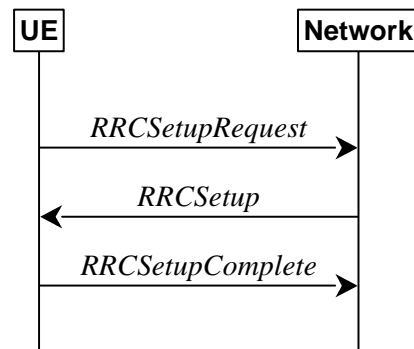


Figure 5.3.3.1-1: RRC connection establishment, successful

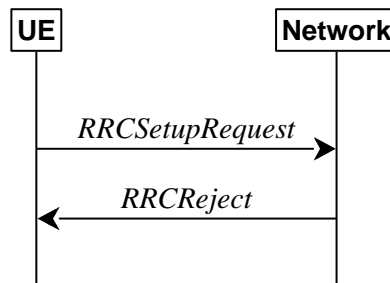


Figure 5.3.3.1-2: RRC connection establishment, network reject

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/MP operation

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/sl-FreqInfoListSizeExt* 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; or
- 1> if *RemoteUEInformationSidelink* containing the *connectionForMP* is received from a L2 U2N Remote UE as specified in 5.8.9.8.3;

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 1: 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.

For N3C relay UE in RRC_IDLE, an RRC connection establishment is initiated when a N3C remote UE indicates it to enter RRC_CONNECTED state.

NOTE 2: How/when the N3C remote UE to indicate N3C relay UE to enter RRC_CONNECTED state is left to UE implementation, e.g. before reporting relay UE information with non-3GPP connection(s).

5.3.3.1b Void

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 either by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1, or by reception of message *RemoteUEInformationSidelink* containing the *connectionForMP*, as specified in 5.3.3.1a, the L2 U2N Relay UE sets the *establishmentCause* by implementation, but: (1) for SL-RLC0, 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; and (2) for SL-RLC1, it sets the *establishmentCause* to *emergency* if the message received from the L2 U2N Remote UE via SL-RLC1 is over PC5 link established for emergency service as indicated by upper layer [72].

- 1> if *ta-Report* or *ta-ReportATG* 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 an (e)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 the UE is NCR-MT:
 - 3> indicate to NCR-Fwd to cease forwarding;
 - 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> if *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured:
 - 3> instruct the MAC entity to stop the *inactivePosSRS-ValidityAreaTAT*, if it is running;
 - 2> if the UE is configured with multicast reception in *RRC_INACTIVE*:
 - 3> reset MAC;
 - 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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* absent:
 - 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 3> release the application layer measurement configuration;
 - 3> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 3> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
 - 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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 2> if the RPLMN is not included in *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig*:
 - 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 3> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;
 - 3> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 3> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
- 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 *npr-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 but not as a mobile IAB-node:
 - 3> include the *iab-NodeIndication*;
- 2> else if connecting as a mobile IAB-node:
 - 3> include the *mobileIAB-NodeIndication*;
- 2> if connecting as an NCR-node:
 - 3> include the *ncr-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 SIB1 contains *reselectionMeasurementsNR* and the UE has valid NR reselection measurements available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig*:
 - 3> include the *reselectionMeasAvailable*;
- 2> if the UE has logged measurements available for NR and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*; or
- 2> if the UE has logged measurements available for NR and if the current registered SNPN identity is included in *snpn-ConfigIDList* 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; or
- 2> if the UE supports the override protection of the signalling based logged MDT for inter-RAT (i.e. LTE to NR), and if the *sigLoggedMeasType* in *VarLogMeasReport* of TS 36.331 [10] is included:
 - 3> if T330 timer is running (associated to the logged measurement configuration for NR or for LTE):
 - 4> set *sigLogMeasConfigAvailable* to *true* in the *RRCSetupComplete* message;
 - 3> else:
 - 4> if the UE has logged measurements in *VarLogMeasReport* or in *VarLogMeasReport* of TS 36.331 [10]:
 - 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*; or
- 2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the current registered SNPN identity is equal to *snpn-identity* stored in *VarConnEstFailReport* or any entry 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]; or
- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarRLF-Report*:
 - 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*; or
- 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessHO-Report*:
 - 3> include *successHO-InfoAvailable* in the *RRCSetupComplete* message;
- 2> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or
- 2> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessPSCell-Report*:
 - 3> include *successPSCell-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 has at least one stored application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 3> include *measConfigReportAppLayerAvailable* 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;
- 2> if the *SIB1* contains *musim-CapRestrictionAllowed*:
 - 3> if supported, include the *musim-CapRestrictionInd* in the *RRCSetupComplete* message upon determining it has temporary capability restriction;
- 2> if the UE has flight path information available:
 - 3> include *flightPathInfoAvailable*;
- 1> submit the *RRCSetupComplete* message to lower layers for transmission, upon which the procedure ends.

NOTE: Upon reception of *musim-CapRestrictionInd* in *RRCSetupComplete*, it is up to network implementation to configure the UE with a limited configuration that is used until network sends *RRCReconfiguration* based on the actual restricted UE capabilities included in *UEAssistanceInformation*.

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 is not in SNPN access mode and 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* in *networkIdentity* stored in *VarConnEstFailReport*; or
 - 3> if the UE is in SNPN access mode and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the registered SNPN identity is equal to *snpn-identity* in *networkIdentity* stored in any entry of *VarConnEstFailReportList*:
 - 4> 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:
 - 5> append the *VarConnEstFailReport* as a new entry in the *VarConnEstFailReportList*;

- 2> if UE is not in SNPN access mode and 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* in *networkIdentity* stored in *VarConnEstFailReport*; or
- 2> if the UE is in SNPN access mode and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* and if the registered SNPN identity is not equal to *snpn-identity* in *networkIdentity* stored in any entry of *VarConnEstFailReportList*:
- 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 information or connection resume failure information available in *VarConnEstFailReportList* and if the RPLMN is not equal to *plmn-identity* in *networkIdentity* stored in any entry of *VarConnEstFailReportList*;or
- 2> if the UE supports multiple CEF report and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReportList* and if the registered SNPN identity is not equal to *snpn-identity* in *networkIdentity* 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> if the UE is not in SNPN access mode:
 - 4> set the *plmn-Identity* in *networkIdentity* to the PLMN selected by upper layers (see TS 24.501 [23]) from the PLMN(s) included in the *plmn-IdentityInfoList* in *SIB1*;
 - 3> else if the UE is in SNPN access mode:
 - 4> set the *snpn-Identity* in *networkIdentity* to include the SNPN identity selected by upper layers (see TS 24.501 [23]) from the list of SNPN(s) included in the *snpn-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 reselection, 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

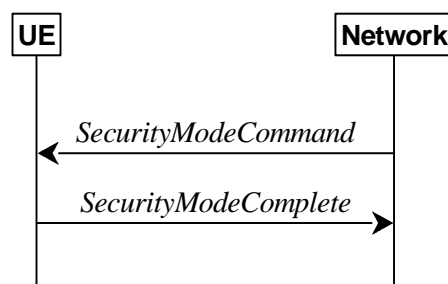


Figure 5.3.4.1-1: Security mode command, successful

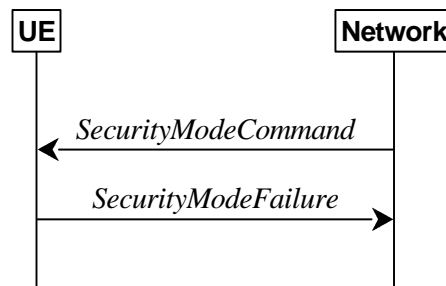


Figure 5.3.4.1-2: Security mode command, failure

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} key after 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

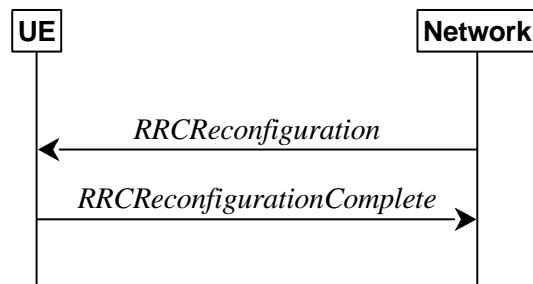


Figure 5.3.5.1-1: RRC reconfiguration, successful

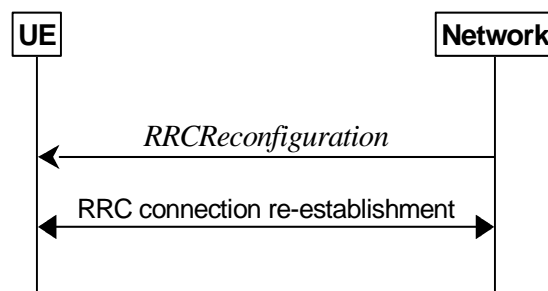


Figure 5.3.5.1-2: RRC reconfiguration, failure

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 reconfiguration configuration, to add/modify/release LTM configuration, and to add/modify/release MP 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 or indirect-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;
- reconfiguration with sync for LTM cell switch (without security key refresh), and
 - involving or not involving RA to the target LTM candidate SpCell according to a network indication;
 - MAC reset;
 - depending on a network indication, involving or not involving re-establishment of RLC and PDCP data recovery (for AM DRB).

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, to reconfigure PDCP for DRBs associated with the $S-K_{gNB}$ or SRB3, to reconfigure SDAP for DRBs associated with $S-K_{gNB}$ in NGEN-DC and NR-DC, to add/modify/release conditional PSCell change configuration or subsequent CPAC configuration, and to add/modify/release the LTM configuration associated with the SCG (only in NR-DC), 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*, *ltm-Config* (only in NR-DC), *bap-Config*, *iab-IP-AddressConfigurationList*, *otherConfig*, *appLayerMeasConfig* and/or *secondaryCellGroup* are included in *RRCReconfiguration* received via SRB3, except when *RRCReconfiguration* is received within *DLInformationTransferMRDC*.

When a clause of 5.3.5 is executed due to an LTM cell switch execution (i.e., as specified in 5.3.5.18.6) or due to a conditional reconfiguration execution for subsequent CPAC (i.e., as specified in 5.3.5.13.8), every appearance of "the received" before *RRCReconfiguration*, before a field name, or before an IE name, refers to the *RRCReconfiguration*, to the field name or to the IE, respectively, that was generated and stored by the UE as specified in 5.3.5.18.6 or 5.3.5.13.8.

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 configuration of NCR-Fwd 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 establishment of PC5 Relay RLC channels for L2 U2U Relay UE and L2 U2U Remote UE 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 and NCR, 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, CPA, or subsequent CPAC 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;
- the addition of indirect path for MP is performed only when AS security has been activated;
- the *ltm-Config* for LTM on the MCG is included only when AS security has been activated, and SRB2 with at least one DRB are setup and not suspended;
- the *ltm-Config* for LTM on the SCG is included only when at least one RLC bearer is setup in SCG.

Editor's Note: Coexistence of LTM with other features is addressed during the ASN.1 review or maintainance.

5.3.5.3 Reception of an *RRCReconfiguration* by the UE

The UE shall perform the following actions upon reception of the *RRCReconfiguration*, upon execution of the conditional reconfiguration (CHO, CPA, CPC, or subsequent CPAC), or upon execution of an LTM cell switch:

- 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 in the *condReconfigList* within the MCG and the SCG *VarConditionalReconfig* except for the entries in which *subsequentCondReconfig* is present, 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 or the LTM cell switch execution 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 or U2U 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 or U2U 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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

3> if the RPLMN is not included in *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig*:

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

4> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;

4> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;

4> consider itself not to be configured to send application layer measurement report for the *measConfigAppLayerId*;

2> if *idleInactiveReportAllowed* is included in the *RRCReconfiguration* message:

3> if the UE is configured with at least one application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

4> initiate the procedure in 5.7.16.2 after the *RRCReconfigurationComplete* has been transmitted;

2> else:

3> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

- 4> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 4> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;
 - 4> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 4> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
- 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> if the *RRCReconfiguration* message includes the *aerial-Config*:
- 2> (re)configure the aerial parameters in accordance with the included *aerial-Config*;
- 1> if the *RRCReconfiguration* message includes the *sl-IndirectPathAddChange*:
- 2> perform the SL indirect path specific configuration procedure as specified in 5.3.5.17.2.2;
- 1> if the *RRCReconfiguration* message includes the *n3c-IndirectPathAddChange*:
- 2> perform configuration procedure for the remote UE part of N3C indirect path as specified in 5.3.5.17.3.2;
- 1> if the *RRCReconfiguration* message includes the *n3c-IndirectPathConfigRelay*:
- 2> perform the configuration procedure for the relay UE part of N3C indirect path as specified in 5.3.5.17.3.3;
- 1> if the *RRCReconfiguration* message includes the *ltm-Config*:
- 2> if the *ltm-Config* is set to *setup*:
 - 3> perform the LTM configuration procedure as specified in 5.3.5.18.1;
 - 2> else:
 - 3> perform the LTM configuration release procedure as specified in clause 5.3.5.18.7;
- 1> if the *RRCReconfiguration* message includes the *srs-PosResourceSetLinkedForAggBWList*:
- 2> if *srs-PosResourceSetLinkedForAggBWList* is set to *setup*:
 - 3> perform the SRS for positioning transmission using bandwidth aggregation provided in configuration *srs-PosResourceSetLinkedForAggBW* as specified in TS 38.211 [16];
 - 2> else:
 - 3> release all the configuration of *srs-PosResourceSetLinkedForAggBW*;
- 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;
 - 4> if a new *sk-Counter* value has been selected due to the conditional reconfiguration execution for subsequent CPAC:
 - 5> include *selectedSK-Counter* and set its value to the selected *sk-Counter* value;
 - 3> if the *RRCReconfiguration* message is applied due to conditional reconfiguration execution and *condExecutionCondPSCell* is configured for the selected PSCell:
 - 4> include in the *selectedPSCellForCHO-WithSCG* and set it to the information of the selected PSCell;

- 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*; or
 - 3> if the UE has logged measurements available for NR and if the current registered SNPN identity is included in *snpn-ConfigIDList* stored in the *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; or
 - 3> if the UE supports the override protection of the signalling based logged MDT for inter-RAT (i.e. LTE to NR), and if the *sigLoggedMeasType* in *VarLogMeasReport* of TS 36.331 [10] is included:
 - 4> if T330 timer is running (associated to the logged measurement configuration for NR or for LTE):
 - 5> set *sigLogMeasConfigAvailable* to *true* in the *RRCReconfigurationComplete* message;
 - 4> else:
 - 5> if the UE has logged measurements in *VarLogMeasReport* or in *VarLogMeasReport* of TS 36.331 [10]:
 - 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*; or
 - 3> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the registered SNPN identity is equal to *snpn-identity* in *networkIdentity* stored in *VarConnEstFailReport* or any entry 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]; or
 - 3> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in *VarRLF-Report*:
 - 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*; or
- 3> if the UE has successful handover information available in *VarSuccessHO-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessHO-Report*:
 - 4> include *successHO-InfoAvailable* in the *RRCReconfigurationComplete* message;
- 3> if the UE supports logging the successful PSCell change or addition information, release *successPSCell-Config* configured by the source PCell, if available;
- 3> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or
- 3> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessPSCell-Report*:
 - 4> include *successPSCell-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; or
 - 4> if the *RRCReconfiguration* message includes the *needForInterruptionConfigNR* and set it to *enabled*; or
 - 4> if the *needForInterruptionConfigNR* is enabled and the *NeedForInterruptionInfoNR* 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;
 - 5> if the *needForInterruptionConfigNR* is enabled:
 - 6> include the *needForInterruptionInfoNR* and set the contents as follows:
 - 7> include *intraFreq-needForInterruption* with the same number of entries, and listed in the same order, as in *intraFreq-needForGap*;
 - 7> for each entry in *intraFreq-needForInterruption*:
 - 8> include *interruptionIndication* and set the interruption requirement information if the corresponding entry in *intraFreq-needForGap* is set to *no-gap*;
 - 7> include *interFreq-needForInterruption* with the same number of entries, and listed in the same order, as in *interFreq-needForGap*;
 - 7> for each entry in *interFreq-needForInterruption*:

- 8> include *interruptionIndication* and set the interruption requirement information if the corresponding entry in *interFreq-needForGap* is set to *no-gap*;
- 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;
- 2> if the UE has (updated) flight path information available:
 - 3> if the UE had not provided a flight path information since last entering *RRC_CONNECTED* state; or
 - 3> if at least one waypoint or a timestamp corresponding to a waypoint location that was not previously provided since last entering *RRC_CONNECTED* state is available; or
 - 3> if at least one upcoming waypoint or a timestamp corresponding to a waypoint location that was previously provided since last entering *RRC_CONNECTED* state is to be removed; or
 - 3> if *flightPathUpdateDistanceThr* is configured and, for at least one waypoint, the 3D distance between the previously provided location and the new location is more than the distance threshold configured by *flightPathUpdateDistanceThr*; or
 - 3> if *flightPathUpdateTimeThr* is configured and, for at least one waypoint, the time difference between the previously provided timestamp and the new timestamp, if available, is more than the time threshold configured by *flightPathUpdateTimeThr*;
 - 4> include *flightPathInfoAvailable*;

NOTE 0c: If neither *flightPathUpdateDistanceThr* nor *flightPathUpdateTimeThr* is configured, it is up to UE implementation whether to include *flightPathInfoAvailable* when updated flight path information is available.

2> if the UE has at least one stored application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

3> include *measConfigReportAppLayerAvailable*;

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 or subsequent CPAC which is configured via *conditionalReconfiguration* contained in *nr-SCG* within *mrdc-SecondaryCellGroup*; or
 - 2> if the *RRCReconfiguration* is applied due to an LTM cell switch execution:
 - 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> if the *RRCReconfiguration* message is not applied due to an LTM cell switch execution for which lower layer indicate to skip the Random Access procedure:
 - 5> initiate the Random Access procedure on the PSCell, as specified in TS 38.321 [3];
 - 4> if the UE was configured with *successPSCell-Config* when connected to the source PSCell (for PSCell change) or to the PCell (for PSCell addition or change):
 - 5> perform the actions for the successful PSCell change or addition report determination as specified in clause 5.7.10.7, upon successfully completing the Random Access procedure triggered for the *reconfigurationWithSync* in *spCellConfig* of the SCG;
 - 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];
 - 6> if the UE was configured with *successPSCell-Config* when connected to the source PSCell (for PSCell change) or to the PCell (for PSCell addition or change):
 - 7> perform the actions for the successful PSCell change report determination as specified in clause 5.7.10.7, upon successfully completing the Random Access procedure triggered for the *reconfigurationWithSync* in *spCellConfig* of the SCG;
 - 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> if the *RRCReconfiguration* includes the *reconfigurationWithSync* in *spCellConfig* for the SCG; and
 - 3> if the UE was configured with *successPSCell-Config* when connected to the source PSCell (for PSCell change) or to the PCell (for PSCell addition or change):
 - 4> perform the actions for the successful PSCell change report determination as specified in clause 5.7.10.7, upon successfully completing the Random Access procedure triggered for the *reconfigurationWithSync* in *spCellConfig* of the SCG;
 - 3> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or

- 3> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessPSCell-Report*:
 - 4> include *successPSCell-InfoAvailable* in the *RRCReconfigurationComplete* message;
- 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* or *ta-ReportATG* 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 *sl-IndirectPathAddChange* was included in *RRCReconfiguration* message:
 - 2> if SRB1 is configured as split SRB and *pdcp-Duplication* is configured:
 - 3> when successfully sending *RRCReconfigurationComplete* message via SL indirect path (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE):
 - 4> stop timer T421;
 - 2> else (i.e. split SRB1 with duplication is not configured):
 - 3> when receiving *RRCReconfigurationCompleteSidelink* message from target L2 U2N Relay UE:
 - 4> stop timer T421;
 - 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); or,
 - 1> if *rach-LessHO* was included in *reconfigurationWithSync* included in *spCellConfig* of an MCG, and upon indication from lower layers that the RACH-less handover has been successfully completed; or,
 - 1> if *reconfigurationWithSync* was included in *spCellConfig* of an MCG or SCG and the *RRCReconfiguration* message is applied due to an LTM cell switch execution and upon an indication from lower layer that the LTM cell switch execution has been successfully completed:

- 2> stop timer T304 for that cell group if running;
- 2> if *sl-PathSwitchConfig* was included in *reconfigurationWithSync*:
 - 3> if the *sl-IndirectPathMaintain* is not included in *reconfigurationWithSync*:
 - 4> stop timer T420;
 - 4> release all radio resources, including release of the RLC entities and the MAC configuration at the source side;
 - 4> reset MAC used in the source cell;
 - 3> else (*sl-IndirectPathMaintain* is included):
 - 4> release radio resources on the direct path, including release of the RLC entities and the MAC configuration;
 - 4> reset MAC used in the source cell;
- 2> if *rach-LessHO* was included in *reconfigurationWithSync* and *cg-NTN-Configuration* was configured:
 - 3> release the uplink grant configured for RACH-less handover;

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 *RRCReconfiguration* message is applied due to a conditional reconfiguration execution and the *subsequentCondReconfig* is included in the entry in *VarConditionalReconfig* containing the *RRCReconfiguration* message:
 - 3> for each entry in the *condReconfigList* within the MCG and the SCG *VarConditionalReconfig*:
 - 4> if there is an entry in *condExecutionCondToAddModList* within the *subsequentCondReconfig* that has *subsequentCondReconfigId* matching the *condReconfigId* in the entry of the *condReconfigList*:

- 5> if *subsequentCondExecutionCond* is included in the entry of the *condExecutionCondToAddModList*:
 - 6> store in the *condExecutionCond* in the entry of the *condReconfigList* the value of *subsequentCondExecutionCond* in the entry of the *condExecutionCondToAddModList*;
- 5> if *subsequentCondExecutionCondSCG* is included in the entry of the *condExecutionCondToAddModList*:
 - 6> store in the *condExecutionCondSCG* in the entry of the *condReconfigList* the value of *subsequentCondExecutionCondSCG* in the entry of the *condExecutionCondToAddModList*;
- 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, CPC, or subsequent CPAC was configured:
 - 3> remove all the entries in the *condReconfigList* within the MCG and the SCG *VarConditionalReconfig* except for the entries in which *subsequentCondReconfig* is present, 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> if the *reportConfigId* is not associated with any *measId* indicated by the *condExecutionCond* or the *condExecutionCondSCG* in an entry of *condReconfigList* in *VarConditionalReconfig* in which *subsequentCondReconfig* is included:
 - 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*; and
 - 4> if the *measObjectId* is not associated with any *measId* indicated by the *condExecutionCond* or the *condExecutionCondSCG* in an entry of *condReconfigList* in *VarConditionalReconfig* in which *subsequentCondReconfig* is included:
 - 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 or an LTM cell switch procedure, 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 or the wait timer for the MUSIM associated with the concerned UE assistance information with the timer value set to the value in corresponding configuration;
 - 3> if *SIB12* is provided by the target PCell, and the UE initiated transmission of a *SidelinkUEInformationNR* message indicating a change of NR sidelink communication/discovery related parameters relevant in target PCell (i.e. change of *sl-RxInterestedFreqList* or *sl-TxResourceReqList*) during the last 1 second

preceding reception of the *RRCReconfiguration* message including *reconfigurationWithSync* in *spCellConfig* of an MCG; or

- 3> if the *RRCReconfiguration* message is applied due to a conditional reconfiguration execution and the UE is capable of NR sidelink communication/discovery and *SIB12* is provided by the target PCell, and the UE has initiated transmission of a *SidelinkUEInformationNR* message since it was configured to do so in accordance with 5.8.3.2:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message in accordance with 5.8.3.3;
- 3> for each application layer measurement configuration:
 - 4> if application layer measurement report container has been received from upper layers for which the successful transmission of the *MeasurementReportAppLayer* message or at least one segment of the message via SRB4 (if *reconfigurationWithSync* was included in *masterCellGroup*) or SRB5 (if *reconfigurationWithSync* was included in *secondaryCellGroup*) has not been confirmed by lower layers:
 - 5> if RRC segmentation was used for the *MeasurementReportAppLayer* message:
 - 6> if RRC segmentation is enabled based on the field *rrc-SegAllowedSRB4* or *rrc-SegAllowedSRB5* for the *reportingSRB* (or SRB4 if *reportingSRB* is not configured):
 - 7> re-submit all segments of the *MeasurementReportAppLayer* message to lower layers for transmission via the *reportingSRB* (or SRB4 if *reportingSRB* is not configured);
 - 6> else:
 - 7> discard all segments of the *MeasurementReportAppLayer* message;
 - 5> else:
 - 6> re-submit the *MeasurementReportAppLayer* message to lower layers for transmission via the *reportingSRB* (or SRB4 if *reportingSRB* is not configured);
 - 2> if *reconfigurationWithSync* was included in *masterCellGroup* and the target cell provides *SIB21* or provides *SIB1* including *non-ServingCellMII*:
 - 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> for each application layer measurement configuration that is part of the SCG configuration:
 - 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 3> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*, if stored;
 - 3> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 3> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
- 2> discard any application layer measurement reports which were configured to be reported via SRB5 and which were not yet fully submitted to lower layers for transmission;
- 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 in the *condReconfigList* within the MCG *VarConditionalReconfig* for which *subsequentCondReconfig* is not present and 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 1: 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;

1> if the *CellGroupConfig* contains the *ncr-FwdConfig*:

2> perform the NCR-Fwd configuration as specified in 5.3.5.5.14;

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

2> consider itself to be allowed to deny any transmission in a particular UL slot if during the number of slots indicated by *autonomousDenialValidity*, preceding and including this particular slot, it autonomously denied fewer UL slots than indicated by *autonomousDenialSlots* within the same cell group;

NOTE 2: When counting the number of denied UL slots, the UE sums up the denied UL slots across all serving cells within the same cell group. When counting the number of slots indicated by *autonomousDenialValidity*, the UE sums up the UL slots across all serving cells within the same cell group.

NOTE 3: When multiple denied UL slots across all serving cells partially or fully overlap in the time domain, the number of denied UL slots across all serving cells is counted as one denied UL slot, based on the longest slot.

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> if the UE supports RLF-Report for fast MCG recovery procedure as specified in TS 38.306 [26]:
 - 4> set the *elapsedTimeT316* in the *VarRLF-Report* to the value of the elapsed time of the timer T316;
 - 4> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;
 - 3> else:
 - 4> 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> apply the value of the *newUE-Identity* as the C-RNTI;
 - 2> if *sl-IndirectPathMaintain* is not included in *reconfigurationWithSync*:
 - 3> consider the target L2 U2N Relay UE to be the one indicated by the *targetRelayUE-Identity* in the *sl-PathSwitchConfig*;
 - 3> start timer T420 for the corresponding target L2 U2N Relay UE with the timer value set to *t420*, as included in the *sl-PathSwitchConfig*;
 - 3> indicate to upper layer (to trigger the PC5 unicast link establishment) with the target L2 U2N Relay UE indicated by the *targetRelayUE-Identity*;
 - 3> apply the default configuration of SL-RLC1 as defined in 9.2.4 for SRB1;
 - 2> else:
 - 3> consider the serving cell of the L2 U2N relay UE to be the serving cell;
 - 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-UISyncValidityDuration* 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 *spCellConfigCommon*;
 - 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 *spCellConfigCommon*;
 - 3> if *rach-LessHO* is included:

- 4> configure lower layers in accordance with *rach-LessHO* for the target SpCell;
- 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> if the *sl-IndirectPathMaintain* is not included in *reconfigurationWithSync*:
 - 4> 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.

NOTE 4: The MP direct path release is realized by direct-to-indirect path switch procedure (i.e. *sl-PathSwitchConfig* and *sl-indirectPathMaintain* included in *RRCReconfiguration* message), where MP is configured in source side.

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 and is not configured with MP:
 - 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 *RRConfigReconfiguration* 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 bandwidth 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 *RRCCConnectionReconfiguration* message or embedded in an E-UTRA *RRCCConnectionResume* message, or received in an *RRCReconfiguration* message embedded in an *RRCReconfiguration* message or embedded in an E-UTRA *RRCCConnectionReconfiguration* 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 or N3C 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 or N3C 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*.

5.3.5.5.14 NCR-Fwd configuration

The NCR-MT shall:

- 1> if *ncr-FwdConfig* is set to *setup*:
 - 2> if *ncr-FwdConfig* includes periodic forwarding resource configuration:
 - 3> indicate to NCR-Fwd to forward in accordance with the configured periodic forwarding resource set(s);

- 1> else (*ncr-FwdConfig* is set to *release*):
 - 2> release NCR-Fwd configuration;
 - 2> indicate to NCR-Fwd to cease forwarding.

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*, *srb4-ToRelease* or *srb5-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 *mrbs-ToReleaseList*:
 - 2> perform multicast MRB release as specified in 5.3.5.6.6;
- 1> if the *RadioBearerConfig* includes the *mrbs-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;
- 1> if *srb5-ToRelease* is included:
 - 2> release the PDCP entity and the *srb-Identity* of the SRB5.

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 $K_{RRCiint}$ 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 $K_{RRCiint}$ 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 $K_{RRCiint}$ 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;
- 2> if the *n3c-BearerAssociated* is included for a DRB:
 - 3> consider this radio bearer to be associated with the N3C indirect path;
- 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;
- 2> if the *n3c-BearerAssociated* is included for a DRB:
 - 3> consider this radio bearer to be associated with the N3C indirect path;

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 $S\text{-}K_{gNB}$ 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)) or if the procedure was initiated due to selection of an *sk-Counter* for conditional reconfiguration execution for subsequent CPAC (UE is in NR-DC):
 - 2> derive or update the secondary key (S- K_{gNB} or S-KeNB) based on the K_{gNB} key and using the received or selected *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* or an *sk-Counter* is selected for subsequent CPAC 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 *searchSpaceMTCH* 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*; or,
- 3> if the *RRCReconfiguration* message was received as part of *lrm-Config*:
 - 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*; or,
- 3> if the *RRCReconfiguration* message was received as part of *lrm-Config*:
 - 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 and NCR, 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, CPC, and subsequent CPAC execution (when the message is required to be applied).

NOTE 4: It is up to UE implementation whether the compliance check for an *RRCReconfiguration* message received as part of an *LTM-Config* IE is performed upon the reception of the message or during an LTM cell switch procedure (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*, successful handover report, and successful PSCell change or addition report (if received for the associated cell group);

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 *successPSCell-Config*:

- 2> if *thresholdPercentageT304-SCG* is included:

- 3> consider itself to be configured by the target PSCell to provide the successful PSCell change or addition information in accordance with 5.7.10.7;

- 2> if *sn-InitiatedPSCellChange* is included in the received *otherConfig*:

- 3> consider itself to be configured by the source PSCell to provide the successful PSCell change or addition information in accordance with 5.7.10.7;

- 2> else if *sn-InitiatedPSCellChange* is not included in the received *otherConfig*:

- 3> consider itself to be configured by the PCell to provide the successful PSCell change or addition information in accordance with 5.7.10.7;

- 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 *musim-GapPriorityAssistanceConfig*:
 - 2> consider itself to be configured to provide MUSIM assistance information for gap(s) priority in accordance with 5.7.4;
- 1> else:
 - 2> consider itself not to be configured to provide MUSIM assistance information for gap(s) priority;
- 1> if the received *otherConfig* includes the *musim-CapabilityRestrictionConfig*:
 - 2> if *musim-CapabilityRestrictionConfig* is set to *setup*:
 - 3> consider itself to be configured to provide MUSIM assistance information for capability restriction in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide MUSIM assistance information for capability restriction and stop timer T348 and T346n, 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.
- 1> if the received *otherConfig* includes the *multiRx-PreferenceReportingConfigFR2*:
 - 2> if the *multiRx-PreferenceReportingConfigFR2* is set to *setup*:
 - 3> consider itself to be configured to provide its preference on multi-Rx operation for FR2 in accordance with 5.7.4;
 - 2> else:
 - 3> consider itself not to be configured to provide its preference on multi-Rx operation for FR2 and stop timer T346m, if running.
- 1> if the received *otherConfig* includes the *aerial-FlightPathAvailabilityConfig*:
 - 2> consider itself to be configured to indicate the availability of flight path information in accordance with 5.7.4;
- 1> if the received *otherConfig* includes the *ul-TrafficInfoReportingConfig*:
 - 2> if *ul-TrafficInfoReportingConfig* is set to *setup*:
 - 3> consider itself to be configured to provide UL traffic information in accordance with 5.7.4;
 - 2> else:

- 3> consider itself not to be configured to provide UL traffic information and stop all instances of timer T3461, if running.

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:

$$\text{SFN mod } T = \text{FLOOR}(\text{Offset}/10);$$

$$\text{subframe} = \text{Offset mod } 10;$$
 with $T = \text{musim-GapRepetition}/10$;
 - 3> set the MUSIM gap priority configuration indicated by *musim-GapPriorityToAddModList*, if configured, for each periodic MUSIM gap;

NOTE: If network does not configure the relative priorities among MUSIM gaps as indicated by the UE, UE behaviour is not specified.

- 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:

$$\text{SFN} = \text{starting-SFN};$$

$$\text{subframe} = \text{startingSubframe};$$
 - 2> keep all colliding MUSIM gaps as specified in TS 38.133 [14], if *musim-GapKeep* is configured;
- 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 SRB5, 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> release *successPSCell-Config* configured by the PCell in the *otherConfig*, 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> release all application layer measurement configurations including their fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*, if stored;
- 2> discard any received application layer measurement reports from upper layers;
- 2> consider itself not to be configured to send application layer measurement reports;

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 can also configure the UE with one or more candidate target PCells associated with one or more candidate target PSCells. The UE evaluates the conditions for the candidate target PCells and the associated candidate target PSCells in parallel and applies a target configuration that include PCell and PSCell for which the associated execution conditions are fulfilled. If there are multiple candidate PSCells associated with one candidate target PCell, the network provides multiple conditional configurations for the same candidate target PCell, i.e., each configuration contains one MCG configuration (for the same candidate target PCell) and one SCG configuration (for one of the multiple associated candidate PSCells). For this case, the network may also provide a complementary CHO only configuration, i.e., there is execution condition only for candidate PCell.

The network provides the configuration parameters for the target SpCell(s) 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;
- 1> if the *ConditionalReconfiguration* contains the *scpac-ReferenceConfiguration*:
 - 2> perform subsequent CPAC reference configuration addition/removal as specified in 5.3.5.13.6;
- 1> if the *ConditionalReconfiguration* contains the *sk-CounterConfiguration*:
 - 2> perform *sk-CounterList* addition/modification/removal as specified in 5.3.5.13.7;
- 1> if the *ConditionalReconfiguration* contains the *servingSecurityCellSetId*:
 - 2> if the current *VarServingSecurityCellSetID* includes *servingSecurityCellSetId*:
 - 3> replace the *servingSecurityCellSetId* value within *VarServingSecurityCellSetID* with the received *servingSecurityCellSetID*;
 - 2> else:
 - 3> store the received *servingSecurityCellSetId* within *VarServingSecurityCellSetID*.

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 1: The UE does not consider the message as erroneous if the *condReconfigToRemoveList* includes any *condReconfigId* value that is not part of the current UE configuration.

NOTE 2: Void.

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*, *condExecutionCondSCG*, or *condExecutionCondPSCell*;
 - 3> replace *condExecutionCond*, *condExecutionCondSCG*, or *condExecutionCondPSCell* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;
 - 2> if the entry in *condReconfigToAddModList* includes *subsequentCondReconfig* containing *condExecutionCondToAddModList*:
 - 3> for each *condReconfigId* received in *condExecutionCondToAddModList*:
 - 4> if an entry with the matching *condReconfigId* exists in the *condExecutionCondToAddModList* within *VarConditionalReconfig*;
 - 5> replace the entry in *condExecutionCondToAddModList* within *VarConditionalReconfig* with the value received for this *condReconfigId*;
 - 4> else:
 - 5> add a new entry in *condExecutionCondToAddModList* within *VarConditionalReconfig* with the value received for this *condReconfigId*;
 - 2> if the entry in *condReconfigToAddModList* includes *subsequentCondReconfig* containing *condExecutionCondToReleaseList*:

- 3> for each *condReconfigId* received in *condExecutionCondToReleaseList* that is part of current stored *condExecutionCondToAddModList* within *VarConditionalReconfig*:
- 4> remove the entry in *condExecutionCondToAddModList* within *VarConditionalReconfig* with the value received for this *condReconfigId*;

NOTE 1: The UE does not consider the message as erroneous if the *condExecutionCondToReleaseList* includes any *condReconfigId* value that is not part of the current UE configuration.

- 2> if the entry in *condReconfigToAddModList* includes a *securityCellSetId*;
- 3> replace *securityCellSetId* within the *VarConditionalReconfig* with the value received for this *condReconfigId*;

NOTE 2: The UE should release the entry within *VarServingSecurityCellSetID* in case all the subsequent CPAC configurations are released.

- 2> if the entry in *condReconfigToAddModList* includes a *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> if the associated *condExecutionCondPSCell* is configured:
 - 4> 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; and
 - 4> 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 *nr-SCG* within the received *condRRCREconfig* to be applicable cell;
 - 3> else:
 - 4> 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> if 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* is not the PSCell; and
 - 4> if the *condReconfigToAddMod* for the *condReconfigId* does not include *subsequentCondReconfig*; or
 - 4> if there is no *condReconfigToAddMod* which includes *subsequentCondReconfig* for the PSCell; or

- 4> if the *condReconfigToAddMod* for the *condReconfigId* includes *subsequentCondReconfig* and there is a *condReconfigToAddMod* which includes *subsequentCondReconfig* with a matching *condReconfigId* value in *condExecutionCondToAddModList* for the PSCell:
 - 5> consider the cell to be applicable cell;
- 2> if *condExecutionCondSCG* is configured and *condExecutionCond* is not 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 the *condExecutionCondPSCell* is configured:
 - 3> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCondPSCell* as a *measId* in the *VarMeasConfig* associated with the MCG *measConfig*;
- 2> if *condExecutionCond* is configured and *condExecutionCondSCG* is not 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> if *subsequentCondReconfig* is included in the entry in MCG *VarConditionalReconfig* associated with this *condReconfigId*:
 - 3> if the UE is in NR-DC:
 - 4> in the remainder of the procedure, consider each *measId* indicated in the *condExecutionCondSCG* 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*, *condExecutionCondSCG*, or *condExecutionCondPSCell* associated to *condReconfigId*:
 - 3> if the *condTriggerConfig* is not configured with *nesEvent*:
 - 4> 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
 - 4> if the *condEventId* is associated with *condEventD1* or *condEventD2*, 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
 - 4> 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*;
 - 5> consider the event associated to that *measId* to be fulfilled;

- 4> if the *measId* for this event associated with the *condReconfigId* has been modified; or
- 4> 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
- 4> if the *condEventId* is associated with *condEventD1* or *condEventD2*, 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
- 4> 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*:
 - 5> consider the event associated to that *measId* to be not fulfilled;
- 3> else:
 - 4> if NES mode indication is received from lower layers, indicating that the NES-specific CHO execution condition of the PCell is enabled; and
 - 4> 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*:
 - 5> consider the event associated to that *measId* to be fulfilled;
 - 4> if the *measId* for this event associated with the *condReconfigId* has been modified; or
 - 4> if NES mode indication is received from lower layers, indicating that the NES-specific CHO execution condition of the PCell is disabled; or
 - 4> 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*:
 - 5> consider the event associated to that *measId* to be not fulfilled;
- 2> if *condExecutionCondPSCell* is not configured:
 - 3> if event(s) associated to all *measId(s)* within *condTriggerConfig* for the applicable cell are fulfilled:
 - 4> consider the applicable cell, associated to that *condReconfigId*, as a triggered cell;
 - 4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;
 - 2> else:
 - 3> if event(s) associated to all *measId(s)*, as indicated in the *condExecutionCond* and *condExecutionCondPSCell*, within *condTriggerConfig* for a target candidate cell within the stored *condRRCRconfig* are fulfilled:
 - 4> consider the target candidate PCell within the stored *condRRCRconfig*, associated to that *condReconfigId*, as a triggered PCell;
 - 4> consider the target candidate PSCell within the stored *condRRCRconfig*, associated to that *condReconfigId*, as a triggered PSCell;

- 4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5.
- 2> if one of the events associated to the *measIds* within *condTriggerConfig* for the applicable cell within the stored *condRRCReconfig* is not configured with *nesEvent*, and the other event associated to the *measIds* within *condTriggerConfig* for the applicable cell within the stored *condRRCReconfig* is configured with *nesEvent*, and at least one of them is fulfilled:
 - 3> consider the applicable cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;
 - 3> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;

NOTE 1: Up to 2 *MeasId* can be configured for each *condReconfigId*, if *condExecutionCondPSCell* is not configured. 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.

NOTE 3: For CHO with candidate SCG(s), up to 2 *MeasId* can be configured for *condExecutionCond* and up to 2 *MeasId* can be configured for *condExecutionCondPSCell* for each *condReconfigId*.

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 pair of triggered PCell and associated triggered PSCell exist:
 - 2> select one of the triggered PCell(s) and the associated triggered PSCell(s) as the selected cells for conditional reconfiguration execution;

- 1> else if only one pair of triggered PCell and associated triggered PSCell exists:
 - 2> consider the triggered PCell and the associated triggered PSCell as the selected cells for conditional reconfiguration execution;
- 1> else 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(s) of conditional reconfiguration execution:
 - 2> if the *subsequentCondReconfig* is included in the entry in *VarConditionalReconfig* containing the *RRCReconfiguration* message for the selected cell:
 - 3> perform the actions as specified in 5.3.5.13.8;
 - 2> else:
 - 3> 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.

5.3.5.13.6 Subsequent CPAC reference configuration addition/removal

The UE shall:

- 1> if the *scpac-ReferenceConfiguration* is set to *setup*:
 - 2> if *scpac-ReferenceConfiguration* exists within the *VarConditionalReconfig*:
 - 3> replace the *scpac-ReferenceConfiguration* within the *VarConditionalReconfig*;
 - 2> else:
 - 3> store the *scpac-ReferenceConfiguration* within the *VarConditionalReconfig*;
- 1> else (if *scpac-ReferenceConfiguration* is set to *release*):
 - 2> remove the *scpac-ReferenceConfiguration* within the *VarConditionalReconfig*;

5.3.5.13.7 sk-Counter configuration addition/modification/removal

The UE shall:

- 1> for each *securityCellSetId* received in the *sk-CounterConfigToAddModList* IE:
 - 2> if an entry with the matching *securityCellSetId* exists in the *sk-CounterConfigToAddModList* within the *VarConditionalReconfig*:
 - 3> replace the *sk-CounterList* within the *VarConditionalReconfig* with the *sk-CounterList* according to the received *securityCellSetId*;
 - 2> else:
 - 3> add a new entry for this *securityCellSetId* within the *VarConditionalReconfig*;
- 1> for each *securityCellSetId* value included in the *sk-CounterConfigToRemoveList* that is part of the current *sk-CounterConfigToAddModList* in *VarConditionalReconfig*:
 - 2> remove the entry with the matching *securityCellSetId* from the *sk-CounterConfigToAddModList*;

5.3.5.13.8 Subsequent CPAC execution

Upon the conditional reconfiguration execution for subsequent CPAC, the UE shall:

- 1> if the selected subsequent CPAC candidate configuration is stored in *MCG VarConditionalReconfig*:
 - 2> release/clear all current dedicated radio configuration except for the following:
 - the MCG C-RNTI;
 - the AS security configurations associated with the master key and the secondary key;
 - for each SRB/DRB in current UE configuration:
 - keep the associated PDCP and SDAP entities, their state variables, buffers and timers;
 - release all fields related to the SRB/DRB configuration except for *srb-Identity* and *drb-Identity*;
 - the UE variables *VarConditionalReconfig* and *VarServingSecurityCellSetID*.
 - 2> release/clear all current common radio configuration;
 - 2> reset MCG MAC;
 - 2> apply the default MAC Cell Group configuration for MCG MAC and SCG MAC as specified in 9.2.2;
 - 2> use the default values specified in 9.2.3 for timers T310, T311 and constants N310, N311;
- 1> else:
 - 2> release/clear all current dedicated radio configuration associated with the SCG except for the following:
 - the AS security configurations associated with the secondary key;
 - for each SRB/DRB in current UE configuration which is using the secondary key:
 - keep the associated RLC, PDCP and SDAP entities, their state variables, buffers and timers;
 - release all fields related to the SRB/DRB configuration except for *srb-Identity* and *drb-Identity*;
 - the UE variables *VarConditionalReconfig*.
 - 2> release/clear all current common radio configuration associated with the SCG;
 - 2> apply the default MAC Cell Group configuration for the SCG MAC as specified in 9.2.2;
 - 2> use the default values specified in 9.2.3 for timers T310, T311 and constants N310, N311 for the cell group for which the subsequent CPAC execution procedure is triggered;
- 1> if the *securityCellSetId* is included in the entry in *VarConditionalReconfig* containing the *RRCReconfiguration* message:
 - 2> if *servingSecurityCellSetId* is not included within *VarServingSecurityCellSetID*; or
 - 2> if the value of the *securityCellSetId* is not equal to the value of *servingSecurityCellSetId* within *VarServingSecurityCellSetID*:
 - 3> consider the first *sk-Counter* value in the *sk-CounterList* associated with the *securityCellSetId* within the *VarConditionalReconfig* as the selected *sk-Counter* value, and perform security key update procedure as specified in 5.3.5.7;
 - 3> remove the selected *sk-Counter* value from the *sk-CounterList* associated with the *securityCellSetId* within the *VarConditionalReconfig*;
 - 3> if the current *VarServingSecurityCellSetID* includes *servingSecurityCellSetId*:
 - 4> replace the value of *servingSecurityCellSetId* within *VarServingSecurityCellSetID* with the value of *securityCellSetId* associated with the selected cell;

- 3> else:
 - 4> store the *servingSecurityCellSetId* within *VarServingSecurityCellSetID* with the value of *securityCellSetId* associated with the selected cell;
- 1> if the selected subsequent CPAC candidate configuration is stored in the SCG *VarConditionalReconfig*:
 - 2> for each *drb-Identity* value included in *RadioBearerConfig* associated with the secondary key (S- K_{gNB}) as indicated by *keyToUse* that is part of the current UE configuration, the UE shall perform the following actions after the end of this procedure:
 - 3> if the bearer is an AM DRB:
 - 4> trigger the PDCP entity of the bearer to perform PDCP data recovery as specified in TS 38.323 [5];
 - 3> re-establish the corresponding RLC entity as specified in TS 38.322 [4];
 - 2> for each *srb-Identity* included in *RadioBearerConfig* that is part of the current UE configuration and if the radio bearer is SRB3, UE shall perform the following actions after the end of this procedure:
 - 3> trigger the PDCP entity of SRB to perform SDU discard as specified in TS 38.323 [5];
 - 3> re-establish the corresponding RLC entity as specified in TS 38.322 [4];
- 1> else:
 - 2> for each *drb-Identity* value included in *RadioBearerConfig* that is part of the current UE configuration, the UE shall perform the following actions after the end of this procedure:
 - 3> if a different *keyToUse* value is configured; or
 - 3> if the bearer is associated with the secondary key (S- K_{gNB}) as indicated by *keyToUse* and a new *sk-Counter* value has been selected due to the conditional reconfiguration execution for subsequent CPAC:
 - 4> if the PDCP entity of this DRB is not configured with *cipheringDisabled*:
 - 5> configure the PDCP entity with the ciphering algorithm and KUPenc key associated with the master key (K_{gNB}) 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;
 - 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_{gNB}) or the secondary key (S- K_{gNB}) as indicated in *keyToUse*;
 - 4> if *drb-ContinueROHC* is included in *pdcp-Config*:
 - 5> indicate to lower layer that *drb-ContinueROHC* is configured;
 - 4> if *drb-ContinueEHC-DL* is included in *pdcp-Config*:
 - 5> indicate to lower layer that *drb-ContinueEHC-DL* is configured;
 - 4> if *drb-ContinueEHC-UL* is included in *pdcp-Config*:
 - 5> indicate to lower layer that *drb-ContinueEHC-UL* is configured;
 - 4> if *drb-ContinueUDC* is included in *pdcp-Config*:
 - 5> indicate to lower layer that *drb-ContinueUDC* is configured;
 - 4> trigger the PDCP entity of the bearer to perform PDCP re-establishment as specified in TS 38.323 [5];
 - 3> else:
 - 4> if the bearer is an AM DRB:

- 5> trigger the PDCP entity of the bearer to perform PDCP data recovery as specified in TS 38.323 [5];
- 3> re-establish the corresponding RLC entity as specified in TS 38.322 [4];
- 2> for each *srb-Identity* included in *RadioBearerConfig* that is part of the current UE configuration and if the radio bearer is SRB3, the UE shall perform the following actions after the end of this procedure:
 - 3> if a new *sk-Counter* value has been selected due to the conditional reconfiguration execution for subsequent CPAC:
 - 4> configure the PDCP entity to apply the integrity protection algorithm and K_{RRCint} key associated with the 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 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;
 - 4> trigger the PDCP entity of SRB to perform PDCP re-establishment as specified in TS 38.323 [5];
 - 3> else:
 - 4> trigger the PDCP entity of SRB to perform SDU discard as specified in TS 38.323 [5];
 - 3> re-establish the corresponding RLC entity as specified in TS 38.322 [4];
- 1> if *scpac-ConfigComplete* is not included within the *VarConditionalReconfig* for the selected cell:
 - 2> if the subsequent CPAC candidate cell configuration is stored in MCG *VarConditionalReconfig*:
 - 3> consider *scpac-ReferenceConfiguration* in MCG *VarConditionalReconfig* to be the current UE configuration;
 - 2> else:
 - 3> consider *scpac-ReferenceConfiguration* in SCG *VarConditionalReconfig* to be the current SCG configuration;

NOTE 1: When the UE considers the reference configuration to be the current UE configuration, the UE should store fields and configurations that are part of the reference configuration but should not execute any actions or procedures triggered by the reception of an *RRCReconfiguration* message which are described in clause 5.3.5.3.

- 1> apply the stored *condRRCReconfig* of the selected cell(s) and perform the actions as specified in 5.3.5.3;
- 1> release the radio bearer(s) and the associated logical channel(s) that are part of the current UE configuration but not part of the subsequent CPAC candidate configuration for the selected cell, or the subsequent CPAC reference configuration (in case the subsequent CPAC candidate configuration does not include *scpac-ConfigComplete*).

NOTE 2: When *scpac-ConfigComplete* is not included for the selected cell, before a subsequent CPAC execution, a UE implementation may generate and store an RRC reconfiguration message by applying the received subsequent CPAC candidate configuration on top of the subsequent CPAC reference configuration, and the stored RRC reconfiguration message is applied for subsequent CPAC execution. The UE needs to ensure that the RRC reconfiguration applied at the time of subsequent CPAC execution is in accordance with the latest received *scpac-ReferenceConfiguration* and *condRRCReconfig* for the subsequent CPAC configuration.

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 *RRCCConnectionReconfiguration* and SRB3 is not to be released according to any *RadioBearerConfig* included in the *RRCReconfiguration* or in the *RRCCConnectionReconfiguration* 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 *RRCCConnectionReconfiguration* 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 *RRCCConnectionReconfiguration* 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:

$$\text{SFN mod } T = \text{FLOOR}(\text{gapOffset}/10);$$
 if the UGRP is larger than 5ms:

$$\text{subframe} = \text{gapOffset mod } 10;$$
 else:

$$\text{subframe} = \text{gapOffset or } (\text{gapOffset} + 5);$$
 with $T = \text{CEIL}(\text{UGRP}/10)$.

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-ServCellAsynchCA* 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 reports received from upper layers;
 - 3> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*, if stored;
 - 3> consider itself not to be configured to send application layer measurement reports 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:
 - 4> forward the *measConfigAppLayerId*, the *ran-VisiblePeriodicity*, if configured, the *numberOfBufferLevelEntries*, if configured, and the *reportPayoutDelayForMediaStartup*, 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 not all segments, or full message, has been submitted to lower layers for transmission;
 - 4> if the memory reserved for storing application layer measurement report containers becomes full while the reporting is paused:
 - 5> if the reports are associated with a configuration including *appLayerMeasPriority*:
 - 6> discard reports in priority order where reports with the lowest priority are discarded first, and among reports with equal associated priority, discard reports in the order they were received, where older reports are discarded first;
 - 5> else:
 - 6> discard reports in the order they were received, where older reports are discarded first;
- 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*;
- 3> if *appLayerIdleInactiveConfig* is configured:
 - 4> store the received *qoe-Reference*, *measConfigAppLayerId*, *serviceType*, *qoe-MeasurementType*, *qoe-AreaScope*, *mce-Id*, *availableRAN-VisibleMetrics* and *appLayerMeasPriority* (if included) in *VarAppLayerIdleConfig*;
 - 4> if the *qoe-AreaScope* includes *plmn-IdentityList*:
 - 5> set *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig* to include the RPLMN as well as the PLMNs included in *plmn-IdentityList*;

4> else:

5> set *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig* to include the RPLMN;

NOTE 1: The UE may discard reports when the memory reserved for storing application layer measurement report containers becomes full. If no or equal *appLayerMeasPriority* is configured, older reports are discarded first.

NOTE 2: The transmission of RAN visible application layer measurement reports and *appLayerSessionStatus* is not paused when *pauseReporting* is set to *true*.

NOTE 3: The UE may discard an application layer measurement configuration and associated unsent reports after 48 hours in RRC_IDLE. The time duration stops incrementing and is reset to zero if the UE is transferred to RRC_CONNECTED.

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/sl-FreqInfoToAddModListExt* 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> if configured to perform SL-PRS measurement:
 - 3> use the resource pool(s) indicated by *sl-RxPool* and/or *sl-PRS-RxPool* for SL-PRS reception, as specified in 5.8.18.2;
 - 2> if configured to transmit SL-PRS:
 - 3> use the resource pool(s) indicated by *sl-PRS-TxPoolSelectedNormal*, *sl-PRS-TxPoolScheduling* or *sl-PRS-TxPoolExceptional* for SL-PRS transmission, as specified in 5.8.18.3;
 - 2> perform CBR measurement on the transmission resource pool(s) indicated by *sl-TxPoolSelectedNormal*, *sl-TxPoolScheduling*, *sl-PRS-TxPoolSelectedNormal*, *sl-PRS-TxPoolScheduling*, *sl-DiscTxPoolSelected*, *sl-DiscTxPoolScheduling*, *sl-TxPoolExceptional* or *sl-PRS-TxPoolExceptional* for NR sidelink communication/discovery/positioning transmission, as specified in 5.5.3;
 - 2> use the synchronization configuration parameters for NR sidelink communication/discovery/positioning on frequencies included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt*, 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-RLC-BearerToReleaseListSizeExt* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> perform additional sidelink RLC bearer release as specified in 5.8.9.1a.5;
 - 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-RLC-BearerToAddModListSizeExt* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> perform additional sidelink RLC bearer addition/modification as specified in 5.8.9.1a.6;
 - 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-ConfigGC-BC* is included in *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 2> 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 *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 or U2U Relay UE configuration

5.3.5.15.1 General

The network configures the L2 U2N or U2U Relay UE with relay operation related configurations. For each connected L2 U2N or U2U 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 L2 U2N relay operation related configurations.

The L2 U2U Relay UE shall:

- 1> if *sl-L2RelayUE-Config* is set to setup:
 - 2> if the *sl-L2RelayUE-Config* contains the *sl-U2U-RemoteUE-ToReleaseList*:
 - 3> perform the L2 U2U Remote UE release as specified in 5.3.5.15.2;
 - 2> if the *sl-L2RelayUE-Config* contains the *sl-U2U-RemoteUE-ToAddModList*:
 - 3> perform the L2 U2U 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 L2 U2U relay operation related configurations.

5.3.5.15.2 L2 U2N or U2U 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.

The L2 U2U Relay UE shall:

- 1> if the release is triggered by reception of the *sl-U2U-RemoteUE-ToReleaseList*:
 - 2> for each *SL-DestinationIdentity* value included in the *sl-U2U-RemoteUE-ToReleaseList*:
 - 3> if the current UE has a PC5-RRC connection to a L2 U2U Remote UE with this *SL-DestinationIdentity*:
 - 4> release the configuration associated with the L2 U2U Remote UE.

5.3.5.15.3 L2 U2N or U2U 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*;

The L2 U2U 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 target L2 U2U Remote UE indicated in *sl-L2IdentityRemote* value included in the *sl-U2U-RemoteUE-ToAddModList* that is not part of the current UE configuration (target L2 U2U Remote UE Addition):
 - 2> for each source L2 U2U Remote UE indicated in *sl-SourceUE-Identity* in accordance with one entry of the *sl-SourceRemoteUE-ToAddModList*, configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigU2U*;

- 1> for each target L2 U2U Remote UE indicated in *sl-L2IdentityRemote* value included in the *sl-U2U-RemoteUE-ToAddModList* that is part of the current UE configuration (target L2 U2U Remote UE modification):
 - 2> for each source L2 U2U Remote UE indicated in *sl-SourceUE-Identity* included in the *sl-SourceRemoteUE-ToReleaseList* (source L2 U2U Remote UE Release):
 - 3> release the configuration associated with the source L2 U2U Remote UE;
 - 2> for the source L2 U2U Remote UE indicated in *sl-SourceUE-Identity* included in the *sl-SourceRemoteUE-ToAddModList* that is not part of the current UE configuration (source L2 U2U Remote UE Addition):
 - 3> configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigU2U*;
 - 2> for the source L2 U2U Remote UE indicated in *sl-SourceUE-Identity* included in the *sl-SourceRemoteUE-ToAddModList* that is part of the current UE configuration (source L2 U2U Remote UE modification):
 - 3> modify the configuration in accordance with the *sl-SRAP-ConfigU2U*;

5.3.5.16 L2 U2N or U2U Remote UE configuration

The network configures the L2 U2N or U2U 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 L2 U2N relay operation related configurations.

The L2 U2U Remote UE shall:

- 1> if *sl-L2RemoteUE-Config* is set to *setup*:
 - 2> if the *sl-L2RemoteUE-Config* contains the *sl-U2U-RelayUE-ToReleaseList*:
 - 3> perform the L2 U2U Relay UE release as specified in 5.3.5.16.1;
 - 2> if the *sl-L2RemoteUE-Config* contains the *sl-U2U-RelayUE-ToAddModList*:

- 3> perform the L2 U2U Relay UE addition/modification as specified in 5.3.5.16.2;
- 1> else if *sl-L2RemoteUE-Config* is set to release:
 - 2> release the L2 U2U relay operation related configurations.

5.3.5.16.1 L2 U2U Relay UE Release

The L2 U2U Remote UE shall:

- 1> if the release is triggered by reception of the *sl-U2U-RelayUE-ToReleaseList*:
 - 2> for each SL-DestinationIdentity value included in the *sl-U2U-RelayUE-ToReleaseList*:
 - 3> release the configuration associated with the L2 U2U Relay UE.

5.3.5.16.2 L2 U2U Relay UE Addition/Modification

The L2 U2U Remote 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 L2 U2U Relay UE indicated in *sl-L2IdentityRelay* value included in the *sl-U2U-RelayUE-ToAddModList* that is not part of the current UE configuration (L2 U2U Relay UE Addition):
 - 2> for peer target L2 U2U Remote UE indicated in *sl-TargetUE-Identity* in accordance with one entry of the *SL-PeerRemoteUE-ToAddModList*:
 - 3> configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigU2U*;
- 1> for each L2 U2U Relay UE indicated in *sl-L2IdentityRelay* value included in the *sl-U2U-RelayUE-ToAddModList* that is part of the current UE configuration (L2 U2U Relay UE modification):
 - 2> for each peer target L2 U2U Remote UE included in the *sl-PeerRemoteUE-ToReleaseList* (peer target L2 U2U Remote UE Release):
 - 3> release the configuration associated with the peer target L2 U2U Remote UE;
 - 2> for the peer target L2 U2U Remote UE indicated in *sl-TargetUE-Identity* included in the *sl-PeerTargetRemoteUE-ToAddModList* that is not part of the current UE configuration (peer target L2 U2U Remote UE Addition):
 - 3> configure the parameters to SRAP entity in accordance with the *sl-SRAP-ConfigU2U*;
 - 2> for the peer target L2 U2U Remote UE indicated in *sl-TargetUE-Identity* included in the *sl-PeerTargetRemoteUE-ToAddModList* that is part of the current UE configuration (peer target L2 U2U Remote UE modification):
 - 3> modify the configuration in accordance with the *sl-SRAP-ConfigU2U*;

5.3.5.17 MP configuration

5.3.5.17.1 Introduction

In case of MP, a MP remote UE is configured with one direct path (i.e. MCG) and one indirect path. The MP remote UE connects to network on the direct path using NR Uu, and connects to network on the indirect path via a MP relay UE.

On indirect path, for the hop between the MP remote UE and the MP relay UE, when the MP remote UE connects to a L2 U2N Relay UE, i.e. the MP remote UE is acting as a L2 U2N Remote UE, the network provides the configuration of SL indirect path to the MP remote UE and the L2 U2N Relay UE as specified in 5.3.5.17.2; when the MP remote UE

connects to a N3C relay UE using non-3GPP connection, the network provides the configuration of N3C indirect path to the MP remote UE and the N3C relay UE as specified in 5.3.5.17.3.

5.3.5.17.2 Configuration of SL indirect path

5.3.5.17.2.1 General

For SL indirect path:

- the L2 U2N Remote UE is provided with sidelink dedicated configuration as specified in 5.3.5.14, L2 U2N Remote UE configuration as specified in 5.3.5.16, and SL indirect path specific configuration as specified in 5.3.5.17.2.2;
- the L2 U2N Relay UE is provided with sidelink dedicated configuration as specified in 5.3.5.14, L2 U2N Relay UE configuration as specified in 5.3.5.15, as well as Uu Relay RLC channel configuration as specified in 5.3.5.5.12 and 5.3.5.5.13.

5.3.5.17.2.2 SL indirect path specific configuration

The L2 U2N Remote UE shall:

- 1> if *sl-IndirectPathAddChange* is set to setup:
 - 2> if the *sl-IndirectPathMaintain* is not included in *reconfigurationWithSync*:
 - 3> consider the UE indicated by the *sl-IndirectPathRelayUE-Identity* to be the (target) L2 U2N Relay UE and indicate to upper layer to trigger the PC5 unicast link establishment with the L2 U2N Relay UE;
 - 3> start timer T421 for the corresponding L2 U2N Relay UE with the timer value set to *T421*;
 - 3> indicate to upper layer (to trigger the PC5 unicast link release) with the source L2 U2N Relay UE in case of SL indirect path change (i.e. a new L2 U2N Relay UE is indicated via *sl-IndirectPathRelayUE-Identity*);
 - 2> else (i.e. the *sl-IndirectPathMaintain* is included in *reconfigurationWithSync*):
 - 3> consider the source L2 U2N Relay UE to be the L2 U2N Relay UE on indirect path in MP operation;
- 1> else if *sl-IndirectPathAddChange* is set to release:
 - 2> consider the SL indirect path is released and release the corresponding configurations;
 - 2> indicate to upper layer (to trigger the PC5 unicast link release) with the L2 U2N Relay UE.

NOTE: The MP direct path addition is realized by indirect-to-direct path switch procedure (i.e. *ReconfigurationWithSync* included in *RRCReconfiguration* message), where *sl-IndirectPathAddChange* is set to *setup* in *RRCReconfiguration* message.

5.3.5.17.2.3 T421 expiry (Indirect path addition/change failure)

The L2 U2N Remote UE shall:

- 1> if T421 expires; or
- 1> if the (target) L2 U2N Relay UE (i.e., the UE indicated by *sl-IndirectPathRelayUE-Identity* in the received *sl-IndirectPathAddChange*) changes its serving PCell to a different cell from the target cell (i.e. the cell indicated by *sl-IndirectPathCellIdentity* in the received *sl-IndirectPathAddChange*) before path addition or change:
 - 2> if MCG transmission is not suspended:
 - 3> initiate the indirect path failure information procedure as specified in clause 5.7.3c to report indirect path addition/change failure;
 - 2> else:

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

5.3.5.17.3 Configuration of N3C indirect path

5.3.5.17.3.1 General

For N3C indirect path,

- the N3C remote UE is provided with N3C indirect path configuration including relay UE identification as specified in 5.3.5.17.3.2;
- the N3C relay UE is provided with N3C indirect path configuration including bearer mapping configurations as specified in 5.3.5.17.3.4, as well as Uu Relay RLC channel configuration as specified in 5.3.5.5.12 and 5.3.5.5.13.

NOTE: The data transmission/reception between the N3C remote UE and the N3C relay UE via the non-3GPP connection is outside the scope of 3GPP.

5.3.5.17.3.2 N3C remote UE configuration

The N3C remote UE shall:

- 1> if *n3c-IndirectPathAddChange* is set to setup:
 - 2> consider the non-3GPP connection with the relay UE indicated by the *n3c-RelayIdentification* to be used for the N3C indirect path;
 - 2> consider the source non-3GPP connection is not to be used in case of N3C indirect path change (i.e. a new relay UE is indicated by the *n3c-RelayIdentification*);
- 1> else if *n3c-IndirectPathAddChange* is set to release:
 - 2> consider the indirect path is not to be used and release the corresponding configuration.

Editor's Note: whether T421 is applicable to scenario 2.

5.3.5.17.3.3 N3C relay UE configuration

The N3C relay UE shall:

- 1> if *n3c-IndirectPathConfigRelay* is set to setup:
 - 2> if *n3c-MappingToReleaseList* is included:
 - 3> perform N3C bearer mapping release as specified in 5.3.5.17.3.4.1;
 - 2> if *n3c-MappingToAddModList* is included:
 - 3> perform N3C bearer mapping addition/modification as specified in 5.3.5.17.3.4.2;
- 1> else if *n3c-IndirectPathConfigRelay* is set to release:
 - 2> consider the indirect path with the remote UE is released and release the corresponding configuration.

5.3.5.17.3.4 Bearer mapping management on N3C indirect path

5.3.5.17.3.4.1 Bearer mapping release

The UE shall:

- 1> if the release is triggered by reception of *n3c-IndirectPathConfigRelay* set to *release*:
 - 2> for all configured *SL-RemoteUE-RB-Identity* value:
 - 3> release *n3c-RLC-ChannelUu* and *n3c-RemoteUE-RB-Identity*;

- 1> else if the release is triggered by reception of the *n3c-MappingToReleaseList*:
 - 2> for each *SL-RemoteUE-RB-Identity* value included in *n3c-MappingToReleaseList*:
 - 3> release the corresponding *n3c-RLC-ChannelUu* and *n3c-RemoteUE-RB-Identity*;

5.3.5.17.3.4.2 Bearer mapping addition and modification

The UE shall:

- 1> for each *n3c-RemoteUE-RB-Identity* value included in the *n3c-MappingToAddModList* that is not part of the current UE configuration:
 - 2> associate the remote UE's RB indicated in *n3c-RemoteUE-RB-Identity* to the Uu RLC channel indicated in *n3c-RLC-ChannelUu*;
- 1> for the *n3c-RemoteUE-RB-Identity* value included in the *n3c-MappingToAddModList* that is part of the current UE configuration:
 - 2> update the associated Uu RLC channel to the one indicated in *n3c-RLC-ChannelUu*.

5.3.5.18 LTM configuration and execution

5.3.5.18.1 LTM configuration

The network configures the UE with one or more LTM candidate configurations within the *LTM-Config* IE.

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

- an *ltm-Config* associated with the MCG that is included within an *RRCReconfiguration* message received via SRB1; and
- an *ltm-Config* associated with the SCG that is included within an *RRCReconfiguration* message either received via SRB3, or, alternatively, embedded in an *RRCReconfiguration* message received via SRB1.

In case the UE receives two independent *ltm-Config*:

- the UE maintains two independent *ltm-Config*;
- the UE maintains two independent *VarLTM-ServingCellNoResetID*, one associated with each *ltm-Config*;
- the UE maintains two independent *VarLTM-ServingCellUE-MeasuredTA-ID*, one associated with each *ltm-Config*;
- the UE independently performs all the procedures in clause 5.3.5.18 for each *ltm-Config* and the associated *VarLTM-ServingCellNoResetID* and *VarLTM-ServingCellUE-MeasuredTA-ID* unless explicitly stated otherwise.

The UE shall perform the following actions based on the received *LTM-Config* IE:

- 1> if the received *LTM-Config* includes *ltm-ServingCellNoResetID*:
 - 2> if the current *VarLTM-ServingCellNoResetID* includes an *ltm-ServingCellNoResetID*:
 - 3> replace the *ltm-ServingCellNoResetID* value within *VarLTM-ServingCellNoResetID* with the received *ltm-ServingCellNoResetID*;
 - 2> else:
 - 3> store the received *ltm-ServingCellNoResetID* in *VarLTM-ServingCellNoResetID*;
- 1> if the received *LTM-Config* includes *ltm-ServingCellUE-MeasuredTA-ID*:
 - 2> if the current *VarLTM-ServingCellUE-MeasuredTA-ID* includes an *ltm-ServingCellUE-MeasuredTA-ID*:
 - 3> replace the *ltm-ServingCellUE-MeasuredTA-ID* value within *VarLTM-ServingCellUE-MeasuredTA-ID* with the received *ltm-ServingCellUE-MeasuredTA-ID*;

- 2> else:
 - 3> store the received *ltm-ServingCellUE-MeasuredTA-ID* in *VarLTM-ServingCellUE-MeasuredTA-ID*;
- 1> if the received *LTM-Config* includes the *ltm-CandidateToReleaseList*:
 - 2> perform the LTM candidate configuration release as specified in 5.3.5.18.2;
- 1> if the received *LTM-Config* includes the *ltm-CandidateToAddModList*:
 - 2> perform the LTM candidate configuration addition or modification as specified in 5.3.5.18.3;
- 1> reconfigure the UE according to all other fields of the received *LTM-Config* IE.

5.3.5.18.2 LTM candidate configuration release

The UE shall:

- 1> for each *ltm-CandidateId* value included in the *ltm-CandidateToReleaseList* that is part of the current UE configuration:
 - 2> remove the corresponding *LTM-Candidate*.

5.3.5.18.3 LTM candidate configuration addition/modification

The UE shall:

- 1> for each *ltm-CandidateId* value in the *ltm-CandidateToAddModList*:
 - 2> if the current UE configuration contains an *LTM-Candidate* with the *ltm-CandidateId* value:
 - 3> reconfigure the corresponding *LTM-Candidate* in accordance with the received *LTM-Candidate*;
 - 2> else:
 - 3> add the received *LTM-Candidate*;
 - 2> if the *LTM-Candidate* with the received *ltm-CandidateId* value includes *ltm-UE-MeasuredTA-ID*:
 - 3> if the value of *ltm-UE-MeasuredTA-ID* is equal to the value of *ltm-ServingCellUE-MeasuredTA-ID* within *VarLTM-ServingCellUE-MeasuredTA-ID*:
 - 4> inform lower layers that the UE is configured with UE-based TA measurements for this *LTM-Candidate*;
 - 3> else:
 - 4> inform lower layers that the UE is not configured with UE-based TA measurements for this *LTM-Candidate*.

5.3.5.18.4 Void

5.3.5.18.5 Void

5.3.5.18.6 LTM cell switch execution

Upon the indication by lower layers that an LTM cell switch procedure is triggered, or upon performing LTM cell switch following cell selection performed while timer T311 was running, as specified in 5.3.7.3, the UE shall:

- 1> for each SRB/DRB in the current UE configuration:
 - 2> if the LTM cell switch is triggered on the MCG and for the SRB/DRB using the master key; or
 - 2> if the LTM cell switch is triggered on the SCG and for the SRB/DRB using the secondary key;

- 3> keep the associated RLC, PDCP and SDAP entities, their state variables, buffers and timers;
- 3> release all fields related to the SRB/DRB configuration except for *srb-Identity* and *drb-Identity*;
- 1> if this procedure has been triggered following cell selection performed while timer T311 was running (due to reconfiguration with sync failure), as specified in clause 5.3.7.3:
 - 2> continue using PDCP entity for SRB1 (if configured) with state variables continuation as specified in TS 38.323 [5];
- 1> release/clear all current dedicated radio configuration associated with the cell group for which the LTM cell switch procedure is triggered except for the following:
 - the *logicalChannelIdentity* and *logicalChannelIdentityExt* of RLC bearers configured in *RLC-BearerConfig* and the associated RLC entities, their state variables, buffers, and timers;
 - the UE variables *VarLTM-ServingCellNoResetID* and *VarLTM-ServingCellUE-MeasuredTA-ID*;
 - the *lrm-Config*;
- 2> if the LTM cell switch is triggered on the MCG:
 - the MCG C-RNTI;
 - the AS security configurations associated with the master key;
- 2> else, if the LTM cell switch is triggered on the SCG:
 - the AS security configurations associated with the secondary key;
- 1> release/clear all current common radio configuration associated with the cell group for which the LTM cell switch procedure is triggered;
- 1> use the default values specified in 9.2.3 for timers T310, T311 and constants N310, N311 associate to cell group for which the LTM cell switch procedure is triggered;
- 1> apply the default MAC Cell Group configuration as specified in 9.2.2 for the cell group for which the LTM cell switch procedure is triggered;
- 1> for each *srb-Identity* in the current UE configuration:
 - 2> apply the default SRB configuration defined in 9.2.1 for the corresponding SRB;
- 1> if the value of field *lrm-NoResetID* contained within the *LTM-Candidate IE* in *lrm-Config* indicated by lower layers or for the selected cell in accordance with 5.3.7.3 is not equal to the value of *lrm-ServingCellNoResetID* within *VarLTM-ServingCellNoResetID*:
 - 2> for each *logicalChannelId* and *logicalChannelIdExt* that is part of the current UE configuration for the cell group for which the LTM cell switch procedure is triggered:
 - 3> if *servedRadioBearer* is set to *drb-Identity*:
 - 4> after the end of this procedure, re-establish the corresponding RLC entity as specified in TS 38.322 [4], after applying the LTM configuration in *lrm-CandidateConfig* within the *LTM-Candidate IE* in *lrm-Config*;
 - 2> for each *drb-Identity* value that is part of the current UE configuration:
 - 3> if this DRB is an AM DRB:
 - 4> after the end of this procedure, trigger the PDCP entity of this DRB to perform data recovery as specified in TS 38.323 [5], after applying the LTM configuration in *lrm-CandidateConfig* within *LTM-Candidate IE* in *lrm-Config*;
- 2> replace the value of *lrm-ServingCellNoResetID* in *VarLTM-ServingCellNoResetID* with the value of *lrm-NoResetID* in the *LTM-Candidate* in *lrm-Config* indicated by lower layers or for the selected cell in accordance with 5.3.7.3;

- 1> if the *LTM-Candidate IE* in *ltm-Config* indicated by lower layers or for the selected cell in accordance with 5.3.7.3 contains the field *ltm-UE-MeasuredTA-ID*:
- 2> if the value of *ltm-UE-MeasuredTA-ID* is not equal to the value of *ltm-ServingCellUE-MeasuredTA-ID* within *VarLTM-ServingCellUE-MeasuredTA-ID*:
- 3> replace the value of *ltm-ServingCellUE-MeasuredTA-ID* in *VarLTM-ServingCellUE-MeasuredTA-ID* with the value received within *ltm-UE-MeasuredTA-ID*;
- 3> for each *LTM-Candidate IE* in *ltm-Config*:
 - 4> if the value of *ltm-UE-MeasuredTA-ID* within *LTM-Candidate IE* is equal to the value of *ltm-ServingCellUE-MeasuredTA-ID* within *VarLTM-ServingCellUE-MeasuredTA-ID*:
 - 5> inform lower layers that UE is configured with UE-based TA measurements for the *LTM-Candidate*;
 - 4> else:
 - 5> inform lower layers that UE is not configured with UE-based TA measurements for the *LTM-Candidate*.
- 1> if *ltm-ConfigComplete* is not included within the *LTM-Candidate IE* in *ltm-Config* indicated by lower layers or for the selected cell in accordance with 5.3.7.3:
 - 2> consider *ltm-ReferenceConfiguration* in *ltm-Config*, associated with the cell group for which the LTM cell switch procedure is triggered, to be the current UE configuration for the fields and configurations to be released by the actions above in this procedure;
 - 2> if *measConfig* is included within *ltm-ReferenceConfiguration* in *ltm-Config*:
 - 3> perform the measurement configuration procedure as specified in clause 5.5.2 by considering the *measConfig* within *ltm-ReferenceConfiguration* in *ltm-Config* as the received *measConfig*;

NOTE 1: When the UE considers the reference configuration to be the current UE configuration, the UE should store fields and configurations that are part of the reference configuration but should not execute any actions or procedures triggered by the reception of an *RRCReconfiguration* message which are described in clause 5.3.5.3, unless specified otherwise in this section.

- 1> if the LTM cell switch is triggered by an indication from lower layers:
 - 2> apply the *RRCReconfiguration* message in *ltm-CandidateConfig* within *LTM-Candidate IE* in *ltm-Config* identified by the LTM candidate configuration identity received from lower layers according to clause 5.3.5.3;
- 1> else (LTM cell switch triggered upon cell selection performed while timer T311 was running):
 - 2> apply the *RRCReconfiguration* message in *ltm-CandidateConfig* within *LTM-Candidate IE* in *ltm-Config* related to the LTM candidate configuration identity for the selected cell (i.e., in accordance with 5.3.7.3) according to clause 5.3.5.3;
- 1> release the radio bearer(s) and the logical channel(s) that were part of the UE configuration before of this LTM cell switch procedure but not part of the LTM candidate configuration either indicated by lower layers or for the selected cell in accordance with 5.3.7.3, or the LTM reference configuration (in case the LTM candidate configuration does not include *ltm-ConfigComplete*).

NOTE 2: When *ltm-ConfigComplete* is not included for an LTM candidate configuration, before an LTM cell switch is triggered a UE implementation may generate and store an *RRCReconfiguration* message by applying the received LTM candidate configuration on top of the LTM reference configuration, and the stored *RRCReconfiguration* message is applied when the LTM cell switch is triggered.

5.3.5.18.7 LTM configuration release

For the cell group for which the LTM configuration release procedure is triggered, the UE shall:

- 1> remove the entry within *VarLTM-ServingCellNoResetID*;

- 1> remove the entry within *VarLTM-ServingCellUE-MeasuredTA-ID*;
- 1> release *ltm-Config*.

5.3.5.19 T348 expiry

The UE can apply the temporary UE capability restriction in accordance with the one indicated in the last transmission of the UEAssistanceInformation message including *musim-CapRestriction*, as specified in 5.7.4.3.

5.3.6 Counter check

5.3.6.1 General

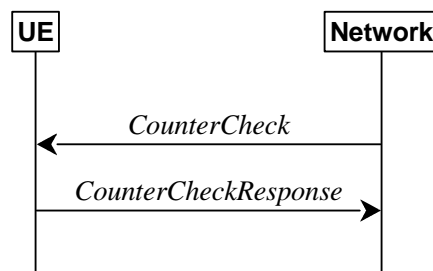


Figure 5.3.6.1-1: Counter check procedure

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

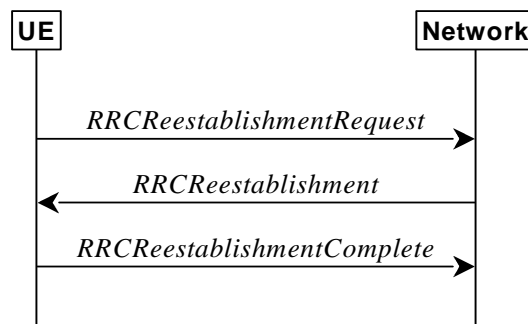


Figure 5.3.7.1-1: RRC connection re-establishment, successful

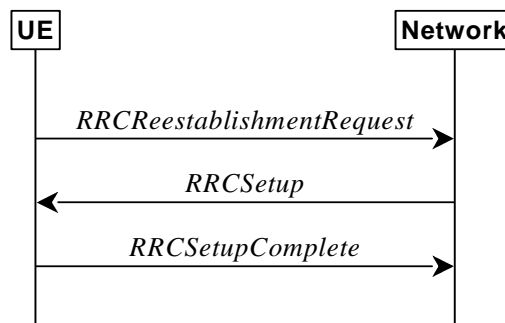


Figure 5.3.7.1-2: RRC re-establishment, fallback to RRC establishment, successful

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 and NCR, 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 and NCR, 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 which is not configured with MP, in accordance with clause 5.8.9.3; or
- 1> upon reception of *NotificationMessageSidelink* including *indicationType* by L2 U2N Remote UE in RRC_CONNECTED which is not configured with MP, in accordance with clause 5.8.9.10; or
- 1> upon PC5 unicast link release for the serving L2 U2N Relay UE indicated by upper layer at L2 U2N Remote UE in RRC_CONNECTED which is not configured with MP while T301 is not running; or
- 1> if MP is configured, upon detecting radio link failure of the MCG (i.e. direct path) in accordance with clause 5.3.10 while the transmission of indirect path is suspended as specified in 5.3.5.17; or
- 1> if MP is configured, upon detecting radio link failure of the MCG (i.e. direct path) in accordance with 5.3.10 while MP indirect path addition or change is ongoing; or
- 1> if MP is configured, upon detecting sidelink radio link failure of SL indirect path by L2 U2N Remote UE, in accordance with clause 5.8.9.3, while MCG transmission (i.e. direct path) is suspended as specified in clause 5.7.3b; or
- 1> if MP is configured, upon reception of *NotificationMessageSidelink* including *indicationType* in accordance with clause 5.8.9.10, while MCG transmission (i.e. direct path) is suspended as specified in clause 5.7.3b; or

1> if MP is configured, upon PC5 unicast link release indicated by upper layer at L2 U2N Remote UE, while MCG transmission (i.e. direct path) is suspended as specified in clause 5.7.3b; or

1> if MP is configured, upon detecting the failure of N3C indirect path by N3C remote UE in accordance with clause 5.7.3c, while MCG transmission (i.e. direct path) is suspended.

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*; and

1> if UE is not configured with *attemptLTM-Switch*:

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> perform the LTM configuration release procedure for the MCG and the SCG as specified in clause 5.3.5.18.7;

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-GapPriorityAssistanceConfig*, if configured;
- 2> release *musim-LeaveAssistanceConfig*, if configured;
- 2> release *musim-CapabilityRestrictionConfig*, if configured and stop timer T346n, if running;
- 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;
- 2> release *multiRx-PreferenceReportingConfigFR2*, if configured, and stop timer T346m, if running;
- 2> release *aerial-FlightPathAvailabilityConfig*, if configured;
- 2> release *ul-TrafficInfoReportingConfig*, if configured, and stop all instances of timer T346l, if running;
- 1> release *successHO-Config*, if configured;
- 1> release *successPSCell-Config* configured by the PCell, if configured;
- 1> release *successPSCell-Config* configured by the PSCell, 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 $K_{RRCCenc}$ 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> release *ncr-FwdConfig*, if configured;
- 1> if the UE is NCR-MT:
 - 2> indicate to NCR-Fwd to cease forwarding;
- 1> if SL indirect path is configured:
 - 2> release cell identity and relay UE ID configured in *sl-IndirectPathAddChange*;
 - 2> indicate upper layers to trigger PC5 unicast link release of the SL indirect path;
- 1> if N3C indirect path is configured:
 - 2> release *n3c-IndirectPathAddChange*;
 - 2> consider the non-3GPP connection is not used;
- 1> if the UE is acting as a N3C relay UE:
 - 2> release *n3c-IndirectPathConfigRelay*;
 - 2> consider the non-3GPP connection is not used;
- 1> if the UE is acting as L2 U2N Remote UE and MP via L2 U2N Relay UE is not configured:
 - 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* and the *condExecutionCondPSCell* is not configured for the corresponding *condReconfigId* 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 keystore reuse in case of CHO based recovery after a failed handover without key change.

- 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 *attemptLTM-Switch* is configured; and
- 1> if the selected cell is one of the LTM candidate cells in the *LTM-Candidate* IE within *ltm-Config* associated with the MCG:
 - 2> perform the LTM cell switch procedure for the selected LTM candidate cell according to the actions specified in 5.3.5.18.6;

NOTE 2: In case both *attemptCondReconfig* and *attemptLTM-Switch* are configured, it is left to the UE implementation which procedure to execute.

- 1> else:
 - 2> if UE is configured with *attemptCondReconfig*; or
 - 2> if UE is configured with *attemptLTM-Switch*:
 - 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-GapPriorityAssistanceConfig*, if configured;
 - 3> release *musim-LeaveAssistanceConfig*, if configured;
 - 3> release *musim-CapabilityRestrictionConfig*, if configured and stop timer T346n, if running;
 - 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> release *aerial-FlightPathAvailabilityConfig*, if configured;
 - 3> release *ul-TrafficInfoReportingConfig*, if configured, and stop all instances of timer T346l, if running;
 - 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> perform the LTM configuration release procedure for the MCG and the SCG as specified in clause 5.3.5.18.7;

- 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> remove the *servingSecurityCellSetId* within the *VarServingSecurityCellSetID*, if any;
- 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; or
- 1> if the procedure was initiated due to mobility from NR failure as specified in 5.4.3.5 and if *voiceFallbackIndication* is included in the *MobilityFromNRCommand* message:
 - 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* or *ta-ReportATG* 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 $K_{RRCCenc}$ 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 $K_{RRCCenc}$ 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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 2> if the RPLMN is not included in *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig*:
 - 3> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;

- 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 3> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;
 - 3> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
- 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*; or
 - 2> if the UE has logged measurements available for NR and if the current registered SNPN identity is included in *snpn-ConfigIDList* 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; or
 - 2> if the UE supports the override protection of the signalling based logged MDT for inter-RAT (i.e. LTE to NR), and if the *sigLoggedMeasType* in *VarLogMeasReport* of TS 36.331 [10] is included:
 - 3> if T330 timer is running (associated to the logged measurement configuration for NR or for LTE):
 - 4> set *sigLogMeasConfigAvailable* to *true* in the *RRCReestablishmentComplete* message;
 - 3> else:
 - 4> if the UE has logged measurements in *VarLogMeasReport* or in *VarLogMeasReport* of TS 36.331 [10]:
 - 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*; or
 - 2> if the UE supports multiple CEF report and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the registered SNPN identity is equal to *snpn-identity* in *networkIdentity* stored in *VarConnEstFailReport* or any entry 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]; or
 - 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in *VarRLF-Report*:
 - 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*; or
- 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessHO-Report*:
 - 3> include *successHO-InfoAvailable* in the *RRCReestablishmentComplete* message;
- 2> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or
- 2> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessPSCell-Report*:
 - 3> include *successPSCell-InfoAvailable* in the *RRCReestablishmentComplete* message;
- 2> if the UE has flight path information available:
 - 3> include *flightPathInfoAvailable*;
- 2> if the UE has at least one stored application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 3> include *measConfigReportAppLayerAvailable* in the *RRCReestablishmentComplete* message;
- 1> submit the *RRCReestablishmentComplete* message to lower layers for transmission;
- 1> if *SIB21* is provided by the PCell; or
- 1> if *nonServingCellMII* is included in *SIB1* 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

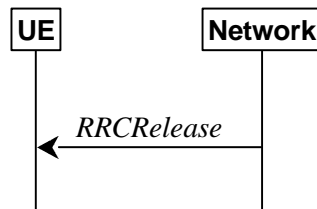


Figure 5.3.8.1-1: RRC connection release, successful

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 and NCR, 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 and NCR, 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> if the UE supports RLF-Report for fast MCG recovery procedure as specified in 38.306 [26];

- 3> set the *elapsedTimeT316* in the *VarRLF-Report* to the value of the elapsed time of the timer T316;

- 3> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;
 - 2> else:
 - 3> clear the information included in *VarRLF-Report*, if any;
 - 1> stop timer T350, if running;
 - 1> stop timer T346g, if running;
 - 1> stop timer T348, 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*;
- 3> if the *measIdleConfig* contains *measReselectionCarrierListNR*:
 - 4> store the received *measReselectionCarrierListNR* in *VarMeasReselectionConfig*;
- 3> if the *measIdleConfig* contains *measReselectionValidityDuration*:
 - 4> store the received *measReselectionValidityDuration* in *VarMeasReselectionConfig*;
- 3> if the *measIdleConfig* contains *measIdleValidityDuration*:
 - 4> store the received *measReselectionValidityDuration* in *VarEnhMeasIdleConfig*;
- 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 and multicast 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 SRS for positioning configuration in *RRC_INACTIVE* and instruct MAC to start the *inactivePosSRS-TimeAlignmentTimer*;
 - 2> if *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured:
 - 3> apply the SRS for positioning configuration in *RRC_INACTIVE* and instruct MAC to start the *inactivePosSRS-ValidityAreaTAT*;
 - 2> if *srs-PosRRC-InactiveValidityAreaPreConfigList* is set to *setup*:

3> store *srs-PosRRC-InactiveValidityAreaConfig* and apply the SRS for positioning configuration in RRC_INACTIVE when requested by upper layers; 2> else if *srs-PosRRC-InactiveValidityAreaPreConfigList* is set to *release*:

3> remove all *srs-PosRRC-InactiveValidityAreaPreConfigList*, if available;

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

2> perform the LTM configuration release procedure for the MCG and the SCG as specified in clause 5.3.5.18.7;

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

2> remove the *servingSecurityCellSetId* within the *VarServingSecurityCellSetID*, 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> for NCR-MT, if *ncr-FwdConfig* is configured:

3> if the *ncr-FwdConfig* includes periodic forwarding resource configuration:

4> indicate to NCR-Fwd to continue forwarding only in accordance with the configured periodic forwarding resource set(s);

3> else:

4> indicate to NCR-Fwd to cease forwarding;

2> if the UE is acting as L2 U2N Remote UE and is not configured with MP:

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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

3> inform upper layers about the release of the RAN visible application layer measurement configuration;

3> initiate the procedure in 5.5b.1.2;

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 *ncr-FwdConfig* (if configured), 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;
 - *aerial-Config*, if configured;
 - *cellDTXDRX-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 the successful transmission of the message or at least one segment of the message has not been confirmed by lower layers;

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), except SRB0 and broadcast MRBs;
- 2> suspend all multicast MRB(s) associated with multicast session(s) not configured for reception in RRC_INACTIVE;
- 2> indicate PDCP suspend to lower layers of all DRBs and multicast MRBs associated with multicast session(s) not configured for reception in RRC_INACTIVE;

- 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 SL indirect path is configured:
 - 3> release cell identity and relay UE ID configured in *sl-IndirectPathAddChange*;
 - 3> indicate upper layers to trigger PC5 unicast link release of the SL indirect path;
- 2> if N3C indirect path is configured:
 - 3> release *n3c-IndirectPathAddChange*;
 - 3> consider the non-3GPP connection is not used;
- 2> if the UE is acting as a N3C relay UE:
 - 3> release *n3c-IndirectPathConfigRelay*;
 - 3> consider the non-3GPP connection is not used;
- 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];
- 2> if the *suspendConfig* includes *resumeIndication*:
 - 3> perform the actions as if the UE received *Paging* message with the *ue-Identity* included in the *PagingRecord* matching the UE's stored *fullI-RNTI*, as specified in clause 5.3.2.3;
- 2> if the *multicastConfigInactive* is set to *setup*:
 - 3> if the multicast PTM configuration is provided for a multicast session for which the UE is not indicated to stop monitoring the G-RNTI and the UE selects the same cell as the one on which the multicast session was received in RRC_CONNECTED:
 - 4> apply the multicast PTM configuration as specified in 5.10.3;
 - 4> monitor the Multicast MCCH-RNTI as specified in 5.10.2;
- 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 1: 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 and NCR, 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 MP is configured:
 - 6> if T316 is configured, and MP indirect path transmission is not suspended; and
 - 6> if neither MP indirect path change nor MP indirect path addition is ongoing:
 - 7> initiate the MCG failure information procedure as specified in 5.7.3b to report MCG radio link failure.
 - 6> else:
 - 7> initiate the connection re-establishment procedure as specified in 5.3.7.
 - 5> else:
 - 6> if the UE supports RLF-Report for fast MCG recovery procedure and if T316 is configured:
 - 7> if the SCG is deactivated at the moment of detecting RLF in the MCG:
 - 8> set the *mcgRecoveryFailureCause* in the *VarRLF-Report* to *scgDeactivated*;
 - 7> else if SCG transmission is suspended at the moment of detecting RLF in the MCG:
 - 8> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;
 - 8> set the *scgFailureCause* value in the *VarRLF-Report* according to 5.7.3.5;
 - 8> set the *elapsedTimeSCGFailure* in the *VarRLF-Report* to the time elapsed between SCG failure and the MCG failure;
 - 6> if T316 is configured; and

Editor's note: The use of *scgDeactivated* cause.

- 6> if SCG transmission is not suspended; and
- 6> if the SCG is not deactivated; and
- 6> 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):
 - 7> initiate the MCG failure information procedure as specified in 5.7.3b to report MCG radio link failure.

6> else:

7> 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.

A N3C Relay UE shall:

1> upon detecting radio link failure:

2> indicates to the associated N3C remote UE via the Non-3GPP Connection.

NOTE 2: How the N3C Relay UE indicates Uu RLF on the Non-3GPP Connection is left to implementation.

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> if the UE supports RLF-Report for fast MCG recovery procedure and if the UE detected SCG failure while the timer T316 was running:

6> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;

6> set the *scgFailureCause* in the *VarRLF-Report* value according to 5.7.3.5;

6> set the *elapsedTimeSCGFailure* in the *VarRLF-Report* to the time elapsed between SCG failure and the MCG failure;

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> if the UE is not in SNPN access mode, set the *plmn-IdentityList* to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);

1> else if the UE is in SNPN access mode, set the *snpn-IdentityList* to include the list of equivalent SNPNs stored by the UE (i.e., registered SNPN identity);

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 *measRSSI-ReportConfig* is configured for the *measObject* indicated as the *servingCellMO* of the source PCell (in case HO failure) or PCell (in case of RLF), set the *measResultLastServCell-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the frequency of the source PCell (in case HO failure) or PCell (in case of RLF) up to the moment the UE detected the 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> 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 fulfilling the condition in *choConfig* that was fulfilled first in time, and the point in time of fulfilling 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 fulfilled;

- 1> for each of the configured *measObjectNR* associated with neighboring cells if the associated *reportConfigNR* includes *measRSSI-ReportConfig*:
 - 2> set the *measResultNeighFreq-RSSI* in the *measResultNeighFreqList-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the frequencies other than the frequency of the source PCell (in case HO failure) or of the PCell (in case RLF), up to the moment the UE detected failure;
- 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;
 - 2> if the UE supports RLF report for inter-system handover for voice fallback and if *voiceFallbackIndication* is included in the last *MobilityFromNRCommand*:
 - 3> include the *voiceFallbackHO*;
- 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 *condRRReconfig* 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 *condRRReconfig* 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 *rlf* and the *rlf-Cause* is set to *lbtFailure* and the radio link failure is detected during the random access procedure; 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 *connectionFailureType* is *rlf* and the *rlf-Cause* is set to *lbtFailure*, and the radio link failure is not detected during the random access procedure:
 - 2> set the *locationAndBandwidth* and *subcarrierSpacing* in *bwp-Info* associated to the UL BWP in which the consistent uplink LBT failure was detected;
- 1> if the *rlf-Cause* is set to *t310-Expiry* or *t312-Expiry*:
 - 2> set the *ssbRLMConfigBitmap* and/or *csi-rsRLMConfigBitmap* in *measResultLastServCell* to include the radio link monitoring configuration of the last serving cell, if available;
- 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> if the UE is NCR-MT:

- 2> indicate to NCR-Fwd to cease forwarding;
- 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 SDT procedure is ongoing:
 - 3> stop timer T319a, if running;
 - 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> release the *aerial-Config*, if configured;
 - 1> perform LTM configuration release procedure for the MCG and SCG as specified in clause 5.3.5.18.7;
 - 1> remove all the entries within the MCG and the SCG *VarConditionalReconfig*, if any;
 - 1> remove the *servingSecurityCellSetId* within the *VarServingSecurityCellSetID*, 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> for each application layer measurement configuration without *appLayerIdleInactiveConfig* configured:

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

2> release the application layer measurement configuration;

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

2> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;

1> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:

2> inform upper layers about the release of the RAN visible application layer measurement configuration;

2> initiate the procedure in 5.5b.1.2;

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

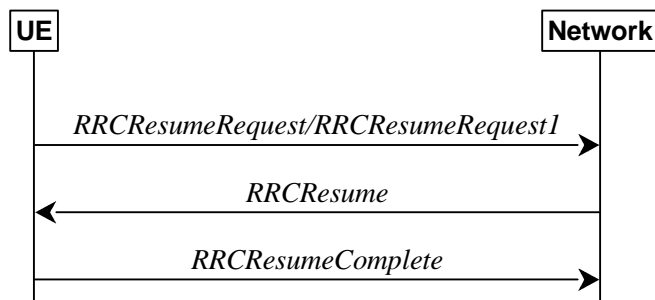


Figure 5.3.13.1-1: RRC connection resume, successful

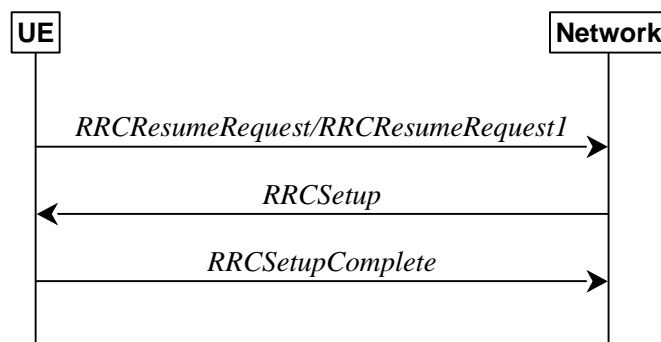


Figure 5.3.13.1-2: RRC connection resume fallback to RRC connection establishment, successful

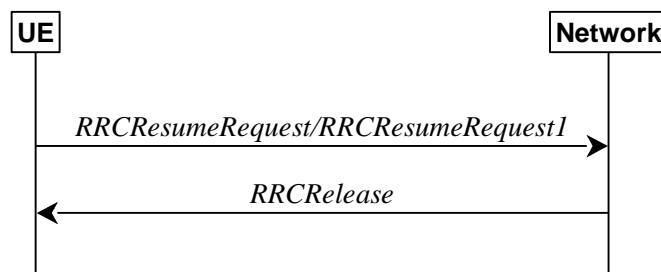


Figure 5.3.13.1-3: RRC connection resume followed by network release, successful

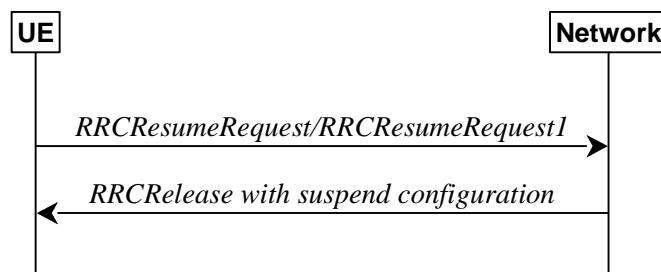


Figure 5.3.13.1-4: RRC connection resume followed by network suspend, successful

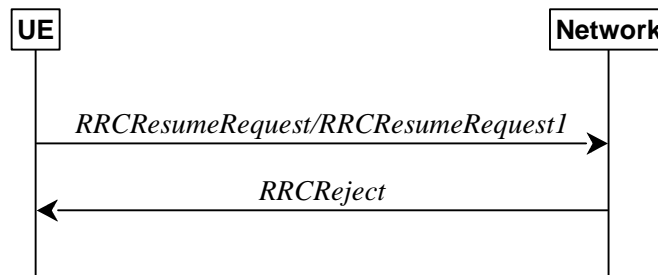


Figure 5.3.13.1-5: RRC connection resume, network reject

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/sl-FreqInfoListSizeExt* 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; or
- 1> if *RemoteUEInformationSidelink* containing the *connectionForMP* is received from a L2 U2N Remote UE as specified in 5.8.9.8.3;

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

When requesting lower layers to check the conditions for initiating SDT, RRC indicates to lower layers whether the resume procedure is initiated for mobile originated or mobile terminated case.

A UE in RRC_INACTIVE initiates the resume procedure for SDT when all of the following conditions are fulfilled:

- 1> for the resume procedure initiated by the upper layers (i.e. mobile originated case):
 - 2> SIB1 includes *sdt-ConfigCommon*; and
 - 2> *sdt-Config* is configured; and
 - 2> all the pending data in UL is mapped to the radio bearers configured for SDT; and
 - 2> for an (e)RedCap UE when RedCap-specific initial downlink BWP includes no CD-SSB, *ncd-SSB-RedCapInitialBWP-SDT* is configured; and
 - 2> lower layers indicate that conditions for initiating MO-SDT as specified in TS 38.321 [3] are fulfilled.
- 1> for the resume procedure initiated in response to RAN paging (i.e. mobile terminated case):
 - 2> lower layers indicate that conditions for initiating MT-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.

5.3.13.1c Void

5.3.13.1d Conditions for resuming RRC connection for multicast reception

In RRC_INACTIVE state, if configured with MBS multicast reception in RRC_INACTIVE, the UE shall:

- 1> if the RRC connection resume procedure is triggered for multicast reception at reception of *SIB1*, as specified in 5.2.2.4.2; or
- 1> if the PTM configuration is not available in the cell after cell selection or reselection for a multicast session that the UE has joined and for which the UE is not indicated to stop monitoring the G-RNTI; or
- 1> if *mbs-NeighbourCellList* included in *MBSMulticastConfiguration* acquired in the previous cell indicates that a multicast session that the UE has joined and for which the UE is not indicated to stop monitoring the G-RNTI, is not provided for RRC_INACTIVE in the current serving cell; or
- 1> if either the measured RSRP or RSRQ for serving cell as specified in TS 38.304 [20] is below the corresponding threshold indicated by *thresholdIndex* for a multicast session that the UE has joined and for which the UE is not indicated to stop monitoring the G-RNTI:
 - 2> initiate RRC connection resume procedure as specified in 5.3.13.2 with *resumeCause* set as below:
 - 3> if the UE is configured by upper layers with Access Identity 1:
 - 4> set *resumeCause* to *mps-PriorityAccess*;
 - 3> else if the UE is configured by upper layers with Access Identity 2:
 - 4> set *resumeCause* to *mcs-PriorityAccess*;
 - 3> else if the UE is configured by upper layers with one or more Access Identities equal to 11-15:
 - 4> set *resumeCause* to *highPriorityAccess*;
 - 3> else:
 - 4> set *resumeCause* to *mt-Access*.

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, upon requesting multicast reception as specified in clause 5.3.13.1d, for NR sidelink communication/discovery/V2X sidelink communication as specified in clause 5.3.13.1a, for NR sidelink positioning as specified in clause 5.3.13.1c, for requesting configuration for SRS for positioning, for activation of preconfigured Positioning SRS in RRC_INACTIVE, upon receiving *RRCRelease* message including *resumeIndication*)

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; or
- 1> if the resumption of the RRC connection is triggered by receiving *RRCRelease* message including *resumeIndication*; or
- 1> if the resumption of the RRC connection is triggered for multicast reception as specified in clause 5.3.13.1d:
 - 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 0: 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;
- 1> else if *srs-PosRRC-InactiveValidityAreaPreConfigList* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured:
 - 2> if the resumption of the RRC connection is triggered due to cell reselection as specified in clause 5.3.13.6; or
 - 2> if the resumption of the RRC connection is triggered due to the need for SRS for positioning configuration and no stored *srs-PosRRC-InactiveValidityAreaPreConfigList* for the camped cell exists; or
 - 2> if the resumption of the RRC connection is triggered for activation of *srs-PosRRC-InactiveValidityAreaPreConfigList* when the UE is camped in one of the cells indicated in *srs-PosConfigValidityArea*:
 - 3> if an emergency service is ongoing:
 - 4> select '2' as the Access Category;
 - 4> set the *resumeCause* to *emergency*;
 - 3> else:
 - 4> select '8' as the Access Category;
 - 4> set the *resumeCause* to *srs-PosConfigOrActivationReq*;

NOTE 2: In case the L2 U2N Relay UE initiates RRC connection resume triggered either by reception of message from a L2 U2N Remote UE via SL-RLC0 or SL-RLC1 as specified in 5.3.13.1a, or by reception of the *RemoteUEInformationSidelink* message containing the *connectionForMP* 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-GapPriorityAssistanceConfig* from the UE Inactive AS context, if stored;
- 1> release *musim-LeaveAssistanceConfig* from the UE Inactive AS context, if stored;
- 1> release *musim-CapabilityRestrictionConfig* from the UE Inactive AS context, if stored and stop timer T346n, if running;
- 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> release *multiRx-PreferenceReportingConfigFR2* if configured, and stop timer T346m, if running;
- 1> release *aerial-FlightPathAvailabilityConfig* from the UE Inactive AS context, if stored;
- 1> release *ul-TrafficInfoReportingConfig* from the UE Inactive AS context, if stored;
- 1> stop all instances of timer T346l, if running;
- 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* or *ta-ReportATG* 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> release *successPSCell-Config* configured by the PCell from the UE Inactive AS context, if stored;
- 1> release *successPSCell-Config* configured by the PSCell 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.

NOTE 2a: Before the lower layers first transmit the *RRCResumeRequest* or *RRCResumeRequest1*, the UE may initiate a new resume procedure if other conditions for initiation of the resume procedure as specified in 5.3.13.2 are satisfied.

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 an (e)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 the UE is configured with multicast reception in RRC_INACTIVE:
 - 2> reset MAC;
- 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> if *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured; or
- 1> if field *srs-PosRRC-InactiveValidityAreaPreConfigList* is configured and if the cell is not listed in *srs-PosConfigValidityArea*:
 - 2> instruct the MAC entity to stop *inactivePosSRS-ValidityAreaTAT*, 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> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 2> if the RPLMN is not included in *plmn-IdentityList* in *VarAppLayerPLMN-ListConfig*:
 - 3> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 3> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;
 - 3> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 3> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
- 1> if the *RRCResume* message includes the *appLayerMeasConfig*:
 - 2> if *idleInactiveReportAllowed* is included in the *RRCResume* message:
 - 3> if the UE is configured with at least one application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 4> initiate the procedure in 5.7.16.2 after the *RRCResumeComplete* has been transmitted;
 - 2> else:
 - 3> for each application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 4> forward the *measConfigAppLayerId* and inform upper layers about the release of the application layer measurement configuration;
 - 4> release the application layer measurement configuration including its fields in the UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*, if stored;

- 4> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
 - 4> consider itself not to be configured to send application layer measurement reports for the *measConfigAppLayerId*;
 - 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), SRB5 (if configured), all DRBs (that are suspended) and multicast MRBs (that are suspended);
- 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> if *measIdleValidityDuration* is included in *VarEnhMeasIdleConfig*:
 - 5> set the *measResultIdleEUTRA* in the *RRCResumeComplete* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport* for any valid measurement results, if available, and set *validityStatus* to value *checked* for each reported measurement;
 - 5> set the *measResultIdleNR* in the *RRCResumeComplete* message to the value of *measReportIdleNR* in the *VarMeasIdleReport* for any valid measurement results, if available, and set *validityStatus* to value *checked* for each reported measurement;
 - 5> discard the *VarMeasIdleReport* upon successful delivery of the *RRCResumeComplete* message is confirmed by lower layers;
 - 4> else:
 - 5> set the *measResultIdleEUTRA* in the *RRCResumeComplete* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport*, if available;
 - 5> set the *measResultIdleNR* in the *RRCResumeComplete* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;
 - 5> 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 UE has valid reselection measurements available;
 - 3> if the *reselectionModeMeasurementReq* is included in the *RRCResume* message:
 - 4> if *measReselectionValidityDuration* is included in *VarMeasReselectionConfig*
 - 5> set the *measResultReselectionNR* in the *RRCResumeComplete* message to the valid NR measurement results, if available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig* and set *validityStatus* to value *checked* for each reported measurement;

- 4> else:
 - 5> set the *measResultReselectionNR* in the *RRCResumeComplete* message to the NR measurement results, if available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig*;
- 3> else:
 - 4> if the SIB1 contains *reselectionMeasurementsNR* and the UE has valid NR reselection measurements available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig*:
 - 5> include the *reselectionMeasAvailable*;
- 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*; or
- 2> if the UE has logged measurements available for NR and if the current registered SNPN identity is included in *snpn-ConfigIDList* 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; or
- 2> if the UE supports the override protection of the signalling based logged MDT for inter-RAT (i.e. LTE to NR), and if the *sigLoggedMeasType* in *VarLogMeasReport* of TS 36.331 [10] is included:
 - 3> if T330 timer is running (associated to the logged measurement configuration for NR or for LTE):
 - 4> set *sigLogMeasConfigAvailable* to *true* in the *RRCResumeComplete* message;
- 3> else:
 - 4> if the UE has logged measurements in *VarLogMeasReport* or in *VarLogMeasReport* of TS 36.331 [10]:
 - 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*; or
- 2> if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the registered SNPN identity is equal to *snpn-identity* in *networkIdentity* stored in *VarConnEstFailReport* or any entry 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]; or
- 2> if the UE has radio link failure or handover failure information available in *VarRLF-Report* and if the current registered SNPN identity are included in *snpn-IdentityList* stored in *VarRLF-Report*; or
 - 3> include *rlf-InfoAvailable* in the *RRCResumeComplete* message;
- 2> if the UE has successful PSCell change or addition related information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or
- 2> if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *VarSuccessPSCell-Report*:
 - 3> include *successPSCell-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*; or
- 2> if the UE has successful handover information available in *VarSuccessHO-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* stored in the *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 has at least one stored application layer measurement configuration with *appLayerIdleInactiveConfig* configured:
 - 3> include *measConfigReportAppLayerAvailable* in the *RRCResumeComplete* message;
- 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;
 - 3> if the *needForInterruptionConfigNR* is enabled:
 - 4> include the *needForInterruptionInfoNR* and set the contents as follows:
 - 5> include *intraFreq-needForInterruption* with the same number of entries, and listed in the same order, as in *intraFreq-needForGap*;
 - 5> for each entry in *intraFreq-needForInterruption*:
 - 6> include *interruptionIndication* and set the interruption requirement information if the corresponding entry in *intraFreq-needForGap* is set to *no-gap*;
 - 5> include *interFreq-needForInterruption* with the same number of entries, and listed in the same order, as in *interFreq-needForGap*;

- 5> for each entry in *interFreq-needForInterruption*:
 - 6> include *interruptionIndication* and set the interruption requirement information if the corresponding entry in *interFreq-needForGap* is set to *no-gap*;
- 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;
 - 2> if the SIB1 contains *musim-CapRestrictionAllowed*:
 - 3> if supported, include the *musim-CapRestrictionInd* in the *RRCResumeComplete* message upon determining it has temporary capability restriction;
 - 2> if the UE has flight path information available:
 - 3> include *flightPathInfoAvailable*;
- 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.

NOTE 3: Upon reception of *musim-CapRestrictionInd* in *RRCResumeComplete*, it is up to network implementation to configure the UE with a limited configuration that is used until network sends *RRCReconfiguration* based on the actual restricted UE capabilities included in *UEAssistanceInformation*.

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 reselection, 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*.
- 1> else if cell reselection occurs when *srs-PosRRC-InactiveValidityAreaPreConfig* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured and if there is an on-going SRS for positioning transmission procedure in RRC_INACTIVE:
 - 2> if the selected cell is not included in the *srs-PosConfigValidityArea*:
 - 3> indicate to the lower layer to stop *inactivePosSRS-ValidityAreaTAT*;
 - 3> initiate RRC connection resume procedure in 5.3.13.2;
 - 2> else if the cell is included in the *srs-PosConfigValidityArea*:
 - 3> if the selected cell and the previously camped cell are in the same *srs-PosConfigValidityArea*;
 - 4> if *autonomousTA-AdjustmentEnabled* is configured;
 - 5> indicate to the lower layer to update Timing Advance and stored RSRP provided the Timing Advance validation requirements specified in clause 5.6.6.3 of TS 38.133 [14] is met;

- 4> instruct lower layers to continue transmitting SRS if Timing Advance validation condition as specified in TS 38.321 [3] are satisfied;
- 3> if the selected cell and previously camped cell are in the different *srs-PosConfigValidityArea*;
 - 4> initiate RRC connection resume procedure in 5.3.13.2;
 - 4> apply the SRS configuration *srs-PosConfigValidityArea* corresponding to the validity area of the selected cell and instruct lower layers to initiate SRS transmission.

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 configured (i.e., via SIB1) to send MUSIM temporary capability restriction indication, and if the UE supports MUSIM temporary capability restriction, the UE does not apply above failure handling in case the UE is unable to apply (part of) the configuration resulting from *RRCResume* message due to UE temporary capability restriction for MUSIM operation. If UE does not go to RRC_IDLE in this case, UE still considers the configuration resulting from the *RRCResume* message as the current configuration as the baseline for delta configuration for future reconfigurations. It is up to UE implementation how to apply *RRCResume* message. For other cases, 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 and NCR-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:
 - 2> if the Access Category is neither '2' nor '0'; or
 - 2> if the Access Category is '0' for RRC resumption triggered by multicast reception as specified in 5.3.13.2:
 - 3> 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 *npr-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> else if the Access Category is Access Category '0' for RRC resumption triggered by multicast reception as specified in 5.3.13.2:
 - 3> perform actions specified in 5.3.13.1d;
 - 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: $0 \leq \text{rand} < 1$;
 - 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: $0 \leq \text{rand} < 1$;
 - 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 $0 \leq \text{rand} < 1$;
 - 2> start timer T390 for the Access Category with the timer value calculated as follows, using the *uac-BarringTime* included in "UAC barring parameter":
$$T390 = (0.7 + 0.6 * \text{rand}) * \text{uac-BarringTime}.$$

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 (except if the *RRCReject* is received in response to resuming RRC connection for multicast reception);
- 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

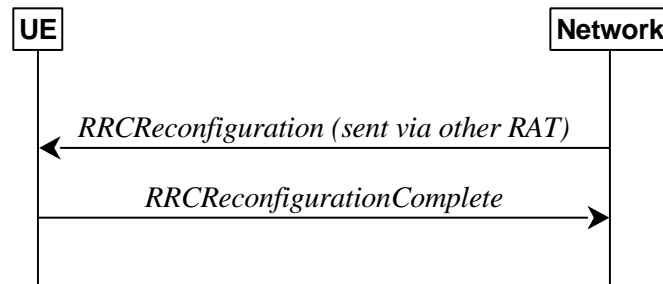


Figure 5.4.2.1-1: Handover to NR, successful

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.

Editor's Note: FFS whether to capture the agreement that all LTE QoE configurations are released at handover to NR in LTE specification or NR specification.

5.4.3 Mobility from NR

5.4.3.1 General



Figure 5.4.3.1-1: Mobility from NR, successful

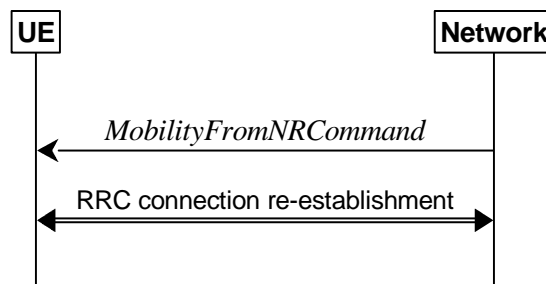


Figure 5.4.3.1-2: Mobility from NR, failure

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> if the UE supports RLF-Report for fast MCG recovery procedure as specified in 38.306 [26]:
 - 3> set the *elapsedTimeT316* in the *VarRLF-Report* to the value of the elapsed time of the timer T316;
 - 3> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;
- 2> else:

- 3> clear the information included in *VarRLF-Report*, if any;
- 1> else if T316 is not running:
 - 2> if *successHO-Config* is configured when connected to the source PCell and the *targetRAT-Type* is set to *eutra*:
 - 3> consider itself to be configured to provide the successful handover information for inter-RAT handover in accordance with 5.7.10.6;
- 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> inform upper layers about the release of all application layer measurement configurations;
- 1> release all application layer measurement configurations including their fields in UE variables *VarAppLayerIdleConfig* and *VarAppLayerPLMN-ListConfig*;
- 1> discard any application layer measurement reports which were not yet fully submitted to lower layers for transmission;
- 1> consider itself not to be configured to send application layer measurement reports;
- 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 $K_{RRCCenc}$ 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 UE was configured with *successHO-Config* when connected to the source PCell and the *targetRAT-Type* is set to *eutra*:
 - 2> perform the actions for the successful handover report determination for inter-RAT handover as specified in clause 5.7.10.6.

- 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 CBR measurement of NR sidelink positioning, a measurement object is a set of positioning dedicated resource pool(s) or transmission resource pool(s) also used for NR sidelink positioning on a single carrier frequency for NR sidelink positioning.
- 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.

6. Effective measurement window: Periods that the UE may use to perform inter RAT 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, ($startPRB + \text{floor}(nrofPRBs/2)$)
- 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.
- 1> if the received *measConfig* includes the *effectiveMeasWindowConfig*:
 - 2> perform the effective measurement window configuration as specified in 5.5.2.12;

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*.
- 2> if the *reportType* is set to *reportOnActivation* in the *reportConfig* associated with this *measId*:
 - 3> indicate to lower layer to disable the measurement reporting for fast unknown SCell activation.

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 an (e)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*.
- 2> if the *reportType* is set to *reportOnActivation* in the *reportConfig* associated with this *measId*:
 - 3> indicate to lower layer to enable the measurement reporting for fast unknown SCell activation.

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> if the UE does not support Uplink PDCP delay measurements upon MO update; or
 - 4> if the UE supports Uplink PDCP delay measurements upon MO update and if *ul-DelayValueConfig* or *ul-ExcessDelayConfig* is not configured for the associated *reportConfig*:
 - 5> remove the measurement reporting entry for this *measId* from the *VarMeasReportList*, if included;
 - 5> 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:
 - $\text{SFN mod } T = \text{FLOOR}(\text{gapOffset}/10)$;
 - $\text{subframe} = \text{gapOffset mod } 10$;
 - with $T = \text{MGRP}/10$ 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:
 - $\text{SFN mod } T = \text{FLOOR}(\text{gapOffset}/10)$;
 - $\text{subframe} = \text{gapOffset mod } 10$;

with $T = \text{MGRP}/10$ 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:
 - $\text{SFN mod } T = \text{FLOOR}(gapOffset/10)$;
 - $\text{subframe} = gapOffset \text{ mod } 10$;
 - with $T = \text{MGRP}/10$ 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:
 - $\text{SFN mod } T = \text{FLOOR}(gapOffset/10)$;
 - $\text{subframe} = gapOffset \text{ mod } 10$;
 - with $T = \text{MGRP}/10$ 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 $T = \text{FLOOR}(\text{gapOffset}/10)$;
 - subframe = $\text{gapOffset} \bmod 10$;
 - with $T = \text{MGRP}/10$ 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 $T = (\text{FLOOR}(\text{Offset}/10))$;

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

subframe = $\text{Offset} \bmod 10$;

else:

subframe = Offset or $(\text{Offset} + 5)$;

with $T = \text{CEIL}(\text{Periodicity}/10)$.

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:

$$\text{SFN mod } T = \text{FLOOR}(\textit{rmtc-SubframeOffset}/10);$$

$$\text{subframe} = \textit{rmtc-SubframeOffset} \bmod 10;$$

$$\text{with } T = \textit{rmtc-Periodicity}/10;$$

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 *tc-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*.

5.5.2.12 Effective measurement window configuration

The UE shall:

- 1> if *effectiveMeasWindowConfig* is set to *setup*:
 - 2> if an effective measurement window configuration is already setup:
 - 3> release the effective measurement window configuration;
 - 2> setup an effective measurement window configuration indicated by the *effectiveMeasWindowConfig* in accordance with the received *windowOffsetPeriodicity* (providing *periodicity* and *offset* for the following condition), i.e., the first subframe of each window occurs at an SFN and subframe meeting the following condition:
 - $SFN \bmod T = \text{FLOOR}(\text{offset}/10)$;
 - $\text{subframe} = \text{offset} \bmod 10$;
 - with $T = \text{periodicity}/10$;
- 1> else if *effectiveMeasWindowConfig* is set to *release*:
 - 2> release the effective measurement window configuration;

NOTE: The SFN and subframe of the PCell is used in the effective measurement window calculation.

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 UE does not apply the layer 3 filtering as specified in 5.5.3.2 to derive the altitude 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* or in the *condExecutionCondPSCell* associated to a *condReconfigId* in the MCG *VarConditionalReconfig* (for CHO, CPA, MN-initiated inter-SN CPC, or subsequent CPAC 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 subsequent CPAC); 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 or subsequent CPAC 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/positioning shall:

- 1> If the frequency used for NR sidelink communication/discovery/positioning is included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12* or included in *sl-PosConfigCommonNR* within *SIB23*:
 - 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*;
- 3> if configured with NR sidelink positioning and the cell chosen for NR sidelink positioning provides *SIB23* which includes *sl-PRS-TxPoolSelectedNormal* or *sl-PRS-TxPoolExceptional* for the concerned frequency, or provides *SIB12* which includes *sl-TxPoolSelectedNormal*, *sl-TxPoolExceptional*:
 - 4> perform CBR measurement on pool(s) in *sl-PRS-TxPoolSelectedNormal*, *sl-PRS-TxPoolExceptional*, *sl-TxPoolSelectedNormal* or *sl-TxPoolExceptional* for the concerned frequency;
- 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*, *sl-TxPoolExceptional*, *sl-PRS-TxPoolSelectedNormal*, *sl-PRS-TxPoolScheduling* or *sl-PRS-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*, *sl-TxPoolExceptional*, *sl-PRS-TxPoolSelectedNormal*, *sl-PRS-TxPoolScheduling* and *sl-PRS-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*;
 - 4> if configured with NR sidelink positioning and the cell chosen for NR sidelink positioning provides *SIB23* which includes *sl-PRS-TxPoolSelectedNormal* or *sl-PRS-TxPoolExceptional*, or provides *SIB12* which includes *sl-TxPoolSelectedNormal*, *sl-TxPoolExceptional* for the concerned frequency:
 - 5> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal*, *sl-TxPoolExceptional*, *sl-PRS-TxPoolSelectedNormal* or *sl-PRS-TxPoolExceptional* for the concerned frequency;
 - 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*.
- 2> if configured with NR sidelink positioning and *sl-TxPoolSelectedNormal* or *sl-PRS-TxPoolSelectedNormal* is included in *SL-PreconfigurationNR* for the concerned frequency:
 - 3> perform CBR measurement on pool(s) in *sl-TxPoolSelectedNormal* or *sl-PRS-TxPoolSelectedNormal* in *SidelinkPreconfigNR* for the concerned frequency.

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, for evaluating the SyncRef UE according to 5.8.5 and 5.8.6, for evaluating the NR sidelink U2U Relay/Remote UE threshold conditions according to 5.8.16.2 and 5.8.17.2, for evaluating the conditions for selection and reselection of NR sidelink U2U Relay UE according to 5.8.17.3, and for evaluating the detected NR sidelink U2U Relay UEs according to 5.8.17.4:
- 2> filter the measured result, before using for evaluation of reporting criteria, for measurement reporting, for U2N/U2U 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/U2U 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.

NOTE 5: For SSB measurements when multiple altitude range-based *ssb-ToMeasure* are configured, it is up to UE implementation whether to reset filtering upon entering a different altitude range.

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* or *eventA3H1* or *eventA3H2* or *eventA5H1* or *eventA5H2* 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*, *eventD2*, *eventX2*, *eventH1* or *eventH2*:
 - 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*;
- 4> if the *eventH1* or *eventH2* is configured in the corresponding *reportConfig*:
 - 5> for all the events with the same *eventID* for which *simulMultiTriggerSingleMeasReport* is set to *true* and the entry condition applicable for the event has been satisfied:
 - 6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;
- 4> else if the *eventA3H1* or *eventA3H2* or *eventA4H1* or *eventA4H2* or *eventA5H1* or *eventA5H2* is configured in the corresponding *reportConfig*:
 - 5> for all the events with the same *eventID* associated with the same *measObjectNR* for which *simulMultiTriggerSingleMeasReport* is set to *true* and the entry conditions applicable for the event has been satisfied:
 - 6> consider only the event for which the difference between the corresponding altitude threshold and the altitude of the UE is the smallest to be applicable;
- 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* or *eventZ1-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 corresponding *reportConfig* does not include *numberOfTriggeringCells*, 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 corresponding *reportConfig* does not include *numberOfTriggeringCells*, 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 corresponding *reportConfig* includes *numberOfTriggeringCells*, 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*:
 - 3> if the *VarMeasReportList* does not include a measurement reporting entry for this *measId* (a first cell triggers the event):
 - 4> include a measurement reporting entry within the *VarMeasReportList* for this *measId*;
 - 3> if the number of cell(s) in the *cellsTriggeredList* is larger than or equal to *numberOfTriggeringCells*:
 - 4> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 3> else:
 - 4> include the concerned cell(s) in the *cellsTriggeredList* defined within the *VarMeasReportList* for this *measId*;
 - 4> if the number of cell(s) in the *cellsTriggeredList* is larger than or equal to *numberOfTriggeringCells*:
 - 5> set the *numberOfReportsSent* defined within the *VarMeasReportList* for this *measId* to 0;
 - 5> 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> if the corresponding *reportConfig* does not include *numberOfTriggeringCells*; or

- 4> if the corresponding *reportConfig* includes *numberOfTriggeringCells* and a measurement report was previously sent to the network for at least one of the concerned cell(s):
 - 5> 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* or *eventD2* or *eventH1* or *eventH2* 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* or *eventD2* or *eventH1* or *eventH2* 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, or for the serving L2 U2N Relay UE and for the strongest L2 U2N Relay UEs among the applicable L2 U2N Relay UEs (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.

If AS security has been activated successfully and if SCell activation(s) indication is received from lower layer, the UE shall:

- 1> if *reportType* is set to *reportOnActivation* for any *measId* included in the *measIdList* within *VarMeasConfig*:
- 2> if the activated SCell(s) fulfills the measurement requirement as specified in TS 38.133 [14]:
 - 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;
 - 4> 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.

NOTE: If the SCell indicated by the *measObjectNR* associated to this event is not detectable, then the UE should consider for the value of *Ms* the lowest value of the value range of the measurement quantity as the SCell measurement.

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, or *cellIndividualOffset* as defined within *reportConfigNR*), 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 or the measurement result of serving PSCell (i.e., in case it is configured as candidate PSCell for CondEvent A4 evaluation) for CHO with candidate SCG(s) case, 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, or *cellIndividualOffset* as defined within *reportConfigNR*), 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, or $cellIndividualOffset$ as defined within $reportConfigNR$), and set to zero if not configured for the neighbour cell.

Hys is the hysteresis parameter for this event (i.e. $hysteresis$ as defined within $reportConfigNR$ for this event).

$Thresh1$ is the threshold parameter for this event (i.e. $a5-Threshold1$ as defined within $reportConfigNR$ for this event).

$Thresh2$ is the threshold parameter for this event (i.e. $a5-Threshold2$ as defined within $reportConfigNR$ for this event).

Mn , Mp are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn , Ocn , Hys are expressed in dB.

$Thresh1$ is expressed in the same unit as Mp .

$Thresh2$ is expressed in the same unit as Mn .

NOTE 2: The definition of Event A5 also applies to CondEvent A5.

5.5.4.7 Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A6-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;

1> for this measurement, consider the (secondary) cell corresponding to the $measObjectNR$ associated to this event to be the serving cell.

NOTE: The reference signal(s) of the neighbour(s) and the reference signal(s) of the SCell are both indicated in the associated *measObjectNR*.

Inequality A6-1 (Entering condition)

$$Mn + Ocn - Hys > Ms + Ocs + Off$$

Inequality A6-2 (Leaving condition)

$$Mn + Ocn + Hys < Ms + Ocs + Off$$

The variables in the formula are defined as follows:

Mn is the measurement result of the neighbouring cell, not taking into account any offsets.

Ocn is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*), and set to zero if not configured for the neighbour cell.

Ms is the measurement result of the serving cell, not taking into account any offsets.

Ocs is the cell specific offset of the serving cell (i.e. *cellIndividualOffset* as defined within the associated *measObjectNR*, or *cellIndividualOffset* as defined within *reportConfigNR*), 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. *etra-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, or *cellIndividualOffset* as defined within *reportConfigInterRAT*), 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. *etra-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, or *cellIndividualOffset* as defined within *reportConfigInterRAT*), 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)

$$M_i - H_{ys} > Thresh$$

Inequality I1-2 (Leaving condition)

$$M_i + H_{ys} < Thresh$$

The variables in the formula are defined as follows:

M_i is the measurement result of the interference, not taking into account any offsets.

H_{ys} 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).

M_i , $Thresh$ are expressed in dBm.

H_{ys} 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)

$$M_s - H_{ys} > Thresh$$

Inequality C1-2 (Leaving condition)

$$M_s + H_{ys} < Thresh$$

The variables in the formula are defined as follows:

M_s is the measurement result of channel busy ratio of the transmission resource pool, not taking into account any offsets.

H_{ys} 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).

M_s is expressed in decimal from 0 to 1 in steps of 0.01.

H_{ys} is expressed in the same unit as **M_s** .

$Thresh$ is expressed in the same unit as **M_s** .

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 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.

M11 is expressed in meters.

M12 is expressed in the same unit as **M11**.

Hys is expressed in the same unit as **M11**.

Thresh1 is expressed in the same unit as **M11**.

Thresh2 is expressed in the same unit as **M11**.

NOTE: The definition of Event D1 also applies to CondEvent D1.

5.5.4.15a Event D2 (Distance between UE and serving cell moving reference location is above threshold1 and distance between UE and a moving reference location is below threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition D2-1 and condition D2-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition D2-3 or condition D2-4, i.e. at least one of the two, as specified below, are fulfilled;

Inequality D2-1 (Entering condition 1)

$$M11 - Hys > Thresh1$$

Inequality D2-2 (Entering condition 2)

$$M12 + Hys < Thresh2$$

Inequality D2-3 (Leaving condition 1)

$$M11 + Hys < Thresh1$$

Inequality D2-4 (Leaving condition 2)

$$M12 - Hys > Thresh2$$

The variables in the formula are defined as follows:

M11 is the distance between UE and a moving reference location for this event, not taking into account any offsets. The moving reference location is determined based on *movingReferenceLocation* and the corresponding epoch time and satellite ephemeris for the serving cell broadcast in *SIB19*.

M12 is the distance between UE and a moving reference location for this event, not taking into account any offsets. The moving reference location is determined based on *referenceLocation2* as defined within *reportConfigNR* for this event and the corresponding epoch time and satellite ephemeris for the candidate cell.

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* in *reportConfigNR* for this event, from a moving reference location derived based on the parameter *movingReferenceLocation* within *SIB19*.

Thresh2 is the threshold for this event defined as a distance, configured with parameter *distanceThreshFromReference2*, from a moving reference location derived based on the parameter *referenceLocation2* within *reportConfigNR* for this event.

MI1 is expressed in meters.

MI2 is expressed in the same unit as **MI1**.

Hys is expressed in the same unit as **MI1**.

Thresh1 is expressed in the same unit as **MI1**.

Thresh2 is expressed in the same unit as **MI1**.

NOTE: The definition of Event D2 also applies to CondEvent D2.

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)

Inequality T1-2 (Leaving condition)

The variables in the formula are defined as follows:

Mt is the time measured at UE.

Thresh1 is the threshold parameter for this event (i.e. *t1-Threshold* as defined within *reportConfigNR* for this event).

Duration is the duration parameter for this event (i.e. *duration* as defined within *reportConfigNR* for this event).

Mt is expressed in *ms*.

Thresh1 is expressed in the same unit as **Mt**.

Duration is expressed in the same unit as **Mt**.

5.5.4.17 Event X1 (Serving L2 U2N Relay UE becomes worse than threshold1 and NR Cell becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition X1-1 and condition X1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition X1-3 or condition X1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality X1-1 (Entering condition 1)

$$Mr + Hys < Thresh1$$

Inequality X1-2 (Entering condition 2)

$$Mn + Ofn + Ocn - Hys > Thresh2$$

Inequality X1-3 (Leaving condition 1)

$$Mr - Hys > Thresh1$$

Inequality X1-4 (Leaving condition 2)

$$Mn + Ofn + Ocn + Hys < Thresh2$$

The variables in the formula are defined as follows:

Mr is the measurement result of the serving L2 U2N Relay UE, not taking into account any offsets.

Mn is the measurement result of the NR cell, not taking into account any offsets.

Ofn is the measurement object specific offset of the reference signal of the NR cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the NR cell).

Ocn is the cell specific offset of the NR cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the frequency of the NR cell, or *cellIndividualOffset* as defined within *reportConfigNR*), 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/eventX1-SD-Threshold1* 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/eventX2-SD-Threshold* 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***.

5.5.4.20b Event Z1 (Serving L2 U2N Relay UE 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 Z1-1 and condition Z1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition Z1-3 or condition Z1-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality Z1-1 (Entering condition 1)

$$Mr + Hys < Thresh1$$

Inequality Z1-2 (Entering condition 2)

$$Mn - Hys > Thresh2$$

Inequality Z1-3 (Leaving condition 1)

$$Mr - Hys > Thresh1$$

Inequality Z1-4 (Leaving condition 2)

$$Mn + Hys < Thresh2$$

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 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. *sl-rsrp* in *z1-Threshold1-Relay* as defined within *reportConfigInterRAT* if the UE measures SL-RSRP, or *sd-rsrp* in *z1-Threshold1-Relay* as defined within *reportConfigInterRAT* if the UE measures SD-RSRP for this event).

Thresh2 is the threshold parameter for this event (i.e. *z1-Threshold2-Relay* as defined within *reportConfigInterRAT* for this event).

Mr is expressed in dBm or dB, depending on the measurement quantity of serving L2 U2N Relay UE.

Mn 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 ***Mr***.

Thresh2 is expressed in the same unit as ***Mn***.

5.5.4.21 Event H1 (The Aerial UE altitude becomes higher than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition H1-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition H1-2, as specified below, is fulfilled;

Inequality H1-1 (Entering condition)

$$Ms - Hys > Thresh$$

Inequality H1-2 (Leaving condition)

$$Ms + Hys < Thresh$$

The variables in the formula are defined as follows:

Ms is the Aerial UE altitude relative to the sea level.

Hys is the hysteresis parameter for this event (i.e. *h1-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh is the threshold parameter for this event (i.e. *h1-Threshold* as defined within *reportConfigNR* for this event).

Ms, Hys, Thresh are expressed in meters.

5.5.4.22 Event H2 (The Aerial UE altitude becomes lower than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition H2-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition H2-2, as specified below, is fulfilled;

Inequality H2-1 (Entering condition)

$$Ms + Hys < Thresh$$

Inequality H2-2 (Leaving condition)

$$Ms - Hys > Thresh$$

The variables in the formula are defined as follows:

Ms is the Aerial UE altitude relative to the sea level.

Hys is the hysteresis parameter for this event (i.e. *h2-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh is the threshold parameter for this event (i.e. *h2-Threshold* as defined within *reportConfigNR* for this event).

Ms, Hys, Thresh are expressed in meters.

5.5.4.23 Event A3H1 (Neighbour becomes offset better than SpCell and the Aerial UE altitude becomes higher than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A3H1-1 and condition A3H1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A3H1-3 or condition A3H1-4, i.e. at least one of the two, as specified below, is fulfilled;

1> use the SpCell for *Mp, Offp 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 A3H1-1 (Entering condition 1)

$$Mn + Ofn + Ocn - Hys1 > Mp + Ofp + Ocp + Off$$

Inequality A3H1-2 (Entering condition 2)

$$Ms - Hys2 > Thresh$$

Inequality A3H1-3 (Leaving condition 1)

$$Mn + Ofn + Ocn + Hys1 < Mp + Ofp + Ocp + Off$$

Inequality A3H1-4 (Leaving condition 2)

$$Ms + Hys2 < Thresh$$

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 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, or *cellIndividualOffset* as defined within *reportConfigNR*), 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.

Hys1 is the hysteresis parameter for this event (i.e. *a3-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).

Ms is the Aerial UE altitude relative to the sea level.

Hys2 is the hysteresis parameter for this event (i.e. *h1-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh is the threshold parameter for this event (i.e. *h1-Threshold* 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*, *Hys1*, *Ofp*, *Ocp*, *Off are expressed in dB.

Ms*, *Hys2*, *Thresh are expressed in meters.

5.5.4.24 Event A3H2 (Neighbour becomes offset better than SpCell and the Aerial UE altitude becomes lower than a threshold)

The UE shall:

- 1> consider the entering condition for this event to be satisfied when both condition A3H2-1 and condition A3H2-2, as specified below, are fulfilled;
- 1> consider the leaving condition for this event to be satisfied when condition A3H2-3 or condition A3H2-4, i.e. at least one of the two, as specified below, is fulfilled;
- 1> use the SpCell for *Mp*, *Ofp* and *Ocp*.

NOTE: 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 A3H2-1 (Entering condition 1)

$$Mn + Ofn + Ocn - Hys1 > Mp + Ofp + Ocp + Off$$

Inequality A3H2-2 (Entering condition 2)

$$Ms + Hys2 < Thresh$$

Inequality A3H2-3 (Leaving condition 1)

$$Mn + Ofn + Ocn + Hys1 < Mp + Ofp + Ocp + Off$$

Inequality A3H1-4 (Leaving condition 2)

$$Ms - Hys > Thresh$$

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 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, or *cellIndividualOffset* as defined within *reportConfigNR*), 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.

Hys1 is the hysteresis parameter for this event (i.e. *a3-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).

Ms is the Aerial UE altitude relative to the sea level.

Hys2 is the hysteresis parameter for this event (i.e. *h2-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh is the threshold parameter for this event (i.e. *h2-Threshold* 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*, *Hys1*, *Ofp*, *Ocp*, *Off are expressed in dB.

Ms*, *Hys2*, *Thresh are expressed in meters.

5.5.4.25 Event A4H1 (Neighbour becomes better than threshold1 and the Aerial UE altitude becomes higher than a threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A4H1-1 and condition A4H1-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A4H1-3 or condition A4H1-4, i.e. at least one of the two, as specified below, is fulfilled.

Inequality A4H1-1 (Entering condition 1)

$$Mn + Ofn + Ocn - Hys1 > Thresh1$$

Inequality A4H1-2 (Entering condition 2)

$$Ms - Hys2 > Thresh2$$

Inequality A4H1-3 (Leaving condition 1)

$$Mn + Ofn + Ocn + Hys1 < Thresh1$$

Inequality A4H1-4 (Leaving condition 2)

$$Ms + Hys2 < Thresh2$$

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, or *cellIndividualOffset* as defined within *reportConfigNR*), and set to zero if not configured for the neighbour cell.

Hys1 is the hysteresis parameter for this event (i.e. *a4-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh1 is the threshold parameter for this event (i.e. *a4-Threshold* as defined within *reportConfigNR* for this event).

Ms is the Aerial UE altitude relative to the sea level.

Hys2 is the hysteresis parameter for this event (i.e. *h1-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh2 is the threshold parameter for this event (i.e. *h1-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.

Thresh1 is expressed in the same unit as **Mn**.

Ms, Hys2, Thresh2 are expressed in meters.

5.5.4.26 Event A4H2 (Neighbour becomes better than threshold1 and the Aerial UE altitude becomes lower than a threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A4H2-1 and condition A4H2-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A4H2-3 or condition A4H2-4, i.e. at least one of the two, as specified below, is fulfilled.

Inequality A4H2-1 (Entering condition 1)

$$Mn + Ofn + Ocn - Hys1 > Thresh1$$

Inequality A4H2-2 (Entering condition 2)

$$Ms + Hys2 < Thresh2$$

Inequality A4H2-3 (Leaving condition 1)

$$Mn + Ofn + Ocn + Hys1 < Thresh1$$

Inequality A4H2-4 (Leaving condition 2)

$$Ms - Hys2 > Thresh2$$

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, or *cellIndividualOffset* as defined within *reportConfigNR*), and set to zero if not configured for the neighbour cell.

Hys1 is the hysteresis parameter for this event (i.e. *a4-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh1 is the threshold parameter for this event (i.e. *a4-Threshold* as defined within *reportConfigNR* for this event).

Ms is the Aerial UE altitude relative to the sea level.

Hys2 is the hysteresis parameter for this event (i.e. *h2-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh2 is the threshold parameter for this event (i.e. *h2-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.

Thresh1 is expressed in the same unit as ***Mn***.

Ms*, *Hys2*, *Thresh2 are expressed in meters.

5.5.4.27 Event A5H1 (SpCell becomes worse than threshold1 and neighbour becomes better than threshold2 and the Aerial UE altitude becomes higher than a threshold3)

The UE shall:

1> consider the entering condition for this event to be satisfied when all of condition A5H1-1 and condition A5H1-2 and condition A5H1-3, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A5H1-4 or condition A5H1-5 or condition A5H1-6, i.e. at least one of the three, as specified below, is fulfilled;

1> use the SpCell for *Mp*.

NOTE: 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 A5H1-1 (Entering condition 1)

$$Mp + Hys1 < Thresh1$$

Inequality A5H1-2 (Entering condition 2)

$$Mn + Ofn + Ocn - Hys1 > Thresh2$$

Inequality A5H1-3 (Entering condition 3)

$$Ms - Hys2 > Thresh3$$

Inequality A5H1-4 (Leaving condition 1)

$$Mp - Hys1 > Thresh1$$

Inequality A5H1-5 (Leaving condition 2)

$$Mn + Ofn + Ocn + Hys1 < Thresh2$$

Inequality A5H1-6 (Leaving condition 3)

$$Ms + Hys2 < Thresh3$$

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, or *cellIndividualOffset* as defined within *reportConfigNR*), and set to zero if not configured for the neighbour cell.

Hys1 is the hysteresis parameter for this event (i.e. *a5-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).

Ms is the Aerial UE altitude relative to the sea level.

Hys2 is the hysteresis parameter for this event (i.e. *h1-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh3 is the threshold parameter for this event (i.e. *h1-Threshold* as defined within *reportConfigNR* for this event).

Mn*, *Mp are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

Ofn*, *Ocn*, *Hys are expressed in dB.

Thresh1 is expressed in the same unit as ***Mp***.

Thresh2 is expressed in the same unit as ***Mn***.

Ms*, *Hys2*, *Thresh3 are expressed in meters.

5.5.4.28 Event A5H2 (SpCell becomes worse than threshold1 and neighbour becomes better than threshold2 and the Aerial UE altitude becomes lower than a threshold3)

The UE shall:

1> consider the entering condition for this event to be satisfied when all of condition A5H2-1 and condition A5H2-2 and condition A5H2-3, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A5H2-4 or condition A5H2-5 or condition A5H2-6, i.e. at least one of the three, as specified below, is fulfilled;

1> use the SpCell for ***Mp***.

NOTE: 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 A5H2-1 (Entering condition 1)

$$Mp + Hys1 < Thresh1$$

Inequality A5H2-2 (Entering condition 2)

$$Mn + Ofn + Ocn - Hys1 > Thresh2$$

Inequality A5H2-3 (Entering condition 3)

$$M_s + H_{ys2} < Thresh3$$

Inequality A5H2-4 (Leaving condition 1)

$$M_p - H_{ys1} > Thresh1$$

Inequality A5H2-5 (Leaving condition 2)

$$M_n + O_{fn} + O_{cn} + H_{ys1} < Thresh2$$

Inequality A5H2-6 (Leaving condition 3)

$$M_s - H_{ys2} > Thresh3$$

The variables in the formula are defined as follows:

M_p is the measurement result of the NR SpCell, not taking into account any offsets.

M_n is the measurement result of the neighbouring cell, not taking into account any offsets.

O_{fn} is the measurement object specific offset of the neighbour cell (i.e. *offsetMO* as defined within *measObjectNR* corresponding to the neighbour cell).

O_{cn} is the cell specific offset of the neighbour cell (i.e. *cellIndividualOffset* as defined within *measObjectNR* corresponding to the neighbour cell, or *cellIndividualOffset* as defined within *reportConfigNR*), and set to zero if not configured for the neighbour cell.

H_{ys1} is the hysteresis parameter for this event (i.e. *a5-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).

M_s is the Aerial UE altitude relative to the sea level.

H_{ys2} is the hysteresis parameter for this event (i.e. *h2-Hysteresis* as defined within *reportConfigNR* for this event).

Thresh3 is the threshold parameter for this event (i.e. *h2-Threshold* as defined within *reportConfigNR* for this event).

M_n*, ***M_p are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.**

O_{fn}*, ***O_{cn}*, ***H_{ys} are expressed in dB.****

Thresh1 is expressed in the same unit as ***M_p***.

Thresh2 is expressed in the same unit as ***M_n***.

M_s*, ***H_{ys2}*, ***Thresh3 are expressed in meters.****

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*, or *eventA3H1*, or *eventA3H2*, or *eventA4H1*, or *eventA4H2*, or *eventA5H1*, or *eventA5H2*:
 - 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*, or *eventA3H1*, or *eventA3H2*, or *eventA4H1*, or *eventA4H2*, or *eventA5H1*, or *eventA5H2*:
 - 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 *rsi-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> if the measurement of serving L2 U2N Relay UE is based on SL-RSRP:
 - 4> set the *sl-MeasResult* to include the SL-RSRP of the serving L2 U2N Relay UE;
 - 4> set the *sl-MeasQuantity* to *sl-rsrp*, if supported by the UE;
 - 3> else:

- 4> set the *sl-MeasResult* to include the SD-RSRP of the serving L2 U2N Relay UE;
- 4> set the *sl-MeasQuantity* to *sd-rsrp*, if supported by the 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;
 - 6> if the UE supports *multipathRemoteUE-PC5L2* and idle/inactive relay UE reporting, and if the *sl-RelayIndicationMP* is contained in the discovery message received from the concerned L2 U2N Relay UE:
 - 7> set the *sl-RelayIndicationMP* in the *sl-MeasResultsCandRelay*;
- 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* or *eventD2* or *eventH1* or *eventH2*:
 - 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 *pdccch-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 the *includeAltitudeUE* is set to *true* in the corresponding *reportConfig* for this *measId*:
 - 2> set the *altitudeUE* to include the altitude of the UE;
- 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 *rsi-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* or *reportOnScellActivation*:
 - 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*, *eventA4*, *eventA4H1* and *eventA4H2*) or in the *a5-Threshold2* (for *eventA5*, *eventA5H1* and *eventA5H2*) or in the *aN-Offset* (for *eventA3*, *eventA3H1*, *eventA3H2* 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*) or *z1-Threshold2-Relay* (for *eventZ1*) 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

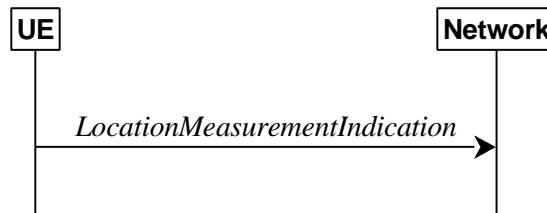


Figure 5.5.6.1-1: Location measurement indication

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

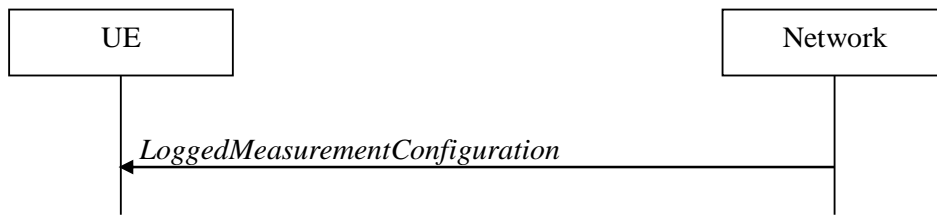


Figure 5.5a.1.1-1: Logged measurement configuration

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 UE is in SNPN access mode:
 - 2> if the *LoggedMeasurementConfiguration* message includes *snpn-ConfigList*:
 - 3> set the *snpn-ConfigIDList* in *VarLogMeasReport* to include the current registered SNPN identity as well as SNPN identities in *snpn-ConfigList*;
 - 2> else:
 - 3> set the *snpn-ConfigIDList* in *VarLogMeasReport* to include the current registered SNPN identity;
- 1> else 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*; or

- 3> if the UE is in camped normally state on an NR cell and if the registered SNPN identity is included in *snpn-ConfigIDList* 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*; or
 - 4> if the serving cell is part of the area indicated by *cag-ConfigList* in *areaConfiguration* in *VarLogMeasConfig*; or
 - 4> if the serving cell is part of the area indicated by *snpn-ConfigList* 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*, or if the registered SNPN identity is included in *snpn-ConfigIDList* 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*, or if the current camping cell is part of the area indicated by *cag-ConfigList* of *areaConfiguration* in *VarLogMeasConfig*, or if the current camping cell is part of the area indicated by *snpn-ConfigList* 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*; or
 - 3> if the UE is in camped normally state on an NR cell and if the registered SNPN identity is included in *snpn-ConfigIDList* 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*; or
 - 4> if the current serving cell is part of the area indicated by *cag-ConfigList* of *areaConfiguration* in *VarLogMeasConfig*, or if the current camping cell is part of the area indicated by *snpn-ConfigList* of *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* or if the registered SNPN identity at the time of entering the any cell selection state is included in *snpn-ConfigIDList* 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*, or if last suitable cell that the UE was camping on is part of the area indicated by *cag-ConfigList* of *areaConfiguration* in *VarLogMeasConfig*, or if last suitable cell that the UE was camping on is part of the area indicated by *snpn-ConfigList* 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.

5.5b Application Layer Measurements in RRC_IDLE/RRC_INACTIVE

5.5b.1 Area handling and storing of Application Layer Measurement reports in RRC_IDLE/RRC_INACTIVE

5.5b.1.1 General

This procedure specifies the area handling and storing of application layer measurement report containers by a UE in RRC_IDLE and RRC_INACTIVE that has an application layer measurement configuration with *appLayerIdleInactiveConfig* configured.

5.5b.1.2 Initiation

While in RRC_INACTIVE and RRC_IDLE state, the UE shall:

- 1> store any previously or subsequently received application layer measurement report containers associated with the *measConfigAppLayerId* for which not all segments, or full message, has been submitted to lower layers for transmission;

NOTE: The UE continues storing application layer measurement report containers for MBS broadcast service in RRC_CONNECTED as long as stored application layer measurement configurations/reports have not been retrieved.

- 1> if the memory reserved for storing application layer measurement report containers becomes full:
 - 2> if the reports are associated with a configuration including *appLayerMeasPriority*:
 - 3> discard reports in priority order where reports with the lowest priority are discarded first, and among reports with equal associated priority, discard reports in the order they were received, where older reports are discarded first;
 - 2> else:
 - 3> discard reports in the order they were received, where older reports are discarded first;
- 1> if *qoe-AreaScope* is configured:
 - 2> if the cell where the UE receives the service when the UE transits from RRC_CONNECTED state to RRC_INACTIVE or RRC_IDLE state is part of the area indicated by *qoe-AreaScope*:
 - 3> inform upper layers of being inside the area;
 - 2> if the cell where the UE receives the service when the UE transits from RRC_CONNECTED state to RRC_INACTIVE or RRC_IDLE state is not part of the area indicated by *qoe-AreaScope*:
 - 3> inform upper layers of being outside the area.
 - 2> if the UE re-selects to a new cell which is part of the area indicated by *qoe-AreaScope* and the previous cell was not part of the area indicated by *qoe-AreaScope*:
 - 3> inform upper layers of being inside the area;
 - 2> if the UE re-selects to a new cell which is not part of the area indicated by *qoe-AreaScope* and the previous cell was part of the area indicated by *qoe-AreaScope*:
 - 3> inform upper layers of being outside the area.

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.

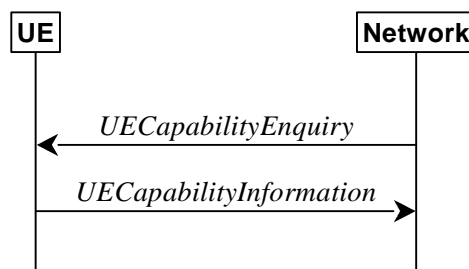


Figure 5.6.1.1-1: UE capability transfer

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-RequestList* 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*, *rrc-SegAllowed* and fields in *UECapabilityEnquiry* message (i.e. *requestedFreqBandsNR-MRDC*, *requestedCapabilityNR*, *eutra-nr-only* flag, *requestedCapabilityCommon*, and *rrc-SegAllowed*) as defined in TS 36.331 [10], 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> if the UE is an eRedCap UE and the UE supports *eRedCapIgnoreCapabilityFiltering*, the UE, in the remainder of this procedure, assumes *frequencyBandListFilter* to be the filter containing all the supported bands of the UE;

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 *supportedBandCombinationList-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*, *supportedBandCombinationListSL-U2U-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> if the UE is an eRedCap UE and the UE supports *eRedCapIgnoreCapabilityFiltering*, i.e., it assumes *frequencyBandListFilter* to be the filter containing all the supported bands of the UE:
 - 2> include all the supported bands of the UE in the field *appliedFreqBandListFilter*, except if the requested *rat-Type* is *nr* and the network included the *eutra-nr-only* field;
 - 1> else:
 - 2> 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.
- 1> if *clockQualityDetailsLevel* is included:
 - 2> store the *eventID-TSS* as the *storedEventID* within *VarTSS-Info*;
 - 2> if the UE is NPN capable and the cell is an NPN-only cell:
 - 3> derive the the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *NPN-IdentityInfoList* in *SIB1* as defined in TS 38.413 [42];
 - 2> else:
 - 3> derive the gNB identity from *gNB-ID-Length* and *cellIdentity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, and *PLMN-Identity* of the first *PLMN-IdentityInfo* list entry of *PLMN-IdentityInfoList* in *SIB1*, as defined in TS 38.413 [42];
 - 2> store the gNB identity derived from *SIB1* as the *storedGnbID* within *VarTSS-Info*;
 - 2> forward *clockQualityDetailsLevel* to upper layers.

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

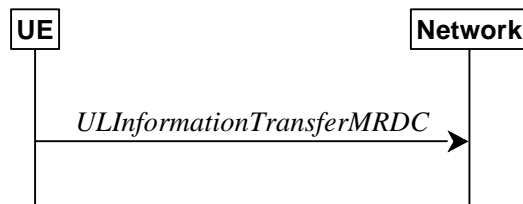


Figure 5.7.2a.1-1: UL information transfer MR-DC

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

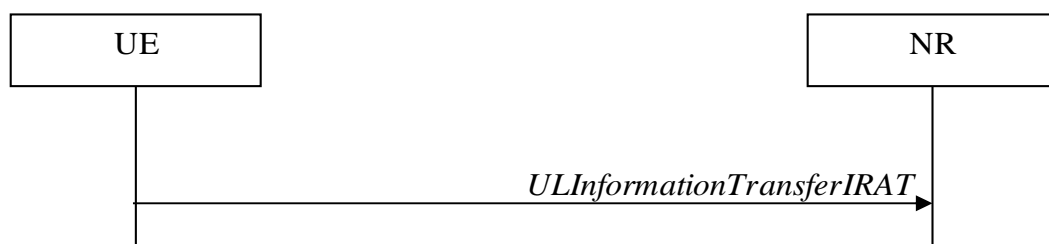


Figure 5.7.2b.1-1: UL transfer of IRAT information

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

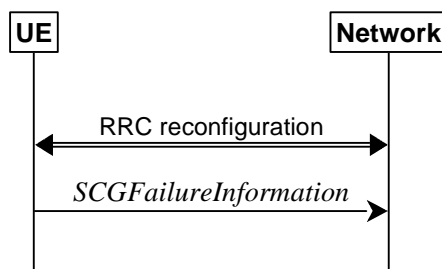


Figure 5.7.3.1-1: SCG failure information

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, CPA, or subsequent CPAC, if configured;
- 1> stop conditional reconfiguration evaluation for each CHO configuration that includes *condExecutionCondPSCell*, 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 *failureType* 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> if the UE supports SCG failure information for mobility robustness optimization for conditional PSCell change or addition, for each neighbour cell, if any, included in *measResultListNR* in *measResultFreqList*:
 - 4> if the neighbour cell is one of the candidate cells for which the *reconfigurationWithSync* is included in the *secondaryCellGroup* in the MCG *VarConditionalReconfig* (for CPA or inter-SN CPC in NR-DC) or *SCG VarConditionalReconfig* (for intra-SN CPC) at the moment of the detected SCG failure (radio link failure at PSCell or PSCell change or addition failure):
 - 5> if the first entry of *choConfig* corresponds to a fulfilled execution condition at the moment of SCG failure; or
 - 5> if the second entry of *choConfig*, if available, corresponds to a fulfilled execution condition at the moment of SCG failure:
 - 6> 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;
 - 6> set *timeBetweenEvents* to the elapsed time between the point in time of fulfilling the condition in *choConfig* that was fulfilled first in time, and the point in time of fulfilling 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 fulfilled;
 - 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;
- 1> release *successPSCell-Config* configured by the source PSCell, if available.

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

5.7.3a EUTRA SCG failure information

5.7.3a.1 General

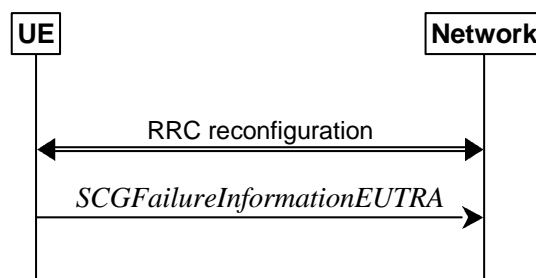


Figure 5.7.3a.1-1: EUTRA SCG failure information

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

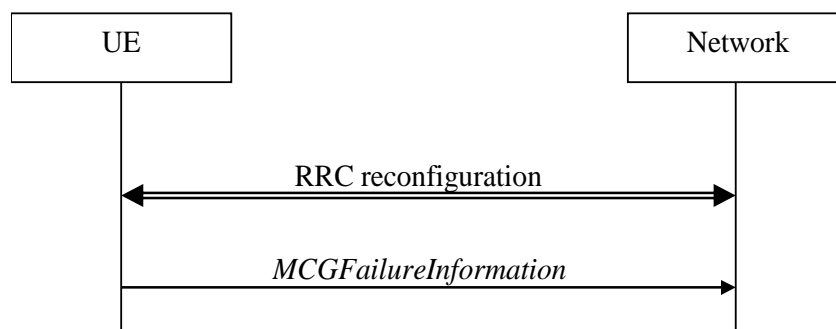


Figure 5.7.3b.1-1: MCG failure information

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

In case of MR-DC, 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; or

In case of MP, a MP remote UE configured with split SRB1 initiates the procedure to report direct path failures when neither MCG (i.e. direct path) nor indirect path transmission is suspended, *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 or subsequent CPAC, 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 direct path when MP is configured:
 - 3> set the *primaryPath* to refer to the indirect path;
 - 2> else 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> if the UE supports RLF-Report for fast MCG recovery procedure:
 - 3> set the *pSCellId* in the *VarRLF-Report* to the global cell identity of the PSCell, if available, otherwise to the physical cell identity and carrier frequency of the PSCell;
 - 3> set the *mcgRecoveryFailureCause* in *VarRLF-Report* to *t316-expiry*;
 - 2> initiate the connection re-establishment procedure as specified in 5.3.7.

5.7.3c Indirect path failure information

5.7.3c.1 General

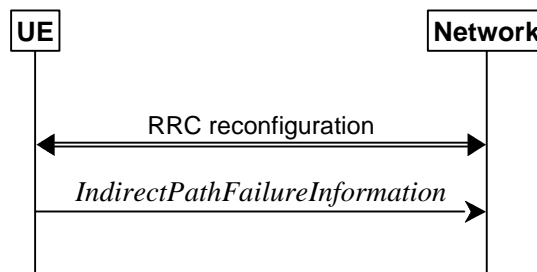


Figure 5.7.3c.1-1: Indirect path failure information

The purpose of this procedure is to inform NR RAN about an indirect path failure the MP remote UE has experienced.

5.7.3c.2 Initiation

In case of MP, a MP remote UE initiates the procedure to report indirect path failures when neither MCG nor indirect path transmission is suspended and when one of the following conditions is met:

- 1> upon detecting a SL indirect path failure resulting from sidelink radio link failure on the PC5 unicast link or reception of *NotificationMessageSidelink* from the L2 U2N Relay UE (except indicating *relayUE-HO*), or indirect path addition/change failure in accordance with 5.3.5.17.2.3; or
- 1> upon detecting a N3C indirect path failure, including N3C connection failure or Uu failure of the N3C relay UE with N3C indirect path;

Upon initiating the procedure, the UE shall:

- 1> if the procedure was initiated to report SL indirect path failure:
 - 2> reset the sidelink specific MAC of the L2 U2N relay UE;

- 2> stop T421 if running;
- 1> suspend indirect path transmission for all SRBs and DRBs;
- 1> initiate transmission of the *IndirectPathFailureInformation* message in accordance with 5.7.3c.4;

5.7.3c.3 Failure type determination

The L2 U2N Remote UE configured with SL indirect path shall set the indirect path failure type as follows:

- 1> if the UE initiates transmission of the *IndirectPathFailureInformation* message due to T421 expiry in accordance with clause 5.3.5.16.1.3:
 - 2> set the *failureTypeIndirectPath* as *t421-Expiry*;
- 1> else if the UE initiates transmission of the *IndirectPathFailureInformation* message due to reception of the *NotificationMessageSidelink* including *indicationType*, in accordance with clause 5.8.9.10.4:
 - 2> set the *failureTypeIndirectPath* as the value in *indicationType* received from *NotificationMessageSidelink*;
- 1> else if the UE initiates transmission of the *IndirectPathFailureInformation* message due to sidelink radio link failure in accordance with clause 5.8.9.3:
 - 2> set the *failureTypeIndirectPath* as *sl-Failure*;
- 1> if the target L2 U2N Relay UE (i.e., the UE indicated by *sl-IndirectPathRelayUE-Identity* in the received *sl-IndirectPathAddChange*) changes its serving PCell to a different cell from the target cell (i.e. the cell indicated by *sl-IndirectPathCellIdentity* in the received *sl-IndirectPathAddChange*) before path addition or change:
 - 2> set the *failureTypeIndirectPath* as *indirectPathAddChangeFailure*;

The N3C remote UE shall set the indirect path failure type as follows:

- 1> if the UE initiates transmission of the *IndirectPathFailureInformation* message due to N3C connection failure:
 - 2> set the *failureTypeIndirectPath* as *n3c-Failure*;
- 1> else if the UE initiates transmission of the *IndirectPathFailureInformation* message due to Uu radio link failure on N3C indirect path in accordance with clause 5.3.10.3:
 - 2> set the *failureTypeIndirectPath* as *relayUE-Uu-RLF*;

NOTE: it is out of 3GPP scope how the remote UE detects N3C connection failure, or how the relay UE indicates Uu RLF to the remote UE on the N3C connection.

5.7.3c.4 Actions related to transmission of *IndirectPathFailureInformation* message

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

- 1> set the *failureTypeIndirectPath* in accordance with 5.7.3c.3;
- 1> if the procedure was initiated to report SL indirect path failure:
 - 2> set the *sl-MeasResultServingRelay* to include the measurement result for serving L2 U2N Relay UE if available;
 - 2> for each *measObjectRelay* included in *MeasConfig*, and for which measurement results are available:
 - 3> include an entry in *sl-MeasResultsCandRelay*;
- 1> else if the procedure was initiated to report N3C indirect path failure:
 - 2> include *n3c-relayUE-InfoList* to report relay UE information with non-3GPP connection(s) if available;
- 1> submit the *IndirectPathFailureInformation* message to lower layers for transmission.

5.7.4 UE Assistance Information

5.7.4.1 General

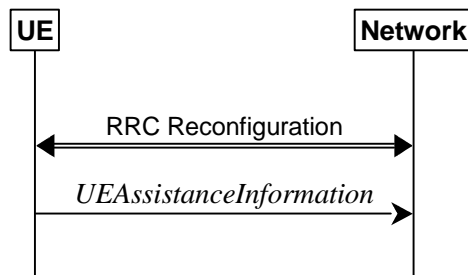


Figure 5.7.4.1-1: UE Assistance Information

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 preference on the MUSIM gap priority; or
- its preference on the MUSIM temporary capability restriction; 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); or
- or

- its preference on multi-Rx operation for FR2; or
- availability of flight path information for Aerial UE operation; or
- UL traffic information; or
- the information of the relay UE(s) with which it connects via a non-3GPP connection for MP; or
- configured grant assistance information for NR sidelink positioning.

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 gap priority preference may initiate the procedure if it was configured to do so, upon determining it has gap priority 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 providing MUSIM assistance information for temporary capability restriction may initiate the procedure if it was configured to do so, upon determining it has temporary capability restriction or upon determining the removal of the capability restriction.

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.

A UE capable of providing an indication of its preference on multi-Rx operation for FR2 may initiate the procedure if it was configured to do so, upon detecting having a preference on multi-Rx operation for FR2 and upon change of its preference on multi-Rx operation for FR2.

A UE capable of indicating the availability of flight path information may initiate the procedure, if it was configured to do so, upon determining that an initial or updated flight path information is available.

A UE capable of providing UL traffic information shall initiate the procedure when this information is available upon being configured to do so, and upon change of UL traffic information.

A UE capable of N3C remote UE operation initiates the procedure upon being configured to report relay UE information on the available non-3GPP connection(s), and upon change of its available non-3GPP connection(s).

A UE capable of providing configured grant assistance information including SL-PRS transmission periodicity and priority for NR sidelink positioning in RRC_CONNECTED may initiate the procedure.

Editor's Note: FFS the details of configured grant assistance information.

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 based on *candidateServingFreqListNR* included in *idc-AssistanceConfig* of a cell group:
 - 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 or NR-DC 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 for the cell group 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;
- 1> if configured to provide IDC assistance information based on *idc-FDM-AssistanceConfig* included in *idc-AssistanceConfig* of a cell group:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *idc-FDM-Assistance* since it was configured to provide IDC assistance information:
 - 3> if on one or more frequency ranges included in *candidateServingFreqRangeListNR*, the UE is experiencing IDC problems that it cannot solve by itself; or
 - 3> if on one or more supported UL CA or NR-DC combination comprising of frequency ranges included in *candidateServingFreqRangeListNR*, 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-FDM-Assistance* information for the cell group 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;
- 1> if configured to provide IDC assistance information based on *idc-TDM-AssistanceConfig* included in *idc-AssistanceConfig* of a cell group:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *idc-TDM-Assistance* since it was configured to provide IDC assistance information:
 - 3> if on one or more frequencies included in *candidateServingFreqListNR* or frequency ranges included in *candidateServingFreqRangeListNR*, the UE is experiencing IDC problems that it cannot solve by itself; or

- 3> if on one or more supported UL CA or NR-DC combination comprising of carrier frequencies included in *candidateServingFreqListNR* or frequency ranges included in *candidateServingFreqRangeListNR*, 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-TDM-Assistance* information for the cell group 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 or frequency range(s) 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 or frequency range(s) 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 or frequency range(s), reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies or frequency range(s) became a serving frequency or serving frequencies or frequency range(s) 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 configured to provide MUSIM assistance information for gap priority preference:
 - 3> 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
 - 3> if the UE has a preference on the MUSIM gap(s) and the UE did not transmit a *UEAssistanceInformation* message with *musim-GapPriorityPreferenceList* since it was configured to provide MUSIM assistance information for gap priority preference; or
 - 3> 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; or
 - 3> if the current *musim-GapPriorityPreferenceList* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-GapPriorityPreferenceList* and the timer T346h is not running:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-GapPreferenceList* and/or *musim-GapPriorityPreferenceList* and/or *musimGap-KeepPreference*;
 - 4> start or restart the timer T346h with the timer value set to the *musim-GapProhibitTimer*.
 - 2> else:
 - 3> 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

- 3> 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:
 - 4> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-GapPreferenceList*;
 - 4> 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 MUSIM assistance information for temporary capability restriction:
 - 2> if the UE has temporary capability restriction on the current configuration and timer T348 is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-Cell-SCG-ToRelease* and/or *musim-CellToAffectList*;
 - 3> start the timer T348 with the timer value set to the *musim-WaitTimer*.
 - 2> if the UE has temporary capability restriction on the combination(s) of bands comprising of band(s) included in *musim-CandidateBandList* and the UE did not transmit a *UEAssistanceInformation* message with *musim-AffectedBandsList* and/or *musim-AvoidedBandsList* since it was configured to provide MUSIM assistance information for temporary capability restriction; or
 - 2> if the current *musim-AffectedBandsList* and/or *musim-AvoidedBandsList* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-CapRestriction* and timer T346n is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-AffectedBandsList* and/or *musim-AvoidedBandsList*;
 - 3> start the timer T346n with the timer value set to the *musim-ProhibitTimer*.
 - 2> if the current *musim-MaxCC* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-CapRestriction* and timer T346n is not running:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-MaxCC*;
 - 3> start the timer T346n with the timer value set to the *musim-ProhibitTimer*.
 - 2> if the UE has a preference on the measurement gap requirement information and the UE did not transmit a *UEAssistanceInformation* message with measurement gap requirement information or *RRCReconfigurationComplete* message or *RRCResumeComplete* message with measurement gap requirement information since it was configured to provide its preference on the measurement gap requirement information for MUSIM; or
 - 2> if the current *musim-NeedForGapsInfoNR* is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *musim-NeedForGapsInfoNR* or *RRCReconfigurationComplete* message or *RRCResumeComplete* message including *needForGapsInfoNR*:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the current *musim-NeedForGapsInfoNR*;
- 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 $T_{\text{SearchDeltaP-StationaryConnected}}$:
 - 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*;
 - 1> if configured to provide its preference for multi-Rx operation and timer T346m is not running;
 - 2> if the UE has a preference on multi-Rx operation for FR2 and did not transmit a *UEAssistanceInformation* message with *multiRx-PreferenceFR2* since it was configured to provide its preference on multi-Rx operation; or
 - 2> if the UE has a different preference on multi-Rx operation for FR2 from the last indicated *multiRx-PreferenceFR2*:
 - 3> start timer T346m with the timer value set to the *multiRx-PreferenceReportingConfigFR2ProhibitTimer*;
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide the UE preference for multi-Rx operation for FR2.
 - 1> if configured to indicate the availability of flight path information and the UE has (updated) flight path information available:
 - 2> if the UE had neither provided a flight path information nor indicated the availability of flight path information since last entering RRC_CONNECTED state; or
 - 2> if at least one waypoint or a timestamp corresponding to a waypoint location that was not previously provided since last entering RRC_CONNECTED state is available; or
 - 2> if at least one upcoming waypoint or a timestamp corresponding to a waypoint location that was previously provided since last entering RRC_CONNECTED state is to be removed; or
 - 2> if *flightPathUpdateDistanceThr* is configured and, for at least one waypoint, the 3D distance between the previously provided location and the new location is more than the distance threshold configured by *flightPathUpdateDistanceThr*; or
 - 2> if *flightPathUpdateTimeThr* is configured and, for at least one waypoint, the time difference between the previously provided timestamp and the new timestamp, if available, is more than the time threshold configured by *flightPathUpdateTimeThr*:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to indicate the availability of flight path information;
- NOTE 4: If neither *flightPathUpdateDistanceThr* nor *flightPathUpdateTimeThr* is configured, it is up to UE implementation whether to initiate transmission of the *UEAssistanceInformation* message when updated flight path information is available.
- 1> if configured to provide UL traffic information:
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *ul-TrafficInfo* since it was configured to provide UL traffic information; or

- 2> if UL traffic information included in the previous *UEAssistanceInformation* has changed since the last transmission of the *UEAssistanceInformation* message containing *ul-TrafficInfo* for at least one QoS flow for which timer T3461 is not running;
- 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide UL traffic information.

NOTE 5: The UE only considers *burstArrivalTime* to have changed when it changes relative to the periodicity of the Data Burst arrival.

- 1> if configured to report relay UE information with non-3GPP connection(s):
 - 2> if the UE did not transmit a *UEAssistanceInformation* message with *n3c-relayUE-InfoList* since it was configured to report available relay UE information with non-3GPP connection(s); or
 - 2> if the UE has new available non-3GPP connection(s); or
 - 2> if the non-3GPP connection(s) with the reported relay UE(s) is not available:
 - 3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to report relay UE information with non-3GPP connection(s) included in the *n3c-relayUE-InfoList*;
- 1> if configured to provide configured grant assistance information for NR sidelink positioning:
 - 2> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide configured grant assistance information for NR sidelink positioning;

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 or NR-DC 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 or NR-DC 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 or NR-DC combination comprising of carrier frequencies included in *candidateServingFreqListNR*, that is affected by IDC problems;
- 2> if there is at least one affected frequency range overlapping with one candidate frequency range included in *candidateServingFreqRangeListNR*, and the center frequency of the affected frequency range is within the candidate frequency range included in *candidateServingFreqRangeListNR*, the UE is experiencing IDC problems that it cannot solve by itself:
 - 3> include the field *affectedCarrierFreqRangeList* with an entry for each affected frequency range;
 - 3> for each affected frequency range included in the field *affectedCarrierFreqRangeList*, include *centerFreq* and *affectedBandwidth*;
 - 3> for each affected frequency range included in the field *affectedCarrierFreqRangeList*, include *interferenceDirection* and optionally *victimSystemType*, and set it accordingly;
- 2> if there is at least one supported UL CA or NR-DC combinations comprising of candidate frequency ranges included in *candidateServingFreqRangeListNR*, and each affected frequency range in the UL CA or NR-DC combination overlapping with one candidate frequency range included in *candidateServingFreqRangeListNR*, and the center frequency of the affected frequency range is within the candidate frequency range included in *candidateServingFreqRangeListNR*, the UE is experiencing IDC problems that it cannot solve by itself:
 - 3> include the field *affectedCarrierFreqRangeCombList* with an entry for each supported UL CA or NR-DC combination comprising of frequency ranges that is affected by IDC problems;
 - 3> for each affected frequency range included in the field *affectedCarrierFreqRangeCombList*, include *centerFreq* and *affectedBandwidth*;
 - 3> for each UL CA or NR-DC combination included in the field *affectedCarrierFreqRangeCombList*, include *interferenceDirection* and optionally *victimSystemType*, and set it accordingly;
- 2> if there is at least one candidate carrier frequency included in *candidateServingFreqListNR* or candidate frequency range included in *candidateServingFreqRangeListNR* or one supported UL CA or NR-DC combination comprising of candidate carrier frequencies included in *candidateServingFreqListNR* or candidate frequency ranges included in *candidateServingFreqRangeListNR*, the UE is experiencing IDC problems that it cannot solve by itself, and *affectedCarrierFreqList* or *affectedCarrierFreqCombList* or *affectedCarrierFreqRangeList* or *affectedCarrierFreqRangeCombList* is included, and *idc-TDM-AssistanceConfig* is set to *setup*:
 - 3> include Time Domain Multiplexing (TDM) based assistance information as indicated by *idc-TDM-Assistance* that could be used to resolve the 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* or *idc-FDM-Assistance* or *idc-TDM-Assistance* fields).

- 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 *MaxBW-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;
 - 4> if UE has a preference for MUSIM gap priority;
 - 5> include the *musim-GapPriorityPreferenceList* the UE prefers to be configured;
 - 5> if the UE has preference to keep all colliding MUSIM gaps for periodic MUSIM gap(s):
 - 6> include the *musim-GapKeepPreference*;
 - 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.
 - 2> if UE has a preference for MUSIM gap priority:
 - 3> include the *musim-GapPriorityPreferenceList* the UE prefers to be configured;
 - 3> if the UE has preference to keep all colliding MUSIM gaps for periodic MUSIM gap(s):
 - 4> include the *musim-GapKeepPreference*;
 - 2> if UE has a preference for temporary capability restriction:
 - 3> if UE has a preference for serving cell(s) and/or SCG to be released:
 - 4> include the *musim-Cell-SCG-ToRelease*;
 - 5> set *musim-CellToRelease* to include the serving cell(s) the UE prefers to be released;
 - 5> set *scg-ReleasePreference* to *scgReleasePreferred* if the UE prefers the SCG to be released;
 - 3> if UE has a preference to indicate the serving cells with restricted capabilities:
 - 4> include the *musim-CellToAffectList* the UE prefers to be configured;
 - 5> include the *musim-ServCellIndex* and the *musim-MIMO-Layers-DL/ musim-MIMO-Layers-UL/ musim-SupportedBandwidth-DL/ musim-SupportedBandwidth-UL* for the corresponding serving cell;

- 3> if UE has a preference to indicate the maximum number of CCs:
 - 4> include the *musim-caRestriction* for the corresponding *musim-MaxCC* the UE prefers to be configured;
 - 5> include the the *musim-MaxCC-DL/ musim-MaxCC-UL* for the corresponding maximum number of CCs;
- 3> if UE has a preference to indicate band(s) and/or combination(s) of bands with capabilities restricted which comprise of the band(s) that is/are indicated in *musim-CandidateBandList*:
 - 4> include the *musim-AffectededBandsList* the UE prefer to be configured with capabilities restricted;
 - 5> include the *musim-bandEntryIndex* for each band or each band of the combination(s) for which capabilities are restricted;
 - 5> include the *musim-CapabilityRestricted* for the corresponding band;
- 3> if UE has a preference to indicate band(s) and/or combination(s) of bands to be avoided which comprise of band(s) that is indicated in *musim-CandidateBandList*:
 - 4> include the *musim-AvoidedBandsList* the UE prefers not to be configured;
 - 5> include the *musim-bandEntryIndex* for each band or each band of the combination(s) to be avoided;
- 3> if UE has a preference for measurement gap requirement:
 - 4> if the *TargetBandFilterNR-r16* of *NeedForGapsConfigNR* is configured:
 - 5> include the *musim-NeedForGapsInfoNR* to provide the measurement gap requirement information from the *requestedTargetBandFilterNR-r16* of *NeedForGapsConfigNR* configuration in RRCResume message or *RRCReconfiguration* message of NR target bands the UE prefer to be configured;
 - 4> else:
 - 5> include the *musim-NeedForGapsInfoNR* to provide the measurement gap requirement information for all the supported bands;
 - 4> include the gap requirement information of intra-frequency measurement for each supported NR serving cell.
- 2> if the UE has no longer preference for temporary capability restriction:
 - 3> do not include the corresponding temporary capability restriction preference in the *musim-CapRestriction* in the *musim-Assistance IE*;
- 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*;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide preference on multi-Rx operation for FR2 according to 5.7.4.2:
 - 2> if the UE has a preference for not operating on multi-Rx (i.e. not supporting simultaneous reception with different QCL-typed) for FR2:
 - 3> set *multiRx-PreferenceFR2* to *single*;
 - 2> else (if the UE has the preference for operating on multi-Rx for FR2):
 - 3> set *multiRx-PreferenceFR2* to *multiple*.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to indicate the availability of flight path information according to 5.7.4.2 or 5.3.5.3;
 - 2> include the *flightPathInfoAvailable*;
- 1> if transmission of the *UEAssistanceInformation* message is initiated to provide UL traffic information according to 5.7.4.2:
 - 2> for each PDU session for which the UE intends to provide UL traffic information in this *UEAssistanceInformation* message:
 - 3> set *pdu-SessionID* to the value of the concerned PDU session ID;

- 3> for each QoS flow of this PDU session for which timer T3461 is not running and for which the UE intends to provide UL traffic information in this *UEAssistanceInformation* message:
 - 4> start timer T3461 associated to this QoS flow with the timer value set to the value of *ul-TrafficInfoProhibitTimer*;
 - 4> set *qfi* to the value of the concerned QFI;
 - 4> if the jitter range measurement is available; and
 - 4> if the UE did not provide jitter range since it was configured to provide UL traffic information, or if the measured jitter range has changed since the last transmission of the *UEAssistanceInformation* message containing *jitterRange*:
 - 5> set *jitterRange* to the latest measured value of the jitter range;
 - 4> if the burst arrival time measurement is available; and
 - 4> if the UE did not provide burst arrival time since it was configured to provide UL traffic information, or if the measured burst arrival time has changed since the last transmission of the *UEAssistanceInformation* message containing *burstArrivalTime*:
 - 5> set *burstArrivalTime* to the latest measured value of the burst arrival time;
 - 4> if the traffic periodicity measurement is available; and
 - 4> if the UE did not provide traffic periodicity since it was configured to provide UL traffic information, or if the measured traffic periodicity has changed since the last transmission of the *UEAssistanceInformation* message containing *trafficPeriodicity*:
 - 5> set *trafficPeriodicity* to the latest measured value of the traffic periodicity;
 - 4> if the UE did not provide *pduSetIdentification* since it was configured to provide UL traffic information, or if the information previously provided in *pduSetIdentification* has changed since the last transmission of the *UEAssistanceInformation* message containing *pduSetIdentification*:
 - 5> if the UE is able to identify PDU Set(s) for the QoS flow:
 - 6> set *pduSetIdentification* to *true*;
 - 5> else:
 - 6> set *pduSetIdentification* to *false*.
 - 4> if the UE did not provide *psiIdentification* since it was configured to provide UL traffic information, or if the information previously provided in *psiIdentification* has changed since the last transmission of the *UEAssistanceInformation* message containing *psiIdentification*:
 - 5> if the UE is able to identify PSI(s) for the QoS flow:
 - 6> set *psiIdentification* to *true*;
 - 5> else:
 - 6> set *psiIdentification* to *false*.
- 1> if transmission of the *UEAssistanceInformation* message is initiated to report relay UE information with non-3GPP connection(s) according to 5.7.4.2:
 - 2> include *n3c-relayUE-InfoList* in the *UEAssistanceInformation* message;

The UE shall set the contents of the *UEAssistanceInformation* message for configured grant assistance information for NR sidelink communication or NR sidelink positioning:

- 1> if configured to provide configured grant assistance information for NR sidelink:
 - 2> include the *sl-UE-AssistanceInformationNR*;

- 1> if configured to provide configured grant assistance information for NR sidelink positioning:
 - 2> include the *sl-PRS-UE-AssistanceInformationNR*;

NOTE 4: It is up to UE implementation when and how to trigger configured grant assistance information for NR sidelink communication or NR sidelink positioning.

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 PSCell and SCells of the SCG the UE prefers to be temporarily configured in downlink;
 - 2> set *reducedCCsUL* to the number of maximum PSCell and 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 (e)RedCap UE

The relaxed measurement criterion for a stationary UE is met when:

- $(SS\text{-RSRP}_{\text{RefStationaryConnected}} - SS\text{-RSRP}) < S_{\text{SearchDeltaP-StationaryConnected}}$,

Where:

- SS-RSRP = current L3 RSRP measurement of the PCell based on SSB (dB).
- $SS\text{-RSRP}_{\text{RefStationaryConnected}}$ = 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 $(SS\text{-RSRP} - SS\text{-RSRP}_{\text{RefStationaryConnected}}) > 0$; or
 - if the relaxed measurement criterion has not been met for $T_{\text{SearchDeltaP-StationaryConnected}}$:
- UE shall set the value of $SS\text{-RSRP}_{\text{RefStationaryConnected}}$ to the current SS-RSRP value of the serving cell.

5.7.4a Void

5.7.5 Failure information

5.7.5.1 General

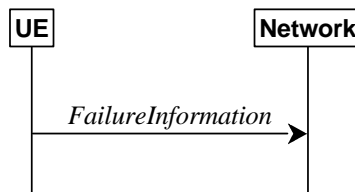


Figure 5.7.5.1-1: Failure information

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 to 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 *DL Dedicated Message Segment* message.

5.7.6.3 Reception of *DL Dedicated Message Segment* by the UE

Upon receiving *DL Dedicated Message Segment* 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*, *rrc-SegAllowedSRB4* or *rrc-SegAllowedSRB5* 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;
- 2> if the UE supports reselection measurement reporting:
 - 3> if *SIB11* includes the *measIdleConfigSIB* and contains *measReselectionCarrierListNR*:
 - 4> store or replace the *measReselectionCarrierListNR* of *measIdleConfigSIB* of *SIB11* within *VarMeasReselectionConfig*;
 - 3> else:
 - 4> remove the *measReselectionCarrierListNR* in *VarMeasReselectionConfig*, if stored;
 - 3> if *SIB11* includes the *measIdleConfigSIB* and contains *measReselectionValidityDuration*:
 - 4> store or replace the *measReselectionValidityDuration* of *measIdleConfigSIB* of *SIB11* within *VarMeasReselectionConfig*;
 - 3> else:
 - 4> remove the *measReselectionValidityDuration* in *VarMeasReselectionConfig*, if stored;

- 3> if *SIB11* includes the *measIdleConfigSIB* and contains *measIdleValidityDuration*:
 - 4> store or replace the *measIdleValidityDuration* of *measIdleConfigSIB* of *SIB11* within *VarEnhMeasIdleConfig*;
- 3> else:
 - 4> remove the *measIdleValidityDuration* in *VarEnhMeasIdleConfig*, 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* and released by the UE upon deregistration as specified in TS 23.502 [43].

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.

5.7.9.3 Release of Mobility History Information

If the UE supports storage of mobility history information, the UE shall:

- 1> if stored, discard the mobility history information, i.e. release the UE variable *VarMobilityHistoryReport* upon deregistration from the network as specified in TS 23.502 [43].

5.7.10 UE Information

5.7.10.1 General

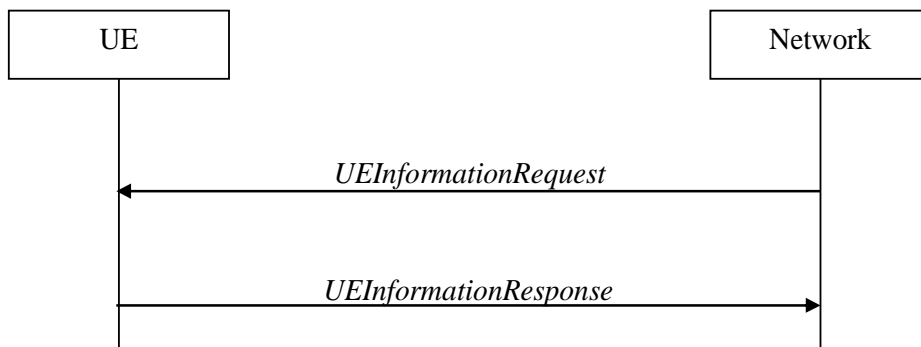


Figure 5.7.10.1-1: UE information procedure

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> if *measIdleValidityDuration* is included in *VarEnhMeasIdleConfig*;
 - 3> set the *measResultIdleEUTRA* in the *UEInformationResponse* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport* for any valid measurement results, if available, and set *validityStatus* to value *checked* for each reported measurement;
 - 3> set the *measResultIdleNR* in the *UEInformationResponse* message to the value of *measReportIdleNR* in the *VarMeasIdleReport* for any valid measurement results, if available, and set *validityStatus* to value *checked* for each reported measurement;
 - 3> discard the *VarMeasIdleReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;
 - 2> else:
 - 3> set the *measResultIdleEUTRA* in the *UEInformationResponse* message to the value of *measReportIdleEUTRA* in the *VarMeasIdleReport*, if available;
 - 3> set the *measResultIdleNR* in the *UEInformationResponse* message to the value of *measReportIdleNR* in the *VarMeasIdleReport*, if available;
 - 3> discard the *VarMeasIdleReport* upon successful delivery of the *UEInformationResponse* message confirmed by lower layers;

- 1> if the *reselectionMeasurementReq* is included in the *UEInformationRequest* and the UE has valid reselection measurements available:
 - 2> if *measReselectionValidityDuration* is included in *VarMeasReselectionConfig*;
 - 3> set the *measResultReselectionNR* in the *UEInformationResponse* message the valid NR measurement results, if available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig* and set *validityStatus* to value *checked* for each reported measurement;
 - 2> else:
 - 3> set the *measResultReselectionNR* in the *UEInformationResponse* message the NR measurement results, if available for any frequency listed in *measReselectionCarrierListNR* in *VarMeasReselectionConfig*;
- 1> if the *logMeasReportReq* is present and if the RPLMN is included in *plmn-IdentityList* stored in *VarLogMeasReport*, or if the current registered SNPN identity is included in *snpn-ConfigIDList* 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*; or
- 1> if *ra-ReportReq* is set to *true* and the UE has random access related information available in *VarRA-Report* and if the registered SNPN identity is included in *snpn-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*; or

- 2> if the UE has radio link failure information or handover failure information available in *VarRLF-Report* and if the current registered SNPN identity is included in *snpn-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*:
- 1> if *connEstFailReportReq* is set to *true* and if the UE has connection establishment failure information or connection resume failure information available in *VarConnEstFailReport* or *VarConnEstFailReportList* and if the registered SNPN identity is equal to *snpn-identity* in *networkIdentity* stored in *VarConnEstFailReport* or any entry 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*;
or
- 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 current registered SNPN identity is included in *snpn-IdentityList* if stored in the *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> if the *successHO-Report* in the *VarSuccessHO-Report* concerns a *mobilityFromNRCommand*:
 - 3> set *timeSinceSHR* in *VarSuccessHO-Report* to the time that elapsed since the successful handover report determination as specified in 5.7.10.6;
- 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 *successPSCell-ReportReq* is set to *true* and if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the RPLMN is included in *plmn-IdentityList* stored in *VarSuccessPSCell-Report*; or
- 1> if the *successPSCell-ReportReq* is set to *true* and if the UE has successful PSCell change or addition information available in *VarSuccessPSCell-Report* and if the current registered SNPN identity is included in *snpn-IdentityList* if stored in the *VarSuccessPSCell-Report*:
 - 2> set the *successPSCell-Report* in the *UEInformationResponse* message to the value of *successPSCell-Report* in the *VarSuccessPSCell-Report*;
 - 2> discard the *VarSuccessPSCell-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 *flightPathInfoReq* is included in the *UEInformationRequest* and the UE has (updated) flight path information available, set the *flightPathInfoReport* in the *UEInformationResponse* message as follows:
 - 2> include the list of up to *maxWayPointNumber* waypoints, if any, along the flight path;
 - 2> if the *includeTimeStamp* is set to *true*, for each included waypoint:
 - 3> if available, set the field *timestamp* to the time when UE intends to arrive at the waypoint;
- 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 for the Random Access report determination

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, or upon failed or successfully completed RA-SDT operation as specified in clause 5.3.13.5, 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*; or
- 1> if the registered SNPN identity or the SNPN identity selected by upper layers (see TS24.501 [23]) from the list of SNPN(s) included in the *NPN-IdentityInfoList* in *SIB1* is not included in *snpn-IdentityList* stored in a non-empty *VarRA-Report*:
 - 2> clear the information included in *VarRA-Report*;

- 1> if the UE is not in SNPN access mode and if the number of *RA-Report* entries stored in the *ra-ReportList* in *VarRA-Report* is less than *maxRARReport*:
 - 2> if the number of PLMN entries in *plmn-IdentityList* in *identityList* stored in *VarRA-Report* is less than *maxPLMN*; or
 - 2> if the number of PLMN entries in *plmn-IdentityList* in *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 random-access 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.
- 1> if the UE is in SNPN access mode and if the number of *RA-Report* entries stored in the *ra-ReportList* in *VarRA-Report* is less than *maxRARReport*:
 - 2> if the number of SNPN identity entries in *snpn-IdentityList* in *identityList* stored in *VarRA-Report* is less than *maxNPN*; or
 - 2> if the number of SNPN identity entries in *snpn-IdentityList* in *identityList* stored in *VarRA-Report* is equal to *maxNPN* and the list of equivalent SNPN(s) is subset of or equal to the *snpn-IdentityList* stored in *VarRA-Report*:
 - 3> append the following contents associated to the random-access procedure as a new entry in the *VarRA-Report*:
 - 4> if the list of equivalent SNPN(s) has been stored by the UE:
 - 5> set the *snpn-IdentityList* to include the list of equivalent SNPN(s) stored by the UE (i.e. includes the registered SNPN identity) without exceeding the limit of *maxNPN*;
 - 4> else:

- 5> set the *snpn-Identity*, in *snpn-IdentityList*, to the SNPN identity selected by upper layers (see TS 24.501 [23]) from the SNPN identities included in the *NPN-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 or the failed or successfully completed RA-SDT procedure related information is added to the *VarRA-Report*.

NOTE 1: Void.

5.7.10.5 RA information determination

The UE shall, for the last successfully completed or last failed random-access procedure, 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 measured 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> if one or more of the features including RedCap and/or Slicing and/or SDT and/or MSG3 repetitions and/or MSG1 repetitions and/or eRedCap are applicable for this random-access procedure as specified in clause 5.1.1b of TS 38.321[3]:
 - 2> set the *triggeredFeatureCombination* to indicate all the features triggering this random-access procedure as below:
 - 3> if this random-access procedure is triggered by RedCap, include *redCap*;
 - 3> if this random-access procedure is triggered by SDT, include *smallData*;
 - 3> if this random-access procedure is triggered by Msg3 repetitions, include *msg3-Repetitions*;
 - 3> if this random-access procedure is triggered by Msg1 repetitions, include *msg1-Repetitions*;
 - 3> if this random-access procedure is triggered by eRedCap, include *eRedCap*;
 - 3> if this random-access procedure is triggered by slicing, set *nsag* to the NSAG ID applied in the random-access procedure and set the *triggered-S-NSSAI-List* to include all the *S-NSSAI(s)* associated to the slices triggering the access attempt in the random-access procedure;
 - 2> if the value of used feature or combination of features is different from the *triggeredFeatureCombination*:
 - 3> set the *usedFeatureCombination* to indicate one or more features of *FeatureCombination* associated to the random-access resource used in the random-access procedure as below:
 - 4> if RedCap is part of the used *FeatureCombination*, include *redCap*;
 - 4> if SDT is part of the used *FeatureCombination*, include *smallData*;
 - 4> if Msg3 repetitions is part of the used *FeatureCombination*, include *msg3-Repetitions*;
 - 4> if Msg1 repetitions is part of the used *FeatureCombination*, include *msg1-Repetitions*;
 - 4> if *eRedCap* is part of the used *FeatureCombination*, include *eRedCap*;
 - 4> if NSAG(s) is part of the used *FeatureCombination*, set *nsag* to include the *NSAG-ID(s)* configured for the used *FeatureCombination*;
 - 2> set the *startPreambleForThisPartition* to the value of *startPreambleForThisPartition* in *FeatureCombinationPreambles* associated to the used *FeatureCombination*;
 - 2> set the *numberOfPreamblesPerSSB-ForThisPartition* to the value of *numberOfPreamblesPerSSB-ForThisPartition* in *FeatureCombinationPreambles* associated to the used *FeatureCombination*;

- 1> if the random-access procedure is initiated for SDT and the SDT transmission was failed:
 - 2> include the *sdT-Failed*;
- 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> if all preamble transmissions for the successive random-access attempts associated to this SS/PBCH block were blocked by LBT:
 - 4> include *allPreamblesBlocked*;
 - 3> else:
 - 4> if LBT failure indication was received from lower layers for the last random-access preamble transmission attempt in the SS/PBCH block associated to the *ssb-Index*, before changing the SS/PBCH block for random access preamble transmission:
 - 5> include *lbt-Detected*;
 - 3> for each random-access attempt performed on the random-access resource, except the random-access attempts for which LBT failure indication was received from lower layers, 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;
 - 3> if all preamble transmissions for the successive random-access attempts associated to this CSI-RS were blocked by LBT:
 - 4> include *allPreamblesBlocked*;
 - 3> else:
 - 4> if LBT failure indication was received from lower layers for the last random-access preamble transmission attempt in the CSI-RS associated to the *csi-RS-Index*, before changing the CSI-RS for random access preamble transmission:
 - 5> include *lbt-Detected*;
- 1> if at least one LBT failure indication has been received from lower layers during the random-access procedure:
 - 2> set the *numberOfLBTFailures* to indicate the total number of random-access attempts for which LBT failure indications have been received from lower layers in the random-access procedure.

The UE shall, for all the BWPs in which consistent LBT failures are triggered and not cancelled (according to TS 38.321 [3]) prior to successful RA completion or prior to RLF/HOF, set the below parameters in *attemptedBWP-InfoList* in the chronological order of BWP selection:

- 1> set the *locationAndBandwidth* and *subcarrierSpacing* associated to the UL BWP.

NOTE 1: Void.

NOTE 2: If *allPreamblesBlocked* is included, it is left to UE implementation how to set the *numberOfPreamblesSentOnSSB-r16*, *numberOfPreamblesSentOnCSI-RS-r16* and the *perRAAttemptInfoList-r16*.

5.7.10.6 Actions for the successful handover report determination

The UE shall for the PCell:

- 1> if the procedure is triggered due to successful completion of reconfiguration with sync, and 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 procedure is triggered due to successful completion of reconfiguration with sync, and 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 procedure is triggered due to successful completion of reconfiguration with sync, and 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 *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync; or

- 1> if the procedure is triggered due to successful completion of reconfiguration with sync, and 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; or
- 1> if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA, and 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 Mobility from NR to E-UTRA, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last Mobility from NR to E-UTRA; or
- 1> if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA, and if the T312 associated to the measurement identity of the target cell was running at the time of initiating the execution of the Mobility from NR to E-UTRA 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 Mobility from NR to E-UTRA, is greater than *thresholdPercentageT312* included in the *successHO-Config* if configured by the source PCell before executing the last Mobility from NR to E-UTRA:
- 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> if the UE is not in SNPN access mode, set the *plmn-IdentityList* to include the list of EPLMNs stored by the UE (i.e., includes the RPLMN);
 - 3> else if the UE is in SNPN access mode, set the *snpn-IdentityList* to include the list of equivalent SNPNs stored by the UE (i.e., includes the registered SNPN identity), if available;
 - 3> set the *c-RNTI* to the C-RNTI assigned by the target PCell of the handover;
 - 3> if the procedure is triggered due to successful completion of reconfiguration with sync, for the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied; or
 - 3> if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA, for the source PCell in which the last *MobilityFromNRCommand* concerning an inter-RAT handover from NR to E-UTRA 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 if the procedure is triggered due to successful completion of reconfiguration with sync, or up to the moment the UE sends the EUTRA *RRConnectionReconfigurationComplete* message if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA;
 - 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 if the procedure is triggered due to successful completion of reconfiguration with sync, or up to the moment the UE sends the EUTRA *RRConnectionReconfigurationComplete* message if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA;
 - 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> if the procedure is triggered due to successful completion of reconfiguration with sync, 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 procedure is triggered due to successful completion of Mobility from NR to E-UTRA, for the target PCell indicated in the last applied *MobilityFromNRCommand* concerning an inter-RAT handover from NR to E-UTRA:
 - 4> set the *targetPCellId* in *eutraTargetCellInfo* 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;
 - 4> set the *targetCellMeas* in *eutraTargetCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the target PCell based on the available measurements collected up to the moment the UE sends *RRCConnectionReconfigurationComplete* message;

NOTE 0: If *eutraTargetCellInfo* is included, it is left to UE implementation how to set the *targetCellInfo*.

- 3> if the procedure is triggered due to successful completion of reconfiguration with sync and 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 or the last Mobility from NR to E-UTRA, is greater than *thresholdPercentageT310* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync or Mobility from NR to E-UTRA:
 - 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 or Mobility from NR to E-UTRA, 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 or Mobility from NR to E-UTRA, is greater than *thresholdPercentageT312* included in the *successHO-Config* if configured by the source PCell before executing the last reconfiguration with sync, or Mobility from NR to E-UTRA:
 - 4> set *t312-cause* in *shr-Cause* to *true*;
- 3> if the procedure is triggered due to successful completion of reconfiguration with sync and 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> if the procedure is triggered due to successful completion of reconfiguration with sync, for each of the *measObjectNR*, configured by the source PCell, in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied; or:
- 3> if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA, for each of the *measObjectNR*, configured by the source PCell, in which the last *MobilityFromNRCommand* concerning an inter-RAT handover from NR to E-UTRA was applied:
- 4> if *measRSSI-ReportConfig* is configured for the frequency of the source PCell:
 - 5> if the procedure is triggered due to successful completion of reconfiguration with sync:
 - 6> set the *measResultServCell-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the frequency of the source PCell up to the moment the UE sends the *RRCReconfigurationComplete* message
 - 5> else if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA:
 - 6> set the *measResultServCell-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the frequency of the source PCell up to the moment the UE sends the EUTRA *RRCConnectionReconfigurationComplete* message;
- 4> for each of the configured *measObjectNR* if *measRSSI-ReportConfig* is configured for the configured frequency:
 - 5> if the procedure is triggered due to successful completion of reconfiguration with sync:
 - 6> set the *measResultNeighFreq-RSSI* in the *measResultNeighFreqList-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the associated neighbouring frequency up to the moment the UE sends the *RRCReconfigurationComplete* message;
 - 5> else if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA:
 - 6> set the *measResultNeighFreq-RSSI* in the *measResultNeighFreqList-RSSI* to the linear average of the available RSSI sample value(s) provided by lower layers for the associated neighbouring frequency up to the moment the UE sends the EUTRA *RRCConnectionReconfigurationComplete* message;
- 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 if the procedure is triggered due to successful completion of reconfiguration with sync, or up to the moment the UE sends the EUTRA *RRCConnectionReconfigurationComplete* message if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA;
 - 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 if the procedure is triggered due to successful completion of reconfiguration with sync, or up to the moment the UE sends the EUTRA *RRCConnectionReconfigurationComplete* message if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA;

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> if the procedure is triggered due to successful completion of reconfiguration with sync, for each of the *measObjectEUTRA*, configured by the source PCell in which the last *RRCReconfiguration* message including *reconfigurationWithSync* was applied; or:

3> if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA, for each of the *measObjectEUTRA*, configured by the source PCell in which the last *MobilityFromNRCommand* concerning an inter-RAT handover from NR to E-UTRA 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 if the procedure is triggered due to successful completion of reconfiguration with sync, or up to the moment the UE sends the EUTRA *RRCConnectionReconfigurationComplete* message if the procedure is triggered due to successful completion of Mobility from NR to E-UTRA;

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*.

5.7.10.7 Actions for the successful PSCell change or addition report determination

The UE shall for the PSCell:

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 for the SCG including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304-SCG* if included in the *successPSCell-Config* received before executing the last reconfiguration with sync for the SCG; or

1> if *sn-InitiatedPSCellChange* is configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG and 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 PSCell before executing the last reconfiguration with sync for the SCG, is greater than *thresholdPercentageT310-SCG* included in the *successPSCell-Config* if configured by the source PSCell before executing the last reconfiguration with sync for the SCG; or

- 1> if *sn-InitiatedPSCellChange* is configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG and if the T312 associated to the measurement identity of the target PSCell was running at the time of initiating the execution of the reconfiguration with sync procedure for the SCG 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 PSCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312-SCG* included in the *successPSCell-Config* if configured by the source PSCell before executing the last reconfiguration with sync for the SCG:
- 1> if *sn-InitiatedPSCellChange* is not configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG and 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 PSCell before executing the last reconfiguration with sync for the SCG, is greater than *thresholdPercentageT310-SCG* included in the *successPSCell-Config* if configured by the PCell before executing the last reconfiguration with sync for the SCG; or
- 1> if *sn-InitiatedPSCellChange* is not configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG and if the T312 associated to the measurement identity of the target PSCell was running at the time of initiating the execution of the reconfiguration with sync procedure for the SCG 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 PSCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312-SCG* included in the *successPSCell-Config* if configured by the PCell before executing the last reconfiguration with sync for the SCG:
- 2> clear the information included in *VarSuccessPSCell-Report*, if any;
- 2> store the successful PSCell change or addition information in *VarSuccessPSCell-Report* and determine the content in *VarSuccessPSCell-Report* as follows:
 - 3> if the UE is not in SNPN access mode, set the *plmn-IdentityList* to include the list of EPLMNs (including the RPLMN) stored by the UE;
 - 3> else if the UE is in SNPN access mode, set the *snpn-IdentityList* to include the list of equivalent SNPN identities (including the registered SNPN identity) stored by the UE, if available;
 - 3> set the *pCellId* to the global cell identity and tracking area code, if available, of the PCell;
 - 3> for the source PSCell (in case of PSCell change procedure) in which the last *RRCReconfiguration* message for the SCG including *reconfigurationWithSync* was applied:
 - 4> set the *sourcePSCellId* in *sourcePSCellInfo* to the global cell identity and tracking area code, and otherwise to the physical cell identity and carrier frequency of the source PSCell;
 - 4> set the *sourcePSCellMeas* in *sourcePSCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the source PSCell based on the available SSB and CSI-RS measurements collected up to the moment the UE successfully completed the random access procedure for the SCG;
 - 4> set the *rsIndexResults* in *sourcePSCellMeas* to include all the available SSB and CSI-RS measurement quantities of the source PSCell collected up to the moment the UE successfully completed the random access procedure for the SCG;
 - 3> for the target PSCell indicated in the last applied *RRCReconfiguration* message for the SCG including *reconfigurationWithSync*:
 - 4> set the *targetPSCellID* in *targetPSCellInfo* to the global cell identity and tracking area code, if available, and otherwise to the physical cell identity and carrier frequency of the target PSCell;
 - 4> set the *targetPSCellMeas* in *targetPSCellInfo* to include the cell level RSRP, RSRQ and the available SINR, of the target PSCell based on the available SSB and CSI-RS measurements collected up to the moment the UE successfully completed the random access procedure for the SCG;
 - 4> set the *rsIndexResults* in *targetPSCellMeas* to include all the available SSB and CSI-RS measurement quantities of the target PSCell collected up to the moment the UE successfully completed the random access procedure for the SCG;

- 4> if the last applied *RRCReconfiguration* message for the SCG including *reconfigurationWithSync* was included in the stored *condRRCReconfig*:
 - 5> set the *timeSinceCPAC-Reconfig* to the time elapsed between the initiation of the execution of conditional reconfiguration for the target PSCell and the reception of the last *conditionalReconfiguration* for the SCG including the *condRRCReconfig* of the target PSCell;
- 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 for the SCG including the *reconfigurationWithSync*, is greater than *thresholdPercentageT304-SCG* if included in the *successPSCell-Config* received before executing the last reconfiguration with sync for the SCG:
 - 4> set *t304-cause* in *spr-Cause* to *true*;
 - 4> set the *ra-InformationCommon* to include the random-access related information associated to the random access procedure in the target PSCell, 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 timer T310, configured while the UE was connected to the source PSCell before executing the last reconfiguration with sync for the SCG, is greater than *thresholdPercentageT310-SCG* included in the *successPSCell-Config* if configured before executing the last reconfiguration with sync:
 - 4> set *t310-cause* in *spr-Cause* to *true*;
- 3> if the T312 associated to the measurement identity of the target PSCell was running at the time of initiating the execution of the reconfiguration with sync procedure for the SCG 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 PSCell before executing the last reconfiguration with sync, is greater than *thresholdPercentageT312-SCG* included in the *successPSCell-Config* if configured before executing the last reconfiguration with sync:
 - 4> set *t312-cause* in *spr-Cause* to *true*;
- 3> if *sn-InitiatedPSCellChange* is configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG:
 - 4> consider all *measObjectNR* configured by the the source PSCell;
- 3> else:
 - 4> consider all *measObjectNR* configured by the the PCell;
- 3> for each of the considered *measObjectNR*:
 - 4> if measurements are available for the *measObjectNR*:
 - 5> if the SS/PBCH block-based measurement quantities are available:
 - 6> include in the *measResultListNR* in *measResultNeighCells* all the available measurement quantities of the best measured cells, other than the source PSCell (in case of PSCell change procedure) or target PSCell, 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 successfully completed the random access procedure;
 - 6> for each neighbour cell included, include the optional fields that are available (including the CSI-RS based measurement quantities, if available);
 - 5> if the CSI-RS measurement quantities are available for the cells not yet included in *measResultListNR* in *measResultNeighCells*:
 - 6> include in the *measResultListNR* in *measResultNeighCells* all the available measurement quantities of the best measured cells, other than the source PSCell (in case of PSCell change procedure) and target PSCell, 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 successfully completed the random access procedure;

6> 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 or by the source PSCell (in case of PSCell change) when the last *RRCReconfiguration* message for the SCG including *reconfigurationWithSync* was applied:

5> set the *choCandidate* to *true* in *measResultNR*;

3> if *sn-InitiatedPSCellChange* is configured in the *RRCReconfiguration* including the last applied *RRCReconfiguration* with *reconfigurationWithSync* for the SCG:

4> if available, set the *locationInfo* as in 5.3.3.7.7 according to the *otherConfig* associated with the source PSCell;

4> include *sn-InitiatedPSCellChange*;

3> else:

4> if available, set the *locationInfo* as in 5.3.3.7.7 according to the *otherConfig* associated with the PCell;

1> release *successPSCell-Config* configured by the source PSCell if available and *thresholdPercentageT304* if configured by the target PSCell.

The UE may discard the successful PSCell change or addition information, i.e., release the UE variable *VarSuccessPSCell-Report*, 48 hours after the last successful PSCell change or addition information is added to the *VarSuccessPSCell-Report* or upon deregistration from the network as specified in TS 23.502 [43].

5.7.11 Void

5.7.12 IAB Other Information

5.7.12.1 General

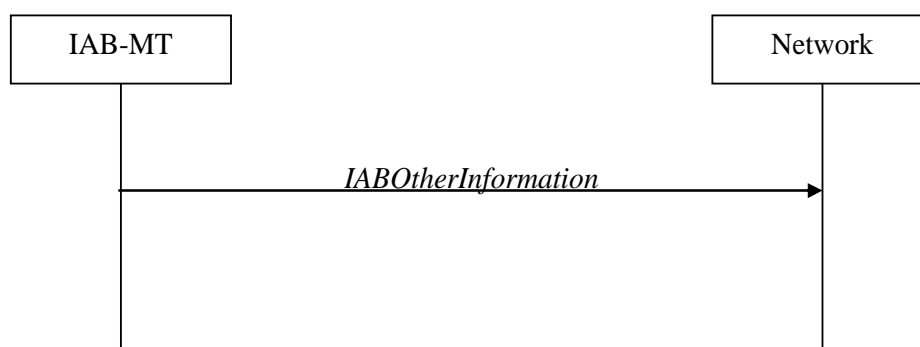


Figure 5.7.12.1-1: IAB Other Information procedure

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 *iIPv6-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:

- $(SS-RSRP_{Ref} - SS-RSRP) < S_{SearchDeltaP-Connected}$,

Where:

- SS-RSRP = current L3 RSRP measurement of the SpCell based on SSB (dB).
- SS-RSRP_{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 $(SS-RSRP - SS-RSRP_{Ref}) > 0$, or
- If the relaxed measurement criterion has not been met for $T_{SearchDeltaP-Connected}$:
 - The UE shall set the value of $SS-RSRP_{Ref}$ 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 $Q_{in}+X$ dB, 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 $Q_{in}+X$ dB, 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

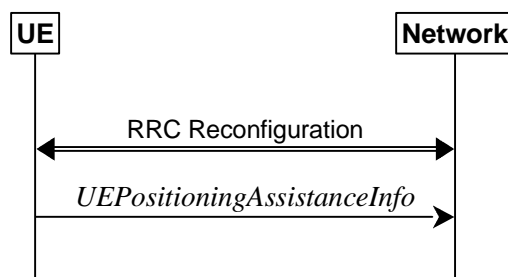


Figure 5.7.14.1-1: UE Positioning Assistance Information procedure

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

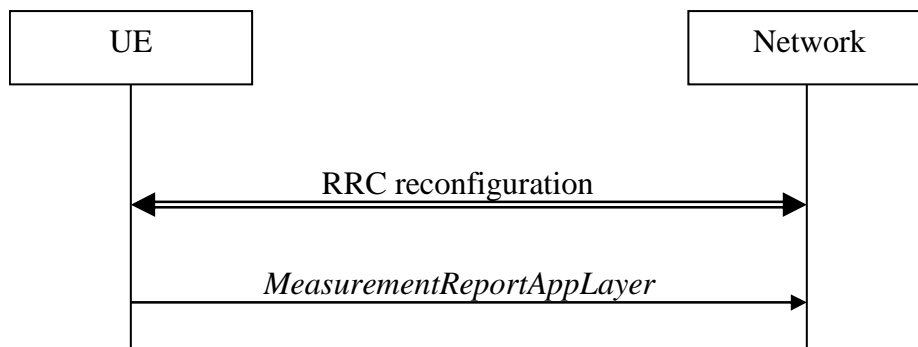


Figure 5.7.16.1-1: Application layer measurement reporting

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 and reporting, i.e. when at least one *measConfigAppLayer* and *SRB4* and/or *SRB5* have been configured by the network.

Upon initiating the procedure, the UE shall:

- 1> for each stored application layer measurement configuration with *appLayerIdleInactiveConfig* configured and for which *appLayerIdleInactiveConfig* has not been transmitted since the UE received the *RRCSetup* message:
 - 2> set the parameters in *appLayerIdleInactiveConfig* in the *MeasurementReportAppLayer* message to the values stored in the UE variable *VarAppLayerIdleConfig*;
 - 2> if the *transmissionOfSessionStartStop* is set to *true*:
 - 3> if a session start or stop indication has been received from upper layers:
 - 4> set the *appLayerSessionStatus* in the *MeasurementReportAppLayer* message to the value of the latest received session start or stop indication;
 - 3> else:
 - 4> set the *appLayerSessionStatus* in the *MeasurementReportAppLayer* message to *stop*;

- 1> for each *measConfigAppLayerId* with an application layer measurement report container which has not been transmitted since the UE received the *RRCSetup* message:
 - 2> set the *measConfigAppLayerId* in a *MeasReportAppLayer* in the *MeasurementReportAppLayer* message(s) to the value of the *measConfigAppLayerId* received together with the application layer measurement report container;
 - 2> for each application measurement report container stored for that *measConfigAppLayerId*:
 - 3> set the *measReportAppLayerContainerList* in the *MeasurementReportAppLayer* message(s) to the stored value of the application layer measurement report container;

NOTE 0: If the application layer measurement configurations and reports exceed the size of an RRC message, the UE includes the *appLayerIdleInactiveConfig* and corresponding *appLayerSessionStatus* in the first *MeasurementReportAppLayer* message when the UE enters RRC_CONNECTED, and transmits application layer measurement report containers in subsequent *MeasurementReportAppLayer* messages.

- 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 latest received value of session start or stop information;
 - 2> if a 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* in the *pdu-SessionIdList* in the *MeasurementReportAppLayer* message to the indicated PDU session ID value;
 - 4> for each QoS Flow ID value indicated in the received RAN visible application layer measurement report associated with the PDU Session ID, if any:
 - 5> set the *QFI* associated with the PDU session ID to the indicated QoS Flow ID value.
- 1> if *reportingSRB* and *ran-VisibleReportingSRB* indicates different SRBs for the *measConfigAppLayerId*:
 - 2> include *measReportAppLayerContainer* and *appLayerSessionStatus* in a separate *MeasurementReportAppLayer* message than *ran-VisibleMeasurements*;

- 1> for each encoded *MeasurementReportAppLayer* message generated above which contains either only encapsulated application layer measurement reports or both encapsulated application layer measurement reports and RAN visible application layer measurement reports:
 - 2> if *reportingSRB* is not configured for the *measConfigAppLayerId*:
 - 3> if the encoded RRC message is larger than the maximum supported size of one PDCP SDU specified in TS 38.323 [5]:
 - 4> if the RRC message segmentation is enabled based on the field *rrc-SegAllowed* received in *appLayerMeasConfig*:
 - 5> initiate the UL message segment transfer procedure as specified in clause 5.7.7 for transmission via SRB4;
 - 4> else:
 - 5> discard the RRC message;
 - 3> else:
 - 4> submit the *MeasurementReportAppLayer* message to lower layers for transmission via SRB4.
 - 2> else if *reportingSRB* is configured for the *measConfigAppLayerId*:
 - 3> if the encoded RRC message is larger than the maximum supported size of one PDCP SDU specified in TS 38.323 [5]:
 - 4> if the RRC message segmentation is enabled based on the field *rrc-SegAllowedSRB4* received in *appLayerMeasConfig* and the *reportingSRB* is SRB4, or
 - 4> if RRC message segmentation is enabled based on the field *rrc-SegAllowedSRB5* received in *appLayerMeasConfig* and the *reportingSRB* is SRB5:
 - 5> initiate the UL message segment transfer procedure as specified in clause 5.7.7 for transmission via the SRB indicated in the field *reportingSRB* in *MeasConfigAppLayer*;
 - 4> else:
 - 5> discard the RRC message;
 - 3> else:
 - 4> submit the *MeasurementReportAppLayer* message to lower layers for transmission via the SRB indicated in the field *reportingSRB* in *MeasConfigAppLayer*.

1> for each encoded *MeasurementReportAppLayer* message generated above which contains only RAN visible application layer measurement reports:

- 2> if *ran-VisibleReportingSRB* is not configured for the *measConfigAppLayerId*:
 - 3> submit the *MeasurementReportAppLayer* message to lower layers for transmission via SRB4;
- 2> else if *ran-VisibleReportingSRB* is configured for the *measConfigAppLayerId*:
 - 3> submit the *MeasurementReportAppLayer* message to lower layers for transmission via the SRB indicated in the field *ran-VisibleReportingSRB* in *MeasConfigAppLayer*.

NOTE 1: If the SRB indicated by *reportingSRB* is not available or if *reportingSRB* is absent and SRB4 is not available, the UE may store application layer measurement report containers until the SRB is available. The UE may discard reports when the memory reserved for storing application layer measurement report containers becomes full. Reports with lower *appLayerMeasPriority* are discarded first. If equal or no *appLayerMeasPriority* is configured, older reports are discarded first.

NOTE 2: If the SRB indicated by *ran-VisibleReportingSRB* is not available, the UE discards RAN visible application layer measurement reports.

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 *absThreshSS-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].

5.7.18 Void

5.7.19 Satellite switch with resynchronization in RRC_CONNECTED

The UE shall:

- 1> stop timer T430 if running;
- 1> inform lower layers that UL synchronisation is lost due to satellite switch with resynchronization;
- 1> start synchronising to the DL of the SpCell served by the satellite indicated by *ntn-Config* in *SatSwitchWithReSync*, if the UE has not acquired DL synchronization;
- 1> start timer T430 with the timer value set to *ntn-ULSyncValidityDuration* from the subframe indicated by *epochTime* in *ntn-Config* in *SatSwitchWithReSync*;
- 1> inform lower layers when UL synchronisation is obtained.

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/positioning operation

The UE shall perform NR sidelink communication/positioning 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/positioning 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/positioning 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/positioning 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/positioning operation or the UE is out of coverage on the frequency used for NR sidelink communication/discovery/positioning 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/positioning

5.8.3.1 General

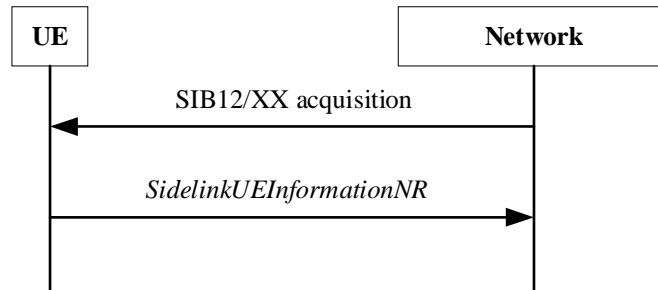


Figure 5.8.3.1-1: Sidelink UE information for NR sidelink communication/discovery

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/positioning,
- is requesting assignment or release of transmission resource for NR sidelink communication/discovery/positioning,
- is reporting QoS parameters and QoS profile(s) related to NR sidelink communication,
- is reporting mapped frequency(ies) for each QoS flow related to NR sidelink communication,
- is reporting associated Tx Profile for each QoS flow related to NR sidelink groupcast and broadcast communication,
- is reporting that a sidelink radio link failure, sidelink RRC reconfiguration failure or a sidelink carrier 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,
- is reporting parameters related to U2U relay operation.

5.8.3.2 Initiation

A UE capable of NR sidelink communication or NR sidelink discovery or NR sidelink U2N relay operation or NR sidelink U2U relay operation or NR sidelink positioning 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 or NR sidelink U2U relay operation or SL-PRS transmission/reception 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*, or upon change to a PCell providing *SIB23* including *sl-PosConfigCommonNR*. 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, sidelink RRC reconfiguration failure or sidelink carrier 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 U2U relay operation may initiate the procedure to report/update parameters for acting as U2U Relay UE or U2U Remote UE. A UE capable of NR sidelink positioning may initiate the procedure to request it is interested or no longer interested in either transmitting SL-PRS or receiving SL-PRS.

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, and to report the frequency(ies) and Tx Profile associated with each QoS flow, 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/sl-FreqInfoListSizeExt* 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/sl-FreqInfoListSizeExt* in *SIB12* of the PCell; or
 - 2> if configured by upper layer to transmit NR sidelink L3 U2U relay communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including [*FFS gNB capability indication*];

- 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*; or
- 2> if configured by upper layer to receive NR sidelink L2 U2U relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2U-Relay*; or
- 2> if configured by upper layer to receive L3 NR sidelink U2U relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including [*FFS gNB capability indication*]:
 - 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 since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell providing *SIB12* but not including *sl-L2U2U-Relay* in case of L2 U2U relay operation; or

- 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell providing *SIB12* but not including [*FFS gNB capability indication*] in case of L3 U2U 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*; or
 - 4> if the UE is capable of U2U Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommonU2U*; or
 - 4> if the UE is selecting a U2U Relay UE / has a selected U2U Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommonU2U*:
 - 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*; or
 - 2> if configured by upper layer to transmit NR sidelink L2 U2U relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2U-Relay*; or
 - 2> if configured by upper layer to transmit NR sidelink L3 U2U relay discovery messages on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including [*FFS gNB capability indication*]:
 - 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 since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell providing *SIB12* but not including *sl-L2U2U-Relay* in case of L2 U2U relay operation;
- 3> if since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell providing *SIB12* but not including [*FFS gNB capability indication*] in case of L3 U2U 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; or
 - 4> if the UE is capable of U2U Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommonU2U*, and if the U2U Relay UE threshold conditions as specified in 5.8.16.2 are met; or
 - 4> if the UE is selecting a U2U Relay UE / has a selected U2U Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommonU2U*, and if the U2N Remote UE threshold conditions as specified in 5.8.17.2 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*; or
 - 2> if configured by upper layer to transmit NR sidelink L2 U2U relay communication on the frequency included in *sl-FreqInfoList* in *SIB12* of the PCell including *sl-L2U2U-Relay*:
 - 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 since the last time the UE transmitted a *SidelinkUEInformationNR* message the UE connected to a PCell providing *SIB12* but not including *sl-L2U2U-Relay* in case of L2 U2U 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 the last transmission of the *SidelinkUEInformationNR* message did not include *sl-TxResourceReqL2U2U-Relay*; or if the information carried by the *sl-TxResourceReqL2U2U-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; or
 - 4> if the UE is capable of L2 U2U Relay UE, and if *SIB12* includes *sl-RelayUE-ConfigCommonU2U*, and if the U2U Relay UE threshold conditions as specified in 5.8.16.2 are met; or
 - 4> if the UE is selecting a L2 U2U Relay UE / has a selected U2U Relay UE, and if *SIB12* includes *sl-RemoteUE-ConfigCommonU2U*, and if the U2N Remote UE threshold conditions as specified in 5.8.17.2 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/sl-FreqInfoListSizeExt* 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;
 - 1> if *SIB23* including *sl-PosConfigCommonNR* is provided by the PCell:
 - 2> ensure having a valid version of *SIB23* for the PCell;
 - 2> if configured to perform SL-PRS on the frequency included in *sl-FreqInfoList* in *SIB23* 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 *SIB23* including *sl-PosConfigCommonNR*; or
- 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-PosRxInterestedFreqList*; or if the frequency configured to receive SL-PRS has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the frequency of interest for SL-PRS reception in accordance with 5.8.3.3;
- 2> else:
 - 3> if the last transmission of the *SidelinkUEInformationNR* message included *sl-PosRxInterestedFreqList*:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it is no longer interested in SL-PRS reception in accordance with 5.8.3.3;
 - 2> if configured to transmit SL-PRS on the frequency included in *sl-FreqInfoList* in *SIB23* 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 *SIB23* including *sl-PosConfigCommonNR*; or
 - 3> if the last transmission of the *SidelinkUEInformationNR* message did not include *sl-PosTxResourceReqList*; or if the information carried by the *sl-PosTxResourceReqList* has changed since the last transmission of the *SidelinkUEInformationNR* message:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate the NR sidelink positioning 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-PosTxResourceReqList*:
 - 4> initiate transmission of the *SidelinkUEInformationNR* message to indicate it no longer requires NR sidelink positioning transmission resources 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/positioning; or
- 1> if the UE initiates the procedure to request (configuration/ release) of NR sidelink communication/positioning transmission resources or to report to the network that a sidelink radio link failure, sidelink RRC reconfiguration failure or sidelink carrier 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 or U2U 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; or
 - 3> if configured by upper layers to transmit NR sidelink L3 U2U relay communication [and *SIB12* includes *FFS gNB capability indication*]:
 - 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-TxInterestedFreqList* 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-TxInterestedFreqList* for NR sidelink communication transmission;
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from the associated peer UE;
 - 5> if *sl-FreqInfoListSizeExt* is included in *SIB12-IEs*:
 - 6> set *sl-QoS-InfoList* to include the frequency(ies), and Tx Profile mapped to the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink groupcast and broadcast communication transmission;
 - 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;
- 4> if a sidelink carrier failure has been indicated by MAC layer;
 - 5> include *sl-CarrierFailureList* and set its fields as follows for each destination for which it reports the sidelink carrier failure:
 - 6> set *sl-DestinationIdentity* to the destination identity for which the concerned sidelink carrier failure is indicated;
 - 6> set *sl-CarrierFailure* to include the concerned carrier for which the sidelink carrier failure is indicated;
- 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; or
- 3> if *SIB12* includes *sl-L2U2U-Relay* and if configured by upper layers to receive NR sidelink L2 U2U relay discovery messages; or
- 3> if *SIB12* includes [*FFS gNB capability indication*] and if configured by upper layers to receive NR sidelink L3 U2U 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; or
- 3> if *SIB12* includes *sl-L2U2U-Relay* and if configured by upper layers to transmit NR sidelink L2 U2U relay discovery messages; or
- 3> if *SIB12* includes [*FFS gNB capability indication*] and if configured by upper layers to transmit NR sidelink L3 U2U 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-TxInterestedFreqListDisc* 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-TxInterestedFreqListL2U2N* 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-TxInterestedFreqListL2U2N* 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-TxInterestedFreqList* 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 *SIB12* includes *sl-L2U2U-Relay* and if configured by upper layers to transmit NR sidelink L2 U2U relay communication and the UE is acting as L2 U2U Relay UE:
 - 4> include *sl-TxResourceReqL2-U2U* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink L2 U2U relay communication resource:
 - 5> set *sl-DestinationIdentityL2-U2U* to the destination identity configured by upper layer for NR sidelink L2 U2U relay communication transmission to peer L2 U2U Remote UE;
 - 5> set *sl-TxInterestedFreqListL2-U2U* to indicate the frequency of the associated destination for NR sidelink L2 U2U relay communication transmission;
 - 5> set *sl-TypeTxSyncListL2-U2U* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2-U2U* for NR sidelink L2 U2U relay communication transmission;
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* message, if any, received from peer L2 U2U Remote UE;
 - 5> include *sl-U2U-InfoList* and set its fields (if needed) for each entry as follows, to report the related information of the connected L2 Remote UEs:
 - 6> include the source L2 U2U Remote UE's L2 ID in *sl-TargetUE-Identity*;
 - 6> include *sl-PerSLRB-QoS-InfoList*, with each entry including the per-SLRB second-hop QoS profile and the corresponding *sl-RemoteUE-SLRB-Identity* which is set to the same value as the *SLRB-PC5-ConfigIndex* received in *RRCReconfigurationSidelink* message from the L2 U2U Remote UE for the same end-to-end SLRB;
- 3> if *SIB12* includes and if configured by upper layers to transmit NR sidelink L2 U2U relay communication and the UE has a selected L2 U2U Relay UE:
 - 4> include *sl-TxResourceReqL2-U2U* and set its fields (if needed) as follows to request network to assign NR sidelink L2 U2U relay communication resource:
 - 5> set *sl-DestinationIdentityL2-U2U* to the destination identity configured by upper layer for NR sidelink L2 U2U relay communication transmission to L2 U2U Relay UE;
 - 5> set *sl-TxInterestedFreqListL2-U2U* to indicate the frequency of the associated destination for NR sidelink L2 U2U relay communication transmission;
 - 5> set *sl-TypeTxSyncListL2-U2U* to the current synchronization reference type used on the associated *sl-InterestedFreqListL2-U2U* for NR sidelink L2 U2U relay communication transmission;
 - 5> set *sl-CapabilityInformationSidelink* to include *UECapabilityInformationSidelink* messages received from L2 U2U Relay UE and the peer L2 U2U Remote UE, if any;
 - 5> include *sl-U2U-InfoList* and set its fields (if needed) for each entry as follows to report the related end-to-end and the first hop information for the end-to-end PC5 connection with each peer L2 U2U Remote UE:

- 6> set *sl-TargetUE-Identity* to the destination identity configured by upper layer for NR sidelink L2 U2U relay communication transmission to peer L2 U2U Remote UE;
 - 6> set *sl-E2E-QoS-InfoList* to include end-to-end QoS profile(s) of the sidelink QoS flow(s) of the associated destination configured by the upper layer for the NR sidelink L2 U2U relay communication transmission to peer L2 U2U Remote UE;
 - 6> set *sl-PerSLRB-QoS-InfoList* to include the first-hop split PDB of the sidelink QoS flow(s) received from the *sl-SplitQoS-InfoListPC5* in *UEInformationResponseSidelink* message for the associated destination in accordance with the received *sl-TargetUE-Identity*;
- 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;
- 2> if *SIB23* including *sl-PosConfigCommonNR* is provided by the PCell;
- 3> if configured to transmit SL-PRS:
- 4> include *sl-PosTxResourceReqList* and set its fields (if needed) as follows for each destination for which it requests network to assign NR sidelink positioning resource:
 - 5> set *sl-DestinationIdentity* to the destination identity configured by upper layer for NR sidelink positioning transmission;
 - 5> set *sl-CastType* to the cast type of the associated destination identity configured by the upper layer for the NR sidelink positioning transmission;

- 5> set *sl-InterestedFreqList* to indicate the frequency of the associated destination for SL-PRS transmission;
- 5> set *sl-TypeTxSyncList* to the current synchronization reference type used on the associated *sl-InterestedFreqList* for NR sidelink positioning transmission;
- 5> set the *sl-PosQoS-InfoList* to include the SL-PRS transmission QoS profile;
- 3> if configured to perform SL-PRS measurements;
 - 4> include *sl-PosRxInterestedFreqList* and set it to the frequency for NR sidelink positioning reception;
- 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-TxResourceReqListCommRelay* in total.

5.8.4 Void

5.8.5 Sidelink synchronisation information transmission for NR sidelink communication/discovery/positioning

5.8.5.1 General

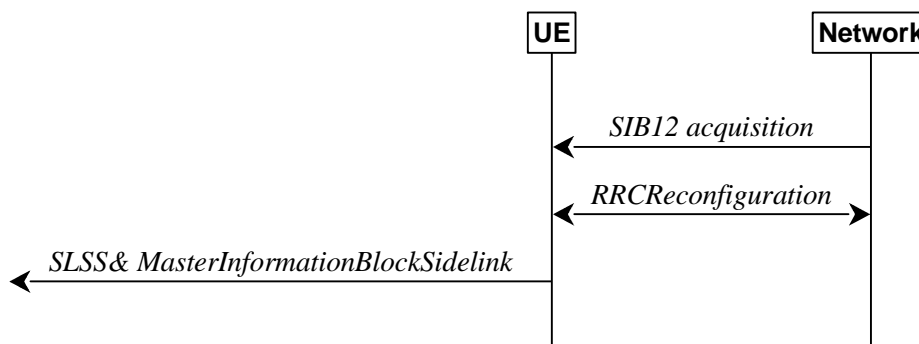


Figure 5.8.5.1-1: Synchronisation information transmission for NR sidelink communication/discovery/positioning, in (partial) coverage

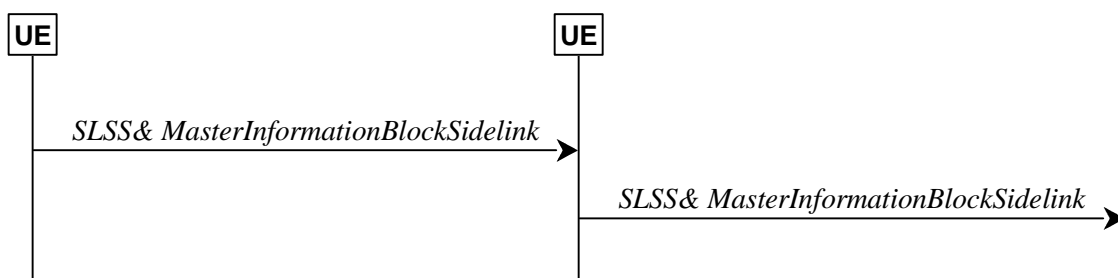


Figure 5.8.5.1-2: Synchronisation information transmission for NR sidelink communication/discovery/positioning, out of coverage

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/positioning, and if the conditions for NR sidelink communication/discovery/positioning operation are met and when the following conditions are met:

- 1> if in coverage on the frequency used for NR sidelink communication/discovery/positioning, 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/positioning, and the frequency used to transmit NR sidelink communication/discovery is included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-FreqInfoList/sl-FreqInfoListSizeExt* within *SIB12* or *SIB23* for NR sidelink positioning; and has selected GNSS or the cell as synchronization reference as defined in 5.8.6.3:
 - 2> if *sl-SyncFreqList* is neither included in *RRCReconfiguration* nor in *SIB12*; or
 - 2> if *sl-SyncFreqList* is included in *RRCReconfiguration* or in *SIB12*; and if none of the frequency(ies) selected as specified in TS 38.321 [3] is included in the *sl-SyncFreqList* or the concerned frequency is selected as the synchronisation carrier frequency in accordance with 5.8.6.2; or
 - 2> if *sl-SyncFreqList* and *sl-SyncTxMultiFreq* are included in *RRCReconfiguration* or in *SIB12*; and if the concerned frequency has been selected for NR sidelink communication transmission as specified in TS 38.321 [3] and is included in *sl-SyncFreqList*; and if the UE has selected a frequency other than the concerned frequency as the synchronisation carrier frequency in accordance with 5.8.6.2; and if *sl-SyncTxDisabled* corresponding to the concerned frequency is not configured in *RRCReconfiguration* or in *SIB12*:
 - 3> if in *RRC_CONNECTED*; and if *networkControlledSyncTx* is configured and set to *on*; or
 - 3> 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*:
 - 4> 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> if *sl-SyncFreqList* is not included in *SL-PreconfigurationNR*; or
 - 2> if *sl-SyncFreqList* is included in *SL-PreconfigurationNR*, and if none of the frequency(ies) selected as specified in TS 38.321 [3] is included in the *sl-SyncFreqList* or the concerned frequency is selected as the synchronisation carrier frequency in accordance with 5.8.6.2; or
 - 2> if *sl-SyncFreqList* and *sl-SyncTxMultiFreq* are included in *SL-PreconfigurationNR*, and if the concerned frequency has been selected for NR sidelink communication transmission as specified in TS 38.321 [3] and included in *sl-SyncFreqList*; and if the UE has selected a frequency other than the concerned frequency as the synchronisation carrier frequency in accordance with 5.8.6.2; and if *sl-SyncTxDisabled* corresponding to the concerned frequency is not configured in *SL-PreconfigurationNR*:
 - 3> 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
 - 3> for the frequency used for NR sidelink communication/discovery, if the UE selects GNSS as the synchronization reference source:

- 4> 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/positioning and in coverage on the frequency used for NR sidelink communication/discovery/positioning, as defined in TS 38.304 [20]; or
- 1> if triggered by NR sidelink communication/discovery/positioning, and out of coverage on the frequency used for NR sidelink communication/discovery/positioning, and the concerned frequency is included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-FreqInfoList/sl-FreqInfoToAddModListExt* within *SIB12* or *SIB23* for NR sidelink positioning:
 - 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

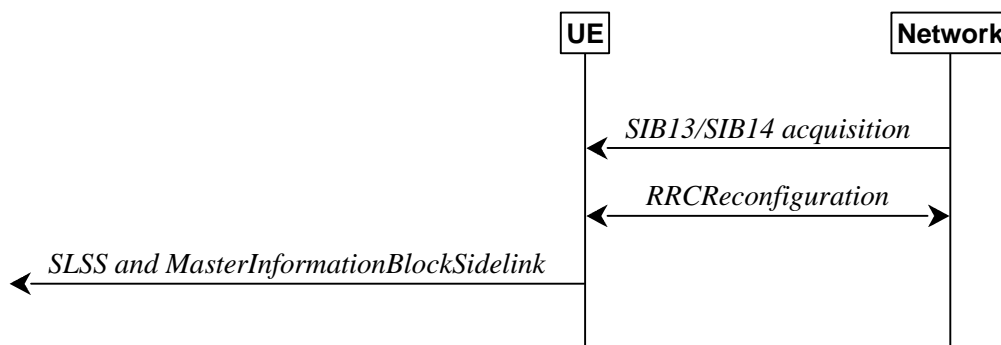


Figure 5.8.5a.1-1: Synchronisation information transmission for V2X sidelink communication, in (partial) coverage

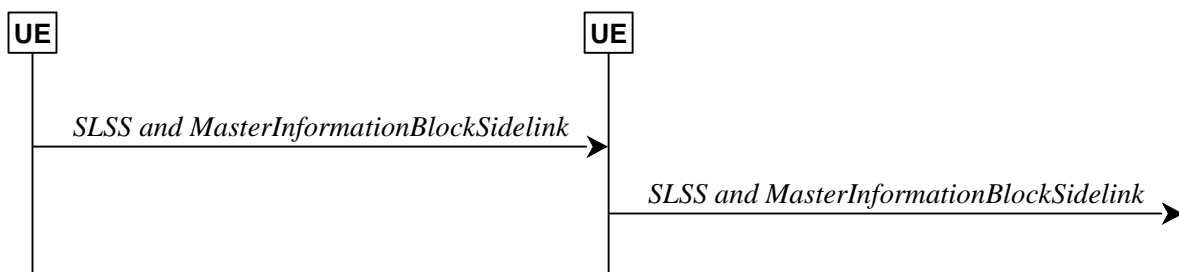


Figure 5.8.5a.1-2: Synchronisation information transmission for V2X sidelink communication, out of coverage

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 for frequency(ies) which have been selected for NR sidelink communication/discovery as specified in TS 38.321 [3]:

- 1> if *sl-SyncFreqList* is not included in *RRCReconfiguration* nor in *SIB12*; or
- 1> if *sl-SyncFreqList* is included in *RRCReconfiguration* or in *SIB12*, and none of the frequency(ies) selected as specified in TS 38.321 [3] is included in the *syncFreqList*:
 - 2> 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*:
 - 3> 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.

- 2> 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]:
 - 3> select GNSS as the synchronization reference source;
- 2> 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]:
 - 3> select GNSS as the synchronization reference source;
- 2> else:
 - 3> perform synchronization reference search procedure as defined in 5.8.6.2b on each frequency which is used for NR sidelink communication/discovery;
 - 3> if the UE has not selected any synchronization reference:
 - 4> for each frequency which is used for NR sidelink communication/discovery:
 - 5> 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 priority group order as defined in 5.8.6.2a:

- 1> if *sl-SyncFreqList* is included in *RRCReconfiguration* or in *SIB12*, and includes at least one of the concerned frequency(ies)
 - 2> if the concerned frequency(ies) are included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* is configured for the concerned frequency(ies) and set to *gnbEnb*:
 - 3> select one frequency from the concerned frequency(ies) which are included in *sl-SyncFreqList* as the synchronisation carrier frequency;
 - 3> select a cell in accordance with the synchronisation carrier frequency as the synchronization reference source as defined in 5.8.6.3:
 - 2> else if the concerned frequency(ies) are included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-ConfigCommonNR* within *SIB12*, and *sl-SyncPriority* for concerned frequency(ies) are not configured or are set to *gnss*, and GNSS is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]; or if the concerned frequency(ies) are 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]:
 - 3> select one frequency from the concerned frequency(ies) which are included in *sl-SyncFreqList* as the synchronisation carrier frequency;
 - 3> select GNSS in accordance with the synchronisation carrier frequency as the synchronization reference source;
 - 2> else:
 - 3> perform a synchronization reference search procedure as defined in 5.8.6.2b on each concerned frequency which is included in *sl-SyncFreqList*;
 - 3> if the UE has not selected any synchronization reference:
 - 4> for each concerned frequency which is included in *sl-SyncFreqList*:
 - 5> 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,
 - 6> select the synchronisation reference source(s) according to the following priority group order as defined in 5.8.6.2a;
 - 6> select the frequency with the highest synchronisation reference source priority as the synchronisation carrier frequency, according to the following priority group order as defined in 5.8.6.2a, and consider the synchronisation reference source (i.e. eNB/gNB, GNSS or SyncRef UE) that selected on the synchronisation carrier frequency as the synchronization reference:

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.

5.8.6.2a Sidelink synchronization reference priority group order

- 1> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnbEnb*:
 - 2> 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);

- 2> 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);
 - 2> GNSS that is reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14] (priority group 3);
 - 2> 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);
 - 2> 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);
 - 2> 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);
 - 2> Other UEs, starting with the UE with the highest PSBCH-RSRP result (priority group 6);
- 1> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *true*:
- 2> 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);
 - 2> 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 2);
 - 2> 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);
 - 2> the cell detected by the UE as defined in 5.8.6.3 (priority group 3);
 - 2> 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);
 - 2> 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);
 - 2> Other UEs, starting with the UE with the highest S-RSRP result (priority group 6);
- 1> if *sl-SyncPriority* corresponding to the concerned frequency is set to *gnss*, and *sl-NbAsSync* is set to *false*:
- 2> 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);
 - 2> 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 2);
 - 2> 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);
 - 2> Other UEs, starting with the UE with the highest PSBCH-RSRP result (priority group 3);

5.8.6.2b Sidelink synchronization reference search

The UE shall for the indicated frequency(ies)

- 1> perform a full search (i.e. covering all subframes and all possible SLSSIDs) on each indicated frequency to detect candidate SLSS, in accordance with TS 38.133 [14];
- 1> when evaluating the one or more detected SLSSIDs, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured *sl-filterCoefficient*, before using the PSBCH-RSRP measurement results;
- 1> if the UE has selected a SyncRef UE:
 - 2> 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
 - 2> 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
 - 2> 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
 - 2> 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
 - 2> if the PSBCH-RSRP of the current SyncRef UE is less than the minimum requirement defined in TS 38.133 [14]:
 - 3> consider no SyncRef UE to be selected;
- 1> if the UE has selected GNSS as the synchronization reference for NR sidelink communication/discovery:
 - 2> 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
 - 2> if GNSS becomes not reliable in accordance with TS 38.101-1 [15] and TS 38.133 [14]:
 - 3> consider GNSS not to be selected;
- 1> if the UE has selected cell as the synchronization reference for NR sidelink communication/discovery:
 - 2> 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
 - 2> if the selected cell is not detected:
 - 3> consider the cell not to be selected;

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/sl-FreqInfoToAddModListExt* in *RRCReconfiguration* message or *sl-FreqInfoList/sl-FreqInfoListSizeExt* 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/sl-FreqInfoToAddModListExt* 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 acting as U2U Relay UE is performing U2U Relay Communication with integrated Discovery as specified in TS 23.304[65] and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2U Relay UE threshold conditions for integrated Discovery as specified in 5.8.16.2 are met based on *sl-RelayUE-ConfigU2U*; or
 - 4> if the UE capable of U2U Remote UE is performing U2U Relay Communication with integrated Discovery as specified in TS 23.304[65] and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2U Remote UE threshold conditions for integrated Discovery as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigU2U*; or
 - 4> if the UE is performing NR sidelink communication other than U2U Relay Communication with integrated Discovery:

NOTE 0: For U2U Relay UE, it can be up to UE implementation on cross-layer interaction for the AS layer condition check for Direct Communication Request message with integrated discovery forwarding.

- 5> if the UE is configured with *sl-ScheduledConfig*:
 - 6> if T310 for MCG or T311 is running; and if *sl-TxPoolExceptional* is included in *sl-FreqInfoList/sl-FreqInfoListSizeExt* for the concerned frequency in *SIB12* or included in *sl-ConfigDedicatedNR* in *RRCReconfiguration*; or
 - 6> 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
 - 6> if T304 for MCG is running and the UE is configured with *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:
 - 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];
 - 6> else:
 - 7> configure lower layers to perform the sidelink resource allocation mode 1 for NR sidelink communication;
 - 6> if T311 is running, configure the lower layers to release the resources indicated by *rrc-ConfiguredSidelinkGrant* (if any);
- 5> if the UE is configured with *sl-UE-SelectedConfig*:
 - 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 included in *sl-ConfigDedicatedNR* within *RRCReconfiguration* is not available in accordance with TS 38.214 [19];
 - 7> if *sl-TxPoolExceptional* for the concerned frequency is included in *RRCReconfiguration*; or
 - 7> if the PCell provides *SIB12* including *sl-TxPoolExceptional* in *sl-FreqInfoList/sl-FreqInfoListSizeExt* for the concerned frequency:
 - 8> 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];
 - 6> else, if the *sl-TxPoolSelectedNormal* for the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 7> 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 the UE acting as U2U Relay UE is performing U2U Relay communication with integrated Discovery as specified in TS 23.304[65], and if the NR sidelink U2U Relay UE threshold conditions for integrated Discovery as specified in 5.8.16.2 are met based on *sl-RelayUE-ConfigCommonU2U* in *SIB12*; or
 - 5> if the UE capable of U2U Remote UE is performing U2U Relay Communication with integrated Discovery as specified in TS 23.304[65], and if the NR sidelink U2U Remote UE threshold conditions for integrated Discovery as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigU2U* in *SIB12*; or
 - 5> if the UE is performing NR sidelink communication other than U2U Relay Communication with integrated Discovery:

- 6> 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:
 - 7> 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];
- 6> else if *SIB12* includes *sl-TxPoolExceptional* for the concerned frequency:
 - 7> 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
 - 7> 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]:
 - 8> 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> if the UE acting as U2U Relay UE is performing U2U Relay communication with integrated Discovery as specified in TS 23.304[65], and if the NR sidelink U2U Relay UE threshold conditions for integrated Discovery as specified in 5.8.16.2 are met based on *sl-RelayUE-PreconfigU2U* in *SidelinkPreconfigNR*; or
- 3> if the UE capable of U2U Remote UE is performing U2U Relay Communication with integrated Discovery as specified in TS 23.304[65], and if the NR sidelink U2U Remote UE threshold conditions for integrated Discovery as specified in 5.8.17.2 are met based on *sl-RemoteUE-PreconfigU2U* in *SidelinkPreconfigNR*; or
- 3> if the UE is performing NR sidelink communication other than U2U Relay Communication with integrated Discovery:
 - 4> 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

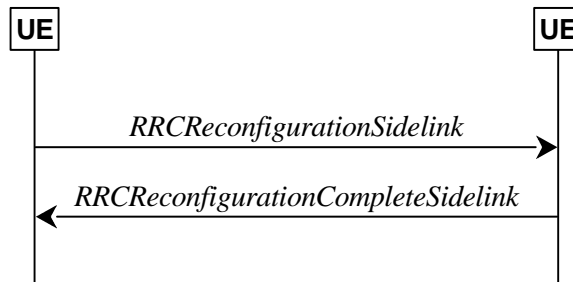


Figure 5.8.9.1.1-1: Sidelink RRC reconfiguration, successful

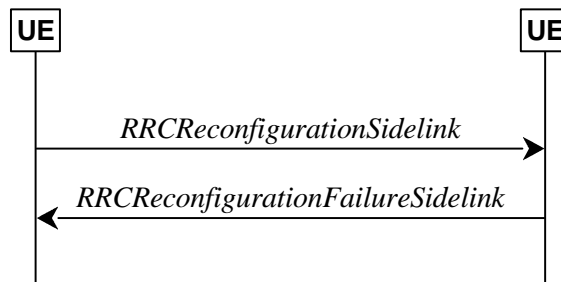


Figure 5.8.9.1.1-2: Sidelink RRC reconfiguration, failure

The purpose of this procedure is to modify a PC5-RRC connection, e.g. to establish/modify/release sidelink DRBs or additional sidelink RLC bearer or PC5 Relay RLC channels, to add/modify/release sidelink carrier, 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, to (re-)configure the latency bound of SL Inter-UE coordination report, and to indicate the SFN-DFN offset.

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, or L2 U2U Relay UE and peer L2 U2U Remote UE in case of L2 U2U Relay operation, as specified in clause 5.8.9.1a.1;
- the establishment of sidelink DRBs associated with the peer UE, or L2 U2U Relay UE and peer L2 U2U Remote UE in case of L2 U2U Relay operation, 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 additional sidelink RLC bearer associated with the peer UE, as specified in clause 5.8.9.1a.5;
- the establishment of additional sidelink RLC bearer associated with the peer UE, as specified in clause 5.8.9.1a.6;
- the modification for the parameters included in *SL-RLC-BearerConfig* of additional sidelink RLC bearer associated with the peer UE, as specified in clause 5.8.9.1a.6;
- the release of PC5 Relay RLC channels for L2 U2N/U2U Relay UE and Remote UE, as specified in clause 5.8.9.7.1;

- the establishment of PC5 Relay RLC channels for L2 U2N/U2U 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/U2U Relay UE and Remote UE, as specified in clause 5.8.9.7.2;
- the release of sidelink carrier associated with the peer UE, as specified in clause 5.8.9.1b.1;
- the addition of sidelink carrier associated with the peer UE, as specified in clause 5.8.9.1b.2;
- the modification of sidelink carrier associated with the peer UE, as specified in clause 5.8.9.1b.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;
- the (re-)configuration of the local UE ID pair for L2 U2U Remote UE and its peer L2 U2U Remote UE by L2 U2U Relay UE.
- the response to the request in a *RemoteUEInformationSidelink* message for the SFN-DFN offset from the L2 U2N Remote UE;
- the change in the value of the SFN-DFN offset at the L2 U2N Relay UE.

NOTE: It is up to L2 U2N Relay UE implementation to determine when the SFN-DFN offset has changed in value to a degree requiring an update to be sent to the L2 U2N Remote UE.

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 the sidelink DRB is a per-hop sidelink DRB (i.e. the UE is performing non-relay NR sidelink communication with a peer UE):
 - 3> if a sidelink DRB is to be established:
 - 4> 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;
 - 3> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, according to the received *sl-RadioBearerConfig* and *sl-RLC-BearerConfig* corresponding to the sidelink DRB;
 - 2> else if the sidelink DRB is an end-to-end sidelink DRB (i.e. the UE is acting as a L2 U2U Remote UE, and configure peer L2 U2U Remote UE with end-to-end SDAP and PDCP, or provide the L2 Relay UE with the QoS flow to end-to-end DRB mapping):

- 3> if the UE is in RRC_CONNECTED:
 - 4> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, according to the received *sl-RadioBearerConfig* in *sl-ConfigDedicatedNR*;
- 3> else if the UE is in RRC_IDLE/RRC_INACTIVE:
 - 4> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, which is derived by end-to-end QoS profile, according to the *sl-RadioBearerConfig* in *SIB12*;
- 3> if the UE is out of coverage:
 - 4> set the *SLRB-Config* included in the *slrb-ConfigToAddModList*, which is derived by end-to-end QoS profile, according to the *sl-RadioBearerConfig* in *SidelinkPreconfigNR*;
- 1> for each additional sidelink RLC bearer that is to be released, according to clause 5.8.9.1a.5.1, due to configuration by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or by upper layers:
 - 2> set the entry included in the *sl-RLC-BearerToReleaseList* corresponding to the additional sidelink RLC bearer;
- 1> for each additional sidelink RLC bearer that is to be established or modified, according to clause 5.8.9.1a.6.1, due to receiving *sl-ConfigDedicatedNR*, *SIB12* or *SidelinkPreconfigNR*:
 - 2> if an additional sidelink RLC bearer is to be established:
 - 3> assign a new logical channel identity for the logical channel to be associated with the additional sidelink RLC bearer and set *sl-MAC-LogicalChannelConfigPC5* in the *SL-RLC-BearerConfig* to include the new logical channel identity;
 - 2> set the *SL-RLC-BearerConfig* included in the *sl-RLC-BearerToAddModList*, according to the received *sl-RadioBearerConfig* and *sl-RLC-BearerConfig* corresponding to the additional sidelink RLC bearer;
- 1> for each carrier that is to be released, according to clause 5.8.9.1b.1.1:
 - 2> include the corresponding sidelink carrier in the *sl-CarrierToReleaseList*;
- 1> for each carrier that is to be added, according to clause 5.8.9.1b.2.1:
 - 2> include the corresponding sidelink carrier in the *sl-CarrierToAddModList*;
- 1> set the *sl-MeasConfig* as follows:
 - 2> If the frequency used for NR sidelink communication is included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* 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/sl-FreqInfoToAddModListExt* 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*;

1> if the UE is operating as a L2 U2N Relay UE:

2> if the destination UE is a L2 U2N Remote UE that requested the SFN-DFN offset in a previous *RemoteUEInformationSidelink* message:

3> if the SFN-DFN offset has changed since a previous transmission of the *RRCReconfigurationSidelink* message, or no previous transmission of the *RRCReconfigurationSidelink* message has occurred since the reception of the *RemoteUEInformationSidelink* message:

4> set the *sl-SFN-DFN-Offset* according to the relation between the SFN timeline of the PCell and the DFN timeline;

1> if the UE is acting as L2 U2U Relay UE, and if the procedure is initiated to configure local ID pair to a connected L2 U2U Remote UE:

2> if the local ID pair is to be assigned or modified for an end-to-end PC5 connection, and if the per-hop PC5-RRC connection with this L2 U2U Remote UE and the per-hop PC5-RRC connection with its peer L2 U2U Remote UE are successfully established:

3> include an entry in *sl-LocalID-PairToAddModList*, and set the fields as below:

4> according to association between User Info and L2 ID as specified in TS 23.304 [65], set *sl-RemoteUE-L2Identity* to the source L2 ID of this L2 U2U Remote UE, and set *sl-RemoteUE-LocalIdentity* to include the new local UE ID assigned to this L2 U2U Remote UE, in the *SL-SRAP-ConfigPC5*, if needed;

- 4> according to association between User Info and L2 ID as specified in TS 23.304 [65], set *sl-PeerRemoteUE-L2Identity* to the destination L2 ID of the peer L2 U2U Remote UE, and set *sl-PeerRemoteUE-LocalIdentity* to include the new local UE ID assigned to the peer L2 U2U Remote UE, in the *SL-SRAP-ConfigPC5*, if needed;
- 2> else if the local ID pair is to be released for an end-to-end PC5 connection:
 - 3> include an entry in *sl-LocalID-PairToReleaseList*, with the value of *SL-DestinationIdentity* set to the destination L2 ID of the peer L2 U2U Remote UE;
- 1> if the UE is acting as L2 U2U Remote UE (i.e. Tx UE and is in RRC_IDLE or in RRC_INACTIVE or out of coverage), and if the procedure is initiated to add/modify the first hop PC5 Relay RLC channel of an end-to-end sidelink DRB to the connected L2 U2U Relay UE (i.e. Rx UE), based on configuration in *SIB12* or *SidelinkPreconfigNR*; or
- 1> if the UE is acting as L2 U2U Relay UE (i.e. Tx UE) and is in RRC_IDLE or in RRC_INACTIVE or out of coverage, and if the procedure is initiated to add/modify the second hop PC5 Relay RLC channel to the connected L2 U2U Remote UE (i.e. Rx UE) based on configuration in *SIB12* or *SidelinkPreconfigNR*:
 - 2> if a PC5 Relay RLC channel is to be established:
 - 3> assign a new RLC channel ID and set *sl-RLC-ChannelID-PC5* in the *SL-RLC-ChannelConfigPC5* to include the new RLC channel ID;
 - 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> if the UE is in RRC_IDLE or in RRC_INACTIVE:
 - 3> set the *SL-RLC-ChannelConfigPC5* included in the *sl-RLC-ChannelToAddModListPC5* according to the *SL-RLC-BearerConfig* derived based on the per-hop QoS of the end-to-end SLRB according to *SIB12*;
 - 2> else if the UE is out of coverage:
 - 3> set the *SL-RLC-ChannelConfigPC5* included in the *sl-RLC-ChannelToAddModListPC5* according to the *SL-RLC-BearerConfig* derived based on the per-hop QoS of the SLRB according to *SidelinkPreconfigNR*;
- 1> if the UE is acting as L2 U2U Remote UE (i.e. Tx UE) and is in RRC_IDLE or in RRC_INACTIVE or out of coverage, and the procedure is initiated to release the first hop PC5 Relay RLC channel of an end-to-end sidelink DRB to the connected L2 U2U Relay UE (i.e. Rx UE) according to clause 5.8.9.7.1; or
- 1> if the UE is acting as L2 U2U Relay UE (i.e. Tx UE) and is in RRC_IDLE or in RRC_INACTIVE or out of coverage, and the procedure is initiated to release the second hop PC5 Relay RLC channel of an end-to-end sidelink DRB to the connected L2 U2U Remote UE (i.e. Rx UE) according to clause 5.8.9.7.1:
 - 2> set the *SL-RLC-ChannelID* corresponding to the PC5 Relay RLC channel in the *sl-RLC-ChannelToReleaseListPC5*;

NOTE 3: If UE is in RRC_IDLE or in RRC_INACTIVE or out of coverage, how to merge the split per-flow QoS on the first/second hop into a per-SLRB level QoS for RLC channel configuration derivation is up to UE implementation.

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* includes the *sl-RLC-BearerToReleaseList*:
 - 2> for each entry value included in the *sl-RLC-BearerToReleaseList* that is part of the current UE sidelink configuration;
 - 3> perform the additional sidelink RLC bearer release procedure, according to clause 5.8.9.1a.5;
- 1> if the *RRCReconfigurationSidelink* includes the *sl-RLC-BearerToAddModList*:
 - 2> for each *SL-RLC-BearerConfigIndex* value included in the *sl-RLC-BearerToAddModList* that is not part of the current UE sidelink configuration:
 - 3> perform the additional sidelink RLC bearer addition procedure, according to clause 5.8.9.1a.6;
 - 2> for each *SL-RLC-BearerConfigIndex* value included in the *sl-RLC-BearerToAddModList* that is part of the current UE sidelink configuration:
 - 3> perform the additional sidelink RLC bearer modification procedure, according to clause 5.8.9.1a.6;
- 1> if the *RRCReconfigurationSidelink* includes the *sl-CarrierToReleaseList*:
 - 2> for each entry value included in the *sl-CarrierToReleaseList* that is part of the current UE sidelink configuration;
 - 3> perform the sidelink carrier release procedure, according to clause 5.8.9.1b.1;
- 1> if the *RRCReconfigurationSidelink* includes the *sl-CarrierToAddModList*:
 - 2> for each *sl-Carrier-Id* value included in the *sl-CarrierToAddModList* that is not part of the current UE sidelink configuration:
 - 3> perform the sidelink carrier addition procedure, according to clause 5.8.9.1b.2;

- 2> for each *sl-Carrier-Id* value included in the *sl-CarrierToAddModList* that is part of the current UE sidelink configuration:
 - 3> perform the carrier modification procedure, according to clause 5.8.9.1b.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 *RRCReconfigurationSidelink* message includes the *sl-LocalID-PairToReleaseList* or *sl-LocalID-PairToAddModList*:
 - 2> configure SRAP entity to perform NR sidelink L2 U2U relay operation accordingly for the end-to-end PC5 connection peer L2 U2U Remote UE as defined in TS 38.351 [65];
- 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> if the *RRCReconfigurationSidelink* message includes the *sl-SFN-DFN-Offset*:
 - 2> if the *sl-SFN-DFN-Offset* is set to *setup*:
 - 3> apply the configured SFN-DFN time offset;

2> if the *sl-SFN-DFN-Offset* is set to *release*:

3> release the received *sl-SFN-DFN-Offset*;

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.

NOTE 3: When UE transmits SL-PRS in dedicated SL-PRS resource pool, the sidelink DRX configuration is not applied.

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> release the additional sidelink RLC bearer of this destination, if configured, in according to clause 5.8.9.1a.5;
- 1> reset the sidelink specific MAC of this destination, except for end-to-end PC5 connection in L2 U2U Relay operation.

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/sl-RLC-BearerToReleaseListSizeExt* 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; or
- 1> for L2 U2U relay operation, when the corresponding end-to-end PC5 connection failure/release is detected according to clause 5.8.9.3a, or 5.8.9.3b; or
- 1> for L2 U2U relay operation, if no sidelink QoS flow indicated by source L2 U2U Remote UE is mapped to the end-to-end sidelink DRB for transmission when the UE is acting as L2 U2U Relay UE.

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/sl-RLC-BearerToReleaseListSizeExt* 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.
- 1> if the sidelink DRB is an end-to-end sidelink DRB in L2 U2U relay operation:
 - 2> perform the PC5 Relay RLC channel release according to 5.8.9.7.1, if there is no other end-to-end sidelink DRB(s) associated with this RLC channel;
 - 2> if the UE is acting as a source L2 U2U Remote/Relay UE and is in RRC_CONNECTED:
 - 3> reconfigure the SRAP entity for the sidelink DRB, in accordance with the *sl-SRAP-ConfigU2U* received in *sl-ConfigDedicatedNR*, if included;
 - 2> else if the UE is acting as a source L2 U2U Remote UE/Relay and is in RRC_IDLE or RRC_INACTIVE:
 - 3> reconfigure the SRAP entity for the sidelink DRB derived based on configuration received in *SIB12*;
 - 2> else if the UE is acting as a source L2 U2U Remote/Relay UE and is out of coverage:
 - 3> reconfigure the SRAP entity for the sidelink DRB derived based on configuration received in *SidelinkPreconfigNR*;

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;

- 1> if any sidelink QoS flow is (re)configured by source L2 U2U Remote UE and is mapped to a end-to-end sidelink DRB for transmission when the UE is acting as L2 U2U Relay UE;

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> for a per-hop sidelink DRB (i.e. the UE is performing NR sidelink communication with a peer UE):
 - 3> 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;
 - 3> if this procedure was due to the reception of a *RRCReconfigurationSidelink* message:
 - 4> 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;
 - 3> else if this procedure was due to the reception of a *RRCReconfigurationCompleteSidelink* message:
 - 4> 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*;
 - 3> else (i.e. for groupcast/broadcast):
 - 4> 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.
 - 2> for an end-to-end sidelink DRB (i.e. the UE is acting as L2 U2U Remote UE):
 - 3> if the UE is in RRC_CONNECTED:
 - 4> associate this end-to-end sidelink DRB with the PC5 RLC channel indicated by *sl-EgressRLC-ChannelPC5* included in *sl-ConfigDedicatedNR*, received from *RRCReconfiguration*;

- 3> else if the UE is in RRC_IDLE or RRC_INACTIVE:
 - 4> consider the PC5 RLC channel derived by per-SLRB QoS profile of this end-to-end sidelink DRB based on the configuration in *SIB12* as the egress PC5 relay RLC channel;
 - 4> associate this end-to-end sidelink DRB with the PC5 RLC channel and configure the mapping to SRAP;
- 3> else if the UE is out of coverage:
 - 4> consider the PC5 RLC channel derived by per-SLRB QoS profile of this end-to-end sidelink DRB based on the configuration in *SidelinkPreconfigNR* as the egress PC5 relay RLC channel;
 - 4> associate this end-to-end sidelink DRB with the PC5 RLC channel and configure the mapping to SRAP;

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;
- 2> for an end-to-end sidelink DRB (i.e. the UE is acting as L2 U2U Remote UE):
 - 3> if the UE is in RRC_CONNECTED:
 - 4> reconfigure the SRAP entity for the sidelink DRB, in accordance with the *sl-SRAP-ConfigU2U* received in *sl-ConfigDedicatedNR*, if included;
 - 3> else if the UE is in RRC_IDLE or RRC_INACTIVE:
 - 4> reconfigure the SRAP entity for the sidelink DRB derived based on configuration received in *SIB12*;
 - 3> else if the UE is out of coverage:
 - 4> reconfigure the SRAP entity for the sidelink DRB derived based on configuration received in *SidelinkPreconfigNR*.

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 if any;
- 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;
- 1> if an end-to-end PC5-RRC connection release/failure is detected:
 - 2> if the UE is acting L2 U2U Remote UE:
 - 3> release the PDCP entity of the end-to-end sidelink SRB for the end-to-end PC5 connection;
 - 2> release the association between the end-to-end sidelink SRB and the egress PC5 RLC channel, and reconfigure SRAP configuration;

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 if needed, as specified in clause 9.1.1.4;
 - 2> if in coverage on the frequency used for the NR sidelink communication as defined in TS 38.304 [20]:
 - 3> indicate the allowed carrier for the RLC bearer of the SRB before the reception of initial *RRCReconfigurationCompleteSidelink* message as specified in subclause 5.8.9.1.9, as indicated in *sl-FreqInfoList*, to lower layer;
 - 2> else:
 - 3> indicate the allowed carrier for the RLC bearer of the SRB before the reception of initial *RRCReconfigurationCompleteSidelink* message as specified in subclause 5.8.9.1.9, as indicated in *sl-PreconfigFreqInfoList*, to lower layer;
- 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 if needed, as specified in clause 9.1.1.4;
 - 2> consider the PC5-RRC connection is established for the destination;
- 1> for end-to-end SRB1/2/3:

2> if the UE is acting L2 U2U Remote UE:

3> consider the SL-U2U-RLC as specified in clause 9.1.1.4 as the egress PC5 relay RLC channel;

4> associate this end-to-end sidelink SRB with the SL-U2U-RLC and configure the mapping to SRAP.

5.8.9.1a.5 Additional Sidelink RLC Bearer release

5.8.9.1a.5.1 Additional Sidelink RLC Bearer release conditions

For NR sidelink communication, additional sidelink RLC bearer release is initiated in the following cases:

1> for sidelink DRB, the release conditions are met as in clause 5.8.9.1a.1.1 for the associated sidelink DRB; or

1> for sidelink SRB, the release conditions are met as in clause 5.8.9.1a.3 for the associated sidelink SRB; or

1> for sidelink DRB, if *SL-RLC-BearerConfigIndex* (if any) of the sidelink DRB is included in *sl-RLC-BearerToReleaseList* in *RRCReconfigurationSidelink*; or

1> for sidelink DRB, if *SL-RLC-BearerConfigIndex* (if any) of the additional Sidelink RLC Bearer is included in *sl-RLC-BearerToReleaseListSizeExt* in *sl-ConfigDedicatedNR*;

5.8.9.1a.5.2 Additional Sidelink RLC Bearer release operation

The UE shall:

1> for groupcast and broadcast; or

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the additional sidelink RLC bearer release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*:

2> for each *sl-RLC-BearerConfigIndex* included in the received *sl-RLC-BearerToReleaseListSizeExt* in *sl-ConfigDedicatedNR* that is part of the current UE sidelink configuration:

3> release the RLC entity and the corresponding logical channel of the additional sidelink RLC bearer for NR sidelink communication, associated with the *sl-RLC-BearerConfigIndex*.

1> for unicast, if the additional sidelink RLC bearer release was triggered due to the reception of the *RRCReconfigurationSidelink* message:

2> for each *SL-RLC-BearerConfigIndex* included in received *sl-RLC-BearerToReleaseList* in *RRCReconfigurationSidelink* that is part of the current UE sidelink configuration:

3> release the RLC entity and the corresponding logical channel of the additional sidelink RLC bearer for NR sidelink communication associated with the *SL-RLC-BearerConfigIndex*;

1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the additional sidelink RLC bearer release was triggered due to the configuration received within the *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:

2> for each *SL-RLC-BearerConfigIndex* included in transmitted *sl-RLC-BearerToReleaseList* in *RRCReconfigurationSidelink* that is part of the current UE sidelink configuration:

3> release the RLC entity and the corresponding logical channel of the additional sidelink RLC bearer for NR sidelink communication associated with the *SL-RLC-BearerConfigIndex*;

5.8.9.1a.6 Additional Sidelink RLC Bearer addition/modification

5.8.9.1a.6.1 Additional Sidelink RLC Bearer addition/modification conditions

For NR sidelink communication, additional sidelink RLC bearer addition is initiated only in the following cases:

1> for unicast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerToAddModList* in the *RRCReconfigurationSidelink* for a *slrb-PC5-ConfigIndex*; or

- 1> for groupcast and broadcast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerToAddModListSizeExt* in *sl-ConfigDedicatedNR* for a *sl-ServedRadioBearer*; or
- 1> for unicast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerToAddModListSizeExt* in *sl-ConfigDedicatedNR* for a *sl-ServedRadioBearer*; or
- 1> for groupcast and broadcast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerConfigListSizeExt* in *SIB12* or in *SidelinkPreconfigNR* for a *sl-ServedRadioBearer*, if the sidelink DRB has been established as in clause 5.8.9.1a.2 and has not been released as in clause 5.8.9.1a.1, and if the *SL-TxProfile* of all associated QoS flow(s) for the *sl-ServedRadioBearer* indicates *backwardsIncompatible*; or
- 1> for groupcast and broadcast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerConfigListSizeExt* in *SIB12* or in *SidelinkPreconfigNR* for a *sl-ServedRadioBearer*, if the sidelink DRB has been established as in clause 5.8.9.1a.2 and has not been released as in clause 5.8.9.1a.1, and if the *SL-TxProfile* of at least one QoS flow for the *sl-ServedRadioBearer* indicates *backwardsCompatible* and UE decides to use PDCP duplication; or
- 1> for unicast, for sidelink DRB, if *SL-RLC-BearerConfig* is received in *sl-RLC-BearerConfigListSizeExt* in *SIB12* or in *SidelinkPreconfigNR* for a *sl-ServedRadioBearer*, and if both UEs support PDCP duplication; or
- 1> for unicast, for sidelink SRB, if UE decides to use PDCP duplication;

For NR sidelink communication, additional sidelink RLC bearer modification is initiated only in the following cases:

- 1> if any of the additional sidelink RLC bearer related parameters is changed by *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or *RRCReconfigurationSidelink* for one additional sidelink RLC bearer, which is established;

5.8.9.1a.6.2 Additional Sidelink RLC Bearer addition/modification operation

For the additional Sidelink RLC bearer, whose addition conditions are met as in clause 5.8.9.1a.6.1, 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 additional Sidelink RLC bearer addition was triggered due to the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, for DRB, after receiving the *RRCReconfigurationCompleteSidelink* message, if the additional Sidelink RLC bearer addition was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers; or
- 1> for unicast, for SRB, after receiving the *RRCReconfigurationCompleteSidelink* message, if the additional Sidelink RLC bearer addition was decided by UE:
 - 2> establish an additional RLC entity for NR sidelink communication and configure it in accordance with each *sl-RLC-ConfigPC5* received in the *RRCReconfigurationSidelink* or *sl-RLC-Config* received in *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* for SL DRB, or as specified in clause 9.1.1.4 for SL SRB;
 - 2> if this procedure was for Sidelink DRB:
 - 3> if this procedure was due to the reception of a *RRCReconfigurationSidelink* message:
 - 4> configure the MAC entity with a logical channel in accordance with the *sl-MAC-LogicalChannelConfigPC5* received in the *RRCReconfigurationSidelink* associated with the sidelink RLC entity;
 - 3> else if this procedure was due to the reception of a *RRCReconfigurationCompleteSidelink* message:
 - 4> configure the MAC entity with a logical channel associated with the sidelink RLC entity, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR*;
 - 3> else (i.e. for groupcast/broadcast):

- 4> configure the MAC entity with a logical channel associated with the sidelink RLC entity, in accordance with the *sl-MAC-LogicalChannelConfig* received in the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* and assign a new LCID to this logical channel.
- 3> if the UE is in RRC_CONNECTED:
 - 4> indicate the allowed carriers for the two RLC bearers of the DRB, as indicated in *sl-AllowedCarriers*, to lower layer;
- 3> else:
 - 4> indicate the allowed carriers for the two RLC bearers of the DRB, decided by UE implementation, to lower layer, where the carrier indicated in *sl-FreqInfoList* is used for the RLC bearer if the *SL-TxProfile* of at least one associated QoS flow for the *sl-ServedRadioBearer* indicates *backwardsCompatible*;
- 2> else (i.e., if this procedure was for Sidelink SRB):
 - 3> configure the MAC entity with a logical channel associated with the sidelink RLC entity, as specified in clause 9.1.1.4.
 - 3> if the UE is in RRC_CONNECTED and if *sl-AllowedCarrierFreqSet1/sl-AllowedCarrierFreqSet2* are configured:
 - 4> indicate the allowed carriers for the two RLC bearers of the SRB, as indicated in *sl-AllowedCarrierFreqSet1/sl-AllowedCarrierFreqSet2*, to lower layer;
 - 3> else:
 - 4> indicate the allowed carriers for the two RLC bearers of the SRB, decided by UE implementation, to lower layer, where the carrier indicated in *sl-FreqInfoList* is used for the RLC bearer if the *SL-TxProfile* of at least one associated QoS flow for the *sl-ServedRadioBearer* indicates *backwardsCompatible*;

For the additional Sidelink RLC bearer, whose modification conditions are met as in clause 5.8.9.1a.6.1, 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 additional Sidelink RLC bearer modification was triggered due to the reception of the *RRCReconfigurationSidelink* message; or
- 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the additional Sidelink RLC bearer modification was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12* or *SidelinkPreconfigNR*:
 - 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.

5.8.9.1b Sidelink Carrier Configuration

5.8.9.1b.1 Sidelink Carrier Release

5.8.9.1b.1.1 Sidelink Carrier Release Condition

For NR sidelink communication, sidelink carrier release is initiated in the following cases:

- 1> for unicast, if *sl-Carrier-Id* of the sidelink carrier is received in *sl-CarrierToReleaseList* in the *RRCReconfigurationSidelink*; or

- 1> for unicast, if a sidelink carrier failure has been indicated by MAC layer; or
- 1> for unicast, if the sidelink carrier release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or upper layer; or
- 1> for unicast, if the sidelink SRB(s), DRB(s) or additional sidelink RLC bearer(s), which was associated with the sidelink carrier(s), are released according to clause 5.8.9.1a.3.1, 5.8.9.1a.1.1 or 5.8.9.1a.5.1;

5.8.9.1b.1.2 Sidelink Carrier Release Operation

The UE shall:

- 1> for unicast, if the sidelink carrier release was triggered due to the reception of the *RRCReconfigurationSidelink* message:
 - 2> for each *sl-Carrier-Id* value included in the *sl-CarrierToReleaseList*:
 - 3> if the current UE configuration includes a sidelink carrier with value *sl-Carrier-Id*:
 - 4> release the sidelink carrier for reception.
 - 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink carrier release was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:
 - 2> for each *sl-Carrier-Id* value included in the *sl-CarrierToReleaseList*:
 - 3> if the current UE configuration includes a sidelink carrier with value *sl-Carrier-Id*:
 - 4> release the sidelink carrier for transmission.

5.8.9.1b.2 Sidelink Carrier Addition

5.8.9.1b.2.1 Sidelink Carrier Addition Condition

For NR sidelink communication, sidelink carrier addition is initiated in the following cases:

- 1> for unicast, if *sl-Carrier-Id* of the sidelink carrier is received in *sl-CarrierToAddModList* in the *RRCReconfigurationSidelink*; or
- 1> for unicast, if *sl-Carrier-Id* of the sidelink carrier is received in *sl-CarrierToAddModList* in the *RRCReconfigurationSidelink*; or
- 1> for unicast, if a sidelink SRB(s), DRB(s) or additional sidelink RLC bearer(s), which is associated with the sidelink carrier(s) (taking into account at least carrier(s) mapped to the sidelink QoS flow(s) configured by the upper layer, carriers configured in *sl-ConfigDedicatedNR*, *SIB12* or *SidelinkPreconfigNR*, and carrier(s) supported by both UEs), are established according to clause 5.8.9.1a.4, 5.8.9.1a.2.1 or 5.8.9.1a.6.1;

5.8.9.1b.2.2 Sidelink Carrier Addition Operation

The UE shall:

- 1> for unicast, if the sidelink carrier addition was triggered due to the reception of the *RRCReconfigurationSidelink* message:
 - 2> for each *sl-Carrier-Id* value included in the *sl-CarrierToAddModList* that is not part of the current UE configuration (sidelink carrier addition):
 - 3> add the sidelink carrier, corresponding to the *sl-Carrier-Id*, in accordance with the *sl-AbsoluteFrequencyPointA* for reception;
 - 1> for unicast, after receiving the *RRCReconfigurationCompleteSidelink* message, if the sidelink carrier addition was triggered due to the configuration received within the *sl-ConfigDedicatedNR*, *SIB12*, *SidelinkPreconfigNR* or indicated by upper layers:

2> for each *sl-Carrier-Id* value included in the *sl-CarrierToAddModList* that is not part of the current UE configuration (sidelink carrier addition):

3> add the sidelink carrier, corresponding to the *sl-Carrier-Id*, in accordance with the *sl-AbsoluteFrequencyPointA* for transmission;

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.

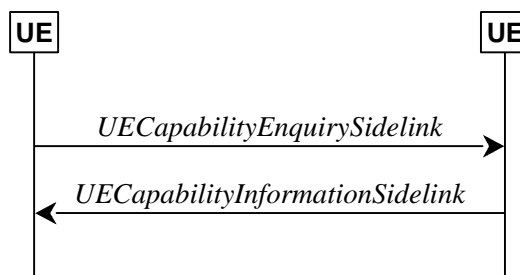


Figure 5.8.9.2.1-1: Sidelink UE capability transfer

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 HARQ-based Sidelink RLF for a specific destination has been detected; or
- 1> upon integrity check failure indication from sidelink PDCP entity concerning SL-SRB2 or SL-SRB3 for a specific destination; or
- 1> upon indication of consistent sidelink LBT failures for all RB sets from MAC entity:
 - 2> consider sidelink radio link failure to be detected for this destination;
 - 2> release the DRBs (if any) 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, except for end-to-end PC5 connection in L2 U2U Relay operation;
 - 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> if MP is configured:
 - 5> initiate the indirect path failure information procedure as specified in 5.7.3c;
 - 4> else:
 - 5> 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;
 - 2> if the UE is acting as L2 U2U Relay UE for the destination which identifies a connected L2 U2U Remote UE:
 - 3> consider the end-to-end PC5 connection failure for the end-to-end PC5 connection(s) over the per-hop PC5 link established with the L2 U2U Remote UE;
 - 3> send *NotificationMessageSidelink* to the peer L2 U2U Remote UE(s) of the end-to-end PC5 connection(s), in accordance with 5.8.9.10.
 - 3> initiate the end-to-end PC5 connection failure related actions as specified in 5.8.9.3b;

- 2> if the UE is acting as L2 U2U Remote UE for the destination which identifies a connected L2 U2U Relay UE:
 - 3> consider the end-to-end PC5 connection failure for the end-to-end PC5 connection(s) over the per-hop PC5 link established with the L2 U2U Relay UE;
 - 3> initiate the end-to-end PC5 connection failure related actions as specified in 5.8.9.3a;

NOTE: It is up to UE implementation on whether and how to indicate to upper layers to maintain the keep-alive procedure [55].

5.8.9.3a End-to-end PC5 connection failure related actions performed by L2 U2U Remote UE

The UE acting as NR sidelink L2 U2U Remote UE shall:

- 1> upon detection of end-to-end PC5 connection failure due to per-hop PC5 link failure, in accordance with clause 5.8.9.3; or
- 1> upon detection of end-to-end PC5 connection failure due to per-hop PC5 link release, in accordance with clause 5.8.9.5; or
- 1> upon T400 expiry for an end-to-end PC5 connection; or
- 1> upon integrity check failure indication from sidelink PDCP entity concerning SL-SRB2 or SL-SRB3 for an end-to-end PC5 connection; or
- 1> upon detection end-to-end PC5 connection failure due to reception of *NotificationMessageSidelink* indicating PC5 RLF from the L2 U2U Relay UE for a specific destination based on the received *sl-DestinationIdentityRemoteUE*, in accordance with clause 5.8.9.10.4:
 - 2> release the end-to-end DRBs for this end-to-end PC5 connection, according to clause 5.8.9.1a.1;
 - 2> release the end-to-end SRBs for this end-to-end PC5 connection, according to clause 5.8.9.1a.3;
 - 2> discard the end-to-end NR sidelink communication related configuration for this end-to-end PC5 connection, including SRAP configuration;
 - 2> consider the end-to-end PC5-RRC connection is released for this end-to-end PC5 connection;
 - 2> indicate the release of the end-to-end PC5-RRC connection to the upper layers;
 - 2> if the end-to-end PC5 connection failure is due to T400 expiry or integrity check failure of SL-SRB2 or SL-SRB3:
 - 3> send *RemoteUEInformationSidelink* message to the L2 Relay UE in the middle of the end-to-end PC5 connection(s) in accordance with 5.8.9.8.2;

5.8.9.3b End-to-end PC5 connection failure/release related actions performed by L2 U2U Relay UE

The UE acting as NR sidelink L2 U2U Relay UE shall:

- 1> upon detection end-to-end PC5 connection failure due to per-hop PC5 link failure, in accordance with clause 5.8.9.3; or
- 1> upon detection end-to-end PC5 connection failure due to per-hop PC5 link release, in accordance with clause 5.8.9.5; or
- 1> upon reception of *RemoteUEInformationSidelink* indicating end-to-end connection release or failure for a specific destination based on the received *sl-DestinationIdentityRemoteUE*, in accordance with clause 5.8.9.8.3:
 - 2> consider the end-to-end DRB(s) for this end-to-end PC5 connection is released;
 - 2> consider the end-to-end SRBs for this end-to-end PC5 connection are released;

- 2> discard the end-to-end NR sidelink communication related configuration for this end-to-end PC5 connection, including end-to-end SRB/DRB related configuration, QoS related configuration, SRAP configuration;

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/positioning 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/positioning 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/positioning as defined in TS 38.304 [20]; and the concerned frequency is included in *sl-FreqInfoToAddModList/sl-FreqInfoToAddModListExt* in *RRCReconfiguration* or in *sl-FreqInfoList/sl-FreqInfoListSizeExt* 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/positioning 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 except for end-to-end PC5-RRC connection in L2 U2U relay operation.
 - 2> consider the PC5-RRC connection is released for the destination;
- 2> if the UE is acting as L2 U2U Remote UE, and this destination identifies a connected L2 U2U Relay UE:
 - 3> consider the end-to-end PC5 connection failure for the end-to-end PC5 connection(s) over the per-hop PC5 link established with the L2 U2U Relay UE;
 - 3> initiate the end-to-end PC5 connection failure related actions as specified in 5.8.9.3a;
- 2> if the UE is acting as L2 U2U Relay UE, and this destination identifies a connected L2 U2U Remote UE:

- 3> consider the end-to-end PC5 connection failure for the end-to-end PC5 connection(s) over the per-hop PC5 link established with the L2 U2U Remote UE;
- 3> send *NotificationMessageSidelink* message to the peer L2 U2U Remote UE(s) for the end-to-end PC5 connection(s) in accordance with 5.8.9.10;
- 3> initiate the end-to-end PC5 connection failure related actions as specified in 5.8.9.3b;

5.8.9.5a Actions related to end-to-end PC5-RRC connection release performed by L2 U2U Remote UE

The UE acting as sidelink L2 U2U Remote UE shall:

- 1> if the end-to-end PC5-RRC connection release is requested by upper layers as specified in TS 23.304 [65]:
 - 2> discard the NR sidelink communication related configuration for this end-to-end PC5-RRC connection, including SRAP configuration;
 - 2> release the end-to-end DRBs for this end-to-end PC5-RRC connection if configured, in according to clause 5.8.9.1a.1;
 - 2> release the end-to-end SRBs for this end-to-end PC5-RRC connection, in according to clause 5.8.9.1a.3;
 - 2> consider the end-to-end PC5-RRC connection is released for this end-to-end PC5-RRC connection;
 - 2> send *RemoteUEInformationSidelink* message to the L2 Relay UE in the middle of the end-to-end PC5 connection(s) in accordance with 5.8.9.8.2;

5.8.9.6 Sidelink UE assistance information

5.8.9.6.1 General

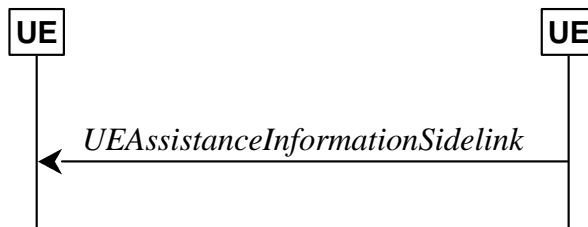


Figure 5.8.9.6.1-1: Sidelink UE assistance information

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 or U2U 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 by end-to-end DRB release as specified in 5.8.9.1a.1.2:
 - 2> release the RLC entity and the corresponding logical channel;
- 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;

Upon PC5-RRC connection establishment between two UEs for L2 U2U relay operation 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-U2U-RLC* as specified in clause 9.1.1.4;

For L2 U2U Relay operation in RRC_IDLE/RRC_INACTIVE or out of coverage, the PC5 Relay RLC channel addition/modification can be triggered due to the addition/modification/release of the end-to-end SL DRB(s). The source L2 U2U Remote UE and L2 U2U Relay UE derive the corresponding PC5 Relay RLC channel based on SIB12/Preconfiguration, as follows:

- The source L2 U2U Remote UE derives the configuration for the PC5 Relay RLC channel(s) between L2 U2U Source Remote UE and L2 U2U relay UE (i.e. the first hop PC5 Relay RLC channel), by aggregating the split QoS profiles of the first hop into a per-SLRB level QoS profile for each end-to-end SL DRB, and considering the *SL-RLC-Config* (linked to the *SL-RadioBearerConfig* which matches the per-SLRB level QoS profile) as the first hop RLC channel configuration.
- The L2 U2U Relay UE derives the configuration for the PC5 Relay RLC channel(s) between L2 U2U relay UE and the target L2 U2U Source Remote UE (i.e. the second hop PC5 Relay RLC channel), by aggregating the split QoS profiles of the second hop into a per-SLRB level QoS profile for each end-to-end SL DRB, and considering the *SL-RLC-Config* (linked to the *SL-RadioBearerConfig* which matches the per-SLRB level QoS profile) as the second hop RLC channel configuration.

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*; or
- 1> after receiving the *RRCReconfigurationCompleteSidelink* message, if the PC5 Relay RLC channel addition/modification was triggered for an end-to-end sidelink DRB based on the configuration in *SIB12* or *SidelinkPreconfigNR*:
 - 2> if the current configuration contains a PC5 Relay RLC channel with the received *sl-RLC-ChannelID* or *sl-RLC-ChannelID-PC5*; or
 - 2> if the configuration in *SIB12* or *SidelinkPreconfigNR* has updated, based on which the PC5 Relay RLC channel is derived:
 - 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* (in *sl-ConfigDedicatedNR*, or *SIB12*, or *SidelinkPreconfigNR*) 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) /posSIB(s), provide Paging related information to the connected L2 U2N Relay UE, request the SFN-DFN offset from the connected L2 U2N Relay UE, and trigger L2 U2N Relay UE in RRC_IDLE/RRC_INACTIVE to enter RRC_CONNECTED during indirect path addition/change in MP operation. This procedure is also used by the L2 U2U Remote UE to send end-to-end PC5 connection release/failure related information to L2 U2U Relay UE.

This procedure is used by the L2 U2N Remote UE in RRC_CONNECTED to request the SFN-DFN offset from 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 not stored a valid version, in accordance with clause 5.2.2.2.1, of one or several posSIB(s) that the UE requires for a positioning operation, and the requested posSIB has not been indicated in *RemoteUEInformationSidelink* message to the L2 U2N Relay UE before, and the connected L2 U2N relay UE set *posSIB-ForwardingSupported* to *supported*:
 - 2> include *sl-RequestedPosSIB-List* in the *RemoteUEInformationSidelink* to indicate the requested posSIB(s);
- 1> if the UE needs the SFN-DFN offset based on the request from upper layers and the connected L2 U2N relay UE set *sfn-DFN-OffsetSupported* to *supported*:
 - 2> set *sl-SFN-DFN-OffsetRequested* to *true*;
- 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*, *sl-RequestedPosSIB-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-RequestedPosSIB-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;

Upon any change in the need of SFN-DFN offset while in RRC_CONNECTED, the L2 U2N Remote UE shall:

- 1> if the UE needs the SFN-DFN offset based on the request from upper layers and the connected L2 U2N relay UE set *sfn-DFN-OffsetSupported* to *supported*:
 - 2> set *sl-SFN-DFN-OffsetRequested* to *true*;
- 1> submit the *RemoteUEInformationSidelink* message to lower layers for transmission;

The L2 U2N Remote UE in RRC_CONNECTED shall:

- 1> if the UE is configured with *sl-IndirectPathAddChange* set to *setup*, and not configured with split SRB1 with duplication:
 - 2> include *connectionForMP*;
 - 2> submit the *RemoteUEInformationSidelink* message to lower layers for transmission;

The L2 U2U Remote UE shall:

- 1> upon end-to-end PC5-RRC connection release; or
- 1> upon end-to-end PC5-RRC connection failure due to T400 expiry or integrity check failure of SL-SRB2 or SL-SRB3:
 - 2> include *sl-DestinationIdentityRemoteUE-r18*;
 - 2> submit the *RemoteUEInformationSidelink* message to lower layers for transmission;

5.8.9.8.3 Reception of *RemoteUEInformationSidelink* message by the L2 U2N/U2U 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*;
- 1> if the *RemoteUEInformationSidelink* includes the *sl-RequestedPosSIB-List*:
 - 2> if the *sl-RequestedPosSIB-List* is set to *setup*:
 - 3> if the L2 U2N Relay UE has not stored a valid version of posSIB(s) indicated in *sl-RequestedPosSIB-List*:
 - 4> perform acquisition of the positioning system information indicated in *sl-RequestedPosSIB-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-RequestedPosSIB-List* is set to *release*:
 - 3> release received posSIB request in *sl-RequestedPosSIB-List*.
 - 1> if the *RemoteUEInformationSidelink* includes the *connectionForMP*:
 - 2> if the L2 U2N Relay UE is in RRC_IDLE:
 - 3> initiate an RRC connection establishment as specified in 5.3.3;
 - 2> else if the L2 U2N Relay UE is in RRC_INACTIVE:
 - 3> initiate an RRC connection resume as specified in 5.3.13;

The L2 U2U Relay UE shall:

- 1> if the *RemoteUEInformationSidelink* includes the *sl-DestinationIdentityRemoteUE*:
 - 2> consider the end-to-end PC5 connection release for the end-to-end PC5 connection between the L2 U2U Remote UE and the peer L2 U2U Remote UE identified by *sl-DestinationIdentityRemoteUE*;
 - 2> initiate the end-to-end PC5 connection failure/release related actions as specified in 5.8.9.3b;

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 acquisition of the posSIB(s) requested by the connected L2 U2N Remote UE (as indicated in *sl-RequestedPosSIB-List* in the *RemoteUEInformationSidelink*) or upon receiving the updated posSIB(s) from network which have 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, or used by a L2 U2U Relay UE to send notification to the L2 U2U Remote UE for an end-to-end PC5 connection when condition(s) as specified in 5.8.9.10.2 is met for the other hop between the L2 U2U Relay UE and the peer L2 U2U Remote UE.

5.8.9.10.2 Initiation

The Relay UE may initiate the procedure when one of the following conditions is met:

- 1> if the UE is acting as U2N Relay UE:
 - 2> upon Uu RLF as specified in 5.3.10;
 - 2> upon reception of an *RRCReconfiguration* including the *reconfigurationWithSync*;
 - 2> upon cell reselection;
 - 2> 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;
- 1> if the UE is acting as L2 U2U Relay UE:
 - 2> upon detection of PC5 RLF for the other hop between the L2 U2U Relay UE and L2 U2U Remote UE as specified in 5.8.9.3;
 - 2> upon PC5-RRC connection release for the per-hop link between the L2 U2U Relay UE and L2 U2U Remote UE as specified in 5.8.9.5;

5.8.9.10.3 Actions related to transmission of *NotificationMessageSidelink* message

The Relay UE shall set the indication type as follows:

- 1> if the UE is acting as U2N Relay UE:
 - 2> if the UE initiates transmission of the *NotificationMessageSidelink* message due to Uu RLF:
 - 3> set the *indicationType* as *relayUE-Uu-RLF*;
 - 2> else if the UE initiates transmission of the *NotificationMessageSidelink* message due to reconfiguration with sync:
 - 3> set the *indicationType* as *relayUE-HO*;
 - 2> else if the UE initiates transmission of the *NotificationMessageSidelink* message due to cell reselection:
 - 3> set the *indicationType* as *relayUE-CellReselection*;
 - 2> if the UE initiates transmission of the *NotificationMessageSidelink* message due to Uu RRC connection establishment/Resume failure:
 - 3> set the *indicationType* as *relayUE-Uu-RRC-Failure*;
 - 2> submit the *NotificationMessageSidelink* message to lower layers for transmission.
- 1> if the UE is acting as L2 U2U Relay UE:
 - 2> if the UE initiates transmission of the *NotificationMessageSidelink* message due to PC5 RLF with L2 U2U Remote UE; or
 - 2> if the UE initiates transmission of the *NotificationMessageSidelink* message due to PC5-RRC connection release for the per-hop link between the L2 U2U Relay UE and L2 U2U Remote UE:
 - 3> set the *sl-IndicationType* as *relayUE-PC5-RLF*;
 - 3> set the *sl-DestinationIdentityRemoteUE* as the associated destination for L2 U2U Remote UE;
 - 3> 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 Remote UE shall:

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

2> if the *indicationType* is included:

3> if the UE is L2 U2N Remote UE in RRC_CONNECTED:

4> if MP is configured and MCG transmission (i.e. direct path) is not suspended;

5> if the *indicationType* is *relayUE-HO*;

6> suspend indirect path transmission;

5> else:

6> initiate the indirect path failure information procedure as specified in 5.7.3c to report indirect path failure;

4> else if T301 is not running, initiate the RRC connection re-establishment procedure as specified in 5.3.7;

3> else (the UE is L3 U2N Remote UE, or L2 U2N Remote UE in RRC_IDLE or RRC_INACTIVE):

4> if the PC5-RRC connection with the U2N Relay UE is determined to be released:

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

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

5> if the UE is L2 U2N Remote UE and the *indicationType* is *relayUE-HO* or *relayUE-CellReselection*:

6> 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.

1> if the UE is acting as L2 U2U Remote UE:

2> if *sl-IndicationType* is *relayUE-PC5-RLF*:

3> indicate PC5 RLF received from L2 U2U Relay UE to the upper layers for the indicated L2 U2U Remote UE based on the received *sl-DestinationIdentityRemoteUE*;

3> consider the end-to-end PC5 connection failure for the end-to-end PC5 connection(s) over the per-hop PC5 link between the L2 U2U Relay UE and the L2 U2U Remote UE identified by *sl-DestinationIdentityRemoteUE*;

3> perform the end-to-end PC5 connection failure related actions as specified in 5.8.9.3a;

NOTE 3: It is up to the upper layers on whether to trigger U2U Relay reselection and whether to keep or release the PC5 link with the U2U Relay UE after the PC5 RLF indication received from U2U Relay UE.

5.8.9.11 UE information transfer on sidelink

5.8.9.11.1 General

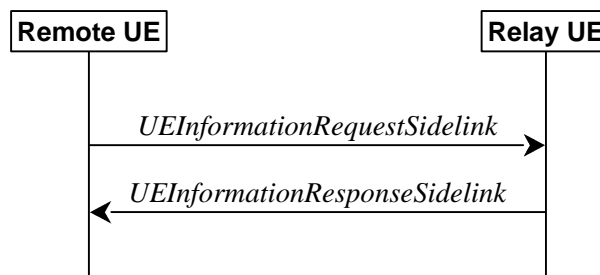


Figure 5.8.9.11.1-1: Sidelink UE information procedure

The purpose of this procedure is to transfer the UE information in sidelink. The L2 U2U Remote UE informs its end-to-end QoS information to its connected L2 U2U Relay UE in the *UEInformationRequestSidelink* message, and the L2 U2U Relay UE delivers the split QoS information of the first-hop to the Remote UE in the *UEInformationResponseSidelink* message.

5.8.9.11.2 Actions related to transmission of the *UEInformationRequestSidelink* by the UE

For initial information transfer (e.g. for QoS split) or upon change in any of the information in the *UEInformationRequestSidelink*, the UE shall set the contents of *UEInformationRequestSidelink* message as follows:

- 1> if the UE is acting as L2 U2U Remote UE:
 - 2> set *sl-E2E-QoS-ConnectionListPC5* to include the end-to-end QoS profile(s) of the sidelink QoS flow(s) towards the peer L2 U2U Remote UE if configured by the upper layer, and for each entry:
 - 3> set *sl-DestinationIdentityRemoteUE* to include the associated identity for peer L2 U2U Remote UE if configured by the upper layer;
 - 3> set *sl-QoS-InfoList* to include the end-to-end QoS profile(s) of the sidelink QoS flow(s) of the indicated peer L2 U2U Remote UE;
 - 2> submit the *UEInformationRequestSidelink* message to lower layers for transmission;

5.8.9.11.3 Actions related to reception of the *UEInformationRequestSidelink* by the UE

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

- 1> if the UE is acting as L2 U2U Relay UE:
 - 2> if the *UEInformationRequestSidelink* includes the *sl-E2E-QoS-ConnectionListPC5*:
 - 3> perform QoS split based on the *sl-QoS-InfoList* for each QoS flow to decide the split PDB value for each PC5 hop;
 - 3> set the contents of *UEInformationResponseSidelink* message as follows:
 - 4> set *sl-SplitQoS-InfoListPC5* to include the split PDB value for each QoS flow on the first PC5 hop between L2 U2U Relay UE and L2 U2U Remote UE;
 - 3> submit the *UEInformationResponseSidelink* message to lower layers for transmission;

NOTE: It is left to Relay UE implementation on how to split the PDB.

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/SL-PRS:

- 2> derive the corresponding measurement of NR sidelink frequency indicated quantity based on PSSCH DMRS/SL-PRS 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).

M_s is expressed in dBm in case of RSRP.

H_{ys} is expressed in dB.

$Thresh$ is expressed in the same unit as M_s .

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> if the $sl-RS-Type$ within $sl-ReportConfig$ is set to $dmsr$:
 - 3> set $sl-ResultDMRS$ within $sl-MeasResult$ to include the NR sidelink DMRS based quantity indicated in the $sl-ReportQuantity$ within the concerned $sl-ReportConfig$;
 - 2> if the $sl-RS-Type$ within $sl-ReportConfig$ is set to $sl-prs$:
 - 3> set $sl-Result-SL-PRS$ within $sl-MeasResult$ to include the NR SL-PRS 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:

$$\text{DFN} = \text{Floor}(0.1 * (T_{\text{current}} - T_{\text{ref}} - \text{OffsetDFN})) \text{ mod } 1024$$

$$\text{SubframeNumber} = \text{Floor}(T_{\text{current}} - T_{\text{ref}} - \text{OffsetDFN}) \text{ mod } 10$$

$$\text{SlotNumber} = \text{Floor}((T_{\text{current}} - T_{\text{ref}} - \text{OffsetDFN}) * 2^\mu) \text{ mod } (10 * 2^\mu)$$

Where:

T_{current} is the current UTC time obtained from GNSS. This value is expressed in milliseconds;

T_{ref} 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.

$\mu=0/1/2/3$ 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 *T_{current}* 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 selecting NR sidelink U2U Relay UE / has a selected NR sidelink U2U Relay UE and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2U Remote UE threshold conditions associated with the peer NR Sidelink U2U Remote UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigU2U*; or
- 3> if the UE acting as Target Remote UE is performing U2U Relay Discovery with Model B and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2U Remote UE threshold conditions associated with the NR sidelink U2U Relay UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigU2U*; or
- 3> if the UE acting as U2U Relay UE is performing U2U Relay Discovery with Model A as specified in TS 23.304[65], and neighbour UEs in discovery message to be transmitted meet the threshold conditions as specified in 5.8.16.3; or
- 3> if the UE acting as U2U Relay UE is sending Discovery Response message with Model B as specified in TS 23.304[65]; or
- 3> if the UE acting as U2U Relay UE is sending Discovery Solicitation message with Model B as specified in TS 23.304[65] and *sl-DiscConfig* is included in *RRCReconfiguration*, and if the NR sidelink U2U Relay UE threshold conditions as specified in 5.8.16.2 are met based on *sl-RelayUE-ConfigU2U*; or

NOTE 1: For U2U Relay UE and Target Remote UE, it can be up to UE implementation on cross-layer interaction for the AS layer condition check for discovery message forwarding.

- 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 selecting NR sidelink U2U Relay UE / has a selected NR sidelink U2U Relay UE and *sl-DiscConfigCommon* is included in *SIB12*, and if the NR sidelink U2U Remote UE threshold conditions associated with the peer NR Sidelink U2U Remote UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigCommonU2U* in *SIB12*; or

3> if the UE acting as Target Remote UE is performing U2U Relay Discovery with Model B and if the NR sidelink U2U Remote UE threshold conditions associated with the NR sidelink U2U Relay UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-ConfigCommonU2U* in *SIB12*; or

3> if the UE acting as U2U Relay UE is performing U2U Relay Discovery with Model A as specified in TS 23.304[65], and neighbor UEs in discovery message to be transmitted meet the threshold conditions as specified in 5.8.16.3; or

3> if the UE acting as U2U Relay UE is sending Discovery Response message with Model B as specified in TS 23.304[65]; or

3> if the UE acting as U2U Relay UE is sending Discovery Solicitation message with Model B as specified in TS 23.304[65] and if the NR sidelink U2U Relay UE threshold conditions as specified in 5.8.16.2 are met based on *sl-RelayUE-ConfigCommonU2U* 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 selecting NR sidelink U2U Relay UE / has a selected NR sidelink U2U Relay UE and if the NR sidelink U2U Remote UE threshold conditions associated with the peer NR sidelink U2U Remote UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-PreconfigU2U* in *SidelinkPreconfigNR*; or
 - 2> if the UE acting as Target Remote UE is performing U2U Relay Discovery with Model B and if the NR sidelink U2U Remote UE threshold conditions associated with the NR sidelink U2U Relay UE as specified in 5.8.17.2 are met based on *sl-RemoteUE-PreconfigU2U* in *SidelinkPreconfigNR*; or
 - 2> if the UE acting as U2U Relay UE is performing U2U Relay Discovery with Model A as specified in TS 23.304[65], and neighbor UEs in discovery message to be transmitted meet the threshold conditions as specified in 5.8.16.3; or
 - 2> if the UE acting as U2U Relay UE is sending Discovery Response message with Model B as specified in TS 23.304[65]; or
 - 2> if the UE acting as U2U Relay UE is sending Discovery Solicitation message with Model B as specified in TS 23.304[65] and if the NR sidelink U2U Relay UE threshold conditions as specified in 5.8.16.2 are met based on *sl-RelayUE-PreconfigU2U* 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 2: 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 not configured with MP 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.

5.8.16 NR sidelink U2U Relay UE operation

5.8.16.1 General

This procedure is used by a UE supporting NR sidelink U2U Relay UE operation configured by upper layers to forward NR sidelink integrated discovery messages or Model B Discovery messages to evaluate AS layer conditions. The procedure is also used to determine whether a NR sidelink UE is in proximity to NR sidelink U2U Relay UE in Model A Discovery messages.

5.8.16.2 NR sidelink U2U Relay UE threshold conditions

A UE capable of NR sidelink U2U Relay UE operation shall:

1> if the threshold conditions for sending Direct Communication Request message with integrated Discovery specified in this clause were previously not met:

2> if the *sd-RSRP-ThreshDiscConfig* is not configured, or if the SL-RSRP of the Direct Communication Request message with integrated Discovery received from the Source NR sidelink U2U Remote UE is available and is above *sd-RSRP-ThreshDiscConfig* if configured:

3> consider the threshold conditions to be met (entry);

1> else:

2> if the SL-RSRP of the Direct Communication Request message with integrated Discovery received from the Source NR sidelink U2U Remote UE is available and is below *sd-RSRP-ThreshDiscConfig* by *sd-hystMaxRelay* if configured:

3> consider the threshold conditions not to be met (leave);

1> if the threshold conditions for sending Relay Discovery Solicitation message with Model B Discovery specified in this clause were previously not met:

2> if the *sd-RSRP-ThreshDiscConfig* is not configured, or if the SD-RSRP of the Model B Discovery message received from the Source NR sidelink U2U Remote UE is available and is above *sd-RSRP-ThreshDiscConfig* if configured:

3> consider the threshold conditions to be met (entry);

1> else:

2> if the SD-RSRP of the Model B Discovery message received from the Source NR sidelink U2U Remote UE is available and is below *sd-RSRP-ThreshDiscConfig* by *sd-hystMaxRelay* if configured:

3> consider the threshold conditions not to be met (leave);

5.8.16.3 Neighbor UE(s) in proximity conditions

A UE capable of NR sidelink U2U Relay UE operation and is performing U2U Relay Discovery with Model A as specified in TS 23.304[65] shall:

- 1> for each of potential neighbor UE(s):
 - 2> if the SL-RSRP of the UE is available and is above *sl-RSRP-Thresh-DiscConfig* if configured; or
 - 2> if the SD-RSRP of the UE is available and is above *sd-RSRP-ThreshDiscConfig* if configured:
 - 3> consider the UE as neighbor UE in discovery message to be transmitted as defined in TS 23.304 [65].

NOTE: The interaction with upper layers is left to UE implementation.

5.8.17 NR sidelink U2U Remote UE operation

5.8.17.1 General

This procedure is used by a UE supporting NR sidelink U2U Remote UE operation configured by upper layers to transmit NR sidelink discovery messages to evaluate AS layer conditions. The procedure is also used to perform selection and reselection of NR sidelink U2U Relay UE.

5.8.17.2 NR Sidelink U2U Remote UE threshold conditions

A UE capable of NR sidelink U2U Remote UE operation shall:

- 1> if the threshold conditions for sending Relay Discovery Solicitation message with Model B or sending Direct Communication Request message with integrated Discovery specified in this clause were previously not met:
 - 2> if *sl-RSRP-ThreshU2U* is not configured, or if the SL-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is below *sl-RSRP-ThreshU2U* by *sl-HystMinU2U* if configured; or
 - 2> if *sd-RSRP-ThreshU2U* is not configured, or if the SD-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is below *sd-RSRP-ThreshU2U* by *sd-HystMinU2U* if configured; or
 - 2> if the peer NR sidelink U2U Remote UE is not reachable, i.e. SL-RSRP/SD-RSRP measurement of the peer sidelink U2U Remote UE is not available:
 - 3> consider the threshold conditions to be met (entry);

1> else:

- 2> if the SL-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is above *sl-RSRP-ThreshU2U* if configured; or
- 2> if the SD-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is above *sd-RSRP-ThreshU2U* if configured:
 - 3> consider the threshold conditions not to be met (leave);

1> if the threshold conditions for sending Relay Discovery Response message with Model B specified in this clause were previously not met:

- 2> if the *sd-RSRP-ThreshU2U* is not configured, or if the SD-RSRP of the NR sidelink U2U Relay UE is available and is above *sd-RSRP-ThreshU2U* if configured:
 - 3> consider the threshold conditions to be met (entry);

1> else:

- 2> if the SD-RSRP of the NR sidelink U2U Relay UE is available and is below *sd-RSRP-ThreshU2U* by *sd-HystMinU2U* if configured:
 - 3> consider the threshold conditions not to be met (leave);

5.8.17.3 Conditions for selection and reselection of NR sidelink U2U Relay UE

A UE capable of NR sidelink U2U Remote UE operation initiates NR sidelink U2U Relay (re)selection procedure as specified in 5.8.17.4 when one of the following conditions is met:

- 1> if the UE does not have a selected NR sidelink U2U Relay UE:
 - 2> if configured by upper layers to search for or select a NR sidelink U2U Relay UE; or
 - 2> if *sl-RSRP-ThreshU2U* is not configured, or if the SL-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is below *sl-RSRP-ThreshU2U* by *sl-HystMinU2U* if configured; or
 - 2> if *sd-RSRP-ThreshU2U* is not configured, or if the SD-RSRP measurement of the peer NR sidelink U2U Remote UE is available and is below *sd-RSRP-ThreshU2U* by *sd-HystMinU2U* if configured;
- 1> else if the UE has a selected NR sidelink U2U Relay UE:
 - 2> if the SL-RSRP of the currently selected NR sidelink U2U Relay UE is available and is below *sl-RSRP-ThreshU2U* by *sl-HystMinU2U* within *sl-RemoteUE-ConfigU2U* if configured; or
 - 2> if the SD-RSRP of the currently selected NR sidelink U2U Relay UE is available, and is below *sd-RSRP-ThreshU2U* by *sd-HystMinU2U* within *sl-RemoteUE-ConfigU2U* if configured; or

NOTE: For relay selection, U2U Remote UE uses SL-RSRP measurements for relay selection trigger evaluation when there is data transmission from peer U2U Remote UE to U2U Remote UE. For relay reselection, U2U Remote UE uses SL-RSRP measurements for relay reselection trigger evaluation when there is data transmission from U2U Relay UE to U2U Remote UE. And in both cases, it is left to UE implementation whether to use SL-RSRP or SD-RSRP for relay (re)selection trigger evaluation in case of no data transmission.

- 2> if the upper layers indicate to reselect another NR sidelink U2U Relay UE; or
- 2> if the sidelink radio link failure is detected on the PC5-RRC connection with the current NR sidelink U2U Relay UE as specified in clause 5.8.9.3.

5.8.17.4 Actions related to selection and reselection of NR sidelink U2U Relay UE

Upon initiation of the NR sidelink U2U Relay (re)selection procedure, the UE shall:

- 1> perform NR sidelink discovery procedure as specified in clause 5.8.13 or U2U Relay Communication with integrated Discovery as specified in clause 5.8.8, in order to search for candidate NR sidelink U2U Relay UEs;
 - 2> when evaluating the one or more detected NR sidelink U2U Relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2U Relay UE ID and using the *sd-FilterCoefficientU2U* in *SIB12* (if in RRC_IDLE/INACTIVE), the *sd-FilterCoefficientU2U* in *sl-ConfigDedicatedNR* (if in RRC_CONNECTED) or the preconfigured *sd-FilterCoefficientU2U* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;
 - 2> consider a candidate NR sidelink U2U Relay UE for which SD-RSRP exceeds *sd-RSRP-ThreshU2U* has met the AS criteria;
- 1> if the UE detects any suitable NR sidelink U2U Relay UE(s):
 - 2> consider one of the available suitable NR sidelink U2U Relay UE(s) can be selected;
- 1> else:
 - 2> consider no NR sidelink U2U Relay UE to be selected;
- 1> if the UE is performing U2U Relay Communication with integrated Discovery as specified in TS 23.304 [65] and has received Direct Communication Request message(s) from one or multiple NR sidelink U2U Relay UEs:
 - 2> when evaluating the NR sidelink U2U Relay UE(s), apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same U2U Relay UE ID and using the *sd-FilterCoefficientU2U* in *SIB12* (if in RRC_IDLE/INACTIVE), the *sd-FilterCoefficientU2U* in *sl-ConfigDedicatedNR* (if in RRC_CONNECTED)

or the preconfigured *sd-FilterCoefficientU2U* as defined in 9.3 (out of coverage), before using the SD-RSRP measurement results;

- 2> consider a candidate NR sidelink U2U Relay UE for which SL-RSRP exceeds *sd-RSRP-ThreshU2U* has met the AS criteria;
- 2> if the UE detects any suitable NR sidelink U2U Relay UE(s):
 - 3> consider one of the available suitable NR sidelink U2U Relay UE(s) can be selected;
- 2> else:
 - 3> consider no NR sidelink U2U Relay UE to be selected.

NOTE: A candidate NR sidelink U2U Relay UE which meets all AS layer criteria defined in 5.8.17.4 and higher layer criteria defined in TS 23.304 [65] can be regarded as suitable NR sidelink U2U Relay UE by the NR sidelink U2U Remote UE. If multiple suitable NR sidelink U2U Relay UEs are available, it is up to Remote UE implementation to choose one NR sidelink U2U Relay UE. The details of the interaction with upper layers are up to UE implementation.

5.8.18 NR sidelink positioning

5.8.18.1 General

The purpose of this procedure is to perform NR sidelink positioning as specified in TS 38.305 [73].

5.8.18.2 NR sidelink positioning measurement

A UE capable of NR sidelink positioning that is configured by upper layers for performing SL-PRS measurement:

- 1> if the conditions for NR sidelink positioning operation as defined in 5.8.2 are met:
 - 2> if the frequency used for NR sidelink positioning is included in *sl-FreqInfoToAddModList* in *RRCReconfiguration* message or *sl-FreqInfoList* included in *SIB12* or *SIB23*:
 - 3> if the UE is configured with *sl-RxPool* and/or *sl-PRS-RxPool* included in *RRCReconfiguration* message with *reconfigurationWithSync* (i.e. handover):
 - 4> configure lower layers to monitor sidelink control information and the corresponding SL-PRS using the pool(s) of resources indicated by *sl-RxPool* and/or *sl-PRS-RxPool*;
 - 3> else if the cell chosen for NR sidelink positioning provides *SIB12* or *SIB23*:
 - 4> configure lower layers to monitor sidelink control information and the corresponding SL-PRS using the pool(s) of resources indicated by *sl-RxPool* in *SIB12* and/or *sl-PRS-RxPool* in *SIB23*;
 - 2> else:
 - 3> configure lower layers to monitor sidelink control information and the corresponding SL-PRS using the pool(s) of resources that were preconfigured by *sl-RxPool* and/or *sl-PRS-RxPool* in *SL-PreconfigurationNR*, as defined in clause 9.3.

5.8.18.3 NR sidelink positioning transmission

A UE capable of NR sidelink positioning that is configured by upper layers to transmit SL-PRS shall:

- 1> if the conditions for NR sidelink positioning operation as defined in 5.8.2 are met:
 - 2> if the frequency used for NR sidelink positioning is included in *sl-FreqInfoToAddModList* in *sl-ConfigDedicatedNR* within *RRCReconfiguration* message or included in *sl-PosConfigCommonNR* within *SIB23*:
 - 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-PRS-TxPoolExceptional* or *sl-TxPoolExceptional* is included in *sl-FreqInfoList* for the concerned frequency in *SIB23* or *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 *SIB23* or *SIB12* including *sl-PRS-TxPoolExceptional* or *sl-TxPoolExceptional* for the concerned frequency; or
 - 5> if T304 for MCG is running and the UE is configured with *sl-PRS-TxPoolExceptional* or *sl-TxPoolExceptional* included in *sl-ConfigDedicatedNR* for the concerned frequency in *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation scheme 2 based on random selection using the resource pool indicated by *sl-PRS-TxPoolExceptional* or *sl-TxPoolExceptional* as defined in TS 38.321 [3];
 - 5> else:
 - 6> configure lower layers to perform the sidelink resource allocation scheme 1 for NR sidelink positioning;
 - 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 sensing, if selected and is allowed by *sl-PosAllowedResourceSelectionConfig*, on the resources configured in *sl-PRS-TxPoolSelectedNormal* or 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* or *sl-PRS-TxPoolExceptional* for the concerned frequency is included in *RRCReconfiguration*; or
 - 6> if the PCell provides *SIB25* including *sl-TxPoolExceptional* or *sl-PRS-TxPoolExceptional* in *sl-FreqInfoList* for the concerned frequency:
 - 7> configure lower layers to perform the sidelink resource allocation scheme 2 based on random selection using the pool of resources indicated by *sl-TxPoolExceptional* or *sl-PRS-TxPoolExceptional* as defined in TS 38.321 [3];
 - 5> else, if the *sl-PRS-TxPoolSelectedNormal* or *sl-TxPoolSelectedNormal* for the concerned frequency is included in the *sl-ConfigDedicatedNR* within *RRCReconfiguration*:
 - 6> configure lower layers to perform the sidelink resource allocation scheme 2 based on resource selection operation according to *sl-PosAllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-PRS-TxPoolSelectedNormalNormal* for the concerned frequency, or 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 positioning transmission provides *SIB23* or *SIB12*:
 - 5> if *SIB23* includes *PRS-TxPoolSelectedNormal* for the concerned frequency, and a result of full sensing, if selected and is allowed by *sl-PosAllowedResourceSelectionConfig*, on the resources configured in the *sl-PRS-TxPoolSelectedNormal* is available in accordance with TS 38.214 [19] or random selection, if allowed by *sl-PosAllowedResourceSelectionConfig*, is selected:
 - 6> configure lower layers to perform the sidelink resource allocation scheme 2 based on resource selection operation according to *sl-PosAllowedResourceSelectionConfig* using the pools of

resources indicated by *sl-PosTxPoolSelectedNormal* for the concerned frequency as defined in TS 38.321 [3];

- 5> if *SIB12* includes *sl-TxPoolSelectedNormal* for the concerned frequency, and a result of full 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 scheme 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 *SIB23* includes *sl-PRS-TxPoolExceptional* or *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 sensing, if selected and is allowed by *sl-PosAllowedResourceSelectionConfig*, on the resources configured in *sl-PRS-TxPoolSelectedNormal* or if selected and is allowed by *sl-AllowedResourceSelectionConfig*, on the resources configured in *sl-TxPoolSelectedNormal* for the concerned frequency in *SIB12/SIB23* is not available in accordance with TS 38.214 [19]:
 - 7> configure lower layers to perform the sidelink resource allocation scheme 2 based on random selection (as defined in TS 38.321 [3]) using the pool of resources indicated by *sl-PRS-TxPoolExceptional* or *sl-TxPoolExceptional* for the concerned frequency;

2> else:

- 3> configure lower layers to perform the sidelink resource allocation scheme 2 based on resource selection operation according to *sl-PosAllowedResourceSelectionConfig* (as defined in TS 38.321 [3] and TS 38.214 [19]) using the pools of resources indicated by *sl-PRS-TxPoolSelectedNormal* or *sl-TxPoolSelectedNormal* in *SL-PreconfigurationNR* for the concerned frequency.

NOTE: The same Notes except NOTE 4 as in clause 5.8.8 are applicable for this clause unless otherwise stated.

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 $[x \times N + K]^{\text{th}}$ PDCCH monitoring occasion for MCCH message in MCCH transmission window corresponds to the K^{th} transmitted SSB, where $x = 0, 1, \dots, X-1$, $K = 1, 2, \dots, N$, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to $\text{CEIL}(\text{number of PDCCH monitoring occasions in MCCH transmission window} / N)$. 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

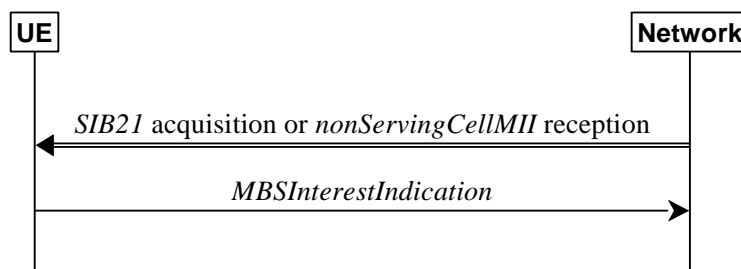


Figure 5.9.4.1-1: MBS Interest Indication

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 reception 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 change to a PCell providing *nonServingCellMII* in *SIB1*, upon starting or stopping reception of MBS broadcast service on a non-serving cell, upon change of CFR information or subcarrier spacing for MBS broadcast reception on a non-

serving cell. If the UE does not have the CFR information and subcarrier spacing for MBS broadcast reception on a non-serving cell at the time it sends the MBS Interest Indication, the UE sends another MBS Interest Indication after it has acquired this information from the non-serving cell.

Upon initiating the procedure, the UE shall:

- 1> if *SIB21* is provided by the PCell; or
 - 1> if *nonServingCellMII* is provided in *SIB1* by the PCell:
 - 2> ensure having a valid version of *SIB21* for the PCell, if present;
 - 2> if the UE did not transmit MBS Interest Indication since last entering RRC_CONNECTED state; or
 - 2> if *SIB21* is provided and since the last time the UE transmitted an MBS Interest Indication to a PCell providing *SIB21*, the UE connected to a PCell, not providing *SIB21*; or
 - 2> if *nonServingCellMII* is provided in *SIB1* and since the last time the UE transmitted an MBS Interest Indication to a PCell providing *nonServingCellMII* in *SIB1*, the UE connected to a PCell not providing *nonServingCellMII* in *SIB1*:
 - 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 set of MBS broadcast frequencies of interest for MBS broadcast reception on non-serving cell, determined in accordance with 5.9.4.3, is different from *freqInfoMBS* included in the last transmission of the MBS Interest Indication; or
 - 3> if any of the subcarrier spacing and the CFR information for MBS broadcast reception on non-serving cell has changed since the last transmission of the MBS Interest Indication; or
 - 3> if the subcarrier spacing and the CFR information for MBS broadcast reception on non-serving cell have been acquired from the non-serving cell which were not reported in the previous 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 or a non-serving cell 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 UE has a valid version of *SIB21* for the PCell; and

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.

1> if *nonServingCellMII* is provided in *SIB1* by the PCell; and

1> if the set of MBS frequencies for MBS broadcast reception on non-serving cell, determined in accordance with 5.9.4.3, is not empty:

2> include *freqInfoMBS*;

2> if the UE has acquired *cfr-InfoMBS* and *subcarrierSpacing* for MBS broadcast reception on the non-serving cell:

3> include *cfr-InfoMBS* and *subcarrierSpacing*.

5.10 MBS multicast reception in RRC_INACTIVE

5.10.1 Introduction

5.10.1.1 General

A UE configured to receive MBS multicast service(s) in RRC_INACTIVE that the UE has joined applies MBS multicast procedures described in this clause.

MBS multicast configuration information is provided in *RRCRelease* and on multicast MCCH logical channel.

When there is temporarily no data for an active multicast session or when the multicast session is deactivated, the network notifies the UE to stop monitoring the corresponding G-RNTI via MBS multicast configuration information. If the UE is notified to stop monitoring the G-RNTI(s) for all the joined multicast sessions, it stops monitoring the Multicast MCCH-RNTI for the cell where it received the notification.

Multicast MCCH carries the *MBSMulticastConfiguration* message which indicates the MBS multicast sessions that are provided in the cell as well as the corresponding scheduling related information for these sessions. Optionally, the *MBSMulticastConfiguration* message may also contain a list of neighbour cells providing the same MBS multicast service(s) for reception in RRC_INACTIVE as provided in the current cell. The configuration information required by the UE to receive multicast MCCH is provided in *SIB24*.

5.10.1.2 Multicast MCCH scheduling

The multicast MCCH information (i.e. information transmitted in messages sent over multicast 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 Multicast MCCH-RNTI. PDCCH monitoring occasion(s) for the multicast MCCH transmission are determined according to the common search space indicated by *searchSpaceMulticastMCCH*. If *searchSpaceMulticastMCCH* is set to zero, PDCCH monitoring occasions for the multicast MCCH message reception in the multicast 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 *searchSpaceMulticastMCCH* is not set to zero, PDCCH monitoring occasions for the multicast MCCH message are determined based on search space indicated by *searchSpaceMulticastMCCH*. PDCCH monitoring occasions for the multicast MCCH message which are not overlapping with UL symbols (determined according to *tdd-UL-DL-ConfigurationCommon*) are sequentially numbered from one in the multicast MCCH transmission window. The $[x \times N + K]^{\text{th}}$ PDCCH monitoring occasion for the multicast MCCH message in the multicast MCCH transmission window corresponds to the K^{th} transmitted SSB, where $x = 0, 1, \dots, X-1$, $K = 1, 2, \dots, N$, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to $\text{CEIL}(\text{number of PDCCH monitoring occasions in multicast MCCH transmission window} / N)$. The actual transmitted SSBs are sequentially numbered from one in ascending order of their SSB indexes. The UE assumes that, in the multicast MCCH transmission window, PDCCH for a multicast 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 of multicast MCCH messages is up to UE implementation.

5.10.1.3 Multicast MCCH information validity and notification of changes

Change of multicast MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same multicast 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 multicast MCCH information, it notifies the UEs about the change starting from the beginning of the multicast MCCH modification period via PDCCH which schedules the multicast MCCH in every repetition in that modification period.

Upon receiving a change notification, a UE receiving MBS multicast service(s) in RRC_INACTIVE acquires the new multicast MCCH information starting from the same slot. The UE applies the previously acquired multicast MCCH information until the UE acquires the new multicast MCCH information.

5.10.2 Multicast MCCH information acquisition

5.10.2.1 General



Figure 5.10.2.1-1: Multicast MCCH information acquisition

The UE applies the multicast MCCH information acquisition procedure to acquire the MBS multicast configuration information from the network. The procedure applies to UEs configured to receive MBS multicast services in RRC_INACTIVE.

5.10.2.2 Initiation

If configured to receive MBS multicast services in RRC_INACTIVE, a UE applies the multicast MCCH information acquisition procedure for PTM configuration update and upon selection or reselection to a new cell providing *SIB24* (except in case the UE is aware that the multicast sessions that the UE has joined are not available for RRC_INACTIVE in the new cell). A UE that is receiving MBS multicast data in RRC_INACTIVE shall apply the multicast MCCH information acquisition procedure upon receiving a notification that the multicast MCCH information has changed.

NOTE: It is up to UE implementation how to address a possibility of the UE missing a multicast MCCH change notification.

Unless explicitly stated otherwise in the procedural specification, the multicast MCCH information acquisition procedure overwrites any stored multicast MCCH information, i.e. delta configuration is not applicable for multicast MCCH information and the UE discontinues using a field if it is absent in multicast MCCH information.

5.10.2.3 Multicast MCCH information acquisition by the UE

A UE configured to receive an MBS multicast service in RRC_INACTIVE shall:

- 1> if the procedure is triggered by a multicast MCCH information change notification:
 - 2> start acquiring the *MBSMulticastConfiguration* message on multicast MCCH in the concerned cell from the slot in which the change notification was received;
- 1> if the UE moves to a different cell providing *SIB24*; or

- 1> if the UE receives *RRCRelease* configuring the UE to receive MBS multicast in *RRC_INACTIVE* which does not include PTM configuration for at least one multicast session for which the UE is not indicated to stop monitoring the G-RNTI:
 - 2> acquire the *MBSMulticastConfiguration* message on multicast MCCH in the concerned cell at the next repetition period.

5.10.2.4 Actions upon reception of the *MBSMulticastConfiguration* message

No UE requirements related to the contents of the *MBSMulticastConfiguration* message apply other than those specified elsewhere, e.g., within the corresponding field descriptions.

5.10.3 MRB configuration

5.10.3.1 General

The multicast MRB configuration procedure is used by the UE in *RRC_INACTIVE* state to configure PDCP, RLC, MAC entities and the physical layer upon PTM configuration update and moving to a cell providing *SIB24*. The UE may perform multicast MRB modification or release/establishment when PTM configuration is updated via multicast MCCH or when it moves to a cell where the PDCP COUNT of the corresponding multicast MRB is not synchronized within the RNA. The UE may perform multicast MRB modification when it moves to a cell where the PDCP COUNT of the corresponding multicast MRB is synchronized within the RNA. The UE resets MAC upon selection or reselection to a new cell.

NOTE: How to perform modification of a multicast MRB which is already configured in the UE is left to UE implementation.

Upon moving to a cell where the PDCP COUNT of a multicast MRB is not synchronized, an indication is sent to the lower layer to inform the PDCP COUNT non-synchronization of the corresponding multicast MRB. Upon transition from *RRC_CONNECTED* to *RRC_INACTIVE* in the same cell, the UE can continue using the multicast MRBs used in *RRC_CONNECTED* and in this case, the same LCIDs are used for the same multicast MRBs. Upon transition from *RRC_INACTIVE* to *RRC_CONNECTED*, the UE releases the MRBs configured in *RRCRelease* or multicast MCCH and performs delta configuration based on the stored MRB configuration from *RRC_CONNECTED*, if not indicated to perform full configuration.

5.10.3.2 Multicast MRB establishment

Upon establishment of a multicast MRB, the UE shall:

- 1> establish a PDCP entity and an RLC entity in accordance with *mrbs-ListMulticast* for this multicast MRB included in the *MBSMulticastConfiguration* message;
- 1> configure the MAC layer in accordance with the *mtch-SchedulingInfo* (if included);
- 1> configure the physical layer in accordance with the *mbs-SessionInfoListMulticast*, *searchSpaceMulticastMTCH*, and *pdsch-ConfigMTCH*, applicable for the multicast 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 *MBSMulticastConfiguration* message was received for the established multicast MRB using *g-RNTI* (if not indicated to stop monitoring this G-RNTI) and *mtch-SchedulingInfo* (if included) in this message for this MBS multicast service.

5.10.3.3 Multicast MRB release

Upon release of a multicast MRB, 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.

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	<i>Specified</i> 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	<i>Maintain</i> 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	<i>No action</i> (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	<i>Release</i> 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 ::=
    field1
    field2
    nonCriticalExtension
}
SEQUENCE {
    InformationElement1
    InformationElement2
    RRCMessage-v1570-IEs
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL

RRCMessage-1570-IEs ::=
    field3
    nonCriticalExtension
}
SEQUENCE {
    InformationElement3
    RRCMessage-v1640-IEs
OPTIONAL, -- Need M
OPTIONAL

RRCMessage-v1640-IEs ::=
    field4
    nonCriticalExtension
}
SEQUENCE {
    InformationElement4
    SEQUENCE {}
OPTIONAL, -- Need R
OPTIONAL

InformationElement1 ::=
    field10
    field11
    field12
    ...
    [[
    field13
    field14
    ]]
}
SEQUENCE {
    InformationElement10
    InformationElement11
    InformationElement12
    InformationElement13
    InformationElement14
OPTIONAL, -- Need N
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need M

InformationElement2 ::=
    field21
    ...
}
SEQUENCE {
    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          RRReject,

```

```

        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 {
        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

```

– *MulticastMCCH-Message*

The *MulticastMCCH-Message* class is the set of RRC messages that may be sent from the network to the UE on the multicast MCCH logical channel.

```

-- ASN1START
-- TAG-MULTICASTMCCH-MESSAGE-START
MulticastMCCH-Message-r18 ::= SEQUENCE {
  message          MulticastMCCH-MessageType-r18
}
MulticastMCCH-MessageType-r18 ::= CHOICE {
  c1                CHOICE {
    mbsMulticastConfiguration-r18  MBSMulticastConfiguration-r18,
    spare1                          NULL
  },
  messageClassExtension SEQUENCE {}
}
-- TAG-MULTICASTMCCH-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
        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,
        indirectPathFailureInformation-r18 IndirectPathFailureInformation-r18, 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 ::=
    rrc-TransactionIdentifier      SEQUENCE {
        criticalExtensions          CHOICE {
            counterCheck            CounterCheck-IEs,
            criticalExtensionsFuture SEQUENCE {}
        }
    }

CounterCheck-IEs ::=
    drb-CountMSB-InfoList          SEQUENCE {
        lateNonCriticalExtension    OCTET STRING OPTIONAL,
        nonCriticalExtension        SEQUENCE {}          OPTIONAL
    }

DRB-CountMSB-InfoList ::=
    SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info

DRB-CountMSB-Info ::=
    drb-Identity                    SEQUENCE {
        countMSB-Uplink              INTEGER(0..33554431),
        countMSB-Downlink            INTEGER(0..33554431)
    }

-- TAG-COUNTERCHECK-STOP
-- ASN1STOP
```

<i>CounterCheck-IEs field descriptions</i>
<i>drb-CountMSB-InfoList</i> Indicates the MSBs of the COUNT values of the DRBs.

<i>DRB-CountMSB-Info field descriptions</i>
<i>countMSB-Downlink</i> Indicates the value of 25 MSBs from RX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.
<i>countMSB-Uplink</i> 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

```

<i>CounterCheckResponse-IEs</i> field descriptions
--

<i>drb-CountInfoList</i>

Indicates the COUNT values of the DRBs.

<i>DRB-CountInfo</i> field descriptions

<i>count-Downlink</i>

Indicates the value of RX_NEXT – 1 (specified in TS 38.323 [5]) associated to this DRB.

<i>count-Uplink</i>

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, sib23-v1810, 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, posSibType1-11-v1800, posSibType1-12-v1800,
        posSibType2-26-v1800, posSibType2-27-v1800, posSibType6-7-v1800, posSibType7-1-v1800,
        posSibType7-2-v1800, posSibType7-3-v1800, posSibType7-4-v1800 }
    }

-- 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*.

– **DL DedicatedMessageSegment**

The *DL DedicatedMessageSegment* 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
        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**

<i>segmentNumber</i>	Identifies the sequence number of a segment within the encoded DL DCCH message. The network transmits the segments with continuously increasing <i>segmentNumber</i> 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.
<i>rrc-MessageSegmentContainer</i>	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.
<i>rrc-MessageSegmentType</i>	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 {
    dedicatedInfoFlc-r17 DedicatedInfoFlc-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 DLInformationTransfer-v1800-IEs OPTIONAL
}

DLInformationTransfer-v1800-IEs ::= SEQUENCE {
    eventID-TSS-r18 INTEGER(0..63) OPTIONAL, -- Cond ClockQualityDetailsLevel
    clockQualityDetailsLevel-r18 CHOICE {
        clockQualityMetrics-r18 ClockQualityMetrics-r18,
        clockQualityAcceptanceStatus-r18 ENUMERATED {acceptable, notAcceptable}
    } OPTIONAL, -- Need N
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- TAG-DLINFORMATIONTRANSFER-STOP
-- ASN1STOP

```

DLInformationTransfer field descriptions	
clockQualityDetailsLevel	This field indicates the clock quality reporting control information as defined in TS 23.501 [32].
eventID-TSS	This field indicates the status of the 5G access stratum time distribution parameter Clock Quality Reporting Control Information as defined in TS 23.501 [32].
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 <i>ta-PDC</i> with value <i>activate</i> .
sib9Fallback	Indicates that the UE fallbacks to receive <i>referenceTimeInfo</i> 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 <i>activate</i> , if the field <i>rxTxTimeDiff-gNB</i> is configured.

Conditional Presence	Explanation
ClockQualityDetailsLevel	Field <i>eventID-TSS</i> is mandatory present if <i>clockQualityDetailsLevel</i> is present. Otherwise, the field is optionally present, Need M.

– 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,
        ...
    }
},
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,
        ...
    }
},
...
},
lateNonCriticalExtension  OCTET STRING          OPTIONAL,
nonCriticalExtension      SEQUENCE {}          OPTIONAL
}

IAB-IP-AddressNumReq-r16 ::= SEQUENCE {
    all-Traffic-NumReq-r16      INTEGER (1..8)          OPTIONAL,
    fl-C-Traffic-NumReq-r16     INTEGER (1..8)          OPTIONAL,
    fl-U-Traffic-NumReq-r16     INTEGER (1..8)          OPTIONAL,
    non-Fl-Traffic-NumReq-r16   INTEGER (1..8)          OPTIONAL,
    ...
}

IAB-IP-AddressPrefixReq-r16 ::= SEQUENCE {
    all-Traffic-PrefixReq-r16   ENUMERATED {true}        OPTIONAL,
    fl-C-Traffic-PrefixReq-r16  ENUMERATED {true}        OPTIONAL,
    fl-U-Traffic-PrefixReq-r16  ENUMERATED {true}        OPTIONAL,
    non-Fl-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,
    fl-C-Traffic-IP-Address-r16     SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16  OPTIONAL,
    fl-U-Traffic-IP-Address-r16     SEQUENCE (SIZE(1..8)) OF IAB-IP-Address-r16  OPTIONAL,
    non-Fl-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,
    fl-C-Traffic-IP-Address-r16    IAB-IP-Address-r16          OPTIONAL,
    fl-U-Traffic-IP-Address-r16    IAB-IP-Address-r16          OPTIONAL,
    non-Fl-Traffic-IP-Address-r16  IAB-IP-Address-r16          OPTIONAL
}

-- TAG-IABOTHERINFORMATION-STOP
-- ASN1STOP

```

<i>IABOtherInformation-IEs field descriptions</i>
<i>iab-IPv4-AddressNumReq</i> 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.
<i>iab-IPv4-AddressReport</i> 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.
<i>iab-IPv6-AddressNumReq</i> 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.
<i>iab-IPv6-AddressPrefixReq</i> 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.
<i>iab-IPv6-AddressReport</i> 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.
<i>iab-IPv6-PrefixReport</i> 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.

<i>IAB-IP-AddressNumReq-IEs field descriptions</i>
<i>all-Traffic-NumReq</i> This field is used to request the numbers of IP address for all traffic.
<i>f1-C-Traffic-NumReq</i> This field is used to request the numbers of IP address for F1-C traffic.
<i>f1-U-Traffic-NumReq</i> This field is used to request the numbers of IP address for F1-U traffic.
<i>non-F1-Traffic-NumReq</i> This field is used to request the numbers of IP address for non-F1 traffic.

<i>IAB-IP-AddressPrefixReq-IEs field descriptions</i>
<i>all-Traffic-PrefixReq</i> This field is used to request the IPv6 address prefix for all traffic. The length of allocated IPv6 prefix is fixed to 64.
<i>f1-C-Traffic-PrefixReq</i> This field is used to request the IPv6 address prefix for F1-C traffic. The length of allocated IPv6 prefix is fixed to 64.
<i>f1-U-Traffic-PrefixReq</i> This field is used to request the IPv6 address prefix for F1-U traffic. The length of allocated IPv6 prefix is fixed to 64.
<i>non-F1-Traffic-PrefixReq</i> This field is used to request the IPv6 address prefix for non-F1 traffic. The length of allocated IPv6 prefix is fixed to 64.

<i>IAB-IP-AddressAndTraffic-IEs field descriptions</i>
<i>all-Traffic-IAB-IP-Address</i> This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for all traffic.
<i>f1-C-Traffic-IP-Address</i> This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-C traffic.
<i>f1-U-Traffic-IP-Address</i> This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for F1-U traffic.
<i>non-F1-Traffic-IP-Address</i> This field is used to report to IAB-donor-CU the IP address(es) or IPv6 address prefix for non-F1 traffic.

– *IndirectPathFailureInformation*

The *IndirectPathFailureInformation* message is used to provide information regarding indirect path failure detected by the MP remote UE.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to Network

***IndirectPathFailureInformation* message**

```
-- ASN1START
-- TAG-INDIRECTPATHFAILUREINFORMATION-START

IndirectPathFailureInformation-r18 ::=
    criticalExtensions
        indirectPathFailureInformation-r18
        criticalExtensionsFuture
    }

IndirectPathFailureInformation-r18-IEs ::=
    failureReportIndirectPath-r18                OPTIONAL,
    lateNonCriticalExtension                      OPTIONAL,
    nonCriticalExtension                          SEQUENCE {} OPTIONAL

FailureReportIndirectPath-r18 ::=
    failureTypeIndirectPath-r18
        SEQUENCE {
            ENUMERATED {t421-Expiry,s1-Failure,n3c-Failure, relayUE-Uu-RLF,
                relayUE-CellReselection, relayUE-Uu-RRC-Failure,
                indirectPathAddChangeFailure, spare1} OPTIONAL,
            s1-MeasResultServingRelay-r18         OPTIONAL,
            s1-MeasResultsCandRelay-r18          OPTIONAL,
            n3c-RelayUE-InfoList-r18             SEQUENCE (SIZE (0..8)) OF N3C-RelayUE-Info-r18 OPTIONAL,
        }
-- Contains PC5 SL-MeasResultRelay-r17
```

```

}
...
-- TAG-INDIRECTPATHFAILUREINFORMATION-STOP
-- ASN1STOP

```

<i>IndirectPathFailureInformation</i> field descriptions
<i>failureTypeIndirectPath</i> The field indicates the failure type of the indirect path failure.
<i>n3c-RelayUE-InfoList</i> Information of available N3C relay UE(s).
<i>si-MeasResultsCandRelay</i> Measurement result(s) of candidate L2 U2N relay UE(s).
<i>si-MeasResultServingRelay</i> Measurement result of serving L2 U2N relay UE.

– *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
        }
    }

LocationMeasurementIndication-IEs ::=
    SEQUENCE {
        measurementIndication
        lateNonCriticalExtension
        nonCriticalExtension
    }
    OPTIONAL,
    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           LoggedMeasurementConfiguration-v1800-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1800-IEs ::= SEQUENCE {
    areaConfiguration-v1800          AreaConfiguration-v1800          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 any of the included cell identities, the included tracking area codes/ frequencies, the included PNI-NPN identities or the SNPN identities. If <i>areaConfiguration-r17</i> is present, the UE shall ignore <i>areaConfiguration-r16</i> . The <i>areaConfiguration-v1800</i> is a non-critical extension of <i>areaConfiguration-r17</i> .
earlyMeasIndication If included, the field indicates the UE is allowed to log measurements on early measurement related frequencies in logged measurements.
eventType The value <i>outOfCoverage</i> indicates the UE to perform logging of measurements when the UE enters any cell selection state, and the value <i>eventL1</i> 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 Triggered 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       MBSInterestIndication-v1800      OPTIONAL
}

MBSInterestIndication-v1800 ::= SEQUENCE {
    mbs-NonServingInfoList-r18 MBS-NonServingInfoList-r18      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-NonServingInfoList

Indicates information for MBS broadcast reception on the non-serving cell.

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-FreqList*, 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.

– MBSMulticastConfiguration

The *MBSMulticastConfiguration* message contains the control information applicable for MBS multicast services transmitted via multicast MRBs for RRC_INACTIVE UEs.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: multicast MCCH

Direction: Network to UE

MBSMulticastConfiguration message

```

-- ASN1START
-- TAG-MBSMULTICASTCONFIGURATION-START

MBSMulticastConfiguration-r18 ::= SEQUENCE {
    criticalExtensions          CHOICE {
        mbsMulticastConfiguration-r18    MBSMulticastConfiguration-r18-IEs,
        criticalExtensionsFuture          SEQUENCE {}
    }
}

MBSMulticastConfiguration-r18-IEs ::= SEQUENCE {
    mbs-SessionInfoListMulticast-r18    MBS-SessionInfoListMulticast-r18          OPTIONAL, -- Need R
    mbs-NeighbourCellList-r18           MBS-NeighbourCellList-r17                OPTIONAL, -- Need S
    drx-ConfigPTM-List-r18              SEQUENCE (SIZE (1..maxNrofDRX-ConfigPTM-r17)) OF DRX-ConfigPTM-r17  OPTIONAL, -- Need R
    pdsch-ConfigMTCH-r18                PDSCH-ConfigBroadcast-r17                OPTIONAL, -- Need S
    mtch-SSB-MappingWindowList-r18      MTCH-SSB-MappingWindowList-r17          OPTIONAL, -- Need R
    thresholdMBS-List-r18                SEQUENCE (SIZE (1..maxNrofThresholdMBS-r18)) OF ThresholdMBS-r18          OPTIONAL, -- Need R
    lateNonCriticalExtension             OCTET STRING                             OPTIONAL,
    nonCriticalExtension                 SEQUENCE {}                             OPTIONAL
}

ThresholdMBS-r18 ::= SEQUENCE {
    rsrp-r18                            RSRP-Range                                OPTIONAL, -- Need R
    rsrq-r18                            RSRQ-Range                                OPTIONAL, -- Need R
}

-- TAG-MBSMULTICASTCONFIGURATION-STOP
-- ASN1STOP

```

MBSMulticastConfiguration field descriptions***mbs-NeighbourCellList***

List of neighbour cells providing one or more MBS multicast services for RRC_INACTIVE 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 multicast services signalled in *mbs-SessionInfoListMulticast* in the *MBSMulticastConfiguration* 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 multicast 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 multicast 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 multicast services in the neighbouring cells, i.e. the UE cannot determine the presence or absence of an MBS multicast service in neighbouring cells based on the absence of this field.

mbs-SessionInfoListMulticast

Provides the configuration of MBS multicast session(s) in the current cell.

pdsch-ConfigMTCH

Provides parameters for acquiring the PDSCH for MTCH. When this field is absent, the UE shall use parameters in *pdsch-ConfigMCCH* in *SIB24* to acquire the PDSCH for MTCH.

thresholdMBS-List

List of reception quality thresholds for RRC connection resume for a UE receiving multicast in RRC_INACTIVE.

– *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}
    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

<i>MCGFailureInformation</i> field descriptions	
<i>measResultFreqList</i>	The field contains available results of measurements on NR frequencies the UE is configured to measure by the <i>measConfig</i> associated with the MCG.
<i>measResultFreqListEUTRA</i>	The field contains available results of measurements on E-UTRA frequencies the UE is configured to measure by <i>measConfig</i> associated with the MCG.
<i>measResultFreqListUTRA-FDD</i>	The field contains available results of measurements on UTRA FDD frequencies the UE is configured to measure by <i>measConfig</i> associated with the MCG.
<i>measResultSCG</i>	The field contains the <i>MeasResultSCG-Failure</i> IE which includes available measurement results on NR frequencies the UE is configured to measure by the <i>measConfig</i> associated with the SCG.
<i>measResultSCG-EUTRA</i>	The field contains the EUTRA <i>MeasResultSCG-FailureMRDC</i> IE which includes available results of measurements on E-UTRA frequencies the UE is configured to measure by the E-UTRA <i>RRCCONNECTIONRECONFIGURATION</i> 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 ::=
    criticalExtensions
        measurementReport
        criticalExtensionsFuture
    }
}

MeasurementReport-IEs ::=
    measResults
    lateNonCriticalExtension
    nonCriticalExtension
}

SEQUENCE {
    CHOICE {
        MeasurementReport-IEs,
        SEQUENCE {}
    }
}

SEQUENCE {
    MeasResults,
    OCTET STRING
    SEQUENCE{}
}
OPTIONAL,
OPTIONAL

```

```
-- TAG-MEASUREMENTREPORT-STOP
-- ASN1STOP
```

– *MeasurementReportAppLayer*

The *MeasurementReportAppLayer* message is used for sending application layer measurement report.

Signalling radio bearer: SRB4, SRB5

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                    MeasurementReportAppLayer-v1800-IEs OPTIONAL
}

MeasurementReportAppLayer-v1800-IEs ::= SEQUENCE {
    measurementReportAppLayerList-v1800    MeasurementReportAppLayerList-v1800 OPTIONAL,
    nonCriticalExtension                    SEQUENCE{} OPTIONAL
}

MeasurementReportAppLayerList-r17 ::= SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasReportAppLayer-r17

MeasurementReportAppLayerList-v1800 ::= SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF MeasReportAppLayer-v1800

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
}

```

```

MeasReportAppLayer-v1800 ::= SEQUENCE {
    appLayerIdleInactiveConfig-r18 AppLayerIdleInactiveConfig-r18 OPTIONAL,
    measReportAppLayerContainerList-r18 SEQUENCE (SIZE (1..maxNrofAppLayerReports-r18)) OF OCTET STRING 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,
    ...
    [[
        pdu-SessionIdListExt-v1800 SEQUENCE (SIZE (1..maxNrofPDU-Sessions-r17)) OF QFI-List-r18 OPTIONAL
    ]]
}

AppLayerBufferLevel-r17 ::= INTEGER (0..30000)

QFI-List-r18 ::= SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI

-- TAG-MEASUREMENTREPORTAPPLAYER-STOP
-- ASN1STOP

```

MeasurementReportAppLayer field descriptions

measurementReportAppLayerList

The field contains a list of application layer measurement reports. If *measurementReportAppLayerList-r18* is present, it contains the same number of entries, listed in the same order as in *measurementReportAppLayerList-r17*.

MeasReportAppLayer field descriptions

appLayerSessionStatus

Indicates that an application layer measurement session in the application layer starts or ends. For application layer measurements applicable to RRC_IDLE or RRC_INACTIVE, the UE transmits *appLayerSessionStatus* upon transfer to RRC_CONNECTED if *transmissionOfSessionStartStop* is set to *true* for the application layer measurement configuration.

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].

measReportAppLayerContainerList

The field contains a list of application layer measurement report containers for each *measConfigAppLayerId*, 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

List of PDU session identities and QoS flow identities per PDU session associated with the application data flows subject to the RAN visible application layer measurements. If *pdu-SessionIdListExt-v1800* is present, it contains the same number of entries, listed in the same order as in *pdu-SessionIdList-r17*.

– **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 ::=
    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
<p>cellBarred Value <i>barred</i> means that the cell is barred, as defined in TS 38.304 [20]. This field is ignored by IAB-MT and NCR-MT. This field is ignored for connectivity to NTN or ATG.</p>
<p>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).</p>
<p>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 and NCR-MT.</p>
<p>pdccch-ConfigSIB1 Determines a common <i>ControlResourceSet</i> (CORESET), a common search space and necessary PDCCH parameters. If the field <i>ssb-SubcarrierOffset</i> indicates that <i>SIB1</i> is absent, the field <i>pdccch-ConfigSIB1</i> indicates the frequency positions where the UE may find SS/PBCH block with <i>SIB1</i> or the frequency range where the network does not provide SS/PBCH block with <i>SIB1</i> (see TS 38.213 [13], clause 13).</p>
<p>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 (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 <i>SIB1</i> and that there is hence no CORESET#0 configured in <i>MIB</i> (see TS 38.213 [13], clause 13). In this case, the field <i>pdccch-ConfigSIB1</i> may indicate the frequency positions where the UE may (not) find a SS/PBCH with a control resource set and search space for <i>SIB1</i> (see TS 38.213 [13], clause 13).</p>
<p>subCarrierSpacingCommon Subcarrier spacing for <i>SIB1</i>, Msg.2/4 and MsgB for initial access, paging and broadcast SI-messages. If the UE acquires this <i>MIB</i> on an FR1 carrier frequency, the value <i>scs15or60</i> corresponds to 15 kHz and the value <i>scs30or120</i> corresponds to 30 kHz. If the UE acquires this <i>MIB</i> on an FR2 carrier frequency, the value <i>scs15or60</i> corresponds to 60 kHz and the value <i>scs30or120</i> 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 <i>SIB1</i>, 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.</p>
<p>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 <i>MIB</i> encoding), as defined in clause 7.1 in TS 38.212 [17].</p>

– *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 ::=
    rrc-TransactionIdentifier      SEQUENCE {
    criticalExtensions             CHOICE {
        mobilityFromNRCommand    MobilityFromNRCommand-IEs,
        criticalExtensionsFuture SEQUENCE {}
    }
}

MobilityFromNRCommand-IEs ::=
    targetRAT-Type                ENUMERATED { eutra, ultra-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 ::=
    voiceFallbackIndication-r16   ENUMERATED {true}                                OPTIONAL, -- Need N
    nonCriticalExtension           MobilityFromNRCommand-v1800-IEs          OPTIONAL
}

MobilityFromNRCommand-v1800-IEs ::=
    successHO-Config-r18          SetupRelease {SuccessHO-Config-r17}          OPTIONAL,
    nonCriticalExtension           SEQUENCE {}                                OPTIONAL
}

-- TAG-MOBILITYFROMNRCOMMAND-STOP
-- ASN1STOP

```

MobilityFromNRCommand-IEs field descriptions	
nas-SecurityParamFromNR	If <i>targetRAT-Type</i> is <i>eutra</i> , 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 <i>targetRAT-Type</i> is <i>utra-fdd</i> , 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 <i>targetRAT-Type</i> , 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
<i>eutra</i>	TS 36.331 [10] (clause 5.4.2)	<i>DL-DCCH-Message</i> including the <i>RRCConnectionReconfiguration</i>
<i>utra-fdd</i>	TS 25.331 [45] (clause 10.2.16a)	<i>Handover TO UTRAN command</i>

Conditional Presence	Explanation
<i>HO-ToEPCUTRAN</i>	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 ::=
    pagingRecordList          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    Paging-v1800-IEs        OPTIONAL
    }

Paging-v1800-IEs ::=
    SEQUENCE {
        pagingRecordList-v1800 PagingRecordList-v1800  OPTIONAL, -- Need N
        pagingGroupList-v1800  PagingGroupList-v1800  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
```

```

PagingRecordList-v1800 ::= SEQUENCE (SIZE(1..maxNrofPageRec)) OF PagingRecord-v1800
PagingGroupList-v1800 ::= SEQUENCE (SIZE(1..maxNrofPageGroup-r17)) OF GroupPaging-r18
PagingRecord ::= SEQUENCE {
    ue-Identity          PagingUE-Identity,
    accessType          ENUMERATED {non3GPP} OPTIONAL, -- Need N
    ...
}
PagingRecord-v1700 ::= SEQUENCE {
    pagingCause-r17     ENUMERATED {voice} OPTIONAL -- Need N
}
PagingRecord-v1800 ::= SEQUENCE {
    mt-SDT              ENUMERATED {true} OPTIONAL -- Need N
}
PagingUE-Identity ::= CHOICE {
    ng-5G-S-TMSI       NG-5G-S-TMSI,
    fullI-RNTI         I-RNTI-Value,
    ...
}
GroupPaging-r18 ::= SEQUENCE {
    inactiveReceptionAllowed-r18 ENUMERATED {true} OPTIONAL -- Need N
}
-- TAG-PAGING-STOP
-- ASN1STOP

```

PagingRecord field descriptions	
accessType	Indicates whether the <i>Paging</i> message is originated due to the PDU sessions from the non-3GPP access.
inactiveReceptionAllowed	Indicates whether the UE with a valid PTM configuration for a <i>TMGI</i> in the <i>PagingGroupList</i> stays in RRC_INACTIVE to receive the corresponding MBS multicast session.
mt-SDT	Mobile Terminated SDT indication. The network includes <i>mt-SDT</i> indication in paging message only if the UE's I-RNTI is included in the paging message.
pagingRecordList	If the network includes <i>pagingRecordList-v1700</i> , it includes the same number of entries, and listed in the same order, as in <i>pagingRecordList</i> (i.e. without suffix). If the network includes <i>pagingRecordList-v1800</i> , it includes the same number of entries, and listed in the same order, as in <i>pagingRecordList</i> (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 <i>pagingRecordList-v1700</i> is present, it implies that the corresponding paging entry is for a service other than IMS voice. Otherwise, paging cause is undetermined.
pagingGroupList	If the network includes <i>pagingGroupList-v1800</i> , it includes the same number of elements, and listed in the same order, as in <i>pagingGroupList-r17</i> . The first element corresponds to the first TMGI in <i>pagingGroupList-r17</i> . The second element corresponds to the second TMGI in <i>pagingGroupList-r17</i> , and so on.

– *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 ::=
  rrc-TransactionIdentifier      SEQUENCE {
    criticalExtensions            RRC-TransactionIdentifier,
    rrcReestablishment           CHOICE {
      criticalExtensionsFuture   RRCReestablishment-IEs,
    }
  }

RRCReestablishment-IEs ::=
  nextHopChainingCount          SEQUENCE {
    lateNonCriticalExtension     OCTET STRING OPTIONAL,
    nonCriticalExtension         RRCReestablishment-v1700-IEs OPTIONAL
  }

RRCReestablishment-v1700-IEs ::=
  sl-L2RemoteUE-Config-r17     SEQUENCE {
    nonCriticalExtension         SetupRelease {SL-L2RemoteUE-Config-r17} OPTIONAL, -- Cond L2RemoteUE
  }

-- 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
<i>L2RemoteUE</i>	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 ::=
    rrc-TransactionIdentifier          SEQUENCE {
        criticalExtensions             CHOICE {
            rrcReestablishmentComplete RRCReestablishmentComplete-IEs,
            criticalExtensionsFuture    SEQUENCE {}
        }
    }

RRCReestablishmentComplete-IEs ::=
    lateNonCriticalExtension           SEQUENCE {
        nonCriticalExtension           OCTET STRING OPTIONAL,
                                       RRCReestablishmentComplete-v1610-IEs OPTIONAL
    }

RRCReestablishmentComplete-v1610-IEs ::=
    ue-MeasurementsAvailable-r16      SEQUENCE {
        nonCriticalExtension           UE-MeasurementsAvailable-r16 OPTIONAL,
                                       RRCReestablishmentComplete-v1800-IEs OPTIONAL
    }

RRCReestablishmentComplete-v1800-IEs ::=
    flightPathInfoAvailable-r18       SEQUENCE {
        measConfigReportAppLayerAvailable-r18 ENUMERATED {true} OPTIONAL,
        nonCriticalExtension           ENUMERATED {true} OPTIONAL,
                                       SEQUENCE {} OPTIONAL
    }

-- TAG-RRCREESTABLISHMENTCOMPLETE-STOP
-- ASN1STOP
```

RRCReestablishmentComplete-IEs field descriptions

measConfigReportAppLayerAvailable

Indication that the UE has at least one application layer measurement configuration with *appLayerIdleInactiveConfig* configured.

– *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 ::=
    rrc-TransactionIdentifier
    criticalExtensions
        rrcReconfiguration
        criticalExtensionsFuture
    }

RRCReconfiguration-IEs ::=
    radioBearerConfig
    secondaryCellGroup
    measConfig
    lateNonCriticalExtension
    nonCriticalExtension

RRCReconfiguration-v1530-IEs ::=
    masterCellGroup
    fullConfig
    dedicatedNAS-MessageList
    masterKeyUpdate
    MasterKeyChange
    dedicatedSIB1-Delivery
    dedicatedSystemInformationDelivery

SEQUENCE {
    RRC-TransactionIdentifier,
    CHOICE {
        RRCReconfiguration-IEs,
        SEQUENCE {}
    }
}

SEQUENCE {
    RadioBearerConfig
    OCTET STRING (CONTAINING CellGroupConfig)
    MeasConfig
    OCTET STRING
    RRCReconfiguration-v1530-IEs
    OPTIONAL, -- Need M
    OPTIONAL, -- Cond SCG
    OPTIONAL, -- Need M
    OPTIONAL,
    OPTIONAL
}

SEQUENCE {
    OCTET STRING (CONTAINING CellGroupConfig)
    ENUMERATED {true}
    SEQUENCE (SIZE(1..maxDRB)) OF DedicatedNAS-Message
    MasterKeyUpdate
    OPTIONAL, -- Need M
    OPTIONAL, -- Cond FullConfig
    OPTIONAL, -- Cond nonHO
    OPTIONAL, -- Cond
}

OCTET STRING (CONTAINING SIB1)
OCTET STRING (CONTAINING SystemInformation)
OPTIONAL, -- Need N
OPTIONAL, -- Need N
```

<pre> otherConfig nonCriticalExtension } </pre>	<pre> OtherConfig RRCReconfiguration-v1540-IEs </pre>	<pre> OPTIONAL, -- Need M OPTIONAL </pre>
<pre> RRCReconfiguration-v1540-IEs ::= otherConfig-v1540 nonCriticalExtension } </pre>	<pre> SEQUENCE { OtherConfig-v1540 RRCReconfiguration-v1560-IEs </pre>	<pre> OPTIONAL, -- Need M OPTIONAL </pre>
<pre> RRCReconfiguration-v1560-IEs ::= mrdc-SecondaryCellGroupConfig radioBearerConfig2 sk-Counter nonCriticalExtension } </pre>	<pre> SEQUENCE { SetupRelease { MRDC-SecondaryCellGroupConfig } OCTET STRING (CONTAINING RadioBearerConfig) SK-Counter RRCReconfiguration-v1610-IEs </pre>	<pre> OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need N OPTIONAL </pre>
<pre> RRCReconfiguration-v1610-IEs ::= otherConfig-v1610 bap-Config-r16 iab-IP-AddressConfigurationList-r16 conditionalReconfiguration-r16 daps-SourceRelease-r16 t316-r16 needForGapsConfigNR-r16 onDemandSIB-Request-r16 dedicatedPosSysInfoDelivery-r16 sl-ConfigDedicatedNR-r16 sl-ConfigDedicatedEUTRA-Info-r16 targetCellSMTC-SCG-r16 nonCriticalExtension } </pre>	<pre> SEQUENCE { OtherConfig-v1610 SetupRelease { BAP-Config-r16 } IAB-IP-AddressConfigurationList-r16 ConditionalReconfiguration-r16 ENUMERATED{true} SetupRelease {T316-r16} SetupRelease {NeedForGapsConfigNR-r16} SetupRelease { OnDemandSIB-Request-r16 } OCTET STRING (CONTAINING PosSystemInformation-r16-IEs) SetupRelease {SL-ConfigDedicatedNR-r16} SetupRelease {SL-ConfigDedicatedEUTRA-Info-r16} SSB-MTC RRCReconfiguration-v1700-IEs </pre>	<pre> OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need N OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need S OPTIONAL </pre>
<pre> RRCReconfiguration-v1700-IEs ::= otherConfig-v1700 sl-L2RelayUE-Config-r17 sl-L2RemoteUE-Config-r17 dedicatedPagingDelivery-r17 needForGapNCSG-ConfigNR-r17 needForGapNCSG-ConfigEUTRA-r17 musim-GapConfig-r17 ul-GapFR2-Config-r17 scg-State-r17 appLayerMeasConfig-r17 ue-TxTEG-RequestUL-TDOA-Config-r17 nonCriticalExtension } </pre>	<pre> SEQUENCE { OtherConfig-v1700 SetupRelease { SL-L2RelayUE-Config-r17 } SetupRelease { SL-L2RemoteUE-Config-r17 } OCTET STRING (CONTAINING Paging) SetupRelease {NeedForGapNCSG-ConfigNR-r17} SetupRelease {NeedForGapNCSG-ConfigEUTRA-r17} SetupRelease {MUSIM-GapConfig-r17} SetupRelease { UL-GapFR2-Config-r17 } ENUMERATED { deactivated } AppLayerMeasConfig-r17 SetupRelease {UE-TxTEG-RequestUL-TDOA-Config-r17} RRCReconfiguration-v1800-IEs </pre>	<pre> OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Cond PagingRelay OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL </pre>
<pre> RRCReconfiguration-v1800-IEs ::= needForInterruptionConfigNR-r18 aerial-Config-r18 sl-IndirectPathAddChange-r18 n3c-IndirectPathAddChange-r18 n3c-IndirectPathConfigRelay-r18 otherConfig-v1800 srs-PosResourceSetLinkedForAggBWLList-r18 </pre>	<pre> SEQUENCE { ENUMERATED { disabled, enabled } SetupRelease { Aerial-Config-r18 } SetupRelease { SL-IndirectPathAddChange-r18 } SetupRelease { N3C-IndirectPathAddChange-r18 } SetupRelease { N3C-IndirectPathConfigRelay-r18 } OtherConfig-v1800 SetupRelease { SRS-PosResourceSetLinkedForAggBWLList-r18 } </pre>	<pre> OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M OPTIONAL, -- Need M </pre>

```

    ltm-Config-r18
    nonCriticalExtension
}
SetupRelease {LTM-Config-r18}
SEQUENCE {}
OPTIONAL, -- Need M
OPTIONAL

MRDC-SecondaryCellGroupConfig ::=
    mrdc-ReleaseAndAdd
    mrdc-SecondaryCellGroup
        nr-SCG
        eutra-SCG
}
SEQUENCE {
    ENUMERATED {true}
    CHOICE {
        OCTET STRING (CONTAINING RRCReconfiguration),
        OCTET STRING
    }
}
OPTIONAL, -- Need N

BAP-Config-r16 ::=
    bap-Address-r16
    defaultUL-BAP-RoutingID-r16
    defaultUL-BH-RLC-Channel-r16
    flowControlFeedbackType-r16
    ...
}
SEQUENCE {
    BIT STRING (SIZE (10))
    BAP-RoutingID-r16
    BH-RLC-ChannelID-r16
    ENUMERATED {perBH-RLC-Channel, perRoutingID, both}
}
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need R

MasterKeyUpdate ::=
    keySetChangeIndicator
    nextHopChainingCount
    nas-Container
    ...
}
SEQUENCE {
    BOOLEAN,
    NextHopChainingCount,
    OCTET STRING
}
OPTIONAL, -- Cond securityNASC

OnDemandSIB-Request-r16 ::=
    onDemandSIB-RequestProhibitTimer-r16
}
SEQUENCE {
    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 ::=
    iab-IP-AddressToAddModList-r16
    iab-IP-AddressToReleaseList-r16
    ...
}
SEQUENCE {
    SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressConfiguration-r16
    SEQUENCE (SIZE(1..maxIAB-IP-Address-r16)) OF IAB-IP-AddressIndex-r16
}
OPTIONAL, -- Need N
OPTIONAL, -- Need N

IAB-IP-AddressConfiguration-r16 ::=
    iab-IP-AddressIndex-r16
    iab-IP-Address-r16
    iab-IP-Usage-r16
    iab-donor-DU-BAP-Address-r16
    ...
}
SEQUENCE {
    IAB-IP-AddressIndex-r16,
    IAB-IP-Address-r16
    IAB-IP-Usage-r16
    BIT STRING (SIZE(10))
}
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M

SL-ConfigDedicatedEUTRA-Info-r16 ::=
    sl-ConfigDedicatedEUTRA-r16
    sl-TimeOffsetEUTRA-List-r16
}
SEQUENCE {
    OCTET STRING
    SEQUENCE (SIZE (8)) OF SL-TimeOffsetEUTRA-r16
}
OPTIONAL, -- Need M
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 }
}

SRS-PosResourceSetLinkedForAggBWLst-r18 ::= SEQUENCE (SIZE(1..maxNrOfLinkedSRS-PosResourceSet-r18)) OF SRS-PosResourceSetLinkedForAggBW-r18

-- TAG-RRCRECONFIGURATION-STOP
-- ASN1STOP
```

<i>RRCReconfiguration-IEs field descriptions</i>
<p><i>appLayerMeasConfig</i> 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 <i>sl-L2RemoteUE-Config-r17</i> is configured or not released.</p>
<p><i>bap-Config</i> This field is used to configure the BAP entity for IAB nodes.</p>
<p><i>bap-Address</i> 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.</p>
<p><i>conditionalReconfiguration</i> 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 <i>masterCellGroup</i> includes <i>ReconfigurationWithSync</i> or if the <i>sl-L2RemoteUE-Config</i> or <i>sl-L2RelayUE-Config</i> is configured. For conditional PSCell change, the field is absent if the <i>secondaryCellGroup</i> includes <i>ReconfigurationWithSync</i>. The <i>RRCReconfiguration</i> message contained in <i>DLInformationTransferMRDC</i> cannot contain the field <i>conditionalReconfiguration</i> for conditional PSCell change or for conditional PSCell addition.</p>
<p><i>daps-SourceRelease</i> 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.</p>
<p><i>dedicatedNAS-MessageList</i> 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.</p>
<p><i>dedicatedPagingDelivery</i> This field is used to transfer <i>Paging</i> message for the associated L2 U2N Remote UE to the L2 U2N Relay UE in RRC_CONNECTED.</p>
<p><i>dedicatedPosSysInfoDelivery</i> This field is used to transfer <i>SIBPos</i> to the UE in RRC_CONNECTED.</p>
<p><i>dedicatedSIB1-Delivery</i> This field is used to transfer <i>SIB1</i> to the UE (including L2 U2N Remote UE). The field has the same values as the corresponding configuration in <i>servingCellConfigCommon</i>.</p>
<p><i>dedicatedSystemInformationDelivery</i> This field is used to transfer <i>SIB6</i>, <i>SIB7</i>, <i>SIB8</i>, <i>SIB19</i>, <i>SIB20</i>, <i>SIB21</i>, <i>SIB25</i> 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.</p>
<p><i>defaultUL-BAP-RoutingID</i> 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 <i>F1-C</i> and <i>non-F1</i> traffic. The <i>defaultUL-BAP-RoutingID</i> can be (re-)configured when IAB-node IP address for <i>F1-C</i> related traffic changes. This field is mandatory only for IAB-node bootstrapping.</p>
<p><i>defaultUL-BH-RLC-Channel</i> 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 <i>F1-C</i> and <i>non-F1</i> traffic. The <i>defaultUL-BH-RLC-Channel</i> can be (re-)configured when IAB-node IP address for <i>F1-C</i> 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.</p>
<p><i>flowControlFeedbackType</i> This field is only used for IAB-node that support hop-by-hop flow control to configure the type of flow control feedback. Value <i>perBH-RLC-Channel</i> indicates that the IAB-node shall provide flow control feedback per BH RLC channel, value <i>perRoutingID</i> indicates that the IAB-node shall provide flow control feedback per routing ID, and value <i>both</i> indicates that the IAB-node shall provide flow control feedback both per BH RLC channel and per routing ID.</p>
<p><i>fullConfig</i> Indicates that the full configuration option is applicable for the <i>RRCReconfiguration</i> message for intra-system intra-RAT HO. For inter-RAT HO from E-UTRA to NR, <i>fullConfig</i> 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 <i>RRCReconfiguration</i> message is transmitted on SRB3, and in an <i>RRCReconfiguration</i> message for SCG contained in another <i>RRCReconfiguration</i> message (or <i>RRCConnectionReconfiguration</i> message, see TS 36.331 [10]) transmitted on SRB1.</p>
<p><i>iab-IP-Address</i> This field is used to provide the IP address information for IAB-node.</p>

<i>iab-IP-AddressIndex</i> This field is used to identify a configuration of an IP address.
<i>iab-IP-AddressToAddModList</i> List of IP addresses allocated for IAB-node to be added and modified.
<i>iab-IP-AddressToReleaseList</i> List of IP address allocated for IAB-node to be released.
<i>iab-IP-Usage</i> 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.
<i>iab-donor-DU-BAP-Address</i> This field is used to indicate the BAP address of the IAB-donor-DU where the IP address is anchored.
<i>keySetChangeIndicator</i> Indicates whether UE shall derive a new K_{gNB} . If <i>reconfigurationWithSync</i> is included, value <i>true</i> 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 <i>false</i> 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].
<i>ltm-Config</i> This field includes the configuration related to LTM.
<i>masterCellGroup</i> Configuration of master cell group.
<i>mrdc-ReleaseAndAdd</i> This field indicates that the current SCG configuration is released and a new SCG is added at the same time.
<i>mrdc-SecondaryCellGroup</i> Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (nr-SCG), <i>mrdc-SecondaryCellGroup</i> contains the <i>RRCReconfiguration</i> message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields <i>secondaryCellGroup</i> , <i>otherConfig</i> , <i>conditionalReconfiguration</i> , <i>ltm-Config</i> , <i>measConfig</i> , <i>bap-Config</i> , <i>IAB-IP-AddressConfigurationList</i> and <i>appLayerMeasConfig</i> . For NE-DC (eutra-SCG), <i>mrdc-SecondaryCellGroup</i> includes the E-UTRA <i>RRCConnectionReconfiguration</i> message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field <i>scg-Configuration</i> .
<i>mrdc-SecondaryCellGroupConfig</i> This field is used to configure and release an SCG in NR-DC and NE-DC. In case the <i>RRCReconfiguration</i> message is part of an <i>LTM-Candidate</i> IE associated with the MCG, if this field is present its value can only be set to <i>release</i> .
<i>musim-GapConfig</i> 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.
<i>nas-Container</i> 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].
<i>needForGapsConfigNR</i> Configuration for the UE to report measurement gap requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.
<i>needForGapNCSG-ConfigEUTRA</i> Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.
<i>needForGapNCSG-ConfigNR</i> Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.
<i>needForInterruptionConfigNR</i> Indicates whether the UE shall report interruption requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message. The network sets this field to <i>enabled</i> only if the <i>needForGapsConfigNR</i> is configured. The network sets this field to <i>disabled</i> if the <i>needForGapsConfigNR</i> is released.

<p>nextHopChainingCount Parameter NCC: See TS 33.501 [11]</p>
<p>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.</p>
<p>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.</p>
<p>otherConfig Contains configuration related to other configurations. When configured for the SCG, only fields <i>drx-PreferenceConfig</i>, <i>maxBW-PreferenceConfig</i>, <i>maxBW-PreferenceConfigFR2-2</i>, <i>maxCC-PreferenceConfig</i>, <i>maxMIMO-LayerPreferenceConfig</i>, <i>maxMIMO-LayerPreferenceConfigFR2-2</i>, <i>minSchedulingOffsetPreferenceConfig</i>, <i>minSchedulingOffsetPreferenceConfigExt</i>, <i>rlm-RelaxationReportingConfig</i>, <i>bfd-RelaxationReportingConfig</i>, <i>btNameList</i>, <i>wlanNameList</i>, <i>sensorNameList</i>, <i>obtainCommonLocation</i>, <i>idc-AssistanceConfig</i>, <i>multiRx-PreferenceReportingConfigFR2</i>, <i>ul-TrafficInfoReportingConfig</i>, <i>n3c-RelayUE-InfoReportConfig</i>, <i>successPSCell-Config</i> and <i>sn-InitiatedPSCellChange</i> can be included.</p>
<p>radioBearerConfig Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP. In (NG)EN-DC this field may only be present if the <i>RRCReconfiguration</i> is transmitted over SRB3. SRB4 should not be configured if <i>sl-L2RemoteUE-Config-r17</i> is configured or not released.</p>
<p>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.</p>
<p>scg-State Indicates that the SCG is in deactivated state. This field is not used</p> <ul style="list-style-type: none"> - in an <i>RRCReconfiguration</i> message received: <ul style="list-style-type: none"> - within <i>mrdc-SecondaryCellGroup</i>, or - in an E-UTRA <i>RRCConnectionReconfiguration</i> message, or - in an E-UTRA <i>RRCConnectionResume</i> message or - in an <i>RRCReconfiguration</i> message received via SRB3, except if the <i>RRCReconfiguration</i> message is included in <i>DLInformationTransferMRDC</i>. <p>The field is absent if CPA, CPC, or subsequent CPAC is configured for the UE, or if the <i>RRCReconfiguration</i> message is contained in <i>CondRRCReconfig</i>, or PSCell is configured with <i>tag2</i>, or if the <i>RRCReconfiguration</i> message is included within an <i>LTM-Config</i> IE.</p>
<p>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 or L2 U2U relay operation related configuration used by a UE acting as a L2 U2U Relay UE. In case of L2 U2N relay operation, the field is absent if <i>conditionalReconfiguration</i> is configured for CHO.</p>
<p>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 or L2 U2U relay operation related configuration used by a UE acting as a L2 U2U Remote UE. In case of L2 U2N relay operation, the field is absent if <i>conditionalReconfiguration</i> is configured for CHO, or if <i>appLayerMeasConfig</i> or SRB4 is configured/not released.</p>
<p>secondaryCellGroup Configuration of secondary cell group ((NG)EN-DC or NR-DC).</p>
<p>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 <i>keyToUse</i> set to <i>secondary</i>, whichever happens first. This field is absent if there is neither any NR SCG nor any RB with <i>keyToUse</i> set to <i>secondary</i>.</p>
<p>sl-ConfigDedicatedNR This field is used to provide the dedicated configurations for NR sidelink communication/discovery/positioning.</p>
<p>sl-ConfigDedicatedEUTRA-Info This field includes the E-UTRA <i>RRCConnectionReconfiguration</i> as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA <i>RRCConnectionReconfiguration</i> can only include sidelink related fields for V2X sidelink communication, i.e. <i>sl-V2X-ConfigDedicated</i>, <i>sl-V2X-SPS-Config</i>, <i>measConfig</i> and/or <i>otherConfig</i>.</p>

<p><i>srs-PosResourceSetLinkedForAggBWLlist</i> This field indicates the SRS resource sets across two or three carriers which are linked for SRS bandwidth aggregation in RRC_CONNECTED state as defined in clause 6.2.1.4 of TS 38.214 [19].</p>
<p><i>sl-TimeOffsetEUTRA</i> 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 <i>ms0dpt75</i> corresponds to 0.75ms, <i>ms1</i> corresponds to 1ms and so on. The network includes this field only when <i>sl-ConfigDedicatedEUTRA</i> is configured.</p>
<p><i>targetCellSMTC-SCG</i> 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 <i>smtc</i> in <i>secondaryCellGroup</i> -> <i>SpCellConfig</i> -> <i>reconfigurationWithSync</i> are absent, the UE uses the SMTC in the <i>measObjectNR</i> having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message.</p>
<p><i>t316</i> Indicates the value for timer T316 as described in clause 7.1. Value <i>ms50</i> corresponds to 50 ms, value <i>ms100</i> corresponds to 100 ms and so on. This field can be configured only if the UE is configured with split SRB1 or SRB3.</p>
<p><i>ue-TxTEG-RequestUL-TDOA-Config</i> Configures the periodicity of UE reporting for the association between Tx TEG and SRS Positioning resources. When configured with <i>oneShot</i> UE reports the association only one time. When configured with <i>periodicReporting</i> UE reports the association periodically and the <i>periodicReporting</i> indicates the periodicity. Value <i>ms160</i> corresponds to 160ms, value <i>ms320</i> corresponds to 320ms and so on.</p>
<p><i>ul-GapFR2-Config</i> 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.</p>

Conditional Presence	Explanation
<i>nonHO</i>	The field is absent in case of reconfiguration with sync within NR or to NR; otherwise it is optionally present, need N.
<i>securityNASC</i>	This field is mandatory present in case of inter system handover. Otherwise the field is optionally present, need N.
<i>MasterKeyChange</i>	This field is mandatory present in case <i>masterCellGroup</i> includes <i>ReconfigurationWithSync</i> and <i>RadioBearerConfig</i> includes <i>SecurityConfig</i> with <i>SecurityAlgorithmConfig</i> , indicating a change of the AS security algorithms associated to the master key. If <i>ReconfigurationWithSync</i> is included for other cases, this field is optionally present, need N. If <i>ReconfigurationWithSync</i> is part of an <i>LTM-Candidate</i> IE associated with the MCG, the field is absent. Otherwise the field is absent.
<i>FullConfig</i>	The field is mandatory present in case of inter-system handover from E-UTRA/EPC to NR. It is optionally present, Need N, during a reconfiguration with sync which is not related to an LTM cell switch or subsequent CPAC, 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: <ul style="list-style-type: none"> - an <i>RRCReconfiguration</i> message contained in an <i>RRCResume</i> message (or in an <i>RRCCConnectionResume</i> message, see TS 36.331 [10]), - an <i>RRCReconfiguration</i> message contained in an <i>RRCCConnectionReconfiguration</i> message, see TS 36.331 [10], which is contained in <i>DLInformationTransferMRDC</i> transmitted on SRB3 (as a response to <i>ULInformationTransferMRDC</i> including an <i>MCGFailureInformation</i>). The field is optional present, Need M, in: <ul style="list-style-type: none"> - an <i>RRCReconfiguration</i> message transmitted on SRB3, - an <i>RRCReconfiguration</i> message contained in another <i>RRCReconfiguration</i> message (or in an <i>RRCCConnectionReconfiguration</i> message, see TS 36.331 [10]) transmitted on SRB1 - an <i>RRCReconfiguration</i> message contained in another <i>RRCReconfiguration</i> message which is contained in <i>DLInformationTransferMRDC</i> transmitted on SRB3 (as a response to <i>ULInformationTransferMRDC</i> including an <i>MCGFailureInformation</i>). Otherwise, the field is absent.
<i>PagingRelay</i>	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 ::=
    rrc-TransactionIdentifier
    criticalExtensions
    SEQUENCE {
        RRC-TransactionIdentifier,
        CHOICE {
```

```

    rrcReconfigurationComplete
    criticalExtensionsFuture
  }
}

RRCReconfigurationComplete-IEs ::=
  lateNonCriticalExtension
  nonCriticalExtension
}

RRCReconfigurationComplete-v1530-IEs ::=
  uplinkTxDirectCurrentList
  nonCriticalExtension
}

RRCReconfigurationComplete-v1560-IEs ::=
  scg-Response
  nr-SCG-Response
  eutra-SCG-Response
}
nonCriticalExtension
}

RRCReconfigurationComplete-v1610-IEs ::=
  ue-MeasurementsAvailable-r16
  needForGapsInfoNR-r16
  nonCriticalExtension
}

RRCReconfigurationComplete-v1640-IEs ::=
  uplinkTxDirectCurrentTwoCarrierList-r16
  nonCriticalExtension
}

RRCReconfigurationComplete-v1700-IEs ::=
  needForGapNCSG-InfoNR-r17
  needForGapNCSG-InfoEUTRA-r17
  selectedCondRRCReconfig-r17
  nonCriticalExtension
}

RRCReconfigurationComplete-v1720-IEs ::=
  uplinkTxDirectCurrentMoreCarrierList-r17
  nonCriticalExtension
}

RRCReconfigurationComplete-v1800-IEs ::=
  needForInterruptionInfoNR-r18
  flightPathInfoAvailable-r18
  selectedPSCellForCHO-WithSCG-r18
  selectedSK-Counter-r18
  measConfigReportAppLayerAvailable-r18
  nonCriticalExtension
}

```

SEQUENCE {
 OCTET STRING
 RRCReconfigurationComplete-v1530-IEs
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 UplinkTxDirectCurrentList
 RRCReconfigurationComplete-v1560-IEs
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 CHOICE {
 OCTET STRING (CONTAINING RRCReconfigurationComplete),
 OCTET STRING
 }
 RRCReconfigurationComplete-v1610-IEs
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 UE-MeasurementsAvailable-r16
 NeedForGapsInfoNR-r16
 RRCReconfigurationComplete-v1640-IEs
 OPTIONAL,
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 UplinkTxDirectCurrentTwoCarrierList-r16
 RRCReconfigurationComplete-v1700-IEs
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 NeedForGapNCSG-InfoNR-r17
 NeedForGapNCSG-InfoEUTRA-r17
 CondReconfigId-r16
 RRCReconfigurationComplete-v1720-IEs
 OPTIONAL,
 OPTIONAL,
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 UplinkTxDirectCurrentMoreCarrierList-r17
 RRCReconfigurationComplete-v1800-IEs
 OPTIONAL,
 OPTIONAL

SEQUENCE {
 NeedForInterruptionInfoNR-r18
 ENUMERATED {true}
 SelectedPSCellForCHO-WithSCG-r18
 SK-Counter
 ENUMERATED {true}
 SEQUENCE {}
 OPTIONAL,
 OPTIONAL,
 OPTIONAL,
 OPTIONAL,
 OPTIONAL,
 OPTIONAL

-- TAG-RRCRECONFIGURATIONCOMPLETE-STOP
 -- ASN1STOP

<i>RRCReconfigurationComplete-IEs field descriptions</i>
<i>measConfigReportAppLayerAvailable</i> Indication that the UE has at least one application layer measurement configuration with <i>appLayerIdleInactiveConfig</i> configured.
<i>needForGapsInfoNR</i> This field is used to indicate the measurement gap requirement information of the UE for NR target bands.
<i>needForGapNCSG-InfoEUTRA</i> This field is used to indicate the measurement gap and NCSG requirement information of the UE for E-UTRA target bands.
<i>needForGapNCSG-InfoNR</i> This field is used to indicate the measurement gap and NCSG requirement information of the UE for NR target bands.
<i>needForInterruptionInfoNR</i> This field indicates whether interruption is needed while performing measurement on NR target bands without measurement gap.
<i>scg-Response</i> In case of NR-DC (<i>nr-SCG-Response</i>), this field includes the <i>RRCReconfigurationComplete</i> message. In case of NE-DC (<i>eutra-SCG-Response</i>), this field includes the E-UTRA <i>RRCConnectionReconfigurationComplete</i> message as specified in TS 36.331 [10].
<i>selectedCondRRCReconfig</i> This field indicates the ID of the selected conditional reconfiguration the UE applied upon the execution of CPA or inter-SN CPC.
<i>selectedPSCellForCHO-WithSCG</i> This field indicates the information of the selected target PSCell to target MN at execution of a conditional reconfiguration for CHO with candidate SCG(s).
<i>selectedSK-Counter</i> This field includes the selected <i>sk-counter</i> value for security key update upon the execution of subsequent CPAC.
<i>uplinkTxDirectCurrentList</i> The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see <i>reportUplinkTxDirectCurrent</i> in <i>CellGroupConfig</i>).
<i>uplinkTxDirectCurrentMoreCarrierList</i> The Tx Direct Current locations for the configured intra-band CA requested by <i>reportUplinkTxDirectCurrentMoreCarrier-r17</i> .
<i>uplinkTxDirectCurrentTwoCarrierList</i> The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see <i>reportUplinkTxDirectCurrentTwoCarrier-r16</i> in <i>CellGroupConfig</i>).

– ***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 ::=
    criticalExtensions
        rrcReject
        criticalExtensionsFuture
    }
    SEQUENCE {
        CHOICE {
            RRCReject-IEs,
            SEQUENCE {}
        }
    }

RRCReject-IEs ::=
    waitTime
    lateNonCriticalExtension
    nonCriticalExtension
    SEQUENCE {
        RejectWaitTime
        OCTET STRING
        SEQUENCE {}
    }
    OPTIONAL, -- Need N
    OPTIONAL,
    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 ::=
    rrc-TransactionIdentifier
    criticalExtensions
        rrcRelease
        criticalExtensionsFuture
    }
    SEQUENCE {
        RRC-TransactionIdentifier,
        CHOICE {
            RRCRelease-IEs,
            SEQUENCE {}
        }
    }

```

```

}

RRCRelease-IEs ::=
  redirectedCarrierInfo      SEQUENCE {
    redirectedCarrierInfo      OPTIONAL, -- Need N
    cellReselectionPriorities  OPTIONAL, -- Need R
    suspendConfig              OPTIONAL, -- Need R
    deprioritisationReq        SEQUENCE {
      deprioritisationType     ENUMERATED {frequency, nr},
      deprioritisationTimer     ENUMERATED {min5, min10, min15, min30}
    }
    lateNonCriticalExtension    OPTIONAL, -- Need N
    nonCriticalExtension        OPTIONAL,
                                OPTIONAL
  }

RRCRelease-v1540-IEs ::=
  waitTime                   SEQUENCE {
    rejectWaitTime             OPTIONAL, -- Need N
    nonCriticalExtension        RRCRelease-v1610-IEs OPTIONAL
  }

RRCRelease-v1610-IEs ::=
  voiceFallbackIndication-r16 ENUMERATED {true}          OPTIONAL, -- Need N
  measIdleConfig-r16          SetupRelease {MeasIdleConfigDedicated-r16} OPTIONAL, -- Need M
  nonCriticalExtension         RRCRelease-v1650-IEs        OPTIONAL
}

RRCRelease-v1650-IEs ::=
  mpsPriorityIndication-r16    SEQUENCE {
    nonCriticalExtension        ENUMERATED {true}          OPTIONAL, -- Cond Redirection2
                                RRCRelease-v1710-IEs        OPTIONAL
  }

RRCRelease-v1710-IEs ::=
  noLastCellUpdate-r17        SEQUENCE {
    nonCriticalExtension        ENUMERATED {true}          OPTIONAL, -- Need S
                                SEQUENCE {}                 OPTIONAL
  }

RedirectedCarrierInfo ::=
  nr                           CHOICE {
    eutra                       CarrierInfoNR,
    ...                         RedirectedCarrierInfo-EUTRA,
  }

RedirectedCarrierInfo-EUTRA ::=
  eutraFrequency              SEQUENCE {
    cnType                      ARFCN-ValueEUTRA,
                                ENUMERATED {epc, fiveGC}    OPTIONAL -- Need N
  }

CarrierInfoNR ::=
  carrierFreq                  SEQUENCE {
    ssbSubcarrierSpacing        ARFCN-ValueNR,
    smtc                        SubcarrierSpacing,
    ...                         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
]],
[[
resumeIndication-r18      ENUMERATED {true}          OPTIONAL, -- Need N
srs-PosRRC-Inactive-v1800 SetupRelease { SRS-PosRRC-Inactive-v1800 }  OPTIONAL, -- Need M
srs-PosRRC-InactiveValidityAreaPreConfigList-r18 SetupRelease { SRS-PosRRC-InactiveValidityAreaPreConfigList-r18 } OPTIONAL, -- Need M
srs-PosRRC-InactiveValidityAreaNonPreConfig-r18 SetupRelease { SRS-PosRRC-InactiveValidityAreaConfig-r18 } OPTIONAL, -- Need M
ran-ExtendedPagingCycleConfig-r18 ExtendedPagingCycleConfig-r18  OPTIONAL, -- Cond RANPaging
multicastConfigInactive-r18 SetupRelease { MulticastConfigInactive-r18 }  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}

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
    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-ConfigLCH-RestrictionToAddModListExt-v1800 SEQUENCE (SIZE(1..maxLC-ID)) OF CG-SDT-ConfigLCH-Restriction-v1800
                                                                OPTIONAL, -- Need N

    cg-MT-SDT-MaxDurationToNext-CG-Occasion-r18 ENUMERATED {
        ms10, ms100, sec1, sec10, sec60, sec100, sec300, sec600,
        sec1200, sec1800, sec3600,
    ]
}

```

```

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

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
}

CG-SDT-ConfigLCH-Restriction-v1800 ::= SEQUENCE {
  cg-SDT-MaxDurationToNext-CG-Occasion-r18 ENUMERATED {
    ms10, ms100, sec1, sec10, sec60, sec100, sec300, sec600,
    sec1200, sec1800, sec3600,
    spare5, spare4, spare3, spare2, spare1}
  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
}

```



```

}

SRS-PosRRC-Inactive-v1800 ::= SEQUENCE {
  srs-PosRRC-AggBW-InactiveConfigList-r18 SetupRelease { SRS-PosRRC-AggBW-InactiveConfigList-r18 } OPTIONAL, -- Need M
  srs-PosTx-Hopping-r18 SetupRelease { SRS-PosTx-Hopping-r18 } OPTIONAL, -- Need M
  ...
}

SRS-PosRRC-InactiveValidityAreaPreConfigList-r18 ::= SEQUENCE (SIZE(1..maxNrOfVA-r18)) OF SRS-PosRRC-InactiveValidityAreaConfig-r18

SRS-PosRRC-InactiveValidityAreaConfig-r18 ::= SEQUENCE {
  srs-PosConfigValidityArea-r18 SEQUENCE (SIZE(1..maxNrOfCellsInVA-r18)) OF CellIdentity,
  srs-PosConfigNUL-r18 SRS-PosConfig-r17 OPTIONAL, -- Need R
  srs-PosConfigSUL-r18 SRS-PosConfig-r17 OPTIONAL, -- Need R
  bwp-NUL-r18 BWP OPTIONAL, -- Need S
  bwp-SUL-r18 BWP OPTIONAL, -- Need S
  areaValidityTA-Config-r18 AreaValidityTA-Config-r18 OPTIONAL, -- Need R
  ...
}

AreaValidityTA-Config-r18 ::= SEQUENCE {
  inactivePosSRS-ValidityAreaTAT-r18 ENUMERATED {ms1280, ms1920, ms2560, ms5120, ms10240, ms20480, ms40960, infinity},
  inactivePosSRS-ValidityAreaRSRP-r18 RSRP-ChangeThreshold-r17 OPTIONAL, -- Need R
  autonomousTA-AdjustmentEnabled-r18 ENUMERATED {true} OPTIONAL, -- Need R
}

SRS-PosRRC-AggBW-InactiveConfigList-r18 ::= SEQUENCE (SIZE (1..2)) OF SRS-PosResourceSetLinkedForAggBW-r18

ExtendedPagingCycle-r17 ::= ENUMERATED {rf256, rf512, rf1024, spare1}

ExtendedPagingCycleConfig-r18 ::= SEQUENCE {
  extendedPagingCycle-r18 ENUMERATED {hf2, hf4, hf8, hf16, hf32, hf64, hf128, hf256, hf512, hf1024,
  spare6, spare5, spare4, spare3, spare2, spare1},
  pagingPTWLength-r18 ENUMERATED {ms1280, ms2560, ms3840, ms5120, ms6400, ms7680, ms8960, ms10240, ms11520,
  ms12800, ms14080, ms15360, ms16640, ms17920, ms19200, ms20480, ms21760,
  ms23040, ms24320, ms25600, ms26880, ms28160, ms29440, ms30720, ms32000,
  ms33280, ms34560, ms35840, ms37120, ms38400, ms39680, ms40960}
}

MulticastConfigInactive-r18 ::= SEQUENCE {
  inactivePTM-Config-r18 OCTET STRING (CONTAINING MBSMulticastConfiguration-r18) OPTIONAL, -- Need S
  inactiveMCCH-Config-r18 OCTET STRING (CONTAINING SystemInformation) OPTIONAL, -- Need N
}

-- TAG-RRCRELEASE-STOP
-- ASN1STOP

```

RRCRelease-IEs field descriptions
<p>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 <i>FreqPriorityListNR</i> and <i>FreqPriorityListDedicatedSlicing</i> together is eight. If the same frequency is configured in both <i>FreqPriorityListNR</i> and <i>FreqPriorityListDedicatedSlicing</i>, the frequency is only counted once.</p>
<p>cnType Indicate that the UE is redirected to EPC or 5GC.</p>
<p>deprioritisationReq Indicates whether the current frequency or RAT is to be de-prioritised.</p>
<p>deprioritisationTimer Indicates the period for which either the current carrier frequency or NR is deprioritised. Value <i>minN</i> corresponds to N minutes.</p>
<p>measIdleConfig Indicates measurement configuration to be stored and used by the UE while in RRC_IDLE or RRC_INACTIVE.</p>
<p>mpsPriorityIndication Indicates the UE can set the establishment cause to <i>mps-PriorityAccess</i> for a new connection following a redirect to NR or set the resume cause to <i>mps-PriorityAccess</i> 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 <i>redirectedCarrierInfo</i> field in the <i>RRCRelease</i> message.</p>
<p>multicastConfigInactive Indicates the multicast service(s) that can be received in RRC_INACTIVE in the serving cell where the multicast service(s) was received in RRC_CONNECTED and optionally the corresponding configuration. The presence of this field indicates the UE is configured to receive MBS multicast in RRC_INACTIVE; otherwise, the UE is not configured to receive MBS multicast in RRC_INACTIVE.</p>
<p>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.</p>
<p>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 <i>redirectedCarrierInfo</i> in <i>RRCRelease</i> message with <i>suspendConfig</i> if this message is sent in response to an <i>RRCResumeRequest</i> or an <i>RRCResumeRequest1</i> which is triggered by the NAS layer (see 5.3.1.4 in TS 24.501 [23]).</p>
<p>srs-PosRRC-Inactive SRS for positioning configuration during RRC_INACTIVE state. The configuration also includes bandwidth aggregation and frequency hopping.</p>
<p>srs-PosRRC-InactiveValidityAreaNonPreConfig Contains the SRS for positioning configuration to be applied immediately and which is valid across a number of cells comprising a validity area during RRC_INACTIVE state.</p>
<p>srs-PosRRC-InactiveValidityAreaPreConfigList Contains the SRS for positioning configurations to be applied when a trigger for an event is met and which is valid across a number of cells comprising a validity area during RRC_INACTIVE state. For each validity area, the UE is preconfigured with only one SRS for positioning configuration. The below fields for the respective IEs are configured commonly in the validity area when <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i>/<i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured: <i>IE SRS-PosResourceSet</i>: <i>srs-PosResourceSetId</i>, <i>srs-PosResourceSetIdList</i>, <i>srs-PosResourceIdList</i>, <i>resourceType</i>, <i>alpha</i>, <i>p0</i> <i>IE SRS-PosResource</i>: <i>srs-PosResourceId</i>, <i>transmissionComb</i>, <i>resourceMapping</i>, <i>freqDomainShift</i>, <i>freqHopping</i>, <i>resourceType</i>, <i>groupOrSequenceHopping</i>, <i>sequenceID</i></p>
<p>srs-PosTx-Hopping Contains configuration related to the SRS for Positioning with frequency hopping for RRC_INACTIVE state.</p>
<p>suspendConfig Indicates configuration for the RRC_INACTIVE state. The network does not configure <i>suspendConfig</i> when the network redirect the UE to an inter-RAT carrier frequency or if the UE is configured with a DAPS bearer.</p>

<p>voiceFallbackIndication Indicates the RRC release is triggered by EPS fallback for IMS voice as specified in TS 23.502 [43].</p>
--

CarrierInfoNR field descriptions
<p>carrierFreq Indicates the redirected NR frequency.</p>
<p>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</p>
<p>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.</p>

RAN-NotificationAreaInfo field descriptions
<p>cellList A list of cells configured as RAN area.</p>
<p>ran-AreaConfigList A list of RAN area codes or RA code(s) as RAN area.</p>

PLMN-RAN-AreaConfig field descriptions
<p>plmn-Identity PLMN Identity to which the cells in <i>ran-Area</i> 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 <i>ran-Area</i> always belongs to the registered SNPN).</p>
<p>ran-AreaCodeList The total number of RAN-AreaCodes of all PLMNs does not exceed 32.</p>
<p>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.</p>

PLMN-RAN-AreaCell field descriptions
<p>plmn-Identity PLMN Identity to which the cells in <i>ran-AreaCells</i> 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 <i>ran-AreaCells</i> always belongs to the registered SNPN).</p>
<p>ran-AreaCells The total number of cells of all PLMNs does not exceed 32.</p>

SDT-Config field descriptions
<p><i>sdt-DRB-ContinueROHC</i> 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 <i>cell</i> 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 <i>ma</i> 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].</p>
<p><i>sdt-DRB-List</i> 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.</p>
<p><i>sdt-SRB2-Indication</i> Indicates whether SRB2 is configured for SDT or not.</p>

SDT-MAC-PHY-CG-Config field descriptions
<p><i>cg-MT-SDT-MaxDurationToNext-CG-Occasion</i> The maximum duration until the next CG-SDT occasion as specified in TS 38.321 [3] for MT-SDT. If configured, the CG-SDT resource can only be used for the initial CG-SDT transmission if the duration between the initiation of the CG-SDT procedure and the next CG-SDT occasion is less than the value configured by this field.</p>
<p><i>cg-SDT-ConfigInitialBWP-DL</i> Downlink BWP configuration for CG-SDT. If a UE is an (e)RedCap UE and if the <i>initialDownlinkBWP-RedCap</i> is configured in <i>downlinkConfigCommon</i> in <i>SIB1</i>, this field is configured for <i>initialDownlinkBWP-RedCap</i>, otherwise it is configured for <i>initialDownlinkBWP</i>.</p>
<p><i>cg-SDT-ConfigInitialBWP-NUL</i> UL BWP configuration for CG-SDT on NUL carrier. If a UE is an (e)RedCap UE and if the <i>initialUplinkBWP-RedCap</i> is configured in <i>uplinkConfigCommon</i> in <i>SIB1</i>, this field is configured for <i>initialUplinkBWP-RedCap</i>, otherwise it is configured for <i>initialUplinkBWP</i> for NUL.</p>
<p><i>cg-SDT-ConfigInitialBWP-SUL</i> UL BWP configuration for CG-SDT on SUL carrier configured for the <i>initialUplinkBWP</i> for SUL.</p>
<p><i>cg-SDT-ConfigLCH-RestrictionToAddModList</i>, <i>cg-SDT-ConfigLCH-RestrictionToAddModListExt</i>, <i>cg-SDT-ConfigLCH-RestrictionToReleaseList</i> Lists for adding and releasing logical channel mapping restrictions for CG-SDT. If the network includes <i>cg-SDT-ConfigLCH-RestrictionToAddModListExt</i>, it includes the same number of entries, and listed in the same order, as in <i>cg-SDT-ConfigLCH-RestrictionToAddModList</i>.</p>
<p><i>cg-SDT-CS-RNTI</i> The CS-RNTI value for CG-SDT as specified in TS 38.321 [3].</p>
<p><i>cg-SDT-RSRP-ThresholdSSB</i> An RSRP threshold configured for SSB selection for CG-SDT as specified in TS 38.321 [3].</p>
<p><i>cg-SDT-TA-ValidationConfig</i> Configuration for the RSRP based TA validation. If this field is not configured, then the UE does not perform RSRP based TA validation.</p>
<p><i>cg-SDT-timeAlignmentTimer</i> TAT value for CG-SDT as specified in TS 38.321 [3]. The network always configures this field when <i>sdt-MAC-PHY-CG-Config</i> is configured.</p>

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].

cg-SDT-MaxDurationToNext-CG-Occasion

The maximum duration until the next CG-SDT occasion for the logical channel identified by the *logicalChannelIdentity* as specified in TS 38.321 [3]. If configured, the CG-SDT resource can only be used for the initial CG-SDT transmission if the duration between the initiation of the CG-SDT procedure and the next CG-SDT occasion is less than the value configured by this field 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
<p>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.</p>
<p>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.</p>
<p>inactivePosSRS-RSRP-ChangeThreshold RSRP threshold for the increase/decrease of RSRP for time alignment validation as specified in TS 38.321 [3].</p>
<p>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 <i>srs-PosRRC-Inactive</i> is configured.</p>
<p>srs-PosConfigNUL SRS for Positioning configuration in RRC_INACTIVE state in Normal Uplink Carrier.</p>
<p>srs-PosConfigSUL SRS for Positioning configuration in RRC_INACTIVE state in Supplementary Uplink Carrier.</p>
<p>srs-PosResSetLinkedForAggBWInactiveList This field indicates the SRS resource sets across carriers which are linked for SRS bandwidth aggregation in RRC_INACTIVE state as defined in clause 6.2.1.4 of TS 38.214 [19].</p>
<p>srs-PosRRC-AggBW-InactiveConfigList SRS for positioning configuration with additional one or two carrier(s) configuration where the primary carrier is provided by <i>srs-PosRRC-Inactive-r17</i> for bandwidth aggregation and to be used in RRC_INACTIVE state.</p>

SRS-PosRRC-InactiveValidityAreaConfig field descriptions
<p>autonomousTA-AdjustmentEnabled This field indicates that UE may adjust the TA value and stored RSRP autonomously after cell reselection within a validity area, if configured.</p>
<p>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.</p>
<p>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.</p>
<p>srs-PosRRC-InactiveValidityArea Provides a list of cells where SRS Positioning Configuration in RRC_INACTIVE state is valid.</p>
<p>inactivePosSRS-ValidityAreaTAT Time alignment timer value for SRS for positioning transmission during RRC_INACTIVE state which is applicable in a validity area.</p>
<p>inactivePosSRS-ValidityAreaRSRP RSRP threshold for the increase/decrease of RSRP for validity area time alignment validation as specified in TS 38.321 [3].</p>

<i>SuspendConfig</i> field descriptions
<p><i>ncd-SSB-RedCapInitialBWP-SDT</i> Indicates that the UE uses the RedCap-specific initial DL BWP associated with the NCD-SSB for SDT. The network configures this field if an (e)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. In the MIB associated with this NCD-SSB, the <i>systemFrameNumber</i> field indicates the frame boundary and frame number of the NCD-SSB. The <i>subCarrierSpacingCommon</i> and <i>dmrs-TypeA-Position</i> field in the MIBs associated with CD-SSB and NCD-SSB in the same cell are configured with the same values, respectively.</p>
<p><i>ran-ExtendedPagingCycle</i> The extended DRX (eDRX) cycle for RAN-initiated paging to be applied by the UE as defined in TS 38.304 [20]. Value <i>rf256</i> corresponds to 256 radio frames, value <i>rf512</i> 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.</p>
<p><i>ran-ExtendedPagingCycleConfig</i> The extended DRX (eDRX) configuration for RAN-initiated paging to be applied by the UE when the eDRX cycle for RAN-initiated paging is longer than 10.24s.</p>
<p><i>ran-NotificationAreaInfo</i> Network ensures that the UE in RRC_INACTIVE always has a valid <i>ran-NotificationAreaInfo</i>.</p>
<p><i>ran-PagingCycle</i> Refers to the UE specific cycle for RAN-initiated paging. Value <i>rf32</i> corresponds to 32 radio frames, value <i>rf64</i> corresponds to 64 radio frames and so on.</p>
<p><i>resumeIndication</i> Indicates that the UE shall trigger the RRC connection resume procedure after receiving this <i>RRCRelease</i> message, as specified in clause 5.3.8.3. The network only includes this field in the <i>RRCRelease</i> message used to terminate an ongoing SDT procedure.</p>
<p><i>sl-UEIdentityRemote</i> Indicates the C-RNTI to the L2 U2N Remote UE.</p>
<p><i>t380</i> Refers to the timer that triggers the periodic RNAU procedure in UE. Value <i>min5</i> corresponds to 5 minutes, value <i>min10</i> corresponds to 10 minutes and so on.</p>

<i>MulticastConfigInactive</i> field descriptions
<p><i>inactivePTM-Config</i> Indicates PTM configuration for MBS multicast reception in RRC_INACTIVE in the serving cell. If absent, UE considers all joined multicast sessions can be received in RRC_INACTIVE.</p>
<p><i>inactiveMCCH-Config</i> Indicates multicast MCCH/MTCH configuration for MBS multicast reception in RRC_INACTIVE in the serving cell. Only <i>SIB24</i> is allowed to be included.</p>

<i>ExtendedPagingCycleConfig</i> field descriptions
<p><i>extendedPagingCycle</i> The eDRX cycle longer than 10.24 s for RAN-initiated paging to be applied by the UE. Value <i>hf2</i> corresponds to 2 hyper frames, value <i>hf4</i> corresponds to 4 hyper frames and so on. Value of the field is shorter than or equal to the IDLE mode eDRX cycle configured for the UE.</p>
<p><i>pagingPTWLength</i> The length of paging transmission window for RAN-initiated paging to be applied by the UE as defined in TS 38.304 [20]. Value <i>ms1280</i> corresponds to 1280 milliseconds, value <i>ms2560</i> corresponds to 2560 milliseconds and so on.</p>

Conditional Presence	Explanation
<i>L2RemoteUE</i>	The field is mandatory present for L2 U2N Remote UE's RNAU; otherwise it is absent.
<i>RAN Paging</i>	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.
<i>Redirection2</i>	The field is optionally present, Need R, if <i>redirectedCarrierInfo</i> 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 ::=
    rrc-TransactionIdentifier
    criticalExtensions
        rrcResume
        criticalExtensionsFuture
    }

RRCResume-IEs ::=
    radioBearerConfig
    masterCellGroup
    measConfig
    fullConfig
    lateNonCriticalExtension
    nonCriticalExtension

RRCResume-v1560-IEs ::=
    radioBearerConfig2
    sk-Counter
    nonCriticalExtension

RRCResume-v1610-IEs ::=
    idleModeMeasurementReq-r16
    restoreMCG-SCells-r16

SEQUENCE {
    RRC-TransactionIdentifier,
    CHOICE {
        RRCResume-IEs,
        SEQUENCE {}
    }
}

SEQUENCE {
    RadioBearerConfig
    OCTET STRING (CONTAINING CellGroupConfig)
    MeasConfig
    ENUMERATED {true}
    OCTET STRING
    RRCResume-v1560-IEs
}

SEQUENCE {
    OCTET STRING (CONTAINING RadioBearerConfig)
    SK-Counter
    RRCResume-v1610-IEs
}

SEQUENCE {
    ENUMERATED {true}
    ENUMERATED {true}
}

OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need N
OPTIONAL,
OPTIONAL

OPTIONAL, -- Need M
OPTIONAL, -- Need N
OPTIONAL

OPTIONAL, -- Need N
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
}
needForGapsConfigNR-r16       SetupRelease {NeedForGapsConfigNR-r16}
nonCriticalExtension           RRCResume-v1700-IEs                OPTIONAL, -- Cond RestoreSCG
                                OPTIONAL, -- Need M
                                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          RRCResume-v1800-IEs                OPTIONAL
}

RRCResume-v1800-IEs ::=      SEQUENCE {
  needForInterruptionConfigNR-r18  ENUMERATED { disabled, enabled }    OPTIONAL, -- Need M
  reselectionMeasurementReq-r18     ENUMERATED { true }                 OPTIONAL, -- Need N
  nonCriticalExtension              SEQUENCE {}                          OPTIONAL
}

-- TAG-RRCRESUME-STOP
-- ASN1STOP

```

RRCResume-IEs field descriptions
<p>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.</p>
<p>idleModeMeasurementReq This field indicates that the UE shall report the idle/inactive measurements, if available, to the network in the <i>RRCResumeComplete</i> message</p>
<p>masterCellGroup Configuration of the master cell group.</p>
<p>mrdc-SecondaryCellGroup Includes an RRC message for SCG configuration in NR-DC or NE-DC. For NR-DC (<i>nr-SCG</i>), <i>mrdc-SecondaryCellGroup</i> contains the <i>RRCReconfiguration</i> message as generated (entirely) by SN gNB. In this version of the specification, the RRC message can only include fields <i>secondaryCellGroup</i> (with at least <i>reconfigurationWithSync</i>), <i>otherConfig</i> and <i>measConfig</i>. For NE-DC (<i>eutra-SCG</i>), <i>mrdc-SecondaryCellGroup</i> includes the E-UTRA <i>RRCConnectionReconfiguration</i> message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message only include the field <i>scg-Configuration</i> with at least <i>mobilityControlInfoSCG</i>.</p>
<p>needForGapsConfigNR Configuration for the UE to report measurement gap requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.</p>
<p>needForGapNCSG-ConfigEUTRA Configuration for the UE to report measurement gap and NCSG requirement information of E-UTRA target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.</p>
<p>needForGapNCSG-ConfigNR Configuration for the UE to report measurement gap and NCSG requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message.</p>
<p>needForInterruptionConfigNR Indicates whether the UE shall report interruption requirement information of NR target bands in the <i>RRCReconfigurationComplete</i> and <i>RRCResumeComplete</i> message. The network sets this field to <i>enabled</i> only if the <i>needForGapsConfigNR</i> is configured. The network sets this field to <i>disabled</i> if the <i>needForGapsConfigNR</i> is released.</p>
<p>radioBearerConfig Configuration of Radio Bearers (DRBs, SRBs, multicast MRBs) including SDAP/PDCP.</p>
<p>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.</p>
<p>reselectionMeasurementReq This field indicates that the UE shall report the reselection measurements, if available, to the network in the <i>RRCResumeComplete</i> message.</p>
<p>restoreMCG-SCells Indicates that the UE shall restore the MCG SCells from the UE Inactive AS Context, if stored.</p>
<p>restoreSCG Indicates that the UE shall restore the SCG configurations from the UE Inactive AS Context, if stored.</p>
<p>scg-State Indicates that the SCG is in deactivated state.</p>
<p>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 <i>keyToUse</i> set to <i>secondary</i> or <i>mrdc-SecondaryCellGroup</i> is included.</p>
<p>sl-ConfigDedicatedNR This field is used to provide the dedicated configurations for NR sidelink communication/discovery used by L2 U2N Remote UE.</p>
<p>sl-L2RemoteUE-Config Contains L2 U2N relay operation related configurations used by L2 U2N Remote UE. The field is absent if <i>appLayerMeasConfig</i> or SRB4 is configured/not released.</p>

Conditional Presence	Explanation
<i>L2RemoteUE</i>	The field is mandatory present for L2 U2N Remote UE; otherwise it is absent.
<i>RestoreSCG</i>	The field is mandatory present if <i>restoreSCG</i> 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 ::=
    rrc-TransactionIdentifier          SEQUENCE {
    criticalExtensions                 RRC-TransactionIdentifier,
    rrcResumeComplete                 CHOICE {
    criticalExtensionsFuture           RRCResumeComplete-IEs,
    }
}

RRCResumeComplete-IEs ::=
    dedicatedNAS-Message              SEQUENCE {
    selectedPLMN-Identity              DedicatedNAS-Message                      OPTIONAL,
    uplinkTxDirectCurrentList          INTEGER (1..maxPLMN)                    OPTIONAL,
    lateNonCriticalExtension            UplinkTxDirectCurrentList                OPTIONAL,
    nonCriticalExtension                OCTET STRING                          OPTIONAL,
    RRCResumeComplete-v1610-IEs       RRCResumeComplete-v1610-IEs
}

RRCResumeComplete-v1610-IEs ::=
    idleMeasAvailable-r16              SEQUENCE {
    measResultIdleEUTRA-r16            ENUMERATED {true}                          OPTIONAL,
    measResultIdleNR-r16              MeasResultIdleEUTRA-r16                    OPTIONAL,
    scg-Response-r16                  MeasResultIdleNR-r16                       OPTIONAL,
    nr-SCG-Response                    CHOICE {
    eutra-SCG-Response                 OCTET STRING (CONTAINING RRCReconfigurationComplete),
    }
    ue-MeasurementsAvailable-r16       OPTIONAL,
    mobilityHistoryAvail-r16           OPTIONAL,
    mobilityState-r16                  ENUMERATED {normal, medium, high, spare}    OPTIONAL,
    needForGapsInfoNR-r16             OPTIONAL,
}

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                RRCResumeComplete-v1800-IEs          OPTIONAL
}

RRCResumeComplete-v1800-IEs ::=      SEQUENCE {
  needForInterruptionInfoNR-r18       NeedForInterruptionInfoNR-r18       OPTIONAL,
  musim-CapRestrictionInd-r18         ENUMERATED {true}                  OPTIONAL,
  flightPathInfoAvailable-r18         ENUMERATED {true}                  OPTIONAL,
  measConfigReportAppLayerAvailable-r18 ENUMERATED {true}                  OPTIONAL,
  measResultReselectionNR-r18         MeasResultIdleNR-r16                OPTIONAL,
  reselectionMeasAvailable-r18        ENUMERATED {true}                  OPTIONAL,
  nonCriticalExtension                SEQUENCE {}                         OPTIONAL
}

-- TAG-RRCRESUMECOMplete-STOP
-- ASN1STOP

```

RRCResumeComplete-IEs field descriptions
idleMeasAvailable Indication that the UE has idle/inactive measurement report available.
measConfigReportAppLayerAvailable Indication that the UE has at least one application layer measurement configuration with <i>appLayerIdleInactiveConfig</i> configured.
measResultIdleEUTRA EUTRA measurement results performed during RRC_INACTIVE.
measResultIdleNR NR measurement results performed during RRC_INACTIVE.
musim-CapRestrictionInd This field indicates the UE temporary capability restriction due to MUSIM operation.
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
needForInterruptionInfoNR This field indicates whether interruption is needed while performing measurement on NR target bands without measurement gap.
reselectionMeasAvailable Indication that the UE has reselection measurement report available.
selectedPLMN-Identity Index of the PLMN selected by the UE from the <i>plmn-IdentityInfoList</i> or <i>npr-IdentityInfoList</i> fields included in <i>SIB1</i> .
uplinkTxDirectCurrentList The Tx Direct Current locations for the configured serving cells and BWPs if requested by the NW (see <i>reportUplinkTxDirectCurrent</i> in <i>CellGroupConfig</i>).
uplinkTxDirectCurrentMoreCarrierList The Tx Direct Current locations for the configured intra-band CA requested by <i>reportUplinkTxDirectCurrentMoreCarrier-r17</i> .
uplinkTxDirectCurrentTwoCarrierList The Tx Direct Current locations for the configured uplink intra-band CA with two carriers if requested by the NW (see <i>reportUplinkTxDirectCurrentTwoCarrier-r16</i> in <i>CellGroupConfig</i>).

– 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-RRCTYPESETUP-START

RRCSetup ::=
    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-r16 SL-ConfigDedicatedNR-r16          OPTIONAL, -- Cond L2RemoteUE
    sl-L2RemoteUE-Config-r17 SL-L2RemoteUE-Config-r17          OPTIONAL, -- Cond L2RemoteUE
    nonCriticalExtension     SEQUENCE {}                        OPTIONAL
}

-- TAG-RRCSETUP-STOP
-- ASN1STOP

```

<i>RRCSetup-IEs</i> field descriptions	
masterCellGroup	The network configures only the RLC bearer for the SRB1, <i>mac-CellGroupConfig</i> , <i>physicalCellGroupConfig</i> and <i>spCellConfig</i> .
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 <i>sl-PHY-MAC-RLC-Config</i> 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
<i>L2RemoteUE</i>	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 ::=
  rrc-TransactionIdentifier
  criticalExtensions
    rrcSetupComplete
    criticalExtensionsFuture
  }
}

RRCSetupComplete-IEs ::=
  selectedPLMN-Identity
  registeredAMF
  guami-Type
  s-NSSAI-List
  dedicatedNAS-Message
  ng-5G-S-TMSI-Value
    ng-5G-S-TMSI
    ng-5G-S-TMSI-Part2
  }
  lateNonCriticalExtension
  nonCriticalExtension
}

RRCSetupComplete-v1610-IEs ::=
  iab-NodeIndication-r16
  idleMeasAvailable-r16
  ue-MeasurementsAvailable-r16
  mobilityHistoryAvail-r16
  mobilityState-r16
  nonCriticalExtension
}

RRCSetupComplete-v1690-IEs ::=
  ul-RRC-Segmentation-r16
  nonCriticalExtension
}

RRCSetupComplete-v1700-IEs ::=
  onboardingRequest-r17
  nonCriticalExtension
}

RRCSetupComplete-v1800-IEs ::=
  ncr-NodeIndication-r18
  musim-CapRestrictionInd-r18
  flightPathInfoAvailable-r18
  measConfigReportAppLayerAvailable-r18
  mobileIAB-NodeIndication-r18
  reselectionMeasAvailable-r18
  nonCriticalExtension
}

RegisteredAMF ::=
  plmn-Identity
  amf-Identifier

```

SEQUENCE {
 RRC-TransactionIdentifier,
 CHOICE {
 RRCSetupComplete-IEs,
 SEQUENCE {}
}

SEQUENCE {
 INTEGER (1..maxPLMN),
 RegisteredAMF OPTIONAL,
 ENUMERATED {native, mapped} OPTIONAL,
 SEQUENCE (SIZE (1..maxNrofS-NSSAI)) OF S-NSSAI OPTIONAL,
 DedicatedNAS-Message,
 CHOICE {
 NG-5G-S-TMSI,
 BIT STRING (SIZE (9))
} OPTIONAL,
 OCTET STRING OPTIONAL,
 RRCSetupComplete-v1610-IEs OPTIONAL

SEQUENCE {
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 UE-MeasurementsAvailable-r16 OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {normal, medium, high, spare} OPTIONAL,
 RRCSetupComplete-v1690-IEs OPTIONAL

SEQUENCE {
 ENUMERATED {true} OPTIONAL,
 RRCSetupComplete-v1700-IEs OPTIONAL

SEQUENCE {
 ENUMERATED {true} OPTIONAL,
 RRCSetupComplete-v1800-IEs OPTIONAL

SEQUENCE {
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 ENUMERATED {true} OPTIONAL,
 SEQUENCE {} OPTIONAL

SEQUENCE {
 PLMN-Identity OPTIONAL,
 AMF-Identifier

```

}
-- TAG-RRCSETUPCOMPLETE-STOP
-- ASN1STOP

```

RRCSetupComplete-IEs field descriptions
<p>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].</p>
<p>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]. If this field is included, the UE shall not include the field <i>mobileIAB-NodeIndication</i>.</p>
<p>idleMeasAvailable Indication that the UE has idle/inactive measurement report available.</p>
<p>measConfigReportAppLayerAvailable Indication that the UE has at least one application layer measurement configuration with <i>appLayerIdleInactiveConfig</i> configured.</p>
<p>mobileIAB-NodeIndication This field is used to indicate that the connection is being established by a mobile IAB-node as specified in TS 38.300 [2]. If this field is included, the UE shall not include the field <i>iab-NodeIndication</i>.</p>
<p>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 <i>medium</i> and <i>high</i> when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value <i>normal</i>.</p>
<p>musim-CapRestrictionInd This field indicates the UE temporary capability restriction due to MUSIM operation.</p>
<p>ncr-NodeIndication This field is used to indicate that the connection is being established by an NCR-node as specified in TS 38.300 [2].</p>
<p>ng-5G-S-TMSI-Part2 The leftmost 9 bits of 5G-S-TMSI.</p>
<p>onboardingRequest This field indicates that the connection is being established for UE onboarding in the selected onboarding SNPN, see TS 23.501 [32].</p>
<p>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].</p>
<p>reselectionMeasAvailable Indication that the UE has reselection measurement report available.</p>
<p>selectedPLMN-Identity Index of the PLMN or SNPN selected by the UE from the <i>plmn-IdentityInfoList</i> or <i>npr-IdentityInfoList</i> fields included in SIB1.</p>
<p>ul-RRC-Segmentation This field indicates the UE supports uplink RRC segmentation of <i>UECapabilityInformation</i>.</p>

– 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 ::=
    criticalExtensions
        scgFailureInformation
        criticalExtensionsFuture
    }

SEQUENCE {
    CHOICE {
        SCGFailureInformation-IEs,
        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},
                                OPTIONAL,
    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,
                                ARFCN-ValueNR
                                OPTIONAL,
    }
    failedPSCellId-r17         SEQUENCE {
                                PhysCellId,
                                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

```

<i>SCGFailureInformation field descriptions</i>
<p>measResultFreqList The field contains available results of measurements on NR frequencies the UE is configured to measure by <i>measConfig</i>.</p>
<p>measResultSCG-Failure The field contains the <i>MeasResultSCG-Failure</i> IE which includes available results of measurements on NR frequencies the UE is configured to measure by the NR SCG <i>RRCReconfiguration</i> message.</p>
<p>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.</p>
<p>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.</p>
<p>timeSCGFailure This field is used to indicate the time elapsed since the last execution of <i>RRCReconfiguration</i> with <i>reconfigurationWithSync</i> for the SCG until the SCG failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.</p>

– *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
            criticalExtensionsFuture
        }
    }

SCGFailureInformationEUTRA-IEs ::=
    SEQUENCE {
        failureReportSCG-EUTRA          OPTIONAL,
        nonCriticalExtension              SCGFailureInformationEUTRA-v1590-IEs OPTIONAL
    }

SCGFailureInformationEUTRA-v1590-IEs ::= SEQUENCE {
    lateNonCriticalExtension            OCTET STRING OPTIONAL,
    nonCriticalExtension                SEQUENCE {}          OPTIONAL
}

```

```

FailureReportSCG-EUTRA ::=
  failureType
                                     SEQUENCE {
                                     ENUMERATED {
                                     t313-Expiry, randomAccessProblem,rlc-MaxNumRetx,
                                     scg-ChangeFailure, spare4,
                                     spare3, spare2, spare1},
                                     MeasResultFreqListMRDC
                                     MeasResultFreqListFailMRDC
                                     OCTET STRING
                                     LocationInfo-r16
                                     LocationInfo-r16
                                     measResultFreqListMRDC
                                     measResultSCG-FailureMRDC
                                     . . . ,
                                     [[
                                     locationInfo-r16
                                     ]]
                                     }
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 ::=
  rrc-TransactionIdentifier
  criticalExtensions
  securityModeCommand
  criticalExtensionsFuture
                                     SEQUENCE {
                                     RRC-TransactionIdentifier,
                                     CHOICE {
                                     SecurityModeCommand-IEs,
                                     SEQUENCE {}
                                     }

```



```

}
}
SecurityModeCommand-IEs ::=
  securityConfigSMC
  lateNonCriticalExtension
  nonCriticalExtension
}
SecurityConfigSMC ::=
  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 ::=
  rrc-TransactionIdentifier
  criticalExtensions
  securityModeComplete
  criticalExtensionsFuture
}
SecurityModeComplete-IEs ::=
  lateNonCriticalExtension
  nonCriticalExtension
}
-- 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 ::=
    rrc-TransactionIdentifier          SEQUENCE {
    criticalExtensions                 CHOICE {
        securityModeFailure          SecurityModeFailure-IEs,
        criticalExtensionsFuture     SEQUENCE {}
    }
}

SecurityModeFailure-IEs ::=
    lateNonCriticalExtension          OPTIONAL,
    nonCriticalExtension              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
  }
  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
  }
  useFullResumeID ENUMERATED {true} OPTIONAL, -- Need R
  lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need R
  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
featurePriorities-r17            SEQUENCE {
  redCapPriority-r17              FeaturePriority-r17
  slicingPriority-r17            FeaturePriority-r17
  msg3-Repetitions-Priority-r17 FeaturePriority-r17
  sdt-Priority-r17               FeaturePriority-r17
}
si-SchedulingInfo-v1700          SI-SchedulingInfo-v1700
hyperSFN-r17                     BIT STRING (SIZE (10))
eDRX-AllowedIdle-r17             ENUMERATED {true}
eDRX-AllowedInactive-r17        ENUMERATED {true}
intraFreqReselectionRedCap-r17  ENUMERATED {allowed, notAllowed}
cellBarredNTN-r17               ENUMERATED {barred, notBarred}
nonCriticalExtension             SIB1-v1740-IEs
}

SIB1-v1740-IEs ::=              SEQUENCE {
  si-SchedulingInfo-v1740        SI-SchedulingInfo-v1740
  nonCriticalExtension           SIB1-v1800-IEs
}

SIB1-v1800-IEs ::=              SEQUENCE {
  ncr-Support-r18               ENUMERATED {true}
  mt-SDT-ConfigCommonSIB-r18    MT-SDT-ConfigCommonSIB-r18
  musim-CapRestrictionAllowed-r18 ENUMERATED {true}
  featurePriorities-v1800        SEQUENCE {
    msg1-Repetitions-Priority-r18 FeaturePriority-r17
    eRedCapPriority-r18           FeaturePriority-r17
  }
  si-SchedulingInfo-v1800        SI-SchedulingInfo-v1800
  cellBarredATG-r18             ENUMERATED {barred, notBarred}
  cellBarredNES-r18             ENUMERATED {notBarred}
  mobileIAB-Cell-r18            ENUMERATED {true}
  eDRX-AllowedInactive-r18      ENUMERATED {true}
  intraFreqReselection-eRedCap-r18 ENUMERATED {allowed, notAllowed}
  nonServingCellMII-r18         ENUMERATED {true}
  sdt-BeamFailureRecoveryProhibitTimer-r18 ENUMERATED {ms50, ms100, ms200, ms500, ms1000, ms1500, ms2000, ms3000}
  eRedCap-ConfigCommon-r18      ERedCap-ConfigCommonSIB-r18
  cellBarredFixedVSAT-r18       ENUMERATED {barred, notBarred}
  cellBarredMobileVSAT-r18      ENUMERATED {barred, notBarred}
  reselectionMeasurementsNR-r18 ENUMERATED {true}
  cellBarred2RxXR-r18           ENUMERATED {true}
  intraFreqReselection2RxXR-r18 ENUMERATED {allowed, notAllowed}
  nonCriticalExtension           SEQUENCE {}
}

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
  sdt-LogicalChannelSR-DelayTimer-r17 ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}
}

```

```

sdt-DataVolumeThreshold-r17      ENUMERATED {byte32, byte100, byte200, byte400, byte600, byte800, byte1000, byte2000, byte4000,
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}
  }
  ...
}

ERedCap-ConfigCommonSIB-r18 ::= SEQUENCE {
  cellBarredRedCap-r18           SEQUENCE {
    cellBarredRedCap1Rx-r18      ENUMERATED {barred, notBarred},
    cellBarredRedCap2Rx-r18      ENUMERATED {barred, notBarred}
  }
}

FeaturePriority-r17 ::= INTEGER (0..7)

MT-SDT-ConfigCommonSIB-r18 ::= SEQUENCE {
  mt-SDT-RSRP-Threshold-r18      RSRP-Range                                OPTIONAL, -- Need S
  sdt-LogicalChannelSR-DelayTimer-r18  ENUMERATED { sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}  OPTIONAL, -- Cond MT-SDT1
  t319a-r18                      ENUMERATED { ms100, ms200, ms300, ms400, ms600, ms1000, ms2000,
                                  ms3000, ms4000, spare7, spare6, spare5, spare4,
                                  spare3, spare2, spare1}                                OPTIONAL -- Cond MT-SDT2
}

-- TAG-SIB1-STOP
-- ASN1STOP

```

SIB1 field descriptions
<p>cellBarred2RxXR Indicates whether the cell is barred for 2Rx XR UEs. This field is ignored by all UEs that are not 2Rx XR UEs. This field may be configured only if the cell operates in a frequency band where 4Rx antenna ports are mandated as specified in TS 38.101-1 [15]. If this field is absent on a cell operating in a frequency band where 4RX antenna ports are mandated, a 2RX XR UE shall treat the cell as not barred, as specified in TS 38.304 [20].</p>
<p>cellBarredATG Value <i>barred</i> means that the cell is barred for connectivity to ATG, as defined in TS 38.304 [20]. Value <i>notBarred</i> means that the cell is allowed for connectivity to ATG. If not present, the UE considers the cell is not allowed for connectivity to ATG, as defined in TS 38.304 [20]. This field is only applicable to ATG-capable UEs.</p>
<p>cellBarred-eRedCap1Rx Value <i>barred</i> means that the cell is barred for an eRedCap UE with 1 Rx branch, as defined in TS 38.304 [20]. This field is ignored by non-eRedCap UEs.</p>
<p>cellBarred-eRedCap2Rx Value <i>barred</i> means that the cell is barred for an eRedCap UE with 2 Rx branches, as defined in TS 38.304 [20]. This field is ignored by non-eRedCap UEs.</p>
<p>cellBarredFixedVSAT Value <i>barred</i> means that the cell is barred for fixed VSAT UEs, as defined in TS 38.304 [20]. If not present, the cell is not allowed for fixed VSAT UEs. This field is ignored by non-VSAT UEs.</p>
<p>cellBarredMobileVSAT Value <i>barred</i> means that the cell is barred for mobile VSAT UEs, as defined in TS 38.304 [20]. If not present, the cell is not allowed for mobile VSAT UEs. This field is ignored by non-VSAT UEs.</p>
<p>cellBarredNES This field indicates the cell barring status for UEs supporting <i>nes-CellDTX-DRX</i> as described in 5.2.2.4.2.</p>
<p>cellBarredNTN Value <i>barred</i> means that the cell is barred for connectivity to NTN, as defined in TS 38.304 [20]. Value <i>notBarred</i> 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.</p>
<p>cellBarredRedCap1Rx Value <i>barred</i> 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.</p>
<p>cellBarredRedCap2Rx Value <i>barred</i> 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.</p>
<p>cellSelectionInfo Parameters for cell selection related to the serving cell.</p>
<p>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.</p>
<p>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 <i>eDRX-AllowedIdle</i> is not present.</p>
<p>eDRX-AllowedInactive The presence of <i>eDRX-AllowedInactive-r17</i> this field indicates that extended DRX cycle equal to or shorter than 10.24 s for RAN paging is allowed in the cell for UEs in RRC_INACTIVE. The UE shall stop using extended DRX cycle equal to or shorter than 10.24 s for RAN paging in RRC_INACTIVE if <i>eDRX-AllowedInactive-r17</i> is not present. The presence of <i>eDRX-AllowedInactive-r18</i> indicates that extended DRX cycle longer than 10.24 s for RAN paging is allowed in the cell for UEs in RRC_INACTIVE. The UE shall stop using extended DRX cycle longer than 10.24 s for RAN paging in RRC_INACTIVE if <i>eDRX-AllowedInactive-r18</i> is not present.</p>
<p>featurePriorities Indicates priorities for features, such as (e)RedCap, Slicing, SDT, MSG1-Repetitions and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which <i>FeatureCombinationPreambles</i> the UE shall use when a feature maps to more than one <i>FeatureCombinationPreambles</i>, 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 <i>FeatureCombinationPreambles</i>.</p>
<p>halfDuplexRedCap-Allowed The presence of this field indicates that the cell supports half-duplex FDD (e)RedCap UEs.</p>

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.
intraFreqReselection2RxXR This field controls cell selection/reselection to intra-frequency cells for 2Rx XR UEs when this cell is barred or treated as barred by the 2Rx XR UE, as specified in TS 38.304 [20]. This field is ignored by all UEs that are not 2Rx XR UEs. This field may be configured only if the cell operates in a frequency band where 4Rx antenna ports are mandated, as specified in TS 38.101-1 [15].
intraFreqReselectioneRedCap Controls cell selection/reselection to intra-frequency cells for eRedCap UEs when this cell is barred, or treated as barred by the eRedCap UE, as specified in TS 38.304 [20]. If not present, an eRedCap UE treats the cell as barred, i.e., the UE considers that the cell does not support eRedCap.
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.
mobileIAB-Cell The presence of this field indicates that this is a mobile IAB cell.
mt-SDT-RSRP-Threshold RSRP threshold used to determine whether MT-SDT procedure can be initiated, as specified in TS 38.321 [3]. If the field is absent, and the field <i>sdt-RSRP-Threshold</i> is present, the UE applies the value in the field <i>sdt-RSRP-Threshold</i> .
musim-CapRestrictionAllowed Indicates the UE is allowed to send the <i>musim-CapRestrictionInd</i> in <i>RRCSetupComplete</i> and <i>RRCResumeComplete</i> messages.
ncr-Support This field combines both the support of NCR and the cell status for NCR. If the field is present, the cell supports NCR and the cell is also considered as a candidate for cell (re)selection for NCR-node; if the field is absent, the cell does not support NCR and/or the cell is barred for NCR-node.
nonServingCellMII Indicates whether the <i>MBSInterestIndication</i> message for MBS broadcast reception on a non-serving cell is allowed to be transmitted to the serving gNB.
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.

<p>q-RxLevMinSUL Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for serving cell.</p>
<p>reselectionMeasurementsNR This field indicates that a UE that is configured for NR reselection measurements shall report availability of these measurements when establishing or resuming a connection in this cell.</p>
<p>sdt-BeamFailureRecoveryProhibitTimer The value of the prohibit timer used for RACH for beam failure indication during SDT as specified in TS 38.321 [3]. Value <i>ms50</i> corresponds to 50 milliseconds, value <i>ms100</i> corresponds to 100 milliseconds and so on.</p>
<p>sdt-DataVolumeThreshold Data volume threshold used to determine whether SDT can be initiated, as specified in TS 38.321 [3]. Value <i>byte32</i> corresponds to 32 bytes, value <i>byte100</i> corresponds to 100 bytes, and so on.</p>
<p>sdt-LogicalChannelSR-DelayTimer The value of <i>logicalChannelSR-DelayTimer</i> applied during SDT for logical channels configured with SDT, as specified in TS 38.321 [3]. Value in number of subframes. Value <i>sf20</i> corresponds to 20 subframes, <i>sf40</i> corresponds to 40 subframes, and so on. If <i>sdt-LogicalChannelSR-DelayTimer-r18</i> is absent and <i>sdt-LogicalChannelSR-DelayTimer-r17</i> is present then, the UE applies the value configured in <i>sdt-LogicalChannelSR-DelayTimer-r17</i> for this field. If this field is not configured, then <i>logicalChannelSR-DelayTimer</i> is not applied for SDT logical channels.</p>
<p>sdt-RSRP-Threshold RSRP threshold used to determine whether SDT procedure can be initiated, as specified in TS 38.321 [3].</p>
<p>servingCellConfigCommon Configuration of the serving cell.</p>
<p>t319a Initial value of the timer T319a used for detection of SDT failure. Value <i>ms100</i> corresponds to 100 milliseconds, value <i>ms200</i> corresponds to 200 milliseconds and so on. If <i>t319a-r18</i> is absent, the UE applies the value configured in <i>t319a-r17</i>.</p>
<p>uac-AccessCategory1-SelectionAssistanceInfo Information used to determine whether Access Category 1 applies to the UE, as defined in TS 22.261 [25]. If <i>plmnCommon</i> is chosen, the <i>UAC-AccessCategory1-SelectionAssistanceInfo</i> is applicable to all the PLMNs and SNPNs in <i>plmn-IdentityInfoList</i> and <i>npn-IdentityInfoList</i>. If <i>individualPLMNList</i> is chosen, the 1st entry in the list corresponds to the first network within all of the PLMNs and SNPNs across the <i>plmn-IdentityList</i> and the <i>npn-IdentityInfoList</i>, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the <i>plmn-IdentityList</i> and the <i>npn-IdentityInfoList</i> and so on. If <i>uac-AC1-SelectAssistInfo-r16</i> is present, the UE shall ignore the <i>uac-AccessCategory1-SelectionAssistanceInfo</i>.</p>
<p>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 <i>plmn-IdentityList</i> and <i>npn-IdentityInfoList</i>, the 2nd entry in the list corresponds to the second network within all of the PLMNs and SNPNs across the <i>plmn-IdentityList</i> and the <i>npn-IdentityInfoList</i> and so on. Value <i>notConfigured</i> indicates that Access Category1 is not configured for the corresponding PLMN/SNPN.</p>
<p>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 <i>uac-BarringPerPLMN-List</i>. The parameters are specified by providing an index to the set of configurations (<i>uac-BarringInfoSetList</i>). UE behaviour upon absence of this field is specified in clause 5.3.14.2.</p>
<p>ue-TimersAndConstants Timer and constant values to be used by the UE. The cell operating as PCell always provides this field.</p>
<p>useFullResumeID Indicates which resume identifier and Resume request message should be used. UE uses <i>full-RNTI</i> and <i>RRCResumeRequest1</i> if the field is present, or <i>short-RNTI</i> and <i>RRCResumeRequest</i> if the field is absent.</p>

Conditional Presence	Explanation
<i>EDRX-RC</i>	The field is optionally present, Need R, in a cell that enables <i>eDRX-AllowedIdle</i> , otherwise it is absent.
<i>MINT</i>	The field is optionally present, Need R, in a cell that provides a configuration for disaster roaming, otherwise it is absent, Need R.
<i>MT-SDT1</i>	This field is optionally present, Need S, in a cell that supports MT-SDT if <i>sdt-ConfigCommon-r17</i> is not present, otherwise it is absent.
<i>MT-SDT2</i>	This field is mandatory present in a cell that supports MT-SDT if <i>sdt-ConfigCommon-r17</i> is not present, otherwise it is absent.
<i>NTN</i>	The field is optionally present, Need S, in a cell where <i>cellBarredNTN</i> is included with value <i>notBarred</i> , otherwise it is absent.
<i>Standalone</i>	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 ::=
    criticalExtensions
        sidelinkUEInformationNR-r16
        criticalExtensionsFuture
    }
}

SidelinkUEInformationNR-r16-IEs ::=
    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 ::=
    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                  SidelinkUEInformationNR-v1800-IEs  OPTIONAL,
}

SidelinkUEInformationNR-v1800-IEs ::= SEQUENCE {
  sl-CarrierFailureList-r18          SL-CarrierFailureList-r18          OPTIONAL,
  sl-TxResourceReqListL2-U2U-r18     SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-TxResourceReqL2-U2U-r18  OPTIONAL,
  sl-PosRxInterestedFreqList-r18     SL-InterestedFreqList-r16          OPTIONAL,
  sl-PosTxResourceReqList-r18        SL-PosTxResourceReqList-r18       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-PosTxResourceReqList-r18 ::= SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-PosTxResourceReq-r18

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
  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-QoS-InfoList-v1800             SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-v1800  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-TxResourceReqL2-U2U-r18 ::= SEQUENCE {
  sl-DestinationIdentityL2-U2U-r18 SL-DestinationIdentity-r16 OPTIONAL,
  sl-TxInterestedFreqListL2-U2U-r18 SL-TxInterestedFreqList-r16,
  sl-TypeTxSyncListL2-U2U-r18 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16,
  sl-CapabilityInformationSidelink-r18 OCTET STRING OPTIONAL,
  sl-U2U-InfoList-r18 SEQUENCE (SIZE (1.. maxNrofRemoteUE-r17)) OF SL-U2U-Info-r18 OPTIONAL,
  ...
}

SL-U2U-Info-r18 ::= SEQUENCE {
  sl-U2U-Identity-r18 CHOICE {
    sl-TargetUE-Identity-r18 SL-DestinationIdentity-r16,
    sl-SourceUE-Identity-r18 SL-SourceIdentity-r17
  },
  sl-E2E-QoS-InfoList-r18 SEQUENCE (SIZE (1.. maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16 OPTIONAL,
  sl-PerHop-QoS-InfoList-r18 SEQUENCE (SIZE (1.. maxNrofSL-QFIsPerDest-r16)) OF SL-SplitQoS-Info-r18 OPTIONAL,
  sl-PerSLRB-QoS-InfoList-r18 SEQUENCE (SIZE (1.. maxNrofSLRB-r16)) OF SL-PerSLRB-QoS-Info-r18 OPTIONAL
}

```

```

SL-PosTxResourceReq-r18 ::=          SEQUENCE {
    sl-PosDestinationIdentity-r18     SL-DestinationIdentity-r16,
    sl-PosCastType-r18                ENUMERATED {broadcast, groupcast, unicast, spare1},
    sl-PosTxInterestedFreqList-r18    SL-TxInterestedFreqList-r16                                OPTIONAL,
    sl-PosTypeTxSyncList-r18          SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-TypeTxSync-r16    OPTIONAL,
    sl-PosQoS-InfoList-r18            SEQUENCE (SIZE (1..maxNrofSL-PRS-PerDest-r18)) OF SL-PRS-QoS-Info-r18  OPTIONAL,
    sl-CapabilityInformationSidelink-r18 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-QoS-Info-v1800 ::=               SEQUENCE {
    sl-TxInterestedFreqList-r18      SL-TxInterestedFreqList-r16,
    sl-TxProfile-r18                  SL-TxProfile-r18                                OPTIONAL,
    ...
}

SL-TxProfile-r18 ::=                ENUMERATED {backwardsCompatible, backwardsIncompatible}

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}
}

SL-CarrierFailureList-r18 ::=        SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-CarrierFailure-r18

SL-CarrierFailure-r18 ::=           SEQUENCE {
    sl-DestinationIdentity-r18         SL-DestinationIdentity-r16,
    sl-CarrierFailure-r18             SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)
}

SL-SplitQoS-Info-r18 ::=            SEQUENCE {
    sl-QoS-FlowIdentity-r18           SL-QoS-FlowIdentity-r16,
    sl-SplitPacketDelayBudget-r18     INTEGER (0..1023)                                OPTIONAL,
    ...
}

```

```

SL-PerSLRB-QoS-Info-r18 ::= SEQUENCE {
    sl-RemoteUE-SLRB-Identity-r18 SLRB-Uu-ConfigIndex-r16,
    sl-QoS-ProfilePerSLRB-r18 SL-QoS-Profile-r16
}
OPTIONAL

SL-PRS-QoS-Info-r18 ::= SEQUENCE {
    sl-PRS-Priority-r18 INTEGER (1..8)
    sl-PRS-DelayBudget-r18 INTEGER (0..1023)
    ...
}
OPTIONAL,
OPTIONAL,

-- TAG-SIDELINKUEINFORMATIONNR-STOP
-- ASN1STOP

```

Editor's Note: Whether the per-SLRB QoS is reported in a list of E2E connections or all in one big list can be further checked in maintenance.

Editor's Note: Whether to differentiate U2U discovery and U2N discovery can be checked in maintenance.

SidelinkUEInformationNR field descriptions
<p><i>sl-PosRxInterestedFreqList</i> Indicates the index of frequency on which the UE is interested to receive NR sidelink positioning. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB23</i>, the value 2 corresponds to the frequency of second entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB23</i> and so on. In this release, only value 1 can be included in the interested frequency list.</p>
<p><i>sl-PosTxResourceReqList</i> List of parameters to request the transmission resources for NR sidelink positioning for the associated destination.</p>
<p><i>sl-RxDRX-ReportList</i> Indicates the accepted DRX configuration that is received from the peer UE and reported to the network for NR sidelink unicast communication.</p>
<p><i>sl-RxInterestedFreqList</i> 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 <i>sl-FreqInfoList</i> broadcast in <i>SIB12</i>, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i>, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i> and so on.</p>
<p><i>sl-RxInterestedGC-BC-DestList</i> 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]).</p>
<p><i>sl-SourceIdentityRemoteUE</i> 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.</p>
<p><i>sl-TxResourceReq</i> Parameters to request the transmission resources for NR sidelink communication to the network in the Sidelink UE Information report.</p>
<p><i>sl-TxResourceReqList</i> List of parameters to request the transmission resources for NR sidelink communication for the associated destination. If <i>sl-TxResourceReqList-v1700</i> is present, it shall contain the same number of entries, listed in the same order as in <i>sl-TxResourceReqList-r16</i>.</p>
<p><i>ue-Type</i> Indicates the UE is acting as U2N Relay UE or U2N Remote UE.</p>

SL-TxResourceReq field descriptions
<p>sl-CapabilityInformationSidelink Includes the <i>UECapabilityInformationSidelink</i> message (which can be also included in <i>ueCapabilityInformationSidelink-r16</i> in <i>UECapabilityEnquirySidelink</i> from peer UE) received from the peer UE.</p>
<p>sl-CastType Indicates the cast type for the corresponding destination for which to request the resource.</p>
<p>sl-DestinationIdentity Indicates the destination for which the TX resource request and allocation from the network are concerned.</p>
<p>sl-DRX-Indication Indicates the sidelink DRX is applied (value <i>on</i>) or not applied (value <i>off</i>) for the associated destination. This field is only valid for NR sidelink groupcast communication.</p>
<p>sl-DRX-InfoFromRxList Indicates list of the sidelink DRX configurations as assistance information received from the peer UE for NR sidelink unicast communication.</p>
<p>sl-QoS-InfoList Includes the QoS profile of the sidelink QoS flow as specified in TS 23.287 [55]. If <i>sl-QoS-InfoList-v1800</i> is included, shall include the same number of entries, and listed in the same order, as in <i>sl-QoS-InfoList-r16</i>.</p>
<p>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.</p>
<p>sl-RLC-ModelIndication 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 <i>sl-QoS-FlowIdentity</i>.</p>
<p>sl-TxInterestedFreqList Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication/positioning, for each destination. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB12/SIB23</i>, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt broadcast</i> in <i>SIB12/SIB23</i>, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt broadcast</i> in <i>SIB12/SIB23</i> and so on.</p>
<p>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 <i>sl-TxInterestedFreqList</i>, i.e. one for each carrier frequency included in <i>sl-TxInterestedFreqList</i>.</p>

SL-Failure field descriptions
<p>sl-DestinationIdentity Indicates the destination for which the SL failure is reporting for unicast.</p>
<p>sl-Failure Indicates the sidelink cause for the sidelink RLF (value <i>rlf</i>), sidelink AS configuration failure (value <i>configFailure</i>) and the rejection of sidelink DRX configuration (value <i>drxReject-v1710</i>) for the associated destination for unicast.</p>

SL-RxDRX-Report field descriptions
<p>sl-DRX-ConfigFromTx Indicates the sidelink DRX configuration received from the peer UE for NR sidelink unicast communication.</p>

SL-RxInterestedGC-BC-Dest field descriptions
<p>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.</p>

SL-TxResourceReqDisc field descriptions
<p>sl-CastTypeDisc Indicates the cast type for the NR sidelink discovery messages. Only value <i>broadcast</i> can be set in this release.</p>
<p>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.</p>
<p>sl-SourceIdentityRelayUE This field is used to indicate the source L2 ID of relay-related discovery transmission by L2 U2N Relay UE.</p>
<p>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 <i>sl-FreqInfoList</i> broadcast in <i>SIB12</i>, the value 2 corresponds to the frequency of second entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB12</i> 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.</p>

SL-PosTxResourceReq field descriptions
<p>sl-CapabilityInformationSidelink Includes the <i>UECapabilityInformationSidelink</i> message (which can be also included in <i>ueCapabilityInformationSidelink-r16</i> in <i>UECapabilityEnquirySidelink</i> from peer UE) received from the peer UE.</p>
<p>sl-PosCastType Indicates the cast type for the SL-PRS transmission.</p>
<p>sl-PosDestinationIdentity This field is used to indicate the destination L2 ID for which the TX resource request and allocation from the network are concerned for SL-PRS transmission</p>
<p>sl-PosQoS-InfoList This field is used to indicate the QoS information for SL-PRS transmission.</p>
<p>sl-PosTxInterestedFreqList Each entry of this field indicates the index of frequency on which the UE is interested to transmit SL-PRS. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB23</i>, the value 2 corresponds to the frequency of second entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB23</i> 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.</p>
<p>sl-PosTypeTxSyncList 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 <i>sl-TxInterestedFreqList</i>, i.e. one for each carrier frequency included in <i>sl-TxInterestedFreqList</i>.</p>
<p>sl-PRS-DelayBudget Indicates the SL-PRS delay budget. Upper bound value for the associated response time provided by upper layers (see TS 38.214 [19]), clause 8.2.4.2).</p>
<p>sl-PRS-Priority Indicates the priority of SL-PRS. Value 1 is the highest priority whereas value 8 is the lowest priority.</p>

<i>SL-TxResourceReqCommRelayInfo</i> field descriptions
<p><i>sl-RelayDRXConfig</i> This field is used to indicate the applied sidelink DRX configuration for the relay related communication.</p>
<p><i>sl-DestinationIdentityL2U2N</i> 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.</p>
<p><i>sl-LocalID-Request</i> This field is used to request local UE ID for the corresponding destination by the L2 U2N Relay UE.</p>
<p><i>sl-TxInterestedFreqListL2U2N</i> 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 <i>sl-FreqInfoList</i> broadcast in SIB12, the value 2 corresponds to the frequency of second entry in <i>sl-FreqInfoList</i> 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.</p>
<p><i>sl-PagingIdentityRemoteUE</i> This field is used to indicate the paging UE ID(s) for the corresponding destination(s) by the L2 U2N Relay UE.</p>
<i>SL-QoS-Info</i> field descriptions
<p><i>sl-TxInterestedFreqList</i> Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication, for each QoS flow. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in SIB12, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt</i> broadcast in SIB12, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt</i> broadcast in SIB12 and so on.</p>
<p><i>sl-TxProfile</i> Indicating Tx profile for each QoS flow, i.e., compatibility of supporting SL CA operation. The IE of <i>SL-TxProfile</i> is referred by upper layer signaling as specified TS 24.588 [78].</p>
<i>SL-CarrierFailure</i> field descriptions
<p><i>sl-CarrierFailure</i> Indicate the carrier(s) where the per-carrier RLF has been indicated by lower layer. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in SIB12, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt</i> broadcast in SIB12, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt</i> broadcast in SIB12 and so on.</p>
<p><i>sl-DestinationIdentity</i> This field is used to indicate the destination L2 ID for which the per-carrier RLF report is concerned.</p>
<i>SL-TxResourceReqL2-U2U</i> field descriptions
<p><i>sl-DestinationIdentityL2-U2U</i> 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 per-hop PC5 link between the L2 U2U Remote UE and L2 U2U Relay UE.</p>
<p><i>sl-TxInterestedFreqListL2-U2U</i> Each entry of this field indicates the index of frequency on which the UE is interested to transmit NR sidelink communication for established per-hop PC5 link. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in SIB12, the value 2 corresponds to the frequency of second entry in <i>sl-FreqInfoList</i> 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.</p>
<p><i>sl-U2U-InfoList</i> This field indicates the information related to a list of end-to-end PC5 links.</p>

<i>SL-U2U-Info</i> field descriptions
<p><i>sl-E2E-QoS-InfoList</i> This field is used by L2 U2U Remote UE to indicate a list of end-to-end QoS info.</p>
<p><i>sl-PerHop-QoS-InfoList</i> This field is used by L2 U2U Remote UE to indicate a list of split QoS info for the first hop.</p>
<p><i>sl-PerSLRB-QoS-InfoList</i> This field is used by L2 U2U Relay UE to indicate a list of split QoS info for the second hop in per-SLRB level, with each entry in accordance with an end-to-end SLRB.</p>
<p><i>sl-U2U-Identity</i> This field is to identify an end-to-end PC5 link. For a L2 U2U Remote UE acting as source UE it includes <i>sl-TargetUE-Identity</i> to indicate the target L2 Remote UE on the second hop, and for a L2 U2U Relay UE, it includes <i>sl-SourceUE-Identity</i> to indicate the source L2 U2U Remote UE on the first hop.</p>

– *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 ::=
    criticalExtensions
        systemInformation
        criticalExtensionsFuture-r16
            posSystemInformation-r16
            criticalExtensionsFuture
    }
}

SystemInformation-IEs ::=
    sib-TypeAndInfo
        sib2
        sib3
        sib4
        sib5
        sib6
        sib7
        sib8
    SEQUENCE {
        CHOICE {
            SystemInformation-IEs,
            CHOICE {
                PosSystemInformation-r16-IEs,
                SEQUENCE {}
            }
        }
    SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
        SIB2,
        SIB3,
        SIB4,
        SIB5,
        SIB6,
        SIB7,
        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,
sib22-v1800   SIB22-r18,
sib23-v1800   SIB23-r18,
sib24-v1800   SIB24-r18,
sib25-v1800   SIB25-r18

},
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
  }
  scg-DeactivationPreference-r17 ENUMERATED { scgDeactivationPreferred, noPreference } OPTIONAL,
  uplinkData-r17                ENUMERATED { true }            OPTIONAL,
  rrm-MeasRelaxationFulfilment-r17 BOOLEAN                        OPTIONAL,
  propagationDelayDifference-r17 PropagationDelayDifference-r17 OPTIONAL,
  nonCriticalExtension           UEAssistanceInformation-v1800-IEs OPTIONAL
}

UEAssistanceInformation-v1800-IEs ::= SEQUENCE {
  idc-FDM-Assistance-r18        IDC-FDM-Assistance-r18        OPTIONAL,
  idc-TDM-Assistance-r18        IDC-TDM-Assistance-r18        OPTIONAL,
  multiRx-PreferenceFR2-r18     ENUMERATED {single, multiple } OPTIONAL,
  musim-Assistance-v1800        MUSIM-Assistance-v1800        OPTIONAL,
  flightPathInfoAvailable-r18   ENUMERATED {true}            OPTIONAL,
  ul-TrafficInfo-r18            UL-TrafficInfo-r18            OPTIONAL,
  n3c-RelayUE-InfoList-r18      SEQUENCE (SIZE (0..8)) OF N3C-RelayUE-Info-r18 OPTIONAL,
  sl-PRS-UE-AssistanceInformationNR-r18 SL-PRS-UE-AssistanceInformationNR-r18 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,
    ...,
    [[
    uwb-r18                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 {s11, s12, s14, s16}           OPTIONAL,
    preferredK0-SCS-30kHz-r16             ENUMERATED {s11, s12, s14, s16}           OPTIONAL,
    preferredK0-SCS-60kHz-r16             ENUMERATED {s12, s14, s18, s112}        OPTIONAL,
    preferredK0-SCS-120kHz-r16            ENUMERATED {s12, s14, s18, s112}        OPTIONAL
  } OPTIONAL,
  preferredK2-r16                         SEQUENCE {
    preferredK2-SCS-15kHz-r16             ENUMERATED {s11, s12, s14, s16}           OPTIONAL,
    preferredK2-SCS-30kHz-r16             ENUMERATED {s11, s12, s14, s16}           OPTIONAL,
    preferredK2-SCS-60kHz-r16             ENUMERATED {s12, s14, s18, s112}        OPTIONAL,
    preferredK2-SCS-120kHz-r16            ENUMERATED {s12, s14, s18, s112}        OPTIONAL
  } OPTIONAL
}

MinSchedulingOffsetPreferenceExt-r17 ::= SEQUENCE {
  preferredK0-r17                         SEQUENCE {
    preferredK0-SCS-480kHz-r17            ENUMERATED {s18, s116, s132, s148}        OPTIONAL,
    preferredK0-SCS-960kHz-r17            ENUMERATED {s18, s116, s132, s148}        OPTIONAL
  } OPTIONAL,
  preferredK2-r17                         SEQUENCE {
    preferredK2-SCS-480kHz-r17            ENUMERATED {s18, s116, s132, s148}        OPTIONAL,
    preferredK2-SCS-960kHz-r17            ENUMERATED {s18, s116, s132, s148}        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

MUSIM-Assistance-v1800 ::= SEQUENCE {
  musim-GapPriorityPreferenceList-r18      MUSIM-GapPriorityPreferenceList-r18    OPTIONAL,
  musim-GapKeepPreference-r18             ENUMERATED {true}                     OPTIONAL,
  musim-CapRestriction-r18                MUSIM-CapRestriction-r18              OPTIONAL,
  musim-NeedForGapsInfoNR-r18             NeedForGapsInfoNR-r16                 OPTIONAL
}

```

```

MUSIM-GapPriorityPreferenceList-r18 ::= SEQUENCE (SIZE (1..3)) OF GapPriority-r17

MUSIM-CapRestriction-r18 ::=
  musim-Cell-SCG-ToRelease-r18      MUSIM-Cell-SCG-ToRelease-r18      OPTIONAL,
  musim-CellToAffectList-r18        MUSIM-CellToAffectList-r18        OPTIONAL,
  musim-AffectedBandsList-r18       MUSIM-AffectedBandsList-r18       OPTIONAL,
  musim-AvoidedBandsList-r18        MUSIM-AvoidedBandsList-r18        OPTIONAL,
  musim-MaxCC-r18                    MUSIM-MaxCC-r18                    OPTIONAL
}

MUSIM-Cell-SCG-ToRelease-r18 ::=
  musim-CellToRelease-r18           MUSIM-CellToRelease-r18           OPTIONAL,
  scg-ReleasePreference-r18         ENUMERATED { scgReleasePreferred }  OPTIONAL
}

MUSIM-CellToRelease-r18 ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF SCellIndex

MUSIM-CellToAffectList-r18 ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF MUSIM-CellToAffect-r18

MUSIM-CellToAffect-r18 ::=
  musim-ServCellIndex-r18           ServCellIndex,
  musim-MIMO-Layers-DL-r18          INTEGER (1..8)                     OPTIONAL,
  musim-MIMO-Layers-UL-r18          INTEGER (1..4)                     OPTIONAL,
  musim-SupportedBandwidth-DL-r18   SupportedBandwidth                 OPTIONAL,
  musim-SupportedBandwidth-UL-r18   SupportedBandwidth                 OPTIONAL
}

MUSIM-AffectedBandsList-r18 ::= SEQUENCE (SIZE (1..maxBandComb-MUSIM-r18)) OF MUSIM-AffectedBands-r18

MUSIM-AffectedBands-r18 ::= SEQUENCE (SIZE (1..maxCandidateBandIndex-r18)) OF MUSIM-CapabilityRestrictedBandParameters-r18

MUSIM-CapabilityRestrictedBandParameters-r18 ::= SEQUENCE {
  musim-bandEntryIndex-r18          MUSIM-BandEntryIndex-r18,
  musim-CapabilityRestricted-r18     SEQUENCE {
    musim-MIMO-Layers-DL-r18         INTEGER (1..8)                     OPTIONAL,
    musim-MIMO-Layers-UL-r18         INTEGER (1..4)                     OPTIONAL,
    musim-SupportedBandwidth-DL-r18   SupportedBandwidth                 OPTIONAL,
    musim-SupportedBandwidth-UL-r18   SupportedBandwidth                 OPTIONAL
  }
}

MUSIM-AvoidedBandsList-r18 ::= SEQUENCE (SIZE (1..maxBandComb-MUSIM-r18)) OF MUSIM-AvoidedBands-r18

MUSIM-AvoidedBands-r18 ::= SEQUENCE (SIZE (1..maxCandidateBandIndex-r18)) OF MUSIM-BandEntryIndex-r18

MUSIM-BandEntryIndex-r18 ::= INTEGER(1.. maxCandidateBandIndex-r18)

MUSIM-MaxCC-r18 ::=
  musim-MaxCC-DL-r18                INTEGER (1..32)                    OPTIONAL,
  musim-MaxCC-UL-r18                INTEGER (1..32)                    OPTIONAL
}

ReleasePreference-r16 ::= SEQUENCE {
  preferredRRC-State-r16            ENUMERATED {idle, inactive, connected, outOfConnected}
}

```

```

}

ReducedMaxBW-FRr-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)

IDC-FDM-Assistance-r18 ::= SEQUENCE {
    affectedCarrierFreqRangeList-r18      AffectedCarrierFreqRangeList-r18      OPTIONAL,
    affectedCarrierFreqRangeCombList-r18  AffectedCarrierFreqRangeCombList-r18  OPTIONAL,
    ...
}

IDC-TDM-Assistance-r18 ::= SEQUENCE {
    cycleLength-r18      ENUMERATED {ms2, ms3, ms4, ms5, ms6, ms7, ms8, ms10, ms14, ms16, ms20, ms30,
    ms32, ms35, ms40, ms60, ms64, ms70, ms80, ms96, ms100, ms128, ms160,
    ms256, ms320, ms512, ms640, ms1024, ms1280, ms2048, ms2560, ms5120, ms10240},
    startOffset-r18      INTEGER (0..10239),
    slotOffset-r18       INTEGER (0..31),
    activeDuration-r18   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 }
    },
    ...
}

AffectedCarrierFreqRangeList-r18 ::= SEQUENCE (SIZE (1..maxFreqIDC-r16)) OF AffectedCarrierFreqRange-r18

AffectedCarrierFreqRange-r18 ::= SEQUENCE {
    affectedFreqRange-r18      AffectedCarrierFreqRange-r18, interferenceDirection-r18      ENUMERATED {nr, other, both, spare},
    victimSystemType-r18      VictimSystemType-r16      OPTIONAL
}

```



```

}

AffectedCarrierFreqRangeCombList-r18 ::= SEQUENCE (SIZE (1..maxCombIDC-r16)) OF AffectedCarrierFreqRangeComb-r18

AffectedCarrierFreqRangeComb-r18 ::= SEQUENCE {
    affectedCarrierFreqRangeComb-r18 SEQUENCE (SIZE (2..maxNrofServingCells)) OF AffectedFreqRange-r18,
    interferenceDirection-r18 ENUMERATED {nr, other, both, spare},
    victimSystemType-r18 VictimSystemType-r16 OPTIONAL
}

AffectedFreqRange-r18 ::= SEQUENCE {
    centerFreq-r18 ARFCN-ValueNR,
    affectedBandwidth-r18 ENUMERATED {khz200, khz400, khz600, khz800, mhz1, mhz2, mhz3, mhz4, mhz5, mhz6,
    mhz8, mhz10, mhz20, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100, mhz200,
    mhz300, mhz400, spare10, spare9, spare8, spare7, spare6, spare5, spare4,
    spare3, spare2, spare1}
}

UL-TrafficInfo-r18 ::= SEQUENCE (SIZE (1..maxNrofPDU-Sessions-r17)) OF PDU-SessionUL-TrafficInfo-r18

PDU-SessionUL-TrafficInfo-r18 ::= SEQUENCE {
    pdu-SessionID-r18 PDU-SessionID,
    qos-FlowUL-TrafficInfoList-r18 SEQUENCE (SIZE (1..maxNrofQFIs)) OF QOS-FlowUL-TrafficInfo-r18
}

QOS-FlowUL-TrafficInfo-r18 ::= SEQUENCE {
    qfi-r18 QFI,
    jitterRange-r18 SEQUENCE {
        lowerBound-r18 JitterBound-r18,
        upperBound-r18 JitterBound-r18
    } OPTIONAL,
    burstArrivalTime-r18 CHOICE {
        referenceTime ReferenceTime-r16,
        referenceSFN-AndSlot ReferenceSFN-AndSlot-r18
    } OPTIONAL,
    trafficPeriodicity-r18 INTEGER (1..640000) OPTIONAL,
    pduSetIdentification-r18 BOOLEAN OPTIONAL,
    psiIdentification-r18 BOOLEAN OPTIONAL,
    ...
}

ReferenceSFN-AndSlot-r18 ::= SEQUENCE {
    referenceSFN-r18 INTEGER (0..1023),
    referenceSlot-r18 INTEGER (0..639)
}

JitterBound-r18 ::= ENUMERATED {ms0, ms0dot5, ms1, ms1dot5, ms2, ms2dot5, ms3, ms3dot5, ms4, ms4dot5, ms5, ms5dot5, ms6, ms6dot5, ms7, beyondMs7}

SL-PRS-UE-AssistanceInformationNR-r18 ::= SEQUENCE (SIZE (1..maxNrofSL-PRS-TxConfig-r18)) OF SL-PRS-TxInfo-r18

SL-PRS-TxInfo-r18 ::= SEQUENCE {
    sl-PRS-Periodicity-r18 ENUMERATED {ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000, spare6,
    spare5, spare4, spare3, spare2, spare1},
    sl-PRS-Priority-r18 INTEGER (1..8) OPTIONAL,

```

```
sl-PRS-DelayBudget-r18          INTEGER (0..1023)
sl-PRS-Bandwidth-r18           ENUMERATED {mhz5, mhz10, mhz15, mhz20, mhz25, mhz30, mhz35, mhz40,
                                         mhz45, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100}
...
}
--Editor's Note: sl-PRS-Priority and sl-PRS-DelayBudgetis FFS.

-- TAG-UEASSISTANCEINFORMATION-STOP
-- ASN1STOP
```

OPTIONAL,

OPTIONAL,

UEAssistanceInformation field descriptions
<p>activeDuration Indicates the UE's preferred active duration to resolve the IDC problem. 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.</p>
<p>affectedBandwidth Indicates the bandwidth around the center frequency of the carrier frequency range which is affected by the IDC problem. Value mhz5 corresponds to 5 MHz, value mhz10 corresponds to 10 MHz and so on. If <i>candidateBandwidth</i> is not configured, the UE is allowed to report the frequency range for any bandwidth as indicated by <i>affectedBandwidth</i>, within the frequency band limitation as defined in TS 38.101-1 [15], TS 38.101-2 [39], TS 38.101-3 [34] and TS 38.101-5 [75].</p>
<p>affectedCarrierFreqList Indicates a list of NR carrier frequencies that are affected by IDC problem.</p>
<p>affectedCarrierFreqRangeList Indicates a list of NR carrier frequency ranges that are affected by IDC problem.</p>
<p>affectedCarrierFreqCombList Indicates a list of NR carrier frequency combinations that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from NR when configured with UL CA or NR-DC.</p>
<p>affectedCarrierFreqRangeCombList Indicates a list of NR carrier frequency range combinations that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from NR when configured with UL CA or NR-DC</p>
<p>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 (<i>servCellIndex</i>+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.</p>
<p>centerFreq Indicates the center frequency of the carrier frequency range which is affected by the IDC problem.</p>
<p>cycleLength Indicates the UE's preferred cycle length to resolve the IDC problem. Value in ms. Value <i>ms2</i> corresponds to 2 ms, value <i>ms3</i> corresponds to 3 ms, and so on.</p>
<p>delayBudgetReport Indicates the UE-preferred adjustment to connected mode DRX.</p>
<p>interferenceDirection Indicates the direction of IDC interference. Value <i>nr</i> indicates that only NR is victim of IDC interference, value <i>other</i> indicates that only another radio is victim of IDC interference and value <i>both</i> 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]).</p>
<p>maxCandidateBandIndex Indicate the maximum number of band entry index for MUSIM capability restriction reporting.</p>
<p>minSchedulingOffsetPreference Indicates the UE's preferences on <i>minimumSchedulingOffset</i> of cross-slot scheduling for power saving.</p>
<p>minSchedulingOffsetPreferenceExt Indicates the UE's preferences on <i>minimumSchedulingOffset</i> of cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.</p>
<p>multiRx-PreferenceFR2 Indicates the UE's preference on single FR2 Rx operation to address overheating or power saving. This field is allowed to be reported only when UE is configured with serving cells operating on FR2.</p>
<p>musim-AffectedBandsList Indicates the UE's preference on the band(s) and/or combination(s) of bands with restricted capability for MUSIM operation.</p>
<p>musim-AvoidedBandsList Indicates the UE's preference on band(s) and/or combination(s) of bands to be avoided or MUSIM purpose. UE explicitly indicates each band and each combination of bands to be avoided. Network should avoid configure combination of bands that contain these bands or combination of bands.</p>

<i>musim-CapabilityRestricted</i>
Indicates the UE's preference on the temporary capability restriction on the band of bands for MUSIM operation.
<i>musim-CapRestriction</i>
Indicates the UE's preference on SCell(s) or PCell to be released, serving cell(s) with restricted capability, band(s) or combination(s) of bands with restricted capability, or band(s) or band combination(s) to be avoided for UE temporary capabilities restriction. The maximum MIMO/bandwidth within band refers to the maximum MIMO/bandwidth on each CC within this band.
<i>musim-Cell-SCG-ToRelease</i>
Indicates the UE's preference on any serving cell(s), except for Pcell, and/or SCG to be released for MUSIM operation.
<i>musim-CellToAffectList</i>
Indicates the UE's preference on the temporary capability restriction on the serving cell(s) for MUSIM operation.
<i>musim-GapKeepPreference</i>
Indicates the UE's preference to keep all collided gaps for requested MUSIM gap(s). If the field is absent, the colliding MUSIM gaps with lower priority shall be dropped as specified in TS 38.133 [14].
<i>musim-GapPreferenceList</i>
Indicates the UE's MUSIM gap preference and related MUSIM gap configuration, as defined in TS 38.133 [14] clause 9.1.10.
<i>musim-GapPriorityPreferenceList</i>
Indicates the UE's MUSIM gap priority preference for periodic MUSIM gaps as specified in TS 38.133[14]. If the UE includes <i>musim-GapPriorityPreferenceList-r18</i> , it includes the same number of entries, and listed in the same order for periodic gaps, as in <i>musim-GapPreferenceList-r17</i> .
<i>musim-MaxCC</i>
Indicates the UE maximum number of CCs per DL/UL.
<i>musim-NeedForGapsInfoNR</i>
This field is used to indicate the measurement gap requirement information of the UE for NR target bands when in MUSIM operation. The field is not included in NR-DC.
<i>musim-PreferredRRC-State</i>
Indicates the UE's preferred RRC state when leaving RRC_CONNECTED.
<i>n3c-RelayUE-InfoList</i>
Information of available N3C relay UE(s).
<i>nonSDT-DataIndication</i>
Informs the network about the arrival of data and/or signaling mapped to radio bearers not configured for SDT while SDT procedure is ongoing.
<i>preferredDRX-InactivityTimer</i>
Indicates the UE's preferred DRX inactivity timer length for power saving. Value in ms (milliSecond). <i>ms0</i> corresponds to 0, <i>ms1</i> corresponds to 1 ms, <i>ms2</i> corresponds to 2 ms, and so on. If the field is absent from the <i>DRX-Preference</i> IE, it is interpreted as the UE having no preference for the DRX inactivity timer. If secondary DRX group is configured, the <i>preferredDRX-InactivityTimer</i> only applies to the default DRX group.
<i>preferredDRX-LongCycle</i>
Indicates the UE's preferred long DRX cycle length for power saving. Value in ms. <i>ms10</i> corresponds to 10ms, <i>ms20</i> corresponds to 20 ms, <i>ms32</i> corresponds to 32 ms, and so on. If <i>preferredDRX-ShortCycle</i> is provided, the value of <i>preferredDRX-LongCycle</i> shall be a multiple of the <i>preferredDRX-ShortCycle</i> value. If the field is absent from the <i>DRX-Preference</i> IE, it is interpreted as the UE having no preference for the long DRX cycle.
<i>preferredDRX-ShortCycle</i>
Indicates the UE's preferred short DRX cycle length for power saving. Value in ms. <i>ms2</i> corresponds to 2ms, <i>ms3</i> corresponds to 3 ms, <i>ms4</i> corresponds to 4 ms, and so on. If the field is absent from the <i>DRX-Preference</i> IE, it is interpreted as the UE having no preference for the short DRX cycle.
<i>preferredDRX-ShortCycleTimer</i>
Indicates the UE's preferred short DRX cycle timer for power saving. Value in multiples of <i>preferredDRX-ShortCycle</i> . A value of 1 corresponds to <i>preferredDRX-ShortCycle</i> , a value of 2 corresponds to 2 * <i>preferredDRX-ShortCycle</i> and so on. If the field is absent from the <i>DRX-Preference</i> 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.

<p>preferredK0 Indicates the UE's preferred value of <i>k0</i> (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. <i>s/1</i> corresponds to 1 slot, <i>s/2</i> corresponds to 2 slots, <i>s/4</i> 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 <i>k0</i> for cross-slot scheduling for that subcarrier spacing. If the field is absent from the <i>MinSchedulingOffsetPreference</i> IE, it is interpreted as the UE having no preference on <i>k0</i> for cross-slot scheduling.</p>
<p>preferredK2 Indicates the UE's preferred value of <i>k2</i> (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. <i>s/1</i> corresponds to 1 slot, <i>s/2</i> corresponds to 2 slots, <i>s/4</i> 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 <i>k2</i> for cross-slot scheduling for that subcarrier spacing. If the field is absent from the <i>MinSchedulingOffsetPreference</i> IE, it is interpreted as the UE having no preference on <i>k2</i> for cross-slot scheduling.</p>
<p>preferredRRC-State Indicates the UE's preferred RRC state. The value <i>idle</i> is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_IDLE. The value <i>inactive</i> is indicated if the UE prefers to be released from RRC_CONNECTED and transition to RRC_INACTIVE. The value <i>connected</i> is indicated if the UE prefers to revert an earlier indication to leave RRC_CONNECTED state. The value <i>outOfConnected</i> is indicated if the UE prefers to be released from RRC_CONNECTED and has no preferred RRC state to transition to. The value <i>connected</i> can only be indicated if the UE is configured with <i>connectedReporting</i>.</p>
<p>propagationDelayDifference Indicates the one-way service link propagation delay difference between serving cell and each neighbour cell included in <i>neighCellInfoList</i>, defined as neighbour cell's service link propagation delay minus serving cell's service link propagation delay, in number of ms. First entry in <i>propagationDelayDifference</i> corresponds to first entry in <i>neighCellInfoList</i>, second entry in <i>propagationDelayDifference</i> corresponds to second entry in <i>neighCellInfoList</i>, and so on.</p>
<p>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 SCells of the NR MCG, PSCell and SCells of the SCG. This maximum number only includes PSCell and SCells of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum number includes PSCell and 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.</p>
<p>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 SCells of the NR MCG, PSCell and SCells of the SCG. This maximum number only includes PSCell and SCells of the SCG in (NG)EN-DC. When indicated to address power saving, this maximum number includes PSCell and 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.</p>
<p>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 <i>MaxBW-Preference</i> IE or the <i>OverheatingAssistance</i> 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 <i>mhz0</i> 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.</p>

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.

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 <i>ReferenceTimeInfo</i> .
resumeCause
Provides the resume cause based on the information received from the upper layers.
rlm-MeasRelaxationState
Indicates the relaxation state of RLM measurements. Value <i>true</i> indicates that the UE is performing relaxation of RLM measurements, and value <i>false</i> 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 <i>true</i> indicates that the UE fulfils the criterion, and value <i>false</i> 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-PRS-BW
Indicates the desired bandwidth of the requested SL-PRS resources in the unit of MHz.
sl-PRS-DelayBudget
Indicates the SL-PRS delay budget. Upper bound value for the associated response time provided by upper layers (see TS 38.214 [19]), clause 8.2.4.2).
sl-PRS-Periodicity
Indicates the periodicity of SL-PRS transmission.
sl-PRS-Priority
Indicates the priority of SL-PRS. Value 1 is the highest priority whereas value 8 is the lowest priority.
sl-UE-AssistanceInformationNR
Indicates the traffic characteristic of sidelink logical channel(s), specified in the IE <i>SL-TrafficPatternInfo</i> , that are setup for NR sidelink communication.
slotOffset
Indicates the UE's preferred slot offset to resolve the IDC problem, in multiples of 1/32 ms.
startOffset
Indicates the UE's preferred start offset to resolve the IDC problem, in multiples of 1 ms.
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 <i>ms40</i> corresponds to 40 milliseconds, <i>msMinus40</i> 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. Value <i>gps</i> , <i>glonass</i> , <i>bds</i> , <i>galileo</i> and <i>navIC</i> indicates the type of GNSS. Value <i>wlan</i> indicates WLAN and value <i>bluetooth</i> indicates Bluetooth. Value <i>uwb</i> indicates Ultra Wide Band.

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
<p>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.</p>
<p>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.</p>
<p>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.</p>

UL-TrafficInfo field descriptions
<p>burstArrivalTime Indicates the expected arrival time of the first packet of the Data Burst for the concerned QoS flow. If the UE provides both <i>burstArrivalTime</i> and <i>jitterRange</i>, <i>burstArrivalTime</i> is used as a reference time for the indicated jitter range. If <i>burstArrivalTime</i> is indicated as <i>referenceTime</i>, the indicated time in 10ns unit from the origin is $refDays*86400*1000*100000 + refSeconds*1000*100000 + refMilliSeconds*100000 + refTenNanoSeconds$. The <i>refDays</i> field specifies the sequential number of days (with day count starting at 0) from 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time). If <i>burstArrivalTime</i> is indicated as <i>referenceSFN-AndSlot</i>, it refers to the UL timing of the closest SFN and slot of the PCell with the indicated number.</p>
<p>jitterRange Indicates the maximum deviation of the arrival time of the first packet of a Data Burst compared to the time indicated with <i>burstArrivalTime</i> and the periodicity of the Data Bursts. <i>lowerBound</i> indicates the negative deviation while <i>upperBound</i> indicates the positive deviation. This field shall only be reported together with the <i>burstArrivalTime</i> or after the <i>burstArrivalTime</i> has been already reported. Value ms0 corresponds to 0 ms, value 0dot5 to 0.5 ms, value ms1 to 1 ms and so on. Value <i>beyondMs7</i> indicates the jitter bound is higher than 7 ms. Value 0 ms means there is no Data Burst arrival time deviation from the indicated <i>burstArrivalTime</i>.</p>
<p>pduSetIdentification Indicates whether the UE is able to identify PDU Set(s) for the QoS flow. If set to <i>true</i>, the UE is able to identify PDU Set(s) for the associated QoS flow, otherwise, the UE is not able to do so. Before receiving this indication, the network assumes the value is set to <i>false</i>.</p>
<p>psiIdentification Indicates whether the UE is able to identify PSI(s) for the QoS flow. This field shall only be set to <i>true</i> if <i>pduSetIdentification</i> is also set to <i>true</i> (or was set to <i>true</i> previously for the same QoS flow). If set to <i>true</i>, the UE is able to identify PSI(s) for the associated QoS flow, otherwise, the UE is not able to do so. Before receiving this indication, the network assumes the value is set to <i>false</i>.</p>
<p>qfi Identity of the QoS flow to which this UL traffic information refers.</p>
<p>trafficPeriodicity Indicates the average time period between the start times of two data bursts, expressed in the number of microseconds.</p>

– 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 ::=
    rrc-TransactionIdentifier
    criticalExtensions
        ueCapabilityEnquiry
        criticalExtensionsFuture
    }
}

UECapabilityEnquiry-IEs ::=
    ue-CapabilityRAT-RequestList
    lateNonCriticalExtension
    ue-CapabilityEnquiryExt
}

UECapabilityEnquiry-v1560-IEs ::=
    capabilityRequestFilterCommon
    nonCriticalExtension
}

UECapabilityEnquiry-v1610-IEs ::=
    rrc-SegAllowed-r16
    nonCriticalExtension
}

-- TAG-UECAPABILITYENQUIRY-STOP
-- ASN1STOP

```

SEQUENCE {
RRC-TransactionIdentifier,
CHOICE {
UECapabilityEnquiry-IEs,
SEQUENCE {}
}

SEQUENCE {
UE-CapabilityRAT-RequestList,
OCTET STRING OPTIONAL,
OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs) OPTIONAL -- Need N

SEQUENCE {
UE-CapabilityRequestFilterCommon OPTIONAL, -- Need N
UECapabilityEnquiry-v1610-IEs OPTIONAL

SEQUENCE {
ENUMERATED {enabled} OPTIONAL, -- Need N
SEQUENCE {} OPTIONAL

– ***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}
    lateNonCriticalExtension          OCTET STRING
    nonCriticalExtension              UEInformationRequest-v1700-IEs
}

UEInformationRequest-v1700-IEs ::= SEQUENCE {
    successHO-ReportReq-r17          ENUMERATED {true}
    coarseLocationRequest-r17       ENUMERATED {true}
    nonCriticalExtension              UEInformationRequest-v1800-IEs
}

UEInformationRequest-v1800-IEs ::= SEQUENCE {
    flightPathInfoReq-r18            FlightPathInfoReportConfig-r18
    successPSCell-ReportReq-r18     ENUMERATED {true}
    reselectionMeasurementReq-r18   ENUMERATED {true}
    nonCriticalExtension              SEQUENCE {}
}

FlightPathInfoReportConfig-r18 ::= SEQUENCE {
    maxWayPointNumber-r18            INTEGER (1..maxWayPoint-r18),
    includeTimeStamp-r18             ENUMERATED {true}
}

-- TAG-UEINFORMATIONREQUEST-STOP
-- ASN1STOP

```

```

OPTIONAL, -- Need N
OPTIONAL,
OPTIONAL

OPTIONAL, -- Need N
OPTIONAL, -- Need N
OPTIONAL

OPTIONAL, -- Need N
OPTIONAL, -- Need N
OPTIONAL, -- Need N
OPTIONAL

OPTIONAL -- Need N

```

<i>UEInformationRequest-IEs field descriptions</i>
<i>coarseLocationRequest</i> This field is used to request UE to report coarse location information.
<i>connEstFailReportReq</i> This field is used to indicate whether the UE shall report information about the connection failure.
<i>flightPathInfoReq</i> This field is used to indicate whether the UE shall report the flight path information, if available, and to specify the flight path information report configuration.
<i>idleModeMeasurementReq</i> This field indicates that the UE shall report the idle/inactive measurement information, if available, to the network in the <i>UEInformationResponse</i> message.
<i>logMeasReportReq</i> This field is used to indicate whether the UE shall report information about logged measurements.
<i>mobilityHistoryReportReq</i> This field is used to indicate whether the UE shall report information about mobility history information.
<i>ra-ReportReq</i> This field is used to indicate whether the UE shall report information about the random access procedure.
<i>reselectionMeasurementReq</i> This field indicates that the UE shall report the reselection measurement information, if available, to the network in the <i>UEInformationResponse</i> message.
<i>rlf-ReportReq</i> This field is used to indicate whether the UE shall report information about the radio link failure.
<i>successHO-ReportReq</i> This field is used to indicate whether the UE shall report information about the successful handover report.
<i>successPSCell-ReportReq</i> This field is used to indicate whether the UE shall report information about the successful PSCell change or addition report.

<i>FlightPathInfoReportConfig field descriptions</i>
<i>includeTimeStamp</i> Indicates whether time stamp of each way point can be reported in the flight path information report if time stamp information is available at the UE.
<i>maxWayPointNumber</i> Indicates the maximum number of way points UE can include in the flight path information report if this information is available at the UE.

– *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 UEInformationResponse-v1800-IEs OPTIONAL
}

UEInformationResponse-v1800-IEs ::= SEQUENCE {
    flightPathInfoReport-r18 FlightPathInfoReport-r18 OPTIONAL,
    successPSCell-Report-r18 SuccessPSCell-Report-r18 OPTIONAL,
    measResultReselectionNR-r18 MeasResultIdleNR-r16 OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

FlightPathInfoReport-r18 ::= SEQUENCE (SIZE (0..maxWayPoint-r18)) OF WayPoint-r18

WayPoint-r18 ::= SEQUENCE {
    wayPointLocation-r18 OCTET STRING,
    timeStamp-r18 AbsoluteTimeInfo-r16 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)
    }
}

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 ::=
  cellId-r16
  cellGlobalId-r16
  pci-arfcn-r16
},
ra-InformationCommon-r16
raPurpose-r16
...
[[
  spCellID-r17
]]
}

RA-InformationCommon-r16 ::=
  absoluteFrequencyPointA-r16
  locationAndBandwidth-r16
  subcarrierSpacing-r16
  msg1-FrequencyStart-r16
  msg1-FrequencyStartCFRA-r16
  msg1-SubcarrierSpacing-r16
  msg1-SubcarrierSpacingCFRA-r16
  msg1-FDM-r16
  msg1-FDMCFRA-r16
  perRAInfoList-r16
...
[[
  perRAInfoList-v1660
]],
[[
  msg1-SCS-From-prach-ConfigurationIndex-r16
]],
[[
  msg1-SCS-From-prach-ConfigurationIndexCFRA-r16
]],
[[
  msgA-RO-FrequencyStart-r17
  msgA-RO-FrequencyStartCFRA-r17
  msgA-SubcarrierSpacing-r17
  msgA-RO-FDM-r17
  msgA-RO-FDMCFRA-r17
  msgA-SCS-From-prach-ConfigurationIndex-r17
  msgA-TransMax-r17
  msgA-MCS-r17
  nrofPRBs-PerMsgA-PO-r17
  msgA-PUSCH-TimeDomainAllocation-r17

```

```

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
]],
[[
usedFeatureCombination-r18        ReportedFeatureCombination-r18          OPTIONAL,
triggeredFeatureCombination-r18   ReportedFeatureCombination-r18          OPTIONAL,
startPreambleForThisPartition-r18 INTEGER (0..63)                          OPTIONAL,
numberOfPreamblesPerSSB-ForThisPartition-r18  INTEGER (1..64)                        OPTIONAL,
attemptedBWP-InfoList-r18        SEQUENCE (SIZE (1..maxNrofBWPs)) OF AttemptedBWP-Info-r18  OPTIONAL,
numberOfLBTFailures-r18          INTEGER (1..128)                        OPTIONAL,
perRAInfoList-v1800              PerRAInfoList-v1800                     OPTIONAL,
sdt-Failed-r18                   ENUMERATED {true}                       OPTIONAL,
SEQUENCE (SIZE (1..maxSIB)) OF SIB-Type-r18  OPTIONAL,
intendedSIBs-r18
]]
}

AttemptedBWP-Info-r18 ::= SEQUENCE {
  locationAndBandwidth-r18      INTEGER (0..37949),
  subcarrierSpacing-r18        SubcarrierSpacing
}

ReportedFeatureCombination-r18 ::= SEQUENCE {
  redCap-r18                    ENUMERATED {true}                               OPTIONAL,
  smallData-r18                 ENUMERATED {true}                               OPTIONAL,
  nsag-r18                      NSAG-List-r17                               OPTIONAL,
  msg3-Repetitions-r18          ENUMERATED {true}                               OPTIONAL,
  msg1-Repetitions-r18          ENUMERATED {true}                               OPTIONAL,
  eRedCap-r18                   ENUMERATED {true}                               OPTIONAL,
  triggered-S-NSSAI-List-r18    SEQUENCE (SIZE (1..maxNrofS-NSSAI)) OF S-NSSAI  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
}

PerRAInfoList-v1800 ::= SEQUENCE (SIZE (1..200)) OF PerRAInfo-v1800

PerRAInfo-v1800 ::= CHOICE {
  perRASSBInfoList-v1800        PerRASSBInfo-v1800,
  perRACSI-RSInfoList-v1800    PerRACSI-RSInfo-v1800
}

PerRASSBInfo-r16 ::= SEQUENCE {
  ssb-Index-r16                SSB-Index,

```



```

    numberOfPreamblesSentOnSSB-r16      INTEGER (1..200),
    perRAAttemptInfoList-r16            PerRAAttemptInfoList-r16
}

PerRASSBInfo-v1800 ::=
    allPreamblesBlocked                 ENUMERATED {true}                OPTIONAL,
    lbt-Detected-r18                    ENUMERATED {true}                OPTIONAL,
    ...
}

PerRACSI-RSInfo-r16 ::=
    csi-RS-Index-r16                    CSI-RS-Index,
    numberOfPreamblesSentOnCSI-RS-r16   INTEGER (1..200)
}

PerRACSI-RSInfo-v1660 ::=
    csi-RS-Index-v1660                  INTEGER (1..96)                OPTIONAL
}

PerRACSI-RSInfo-v1800 ::=
    allPreamblesBlocked                 ENUMERATED {true}                OPTIONAL,
    lbt-Detected-r18                    ENUMERATED {true}                OPTIONAL,
    ...
}

PerRAAttemptInfoList-r16 ::=
    SEQUENCE (SIZE (1..200)) OF PerRAAttemptInfo-r16

PerRAAttemptInfo-r16 ::=
    contentionDetected-r16              BOOLEAN                OPTIONAL,
    dlRSRPAboveThreshold-r16           BOOLEAN                OPTIONAL,
    ...
    [[
    fallbackToFourStepRA-r17           ENUMERATED {true}        OPTIONAL
    ]]
}

SIB-Type-r17 ::= ENUMERATED {sibType2, sibType3, sibType4, sibType5, sibType9, sibType10, sibType11, sibType12,
    sibType13, sibType14, posSIB-v1810, spare5, spare4, spare3, spare2, spare1}

SIB-Type-r18 ::= ENUMERATED {sibType15, sibType16, sibType17, sibType18, sibType19, sibType20,
    sibType21, sibType22, sibType23, sibType24, sibType25, spare5, spare4,
    spare3, spare2, spare1}

RLF-Report-r16 ::=
    nr-RLF-Report-r16                   SEQUENCE {
        measResultLastServCell-r16      MeasResultRLFNR-r16,
        measResultNeighCells-r16        SEQUENCE {
            measResultListNR-r16         MeasResultList2NR-r16        OPTIONAL,
            measResultListEUTRA-r16     MeasResultList2EUTRA-r16   OPTIONAL,
        }
        c-RNTI-r16                       RNTI-Value,
        previousPCellId-r16              CHOICE {
            nrPreviousCell-r16          CGI-Info-Logging-r16,
            eutraPreviousCell-r16       CGI-InfoEUTRALogging
        }
    }

```

failedPCellId-r16	CHOICE {	OPTIONAL,
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
]],		
[[
pSCellId-r18	CHOICE {	
cellGlobalId-r18	CGI-Info-Logging-r16,	
pci-arfcn-r18	PCI-ARFCN-NR-r16	
}		OPTIONAL,
mcgRecoveryFailureCause-r18	ENUMERATED {t316-Expiry, scgDeactivated, spare2, spare1}	OPTIONAL,
scgFailureCause-r18	ENUMERATED {t310-Expiry, randomAccessProblem, rlc-MaxNumRetx, synchReconfigFailureSCG, scg-ReconfigFailure, srb3-IntegrityFailure, scg-lbtFailure-r16, beamFailureRecoveryFailure-r16, t312-Expiry-r16, bh-RLF-r16, beamFailure-r17, spare3, spare2, spare1 }	
		OPTIONAL,
elapsedTimeSCGFailure-r18	ElapsedTimeSCGFailure-r18	OPTIONAL,
voiceFallbackHO-r18	ENUMERATED {true}	OPTIONAL,
measResultLastServCell-RSSI-r18	RSSI-Range-r16	OPTIONAL,

```

    measResultNeighFreqList-RSSI-r18      MeasResultNeighFreqList-RSSI-r18      OPTIONAL,
    bwp-Info-r18                          AttemptedBWP-Info-r18                  OPTIONAL,
    elapsedTimeT316-r18                    ElapsedTimeT316-r18                    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 ::=
  sourceCellInfo-r17                      SEQUENCE {
    sourcePCellId-r17                      SEQUENCE {
      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,
    }
    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,
    . . .
    [[
    eutraTargetCellInfo-r18                 SEQUENCE {
      targetPCellId-r18                     CHOICE {
        cellGlobalId-r18                    CGI-Info-Logging-r16,
        pci-arfcn-r18                       PCI-ARFCN-EUTRA-r16
      },
      targetCellMeas-r18                     MeasQuantityResultsEUTRA                OPTIONAL
    }
    measResultServCell-RSSI-r18              RSSI-Range-r16                          OPTIONAL,
    measResultNeighFreqList-RSSI-r18         MeasResultNeighFreqList-RSSI-r18       OPTIONAL,
    eutra-C-RNTI-r18                         EUTRA-C-RNTI                            OPTIONAL,
    timeSinceSHR-r18                         TimeSinceSHR-r18                         OPTIONAL
  ]]
}

SuccessPSCell-Report-r18 ::=
  pCellId-r18                             SEQUENCE {
    sourcePSCellInfo-r18                   SEQUENCE {

```

```

        sourcePSCellId-r18          CHOICE {
            cellGlobalId-r18
            pci-arfcn-r18
        },
        sourcePSCellMeas-r18        MeasResultSuccessHONR-r17          OPTIONAL
    }
    targetPSCellInfo-r18           SEQUENCE {
        targetPSCellId-r18         CHOICE {
            cellGlobalId-r18
            pci-arfcn-r18
        },
        targetPSCellMeas-r18        MeasResultSuccessHONR-r17          OPTIONAL
    },
    measResultNeighCells-r18        SEQUENCE {
        measResultListNR-r18        MeasResultList2NR-r16          OPTIONAL,
        measResultListEUTRA-r18     MeasResultList2EUTRA-r16       OPTIONAL,
    }
    spr-Cause-r18                  SPR-Cause-r18                  OPTIONAL,
    timeSinceCPAC-Reconfig-r18     TimeSinceCPAC-Reconfig-r18     OPTIONAL,
    locationInfo-r18                LocationInfo-r16                 OPTIONAL,
    ra-InformationCommon-r18        RA-InformationCommon-r16        OPTIONAL,
    sn-InitiatedPSCellChange-r18    ENUMERATED {true}              OPTIONAL,
    ...
}

MeasResultNeighFreqList-RSSI-r18 ::= SEQUENCE(SIZE (1..maxFreq)) OF MeasResultNeighFreq-RSSI-r18

MeasResultNeighFreq-RSSI-r18 ::= SEQUENCE {
    ssbFrequency-r18                ARFCN-ValueNR                  OPTIONAL,
    ssbSubcarrierSpacing-r18        SubcarrierSpacing              OPTIONAL,
    refFreqCSI-RS-r18              ARFCN-ValueNR                  OPTIONAL,
    measResult-RSSI-r18             RSSI-Range-r16                 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,

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```

    resultsSSB-Cell-r16
    numberOfGoodSSB-r16
}
MeasResult2EUTRA-r16 ::=
    carrierFreq-r16
    measResultList-r16
}
MeasResultRLFNR-r16 ::=
    measResult-r16
        cellResults-r16
            resultsSSB-Cell-r16
            resultsCSI-RS-Cell-r16
        },
        rsIndexResults-r16
            resultsSSB-Indexes-r16
            ssbRLMConfigBitmap-r16
            resultsCSI-RS-Indexes-r16
            csi-rsRLMConfigBitmap-r16
    }
}
MeasResultSuccessHONR-r17 ::=
    measResult-r17
        cellResults-r17
            resultsSSB-Cell-r17
            resultsCSI-RS-Cell-r17
        },
        rsIndexResults-r17
            resultsSSB-Indexes-r17
            resultsCSI-RS-Indexes-r17
    }
}
ChoCandidateCellList-r17 ::=
    SEQUENCE(SIZE (1..maxNrofCondCells-r16)) OF ChoCandidateCell-r17
ChoCandidateCell-r17 ::=
    CHOICE {
        cellGlobalId-r17
        pci-arfcn-r17
    }
SHR-Cause-r17 ::=
    SEQUENCE {
        t304-cause-r17
        t310-cause-r17
        t312-cause-r17
        sourceDAPS-Failure-r17
        ...
    }
SPR-Cause-r18 ::=
    SEQUENCE {
        t304-cause-r18
    }

```

```
t310-cause-r18          ENUMERATED {true}
t312-cause-r18          ENUMERATED {true}
...
}
OPTIONAL,
OPTIONAL,

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

MobilityHistoryReport-r16 ::= VisitedCellInfoList-r16

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

TimeSinceCHO-Reconfig-r17 ::= INTEGER (0..1023)

TimeSinceCPAC-Reconfig-r18 ::= INTEGER (0.. 1023)

TimeConnSourceDAPS-Failure-r17 ::= INTEGER (0..1023)

UPInterruptionTimeAtHO-r17 ::= INTEGER (0..1023)

ElapsedTimeT316-r18 ::= INTEGER (0..2000)

ElapsedTimeSCGFailure-r18 ::= INTEGER (0..1023)

TimeSinceSHR-r18 ::= INTEGER (0..172800)

-- TAG-UEINFORMATIONRESPONSE-STOP
-- ASN1STOP
```

UEInformationResponse-IEs field descriptions
<p>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 <i>degreesLatitude</i> and <i>degreesLongitude</i> 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.</p>
<p>connEstFailReport This field is used to provide connection establishment failure or connection resume failure information.</p>
<p>connEstFailReportList This field is used to provide the list of <i>connEstFailReport</i> that are stored by the UE for the past up to <i>maxCEFReport-r17</i>.</p>
<p>flightPathInfoReport This field is used to provide the flight path information as list of waypoints and, if available, corresponding timestamps. List of size zero indicates the previously provided flight path information is no longer valid.</p>
<p>logMeasReport This field is used to provide the measurement results stored by the UE associated to logged MDT.</p>
<p>measResultIdleEUTRA EUTRA measurement results performed during RRC_INACTIVE or RRC_IDLE.</p>
<p>measResultIdleNR NR measurement results performed during RRC_INACTIVE or RRC_IDLE.</p>
<p>ra-ReportList This field is used to provide the list of RA reports that is stored by the UE for the past upto <i>maxRARReport-r16</i> number of successful random access procedures, or failed or successful completion of on-demand system information request procedure. If the UE is an eRedCap UE, this field is used to provide the list of RA reports that is stored by the UE for the past up to 2 number of successful random access procedures, or failed or successful completion of on-demand system information request procedure.</p>
<p>rif-Report This field is used to indicate the RLF report related contents.</p>
<p>successHO-Report This field is used to provide the successful handover report if triggered based on the successful handover configuration.</p>
<p>successPSCell-Report This field is used to provide the successful PSCell change or addition report if triggered based on the successful PSCell change or addition report configuration.</p>

LogMeasReport field descriptions	
<i>absoluteTimeStamp</i>	Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by NR within <i>absoluteTimeInfo</i> .
<i>anyCellSelectionDetected</i>	This field is used to indicate the detection of <i>any cell selection</i> 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.
<i>inDeviceCoexDetected</i>	Indicates that measurement logging is suspended due to IDC problem detection.
<i>measResultServingCell</i>	This field refers to the log measurement results taken in the Serving cell.
<i>numberOfGoodSSB</i>	Indicates the number of good beams (beams that are above <i>absThreshSS-BlocksConsolidation</i> , 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 <i>absThreshSS-BlocksConsolidation</i> or if the network has not configured the <i>absThreshSS-BlocksConsolidation</i> , then the UE does not include <i>numberOfGoodSSB</i> for the corresponding neighbour cell. If the UE has no SSB of the serving cell whose measurement quantity is above the <i>absThreshSS-BlocksConsolidation</i> or if the network has not configured the <i>absThreshSS-BlocksConsolidation</i> , then the UE shall set the <i>numberOfGoodSSB</i> for the serving cell to one.
<i>relativeTimeStamp</i>	Indicates the time of logging measurement results, measured relative to the <i>absoluteTimeStamp</i> . Value in seconds.
<i>tce-Id</i>	Parameter Trace Collection Entity Id: See TS 32.422 [52].
<i>traceRecordingSessionRef</i>	Parameter Trace Recording Session Reference: See TS 32.422 [52].

ConnEstFailReport field descriptions	
<i>measResultFailedCell</i>	This field refers to the last measurement results taken in the cell, where connection establishment failure or connection resume failure happened.
<i>measResultNeighCells</i>	This field refers to the neighbour cell measurements when connection establishment failure or connection resume failure happened.
<i>numberOfConnFail</i>	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.
<i>timeSinceFailure</i>	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	
<i>absoluteFrequencyPointA</i>	This field indicates the absolute frequency position of the reference resource block (Common RB 0).
<i>allPreamblesBlocked</i>	This field is included when the all the preamble transmission attempts in the corresponding beam (SSB or CSI-RS) are blocked by failed LBT.
<i>attemptedBWP-InfoList</i>	This field indicates <i>locationAndBandwidth</i> and <i>subcarrierSpacing</i> of all the bandwidth parts in which the consistent LBT failures are triggered at the moment of successful RA completion.
<i>locationAndBandwidth</i>	Frequency domain location and bandwidth of the bandwidth part associated to the random-access resources used by the UE or of the bandwidth part in which the consistent LBT failures is triggered and not cancelled prior to successful completion of random access procedure (if this field is included in <i>attemptedBWP-InfoList</i>) or prior to RLF/HOF (if this field is included in <i>attemptedBWP-InfoList</i> or <i>bwp-Info</i>).
<i>numberOfLBTFailures</i>	This field is used to indicate the total number of preamble transmission attempts for which LBT failure indication is received in the RA procedure. If the number of LBT failure indications received from lower layers during the RA procedure exceeds or equals to 128, UE sets the field to 128. This field is optional present when there is at least one preamble transmission attempt for which LBT failure indication is received during the RA procedure, otherwise it is absent.
<i>numberOfPreamblesPerSSB-ForThisPartition</i>	This field determines how many consecutive preambles are associated to the used feature or combination of features starting from the starting preamble(s) per SSB.
<i>perRAInfoList, perRAInfoList-v1660</i>	This field provides detailed information about each of the random access attempts in the chronological order of the random access attempts. If <i>perRAInfoList-v1660</i> is present, it shall contain the same number of entries, listed in the same order as in <i>perRAInfoList-r16</i> .
<i>sdt-Failed</i>	This field is included when the RA report entry is included because of SDT and if the SDT transmission failed. Otherwise, the field is absent.
<i>startPreambleForThisPartition</i>	This field indicates the first preamble associated with the used feature or combination of features.
<i>subcarrierSpacing</i>	Subcarrier spacing used in the bandwidth part associated to the random-access resources used by the UE or of the bandwidth part in which the consistent LBT failures is triggered and not cancelled prior to successful completion of random access procedure (if this field is included in <i>attemptedBWP-InfoList</i>) or prior to RLF/HOF (if this field is included in <i>attemptedBWP-InfoList</i> or <i>bwp-Info</i>).
<i>triggeredFeatureCombination</i>	One or more features (e.g., <i>RedCap</i> , <i>Slicing</i> , <i>SDT</i> and <i>MSG3 repetition</i>) that triggers the random-access procedure. When triggered feature is <i>Slicing</i> , UE includes all the S-NSSAIs associated to the slices triggering the access attempt in the random-access procedure.
<i>usedFeatureCombination</i>	The feature or combination of features (e.g., <i>redCap</i> , <i>smallData</i> , <i>nsag</i> and <i>msg3-Repetitions</i>) associated to the used random-access resources as specified in TS 38.321[3].

RA-Report field descriptions
<p>cellID This field indicates the CGI of the cell in which the associated random access procedure was performed.</p>
<p>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 <i>raPurpose</i> is set to <i>requestForOtherSI</i> or when the RA attempt is a 2-step RA attempt and fallback to 4-step RA did not occur (i.e. <i>fallbackToFourStepRA</i> is not included).</p>
<p>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.</p>
<p>dlPathlossRSRP Measured RSRP of the DL pathloss reference obtained at the time of <i>RA_Type</i> selection stage of the RA procedure as captured in TS 38.321 [3].</p>
<p>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 <i>rsrp-ThresholdSSB</i> in <i>beamFailureRecoveryConfig</i> in UL BWP configuration of UL BWP selected for random access procedure initiated for beam failure recovery; Otherwise, if the UE has received <i>rsrp-ThresholdSSB</i> in <i>FeatureCombinationPreambles</i> used for the feature specific random access, the field is used to indicate whether DL beam (SSB) quality associated to the random access attempt was above or below this <i>rsrp-ThresholdSSB-r17</i>, else <i>rsrp-ThresholdSSB</i> in <i>rach-ConfigCommon</i> in UL BWP configuration of UL BWP selected for random access procedure. In 2 step random access procedure, if the UE has received <i>msgA-RSRP-ThresholdSSB</i> in <i>FeatureCombinationPreambles</i> used for the feature specific random access, the field is used to indicate whether DL beam (SSB) quality associated to the random access attempt was above or below this <i>rsrp-ThresholdSSB-r17</i>, else this field is used to indicate whether the DL beam (SSB) quality associated to the random access attempt was above or below the threshold <i>msgA-RSRP-ThresholdSSB</i> in <i>rach-ConfigCommonTwoStepRA</i> in UL BWP configuration of UL BWP selected for random access procedure.</p>
<p>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.</p>
<p>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.</p>
<p>lbt-Detected This field is included when there is at least one LBT failure indication received prior to change of beam for preamble transmission during RA procedure, otherwise this field is absent.</p>
<p>msg1-SCS-From-prach-ConfigurationIndex This field is set by the UE with the corresponding SCS for CBRA as derived from the <i>prach-ConfigurationIndex</i> in <i>RACH-ConfigGeneric</i> when the <i>msg1-SubcarrierSpacing</i> is absent; otherwise, this field is absent.</p>
<p>msg1-SCS-From-prach-ConfigurationIndexCFRA This field is set by the UE with the corresponding SCS for CFRA as derived from the <i>prach-ConfigurationIndex</i> in <i>RACH-ConfigGeneric</i> when the <i>msg1-SubcarrierSpacing</i> is absent; otherwise, this field is absent.</p>
<p>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.</p>
<p>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..</p>
<p>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.</p>

<i>msgA-RO-FrequencyStart</i>
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.
<i>msgA-RO-FrequencyStartCFRA</i>
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.
<i>msgA-SCS-From-prach-ConfigurationIndex</i>
This field is set by the UE with the corresponding SCS as derived from the <i>msgA-PRACH-ConfigurationIndex</i> in <i>RACH-ConfigGenericTwoStepRA</i> (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 <i>msgA-SubcarrierSpacing</i> 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.
<i>numberOfPreamblesSentOnCSI-RS</i>
This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding CSI-RS.
<i>numberOfPreamblesSentOnSSB</i>
This field is used to indicate the total number of successive RA preambles that were transmitted on the corresponding SS/PBCH block.
<i>onDemandSISuccess</i>
This field is set to <i>true</i> 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.
<i>perRAAttemptInfoList</i>
This field provides detailed information about a random access attempt.
<i>perRACSI-RSInfoList</i>
This field provides detailed information about the successive random access attempts associated to the same CSI-RS.
<i>perRASSBInfoList</i>
This field provides detailed information about the successive random access attempts associated to the same SS/PBCH block.
<i>ra-InformationCommon</i>
This field is used to provide information on random access attempts. This field is mandatory present.
<i>raPurpose</i>
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 <i>beamFailureRecovery</i> is used in case of successful beam failure recovery related RA procedure in the SpCell [3]. The indicator <i>reconfigurationWithSync</i> is used if the UE executes a reconfiguration with sync. The indicator <i>ulUnSynchronized</i> is used if the random access procedure is initiated in a SpCell by DL or UL data arrival during RRC_CONNECTED when the <i>timeAlignmentTimer</i> is not running in the PTAG or if the RA procedure is initiated in a serving cell by a PDCCH order [3]. The indicator <i>schedulingRequestFailure</i> is used in case of SR failures [3]. The indicator <i>noPUCCHResourceAvailable</i> is used when the UE has no valid SR PUCCH resources configured [3]. The indicator <i>requestForOtherSI</i> is used for MSG1 based on demand SI request. The indicator <i>msg3RequestForOtherSI</i> is used in case of MSG3 based SI request. The indication <i>lbtFailure</i> is used when the UE initiates RACH in SpCell due to consistent uplink LBT failures [3]. The field can also be used for the SCG-related RA-Report when the <i>raPurpose</i> is set to <i>beamFailureRecovery</i> , <i>reconfigurationWithSync</i> , <i>ulUnSynchronized</i> , <i>schedulingRequestFailure</i> , <i>noPUCCHResourceAvailable</i> and <i>lbtFailure</i> .
<i>spCellID</i>
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.
<i>ssb-Index</i>
This field is used to indicate the SS/PBCH index of the SS/PBCH block corresponding to the random access attempt.
<i>ssbsForSI-Acquisition</i>
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 <i>raPurpose</i> is set to <i>requestForOtherSI</i> or <i>msg3RequestForOtherSI</i>). Otherwise, the field is absent.

RLF-Report field descriptions
<p><i>bwp-Info</i> This field is used to indicate the BWP information in which the UE detected consistent uplink LBT failure. This field is set only when the detected consistent uplink LBT failure did not trigger the random access procedure.</p>
<p><i>choCandidateCellList</i> This field is used to indicate the list of candidate target cells for conditional handover included in <i>condRRCReconfig</i> at the time of connection failure. The field does not include the candidate target cells included in <i>measResultNeighCells</i>.</p>
<p><i>choCellId</i> This field is used to indicate the candidate target cell for conditional handover included in <i>condRRCReconfig</i> that the UE selected for CHO based recovery while T311 is running.</p>
<p><i>connectionFailureType</i> This field is used to indicate whether the connection failure is due to radio link failure or handover failure.</p>
<p><i>csi-rsRLMConfigBitmap, csi-rsRLMConfigBitmap-v1650</i> 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 <i>csi-rsRLMConfigBitmap-r16</i> to indicate the first 96 CSI-RS indexes and then <i>csi-rsRLMConfigBitmap-v1650</i> to indicate the latter 96 CSI-RS indexes. The first/leftmost bit in <i>csi-rsRLMConfigBitmap-r16</i> corresponds to CSI-RS index 0, the second bit corresponds to CSI-RS index 1. The first/leftmost bit in <i>csi-rsRLMConfigBitmap-v1650</i> corresponds to CSI-RS index 96, the second bit corresponds to CSI-RS index 97. These fields are included only if the <i>RadioLinkMonitoringConfig</i> for the respective BWP is configured.</p>
<p><i>c-RNTI</i> 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.</p>
<p><i>elapsedTimeSCGFailure</i> This field is used to indicate the time elapsed between the SCG failure and the MCG failure. The maximum value <i>1023</i> means 1023ms or longer.</p>
<p><i>elapsedTimeT316</i> This field is used to indicate the value of the elapsed time of the timer T316. Value in milliseconds.</p>
<p><i>failedPCellId</i> 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 <i>nrFailedPCellId</i> is included and for the handover from NR to EUTRA <i>eutraFailedPCellId</i> is included. The UE sets the ARFCN according to the frequency band used for transmission/ reception when the failure occurred.</p>
<p><i>failedPCellId-EUTRA</i> 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.</p>
<p><i>lastHO-Type</i> This field is used to indicate the type of the last executed handover before the last detected connection failure. The field is set to <i>cho</i> if the last executed handover was initiated by a conditional reconfiguration execution. The field is set to <i>daps</i> if the last executed handover was a DAPS handover.</p>
<p><i>mcgRecoveryFailureCause</i> This field is used to indicate the cause of the fast MCG recovery failure.</p>
<p><i>measResultListEUTRA</i> This field refers to the last measurement results taken in the neighboring EUTRA Cells, when the radio link failure or handover failure happened.</p>
<p><i>measResultListNR</i> This field refers to the last measurement results taken in the neighboring NR Cells, when the radio link failure or handover failure happened.</p>
<p><i>measResultLastServCell</i> This field refers to the log measurement results taken in the PCell upon detecting radio link failure or the source PCell upon handover failure.</p>
<p><i>measResultLastServCell-RSSI</i> This field refers to the log RSSI measurement results in dBm (see TS 38.215 [9]) taken for the frequency of the PCell upon detecting radio link failure or handover failure.</p>
<p><i>measResultNeighFreqList-RSSI</i> This field is used to log the RSSI measurement results in dBm (see TS 38.215 [9]) taken for the neighbouring frequencies upon detecting radio link failure or handover failure, when UE operates in unlicensed spectrum.</p>

measResult-RLF-Report-EUTRA Includes the E-UTRA <i>RLF-Report-r9</i> IE as specified in TS 36.331 [10].
measResult-RLF-Report-EUTRA-v1690 Includes the E-UTRA <i>RLF-Report-v9e0</i> 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 <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> was received). For intra-NR handover <i>nrPreviousCell</i> is included and for the handover from EUTRA to NR <i>eutraPreviousCell</i> is included.
pSCellId This field is used to indicate the PSCell in which the UE failed to perform fast MCG recovery procedure or the UE successfully performed fast MCG recovery procedure.
ra-InformationCommon This field is optionally included when <i>connectionFailureType</i> is set to 'hof' or when <i>connectionFailureType</i> is set to 'rlf' and the <i>rlf-Cause</i> 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, or to indicate the suitable cell in which the UE reconnects after failure in performing <i>MobilityFromNRCommand</i> for voice fallback (without initiating re-establishment procedure). If the UE comes back to RRC CONNECTED in an NR cell then <i>nrReconnectCellId</i> is included and if the UE comes back to RRC CONNECTED in an LTE cell then <i>eutraReconnectCellId</i> is included.
reestablishmentCellId If the UE was not configured with <i>conditionalReconfiguration</i> 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 <i>connectionFailureType</i> 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 <i>RadioLinkMonitoringConfig</i> 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.
voiceFallbackHO This field is set if for the failed mobility from NR, the <i>voiceFallbackIndication</i> was included in the <i>MobilityFromNRCommand</i> message.

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.
eutraTargetCellInfo	This field is used to indicate the target EUTRA PCell and the last measurement results of the target PCell of a handover in which the successful handover triggers the <i>SuccessHO-Report</i> .
eutra-C-RNTI	This field indicates the C-RNTI assigned by the E-UTRA target PCell of the mobility from NR command 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.
measResultNeighFreqList-RSSI	This field is used to log the RSSI measurement results in dBm (see TS 38.215 [9]) taken for the neighbouring frequencies upon successful handover execution.
measResultServCell-RSSI	This field refers to the log RSSI measurement results in dBm (see TS 38.215 [9]) taken for the frequency of the source PCell upon successful handover execution.
rif-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 <i>SuccessHO-Report</i> .
sourcePCellId	This field is used to indicate the source PCell of a handover in which the successful handover triggers the <i>SuccessHO-Report</i> .
targetPCellId	This field is used to indicate the target PCell of a handover in which the successful handover triggers the <i>SuccessHO-Report</i> .
targetCellMeas	This field refers to the last measurement results taken in the target PCell of a handover in which the successful handover triggers the <i>SuccessHO-Report</i> .
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.
timeSinceSHR	This field is used to indicate the time elapsed since the execution of the last MobilityFromNRCommand towards the target EUTRA cell. Value in seconds. The maximum value 172800 means 172800s or longer.
uplInterruptionTimeAtHO	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.

FlightPathInfoReport field descriptions	
timeStamp	Time stamp that describes estimated time of arrival, if available, of the UE at the corresponding <i>wayPointLocation</i> .
wayPointLocation	Location coordinates of the planned waypoint. Parameter type <i>LocationCoordinates</i> defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit.

SuccessPSCell-Report field descriptions	
measResultListNR	This field refers to the last measurement results according to the initiating node configuration taken in the neighboring NR Cells when a successful PSCell change/addition is executed.
pCellId	This field is used to indicate the PCell to which the UE was connected when the successful PSCell change or addition triggers the <i>SuccessPSCell-Report</i> .
sn-InitiatedPSCellChange	This field indicates whether the PSCell change procedure for which the successful PSCell change report is logged is SN initiated or not.
spr-Cause	This field is used to indicate the cause of the successful PSCell change or addition report.
sourcePSCellId	This field is used to indicate the source PSCell of a PSCell change in which the successful PSCell change triggers the <i>SuccessPSCell-Report</i> .
sourcePSCellMeas	This field refers to the last measurement results taken in the source PSCell of a PSCell change in which the successful PSCell change triggers the <i>SuccessPSCell-Report</i> .
targetPSCellId	This field is used to indicate the target PSCell of a PSCell change/addition in which the successful PSCell change or addition triggers the <i>SuccessPSCell-Report</i> .
targetPSCellMeas	This field refers to the last measurement results taken in the target PSCell of a PSCell change/addition in which the successful PSCell change or addition triggers the <i>SuccessPSCell-Report</i> .
timeSinceCPAC-Reconfig	This field is used to indicate the time elapsed between the initiation of the last conditional reconfiguration execution towards the target PSCell and the reception of the latest conditional reconfiguration for this target PSCell. Actual value = field value * 100ms. The maximum value 1023 means 102.3s 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-l-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 <i>UEPositioningAssistanceInfo</i> . Value <i>tc0</i> corresponds to 0 Tc, <i>tc2</i> 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 or SRB5 is used at transfer of segments of *MeasurementReportAppLayer*.

Signalling radio bearer: SRB1, SRB4 or SRB5

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 ::=
    criticalExtensions
        c1
            ulInformationTransferIRAT-r16
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture
    }
}

ULInformationTransferIRAT-r16-IEs ::=
    ul-DCCH-MessageEUTRA-r16
    lateNonCriticalExtension
    nonCriticalExtension
}

-- 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 ::=
    criticalExtensions
        c1
            ulInformationTransferMRDC
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture
            SEQUENCE {}
    }

ULInformationTransferMRDC-IEs ::=
    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 ::=
  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}
      }
    }
  }
  ...
},
  cellReselectionServingFreqInfo SEQUENCE {
    s-NonIntraSearchP            ReselectionThreshold      OPTIONAL,      -- Need S
    s-NonIntraSearchQ            ReselectionThresholdQ     OPTIONAL,      -- Need S
    threshServingLowP            ReselectionThreshold,     OPTIONAL,      -- Need R
    threshServingLowQ            ReselectionThresholdQ     OPTIONAL,      -- Need R
    cellReselectionPriority       CellReselectionPriority,   OPTIONAL,      -- Need R
    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
]],			
[[
frequencyBandListAerial-r18	MultiFrequencyBandListNR-Aerial-SIB-r18	OPTIONAL	-- Need S
]]			
},			
...			
[[
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
  }
  combineRelaxedMeasCondition2-r17  ENUMERATED {true}
}
}}
}

RangeToBestCell ::= Q-OffsetRange

-- TAG-SIB2-STOP
-- ASN1STOP

```

SIB2 field descriptions
<p>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].</p>
<p>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).</p>
<p>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).</p>
<p>cellEquivalentSize The number of cell count used for mobility state estimation for this cell as specified in TS 38.304 [20].</p>
<p>cellReselectionInfoCommon Cell re-selection information common for intra-frequency, inter-frequency and/ or inter-RAT cell re-selection.</p>
<p>cellReselectionServingFreqInfo Information common for non-intra-frequency cell re-selection i.e. cell re-selection to inter-frequency and inter-RAT cells.</p>
<p>combineRelaxedMeasCondition When both <i>lowMobilityEvaluation</i> and <i>cellEdgeEvaluation</i> 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)</p>
<p>combineRelaxedMeasCondition2 When both <i>stationaryMobilityEvaluation</i> and <i>cellEdgeEvaluationWhileStationary</i> 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)</p>
<p>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 <i>true</i>, the UE assumes SFN and frame boundary alignment across cells on the serving frequency as specified in TS 38.133 [14].</p>
<p>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.</p>
<p>frequencyBandListAerial Indicates the list of frequency bands for aerial operation 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.</p>
<p>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).</p>
<p>intraFreqCellReselectionInfo Cell re-selection information common for intra-frequency cells.</p>
<p>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).</p>
<p>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>
<p>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 <i>p-Max</i> 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].</p>
<p>q-Hyst Parameter "Q_{hyst}" in TS 38.304 [20], Value in dB. Value <i>dB1</i> corresponds to 1 dB, <i>dB2</i> corresponds to 2 dB and so on.</p>

SIB2 field descriptions
<p>q-HystSF Parameter "Speed dependent ScalingFactor for Qhyst" in TS 38.304 [20]. The <i>sf-Medium</i> and <i>sf-High</i> 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 <i>dB-6</i> corresponds to -6dB, <i>dB-4</i> corresponds to -4dB and so on.</p>
<p>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}.</p>
<p>q-RxLevMin Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for intra-frequency neighbour cells.</p>
<p>q-RxLevMinSUL Parameter "Q_{rxlevmin}" in TS 38.304 [20], applicable for intra-frequency neighbour cells.</p>
<p>rangeToBestCell Parameter "rangeToBestCell" in TS 38.304 [20]. The network configures only non-negative (in dB) values.</p>
<p>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.</p>
<p>s-IntraSearchP Parameter "S_{IntraSearchP}" in TS 38.304 [20].</p>
<p>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}.</p>
<p>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}.</p>
<p>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}.</p>
<p>s-SearchDeltaP Parameter "S_{SearchDeltaP}" in TS 38.304 [20]. Value <i>dB3</i> corresponds to 3 dB, <i>dB6</i> corresponds to 6 dB and so on.</p>
<p>s-SearchDeltaP-Stationary Parameter "S_{SearchDeltaP-Stationary}" in TS 38.304 [20]. Value <i>dB2</i> corresponds to 2 dB, <i>dB3</i> corresponds to 3 dB and so on.</p>
<p>s-SearchThresholdP, s-SearchThresholdP2 Parameters "S_{SearchThresholdP}" and "S_{SearchThresholdP2}" in TS 38.304 [20]. The network configures <i>s-SearchThresholdP</i> and <i>s-SearchThresholdP2</i> to be less than or equal to <i>s-IntraSearchP</i> and <i>s-NonIntraSearchP</i>.</p>
<p>s-SearchThresholdQ, s-SearchThresholdQ2 Parameters "S_{SearchThresholdQ}" and "S_{SearchThresholdQ2}" in TS 38.304 [20]. The network configures <i>s-SearchThresholdQ</i> and <i>s-SearchThresholdQ2</i> to be less than or equal to <i>s-IntraSearchQ</i> and <i>s-NonIntraSearchQ</i>.</p>
<p>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-frequency cells. If the field is broadcast by an NTN cell, the <i>offset</i> (derived from parameter <i>periodicityAndOffset</i>) 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 <i>offset</i> based on the actual propagation delay difference.</p>
<p>smtc2-LP Measurement timing configuration for intra-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in <i>smtc2-LP</i>. The timing offset and duration are equal to the offset and duration indicated in <i>smtc</i> in <i>intraFreqCellReselectionInfo</i>. The periodicity in <i>smtc2-LP</i> can only be set to a value strictly larger than the periodicity in <i>smtc</i> in <i>intraFreqCellReselectionInfo</i> (e.g. if <i>smtc</i> indicates <i>sf20</i> the Long Periodicity can only be set to <i>sf40</i>, <i>sf80</i> or <i>sf160</i>, if <i>smtc</i> indicates <i>sf160</i>, <i>smtc2-LP</i> cannot be configured). The <i>pci-List</i>, if present, includes the physical cell identities of the intra-frequency neighbour cells with Long Periodicity. If <i>smtc2-LP</i> is absent, the UE assumes that there are no intra-frequency neighbour cells with a Long Periodicity.</p>
<p>smtc4list Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in <i>smtc4list</i> 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 <i>offset</i> 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.</p>

SIB2 field descriptions
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.
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 "Treselction _{NR} " in TS 38.304 [20].
t-ReselectionNR-SF Parameter "Speed dependent ScalingFactor for Treselction _{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 <i>s5</i> means 5 seconds, value <i>s10</i> means 10 seconds and so on.
t-SearchDeltaP-Stationary Parameter "T _{SearchDeltaP-Stationary} " in TS 38.304 [20]. Value in seconds. Value <i>s5</i> means 5 seconds, value <i>s10</i> means 10 seconds and so on.

Conditional Presence	Explanation
<i>HSDN</i>	The field is optionally present, Need R, if <i>speedStateReselectionPars</i> is present; otherwise the field is not present.
<i>SharedSpectrum</i>	This field is mandatory present if this intra-frequency operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
<i>SharedSpectrum2</i>	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 ::=
  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
<p>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.</p>
<p>intraFreqAllowedCellList List of allow-listed intra-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.</p>
<p>intraFreqCAG-CellList List of intra-frequency neighbouring CAG cells (as defined in TS 38.304 [20]) per PLMN.</p>
<p>intraFreqExcludedCellList List of exclude-listed intra-frequency neighbouring cells.</p>
<p>intraFreqNeighCellList List of intra-frequency neighbouring cells with specific cell re-selection parameters. If <i>intraFreqNeighCellList-v1610</i> is present, it shall contain the same number of entries, listed in the same order as in <i>intraFreqNeighCellList</i> (without suffix).</p>
<p>intraFreqNeighHSDN-CellList List of intra-frequency neighbouring HSDN cells as specified in TS 38.304 [20].</p>
<p>q-OffsetCell Parameter "Qoffset_{s,n}" in TS 38.304 [20].</p>
<p>q-QualMinOffsetCell Parameter "Q_{qualminoffsetcell}" in TS 38.304 [20]. Actual value Q_{qualminoffsetcell} = field value [dB].</p>
<p>q-RxLevMinOffsetCell Parameter "Q_{rxlevminoffsetcell}" in TS 38.304 [20]. Actual value Q_{rxlevminoffsetcell} = field value * 2 [dB].</p>
<p>q-RxLevMinOffsetCellSUL Parameter "Q_{rxlevminoffsetcellSUL}" in TS 38.304 [20]. Actual value Q_{rxlevminoffsetcellSUL} = field value * 2 [dB].</p>
<p>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 <i>ssb-PositionQCL-Common</i> in <i>SIB2</i> for the indicated cell.</p>

Conditional Presence	Explanation
<i>SharedSpectrum2</i>	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 ::=
    interFreqCarrierFreqList          SEQUENCE {
        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-v1800  InterFreqCarrierFreqList-v1800    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

InterFreqCarrierFreqList-v1800 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1800

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
    }
    cellReselectionPriority      CellReselectionPriority                OPTIONAL, -- Cond RSRQ
    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
}

InterFreqCarrierFreqInfo-v1800 ::= SEQUENCE {
    frequencyBandListAerial-r18    MultiFrequencyBandListNR-Aerial-SIB-r18    OPTIONAL, -- Need S
    mobileIAB-CellList-r18         PCI-Range                             OPTIONAL, -- Need R
    mobileIAB-Freq-r18             ENUMERATED {true}                   OPTIONAL, -- Need R
    eRedCapAccessAllowed-r18       ENUMERATED {true}                   OPTIONAL, -- Need R
    tn-AreaIdList-r18              SEQUENCE (SIZE (1..maxTN-AreaInfo-r18)) OF TN-AreaId-r18    OPTIONAL, -- Need R
    accessAllowed2RxXR-r18         ENUMERATED {true}                   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
<p><i>absThreshSS-BlocksConsolidation</i> 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].</p>
<p><i>accessAllowed2RxXR</i> Indicates if the cells on the frequency support 2Rx XR UEs. If present, 2Rx XR UEs shall consider only these NR frequencies in cell reselection evaluation.</p>
<p><i>channelAccessMode2</i> 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.</p>
<p><i>deriveSSB-IndexFromCell</i> 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 <i>true</i>, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14].</p>
<p><i>dl-CarrierFreq</i> 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].</p>
<p><i>eRedCapAccessAllowed</i> Indicates whether eRedCap UEs are allowed to access cells on the frequency.</p>
<p><i>frequencyBandList</i> Indicates the list of frequency bands for which the NR cell reselection parameters apply.</p>
<p><i>frequencyBandListAerial</i> Indicates the list of frequency bands for aerial operation for which the NR cell reselection parameters apply. The UE behaviour in case the field is absent is described in clause 5.2.2.4.5.</p>
<p><i>highSpeedMeasInterFreq</i> If the field is set to <i>true</i> 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].</p>
<p><i>interFreqAllowedCellList</i> List of allow-listed inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4.</p>
<p><i>interFreqCAG-CellList</i> List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN).</p>
<p><i>interFreqCarrierFreqList</i> List of neighbouring carrier frequencies and frequency specific cell re-selection information. If <i>interFreqCarrierFreqList-v1610</i>, <i>interFreqCarrierFreqList-v1700</i>, <i>interFreqCarrierFreqList-v1720</i>, <i>interFreqCarrierFreqList-v1730</i>, <i>interFreqCarrierFreqList-v1760</i> or <i>InterFreqCarrierFreqInfo-v1800</i> are present, they shall contain the same number of entries, listed in the same order as in <i>interFreqCarrierFreqList</i> (without suffix).</p>
<p><i>interFreqExcludedCellList</i> List of exclude-listed inter-frequency neighbouring cells.</p>
<p><i>interFreqNeighCellList</i> List of inter-frequency neighbouring cells with specific cell re-selection parameters. If <i>interFreqNeighCellList-v1610</i> is present, it shall contain the same number of entries, listed in the same order as in <i>interFreqNeighCellList</i> (without suffix).</p>
<p><i>interFreqNeighHSDN-CellList</i> List of inter-frequency neighbouring HSDN cells as specified in TS 38.304 [20].</p>
<p><i>mobileIAB-CellList</i> Contains a PCI range on which mobile IAB cells may be deployed.</p>
<p><i>mobileIAB-Freq</i> If present, it indicates that a mobile IAB node may be deployed on the inter-frequency carrier.</p>
<p><i>nrofSS-BlocksToAverage</i> 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>

SIB4 field descriptions
<p>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 <i>p-Max</i> 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].</p>
<p>q-OffsetCell Parameter "Qoffset_{s,n}" in TS 38.304 [20].</p>
<p>q-OffsetFreq Parameter "Qoffset_{frequency}" in TS 38.304 [20].</p>
<p>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}.</p>
<p>q-QualMinOffsetCell Parameter "Q_{qualminoffsetcell}" in TS 38.304 [20]. Actual value Q_{qualminoffsetcell} = field value [dB].</p>
<p>q-RxLevMin Parameter "Q_{rxlevmin}" in TS 38.304 [20].</p>
<p>q-RxLevMinOffsetCell Parameter "Q_{rxlevminoffsetcell}" in TS 38.304 [20]. Actual value Q_{rxlevminoffsetcell} = field value * 2 [dB].</p>
<p>q-RxLevMinOffsetCellSUL Parameter "Q_{rxlevminoffsetcellSUL}" in TS 38.304 [20]. Actual value Q_{rxlevminoffsetcellSUL} = field value * 2 [dB].</p>
<p>q-RxLevMinSUL Parameter "Q_{rxlevmin}" in TS 38.304 [20].</p>
<p>redCapAccessAllowed Indicates whether RedCap UEs are allowed to access cells on the frequency.</p>
<p>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 <i>offset</i> (derived from parameter <i>periodicityAndOffset</i>) 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 <i>offset</i> based on the actual propagation delay difference.</p>
<p>smtc2-LP Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in <i>smtc2-LP</i>. The timing offset and duration are equal to the offset and duration indicated in <i>smtc</i> in <i>InterFreqCarrierFreqInfo</i>. The periodicity in <i>smtc2-LP</i> can only be set to a value strictly larger than the periodicity in <i>smtc</i> in <i>InterFreqCarrierFreqInfo</i> (e.g. if <i>smtc</i> indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if <i>smtc</i> indicates sf160, <i>smtc2-LP</i> cannot be configured). The <i>pci-List</i>, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If <i>smtc2-LP</i> is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity.</p>
<p>smtc4list Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in <i>smtc4list</i> 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 <i>offset</i> 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.</p>
<p>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 <i>ssb-PositionQCL-Common</i> in <i>SIB4</i> for the indicated cell.</p>
<p>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.</p>
<p>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.</p>

SIB4 field descriptions
<p>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</p>
<p>threshX-HighP Parameter "Thresh_{X, HighP}" in TS 38.304 [20].</p>
<p>threshX-HighQ Parameter "Thresh_{X, HighQ}" in TS 38.304 [20].</p>
<p>threshX-LowP Parameter "Thresh_{X, LowP}" in TS 38.304 [20].</p>
<p>threshX-LowQ Parameter "Thresh_{X, LowQ}" in TS 38.304 [20].</p>
<p>tn-ArealdList List of TN area identifiers. The associated coverage information is provided in SIB25.</p>
<p>t-ReselectionNR Parameter "Treselction_{NR}" in TS 38.304 [20].</p>
<p>t-ReselectionNR-SF Parameter "Speed dependent ScalingFactor for Treselction_{NR}" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].</p>

Conditional Presence	Explanation
<i>Mandatory</i>	The field is mandatory present in SIB4.
<i>RSRQ</i>	The field is mandatory present if <i>threshServingLowQ</i> is present in SIB2; otherwise it is absent.
<i>SharedSpectrum</i>	This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R.
<i>SharedSpectrum2</i>	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 ::=
    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-v1800      CarrierFreqListEUTRA-v1800      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

CarrierFreqListEUTRA-v1800 ::=    SEQUENCE (SIZE (1..maxEUTRA-Carrier)) OF CarrierFreqEUTRA-v1800

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
}

CarrierFreqEUTRA-v1800 ::= SEQUENCE {
  eutra-MultiBandInfoListAerial-r18 EUTRA-MultiBandInfoListAerial-r18 OPTIONAL,      -- Need R
  tn-AreaIdList-r18                 SEQUENCE (SIZE (1..maxTN-AreaInfo-r18)) OF TN-AreaId-r18 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
<p>carrierFreqListEUTRA List of carrier frequencies of E-UTRA. If the <i>carrierFreqListEUTRA-v1610/ carrierFreqListEUTRA-v1700/ carrierFreqListEUTRA-v1800</i> is present, it shall contain the same number of entries, listed in the same order as in the <i>carrierFreqListEUTRA</i> (without suffix).</p>
<p>dummy This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>eutra-ExcludedCellList List of exclude-listed E-UTRA neighbouring cells.</p>
<p>eutra-FreqNeighHSDN-CellList List of neighbouring EUTRA HSDN cells as specified in TS 36.304 [27].</p>
<p>eutra-multiBandInfoList Indicates the list of frequency bands in addition to the band represented by <i>carrierFreq</i> for which cell reselection parameters are common, and a list of <i>additionalPmax</i> and <i>additionalSpectrumEmission</i> values, as defined in TS 36.101 [22], table 6.2.4-1, for the frequency bands in <i>eutra-multiBandInfoList</i></p>
<p>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.</p>
<p>idleModeMeasVoiceFallback Indicates whether E-UTRA idle/inactive measurements and reporting for EPS fallback can be used.</p>
<p>p-MaxEUTRA The maximum allowed transmission power in dBm on the (uplink) carrier frequency, see TS 36.304 [27].</p>
<p>q-QualMin Parameter "Q_{qualmin}" in TS 36.304 [27]. Actual value Q_{qualmin} = field value [dB].</p>
<p>q-QualMinOffsetCell Parameter "Q_{qualminoffsetcell}" in TS 36.304 [27]. Actual value Q_{qualminoffsetcell} = field value [dB].</p>
<p>q-RxLevMin Parameter "Q_{rxlevmin}" in TS 36.304 [27]. Actual value Q_{rxlevmin} = field value * 2 [dBm].</p>
<p>q-RxLevMinOffsetCell Parameter "Q_{rxlevminoffsetcell}" in TS 36.304 [27]. Actual value Q_{rxlevminoffsetcell} = field value * 2 [dB].</p>
<p>t-ReselectionEUTRA Parameter "T_{reselectionEUTRA}" in TS 38.304 [20].</p>
<p>threshX-High Parameter "Thresh_{X, HighP}" in TS 38.304 [20].</p>
<p>threshX-HighQ Parameter "Thresh_{X, HighQ}" in TS 38.304 [20].</p>
<p>threshX-Low Parameter "Thresh_{X, LowP}" in TS 38.304 [20].</p>
<p>threshX-LowQ Parameter "Thresh_{X, LowQ}" in TS 38.304 [20].</p>
<p>tn-ArealdList List of TN area identifiers. The associated coverage information is provided in <i>SIB25</i>.</p>
<p>t-ReselectionEUTRA-SF Parameter "Speed dependent ScalingFactor for T_{reselectionEUTRA}" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20].</p>

Conditional Presence	Explanation
RSRQ	The field is mandatory present if the <i>threshServingLowQ</i> is present in <i>SIB2</i> ; otherwise it is absent.

– SIB6

SIB6 contains an ETWS primary notification.

SIB6 information element

```
-- ASN1START
-- TAG-SIB6-START

SIB6 ::=
    messageIdentifier          SEQUENCE {
        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 ::=
    messageIdentifier          SEQUENCE {
        serialNumber          BIT STRING (SIZE (16)),
        warningMessageSegmentType ENUMERATED {notLastSegment, lastSegment},
        warningMessageSegmentNumber INTEGER (0..63),
    }

-- TAG-SIB7-STOP
-- ASN1STOP
```

```

warningMessageSegment      OCTET STRING,
dataCodingScheme           OCTET STRING (SIZE (1))      OPTIONAL,  -- Cond Segment1
lateNonCriticalExtension   OCTET STRING      OPTIONAL,
...
}
-- TAG-SIB7-STOP
-- ASN1STOP

```

SIB7 field descriptions
<p>dataCodingScheme Identifies the alphabet/coding and the language applied variations of an ETWS notification.</p>
<p>messageIdentifier Identifies the source and type of ETWS notification.</p>
<p>serialNumber Identifies variations of an ETWS notification.</p>
<p>warningMessageSegment Carries a segment of the Warning Message Contents IE.</p>
<p>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.</p>
<p>warningMessageSegmentType Indicates whether the included ETWS warning message segment is the last segment or not.</p>

Conditional Presence	Explanation
<i>Segment1</i>	The field is mandatory present in the first segment of <i>SIB7</i> , 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
<p>dataCodingScheme Identifies the alphabet/coding and the language applied variations of a CMAS notification.</p>
<p>messageIdentifier Identifies the source and type of CMAS notification.</p>
<p>serialNumber Identifies variations of a CMAS notification.</p>
<p>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 <i>warningAreaCoordinatesSegment</i> is equivalent to the first octet of Warning Area Coordinates IE defined in and encoded according to TS 23.041 [29] and so on.</p>
<p>warningMessageSegment Carries a segment, with one or more octets, of the <i>Warning Message Contents</i> IE defined in TS 38.413 [42]. The first octet of the <i>Warning Message Contents</i> IE is equivalent to the first octet of the <i>CB data</i> IE defined in and encoded according to TS 23.041 [29], clause 9.4.2.2.5, and so on.</p>
<p>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.</p>
<p>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.</p>

Conditional Presence	Explanation
<i>Segment1</i>	The field is mandatory present in the first segment of <i>SIB8</i> , 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 ::=
    timeInfo
    timeInfoUTC
    SEQUENCE {
        SEQUENCE {
            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
  }
  lateNonCriticalExtension     OCTET STRING                   OPTIONAL,
  . . .
  [[
  referenceTimeInfo-r16        ReferenceTimeInfo-r16         OPTIONAL -- Need R
  ]],
  [[
  eventID-TSS-r18              INTEGER (0..63)                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].

eventID-TSS

This field indicates the status of the 5G access stratum time distribution parameter Clock Quality Reporting Control Information as defined in TS 23.501 [32].

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-FreqInfoListSizeExt-v1800      SEQUENCE (SIZE (1..maxNrofFreqSL-r18)) OF SL-FreqConfigCommon-r16  OPTIONAL, -- Need R
            sl-RLC-BearerConfigListSizeExt-v1800 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16  OPTIONAL, -- Need R
            sl-SyncFreqList-r18               SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-Freq-Id-r16           OPTIONAL, -- Need R
            sl-SyncTxMultiFreq-r18            ENUMERATED {true}              OPTIONAL, -- Need S
            sl-MaxTransPowerCA-r18            P-Max                          OPTIONAL, -- Need R
            sl-DiscConfigCommon-v1800         SL-DiscConfigCommon-v1800     OPTIONAL, -- Need R
            sl-L2U2U-Relay-r18                ENUMERATED {enabled}           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
}
SL-DiscConfigCommon-v1800 ::= SEQUENCE {
    sl-RelayUE-ConfigCommonU2U-r18  SL-RelayUE-ConfigU2U-r18,
    sl-RemoteUE-ConfigCommonU2U-r18 SL-RemoteUE-ConfigU2U-r18
}
-- TAG-SIB12-STOP
-- ASN1STOP
```

Editor's Note: FFS whether a new L3 U2U Relay-specific indication is needed.

Editor's Note: The mapping configuration (from e2e SLRB to RLC channel) is needed in pre-configuration. The existing table format is used as a baseline, subject to discussion during maintenance.

SIB12 field descriptions
<p><i>segmentContainer</i> This field includes a segment of the encoded <i>SIB12-IE</i>s. 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.</p>
<p><i>segmentNumber</i> This field identifies the sequence number of a segment of <i>SIB12-IE</i>s. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on.</p>
<p><i>segmentType</i> This field indicates whether the included segment is the last segment or not.</p>
<p><i>sl-CSI-Acquisition</i> This field indicates whether CSI reporting is enabled in sidelink unicast. If not set, SL CSI reporting is disabled.</p>
<p><i>sl-DRX-ConfigCommonGC-BC</i> 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.</p>
<p><i>sl-EUTRA-AnchorCarrierFreqList</i> This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configurations.</p>
<p><i>sl-FreqInfoList, sl-FreqInfoListSizeExt</i> This field indicates the NR sidelink communication/discovery configuration on some carrier frequency (ies). In this release, only one entry can be configured in <i>sl-FreqInfoList</i>. More entries can be configured in <i>sl-FreqInfoListSizeExt</i>.</p>
<p><i>sl-L2U2N-Relay</i> This field indicates the support of NR sidelink Layer-2 U2N relay operation.</p>
<p><i>sl-L2U2U-Relay</i> This field indicates the support of NR sidelink Layer-2 U2U relay operation.</p>
<p><i>sl-L3U2N-RelayDiscovery</i> This field indicates the support of L3 U2N relay AS-layer capability, i.e. NR sidelink relay discovery.</p>
<p><i>sl-MaxNumConsecutiveDTX</i> 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.</p>
<p><i>sl-MaxTransPowerCA</i> The maximum total transmit power to be used by the UE across all sidelink carriers.</p>
<p><i>sl-MeasConfigCommon</i> This field indicates the measurement configurations (e.g. RSRP) for NR sidelink communication.</p>
<p><i>sl-NonRelayDiscovery</i> This field indicates the support of NR sidelink non-relay discovery.</p>
<p><i>sl-NR-AnchorCarrierFreqList</i> This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication/discovery configurations.</p>
<p><i>sl-OffsetDFN</i> 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.</p>
<p><i>sl-RadioBearerConfigList</i> This field indicates one or multiple sidelink radio bearer configurations.</p>
<p><i>sl-RLC-BearerConfigList, sl-RLC-BearerConfigListSizeExt</i> This field indicates one or multiple sidelink RLC bearer configurations. For L2 U2U operation, <i>sl-RLC-BearerConfigList</i> also indicates the PC5 Relay RLC Channel configurations.</p>
<p><i>sl-SSB-PriorityNR</i> This field indicates the priority of NR sidelink SSB transmission and reception.</p>

SIB12 field descriptions
<p>segmentContainer This field includes a segment of the encoded <i>SIB12-IEs</i>. 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.</p>
<p>segmentNumber This field identifies the sequence number of a segment of <i>SIB12-IEs</i>. A segment number of zero corresponds to the first segment, A segment number of one corresponds to the second segment, and so on.</p>
<p>segmentType This field indicates whether the included segment is the last segment or not.</p>
<p>sl-CSI-Acquisition This field indicates whether CSI reporting is enabled in sidelink unicast. If not set, SL CSI reporting is disabled.</p>
<p>sl-SyncFreqList Indicates a list of candidate carrier frequencies that can be used for the synchronisation of NR sidelink communication. For <i>SL-Freq-Id-r16</i>, the value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB12</i>, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i>, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i> and so on.</p>
<p>sl-SyncTxMultiFreq Indicates that the UE transmits S-SSB on multiple carrier frequencies for NR sidelink communication. If this field is absent, the UE transmits S-SSB only on the synchronisation carrier frequency.</p>
<p>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.</p>

– SIB13

SIB13 contains configurations of V2X sidelink communication defined in TS 36.331 [10].

SIB13 information element

```

-- ASN1START
-- TAG-SIB13-START

SIB13-r16 ::=
    sl-V2X-ConfigCommon-r16          SEQUENCE {
        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,
        ...
    }

-- TAG-SIB15-STOP
-- ASN1STOP
```

```

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 $N \geq 1$ 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
<p>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 <i>firstOFDMSymbolInTimeDomain+4</i>.</p>
<p>frequencyDomainAllocation Indicates the offset of the first RE to RE#0 in a RB in row1.</p>
<p>indBitID The index of the associated bit in TRS availability indication field in DCI. Each TRS resource set is configured with an ID <i>i</i> for the association with (i+1)-th indication bit in TRS availability indication field in DCI.</p>
<p>nrofRBs Number of PRBs across which corresponding TRS resource spans.</p>
<p>nrofResources The number of TRS resources for a TRS resource set.</p>
<p>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 <i>slots10</i> corresponds to 10 slots, value <i>slots20</i> corresponds to 20 slots, and so on.</p>
<p>powerControlOffsetSS Power offset (dB) of NZP CSI-RS RE to SSS RE.</p>
<p>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, <i>scramblingIDperResourceListWith2-r17</i> is configured, while <i>scramblingIDperResourceListWith4-r17</i> is configured for the case that the number of TRS resources for the TRS resource set is 4.</p>
<p>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.</p>
<p>startingRB The PRB index where corresponding TRS resource starts in relation to common resource block #0 (CRB#0) on the common resource block grid.</p>

– 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 $d1+d2+\dots+d(n-1)+i$ 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
    ]],
    [[
    movingReferenceLocation-r18     ReferenceLocation-r17    OPTIONAL,      -- Need R

```

```

    ntnCovEnh-r18                NTN-CovEnh-r18                OPTIONAL,        -- Need R
    satSwitchWithReSync-r18     SatSwitchWithReSync-r18  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
}

NTN-CovEnh-r18 ::= SEQUENCE {
  rsrp-ThresholdMsg4-r18       RSRP-Range                    OPTIONAL,        -- Need R
  numberOfMsg4-RepetitionsList-r18 SEQUENCE (SIZE(1..4)) OF NumberOfMsg4-Repetitions-r18 OPTIONAL,        -- Need R
  ...
}

NumberOfMsg4-Repetitions-r18 ::= ENUMERATED {n1, n2, n4, n8}

SatSwitchWithReSync-r18 ::= SEQUENCE {
  ntn-Config-r18               NTN-Config-r17,
  t-ServiceStart-r18           INTEGER (0..549755813887)     OPTIONAL,        -- Need R
  ssb-TimeOffset-r18          INTEGER (0..159)              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. This field is only present in an NTN cell.

movingReferenceLocation

Reference location of the serving cell of an NTN Earth moving system at a time reference. It is used in the evaluation of *eventD2* and *condEventD2* criteria for the serving cell in RRC_CONNECTED, and location-based measurement initiation in RRC_IDLE and RRC_INACTIVE when *distanceThresh* is also configured, as defined in TS 38.304 [20]. The time reference of this field is indicated by *epochTime* in *ntn-Config* of the serving cell. This field is excluded when determining changes in system information, i.e., changes to *movingReferenceLocation* should neither result in system information change notifications nor in a modification of *valueTag* in *SIB1*. This field is only present in an NTN cell.

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. In a TN cell, this field is only present in *ntn-NeighCellConfigList* and *ntn-NeighCellConfigListExt*.

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]. This field is only present in an NTN cell.

satSwitchWithReSync

Provides parameters for the target satellite required to perform satellite switch with resynchronization. This field is only present in an NTN cell and its presence indicates that satellite switch without PCI change is supported in the cell.

t-Service

Indicates the time information on when a cell provided via NTN system is going to stop serving the area it is currently covering. This field applies for both service link switches in NTN quasi-Earth fixed system and feeder link switches for both NTN quasi-Earth fixed and Earth moving system. 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. This field is only present in an NTN cell.

NTN-CovEnh field descriptions***numberOfMsg4-RepetitionsList***

The number of repetitions for PUCCH transmission for Msg4 HARQ-ACK, see clause 9.2.6 in TS 38.213 [13]. The value {n1} needs to be configured with another value from the list {n2, n4, n8}. If more than one value is configured, a single value from the configured values is indicated in DCI.

rsrp-ThresholdMsg4

This threshold used by the UE for determining the report of the capability of PUCCH repetition for Msg4 HARQ-ACK if *numberOfMsg4-RepetitionsList* is provided, as specified in TS 38.321 [3].

satSwitchWithReSync field descriptions**ssb-TimeOffset**

Indicates the time offset between the SSB from source and target satellite at the uplink time synchronization reference point. It is given in number of subframes.

t-ServiceStart

Indicates the time information on when the target satellite is going to start serving the area currently covered by the serving satellite. The field indicates a time in multiples of 10 ms after 00:00:00 on Gregorian calendar date 1st January 1900 (midnight between Sunday, December 31, 1899, and Monday, January 1, 1900). The exact start 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-ServiceStart* is the uplink time synchronization reference point of the serving satellite.

— **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,
    ...,
    [[
    cfr-ConfigMCCH-MTCH-RedCap-r18 CFR-ConfigMCCH-MTCH-r17 OPTIONAL, -- Need S
    mcch-ConfigRedCap-r18        MCCH-Config-r17 OPTIONAL -- Cond CFR-RedCap
    ]]
}

MCCH-Config-r17 ::= SEQUENCE {
    mcch-RepetitionPeriodAndOffset-r17 MCCH-RepetitionPeriodAndOffset-r17,
    mcch-WindowStartSlot-r17          INTEGER (0..79),
    mcch-WindowDuration-r17          ENUMERATED {s12, s14, s18, s110, s120, s140,s180, s1160} 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
<p><i>cfr-ConfigMCCH-MTCH</i> 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 <i>initialDownlinkBWP</i> in <i>SIB1</i>.</p>
<p><i>cfr-ConfigMCCH-MTCH-RedCap</i> Common frequency resource used for MCCH and MTCH reception for (e)RedCap UEs. If the field is absent, the (e)RedCap UE can use <i>cfr-ConfigMCCH-MTCH</i> if the UE supports the configured bandwidth.</p>
<p><i>mcch-WindowDuration</i> Indicates, starting from the slot indicated by <i>mcch-WindowStartSlot</i>, 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 <i>mcch-WindowStartSlot</i>. The network always configures <i>mcch-WindowDuration</i> to be shorter or equal to the length of MCCH repetition period.</p>
<p><i>mcch-ModificationPeriod</i> Defines periodically appearing boundaries, i.e. radio frames for which $\text{SFN mod } mcch\text{-ModificationPeriod} = 0$. 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.</p>
<p><i>mcch-RepetitionPeriodAndOffset</i> 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: $\text{SFN mod repetition period length} = \text{offset of the repetition period}$.</p>
<p><i>mcch-WindowStartSlot</i> Indicates the slot in which MCCH transmission window starts.</p>

Conditional presence	Explanation
<i>CFR-RedCap</i>	The field is optionally present, Need R, if the configured bandwidth in <i>cfr-ConfigMCCH-MTCH</i> exceeds the RedCap UE capability. It is absent otherwise.

– 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.

— SIB22

SIB22 contains ATG assistance information for ATG access.

SIB22 information element

```
-- ASN1START
-- TAG-SIB22-START
```

```
SIB22-r18 ::=
    atg-Config-r18                SEQUENCE {
        atg-Config-r18            OPTIONAL,      -- Need R
        hs-ATG-cellReselectionSet-r18 ENUMERATED {true} OPTIONAL,      -- Need R
        atg-NeighCellConfigList-r18 ATG-NeighCellConfigList-r18 OPTIONAL,      -- Need R
        lateNonCriticalExtension   OCTET STRING   OPTIONAL,
        ...
    }
```

```
ATG-NeighCellConfigList-r18 ::= SEQUENCE (SIZE(1..maxCellATG-r18)) OF ATG-NeighCellConfig-r18
```

```
ATG-NeighCellConfig-r18 ::=
    atg-gNB-Location-r18         ReferenceLocation-r17    OPTIONAL,      -- Need R
    heightgNB-r18                INTEGER (-16384..16383)    OPTIONAL,      -- Need R
    carrierFreq-r18              ARFCN-ValueNR           OPTIONAL,      -- Need R
    physCellId-r18               PhysCellId              OPTIONAL,      -- Need R
}
```

```
-- TAG-SIB22-STOP
-- ASN1STOP
```

SIB22 field descriptions
atg-Config Provides parameters needed for ATG access such as ATG gNB location information, cell Specific Koffset, TA Report indication.
atg-NeighCellConfigList Provides ATG assistance information of ATG neighbour cells.
hs-ATG-cellReselectionSet Indicates whether the UE applies high speed inter-frequency measurements requirements for inter-frequency cell reselection in RRC_IDLE and RRC_INACTIVE states as specified in TS 38.133 [14]. If the field is absent UE applies only the NR cell reselection requirements as specified in TS 38.133 [14].

– SIB23

SIB23 contains NR sidelink Positioning configuration.

SIB23 information element

```

-- ASN1START
-- TAG-SIB23-START

SIB23-r18 ::= SEQUENCE {
    segmentNumber-r18      INTEGER (0..63),
    segmentType-r18        ENUMERATED {notLastSegment, lastSegment},
    segmentContainer-r18   OCTET STRING
}

SIB23-IEs-r18 ::= SEQUENCE {
    sl-PosConfigCommonNR-r18  SL-PosConfigCommonNR-r18,
    lateNonCriticalExtension   OCTET STRING OPTIONAL,
    ...
}

SL-PosConfigCommonNR-r18 ::= SEQUENCE {
    sl-PosFreqInfoList-r18    SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16 OPTIONAL, -- Need R
    sl-PosUE-SelectedConfig-r18 SL-UE-SelectedConfig-r16 OPTIONAL, -- Need R
    sl-PosNR-AnchorCarrierFreqList-r18 SL-NR-AnchorCarrierFreqList-r16 OPTIONAL, -- Need R
    sl-PosMeasConfigCommon-r18 SL-MeasConfigCommon-r16 OPTIONAL, -- Need R
    sl-PosOffsetDFN-r18       INTEGER (1..1000) OPTIONAL, -- Need R
    sl-PosSSB-PriorityNR-r18  INTEGER (1..8) OPTIONAL, -- Need R
    ...
}

-- TAG-SIB23-STOP
-- ASN1STOP

```

SIB23 field descriptions**segmentContainer**

This field includes a segment of the encoded *SIB23-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 SIB23 is broadcast.

segmentNumber

This field identifies the sequence number of a segment of *SIB23-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-PosConfigCommonNR

This field indicates the NR sidelink positioning configuration.

SL-PosConfigCommonNR field descriptions**sl-PosMeasConfigCommon**

This field indicates the measurement configurations (e.g. RSRP) for NR sidelink positioning.

sl-PosNR-AnchorCarrierFreqList

This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink positioning configurations.

sl-PosOffsetDFN

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-PosSSB-PriorityNR

This field indicates the priority of NR sidelink SSB transmission and reception.

sl-PosUE-SelectedConfig

Indicates the configuration used for UE autonomous resource selection.

– **SIB24**

SIB24 contains the information required to acquire the multicast MCCH/MTCH configuration for MBS multicast reception in RRC_INACTIVE.

SIB24 information element

```
-- ASN1START
-- TAG-SIB24-START

SIB24-r18 ::= SEQUENCE {
    multicastMCCH-Config-r18      MCCH-Config-r17      OPTIONAL, -- Need S
    cfr-ConfigMCCH-MTCH-r18      CFR-ConfigMCCH-MTCH-r17  OPTIONAL, -- Need S
    lateNonCriticalExtension      OCTET STRING          OPTIONAL,
    ...
}

-- TAG-SIB24-STOP
-- ASN1STOP
```

SIB24 field descriptions***cfr-ConfigMCCH-MTCH***

Common frequency resource used for multicast MCCH and/or multicast MTCH reception. If the field is absent, the CFR for multicast has the same location and size as CORESET#0 and PDSCH configuration of multicast MCCH, if present, is the same as PDSCH configuration provided in *initialDownlinkBWP* in *SIB1*.

multicastMCCH-Config

Indicates MCCH configuration for MBS multicast reception in RRC_INACTIVE. This field is always included if it is provided via broadcast signalling in *SIB24*.

– **SIB25**

SIB25 contains TN coverage information to assist neighbour cell measurements for the UEs in an NTN cell.

SIB25 information element

```
-- ASN1START
-- TAG-SIB25-START

SIB25-r18 ::= SEQUENCE {
    coverageAreaInfoList-r18 CoverageAreaInfoList-r18 OPTIONAL, -- Need R
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    ...
}

CoverageAreaInfoList-r18 ::= SEQUENCE (SIZE (1..maxTN-AreaInfo-r18)) OF CoverageAreaInfo-r18

CoverageAreaInfo-r18 ::= SEQUENCE {
    tn-AreaId-r18 TN-AreaId-r18,
    tn-ReferenceLocation-r18 ReferenceLocation-r17,
    tn-DistanceRadius-r18 INTEGER(0..65535)
}

-- TAG-SIB25-STOP
-- ASN1STOP
```

SIB25 field descriptions***coverageAreaInfoList***

Contains a list of TN coverage area's information to assist skipping TN measurements for NTN UEs in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20].

tn-DistanceRadius

Distance from the TN coverage area reference location. It is used for skipping TN measurements in RRC_IDLE and RRC_INACTIVE, as defined in TS 38.304 [20]. Each step represents 1m.

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,
    posSib1-11-v1800         SIBpos-r16,
    posSib1-12-v1800         SIBpos-r16,
    posSib2-26-v1800         SIBpos-r16,
    posSib2-27-v1800         SIBpos-r16,
    posSib6-7-v1800          SIBpos-r16,
    posSib7-1-v1800          SIBpos-r16,
    posSib7-2-v1800          SIBpos-r16,
    posSib7-3-v1800          SIBpos-r16,
    posSib7-4-v1800          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
    ]],
    [[
    posSI-RequestConfigMSG1-Repetition-r18 SI-RequestConfigRepetition-r18 OPTIONAL, -- Cond MSG-1
    posSI-RequestConfigSUL-MSG1-Repetition-r18 SI-RequestConfigRepetition-r18 OPTIONAL, -- Cond SUL-MSG-1
    posSI-RequestConfigRedCap-MSG1-Repetition-r18 SI-RequestConfigRepetition-r18 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
<p>areaScope Indicates that a posSIB is area specific. If the field is absent, the posSIB is cell specific.</p>
<p>encrypted The presence of this field indicates that the <i>pos-sib-type</i> is encrypted as specified in TS 37.355 [49].</p>
<p>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]).</p>
<p>posSI-BroadcastStatus Indicates if the SI message is being broadcasted or not. Change of <i>posSI-BroadcastStatus</i> 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 <i>broadcasting</i>. If <i>si-SchedulingInfo-v1700</i> is present, the network ensures that the total number of SI messages with <i>posSI-BroadcastStatus</i> and <i>si-BroadcastStatus</i> set to <i>notBroadcasting</i> in the concatenated list of SI messages configured by <i>posSchedulingInfoList</i> in <i>posSI-SchedulingInfo</i> and SI messages containing type2 SIB configured by <i>schedulingInfoList2</i> in <i>si-SchedulingInfo-v1700</i> does not exceed the limit of <i>maxSI-Message</i> when <i>posSI-RequestConfig</i> or <i>posSI-RequestConfigRedCap</i> or <i>posSI-RequestConfigSUL</i> is configured.</p>
<p>posSI-RequestConfig Configuration of Msg1 resources that the UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>posSI-RequestConfigMSG1-Repetition Configuration of Msg1 repetition resources on NUL that the UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>posSI-RequestConfigRedCap Configuration of Msg1 resources for <i>initialUplinkBWP-RedCap</i> that the (e)RedCap UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>posSI-RequestConfigRedCap-MSG1-Repetition Configuration of Msg1 repetition resources for <i>initialUplinkBWP-RedCap</i> that the (e)RedCap UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>posSI-RequestConfigSUL Configuration of Msg1 resources that the UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>posSI-RequestConfigSUL-MSG1-Repetition Configuration of Msg1 repetition resources on SUL that the UE uses for requesting SI-messages for which <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>posSIB-MappingInfo List of the posSIBs mapped to this <i>SystemInformation</i> message.</p>
<p>posSibType The positioning SIB type is defined in TS 37.355 [49].</p>
<p>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 <i>offsetToSI-Used</i> is configured, the <i>posSI-Periodicity</i> of rf8 cannot be used.</p>
<p>offsetToSI-Used This field, if present indicates that all the SI messages in <i>posSchedulingInfoList</i> are scheduled with an offset of 8 radio frames compared to SI messages in <i>schedulingInfoList</i>. <i>offsetToSI-Used</i> may be present only if the shortest configured SI message periodicity for SI messages in <i>schedulingInfoList</i> is 80ms. If SI offset is used, this field is present in each of the SI messages in the <i>posSchedulingInfoList</i>.</p>
<p>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]).</p>

Conditional presence	Explanation
<i>GNSS-ID-SBAS</i>	The field is mandatory present if <i>gnss-id</i> is set to <i>sbas</i> . It is absent otherwise.
<i>MSG-1</i>	The field is optionally present, Need R, if <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>posSchedulingInfoList</i> or if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message containing type2 SIB included in <i>schedulingInfoList2</i> . It is absent otherwise.
<i>SUL-MSG-1</i>	The field is optionally present, Need R, if <i>supplementaryUplink</i> is configured in <i>ServingCellConfigCommonSIB</i> , and if <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>posSchedulingInfoList</i> or if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message containing type2 SIB included in <i>schedulingInfoList2</i> . It is absent otherwise.
<i>REDCAP-MSG-1</i>	The field is optionally present, Need R, if <i>initialUplinkBWP-RedCap</i> is configured in <i>UplinkConfigCommonSIB</i> , and if <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>posSchedulingInfoList</i> or if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message containing type2 SIB included in <i>schedulingInfoList2</i> . It is absent otherwise.

– *SIBpos*

The IE *SIBpos* contains positioning assistance data as defined in TS 37.355 [49].

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.

AdditionalSpectrumEmission information element

```

-- ASN1START
-- TAG-ADDITIONALSPECTRUMEMISSION-START

AdditionalSpectrumEmission ::=          INTEGER (0..7)

AdditionalSpectrumEmission-v1760 ::=    INTEGER (8..39)

AdditionalSpectrumEmission-r18 ::=      INTEGER (0..39)

-- TAG-ADDITIONALSPECTRUMEMISSION-STOP
-- ASN1STOP

```

– **AdvancedReceiver-MU-MIMO**

The IE *AdvancedReceiver-MU-MIMO* is used to provide a set of assistance information for R-ML (reduced complexity ML) receivers with enhanced inter-user interference suppression for MU-MIMO transmissions.

AdvancedReceiver-MU-MIMO information element

```

-- ASN1START
-- TAG-ADVANCEDRECEIVER-MU-MIMO-START

AdvancedReceiver-MU-MIMO-r18 ::=        SEQUENCE {
  precodingAndResourceAllocation-r18    BOOLEAN                OPTIONAL,    -- Need M
  dmrsPowerBoosting-r18                 BOOLEAN                OPTIONAL,    -- Need M
  pdsch-TimeDomainAllocation-r18        BOOLEAN                OPTIONAL,    -- Need M
  mcs-Table-r18                         ENUMERATED {qam1024, qam256, qam64, spare1}  OPTIONAL,    -- Need R
  advReceiver-MU-MIMO-DCI-1-1-r18        ENUMERATED {enabled}        OPTIONAL,    -- Need R
  ...
}

-- TAG-ADVANCEDRECEIVER-MU-MIMO-STOP
-- ASN1STOP

```

Editor's note: whether the IE type BOOLEAN within AdvancedReceiver-MU-MIMO-r18 needs to be changed to ENUMERATED {true} depends on further RAN4 clarification.

Editor's note: whether dmrsPowerBoosting-r18 needs to be removed depends on further RAN4 clarification.

AdvancedReceiver-MU-MIMO field descriptions
<p>advReceiver-MU-MIMO-DCI-1-1 Configure the presence of the co-scheduled UE information field in DCI format 1_1 (see TS 38.212 [17], clause 7.3.1.2.2).</p>
<p>dmrsPowerBoosting If the field is set to true, the UE can assume the DMRS power boosting configurations (i.e., Number of DMRS CDM groups without data, see TS 38.214 [19], table 4.1-1) of all the co-scheduled UE(s), which has the same DM-RS sequence as the target UE, is the same as the target UE. If the field is set to false, the UE can not assume the DMRS power boosting configurations (i.e., Number of DMRS CDM groups without data, see TS 38.214 [19], table 4.1-1) of all the co-scheduled UE(s), which has the same DM-RS sequence as the target UE, is the same as the target UE.</p>
<p>mcs-Table Indicates the MCS table with the highest modulation order among all MCS tables configured to the co-scheduled UE(s), which has the same DMRS sequence as the target UE.</p>
<p>pdsch-TimeDomainAllocation If the field is set to true, the UE can assume the time domain resource assignment for PDSCH symbols of all the co-scheduled UE(s), which has the same DMRS sequence as the target UE, is same as the target UE. If the field is set to false, the UE can not assume the time domain resource assignment for PDSCH symbols of all the co-scheduled UE(s), which has the same DMRS sequence as the target UE, is same as the target UE.</p>
<p>precodingAndResourceAllocation If the field is set to true, the UE can assume the precoding and resource allocation of the co-scheduled UE are the same in the PRG-level grid configured to the target UE when PRG=2 or 4, when the target UE and any co-scheduled UEs are in different CDM groups and with the same DMRS sequence. If the field is set to false, the UE can not assume the precoding or resource allocation of the co-scheduled UE is the same in the PRG-level grid configured to the target UE when PRG=2 or 4, when the target UE and any co-scheduled UEs are in different CDM groups and with the same DMRS sequence.</p>

NOTE: the same DMRS sequence represents the same root DMRS sequence $r(n)$, see TS 38.211 [16], clause 7.4.1.1.1.

– Aerial-Config

The IE *Aerial-Config* provides configuration parameters for aerial UE.

Aerial-Config information element

```

-- ASN1START
-- TAG-AERIAL-CONFIG-START

Aerial-Config-r18 ::= SEQUENCE {
    flightPathUpdateThrConfig-r18      SEQUENCE {
        flightPathUpdateDistanceThr-r18  SetupRelease { FlightPathUpdateDistanceThr-r18 }    OPTIONAL, -- Need M
        flightPathUpdateTimeThr-r18      SetupRelease { FlightPathUpdateTimeThr-r18 }    OPTIONAL, -- Need M
    }
    ...
}

FlightPathUpdateDistanceThr-r18 ::= INTEGER (0..1023)

FlightPathUpdateTimeThr-r18 ::= INTEGER (0..16383)

-- TAG-AERIAL-CONFIG-STOP

```

```
-- ASN1STOP
```

Aerial-Config field descriptions
<i>flightPathUpdateDistanceThr</i> Distance threshold for triggering flight path update indication. Actual value is 5 x field value in meters.
<i>flightPathUpdateTimeThr</i> Time threshold for triggering flight path update indication. Value in seconds.

– *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
```

– *Altitude*

The IE *Altitude* is used to indicate altitude relative to sea level. The actual value is the field value in meters.

***Altitude* information element**

```
-- ASN1START
-- TAG-ALTITUDE-START
```

```
Altitude-r18 ::= INTEGER (minAltitude-r18..maxAltitude-r18)
```

```
-- TAG-ALTITUDE-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
```

– ATG-Config

The IE *ATG-Config* provides parameters needed for the UE to access NR via ATG access.

ATG-Config information element

```
-- ASN1START
-- TAG-ATG-CONFIG-START

ATG-Config-r18 ::= SEQUENCE {
    atg-gNB-Location-r18      ReferenceLocation-r17      OPTIONAL,    -- Need R
    heightgNB-r18           INTEGER (-16384..16383)      OPTIONAL,    -- Need R
    cellSpecificKoffset-r18 INTEGER(1..3)              OPTIONAL,    -- Need R
    ta-ReportATG-r18        ENUMERATED {enabled}        OPTIONAL,    -- Need R
}

-- TAG-ATG-CONFIG-STOP
-- ASN1STOP
```

ATG-Config field descriptions

atg-gNB-Location

Indicates the BS location for ATG access.

cellSpecificKoffset

Scheduling offset used for the timing relationships that are modified for ATG. Unit in slot.

heightgNB

Indicates the height of the BS for ATG access relative to the sea level. Unit in meter.

ta-ReportATG

When this field is included in SIB22, 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).

– 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
<p><i>iab-DU-CellIdentity</i> The ID of the IAB-DU cell for which the <i>availabilityCombinations</i> are applicable.</p>
<p><i>positionInDCI-AI</i> The (starting) position (bit) of the <i>availabilityCombinationId</i> for the indicated IAB-DU cell (<i>iab-DU-CellIdentity</i>) within the DCI payload. If <i>positionInDCI-AI-RBGroups</i> is not configured, it applies to the <i>availabilityCombinationId</i> included in <i>availabilityCombinations</i> and in <i>availabilityCombinationsRB-Groups</i>. If <i>positionInDCI-AI-RBGroups</i> is configured, it applies to the <i>availabilityCombinationId</i> included in <i>availabilityCombinations</i>.</p>
<p><i>positionInDCI-AI-RBGroups</i> The (starting) position (bit) of the <i>availabilityCombinationId</i> associated to the <i>availabilityCombinationsRB-Groups</i> for the indicated IAB-DU cell (<i>iab-DU-CellIdentity</i>) within the DCI payload.</p>

AvailabilityCombinationRB-Groups field descriptions
<p><i>rb-SetGroups</i> Indicates the RB set groups configured for the availability combination. Each group includes consecutive RB sets.</p>
<p><i>rb-Sets</i> Indicates the one or more RB set indexes associated to one or more RB sets configured for one RB set group.</p>

– 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

```


<i>AvailabilityIndicator</i> field descriptions
ai-RNTI Used by an IAB-MT for detection of DCI format 2_5 indicating <i>AvailabilityCombinationId</i> for an IAB-DU's cells.
availableCombToAddModList A list of <i>availabilityCombinations</i> to add for the IAB-DU's cells. (see TS 38.213 [13], clause 14).
availableCombToReleaseList A list of <i>availabilityCombinations</i> 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
```

<i>BAP-RoutingID</i> 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)
rach-ConfigBFR                 RACH-ConfigGeneric
rsrp-ThresholdSSB              RSRP-Range
candidateBeamRSLIST            SEQUENCE (SIZE(1..maxNrofCandidateBeams)) OF PRACH-ResourceDedicatedBFR
ssb-perRACH-Occasion           ENUMERATED {oneEighth, oneFourth, oneHalf, one, two,
                                         four, eight, sixteen}
ra-ssb-OccasionMaskIndex       INTEGER (0..15)
recoverySearchSpaceId          SearchSpaceId
ra-Prioritization              RA-Prioritization
beamFailureRecoveryTimer       ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, ms150, ms200}
...
[[
msg1-SubcarrierSpacing         SubcarrierSpacing
]],
[[
ra-PrioritizationTwoStep-r16   RA-Prioritization
candidateBeamRSLISTExt-v1610   SetupRelease{ CandidateBeamRSLISTExt-r16 }
]],
[[
spCell-BFR-CBRA-r16           ENUMERATED {true}
]]
}

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)
    ra-PreambleIndex            INTEGER (0..63)
    ...
}

CandidateBeamRSLISTExt-r16 ::= SEQUENCE (SIZE(1.. maxNrofCandidateBeamsExt-r16)) OF PRACH-ResourceDedicatedBFR

-- TAG-BEAMFAILURERECOVERYCONFIG-STOP
-- ASN1STOP

```

BeamFailureRecoveryConfig field descriptions
<p>beamFailureRecoveryTimer Timer for beam failure recovery timer. Upon expiration of the timer the UE does not use CFRA for BFR. Value in ms. Value <i>ms10</i> corresponds to 10 ms, value <i>ms20</i> corresponds to 20 ms, and so on.</p>
<p>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 <i>candidateBeamRSList</i> (without suffix) and all elements of <i>candidateBeamRSListExt-v1610</i>. The UE maintains <i>candidateBeamRSList</i> and <i>candidateBeamRSListExt-v1610</i> separately: Receiving <i>candidateBeamRSListExt-v1610</i> set to <i>release</i> releases only the entries that were configured by <i>candidateBeamRSListExt-v1610</i>, and receiving <i>candidateBeamRSListExt-v1610</i> set to <i>setup</i> replaces only the entries that were configured by <i>candidateBeamRSListExt-v1610</i> 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 <i>bwp-Id</i>) of the UL BWP in which the <i>BeamFailureRecoveryConfig</i> is provided.</p>
<p>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</p>
<p>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).</p>
<p>ra-prioritization Parameters which apply for prioritized random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).</p>
<p>ra-PrioritizationTwoStep Parameters which apply for prioritized 2-step random access procedure for BFR (see TS 38.321 [3], clause 5.1.1).</p>
<p>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.</p>
<p>rach-ConfigBFR Configuration of random access parameters for BFR.</p>
<p>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 <i>bwp-Id</i>) of the UL BWP in which the <i>BeamFailureRecoveryConfig</i> 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.</p>
<p>rootSequenceIndex-BFR PRACH root sequence index (see TS 38.211 [16], clause 6.3.3.1) for beam failure recovery.</p>
<p>spCell-BFR-CBRA Indicates that UE is configured to send MAC CE for SpCell BFR as specified in TS38.321 [3].</p>
<p>ssb-perRACH-Occasion Number of SSBs per RACH occasion for CF-BFR, see TS 38.213 [13], clause 8.1.</p>

BFR-CSIRS-Resource field descriptions
<p>csi-RS The ID of a <i>NZP-CSI-RS-Resource</i> configured in the <i>CSI-MeasConfig</i> of this serving cell. This reference signal determines a candidate beam for beam failure recovery (BFR).</p>
<p>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 <i>prach-ConfigurationIndex</i> and <i>msg1-FDM</i>. 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.</p>
<p>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.</p>

BFR-SSB-Resource field descriptions
<p>ra-PreambleIndex The preamble index that the UE shall use when performing BFR upon selecting the candidate beams identified by this SSB.</p>
<p>ssb The ID of an SSB transmitted by this serving cell. It determines a candidate beam for beam failure recovery (BFR).</p>

– **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

```

<i>BeamFailureRecoveryRSConfig</i> field descriptions
<i>candidateBeamRS-List</i> 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.
<i>candidateBeamRS-List2</i> A list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery.
<i>rsrp-ThresholdBFR</i> 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

```

<i>BetaOffsets</i> field descriptions
<i>betaOffsetACK-Index1</i> 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.
<i>betaOffsetACK-Index2</i> 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.
<i>betaOffsetACK-Index3</i> Above 11 bits HARQ-ACK (see TS 38.213 [13], clause 9.3). When the field is absent the UE applies the value 11.
<i>betaOffsetCSI-Part1-Index1</i> 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.
<i>betaOffsetCSI-Part1-Index2</i> 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.
<i>betaOffsetCSI-Part2-Index1</i> 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.
<i>betaOffsetCSI-Part2-Index2</i> 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
```

<i>BH-LogicalChannelIdentity</i> field descriptions
<i>bh-LogicalChannelIdentity</i> ID used for the MAC logical channel.
<i>bh-LogicalChannelIdentityExt</i> 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
<i>LCH-Setup</i>	This field is mandatory present upon creation of a new logical channel for a BH RLC channel. It is optionally present, Need M, otherwise.
<i>LCH-SetupOnly</i>	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 ::=
    periodicBSR-Timer          SEQUENCE {
        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 <i>sf20</i> corresponds to 20 subframes, <i>sf40</i> corresponds to 40 subframes, and so on.
periodicBSR-Timer Value in number of subframes. Value <i>sf1</i> corresponds to 1 subframe, value <i>sf5</i> corresponds to 5 subframes and so on.
retxBSR-Timer Value in number of subframes. Value <i>sf10</i> corresponds to 10 subframes, value <i>sf20</i> 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 ::=
    locationAndBandwidth          SEQUENCE {
        subcarrierSpacing        INTEGER (0..37949),
        cyclicPrefix              ENUMERATED { extended }
    }
-- TAG-BWP-STOP
-- ASN1STOP

```

OPTIONAL -- Need R

BWP field descriptions
<p>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.</p>
<p>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 $N_{\text{BWP}}^{\text{size}}=275$. The first PRB is a PRB determined by <i>subcarrierSpacing</i> of this BWP and <i>offsetToCarrier</i> (configured in <i>SCS-SpecificCarrier</i> contained within <i>FrequencyInfoDL</i> / <i>FrequencyInfoUL</i> / <i>FrequencyInfoUL-SIB</i> / <i>FrequencyInfoDL-SIB</i> within <i>ServingCellConfigCommon</i> / <i>ServingCellConfigCommonSIB</i>) corresponding to this subcarrier spacing. In case of TDD, a BWP-pair (UL BWP and DL BWP with the same <i>bwp-Id</i>) must have the same center frequency (see TS 38.213 [13], clause 12)</p>
<p>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 <i>kHz15</i> corresponds to $\mu=0$, value <i>kHz30</i> corresponds to $\mu=1$, 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 <i>subCarrierSpacingCommon</i> in <i>MIB</i> 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.</p>

– *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-Common
        bwp-Dedicated
        ...
    }

-- TAG-BWP-DOWNLINK-STOP
-- ASN1STOP

```

<i>BWP-Downlink</i> field descriptions
<p><i>bwp-Id</i> An identifier for this bandwidth part. Other parts of the RRC configuration use the <i>BWP-Id</i> 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.</p>

Conditional Presence	Explanation
<i>SetupOtherBWP</i>	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 ::=
    genericParameters
    pdcch-ConfigCommon
    pdsch-ConfigCommon
    ...
}

SEQUENCE {
    BWP,
    SetupRelease { PDCCH-ConfigCommon } OPTIONAL, -- Need M
    SetupRelease { PDSCH-ConfigCommon } OPTIONAL, -- Need M
}

-- TAG-BWP-DOWNLINKCOMMON-STOP
-- ASN1STOP

```

<i>BWP-DownlinkCommon</i> field descriptions
<p><i>pdcch-ConfigCommon</i> Cell specific parameters for the PDCCH of this BWP. This field is absent for a dormant BWP.</p>
<p><i>pdsch-ConfigCommon</i> Cell specific parameters for the PDSCH of this BWP.</p>

– *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
    ]],
    [[
        preConfigGapStatus-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
    ]],
    [[
        tci-inDCI-18                         SetupRelease { TCI-inDCI-r18 }          OPTIONAL, -- Need M
    ]]
}

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

TCI-inDCI-r18 ::= SEQUENCE {
    tci-SelectionPresentInDCI-r18          ENUMERATED { enabled }          OPTIONAL, -- Need R
    applyIndicatedTCI-StatesDCI-1-0-r18   ENUMERATED { first, second, both } OPTIONAL, -- Need R
}

-- TAG-BWP-DOWNLINKDEDICATED-STOP
-- ASN1STOP

```

<i>BWP-DownlinkDedicated</i> field descriptions
<p><i>applyIndicatedTCI-StateDCI-1-0</i> This field indicates, for PDSCH reception scheduled or activated by DCI format 1_0, if UE applies the first, the second or both "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. Only when the UE is configured with PDSCH-CJT (<i>cjt-Scheme-PDSCH</i> in IE <i>ServingCellConfig</i>) and the UE supports two joint TCI states for PDSCH-CJT or the UE is configured with PDSCH-SFN (<i>sfnSchemePDSCH</i> in IE <i>ServingCellConfig</i>), the RRC configuration can indicate both indicated joint/DL TCI states are applied. This field is absent if more than one value for the field <i>coresetPoolIndex</i> is configured in <i>controlResourceSet</i> for the same DL BWP.</p>
<p><i>beamFailureRecoverySCellConfig</i> Configuration of candidate RS for beam failure recovery on SCells.</p>
<p><i>beamFailureRecoverySpCellConfig</i> Configuration of candidate RS for beam failure recovery on the SpCell. This field can only be configured when <i>beamFailure-r17</i> is configured in <i>RadioLinkMonitoringConfig</i>.</p>
<p><i>cfr-ConfigMulticast</i> UE specific common frequency resource configuration for MBS multicast for one dedicated BWP. This field can be configured within at most one serving cell.</p>
<p><i>dl-PPW-PreConfigToAddModList</i> Indicates a list of DL-PRS processing window configurations to be added or modified for the dedicated DL BWP.</p>
<p><i>dl-PPW-PreConfigToReleaseList</i> Indicates a list of DL-PRS processing window configurations to be released for the dedicated DL BWP.</p>
<p><i>harq-FeedbackEnablingforSPSActive</i> If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled for the HARQ process corresponding to the first SPS PDSCH after activation. Otherwise, UE follows configuration of HARQ feedback enabled/disabled for the HARQ process corresponding to the first SPS PDSCH after activation.</p>
<p><i>nonCellDefiningSSB</i> If configured, the 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, BFD, beam management). Furthermore, other parts of the BWP configuration that refer to an SSB (e.g. the "SSB" configured in the <i>QCL-Info</i> IE; the "ssb-Index" configured in the <i>RadioLinkMonitoringRS</i>; <i>CFRA-SSB-Resource</i>; <i>PRACH-ResourceDedicatedBFR</i>) refer implicitly to this NCD-SSB. The NCD-SSB has the same values for the properties (e.g., <i>ssb-PositionsInBurst</i>, <i>PCI</i>, <i>ssb-PBCH-BlockPower</i>) of the corresponding CD-SSB apart from the values of the properties configured in the <i>NonCellDefiningSSB-r17</i> IE. In the MIB associated with this NCD-SSB, the <i>systemFrameNumber</i> field indicates the frame boundary and frame number of the NCD-SSB. The <i>subCarrierSpacingCommon</i> and <i>dmrs-TypeA-Position</i> field in the MIBs associated with CD-SSB and NCD-SSB in the same cell are configured with the same values, respectively.</p>
<p><i>pdccch-Config</i> UE specific PDCCCH configuration for one BWP.</p>
<p><i>pdsch-Config</i> UE specific PDSCH configuration for one BWP.</p>
<p><i>preConfigGapStatus</i> Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with <i>preConfigInd</i>) 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.</p>
<p><i>servingCellMO</i> <i>measObjectID</i> of the <i>MeasObjectNR</i> in <i>MeasConfig</i> which is associated to the serving cell. For this <i>MeasObjectNR</i>, the following relationship applies between this <i>MeasObjectNR</i> and <i>nonCellDefiningSSB</i> in <i>BWP-DownlinkDedicated</i> of the associated downlink BWP: if <i>ssbFrequency</i> is configured, its value is the same as the <i>absoluteFrequencySSB</i> in the <i>nonCellDefiningSSB</i>. If the field is present in a downlink BWP and the BWP is activated, the UE uses this measurement object for serving cell measurements (e.g., including those used in measurement report triggering events), otherwise, the UE uses the <i>servingCellMO</i> in <i>ServingCellConfig</i> IE.</p>

<i>sps-Config</i> UE specific SPS (Semi-Persistent Scheduling) configuration for one BWP. Except for reconfiguration with sync, the NW does not reconfigure <i>sps-Config</i> when there is an active configured downlink assignment (see TS 38.321 [3]). However, the NW may release the <i>sps-Config</i> at any time. Network can only configure SPS in one BWP using either this field or <i>sps-ConfigToAddModList</i> . Network does not configure SPS in one BWP using this field and <i>sps-ConfigMulticastToAddModList-r17</i> simultaneously.
<i>sps-ConfigDeactivationStateList</i> 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 <i>harq-CodebookID</i> .
<i>sps-ConfigToAddModList</i> 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]).
<i>sps-ConfigToReleaseList</i> Indicates a list of one or more DL SPS configurations to be released. The NW may release a SPS configuration at any time.
<i>radioLinkMonitoringConfig</i> 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 <i>RadioLinkMonitoringConfig</i> .
<i>sl-PDCCH-Config</i> Indicates the UE specific PDCCH configurations for receiving the SL grants (via SL-RNTI or SL-CS-RNTI) for NR sidelink communication/discovery.
<i>sl-V2X-PDCCH-Config</i> Indicates the UE specific PDCCH configurations for receiving SL grants (i.e. sidelink SPS) for V2X sidelink communication.
<i>tci-SelectionPresentInDCI</i> Indicates if a [TCI selection field] is present or absent in DCI format 1_1 and DCI format 1_2 for a DL BWP, see TS 38.214 [19] clause 5.1.5 and TS 38.212 [17] clauses 7.3.1.2.2 and 7.3.1.2.3.

Conditional Presence	Explanation
<i>MeasObject-NCD-SSB</i>	This field is optionally present, Need S, if <i>nonCellDefiningSSB</i> is configured in this DL BWP. It is absent otherwise.
<i>PreConfigMG</i>	The field is optionally present, Need R, if there is at least one per UE gap configured with <i>preConfigInd</i> or there is at least one per FR gap of the same FR which the BWP belongs to and configured with <i>preConfigInd</i> . It is absent, Need R, otherwise.
<i>ScellOnly</i>	The field is optionally present, Need M, in the <i>BWP-DownlinkDedicated</i> of an Scell. It is absent otherwise.
<i>SpCellOnly</i>	The field is optionally present, Need M, in the <i>BWP-DownlinkDedicated</i> 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
```

<i>BWP-Uplink</i> field descriptions
<p><i>bwp-Id</i> An identifier for this bandwidth part. Other parts of the RRC configuration use the <i>BWP-Id</i> 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.</p>

Conditional Presence	Explanation
<i>SetupOtherBWP</i>	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, excluding *additionalRACH-perPCI-ToAddModList* and *additionalRACH-perPCI-ToReleaseList*, 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
rach-ConfigCommon          BWP,
pusch-ConfigCommon        SetupRelease { RACH-ConfigCommon }           OPTIONAL, -- Need M
pucch-ConfigCommon        SetupRelease { PUSCH-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-perPCI-ToAddModList-r18 SEQUENCE (SIZE (1.. maxNrofAdditionalPRACHConfigs-r18)) OF RACH-ConfigTwoTA-r18
                                                                    OPTIONAL, -- Cond 2TA-Only
additionalRACH-perPCI-ToReleaseList-r18 SEQUENCE (SIZE (1.. maxNrofAdditionalPRACHConfigs-r18)) OF RACH-ConfigTwoTAIndex-r18
                                                                    OPTIONAL, -- Need N
rsrp-ThresholdMsg1-RepetitionNum2-r18 RSRP-Range                                           OPTIONAL, -- Need R
rsrp-ThresholdMsg1-RepetitionNum4-r18 RSRP-Range                                           OPTIONAL, -- Need R
rsrp-ThresholdMsg1-RepetitionNum8-r18 RSRP-Range                                           OPTIONAL, -- Need R
preambleTransMax-Msg1-Repetition-r18  ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200} OPTIONAL, -- Cond Msg1Rep1
]],
}]
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
<p>additionalRACH-ConfigList List of feature or feature combination-specific RACH configurations, i.e. the RACH configurations configured in addition to the one configured by <i>rach-ConfigCommon</i> and by <i>msgA-ConfigCommon</i>. 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 32 entries. If both <i>rach-ConfigCommon</i> and <i>msgA-ConfigCommon</i> are configured for a specific <i>FeatureCombination</i>, the network always provides them in the same <i>additionalRACH-Config</i>.</p>
<p>additionalRACH-perPCI-ToAddModList List of RACH configurations for the additional PCIs. The RACH configuration for an additional PCI is applied for Random Access procedure initiated by PDCCH order towards to the additional PCI, as specified in TS 38.321 clause 5.1.1b. This list includes the same number of elements like <i>additionalPCI-ToAddModList</i> for this serving cell and the <i>n</i>-th element of this list is for the PCI in the <i>n</i>-th element of <i>additionalPCI-ToAddModList</i>. This configuration may be different for different UEs.</p>
<p>enableRA-PrioritizationForSlicing Indicates whether or not the <i>ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep</i> should override the <i>ra-PrioritizationForAccessIdentity</i>. The field is applicable only when the UE is configured by upper layers with both NSAG and Access Identity 1 or 2. If value <i>TRUE</i> is configured, the UE should only apply the <i>ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep</i>. If value <i>FALSE</i> is configured, the UE should only apply <i>ra-PrioritizationForAccessIdentity</i>. If the field is absent, whether to use <i>ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep</i> or <i>ra-PrioritizationForAccessIdentity</i> is up to UE implementation.</p>
<p>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 <i>BWP-UplinkCommon</i>, the UE shall apply the values {0, 1, 2, 3, 4, 5, 6, 7} (see TS 38.214 [19], clause 6.1.4).</p>
<p>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 <i>msgA-ConfigCommon</i> only for UL BWPs if the linked DL BWPs (same <i>bwp-Id</i> as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or DL BWPs associated with <i>nonCellDefiningSSB</i> or, for (e)RedCap UEs, the RedCap-specific initial downlink BWP.</p>
<p>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 <i>BWP-UplinkCommon</i>, the UE shall apply the values {n1, n2, n3, n4} (see TS 38.214 [19], clause 6.1.2.1).</p>
<p>preambleTransMax-Msg1-Repetition Max number of transmissions of MSG1 repetitions number (2, 4 and 8) performed before switching to higher repetition number (see TS 38.321 [3], clauses 5.1.1). This field is only applicable when more than one repetition numbers are configured in shared RO. If the field is absent, switching from lower repetition number to higher repetition number is not allowed.</p>
<p>pucch-ConfigCommon Cell specific parameters for the PUCCH of this BWP.</p>
<p>pusch-ConfigCommon Cell specific parameters for the PUSCH of this BWP.</p>
<p>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 <i>RACH-ConfigCommon</i>) only for UL BWPs if the linked DL BWPs (same <i>bwp-Id</i> as UL-BWP) are the initial DL BWPs or DL BWPs containing the SSB associated to the initial DL BWP or DL BWPs associated with <i>nonCellDefiningSSB</i> or, for (e)RedCap UEs, the RedCap-specific initial downlink BWP. The network configures <i>rach-ConfigCommon</i> (without suffix) and/or <i>rach-ConfigCommon-r17</i>, whenever it configures contention free random access (for reconfiguration with sync or for beam failure recovery), the UE then applies the corresponding configuration depending on the RACH resource set selected upon RACH initialization, as specified in TS 38.321 [3]. For RedCap-specific initial uplink BWP, <i>rach-ConfigCommon</i> is always configured when <i>msgA-ConfigCommon</i> is configured in this BWP.</p>
<p>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.</p>

<p><i>rsrp-ThresholdMsg1-RepetitionNum2, rsrp-ThresholdMsg1-RepetitionNum4, rsrp-ThresholdMsg1-RepetitionNum8</i> Threshold used by the UE for determining whether to select resources indicating Msg1 repetition number 2, 4 or 8 in this BWP, as specified in TS 38.321 [3]. The value applies to all the BWPs and all RACH configurations. For a given MSG1 repetition number, this corresponding field is mandatory if both set(s) of Random Access resources with MSG1 repetition indication associated with this MSG1 repetition number and set(s) of Random Access resources without MSG1 repetition indication are configured in the BWP, or if the set(s) of Random Access resources with MSG1 repetition indication associated with this MSG1 repetition number and set(s) of Random Access resources with MSG1 repetition indication associated with a lower repetition number are configured in the BWP. It is absent otherwise.</p>
<p><i>rsrp-ThresholdMsg3</i> 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.</p>
<p><i>useInterlacePUCCH-PUSCH</i> 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).</p>

Conditional Presence	Explanation
<i>Msg1Rep1</i>	This field is optionally present, Need R, if the set(s) of Random Access resources with MSG1 repetition indication are configured in the <i>BWP-UplinkCommon</i> . It is absent otherwise.
<i>Msg3Rep</i>	This field is optionally present, Need S, if the set(s) of Random Access resources with MSG3 repetition indication are configured in the <i>BWP-UplinkCommon</i> . It is absent otherwise.
<i>RA-PrioSliceAI</i>	The field is optionally present in <i>SIB1</i> , Need R, if both parameters <i>ra-PrioritizationForAccessIdentity</i> and the <i>ra-PrioritizationForSlicing/ra-PrioritizationForSlicingTwoStep</i> are present in <i>SIB1</i> . It is absent otherwise.
<i>SpCellOnly2</i>	The field is optionally present, Need M, in the <i>BWP-UplinkCommon</i> of an SpCell. It is absent otherwise.
<i>2TA-Only</i>	The field is optionally present, Need N in the <i>BWP-UplinkCommon</i> if <i>additionalPCI-ToAddModList</i> is present in <i>spCellConfigDedicated</i> or <i>sCellConfigDedicated</i> and it has the same number of entries as the <i>additionalPCI-ToAddModList</i> . 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
        ...
        [[
            s1-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
        ]]
    }
-- ASN1END
```

```

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
}
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
<p>beamFailureRecoveryConfig Configuration of beam failure recovery. If <i>supplementaryUplink</i> is present, the field is present only in one of the uplink carriers, either UL or SUL.</p>
<p>configuredGrantConfig A <i>Configured-Grant</i> of <i>type1</i> or <i>type2</i>. It may be configured for UL or SUL but in case of <i>type1</i> not for both at a time. Except for reconfiguration with sync, the NW does not reconfigure <i>configuredGrantConfig</i> when there is an active configured uplink grant Type 2 (see TS 38.321 [3]). However, the NW may release the <i>configuredGrantConfig</i> at any time. Network can only configure configured grant in one BWP using either this field or <i>configuredGrantConfigToAddModList</i>.</p>
<p>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 <i>cg-RetransmissionTimer-r16</i>.</p>
<p>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.</p>
<p>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].</p>
<p>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 <i>cp-ExtensionC2</i> and <i>cp-ExtensionC3</i>. For 30 kHz SCS, {1..28} are valid for <i>cp-ExtensionC2</i> and {2..28} are valid for <i>cp-ExtensionC3</i>. For 60 kHz SCS, {2..28} are valid for <i>cp-ExtensionC2</i> and {3..28} are valid for <i>cp-ExtensionC3</i>.</p>
<p>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].</p>
<p>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 <i>unifiedTCI-StateType</i> is not configured for the serving cell, no element in this list is configured.</p>
<p>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 <i>PUCCH-Config</i> 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 <i>PUCCH-Config</i> (i.e. PUCCH SCell). If PUCCH cell switching is supported by the UE, the network may configure two TDD serving cells with <i>PUCCH-Config</i> 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 <i>PUCCH-Config</i> on their normal UL. For supporting PUCCH cell switching in the PUCCH group with only SCells, two TDD SCells shall have <i>PUCCH-Config</i> 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 <i>pucch-Config</i> in an <i>RRCReconfiguration</i> with <i>reconfigurationWithSync</i> (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 <i>pucch-Config</i> 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.</p>
<p>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 <i>PUCCH-Config</i> within the <i>pucch-ConfigurationList</i> if configured.</p>
<p>pucch-ConfigurationListMulticast1 PUCCH configurations for two simultaneously constructed HARQ-ACK codebooks for MBS multicast (see TS 38.213, clause 9).</p>
<p>pucch-ConfigurationListMulticast2 PUCCH configurations for two simultaneously constructed NACK-only feedback for MBS multicast (see TS 38.213, clause 9).</p>

<i>pusch-Config</i> 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 <i>PUSCH-Config</i> 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.
<i>pucch-ConfigMulticast1</i> 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, <i>pucch-Config</i> applies.
<i>pucch-ConfigMulticast2</i> 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, <i>pucch-Config</i> applies.
<i>sl-PUCCH-Config</i> Indicates the UE specific PUCCH configurations used for the HARQ-ACK feedback reporting for NR sidelink communication.
<i>srs-Config</i> Uplink sounding reference signal configuration.
<i>ul-powerControl</i> Configures power control parameters for PUCCH, PUSCH and SRS when UE is configured with <i>unifiedTCI-StateType</i> for this serving cell. For each serving cell, <i>ul-powerControl</i> is either configured in all <i>BWP-UplinkDedicated</i> or it is not configured in any <i>BWP-UplinkDedicated</i> . When <i>unifiedTCI-StateRef</i> in the <i>BWP-UplinkDedicated</i> or in the <i>PDSCH-Config</i> if the <i>unifiedTCI-StateType</i> is set to <i>joint</i> , of a serving cell refers to another serving cell, <i>ul-powerControl</i> is either configured in all <i>BWP-UplinkDedicated</i> of these two serving cells or it is not configured in any <i>BWP-UplinkDedicated</i> of these two serving cells.
<i>ul-TCI-StateList</i> Indicates the applicable UL TCI states for PUCCH, PUSCH and SRS.
<i>ul-TCI-ToAddModList</i> Indicates a list of UL TCI states.
<i>unifiedTCI-StateRef</i> Provides the serving cell and UL BWP where UL TCI states applicable to this UL BWP are defined. The value of <i>unifiedTCI-StateType</i> of current serving cell is the same in the serving cell indicated by <i>unifiedTCI-StateRef</i> .
<i>useInterlacePUCCH-PUSCH</i> 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
<i>NoTCI-PC</i>	The field is optionally present, Need R, if <i>unifiedTCI-StateType</i> is configured for this serving cell and <i>ul-powerControl</i> is not configured for any UL TCI state or joint TCI state of this serving cell. Otherwise it is absent, Need R
<i>SpCellOnly</i>	The field is optionally present, Need M, in the <i>BWP-UplinkDedicated</i> 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* includes 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 ::=
  candidateBeamConfig-r16          SEQUENCE {
    ssb-r16                        CHOICE {
      SSB-Index,
      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.

– **CandidateTCI-State**

The IE *CandidateTCI-State* defines a TCI states configuration which associate one or more reference signal with a corresponding quasi-colocation (QCL) type.

CandidateTCI-State information element

```

-- ASN1START
-- TAG-CANDIDATETCI-STATE-START

CandidateTCI-State-r18 ::=
  tci-StateId-r18                 TCI-StateId,
  qcl-Type1-r18                   LTM-QCL-Info-r18,
  qcl-Type2-r18                   LTM-QCL-Info-r18                                OPTIONAL, -- Need R
  pathlossReferenceRS-Id-r18      PathlossReferenceRS-Id-r17                    OPTIONAL, -- Need R
  ...
}

LTM-QCL-Info-r18 ::=
  referenceSignal-r18            CHOICE {
    ssb-Index,
    csi-RS-Index
  },
  qcl-Type-r18                   ENUMERATED {typeA, typeB, typeC, typeD},
  ...
}

```

```
-- TAG-CANDIDATETCI-STATE-STOP
-- ASN1STOP
```

<i>CandidateTCI-State</i> field descriptions
<i>pathlossReferenceRS-Id</i> Indicates a <i>PathlossReferenceRS</i> of the LTM candidate that includes this <i>CandidateTCI-State</i> .
<i>qcl-Type1, qcl-Type2</i> QCL information for the TCI state.
<i>tcI-StateId</i> The ID number of the TCI state.

– *CandidateTCI-UL-State*

The IE *CandidateTCI-UL-State* defines an uplink TCI states configuration.

CandidateTCI-UL-State information element

```
-- ASN1START
-- TAG-CANDIDATETCI-UL-STATE-START
```

```
CandidateTCI-UL-State-r18 ::=
  tci-UL-StateId-r18          SEQUENCE {
    referenceSignal-r18      TCI-UL-StateId-r17,
    ssb-Index                CHOICE {
      csi-RS-Index           SSB-Index,
                           NZP-CSI-RS-ResourceId
    },
    pathlossReferenceRS-Id-r18 PathlossReferenceRS-Id-r17 OPTIONAL, -- Need R
    ...
  }
```

```
-- TAG-CANDIDATETCI-UL-STATE-STOP
-- ASN1STOP
```

CandidateTCI-UL-State field descriptions
csi-RS-Index Indicates an <i>NZP-CSI-RS-Resource</i> of the LTM candidate that includes this <i>CandidateTCI-UL-State</i> .
pathlossReferenceRS-Id Indicates a <i>PathlossReferenceRS</i> of the LTM candidate that includes this <i>CandidateTCI-UL-State</i> .
referenceSignal Reference signal with which spatial relation information is provided.
ssb-Index The index of a SSB/PBCH block as indicated in <i>ltm-SSB-Config</i> of the LTM candidate that includes this <i>CandidateTCI-UL-State</i> .
tcI-UL-StateID The ID number of the uplink TCI state.

– 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
<p>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 and NCR-MT.</p>
<p>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 and NCR-MT for cell barring determination, but still considered by NPN capable IAB-MT and NPN capable NCR-MT for determination of an NPN-only cell.</p>
<p>npn-IdentityInfoList The <i>npn-IdentityInfoList</i> is used to configure a set of <i>NPN-IdentityInfo</i> 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 <i>plmn-IdentityList</i>), PNI-NPNs (identified by a PLMN identity and a CAG-ID), and SNPNs (identified by a PLMN identity and a NID) together in the <i>PLMN-IdentityInfoList</i> and <i>NPN-IdentityInfoList</i> 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 <i>NPN-IdentityInfoList</i>. In case of NPN-only cells the <i>PLMN-IdentityList</i> contains a single element that does not count to the limit of 12 and the <i>cellIdentity</i> of the first entry of the <i>PLMN-IdentityInfoList</i> is set to the same value as the <i>cellIdentity-r16</i> of the first entry of the <i>NPN-IdentityInfoList</i>. The NPN index is defined as $B+c1+c2+\dots+c(n-1)+d1+d2+\dots+d(m-1)+e(i)$ for the NPN identity included in the <i>n</i>-th entry of <i>NPN-IdentityInfoList</i> and in the <i>m</i>-th entry of <i>npn-Identitylist</i> within that <i>NPN-IdentityInfoList</i> entry, and the <i>i</i>-th entry of its corresponding <i>NPN-Identity</i>, where</p> <ul style="list-style-type: none"> - <i>B</i> is the index used for the last PLMN in the <i>PLMN-IdentityInfoList</i>; in NPN-only cells <i>B</i> is considered 0; - <i>c(j)</i> is the number of NPN index values used in the <i>j</i>-th <i>NPN-IdentityInfoList</i> entry; - <i>d(k)</i> is the number of NPN index values used in the <i>k</i>-th <i>npn-IdentityList</i> entry within the <i>n</i>-th <i>NPN-IdentityInfoList</i> entry; - <i>e(i)</i> is <ul style="list-style-type: none"> - <i>i</i> if the <i>n</i>-th entry of <i>NPN-IdentityInfoList</i> entry is for SNPN(s); - 1 if the <i>n</i>-th entry of <i>NPN-IdentityInfoList</i> entry is for PNI-NPN(s).
<p>plmn-IdentityInfoList The <i>plmn-IdentityInfoList</i> is used to configure a set of <i>PLMN-IdentityInfo</i> 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 <i>PLMN-IdentityInfoList</i>. The PLMN index is defined as $b1+b2+\dots+b(n-1)+i$ for the PLMN included at the <i>n</i>-th entry of <i>PLMN-IdentityInfoList</i> and the <i>i</i>-th entry of its corresponding <i>PLMN-IdentityInfo</i>, where <i>b(j)</i> is the number of <i>PLMN-Identity</i> entries in each <i>PLMN-IdentityInfo</i>, respectively.</p>
<p>snpn-AccessInfoList This list provides access related information for each SNPN in <i>npn-IdentityInfoList</i>, see TS 23.501 [32]. The <i>n</i>-th entry of the list contains the access related information of the <i>n</i>-th SNPN in <i>npn-IdentityInfoList</i>.</p>

SNPN-AccessInfo field descriptions
<p>extCH-Supported Indicates whether the SNPN supports access using credentials from a Credentials Holder as specified in TS 23.501 [32].</p>
<p>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].</p>
<p>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.</p>
<p>onboardingEnabled Indicates whether the onboarding SNPN allows registration for onboarding in the cell as specified in TS 23.501 [32].</p>

– **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

```

– **CellIDTXDRX-Config**

The IE *CellIDTXDRX-Config* is used to configure cell DTX/DRX related parameters.

CellIDTXDRX-Config information element

```

-- ASN1START
-- TAG-CELLDTXDRX-CONFIG-START

CellIDTXDRX-Config-r18 ::=
    cellDTXDRX-onDurationTimer-r18
    },
    cellDTXDRX-CycleStartOffset-r18
        ms10
        ms20
        ms32
        ms40
        ms60
        ms64
        ms70
        ms80
        ms128
        ms160
        ms256
        ms320
        ms512
        ms640
        ms1024
        ms1280
        ms2048
        ms2560
        ms5120
        ms10240
    },
    cellDTXDRX-SlotOffset-r18
    cellDTXDRXconfigType-r18
    cellDTXDRXactivationStatus-r18
}

SEQUENCE {
    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 }
    },
    CHOICE {
        INTEGER(0..9),
        INTEGER(0..19),
        INTEGER(0..31),
        INTEGER(0..39),
        INTEGER(0..59),
        INTEGER(0..63),
        INTEGER(0..69),
        INTEGER(0..79),
        INTEGER(0..127),
        INTEGER(0..159),
        INTEGER(0..255),
        INTEGER(0..319),
        INTEGER(0..511),
        INTEGER(0..639),
        INTEGER(0..1023),
        INTEGER(0..1279),
        INTEGER(0..2047),
        INTEGER(0..2559),
        INTEGER(0..5119),
        INTEGER(0..10239)
    },
    INTEGER(0..31),
    ENUMERATED {dtx, drx, dtxdrx},
    ENUMERATED {activated, deactivated}
}

-- TAG-CELLDTXDRX-CONFIG-STOP
-- ASN1STOP

```

OPTIONAL -- Need N

CellDTXDRX-Config field descriptions
<p>cellDTXDRX-CycleStartOffset <i>cellDTXDRX-Cycle</i> in ms and <i>cellDTXDRX-StartOffset</i> in multiples of 1 ms. The configured <i>cellDTXDRX-Cycle</i> is an integer multiple of configured <i>drx-longCycle</i> or vice versa.</p>
<p>cellDTXDRX-onDurationTimer Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value <i>ms1</i> corresponds to 1 ms, value <i>ms2</i> corresponds to 2 ms, and so on.</p>
<p>cellDTXDRX-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.</p>
<p>cellDTXDRXactivationStatus Initial activation status of cell DTX/DRX indicating whether the UE shall activate the configuration according to the received parameters. This field is only used upon setup of a cell DTX/DRX configuration.</p>
<p>cellDTXDRXconfigType Indicates whether the configuration is for cell DTX only, cell DRX only, or joint cell DTX/DRX configuration.</p>

– 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). For an NCR-MT, the *CellGroupConfig* IE is also used to provide the configuration of side control information for the NCR-Fwd access link.

CellGroupConfig information element

```

-- ASN1START
-- TAG-CELLGROUPCONFIG-START

-- Configuration of one Cell-Group:
CellGroupConfig ::=
    cellGroupId
    rlc-BearerToAddModList
    rlc-BearerToReleaseList
    mac-CellGroupConfig
    physicalCellGroupConfig
    spCellConfig
    sCellToAddModList
    sCellToReleaseList
    . . .
    [[
    reportUplinkTxDirectCurrent
    ]],
    [[
    bap-Address-r16
    bh-RLC-ChannelToAddModList-r16
    bh-RLC-ChannelToReleaseList-r16
    flc-TransferPath-r16
    simultaneousTCI-UpdateList1-r16
    simultaneousTCI-UpdateList2-r16
    simultaneousSpatial-UpdatedList1-r16
    ]],
    SEQUENCE {
        CellGroupId,
        SEQUENCE (SIZE(1..maxLC-ID)) OF RLC-BearerConfig OPTIONAL, -- Need N
        SEQUENCE (SIZE(1..maxLC-ID)) OF LogicalChannelIdentity OPTIONAL, -- Need N
        MAC-CellGroupConfig OPTIONAL, -- Need M
        PhysicalCellGroupConfig OPTIONAL, -- Need M
        SpCellConfig OPTIONAL, -- Need M
        SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellConfig OPTIONAL, -- Need N
        SEQUENCE (SIZE (1..maxNrofSCells)) OF SCellIndex OPTIONAL, -- Need N
        . . .
        ENUMERATED {true} OPTIONAL -- Cond BWP-Reconfig
        BIT STRING (SIZE (10)) OPTIONAL, -- Need M
        SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelConfig-r16 OPTIONAL, -- Need N
        SEQUENCE (SIZE(1..maxBH-RLC-ChannelID-r16)) OF BH-RLC-ChannelID-r16 OPTIONAL, -- Need N
        ENUMERATED {lte, nr, both} OPTIONAL, -- Need M
        SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R
        SEQUENCE (SIZE (1..maxNrofServingCellsTCI-r16)) OF ServCellIndex OPTIONAL, -- Need R
        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
]],
[[
flc-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
]],
[[
ncr-FwdConfig-r18 SetupRelease { NCR-FwdConfig-r18 } OPTIONAL, -- Cond NCR
autonomousDenialParameters-r18 SetupRelease {AutonomousDenialParameters-r18} OPTIONAL, -- Need M
nonCollocatedTypeMRDC-r18 ENUMERATED { true } OPTIONAL, -- Need R
nonCollocatedTypeNR-CA-r18 ENUMERATED { true } OPTIONAL, -- Need R
uplinkTxSwitchingMoreBands-r18 SetupRelease { UplinkTxSwitchingMoreBands-r18 } OPTIONAL, -- Need M
]]
}

-- 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 {nl} 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}
}
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 ::=
  spCellConfigCommon              SEQUENCE {
    newUE-Identity                 RNTI-Value,
    t304                           ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000},
    rach-ConfigDedicated           CHOICE {
      uplink                       RACH-ConfigDedicated,
      supplementaryUplink           RACH-ConfigDedicated
    }
  }
  ...,
  [[
    smtc                           SSB-MTC
  ]],
  [[
    daps-UplinkPowerConfig-r16     DAPS-UplinkPowerConfig-r16
  ]],
  [[
    sl-PathSwitchConfig-r17       SL-PathSwitchConfig-r17
  ]],
  [[
    rach-LessHO-r18               RACH-LessHO-r18
    sl-IndirectPathMaintain-r18    ENUMERATED {true}
  ]]
}

DAPS-UplinkPowerConfig-r16 ::=
  p-DAPS-Source-r16              P-Max,
  p-DAPS-Target-r16              P-Max,
  uplinkPowerSharingDAPS-Mode-r16 ENUMERATED {semi-static-model, semi-static-mode2, dynamic }
}

SCellConfig ::=
  sCellIndex                     SCellIndex,
  sCellConfigCommon              ServingCellConfigCommon
  sCellConfigDedicated           ServingCellConfig
  ...,
  [[
    smtc                           SSB-MTC
  ]],
  [[
    sCellState-r16                 ENUMERATED {activated}
    secondaryDRX-GroupConfig-r16   ENUMERATED {true}
  ]],
  [[
    preConfigGapStatus-r17         BIT STRING (SIZE (maxNrofGapId-r17))
    goodServingCellEvaluationBFD-r17 GoodServingCellEvaluation-r17
    sCellSIB20-r17                 SetupRelease { SCellSIB20-r17 }
  ]],
  [[
    plmn-IdentityInfoList-r17      SetupRelease {PLMN-IdentityInfoList}
    npn-IdentityInfoList-r17       SetupRelease {NPN-IdentityInfoList-r16}
  ]],
  OPTIONAL, -- Cond SCellAdd
  OPTIONAL, -- Cond SCellAddMod
  OPTIONAL, -- Need S
  OPTIONAL, -- Cond SCellAddSync
  OPTIONAL, -- Need S
  OPTIONAL, -- Cond PreConfigMG
  OPTIONAL, -- Need R
  OPTIONAL, -- Need M
  OPTIONAL, -- Cond SCellSIB20-Opt
  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)
}

AutonomousDenialParameters-r18 ::= SEQUENCE {
    autonomousDenialSlots-r18 ENUMERATED {n2, n5, n10, n15, n20, n30, spare2, spare1},
    autonomousDenialValidity-r18 ENUMERATED {n200, n500, n1000, n2000}
}

```

```

RACH-LessHO-r18 ::=
    targetNTA-r18
    beamIndication-r18
        tci-StateID-r18
        ssb-Index-r18
    }
    ...
}

UplinkTxSwitchingMoreBands-r18 ::=
    uplinkTxSwitchingBandList-r18
    uplinkTxSwitchingBandPairList-r18
    uplinkTxSwitchingAssociatedBandDualUL-List-r18
}

UplinkTxSwitchingBandPairList-r18 ::=
    SEQUENCE (SIZE (1.. maxULTxSwitchingBandPairs)) OF UplinkTxSwitchingBandPairConfig-r18

UplinkTxSwitchingBandPairConfig-r18 ::=
    SEQUENCE {
        bandInfoUL1-r18
        bandInfoUL2-r18
        switchingOptionConfigForBandPair-r18
        switching2T-Mode-r18
        switchingPeriodConfigForBandPair-r18
    }
    ...
}

UplinkTxSwitchingAssociatedBandDualUL-List-r18 ::= SEQUENCE (SIZE (0..maxSimultaneousBands)) OF UplinkTxSwitchingAssociatedBandDualUL-r18

UplinkTxSwitchingAssociatedBandDualUL-r18 ::= SEQUENCE {
    transmitBand-r18
    associatedBand-r18
}

UplinkTxSwitchingBandIndex-r18 ::= INTEGER (1..maxSimultaneousBands)

-- TAG-CELLGROUPCONFIG-STOP
-- ASN1STOP

```

AutonomousDenialParamters field descriptions

autonomousDenialSlots

Indicates the maximum number of the UL slots for which the UE is allowed to deny any UL transmission. Value *n2* corresponds to 2 slots, value *n5* to 5 slots and so on.

autonomousDenialValidity

Indicates the validity period over which the UL autonomous denial slots shall be counted. Value *n200* corresponds to 200 slots, value *n500* corresponds to 500 slots and so on.

CC-State field descriptions	
<i>dICarrier</i>	Indicates DL carrier activation state for this carrier and the related active BWP Index, if activated.
<i>uICarrier</i>	Indicates UL carrier activation state for this carrier and the related active BWP Index, if activated.

CellGroupConfig field descriptions
<p>bap-Address BAP address of the parent node in cell group.</p>
<p>bh-RLC-ChannelToAddModList Configuration of the backhaul RLC entities and the corresponding MAC Logical Channels to be added and modified.</p>
<p>bh-RLC-ChannelToReleaseList List of the backhaul RLC entities and the corresponding MAC Logical Channels to be released.</p>
<p>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 <i>lte</i>, IAB-MT can only use LTE leg for F1-C transfer. If IAB-MT is configured with <i>nr</i>, IAB-MT can only use NR leg for F1-C transfer. If IAB-MT is configured with <i>both</i>, 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.</p>
<p>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 <i>mcg</i>, IAB-MT can only use the MCG for F1-C transfer. If IAB-MT is configured with <i>scg</i>, IAB-MT can only use the SCG for F1-C transfer. If IAB-MT is configured with <i>both</i>, it is up to IAB-MT to select the MCG or the SCG for F1-C transfer.</p>
<p>mac-CellGroupConfig MAC parameters applicable for the entire cell group.</p>
<p>ncr-FwdConfig Configuration of side control information for the NCR-Fwd access link.</p>
<p>nonCollocatedTypeMRDC This field is only present for a UE configured with <i>maxMIMO-Layers</i> with value less than or equal to 2 for all corresponding serving cells, in case of TDD-TDD inter-band (NG) EN-DC with overlapping or partially overlapping bands. If this field is present, the UE applies (NG)EN-DC MTTD/MRTD according to clause 7.5.3/7.6.3 in TS 38.133 [14] and inter-band RF requirements. If this field is absent, the UE applies (NG)EN-DC MTTD/MRTD according to clause 7.5.2/7.6.2 in TS 38.133 [14] and inter-band RF requirements when indicating support of <i>interBandMRDC-WithOverlapDL-Bands-r16</i>.</p>
<p>nonCollocatedTypeNR-CA This field is only present for a UE configured with <i>maxMIMO-Layers</i> with value less than or equal to 2 for all corresponding serving cells, in case of TDD-TDD intra-band NR-CA. If this field is present, the UE applies MRTD according to Table 7.6.4-1 in TS 38.133 [14] and UE RF requirements for intra-band NR-CA except for 7.10A in TS 38.101-1 [15]. If this field is absent, the UE applies MTTD/MRTD requirements according to Table 7.5.4-1/Table 7.6.4-2 in TS 38.133 [14] and UE RF requirements for intra-band non-collocated NR-CA including 7.10A in TS 38.101-1 [15] when indicating support of <i>intraBandNR-CA-non-collocated-r18</i>.</p>
<p>npr-IdentityInfoList This field is used to transfer <i>npr-IdentityInfoList</i> in <i>SIB1</i> of the SCell. The UE uses this field to translate the <i>plmn-Index</i> in MCCH of SCell to SNPN Identity. If this field and <i>plmn-IdentityInfoList</i> are both absent, the UE uses the <i>npr-IdentityInfoList</i> in <i>SIB1</i> of the PCell.</p>
<p>plmn-IdentityInfoList This field is used to transfer <i>plmn-IdentityInfoList</i> in <i>SIB1</i> of the SCell. The UE uses this field to translate the <i>plmn-Index</i> in MCCH of SCell to PLMN Identity. If this field and <i>npr-IdentityInfoList</i> are both absent, the UE uses the <i>plmn-IdentityInfoList</i> in <i>SIB1</i> of the PCell.</p>
<p>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].</p>
<p>rlc-BearerToAddModList Configuration of the MAC Logical Channel, the corresponding RLC entities and association with radio bearers.</p>
<p>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 <i>CellGroupConfig</i> when provided as part of <i>RRCSetup</i> message. If UE is configured with SUL carrier, UE reports both UL and SUL Direct Current locations.</p>

<p>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 <i>CellGroupConfig</i> when provided as part of <i>RRCSetup</i> message. The UE only reports the uplink Direct Current location information that are related to the indicated <i>cc-CombinationList</i>. 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 <i>Fsd</i> according to Table 5.3A.4-3 in FR2 in the <i>IntraBandCC-CombinationReqList</i>. I.e. DL-only carrier in FR2 frequency spectrum is not used to calculate the default DC location.</p>
<p>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 <i>CellGroupConfig</i> when provided as part of <i>RRCSetup</i> message.</p>
<p>rlc-BearerToReleaseListExt List of the RLC entities and the corresponding MAC Logical Channels to be released for multicast MRBs.</p>
<p>rlmInSyncOutOfSyncThreshold BLER threshold pair index for IS/OOS indication generation, see TS 38.133 [14], table 8.1.1-1. <i>n1</i> 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.</p>
<p>sCellSIB20 This field is used to transfer <i>SIB20</i> 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.</p>
<p>sCellToAddModList List of secondary serving cells (SCells) to be added or modified.</p>
<p>sCellToReleaseList List of secondary serving cells (SCells) to be released.</p>
<p>simultaneousSpatial-UpdatedList1, simultaneousSpatial-UpdatedList2 List of serving cells which can be updated simultaneously for spatial relation with a MAC CE. The <i>simultaneousSpatial-UpdatedList1</i> and <i>simultaneousSpatial-UpdatedList2</i> shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the <i>coresetPoolIndex</i> in these lists.</p>
<p>simultaneousTCI-UpdateList1, simultaneousTCI-UpdateList2 List of serving cells which can be updated simultaneously for TCI relation with a MAC CE. The <i>simultaneousTCI-UpdateList1</i> and <i>simultaneousTCI-UpdateList2</i> shall not contain same serving cells. Network should not configure serving cells that are configured with a BWP with two different values for the <i>coresetPoolIndex</i> in these lists.</p>
<p>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 <i>unifiedTCI-StateType</i>. Network should not configure serving cells that are configured with a BWP with different number of <i>coresetPoolIndexes</i> in these lists.</p>
<p>spCellConfig Parameters for the SpCell of this cell group (PCell of MCG or PSCell of SCG).</p>
<p>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 <i>switchedUL</i> if network configures option 1 as specified in TS 38.214 [19], or <i>dualUL</i> 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.</p>
<p>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].</p>
<p>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 <i>uplinkTxSwitching</i> 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 <i>uplinkTxSwitching</i>, 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.</p>

<i>uplinkTxSwitching-DualUL-TxState</i> 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 <i>uplinkTxSwitchingOption</i> is set to <i>dualUL</i> . Value <i>oneT</i> indicates 1Tx is assumed to be supported on the carriers on each band, value <i>twoT</i> indicates 2Tx is assumed to be supported on that carrier. This field applies for all band pairs if <i>uplinkTxSwitchingMoreBands</i> is configured.
<i>uplinkTxSwitchingMoreBands</i> Indicates UL band list, band pair list and other configurations for ULTx switching.
<i>uu-RelayRLC-ChannelToAddModList</i> List of the Uu RLC entities and the corresponding MAC Logical Channels to be added or modified.
<i>uu-RelayRLC-ChannelToReleaseList</i> List of the Uu RLC entities and the corresponding MAC Logical Channels to be released.

***DeactivatedSCG-Config* field descriptions**

<i>bfd-and-RLM</i> If the field is set to <i>true</i> , the UE shall perform RLM and BFD on the PSCell when the SCG is deactivated and the network ensures that <i>beamFailure-r17</i> is not configured in the <i>radioLinkMonitoringConfig</i> of the DL BWP of the PSCell in which the UE performs BFD. If set to <i>false</i> , the UE is not required to perform RLM and BFD on the PSCell when the SCG is deactivated.
--

***DAPS-UplinkPowerConfig* field descriptions**

<i>p-DAPS-Source</i> The maximum total transmit power to be used by the UE in the source cell group during DAPS handover.
<i>p-DAPS-Target</i> The maximum total transmit power to be used by the UE in the target cell group during DAPS handover.
<i>uplinkPowerSharingDAPS-Mode</i> Indicates the uplink power sharing mode that the UE uses in DAPS handover (see TS 38.213 [13]).

***GoodServingCellEvaluation* field descriptions**

<i>offset</i> 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
<p><i>iab-ResourceConfigID</i> This ID is used to indicate the specific resource configuration addressed by the MAC CEs specified in TS 38.321 [3].</p>
<p><i>periodicitySlotList</i> Indicates the periodicity in ms of the list of slot indexes indicated in <i>slotList</i>.</p>
<p><i>slotList</i> 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 <i>slotList</i> are strictly less than the value of the <i>periodicitySlotList</i>.</p>
<p><i>slotListSubcarrierSpacing</i> Subcarrier spacing used as reference for the <i>slotList</i> 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</p>

RACH-LessHO field descriptions
<p><i>ssb-Index</i> This field indicates a beam that the UE should use in the target cell to monitor PDCCH for initial uplink transmission, see TS 38.321 [3]. This field is present when dynamic grant is used for initial uplink transmission in RACH-less handover in NTN.</p>
<p><i>targetNTA</i> This field refers to the timing adjustment, see TS 38.213 [13] and TS 38.321 [3], indicating the N_{TA} value which the UE shall use for the target PTAG of handover. The value zero corresponds to $N_{TA}=0$, while the value <i>source</i> corresponds to the N_{TA} value of the source serving cell. Only value <i>source</i> is configured by the network in case source cell is a mobile IAB cell.</p>
<p><i>tci-StateID</i> This field indicates a beam that the UE should use in the target cell to monitor PDCCH for initial uplink transmission. This field is present in case this cell is a mobile IAB cell.</p>

ReconfigurationWithSync field descriptions
<p><i>rach-ConfigDedicated</i> 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 <i>firstActiveUplinkBWP</i> (see <i>UplinkConfig</i>).</p>
<p><i>sl-IndirectPathMaintain</i> Indicates that the L2 U2N Remote UE keeps the PC5 connection with its connected L2 U2N Relay UE.</p>
<p><i>smtc</i> The SSB periodicity/offset/duration configuration of target cell for NR PSCell change and NR PCell change. The network sets the <i>periodicityAndOffset</i> to indicate the same periodicity as <i>ssb-periodicityServingCell</i> in <i>spCellConfigCommon</i> or sets to the same periodicity as <i>ssb-Periodicity-r17</i> in <i>nonCellDefiningSSB-r17</i> if the first active DL BWP included in this RRC message is configured with <i>nonCellDefiningSSB-r17</i>. For case of NR PCell change, the <i>smtc</i> 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 <i>targetCellSMTC-SCG</i> are absent, the UE uses the SMTC in the <i>measObjectNR</i> having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. If the first active DL BWP included in this RRC message is configured with <i>nonCellDefiningSSB-r17</i>, this field corresponds to the NCD-SSB indicated by <i>nonCellDefiningSSB-r17</i>, otherwise, this field corresponds to the CD-SSB indicated by <i>absoluteFrequencySSB</i> in <i>frequencyInfoDL</i>.</p>

ReportUplinkTxDirectCurrentMoreCarrier field descriptions
<p>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 <i>servCellIndexList</i> with same order. This IE shall have the same size as <i>servCellIndexList</i>.</p>
<p>IntraBandCC-CombinationReqList Indicates the list of the requested carriers/BWPs combinations for an intra-band CA component.</p>
<p>servCellIndexList indicates the list of cell index for an intra-band CA component.</p>

SCellConfig field descriptions
<p>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 <i>failureDetectionSetN</i> is present for the SCell.</p>
<p>preConfGapStatus Indicates whether the pre-configured measurement gaps (i.e. the gaps configured with <i>preConfigInd</i>) 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.</p>
<p>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.</p>
<p>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 <i>drx-ConfigSecondaryGroup</i> 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 <i>drx-ConfigSecondaryGroup</i> is not configured, the field is absent and the UE shall release the field. The UE shall also release the field if <i>drx-ConfigSecondaryGroup</i> is released without including <i>sCellToAddModList</i>.</p>
<p>smtc The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the <i>periodicityAndOffset</i> to indicate the same periodicity as <i>ssb-periodicityServingCell</i> in <i>sCellConfigCommon</i>. The <i>smtc</i> 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 and <i>absoluteFrequencySSB</i> is included, the UE uses the SMTC in the <i>measObjectNR</i> having the same SSB frequency and subcarrier spacing, as configured before the reception of the RRC message. If the SCell is an SSB-less SCell (i.e., the IE <i>absoluteFrequencySSB</i> in <i>ServingCellConfigCommon</i> is absent), this field is absent.</p>

SpCellConfig field descriptions
<p>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 <i>RRCReconfiguration</i>, <i>RRCResume</i>, E-UTRA <i>RRCCONNECTIONRECONFIGURATION</i> or E-UTRA <i>RRCCONNECTIONRESUME</i> message.</p>
<p>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 <i>failureDetectionSetN</i> is present for the SpCell.</p>
<p>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.</p>
<p>lowMobilityEvaluationConnected Indicates the criterion for a UE to detect low mobility in RRC_CONNECTED in an SpCell. The <i>s-SearchDeltaP-Connected</i> is the parameter "<i>S_{SearchDeltaP-connected}</i>". Value <i>dB3</i> corresponds to 3 dB, <i>dB6</i> corresponds to 6 dB and so on. The <i>t-SearchDeltaP-Connected</i> is the parameter "<i>T_{SearchDeltaP-Connected}</i>". Value <i>s5</i> means 5 seconds, value <i>s10</i> 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.</p>
<p>reconfigurationWithSync Parameters for the synchronous reconfiguration to the target SpCell.</p>
<p>rlf-TimersAndConstants Timers and constants for detecting and triggering cell-level radio link failure. For the SCG, <i>rlf-TimersAndConstants</i> can only be set to <i>setup</i> and is always included at SCG addition.</p>
<p>servCellIndex Serving cell ID of a PSCell. The PCell of the Master Cell Group uses ID = 0.</p>

SL-PathSwitchConfig field descriptions
<p>targetRelayUE-Identity Indicates the L2 source ID of the target L2 U2N Relay UE during path switch.</p>
<p>t420 Indicates the timer value of <i>T420</i> to be used during path switch.</p>

UplinkTxSwitchingMoreBands field descriptions
<p>uplinkTxSwitchingBandList Indicates the NR frequency band number of the UL bands for UL Tx switching. If the UE needs to determine location of switching period as specified in TS 38.101-1 [15], the UE considers that the bands are listed in decreasing order of priority, i.e. the first/leftmost entry corresponds to the band with the highest priority, the next entry corresponds to the band with the second highest priority, and so on. The last entry corresponds the band with the lowest priority.</p>
<p>uplinkTxSwitchingBandPairList Indicates the band pairs involved in UL Tx switching, as well as the per band pair configurations.</p>
<p>uplinkTxSwitchingAssociatedBandDualUL-List Indicates the associated band for the transmitting band indicated by <i>transmitBand</i> which the transmitting carrier(s) is on as specified in TS 38.214 [19], clause 6.1.6. The network ensures that each band pair of a transmitting band and an associated band supports the <i>dualUL</i> switching option.</p>
<p>UplinkTxSwitchingBandIndex The value <i>n</i> indicates the band included at the <i>n</i>-th entry of <i>uplinkTxSwitchingBandList</i>.</p>

<i>UplinkTxSwitchingBandPairConfig</i> field descriptions
<i>bandInfoUL1, bandInfoUL2</i> Indicates the band index for a band pair. The value n indicates the band included at the n-th entry of <i>uplinkTxSwitchingBandList</i> .
<i>switching2T-Mode</i> Indicates 2Tx-2Tx switching mode is configured to the band pair. If this field is absent when uplink Tx switching is configured, it is interpreted that 1Tx-2Tx/1Tx-1Tx UL Tx switching is configured as specified in TS 38.214 [19].
<i>switchingOptionConfigForBandPair</i> Indicates the switching option for the band pair as specified in TS 38.214 [19], clause 6.1.6.
<i>switchingPeriodConfigForBandPair</i> Indicates the value of switching period for the band pair as specified in TS 38.214 [19], clause 6.1.6. Value <i>n35us</i> represents 35 us, <i>n140us</i> represents 140us. If the field is absent, 210 us is applied.

Conditional Presence	Explanation
<i>2Tx</i>	The field is optionally present, Need R, if <i>uplinkTxSwitching</i> is configured; otherwise it is absent, Need R.
<i>BWP-Reconfig</i>	The field is optionally present, Need N, if the BWPs are reconfigured or if serving cells are added or removed. Otherwise it is absent.
<i>DirectToIndirect-PathSwitch</i>	The field is mandatory present for the L2 U2N remote UE at path switch to the target L2 U2N Relay UE (including direct to indirect path switch and indirect to indirect path switch). It is absent otherwise. Note: the target L2 U2N Relay UE should not be the same as serving L2 U2N Relay UE for inter-gNB indirect to indirect path switch.
<i>MP</i>	This field is optionally present, Need N, if a L2 U2N remote UE is configured to perform MP direct path addition during indirect-to-direct path switch procedure, or to perform MP direct path release during direct-to-indirect path switch procedure. It is absent otherwise.
<i>NCR</i>	The field is optionally present, Need M, for NCR-MT. It is absent otherwise.
<i>PreConfigMG</i>	The field is optionally present, Need R, if there is at least one per UE gap configured with <i>preConfigInd</i> or there is at least one per FR gap of the same FR which the SCell belongs to and configured with <i>preConfigInd</i> . It is absent, Need R, otherwise.
<i>ReconfWithSync</i>	The field is mandatory present in the <i>RRCReconfiguration</i> message: <ul style="list-style-type: none"> - in each configured <i>CellGroupConfig</i> for which the SpCell changes, - in the <i>masterCellGroup</i>: <ul style="list-style-type: none"> - at change of AS security key derived from K_{gNB}, - in an <i>RRCReconfiguration</i> message contained in a <i>DLInformationTransferMRDC</i> 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 <i>secondaryCellGroup</i> at: <ul style="list-style-type: none"> - 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 <i>keyToUse</i> set to <i>secondary</i> and that is not released by this <i>RRCReconfiguration</i> message, - MN handover in (NG)EN-DC. Otherwise, it is optionally present, need M. The field is absent in the <i>masterCellGroup</i> in <i>RRCResume</i> and <i>RRCSetup</i> messages and is absent in the <i>masterCellGroup</i> in <i>RRCReconfiguration</i> messages if source configuration is not released during DAPS handover.
<i>SCellAdd</i>	The field is mandatory present upon SCell addition; otherwise it is absent, Need M.
<i>SCellAddMod</i>	The field is mandatory present upon SCell addition; otherwise it is optionally present, need M.
<i>SCellAddSync</i>	The field is optionally present, Need N: <ul style="list-style-type: none"> - in the <i>masterCellGroup</i> at <ul style="list-style-type: none"> - SCell addition, - reconfiguration with sync, - resume of an RRC connection. - in the <i>secondaryCellGroup</i>, when the SCG is not indicated as deactivated at: <ul style="list-style-type: none"> - SCG activation while the SCG was previously deactivated, - SCell addition, - reconfiguration with sync. It is absent otherwise.
<i>SCG</i>	The field is mandatory present in an <i>SpCellConfig</i> for the PSCell. It is absent otherwise.
<i>SCellSIB20-Opt</i>	This field is optionally present, Need M, if the field <i>sCellSIB20</i> is configured. It is absent otherwise.
<i>SCG-Opt</i>	The field is optionally present, Need M, in an <i>SpCellConfig</i> for the PSCell. It is absent otherwise.

NOTE: In case of change of AS security key derived from $S\text{-}K_{\text{gNB}}/S\text{-}K_{\text{eNB}}$, 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 $K_{\text{gNB}}/K_{\text{eNB}}$, 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
  pdccch-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
<p>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 $N^{\text{size_BWP}}=275$. The first PRB is a PRB determined by <i>subcarrierSpacing</i> of the associated BWP and <i>offsetToCarrier</i> corresponding to this subcarrier spacing. If not configured, the UE applies the value of <i>locationAndBandwidth</i> of the DL BWP in which the <i>cfR-ConfigMulticast</i> is configured.</p>
<p>pdccch-ConfigMulticast UE specific group-common PDCCH configuration for MBS multicast for one CFR.</p>
<p>pdsch-ConfigMulticast UE specific group-common PDSCH configuration for MBS multicast for one CFR.</p>
<p>sps-ConfigMulticastToAddModList Indicates a list of one or more DL SPS configurations for MBS multicast.</p>
<p>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.</p>

– 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 ::=
  cgi-info-EPC
    cgi-info-EPC-legacy
    cgi-info-EPC-list
  }
  cgi-info-5GC
  freqBandIndicator
  multiBandInfoList
  freqBandIndicatorPriority
}

SEQUENCE {
  SEQUENCE {
    CellAccessRelatedInfo-EUTRA-EPC,
    SEQUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-EPC
  }
  SEQUENCE (SIZE (1..maxPLMN)) OF CellAccessRelatedInfo-EUTRA-5GC
  FreqBandIndicatorEUTRA,
  MultiBandInfoListEUTRA
  ENUMERATED {true}
}

OPTIONAL
OPTIONAL,
OPTIONAL,
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-utra-5gc          PLMN-Identity          OPTIONAL,
    trackingAreaCode-utra-5gc      TrackingAreaCode   OPTIONAL,
    cellIdentity-utra-5gc          BIT STRING (SIZE (28)) OPTIONAL,
    plmn-Identity-utra-epc         PLMN-Identity          OPTIONAL,
    trackingAreaCode-utra-epc      BIT STRING (SIZE (16)) OPTIONAL,
    cellIdentity-utra-epc         BIT STRING (SIZE (28)) OPTIONAL
}

-- TAG-CGI-INFOEUTRALOGGING-STOP
-- ASN1STOP

```

CGI-InfoEUTRALogging field descriptions**cellIdentity-utra-epc, cellIdentity-utra-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-utra-epc, plmn-Identity-utra-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-utra-epc, trackingAreaCode-utra-5gc

Indicates Tracking Area Code to which the cell indicated by *cellIdentity-utra-epc*, *cellIdentity-utra-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
<p>noSIB1 Contains <i>ssb-SubcarrierOffset</i> and <i>pdccch-ConfigSIB1</i> fields acquired by the UE from <i>MIB</i> of the cell for which report CGI procedure was requested by the network in case <i>SIB1</i> was not broadcast by the cell.</p>
<p>cellReservedForOtherUse Contains <i>cellReservedForOtherUse</i> field acquired by the UE that supports <i>nr-CGI-Reporting-NPN</i> from <i>SIB1</i> of the cell for which report CGI procedure was requested by the network.</p>

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
<p>cellIdentity Unambiguously identify a cell within the context of the PLMN. It belongs the first <i>PLMN-IdentityInfo</i> IE of <i>PLMN-IdentityInfoList</i> in <i>SIB1</i>.</p>
<p>plmn-Identity Identifies the PLMN of the cell for the reported <i>cellIdentity</i>: the first PLMN entry of <i>plmn-IdentityList</i> (in <i>SIB1</i>) in the instance of <i>PLMN-IdentityInfoList</i> that contained the reported <i>cellIdentity</i>.</p>
<p>trackingAreaCode Indicates Tracking Area Code to which the cell indicated by <i>cellIdentity</i> field belongs.</p>

– 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
```

– ClockQualityMetrics

The IE *ClockQualityMetrics* is used to configure RAN timing synchronisation status information as specified in TS 38.473 [36]

ClockQualityMetrics information element

```
-- ASN1START
-- TAG-CLOCKQUALITYMETRICS-START

ClockQualityMetrics-r18 ::= SEQUENCE {
    synchronisationState-r18          ENUMERATED {locked, holdover, freerun, spare1}          OPTIONAL,  -- Need N
    traceabilityToUTC-r18             BOOLEAN                                           OPTIONAL,  -- Need N
    traceabilityToGNSS-r18            BOOLEAN                                           OPTIONAL,  -- Need N
    clockFrequencyStability-r18       BIT STRING (SIZE(16))                            OPTIONAL,  -- Need N
    clockAccuracy-r18                 CHOICE {
        value INTEGER (1..40000000),
        index INTEGER (32..47)
    }
    parentTimeSource-r18              ENUMERATED {syncE, pTP, gNSS,atomicClock, terrestrialRadio,
        serialTimeCode, nTP, handset, other, spare7,
        spare6, spare5, spare4, spare3, spare2, spare1}          OPTIONAL,  -- Need N
    ...
}

-- TAG-CLOCKQUALITYMETRICS-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 ::=
  codebookType
  type1
  subType
  typeI-SinglePanel
  nrOfAntennaPorts
  two
  twoTX-CodebookSubsetRestriction
  },
  moreThanTwo
  n1-n2
  two-one-TypeI-SinglePanel-Restriction
  two-two-TypeI-SinglePanel-Restriction
  four-one-TypeI-SinglePanel-Restriction
  three-two-TypeI-SinglePanel-Restriction
  six-one-TypeI-SinglePanel-Restriction
  four-two-TypeI-SinglePanel-Restriction
  eight-one-TypeI-SinglePanel-Restriction
  four-three-TypeI-SinglePanel-Restriction
  six-two-TypeI-SinglePanel-Restriction
  twelve-one-TypeI-SinglePanel-Restriction
  four-four-TypeI-SinglePanel-Restriction
  eight-two-TypeI-SinglePanel-Restriction
  sixteen-one-TypeI-SinglePanel-Restriction
  },
  typeI-SinglePanel-codebookSubsetRestriction-i2
  },
  typeI-SinglePanel-ri-Restriction
  },
  typeI-MultiPanel
  ng-n1-n2
  two-two-one-TypeI-MultiPanel-Restriction
  two-four-one-TypeI-MultiPanel-Restriction
  four-two-one-TypeI-MultiPanel-Restriction
  two-two-two-TypeI-MultiPanel-Restriction
  two-eight-one-TypeI-MultiPanel-Restriction
  four-four-one-TypeI-MultiPanel-Restriction
  two-four-two-TypeI-MultiPanel-Restriction
  four-two-two-TypeI-MultiPanel-Restriction
  },
  ri-Restriction
  },
  codebookMode
  },
  type2
  subType

```

```

SEQUENCE {
  CHOICE {
    SEQUENCE {
      CHOICE {
        SEQUENCE {
          CHOICE {
            SEQUENCE {
              SEQUENCE {
                SEQUENCE {
                  CHOICE {
                    BIT STRING (SIZE (6))
                  }
                }
              }
            }
          }
        }
      }
    }
  }
  BIT STRING (SIZE (16))
  OPTIONAL -- Need R
  BIT STRING (SIZE (8))
  SEQUENCE {
    CHOICE {
      BIT STRING (SIZE (8)),
      BIT STRING (SIZE (16)),
      BIT STRING (SIZE (8)),
      BIT STRING (SIZE (64)),
      BIT STRING (SIZE (32)),
      BIT STRING (SIZE (16)),
      BIT STRING (SIZE (128)),
      BIT STRING (SIZE (64))
    }
  }
  BIT STRING (SIZE (4))
  INTEGER (1..2)
  SEQUENCE {
    CHOICE {

```



```

    typeII
      nl-n2-codebookSubsetRestriction SEQUENCE {
        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 {
          nl-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 ::=
    codebookType
        type1
            typeI-SinglePanel-Group1-r17
                nrOfAntennaPorts
                    two
                        twoTX-CodebookSubsetRestriction1-r17 BIT STRING (SIZE (6))
                    },
                    moreThanTwo
                        n1-n2
                            SEQUENCE {
                                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
            nrOfAntennaPorts
                two
                    twoTX-CodebookSubsetRestriction2-r17 BIT STRING (SIZE (6))
                },
                moreThanTwo
                    n1-n2
                        SEQUENCE {
                            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))
    }
}
}
}
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
    typeII-PortSelection-r17                          SEQUENCE {
        paramCombination-r17                          SEQUENCE {
            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 ::=
    codebookType
        type1
            codebookMode
                INTEGER (1..2)
                OPTIONAL, -- Need R
        }
    }
}
CodebookConfig-r18 ::=
    codebookType
        type2
            typeII-CJT-r18
                SEQUENCE {
                    n1-n2-codebookSubsetRestrictionList-r18 SEQUENCE (SIZE (1..4)) OF CBSR-r18,
                    paramCombination-CJT-r18                INTEGER (1..7),
                    paramCombination-CJT-L-r18              SEQUENCE (SIZE (1..4)) OF INTEGER (1..5),
                    restrictedCMR-Selection-r18              ENUMERATED {enable},
                    valueOfO3-r18                          ENUMERATED {n1, n4}                 OPTIONAL, -- Need R
                    numberOfPMI-SubbandsPerCQI-Subband-r18 INTEGER(1..2),
                    typeII-RI-Restriction-r18               BIT STRING (SIZE (4)),
                    codebookMode-r18                       INTEGER (1..2)
                },
            typeII-CJT-PortSelection-r18                    SEQUENCE {
                paramCombination-CJT-PS-r18                INTEGER (1..5),
                paramCombination-CJT-PS-alpha-r18          SEQUENCE (SIZE (1..4)) OF INTEGER (1..8),
                restrictedCMR-Selection-r18                ENUMERATED {enable},
                valueOfO3-r18                              ENUMERATED {n1, n4}                 OPTIONAL, -- Need R
                valueOfN-CJT-r18                          ENUMERATED {n2, n4}                 OPTIONAL, -- Need R
                numberOfPMI-SubbandsPerCQI-Subband-r18    INTEGER(1..2),
                typeII-PortSelectionRI-Restriction-r18    BIT STRING (SIZE (4)),
                codebookMode-r18                          INTEGER (1..2)
            },
            typeII-Doppler-r18
                SEQUENCE {
                    n1-n2-codebookSubsetRestriction-r18    CBSR-r18,
                    paramCombination-Doppler-r18           INTEGER (1..9),
                }
        }
    }
}

```

```

    td-dd-config-r18
    numberOfPMI-SubbandsPerCQI-Subband-r18
    predictionDelay-r18
    typeII-RI-Restriction-r18
  },
  typeII-DopplerPortSelection-r18
  paramCombinationDoppler-PS-r18
  td-dd-config-r18
  valueOfN-Doppler-r18
  numberOfPMI-SubbandsPerCQI-Subband-r18
  predictionDelay-r18
  typeII-PortSelectionRI-Restriction-r18
}
}
}
}
}

CBSR-r18 ::= CHOICE {
  two-one          BIT STRING (SIZE (8)),
  two-two          BIT STRING (SIZE (27)),
  four-one         BIT STRING (SIZE (16)),
  three-two        BIT STRING (SIZE (35)),
  six-one          BIT STRING (SIZE (24)),
  four-two         BIT STRING (SIZE (43)),
  eight-one        BIT STRING (SIZE (32)),
  four-three       BIT STRING (SIZE (59)),
  six-two          BIT STRING (SIZE (59)),
  twelve-one       BIT STRING (SIZE (48)),
  four-four        BIT STRING (SIZE (75)),
  eight-two        BIT STRING (SIZE (75)),
  sixteen-one      BIT STRING (SIZE (64))
}

TD-DD-Config-r18 ::= SEQUENCE {
  vectorLengthDD-r18      ENUMERATED {n1,n2,n4,n8},
  unitDurationDD-r18      ENUMERATED {m1,m2}
  aperiodicResourceOffset-r18 INTEGER(1..2)
  tdCQI-r18                ENUMERATED {n11,n12,n2, spare1}
}

-- TAG-CODEBOOKCONFIG-STOP
-- ASN1STOP

```

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL -- Need R

CodebookConfig field descriptions
<p>codebookMode CodebookMode as specified in TS 38.214 [19], clause 5.2.2.2 8 and 5.2.2.9.</p>
<p>codebookType CodebookType including possibly sub-types and the corresponding parameters for each (see TS 38.214 [19], clause 5.2.2.2).</p>
<p>n1-n2-codebookSubsetRestriction, n1-n2-codebookSubsetRestrictionList 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 $\text{CEIL}(\log_2(\text{nchoosek}(O1*O2,4)))+8*n1*n2$ where $\text{nchoosek}(a,b) = a!/(b!(a-b)!)$. The number of elements in $n1-n2$-codebookSubSetRestrictionList is up to the number of elements of nzp-CSI-RS-Resources in NZP-CSI-RS-ResourceSet(S) indicated by nzp-CSI-RS-ResourceSetList in the CSI-ResourceConfig indicated by $resourcesForChannelMeasurement$ in the CSI-ReportConfig in which the $CodebookConfig$ is included. Each element in $n1-n2$-codebookSubsetRestrictionList has same $n1-n2$ bitstring.</p>
<p>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).</p>
<p>ng-n1-n2 Codebook subset restriction for Type I Multi-panel codebook (see TS 38.214 [19], clause 5.2.2.2.2).</p>
<p>numberOfBeams Number of beams, L, used for linear combination.</p>
<p>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, 5.2.2.2.8 and 5.2.2.9.</p>
<p>paramCombination, paramCombination-CJT-r18, paramCombination-CJT-L-r18, paramCombination-CJT-PS-r18, paramCombination-CJT-PS-alpha, paramCombinationDoppler-r18, paramCombinationDoppler-PS-r18 Field describes supported parameter combination ($M, ,$) as specified in TS 38.214 [19] Clause 5.2.2. For fields $paramCombination-CJT-L-r18$ or $paramCombination-CJT-PS-alpha$ the number of elements is 1, 2 or 4, and the values are configured according to the number of nzp-CSI-RS-Resources in NZP-CSI-RS-ResourceSet elements from Tables 5.2.2.2.8-1 and 5.2.2.2.9-1 in TS 38.214 [19], respectively. The allowed configuration combinations for $paramCombination-CJT-r18$ and $paramCombination-CJT-L-r18$ are given in Table 5.2.2.2.8-3 in TS 38.214 [19]. The allowed configuration combinations for $paramCombination-CJT-PS-r18$ and $paramCombination-CJT-PS-alpha-r18$ are given in Table 5.2.2.2.9-3 in TS 38.214 [19].</p>
<p>phaseAlphabetSize The size of the PSK alphabet, QPSK or 8-PSK.</p>
<p>portSelectionSamplingSize The size of the port selection codebook (parameter d), see TS 38.214 [19] clause 5.2.2.2.6.</p>
<p>predictionDelay Prediction delay for Doppler and Doppler port selection codebooks see TS 38.214 [19], Clause 5.2.1.4. The first value $m0$ means that the first slot for which the CSI corresponds to is the slot where the CSI reference resource is located at. For the other three candidate values ($n0, n1, n2$), then the first slot for which the CSI corresponds to is given by $l = n + \text{delta}$, where delta can take on values of 0, 1, 2 and n the slot in which CSI is reported.</p>
<p>restrictedCMR-Selection Enabling CSI-RS resource (CMR) restriction, (see TS 38.214 [19], clause 5.2.2.2.8)</p>
<p>ri-Restriction Restriction for RI for $Type1$-MultiPanel-RI-Restriction (see TS 38.214 [19], clause 5.2.2.2.2).</p>
<p>subbandAmplitude If subband amplitude reporting is activated ($true$).</p>
<p>twoTX-CodebookSubsetRestriction Codebook subset restriction for 2TX codebook (see TS 38.214 [19] clause 5.2.2.2.1).</p>
<p>typel-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).</p>
<p>typel-SinglePanel-ri-Restriction Restriction for RI for $Type1$-SinglePanel-RI-Restriction (see TS 38.214 [19], clause 5.2.2.2.1).</p>

typel-SinglePanel-Group1, typel-SinglePanel-Group2 Configures codebooks for CSI calculation when UE is configured with two CMR Groups with <i>CMRGroupingAndPairing</i> in the <i>NZP-CSI-RS-ResourceSet</i> associated with the <i>CSI-ReportConfig</i> . Network configures the same number of ports for both codebooks.
typel-SinglePanel-ri-RestrictionSDM, typel-SinglePanel-ri-RestrictionSTRP Restriction for RI for <i>N</i> Resource Pairs when two CMR Groups are configured with <i>CMRGroupingAndPairing</i> in the <i>NZP-CSI-RS-ResourceSet</i> associated with the <i>CSI-ReportConfig</i> (see TS 38.214 [19], clause 5.2.1.4.2).
typell-PortSelectionRI-Restriction Restriction for RI for <i>Typell-PortSelection-RI-Restriction</i> (see TS 38.214 [19], clauses 5.2.2.2.4, 5.2.2.2.6 and 5.2.2.2.7).
typell-RI-Restriction Restriction for RI for <i>Typell-RI-Restriction</i> (see TS 38.214 [19], clauses 5.2.2.2.3 and 5.2.2.2.5).
valueOfN Field provides the value of parameter <i>N</i> as specified in TS 38.214 [19], clause 5.2.2.2.7. The field is present only when <i>M=2</i> set by <i>paramCombination</i> , see TS 38.214 [19].
valueOfO3 O3: oversampling factor for frequency-domain basis selection offset Only applicable when <i>CodebookMode = 'Mode1'</i> .
valueOfN-CJT Field describes the size of the window of FD basis for Rel-18 Type II CJT PS codebook. For <i>M=2, N=2,4</i> (see TS 38.214 [19], clause 5.2.2.2.9)
valueOfN-Doppler Field describes the size of the window of FD basis for Rel-18 Type II Doppler PS codebook. For <i>M=2, N=2,4</i> (see TS 38.214 [19], clause 5.2.2.2.9)

TD-DD-Config field descriptions
aperiodicResourceOffset Offset <i>m</i> between two consecutive aperiodic CSI-RS resources. See TS 38.214 [19], clause 5.2.1.4.
tdCQI Number of TD CQIs (<i>X</i>) in each SB and ref slot(s) + ref <i>W2</i> (s). 1-1: 1 TD CQI, ref = 1st slot and 1st <i>W2</i> 1-2: 1 TD CQI, ref = 1st and last slots, and 1st and last <i>W2</i> 2: 2 TC CQIs (see TS 38.214 [19], clause 5.2.1.4).
unitDurationDD DD/TD unit duration (in slots), for AP-CSI-RS only. Note: For P/SP-CSI-RS, <i>d</i> is set to CSI-RS periodicity (see TS 38.214 [19], clause 5.2.1.4). If the value of <i>aperiodicResourceOffset</i> is '1', network configures value 'm1' for this field.
vectorLengthDD Doppler-/time-domain (DD/TD) basis vector length; See TS 38.214 [19], clause 5.2.1.4.

– 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, CPC, subsequent CPAC, CHO with target SCG, or CHO with candidate SCG(s) 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 fields.

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
    ]],
    [[
    condExecutionCondPSCell-r18 SEQUENCE (SIZE (1..2)) OF MeasId          OPTIONAL,      -- Cond condReconfigCHO-WithSCG
    subsequentCondReconfig-r18 SubsequentCondReconfig-r18          OPTIONAL,      -- Need M
    securityCellSetId-r18     SecurityCellSetId-r18                OPTIONAL,      -- Need M
    scpac-ConfigComplete-r18  ENUMERATED {true}                    OPTIONAL,      -- Cond CPAC
    ]]
}

CondReconfigExecCondSCG-r17 ::= SEQUENCE (SIZE (1..2)) OF MeasId

SubsequentCondReconfig-r18 ::= SEQUENCE {
    condExecutionCondToReleaseList-r18 CondExecutionCondToReleaseList-r18  OPTIONAL,      -- Need N
    condExecutionCondToAddModList-r18  CondExecutionCondToAddModList-r18  OPTIONAL,      -- Need N
    ...
}

CondExecutionCondToAddModList-r18 ::= SEQUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondExecutionCondToAddMod-r18

CondExecutionCondToAddMod-r18 ::= SEQUENCE {
    subsequentCondReconfigId-r18      CondReconfigId-r16,
    subsequentCondExecutionCond-r18   SEQUENCE (SIZE (1..2)) OF MeasId          OPTIONAL,      -- Need M
    subsequentCondExecutionCondSCG-r18 OCTET STRING (CONTAINING CondReconfigExecCondSCG-r17)  OPTIONAL,      -- Need M
    ...
}

CondExecutionCondToReleaseList-r18 ::= SEQUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondReconfigId-r16

-- 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 <i>measObject</i> . The network configures at most one from <i>condEventD1</i> , <i>condEventD2</i> or <i>condEventT1</i> for the same candidate cell. For CPA and for MN-initiated inter-SN CPC, the network only indicates <i>MeasId(s)</i> associated with <i>condEventA4</i> . For intra-SN CPC, the network only indicates <i>MeasId(s)</i> associated with <i>condEventA3</i> or <i>condEventA5</i> .
condExecutionCondPSCell	The execution condition that needs to be fulfilled for the associated PSCell in order to trigger the execution of a conditional reconfiguration for CHO with candidate SCG(s). The Meas Ids refer to the <i>measConfig</i> associated with the MCG. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same <i>measObject</i> . The network only indicates <i>MeasId(s)</i> associated with <i>condEventA4</i> .
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 <i>measConfig</i> associated with the SCG. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same <i>measObject</i> . For each <i>condReconfigId</i> , the network always configures either <i>condExecutionCond</i> or <i>condExecutionCondSCG</i> (not both). The network only indicates <i>MeasId(s)</i> associated with <i>condEventA3</i> or <i>condEventA5</i> .
condRRReconfig	The <i>RRReconfiguration</i> message to be applied when the condition(s) are fulfilled. The <i>RRReconfiguration</i> message contained in <i>condRRReconfig</i> cannot contain the field <i>conditionalReconfiguration</i> or the field <i>daps-Config</i> .
scpac-ConfigComplete	This field indicates whether the configuration contained in <i>condRRReconfig</i> for subsequent CPAC is a complete configuration.
subsequentCondReconfig	Contains the execution conditions that need to be fulfilled in order to trigger the execution of a subsequent CPAC. If the field is configured, the configuration of candidate PSCells for subsequent CPAC is supported. The subsequent execution condition is used for conditional reconfiguration evaluation for other candidate cells when the <i>RRReconfiguration</i> message contained in <i>condRRReconfig</i> has been applied.

CondExecutionCondToAddMod field descriptions	
subsequentCondExecutionCond	The execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for SN initiated intra-SN subsequent CPAC without MN involvement. When configuring 2 triggering events (Meas Ids) for a candidate cell, the network ensures that both refer to the same <i>measObject</i> . The network only indicates <i>MeasId(s)</i> associated with <i>condEventA3</i> or <i>condEventA5</i> .
subsequentCondExecutionCondSCG	Contains execution condition that needs to be fulfilled in order to trigger the execution of a conditional reconfiguration for SN initiated inter-SN subsequent CPAC, SN initiated intra-SN subsequent CPAC with MN involvement, or MN initiated inter-SN subsequent CPAC. The Meas Ids refer to the <i>measConfig</i> associated with the SCG. When configuring 2 triggering events (Meas Ids) for a candidate cell, network ensures that both refer to the same <i>measObject</i> . The network only indicates <i>MeasId(s)</i> associated with <i>condEventA3</i> or <i>condEventA5</i> .

Conditional Presence	Explanation
<i>condReconfigAdd</i>	The field is mandatory present when a <i>condReconfigId</i> is being added. Otherwise the field is optional, need M.
<i>condReconfigCHO-WithSCG</i>	This field is optional present, need M, if the <i>RRReconfiguration</i> message contained in corresponding <i>condRRReconfig</i> includes the <i>nr-SCG</i> and <i>condExecutionCond</i> is configured. Otherwise, it is absent.
CPAC	The field is optionally present, need M, when the conditional reconfiguration includes at least one candidate PSCell supporting subsequent CPAC. Otherwise, the field is absent, need R.

– 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
  ...,
  [[
  scpac-ReferenceConfiguration-r18 SetupRelease {ReferenceConfiguration-r18} OPTIONAL,  -- Need M
  servingSecurityCellSetId-r18    SecurityCellSetId-r18      OPTIONAL,  -- Cond condInitialSCPAC
  sk-CounterConfiguration-r18     SK-CounterConfiguration-r18 OPTIONAL,  -- Cond condInitialSCPAC
  ]]
}

CondReconfigToRemoveList-r16 ::= SEQUENCE (SIZE (1.. maxNrofCondCells-r16)) OF CondReconfigId-r16

SK-CounterConfiguration-r18 ::= SEQUENCE {
  sk-CounterConfigToReleaseList-r18 SEQUENCE (SIZE (1..maxSecurityCellSet-r18)) OF SecurityCellSetId-r18 OPTIONAL,  -- Need N
  sk-CounterConfigToAddModList-r18 SEQUENCE (SIZE (1..maxSecurityCellSet-r18)) OF SK-CounterConfig-r18 OPTIONAL,  -- Need N
}

SK-CounterConfig-r18 ::= SEQUENCE {
  securityCellSetId-r18 SecurityCellSetId-r18,
  sk-CounterList-r18 SEQUENCE (SIZE (1..maxSK-Counter-r18)) OF SK-Counter
}

SecurityCellSetId-r18 ::= INTEGER (1.. maxSecurityCellSet-r18)

-- 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.
scpac-ReferenceConfiguration Includes the reference configuration for the candidate supporting subsequent CPAC.
securityCellSetId This field is used to determine whether UE should perform security update when conditional reconfiguration containing <i>subsequentCondReconfig</i> is executed.
servingSecurityCellSetId This field identifies the security cell set for serving PSCell.
sk-counterConfiguration Includes a list of <i>sk-Counter</i> from which the UE should select the <i>sk-counter</i> used to derive $S-K_{qNB}$ for inter-SN subsequent CPAC. If this field is configured, the network shall not configure the field <i>sk-Counter</i> within the <i>RRCReconfiguration</i> message for conditional reconfiguration execution for subsequent CPAC.

Conditional Presence	Explanation
<i>CHO</i>	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.
<i>condInitialSCPAC</i>	The field is mandatory present upon the initial conditional reconfiguration, generated by the MN, which includes at least one inter-SN candidate PSCell supporting subsequent CPAC. The field is absent for any conditional reconfiguration generated by the SN. Otherwise, the field is optional, need M.

– *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 ::=
    frequencyHopping
    cg-DMRS-Configuration
    mcs-Table
    mcs-TableTransformPrecoder
    uci-OnPUSCH
    resourceAllocation
    rbg-Size
    powerControlLoopToUse
    p0-PUSCH-Alpha
    SEQUENCE {
        ENUMERATED {intraSlot, interSlot}
        DMRS-UplinkConfig,
        ENUMERATED {qam256, qam64LowSE}
        ENUMERATED {qam256, qam64LowSE}
        SetupRelease { CG-UCI-OnPUSCH }
        ENUMERATED { resourceAllocationType0, resourceAllocationType1, dynamicSwitch },
        ENUMERATED {config2}
        ENUMERATED {n0, n1},
        P0-PUSCH-AlphaSetId,
        OPTIONAL, -- Need S
        OPTIONAL, -- Need S
        OPTIONAL, -- Need M
        OPTIONAL, -- Need S
```

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
]],		
[[
srs-ResourceSetId-r18	SRS-ResourceSetId	OPTIONAL, -- Need R
cg-LTM-Configuration-r18	CG-RRC-Configuration-r18	OPTIONAL, -- Cond LTM
cg-SDT-PeriodicityExt-r18	ENUMERATED { sym1x14x1280, sym2x14x1280, sym4x14x1280, sym8x14x1280, sym16x14x1280, sym32x14x1280, sym48x14x1280, sym64x14x1280, sym96x14x1280, sym128x14x1280, sym192x14x1280, sym240x14x1280, sym256x14x1280, sym384x14x1280, sym472x14x1280, sym480x14x1280, sym512x14x1280, sym768x14x1280, sym944x14x1280, sym960x14x1280, sym1408x14x1280, sym1536x14x1280, sym1888x14x1280, sym1920x14x1280, sym2816x14x1280, sym3072x14x1280, sym3776x14x1280, sym5632x14x1280, sym6144x14x1280, sym7552x14x1280, sym7680x14x1280, sym11264x14x1280, sym15104x14x1280, sym15360x14x1280, sym22528x14x1280, sym30208x14x1280, sym45056x14x1280, sym60416x14x1280, sym90112x14x1280, sym180224x14x1280, sym4x12x1280, sym8x12x1280, sym16x12x1280, sym32x12x1280, sym192x12x1280, sym384x12x1280, sym960x12x1280, sym1888x12x1280, sym3776x12x1280, sym5632x12x1280, sym11264x12x1280, spare13, spare12, spare11, spare10, spare9,	

```

        spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
    }
    timeReferenceHyperSFN-r18      INTEGER (0..1023)
    cg-RRC-Configuration-r18      CG-RRC-Configuration-r18
    applyIndicatedTCI-State-r18   ENUMERATED {first, second, both}
]]
}
...
[[
cg-RetransmissionTimer-r16      INTEGER (1..64)
cg-minDFI-Delay-r16            ENUMERATED
                                {sym7, sym1x14, sym2x14, sym3x14, sym4x14, sym5x14, sym6x14, sym7x14, sym8x14,
                                sym9x14, sym10x14, sym11x14, sym12x14, sym13x14, sym14x14, sym15x14, sym16x14}
cg-nrofPUSCH-InSlot-r16        INTEGER (1..7)
cg-nrofSlots-r16               INTEGER (1..40)
cg-StartingOffsets-r16        CG-StartingOffsets-r16
cg-UCI-Multiplexing-r16       ENUMERATED {enabled}
cg-COT-SharingOffset-r16      INTEGER (1..39)
betaOffsetCG-UCI-r16          INTEGER (0..31)
cg-COT-SharingList-r16        SEQUENCE (SIZE (1..1709)) OF CG-COT-Sharing-r16
harq-ProcID-Offset-r16        INTEGER (0..15)
harq-ProcID-Offset2-r16       INTEGER (0..15)
configuredGrantConfigIndex-r16 ConfiguredGrantConfigIndex-r16
configuredGrantConfigIndexMAC-r16 ConfiguredGrantConfigIndexMAC-r16
periodicityExt-r16            INTEGER (1..5120)
startingFromRV0-r16           ENUMERATED {on, off}
phy-PriorityIndex-r16         ENUMERATED {p0, p1}
autonomousTx-r16              ENUMERATED {enabled}
]],
[[
cg-betaOffsetsCrossPri0-r17    SetupRelease { BetaOffsetsCrossPriSelCG-r17 }
cg-betaOffsetsCrossPri1-r17    SetupRelease { BetaOffsetsCrossPriSelCG-r17 }
mappingPattern-r17            ENUMERATED {cyclicMapping, sequentialMapping}
sequenceOffsetForRV-r17       INTEGER (0..3)
p0-PUSCH-Alpha2-r17          P0-PUSCH-AlphaSetId
powerControlLoopToUse2-r17    ENUMERATED {n0, n1}
cg-COT-SharingList-r17        SEQUENCE (SIZE (1..50722)) OF CG-COT-Sharing-r17
periodicityExt-r17            INTEGER (1..40960)
repK-v1710                     ENUMERATED {n12, n16, n24, n32}
nrofHARQ-Processes-v1700      INTEGER(17..32)
harq-ProcID-Offset2-v1700     INTEGER (16..31)
configuredGrantTimer-v1700    INTEGER(33..288)
cg-minDFI-Delay-v1710         INTEGER (238..3584)
]],
[[
harq-ProcID-Offset-v1730      INTEGER (16..31)
cg-nrofSlots-r17              INTEGER (1..320)
]],
[[
disableCG-RetransmissionMonitoring-r18 ENUMERATED {true}
nrofSlotsInCG-Period-r18      INTEGER (2..32)
uto-UCI-Config-r18            SEQUENCE {
    nrofBitsInUTO-UCI-r18      INTEGER (3..8),

```

OPTIONAL, -- Need R
 OPTIONAL, -- Need R
 OPTIONAL, -- Cond RACH-LessHO
 OPTIONAL -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need M

OPTIONAL, -- Need M

OPTIONAL, -- Cond CG-List

OPTIONAL, -- Cond CG-IndexMAC

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL -- Cond LCH-BasedPrioritization

OPTIONAL, -- Need M

OPTIONAL, -- Need M

OPTIONAL, -- Cond SRssets

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need M

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

```

        betaOffsetUTO-UCI-r18          INTEGER (0..31),
        ...
    }
    ]]
}
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))
    }
    sdt-SSB-PerCG-PUSCH-r17    ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need S
    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
}
CG-RRC-Configuration-r18 ::= SEQUENCE {
    cg-RRC-RetransmissionTimer-r18  INTEGER (1..64)                        OPTIONAL,  -- Need R
    cg-RRC-RSRP-ThresholdSSB-r18    RSRP-Range                            OPTIONAL,  -- Need R
    rrc-SSB-Subset-r18              CHOICE {
        shortBitmap-r18             BIT STRING (SIZE (4)),
        mediumBitmap-r18           BIT STRING (SIZE (8)),
        longBitmap-r18             BIT STRING (SIZE (64))
    }
    rrc-SSB-PerCG-PUSCH-r18         ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen}  OPTIONAL,  -- Need S
    rrc-PO-PUSCH-r18               INTEGER (-16..15)                       OPTIONAL,  -- Need M
    rrc-Alpha-r18                  ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL,  -- Need M
    rrc-DMRS-Ports-r18             CHOICE {
        dmrType1-r18               BIT STRING (SIZE (8)),
        dmrType2-r18               BIT STRING (SIZE (12))
    }
    rrc-NrofDMRS-Sequences-r18     INTEGER (1..2)                            OPTIONAL,  -- Need M
    ...
}
-- TAG-CONFIGUREDGRANTCONFIG-STOP
-- ASN1STOP

```

ConfiguredGrantConfig field descriptions
<p>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.</p>
<p>applyIndicatedTCI-State This field indicates, for PUSCH transmission(s) corresponding a Type1-CG configuration, if UE applies the first, the second or both "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. If more than one value for the field <i>coresetPoolIndex</i> is configured in IE <i>controlResourceSet</i> for the BWP, the value 'first' corresponds to the "indicated" joint/UL TCI states specific to <i>coresetPoolIndex</i> value 0 and the value 'second' correspond to the <i>coresetPoolIndex</i> value 1, respectively. In this case, network does not configure the value 'both'.</p>
<p>autonomousTx If this field is present, the Configured Grant configuration is configured with autonomous transmission, see TS 38.321 [3].</p>
<p>betaOffsetCG-UCI Beta offset for CG-UCI in CG-PUSCH, see TS 38.213 [13], clause 9.3</p>
<p>betaOffsetUTO-UCI Beta offset value for UTO-UCI multiplexing on CG PUSCH, see TS 38.213 [13], clause 9.3.</p>
<p>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 <i>cg-betaOffsetsCrossPri0</i> indicates multiplexing LP HARQ-ACK in HP CG-PUSCH. This field is configured only if <i>phy-PriorityIndex-r16</i> is configured with value <i>p1</i>. The field <i>cg-betaOffsetsCrossPri1</i> indicates multiplexing HP HARQ-ACK in LP CG-PUSCH. This field is configured only if <i>phy-PriorityIndex-r16</i> is configured with value <i>p0</i>.</p>
<p>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 <i>cg-RetransmissionTimer-r16</i> 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 <i>cg-COT-SharingList-r16</i> is configured.</p>
<p>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 $14 \cdot n$, where <i>n</i> is the signaled value for <i>cg-COT-SharingOffset</i>. Applicable when <i>ul-toDL-COT-SharingED-Threshold-r16</i> is not configured (see 37.213 [48], clause 4.1.3).</p>
<p>cg-DMRS-Configuration DMRS configuration (see TS 38.214 [19], clause 6.1.2.3).</p>
<p>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, $m \cdot 14$, where $m = \{1, 2, 3, 4\}$ 30 kHz: 7, $m \cdot 14$, where $m = \{1, 2, 3, 4, 5, 6, 7, 8\}$ 60 kHz: 7, $m \cdot 14$, where $m = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}$ 120 kHz: 7, $m \cdot 14$, 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: $m \cdot 14$, 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: $m \cdot 14$, where $m = \{4, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, 120, 128, 136, 144, 152, 160, 168, 176, 184, 192, 200, 208, 216, 224, 232, 240, 248, 256\}$</p>
<p>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 <i>cg-RetransmissionTimer</i> is configured.</p>
<p>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). <i>cg-nrofSlots-r17</i> is only applicable for operation with shared spectrum channel access in FR2-2. When <i>cg-nrofSlots-r17</i> is configured, the UE shall ignore <i>cg-nrofSlots-r16</i>. The network can only configure this field if <i>cg-RetransmissionTimer</i> is configured.</p>

<p>cg-RetransmissionTimer Indicates the initial value of the configured retransmission timer (see TS 38.321 [3]) in multiples of <i>periodicity</i>. The value of <i>cg-RetransmissionTimer</i> is always less than or equal to the value of <i>configuredGrantTimer</i>. This field is always configured together with <i>harq-ProclD-Offset</i>. This field is not configured for operation in licensed spectrum or simultaneously with <i>harq-ProclD-Offset2</i>. The network does not configure this field for CG-SDT.</p>
<p>cg-SDT-PeriodicityExt This field is used to calculate the periodicity for UL transmission without UL grant for type 1 (see TS 38.321 [3], clause 5.8.2) for extended CG-SDT periodicities. If this field is present, the fields <i>periodicity</i> and <i>periodicityExt</i> are ignored. The following periodicities are supported depending on the configured subcarrier spacing [symbols]: 15 kHz: $n \cdot 14 \cdot 1280$, where $n = \{1, 2, 4, 8, 48, 96, 240, 472, 944, 1408, 2816\}$ 30 kHz: $n \cdot 14 \cdot 1280$, where $n = \{2, 4, 8, 16, 96, 192, 480, 944, 1888, 2816, 5632\}$ 60 kHz with normal CP: $n \cdot 14 \cdot 1280$, where $n = \{4, 8, 16, 32, 192, 384, 960, 1888, 3776, 5632, 11264\}$ 60 kHz with ECP: $n \cdot 12 \cdot 1280$, where $n = \{4, 8, 16, 32, 192, 384, 960, 1888, 3776, 5632, 11264\}$ 120 kHz: $n \cdot 14 \cdot 1280$, where $n = \{8, 16, 32, 64, 384, 768, 1920, 3776, 7552, 11264, 22528\}$ 480 kHz: $n \cdot 14 \cdot 1280$, where $n = \{32, 64, 128, 256, 1536, 3072, 7680, 15104, 30208, 45056, 90112\}$ 960 kHz: $n \cdot 14 \cdot 1280$, where $n = \{64, 128, 256, 512, 3072, 6144, 15360, 30208, 60416, 90112, 180224\}$</p>
<p>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.</p>
<p>cg-UCI-Multiplexing If present, this field indicates that in the case of PUCCH overlapping with CG-PUSCH(s) including CG-UCI within a PUCCH group, HARQ-ACK is multiplexed on the CG-PUSCH including CG-UCI (see TS 38.213 [13], clause 9).</p>
<p>configuredGrantConfigIndex Indicates the index of the Configured Grant configurations within the BWP.</p>
<p>configuredGrantConfigIndexMAC Indicates the index of the Configured Grant configurations within the MAC entity.</p>
<p>disableCG-RetransmissionMonitoring Indicates that the UE shall disable waking-up to monitor possible grants for retransmissions corresponding to this <i>ConfiguredGrantConfig</i> when DRX is configured. When this field is configured, the UE does not start the <i>drx-HARQ-RTT-TimerUL</i> for PUSCH transmissions using configured uplink grants corresponding to this <i>ConfiguredGrantConfig</i>. See TS 38.321 [3], clause 5.7.</p>
<p>configuredGrantTimer Indicates the initial value of the configured grant timer (see TS 38.321 [3]) in multiples of periodicity. When <i>cg-RetransmissionTimer</i> is configured, if HARQ processes are shared among different configured grants on the same BWP, <i>configuredGrantTimer</i> * <i>periodicity</i> is set to the same value for the configurations that share HARQ processes on this BWP. The value of the extension <i>configuredGrantTimer</i> is 2 times the configured value.</p>
<p>dmrs-SeqInitialization The network configures this field if <i>transformPrecoder</i> is disabled or when the value of <i>sdt-NrofDMRS-Sequences</i> is set to 1. Otherwise, the field is absent.</p>
<p>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).</p>
<p>frequencyHopping The value <i>intraSlot</i> enables 'Intra-slot frequency hopping' and the value <i>interSlot</i> enables 'Inter-slot frequency hopping'. If the field is absent, frequency hopping is not configured. The field <i>frequencyHopping</i> applies to configured grant for 'pusch-RepTypeA' (see TS 38.214 [19], clause 6.3.1).</p>
<p>frequencyHoppingOffset Frequency hopping offset used when frequency hopping is enabled (see TS 38.214 [19], clause 6.1.2 and clause 6.3).</p>
<p>frequencyHoppingPUSCH-RepTypeB Indicates the frequency hopping scheme for Type 1 CG when <i>pusch-RepTypeIndicator</i> is set to 'pusch-RepTypeB' (see TS 38.214 [19], clause 6.1). The value <i>interRepetition</i> enables 'Inter-repetition frequency hopping', and the value <i>interSlot</i> enables 'Inter-slot frequency hopping'. If the field is absent, the frequency hopping is not enabled for Type 1 CG.</p>

<p>harq-ProclD-Offset For operation with shared spectrum channel access configured with <i>cg-RetransmissionTimer-r16</i>, 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 [<i>harq-proclD-offset</i>, ..., (<i>harq-proclD-offset</i> + <i>nrofHARQ-Processes</i> – 1)]. <i>harq-ProclD-Offset-v1730</i> is only applicable for operation with shared spectrum channel access in FR2-2. If the field <i>harq-ProclD-Offset-v1730</i> is present, the UE shall ignore the <i>harq-ProclD-Offset-r16</i>. The network does not configure this field for CG-SDT.</p>
<p>harq-ProclD-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 <i>cg-RetransmissionTimer-r16</i>. If the field <i>harq-ProclD-Offset2-v1700</i> is present, the UE shall ignore the <i>harq-ProclD-Offset2-r16</i>.</p>
<p>mappingPattern Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern when two SRS resource sets are configured in <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> 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]</p>
<p>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 <i>qam64</i>.</p>
<p>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 <i>qam64</i>.</p>
<p>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.</p>
<p>nrofBitsInUTO-UCI Indicates the number of bits in the UTO-UCI bitmap (see TS 38.212 [17], clause 6.2.7, 6.3.2, TS 38.213 [13], clause 9.3.1, TS 38.214 [19], clause 5.2.3). When this field is configured, UTO-UCI is enabled for the UE.</p>
<p>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 <i>nrofHARQ-Processes-v1700</i>, the UE shall ignore <i>nrofHARQ-Processes</i> (without suffix).</p>
<p>nrofSlotsInCG-Period Number of consecutive slots for CG PUSCH transmission occasions in a period of a single CG PUSCH configuration, see TS 38.214 [19], clause 6.1. The network does not configure this field for operation on shared spectrum.</p>
<p>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.</p>
<p>pathlossReferenceIndex2 Indicates the reference signal used as PUSCH pathloss reference for the second SRS resource set. When this field is present, <i>pathlossReferenceIndex</i> indicates the reference signal used as PUSCH pathloss reference for the first SRS resource set</p>
<p>p0-PUSCH-Alpha Index of the <i>P0-PUSCH-AlphaSet</i> to be used for this configuration.</p>
<p>p0-PUSCH-Alpha2 Index of the <i>P0-PUSCH-AlphaSet</i> to be used for second SRS resource set. If this field is present, the <i>p0-PUSCH-Alpha</i> provides index for the <i>P0-PUSCH-AlphaSet</i> to be used for first SRS resource set.</p>
<p>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, $n \cdot 14$, where $n = \{1, 2, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 128, 160, 320, 640\}$ 30 kHz: 2, 7, $n \cdot 14$, 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, $n \cdot 14$, 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, $n \cdot 12$, 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, $n \cdot 14$, 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: $n \cdot 14$, 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.</p>

<p>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 <i>periodicity</i> (without suffix). Network does not configure <i>periodicityExt-r17</i> together with <i>periodicityExt-r16</i>. The following periodicities are supported depending on the configured subcarrier spacing [symbols]: 15 kHz: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 640. 30 kHz: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 1280. 60 kHz with normal CP: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 2560. 60 kHz with ECP: <i>periodicityExt</i>*12, where <i>periodicityExt</i> has a value between 1 and 2560. 120 kHz: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 5120. 480 kHz: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 20480. 960 kHz: <i>periodicityExt</i>*14, where <i>periodicityExt</i> has a value between 1 and 40960. In case of SDT, the network does not configure periodicity values less than 5ms.</p>
<p>phy-PriorityIndex Indicates the PHY priority of CG PUSCH at least for PHY-layer collision handling. Value <i>p0</i> indicates low priority and value <i>p1</i> indicates high priority. The network does not configure this for CG-SDT.</p>
<p>powerControlLoopToUse Closed control loop to apply (see TS 38.213 [13], clause 7.1.1).</p>
<p>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 <i>powerControlLoopToUse</i> applies to the first SRS resource set.</p>
<p>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.</p>
<p>precodingAndNumberOfLayers2 Indicates the precoding and number of layers for the second SRS resource set. When this field is present, <i>precodingAndNumberOfLayers</i> indicated the precoding and number of layers for the first SRS resource set.</p>
<p>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 <i>pusch-RepTypeA</i> enables the 'PUSCH repetition type A' and the value <i>pusch-RepTypeB</i> enables the 'PUSCH repetition type B' (see TS 38.214 [19], clause 6.1.2.3). The value <i>pusch-RepTypeB</i> is not configured simultaneously with <i>cg-nrofPUSCH-InSlot-r16</i> and <i>cg-nrofSlots-r16</i>. The network does not configure this field if <i>cg-RetransmissionTimer-r16</i> is configured for CG operation with shared spectrum channel access.</p>
<p>rbg-Size Selection between configuration 1 and configuration 2 for RBG size for PUSCH. The UE does not apply this field if <i>resourceAllocation</i> is set to <i>resourceAllocationType1</i>. Otherwise, the UE applies the value <i>config1</i> when the field is absent. Note: <i>rbg-Size</i> is used when the <i>transformPrecoder</i> parameter is disabled.</p>
<p>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 <i>repK</i> is set to <i>n2</i>, <i>n4</i> or <i>n8</i>. This field is not configured when <i>cg-RetransmissionTimer</i> is configured. Otherwise, the field is absent.</p>
<p>repK Number of repetitions K, see TS 38.214 [19]. If the field <i>repK-v1710</i> is present, the UE shall ignore the <i>repK</i> (without suffix).</p>
<p>resourceAllocation Configuration of resource allocation type 0 and resource allocation type 1. For Type 1 UL data transmission without grant, <i>resourceAllocation</i> should be <i>resourceAllocationType0</i> or <i>resourceAllocationType1</i>.</p>
<p>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).</p>
<p>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 <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> with usage 'codebook' or 'noncodebook'.</p>

<i>srs-ResourceSetId</i>
Indicates the associated SRS resource set for PUSCH+PUSCH simultaneous uplink transmission for CG-type 1 PUSCH.
<i>srs-ResourceIndicator</i>
Indicates the SRS resource to be used. The network does not configure this for CG-SDT.
<i>srs-ResourceIndicator2</i>
Indicates the SRS resource to be used for the second SRS resource set. When this field is present, the <i>srs-ResourceIndicator</i> is used for the first SRS resource set.
<i>startingFromRV0</i>
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 <i>cg-RetransmissionTimer-r16</i> is configured for CG operation.
<i>timeDomainAllocation, timeDomainAllocation-v1710</i>
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 <i>timeDomainAllocation-v1710</i> is present, the UE shall ignore <i>timeDomainAllocation</i> field (without suffix).
<i>timeDomainOffset</i>
Offset related to the reference SFN indicated by <i>timeReferenceSFN</i> , see TS 38.321 [3], clause 5.8.2. <i>timeDomainOffset-r17</i> is only applicable to 480 kHz and 960 kHz. If <i>timeDomainOffset-r17</i> is present, the UE shall ignore <i>timeDomainOffset</i> (without suffix).
<i>timeReferenceHyperSFN</i>
Indicates H-SFN used for determination of the offset of a resource in time domain. The UE uses the closest H-SFN with the indicated number preceding the reception of the configured grant configuration, see TS 38.321 [3], clause 5.8.2.
<i>timeReferenceSFN</i>
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 <i>timeReferenceSFN</i> is not present, the reference SFN is 0.
<i>transformPrecoder</i>
Enables or disables transform precoding for <i>type1</i> and <i>type2</i> . If the field is absent, the UE enables or disables transform precoding in accordance with the field <i>msg3-transformPrecoder</i> in <i>RACH-ConfigCommon</i> from <i>rach-ConfigCommon</i> included directly within BWP configuration (i.e., not included in <i>additionalRACH-ConfigList</i>), see TS 38.214 [19], clause 6.1.3.
<i>uci-OnPUSCH</i>
Selection between and configuration of dynamic and semi-static beta-offset. For Type 1 UL data transmission without grant, <i>uci-OnPUSCH</i> should be set to <i>semiStatic</i> . The network does not configure this for CG-SDT.

CG-COT-Sharing field descriptions

<i>channelAccessPriority</i>
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).
<i>duration</i>
Indicates the number of DL transmission slots within UE initiated COT (see 37.213 [48], clause 4.1.3).
<i>offset</i>
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 and CG-RRC-Configuration field descriptions	
cg-RRC-RSRP-ThresholdSSB	An RSRP threshold configured for SSB selection for the CG as specified in TS 38.321 [3]. This field is absent in case <i>CG-RRC-Configuration</i> IE is received as part of an LTM-Candidate IE.
cg-SDT-RetransmissionTimer, cg-RRC-RetransmissionTimer	Indicates the initial value of the configured grant retransmission timer used for the initial transmission of CG with CCCH (for CG-SDT) or DCCH message (see TS 38.321 [3]) in multiples of <i>periodicity</i> .
sdt-DMRS-Ports, rrc-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 an 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, rrc-NrofDMRS-Sequences	Indicates the number of DMRS sequences for SSB to PUSCH mapping (see TS 38.213 [13]). In case of an 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, rrc-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 an 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, rrc-SSB-PerCG-PUSCH	The number of SSBs per CG PUSCH (see TS 38.213 [13]). Value <i>one</i> corresponds to 1 SSBs per CG PUSCH, value <i>two</i> corresponds to 2 SSBs per CG PUSCH and so on. In case of an 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, rrc-P0-PUSCH	Indicates P0 value for PUSCH in steps of 1dB (see TS 38.213 [13]). When this field is configured, the UE ignores the <i>p0-PUSCH-Alpha</i> .
sdt-Alpha, rrc-Alpha	Indicates alpha value for PUSCH. <i>alpha0</i> indicates value 0 is used, <i>alpha04</i> indicates value 4 is used and so on (see TS 38.213 [13]). When this field is configured, the UE ignores the <i>p0-PUSCH-Alpha</i> .

Conditional Presence	Explanation
<i>LCH-BasedPrioritization</i>	This field is optionally present, Need R, if <i>lch-BasedPrioritization</i> is configured in the MAC entity. It is absent otherwise.
<i>RACH-LessHO</i>	The field is optionally present, Need N, if <i>rach-LessHO</i> is present in <i>reconfigurationWithSync</i> . It is absent otherwise.
<i>RepTypeB</i>	The field is optionally present if <i>pusch-RepTypeIndicator</i> is set to <i>pusch-RepTypeB</i> , Need S, and absent otherwise.
<i>CG-List</i>	The field is mandatory present when included in <i>configuredGrantConfigToAddModList-r16</i> , otherwise the field is absent.
<i>CG-IndexMAC</i>	The field is mandatory present if at least one configured grant is configured by <i>configuredGrantConfigToAddModList-r16</i> in any BWP of this MAC entity, otherwise it is optionally present, need R.
<i>LTM</i>	The field is optionally present, Need R, if the UE is configured with at least an LTM candidate configuration. Otherwise, the field is absent.
<i>SRSsets</i>	This field is mandatory present when UE is configured with two SRS sets configured in either <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> 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)
}

-- TAG-CONNESTFAILURECONTROL-STOP
-- ASN1STOP
```

OPTIONAL -- Need S

ConnEstFailureControl field descriptions
connEstFailCount Number of times that the UE detects T300 expiry on the same cell before applying <i>connEstFailOffset</i> .
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 <i>connEstFailOffset</i> 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 ::=
    controlResourceSetId          SEQUENCE {
        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
        ]]
    }
-- ASN1END
```



```
    ]],
    [[
    applyIndicatedTCI-State-r18          ENUMERATED {first, second, both, none}          OPTIONAL -- Cond FollowUTCI
    ]]
}

-- TAG-CONTROLRESOURCESET-STOP
-- ASN1STOP
```

ControlResourceSet field descriptions
<p>applyIndicatedTCI-State This field indicates, for PDCCH reception on this CORESET, if UE applies the first, the second, both or none "indicated" DL only TCI or joint TCI as specified in TS 38.213 [13], clause 10.1.</p>
<p>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).</p>
<p>controlResourceSetId Identifies the instance of the <i>ControlResourceSet</i> IE. Value 0 identifies the common CORESET configured in <i>MIB</i> and in <i>ServingCellConfigCommon</i> (<i>controlResourceSetZero</i>) and is hence not used here in the <i>ControlResourceSet</i> IE. Other values identify CORESETs configured by dedicated signalling or in <i>SIB1</i> or <i>SIB20</i>. The <i>controlResourceSetId</i> is unique among the BWPs of a serving cell. If the field <i>controlResourceSetId-v1610</i> is present, the UE shall ignore the <i>controlResourceSetId</i> field (without suffix).</p>
<p>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.</p>
<p>duration Contiguous time duration of the CORESET in number of symbols (see TS 38.211 [16], clause 7.3.2.2).</p>
<p>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.</p>
<p>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 <i>freqMonitorLocation-r16</i>, only the first $N_{RBG,se}^{size}$ 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).</p>
<p>interleaverSize Interleaver-size (see TS 38.211 [16], clause 7.3.2.2).</p>
<p>pdccch-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 <i>physCellId</i> configured for this serving cell.</p>
<p>precoderGranularity Precoder granularity in frequency domain (see TS 38.211 [16], clauses 7.3.2.2 and 7.4.1.3.2).</p>
<p>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).</p>
<p>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).</p>
<p>shiftIndex When the field is absent the UE applies the value of the <i>physCellId</i> configured for this serving cell (see TS 38.211 [16], clause 7.3.2.2).</p>
<p>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 <i>ControlResourceSet</i> used for cross carrier scheduling in DCI format 1_1 in the scheduling cell if <i>enableDefaultBeamForCCS</i> is not configured (see TS 38.214 [19], clause 5.1.5).</p>
<p>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 <i>ControlResourceSet</i> used for cross carrier scheduling in DCI format 1_2 in the scheduling cell if <i>enableDefaultBeamForCCS</i> is not configured (see TS 38.214 [19], clause 5.1.5).</p>

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
<i>FollowUTC1</i>	The field is absent if the field <i>followUnifiedTCI-State</i> is present or if more than one value for the field <i>coresetPoolIndex</i> is configured in <i>controlResourceSet</i> for the same bandwidthpart. Otherwise, it is optionally present, Need R.
<i>NotSIB-initialBWP</i>	The field is absent in <i>SIB1/SIB20</i> and in the <i>PDCCH-ConfigCommon</i> of the initial BWP in <i>ServingCellConfigCommon</i> , if <i>SIB1/SIB20</i> 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 ::=
  schedulingCellInfo
    own
      cif-Presence
    },
    other
      schedulingCellId
      cif-InSchedulingCell
  },
  ...,
  [[
    carrierIndicatorSize-r16
      carrierIndicatorSizeDCI-1-2-r16
      carrierIndicatorSizeDCI-0-2-r16
    }
    enableDefaultBeamForCCS-r16
  ]],
  [[
    ccs-BlindDetectionSplit-r17
  ]]
}

-- TAG-CROSSCARRIERSCHEDULINGCONFIG-STOP
-- ASN1STOP
```

SEQUENCE {

CHOICE {

SEQUENCE { -- Cross carrier scheduling: scheduling cell

BOOLEAN

SEQUENCE { -- Cross carrier scheduling: scheduled cell

ServCellIndex,

INTEGER (1..7)

SEQUENCE {

INTEGER (0..3),

INTEGER (0..3)

OPTIONAL, -- Cond CIF-PRESENCE

OPTIONAL -- Need S

ENUMERATED {oneSeventh, threeFourteenth, twoSeventh, threeSeventh,

oneHalf, fourSeventh, fiveSeventh, spare1} OPTIONAL -- Need R

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 <i>carrierIndicatorSizeDCI-0-2</i> refers to DCI format 0_2 and the field <i>carrierIndicatorSizeDCI-1-2</i> 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 <i>other</i> 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 <i>true</i>) or not (value <i>false</i>) in PDCCH DCI formats, see TS 38.213 [13]. If <i>cif-Presence</i> is set to <i>true</i> , 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 <i>drx-ConfigSecondaryGroup</i> is configured in the <i>MAC-CellGroupConfig</i> 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
<i>CIF-PRESENCE</i>	The field is mandatory present if the <i>cif-Presence</i> is set to <i>true</i> . 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
  ]],
  [[
    ltm-AssociatedReportConfigInfo-r18 LTM-CSI-ReportConfigId-r18 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, -- Need R
    }
  ]],
  csi-SSB-ResourceSetExt INTEGER (1..maxNrofCSI-SSB-ResourceSetsPerConfigExt) OPTIONAL -- Need R
  ]],
  [[
    resourcesForChannelTDCP-r18 SEQUENCE {
      resourceSet2TDCP-r18 INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig),
      resourceSet3TDCP-r18 INTEGER (1..maxNrofNZP-CSI-RS-ResourceSetsPerConfig) OPTIONAL -- Need R
    }
  ]],
  applyIndicatedTCI-State-r18 CHOICE {
    perSet-r18 ENUMERATED {first, second},
    perResource-r18 SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF ENUMERATED {first, second} OPTIONAL, -- Need R
  }
  ],
  applyIndicatedTCI-State2-r18 CHOICE {
    perSet-r18 ENUMERATED {first, second},
    perResource-r18 SEQUENCE (SIZE(1..maxNrofAP-CSI-RS-ResourcesPerSet)) OF ENUMERATED {first, second} OPTIONAL, -- Cond SecondCSICMR
  }
  ],
  csi-ReportSubConfigTriggerList-r18 CSI-ReportSubConfigTriggerList-r18 OPTIONAL -- Need R
  ]]
```

}

```
-- TAG-CSI-APERIODICTRIGGERSTATELIST-STOP  
-- ASN1STOP
```

CSI-AperiodicTriggerState field descriptions***Itm-AssociatedReportConfigInfo***

This field configures the aperiodic CSI reports of LTM candidate cells. If *Itm-associatedReportConfigInfo* is configured the UE shall ignore the field *associatedReportConfigInfoList*.

CSI-AssociatedReportConfigInfo field descriptions
<p>ap-CSI-MultiplexingMode Indicates if the behavior of transmitting aperiodic CSI on the first PUSCH repetitions corresponding to two SRS resource sets configured in <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> with usage 'codebook' or 'noncodebook' is enabled or not.</p>
<p>applyIndicatedTCI-State, applyIndicatedTCI-State2 This field indicates, for an aperiodic CSI-RS resource set (perSet) or for CSI-RS resource (perResource), if UE applies the first or the second "indicated" DL only TCI or joint TCI as specified in TS 38.214 [19], clause 5.1.5. If more than one value for the field <i>coresetPoolIndex</i> is configured in the DL BWP used to trigger the CSI report, the value 'first' corresponds to the "indicated" joint/DL TCI states specific to <i>coresetPoolIndex</i> value 0 and the value 'second' correspond to the value 1, respectively. The <i>applyIndicatedTCI-State</i> is for <i>ResourcesForChannel</i>, and <i>applyIndicatedTCI-State2</i> is for <i>ResourcesForChannels2</i>.</p>
<p>csi-IM-ResourcesForInterference CSI-IM-ResourceSet for interference measurement. Entry number in <i>csi-IM-ResourceSetList</i> in the CSI-ResourceConfig indicated by <i>csi-IM-ResourcesForInterference</i> in the CSI-ReportConfig indicated by <i>reportConfigId</i> 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 <i>resourceSet</i> within <i>nzp-CSI-RS</i>.</p>
<p>csi-ReportSubConfigTriggerList A list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a CSI-ReportConfig associated with a triggering state for aperiodic CSI reporting on PUSCH.</p>
<p>csi-SSB-ResourceSet, csi-SSB-ResourceSet2 CSI-SSB-ResourceSet for channel measurements. Entry number in <i>csi-SSB-ResourceSetList</i> in the CSI-ResourceConfig indicated by <i>resourcesForChannelMeasurement</i> in the CSI-ReportConfig indicated by <i>reportConfigId</i> above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).</p>
<p>nzp-CSI-RS-ResourcesForInterference NZP-CSI-RS-ResourceSet for interference measurement. Entry number in <i>nzp-CSI-RS-ResourceSetList</i> in the CSI-ResourceConfig indicated by <i>nzp-CSI-RS-ResourcesForInterference</i> in the CSI-ReportConfig indicated by <i>reportConfigId</i> above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).</p>
<p>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 <i>nzp-CSI-RS-Resources</i> of the NZP-CSI-RS-ResourceSet indicated by <i>resourceSet</i> within <i>nzp-CSI-RS</i>. Each <i>TCI-StateId</i> refers to the TCI-State which has this value for <i>tcI-StateId</i> and is defined in <i>tcI-StatesToAddModList</i> or in <i>dl-OrJointTCI-StateList</i> in the PDSCH-Config included in the BWP-Downlink corresponding to the serving cell and to the DL BWP to which the <i>resourcesForChannelMeasurement</i> (in the CSI-ReportConfig indicated by <i>reportConfigId</i> above) belong to. First entry in <i>qcl-info</i> corresponds to first entry in <i>nzp-CSI-RS-Resources</i> of that NZP-CSI-RS-ResourceSet, second entry in <i>qcl-info</i> corresponds to second entry in <i>nzp-CSI-RS-Resources</i>, and so on (see TS 38.214 [19], clause 5.2.1.5.1). When this field is absent for aperiodic CSI RS, and <i>applyIndicatedTCI-State</i> or <i>applyIndicatedTCI-State2</i> is not configured, the UE shall use QCL information included in the "indicated" DL only/Joint TCI state as specified in TS 38.214 [19].</p>
<p>reportConfigId The <i>reportConfigId</i> of one of the CSI-ReportConfigToAddMod configured in CSI-MeasConfig</p>
<p>resourcesForChannel2 Configures reference signals for channel measurement corresponding to the second resource set for L1-RSRP measurement as configured in IE CSI-ResourceConfig when <i>nrofReportedGroups-r17</i> 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 <i>resourcesForChannel</i>, and the <i>resourcesForChannel</i> 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).</p>
<p>resourcesForChannelTDCP Configures reference signals for channel measurement corresponding to the second resource set and third resource set for TDCP reporting. All CSI resources of these two resource sets always share the same QCL-info with the resource sets indicated by <i>resourcesForChannel</i> as specified in TS 38.214 [19].</p>
<p>resourceSet NZP-CSI-RS-ResourceSet for channel measurements. Entry number in <i>nzp-CSI-RS-ResourceSetList</i> in the CSI-ResourceConfig indicated by <i>resourcesForChannelMeasurement</i> in the CSI-ReportConfig indicated by <i>reportConfigId</i> above (value 1 corresponds to the first entry, value 2 to the second entry, and so on).</p>

Conditional Presence	Explanation
<i>Aperiodic</i>	The field is mandatory present if the <i>NZP-CSI-RS-Resources</i> in the associated <i>resourceSet</i> have the <i>resourceType</i> <i>aperiodic</i> and <i>unifiedTCI-StateType</i> is not configured. The field is optionally present, Need R, if the <i>NZP-CSI-RS-Resources</i> in the associated <i>resourceSet</i> have the <i>resourceType</i> <i>aperiodic</i> and <i>unifiedTCI-StateType</i> is configured. The field is absent otherwise.
<i>CSI-IM-ForInterference</i>	This field is mandatory present if the <i>CSI-ReportConfig</i> identified by <i>reportConfigId</i> is configured with <i>csi-IM-ResourcesForInterference</i> ; otherwise it is absent.
<i>NZP-CSI-RS-ForInterference</i>	This field is mandatory present if the <i>CSI-ReportConfig</i> identified by <i>reportConfigId</i> is configured with <i>nzp-CSI-RS-ResourcesForInterference</i> ; otherwise it is absent.
<i>SecondCSICMR</i>	This field is optionally present, Need R, if <i>resourcesForChannel2</i> is configured with <i>aperiodic</i> CSI-RS. It is absent otherwise.
<i>TDCP</i>	This field is absent if <i>resourcesForChannel2</i> is configured. 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

<i>nrofRBs</i>	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.
<i>startingRB</i>	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 ::=
    csi-IM-ResourceId                SEQUENCE {
        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)
            }
        }
    }
    freqBand                        CSI-FrequencyOccupation OPTIONAL, -- Need M
    periodicityAndOffset            CSI-ResourcePeriodicityAndOffset OPTIONAL, -- Need M
    ...                             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
<i>PeriodicOrSemiPersistent</i>	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
```

<i>CSI-IM-ResourceSet</i> field descriptions
<i>csi-IM-Resources</i> <i>CSI-IM-Resources</i> associated with this <i>CSI-IM-ResourceSet</i> (see TS 38.214 [19], clause 5.2).

– *CSI-IM-ResourceSetId*

The IE *CSI-IM-ResourceSetId* is used to identify *CSI-IM-ResourceSets*.

***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
        ]],
        [[
        ltm-CSI-ReportConfigToAddModList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ReportConfigurations-r18)) OF LTM-CSI-ReportConfig-r18    OPTIONAL, -- Need N
        ]]
```

```

    ltm-CSI-ReportConfigToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ReportConfigurations-r18)) OF LTM-CSI-ReportConfigId-r18
    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 <i>CSI-IM-ResourceSet</i> which can be referred to from <i>CSI-ResourceConfig</i> or from MAC CEs.
csi-IM-ResourceToAddModList Pool of <i>CSI-IM-Resource</i> which can be referred to from <i>CSI-IM-ResourceSet</i> .
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 <i>CSI-ResourceConfig</i> .
ltm-CSI-ReportConfigToAddModList Configured CSI report settings for LTM as specified in TS 38.214 [19].
nzp-CSI-RS-ResourceSetToAddModList Pool of <i>NZP-CSI-RS-ResourceSet</i> which can be referred to from <i>CSI-ResourceConfig</i> or from MAC CEs.
nzp-CSI-RS-ResourceToAddModList Pool of <i>NZP-CSI-RS-Resource</i> which can be referred to from <i>NZP-CSI-RS-ResourceSet</i> .
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 <i>reportTriggerSize</i> applies to DCI format 0_1 and the field <i>reportTriggerSizeDCI-0-2</i> 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 ::=
    reportConfigId          SEQUENCE {
        carrier              CSI-ReportConfigId,
        resourcesForChannelMeasurement ServCellIndex          OPTIONAL, -- Need S
        csi-IM-ResourcesForInterference CSI-ResourceConfigId,
        nzp-CSI-RS-ResourcesForInterference CSI-ResourceConfigId OPTIONAL, -- Need R
        reportConfigType    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 {s15, s110, s120, s140, s180, s1160, s1320},
                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

}
timeRestrictionForChannelMeasurements    ENUMERATED {configured, notConfigured},
timeRestrictionForInterferenceMeasurements    ENUMERATED {configured, notConfigured},
codebookConfig                          CodebookConfig
dummy                                    ENUMERATED {n1, n2}
groupBasedBeamReporting                 CHOICE {
    enabled                               NULL,
    disabled                              SEQUENCE {
        nrofReportedRS                  ENUMERATED {n1, n2, n3, n4}
    }
},
cqi-Table                                ENUMERATED {table1, table2, table3, table4-r17}
subbandSize                              ENUMERATED {value1, value2},
non-PMI-PortIndication                   SEQUENCE (SIZE (1..maxNrofNRP-CI-RS-ResourcesPerConfig)) OF PortIndexFor8Ranks
...,
[[
semiPersistentOnPUSCH-v1530              SEQUENCE {
    reportSlotConfig-v1530              ENUMERATED {s14, s18, s116}
}
]],
[[
semiPersistentOnPUSCH-v1610              SEQUENCE {
    reportSlotOffsetListDCI-0-2-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
    reportSlotOffsetListDCI-0-1-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
}
aperiodic-v1610                          SEQUENCE {
    reportSlotOffsetListDCI-0-2-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
    reportSlotOffsetListDCI-0-1-r16     SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER(0..32)
}
reportQuantity-r16                       CHOICE {
    cri-SINR-r16                        NULL,
    ssb-Index-SINR-r16                  NULL
}
codebookConfig-r16                       CodebookConfig-r16
]],
[[
cqi-BitsPerSubband-r17                   ENUMERATED {bits4}
groupBasedBeamReporting-v1710            SEQUENCE {
    nrofReportedGroups-r17              ENUMERATED {n1, n2, n3, n4}
}
codebookConfig-r17                       CodebookConfig-r17
sharedCMR-r17                             ENUMERATED {enable}
csi-ReportMode-r17                       ENUMERATED {mode1, mode2}
numberOfSingleTRP-CI-Model-r17          ENUMERATED {n0, n1, n2}
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
    }
  ]],
  [[
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
}
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
}
  ]],
  [[
codebookConfig-v1730                   CodebookConfig-v1730                                OPTIONAL, -- Need R
  ]],
  [[
groupBasedBeamReporting-v1800          SEQUENCE {
  reportingMode-r18                     ENUMERATED {jointULDL, onlyUL}
}
reportQuantity-r18                     TDCP-r18                                          OPTIONAL, -- Need R
codebookConfig-r18                     CodebookConfig-r18                               OPTIONAL, -- Need R
csi-ReportSubConfigToAddModList-r18     SEQUENCE (SIZE (1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfig-r18
                                                                                               OPTIONAL, -- Need N
csi-ReportSubConfigToReleaseList-r18    SEQUENCE (SIZE (1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfigId-r18
                                                                                               OPTIONAL, -- Need N
  ]],
}

CSI-ReportPeriodicityAndOffset ::= 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)
}

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
        rank1-4
        rank2-4
        rank3-4
        rank4-4
    },
    portIndex2
        rank1-2
        rank2-2
    },
    portIndex1
}

PortIndex8 ::=
INTEGER (0..7)
PortIndex4 ::=
INTEGER (0..3)
PortIndex2 ::=
INTEGER (0..1)

TDCP-r18 ::=
SEQUENCE {
    delayDSetofLengthY-r18
        SEQUENCE (SIZE (1.. maxNrofdelayD-r18)) OF DelayD,
    phaseReporting-r18
        ENUMERATED {enable}
}

DelayD ::=
ENUMERATED { symb4, slot1, slot2, slot3, slot4, slot5, slot6, slot10 }

-- TAG-CSI-REPORTCONFIG-STOP
-- ASN1STOP

```

```

OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL  -- Need R

```

```

OPTIONAL, -- Need R
OPTIONAL  -- Need R

```

```

OPTIONAL  -- Need R

```

CSI-ReportConfig field descriptions
<p>carrier Indicates in which serving cell the <i>CSI-ResourceConfig</i> indicated below are to be found. If the field is absent, the resources are on the same serving cell as this report configuration.</p>
<p>codebookConfig Codebook configuration for Type-1 or Type-2 including codebook subset restriction. Network can only configure one of <i>codebookConfig</i>, <i>codebookConfig-r16</i> or <i>codebookConfig-r17</i> or <i>codebookConfig-r18</i> to a UE. The network includes <i>codebookConfig-v1730</i> only if <i>codebookConfig-r17</i> is configured.</p>
<p>cqi-BitsPerSubband This field can only be present if <i>cqi-FormatIndicator</i> is set to <i>subbandCQI</i>. If the field is configured with <i>bits4</i>, the UE uses 4-bit sub-band CQI. If the field is not present and <i>cqi-FormatIndicator</i> is set to <i>subbandCQI</i>, the UE uses 2-bit sub-band differential CQI.</p>
<p>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).</p>
<p>cqi-Table Which CQI table to use for CQI calculation (see TS 38.214 [19], clause 5.2.2.1). For an (e)RedCap UE, CQI table 2 is only supported if the UE indicates support of 256QAM for PDSCH.</p>
<p>csi-IM-ResourcesForInterference CSI IM resources for interference measurement. <i>csi-ResourceConfigId</i> of a <i>CSI-ResourceConfig</i> included in the configuration of the serving cell indicated with the field "carrier" above. The <i>CSI-ResourceConfig</i> indicated here contains only CSI-IM resources. The <i>bwpld</i> in that <i>CSI-ResourceConfig</i> is the same value as the <i>bwpld</i> in the <i>CSI-ResourceConfig</i> indicated by <i>resourcesForChannelMeasurement</i>.</p>
<p>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 in order of frequency position in the BWP. The right-most bit in the bit string represents the lowest subband with the lowest frequency position 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). NOTE: In TS 38.212 [17] clause 6.3.1.1.2 and TS 38.214 [19] clause 5.2.1.4, only subbands to be reported are numbered, e.g. subband #0 is the subband corresponding to the right-most bit set to 1.</p>
<p>csi-ReportMode Configures the CSI report modes Mode1 or Mode 2 (see TS 38.214 [19], clause 5.2.1.4.2)</p>
<p>csi-ReportSubConfigToAddModList List of CSI-ReportSubConfiguration(s) in a CSI report configuration to add or modify. No simultaneous configuration of <i>portSubsetIndicator</i> and a list of <i>nzp-CSI-RS-resources</i> in a same CSI report sub-configuration. The number of elements in a list is at least 2.</p>
<p>csi-ReportSubConfigToReleaseList List of CSI-ReportSubConfiguration(s) in a CSI report configuration to release.</p>
<p>dummy This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>groupBasedBeamReporting Turning on/off group beam based reporting (see TS 38.214 [19], clause 5.2.1.4). If <i>groupBasedBeamReporting</i> (without suffix) is set to disabled, <i>groupBasedBeamReporting-v1710</i> and <i>groupBasedBeamReporting-v1800</i> is absent.</p>

<p>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 <i>non-PMI-PortIndication</i> corresponds to the NZP-CSI-RS-Resource indicated by the first entry in <i>nzp-CSI-RS-Resources</i> in the <i>NZP-CSI-RS-ResourceSet</i> indicated in the first entry of <i>nzp-CSI-RS-ResourceSetList</i> of the <i>CSI-ResourceConfig</i> whose <i>CSI-ResourceConfigId</i> is indicated in a CSI-MeasId together with the above <i>CSI-ReportConfigId</i>; the second entry in <i>non-PMI-PortIndication</i> corresponds to the NZP-CSI-RS-Resource indicated by the second entry in <i>nzp-CSI-RS-Resources</i> in the <i>NZP-CSI-RS-ResourceSet</i> indicated in the first entry of <i>nzp-CSI-RS-ResourceSetList</i> of the same <i>CSI-ResourceConfig</i>, and so on until the NZP-CSI-RS-Resource indicated by the last entry in <i>nzp-CSI-RS-Resources</i> in the in the <i>NZP-CSI-RS-ResourceSet</i> indicated in the first entry of <i>nzp-CSI-RS-ResourceSetList</i> of the same <i>CSI-ResourceConfig</i>. Then the next entry corresponds to the NZP-CSI-RS-Resource indicated by the first entry in <i>nzp-CSI-RS-Resources</i> in the <i>NZP-CSI-RS-ResourceSet</i> indicated in the second entry of <i>nzp-CSI-RS-ResourceSetList</i> of the same <i>CSI-ResourceConfig</i> and so on.</p>
<p>nrofReportedGroups Number of reported resource groups per CSI-report. Value <i>n1</i> means one resource group, <i>n2</i> means 2 resource groups, and so on. If <i>nrofReportedGroups</i> is configured, the UE ignores groupBasedBeamReporting (without suffix).</p>
<p>nrofReportedRS The number (N) of measured RS resources to be reported per report setting in a non-group-based report. $N \leq N_{max}$, 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.</p>
<p>numberOfSingleTRP-CSI-Mode1 Configures the number of reported X CSIs when <i>csi-ReportMode</i> is set to 'Mode 1' as described in TS 38.214 [19], clause 5.2.1.4.2. The field is present only if <i>csi-ReportMode</i> configures Mode 1.</p>
<p>nzp-CSI-RS-ResourcesForInterference NZP CSI RS resources for interference measurement. <i>csi-ResourceConfigId</i> of a <i>CSI-ResourceConfig</i> included in the configuration of the serving cell indicated with the field "carrier" above. The <i>CSI-ResourceConfig</i> indicated here contains only NZP-CSI-RS resources. The <i>bwp-Id</i> in that <i>CSI-ResourceConfig</i> is the same value as the <i>bwp-Id</i> in the <i>CSI-ResourceConfig</i> indicated by <i>resourcesForChannelMeasurement</i>.</p>
<p>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).</p>
<p>pdsch-BundleSizeForCSI PRB bundling size to assume for CQI calculation when <i>reportQuantity</i> 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).</p>
<p>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).</p>
<p>pucch-CSI-ResourceList Indicates which PUCCH resource to use for reporting on PUCCH.</p>
<p>reportConfigType Time domain behavior of reporting configuration.</p>
<p>reportFreqConfiguration Reporting configuration in the frequency domain. (see TS 38.214 [19], clause 5.2.1.4).</p>
<p>reportQuantity The CSI related quantities to report. see TS 38.214 [19], clause 5.2.1. If the field <i>reportQuantity-r16</i>, <i>reportQuantity-r17</i> or <i>reportQuantity-r18</i> is present, UE shall ignore <i>reportQuantity</i> (without suffix). Network does not configure <i>reportQuantity-r17</i> or <i>reportQuantity-r18</i> together with <i>reportQuantity-r16</i>.</p>
<p>reportingMode Configures the UE with reporting mode for group based reporting.(see TS 38.214 [19] clause 5.2.1.4).</p>
<p>reportSlotConfig Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4). If the field <i>reportSlotConfig-v1530</i> is present, the UE shall ignore the value provided in <i>reportSlotConfig</i> (without suffix).</p>

<p>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 <i>pusch-TimeDomainAllocationList</i> in <i>PUSCH-Config</i>. 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.</p> <p>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 <i>pusch-TimeDomainAllocationList</i> in <i>PUSCH-Config</i>. 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).</p> <p>The field <i>reportSlotOffsetListDCI-0-1</i> applies to DCI format 0_1 and the field <i>reportSlotOffsetListDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1). The fields <i>reportSlotOffsetList-r17</i>, <i>reportSlotOffsetListDCI-0-1-r17</i> and <i>reportSlotOffsetListDCI-0-2-r17</i> are only applicable for SCS 480 kHz and 960 kHz and if they are configured, the UE shall ignore the fields <i>reportSlotOffsetList</i> (without suffix), <i>reportSlotOffsetListDCI-0-1</i> (without suffix) and <i>reportSlotOffsetListDCI-0-2</i> (without suffix) for SCS 480 kHz and 960 kHz.</p>
<p>resourcesForChannelMeasurement Resources for channel measurement. <i>csi-ResourceConfigId</i> of a <i>CSI-ResourceConfig</i> included in the configuration of the serving cell indicated with the field "carrier" above. The <i>CSI-ResourceConfig</i> indicated here contains only NZP-CSI-RS resources and/or SSB resources. This <i>CSI-ReportConfig</i> is associated with the DL BWP indicated by <i>bwp-Id</i> in that <i>CSI-ResourceConfig</i>.</p>
<p>sharedCMR Enables sharing of channel measurement resources between different CSI measurement hypotheses when (1) <i>csi-ReportMode</i> is set to 'Mode1' and <i>numberOfSingleTRP-CSI-Mode1</i> is set to 1 or 2; or (2) <i>csi-ReportMode</i> is set to 'Mode2' (see TS 38.214 [19], clause 5.2.1.4.2).</p>
<p>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 <i>csi-ReportingBand</i> is absent, the UE shall ignore this field.</p>
<p>timeRestrictionForChannelMeasurements Time domain measurement restriction for the channel (signal) measurements (see TS 38.214 [19], clause 5.2.1.1).</p>
<p>timeRestrictionForInterferenceMeasurements Time domain measurement restriction for interference measurements (see TS 38.214 [19], clause 5.2.1.1).</p>

PortIndexFor8Ranks field descriptions

<p>portIndex8 Port-Index configuration for up to rank 8. If present, the network configures port indexes for at least one of the ranks.</p>
<p>portIndex4 Port-Index configuration for up to rank 4. If present, the network configures port indexes for at least one of the ranks.</p>
<p>portIndex2 Port-Index configuration for up to rank 2. If present, the network configures port indexes for at least one of the ranks.</p>
<p>portIndex1 Port-Index configuration for rank 1.</p>

TDCP field descriptions

<p>delayDSetofLengthY Configures a set of Y delay values for TDCP reporting, see reference TS 38.214 clause 5.2.1.4. The <i>symp4</i> denotes 4 symbols, the <i>slot1</i> denotes 1 slot, the <i>slot2</i> denotes 2 slots and so on. The value <i>slot10</i> is applicable only to SCS >=30kHz. The parameter Y, see reference TS38.214 clause 5.2.1.4, is given by the length of the set of D values.</p>
<p>phaseReporting Configures the UE for phase reporting for TDCP reporting see reference TS 38.214 clause 5.2.1.4</p>

– *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-ReportSubConfig*

The IE *CSI-ReportSubConfig* is used to configure parameters in one sub-configuration within a CSI report configuration.

CSI-ReportSubConfig information element

```
-- ASN1START
-- TAG-CSI-REPORTSUBCONFIG-START

CSI-ReportSubConfig-r18 ::=          SEQUENCE {
  reportSubConfigId-r18              CSI-ReportSubConfigId-r18,
  reportSubConfigParams              CHOICE {
    a1-parameters                    SEQUENCE {
      codebookSubConfig-r18          CodebookConfig                               OPTIONAL, -- Need R
      portSubsetIndicator-r18        CHOICE {
        p2                           BIT STRING (SIZE (2)),
        p4                           BIT STRING (SIZE (4)),
        p8                           BIT STRING (SIZE (8)),
        p12                          BIT STRING (SIZE (12)),
        p16                          BIT STRING (SIZE (16)),
        p24                          BIT STRING (SIZE (24)),
        p32                          BIT STRING (SIZE (32))
      }
      non-PMI-PortIndication-r18     PortIndexFor8Ranks                       OPTIONAL, -- Need R
    },
    a2-parameters                    SEQUENCE {
      nzp-CSI-RS-ResourceList-r18    SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourcesPerSet)) OF NZP-CSI-RS-ResourceIndex-r18
    }
  }
  powerOffset-r18                    INTEGER(0..23)                                OPTIONAL, -- Need R
}

NZP-CSI-RS-ResourceIndex-r18 ::=    INTEGER (0..maxNrofNZP-CSI-RS-ResourcesPerSet-1-r18)

-- TAG-CSI-REPORTSUBCONFIG-STOP
-- ASN1STOP
```

CSI-ReportSubConfig field descriptions
<p>codebookSubConfig Applicable codebook parameters for the ports indicated by <i>portSubsetIndicator</i>. Applicable value ranges for codebook subset restriction, rank restriction, N1, N2, and Ng and twoTX-CodebookSubsetRestriction follow existing specification according to the <i>codebookConfig</i> configured within the <i>CSI-ReportConfig</i>, and apply for the number of ports determined by <i>portSubsetIndicator</i> (see TS 38.214 [19], clause 5.2.1.4.1). In this field, the network always sets the <i>codebookType</i> to <i>type1</i>.</p>
<p>non-PMI-PortIndication Port indication for RI/CQI calculation applicable only for non-PMI feedback. The field shall be configured only if the <i>portSubsetIndicator-r18</i> is configured. A port indication for each rank R, indicating which R ports out of P ports to use within the sub-configuration. P corresponds to the number of bits with value 1 in the bitmap <i>portSubsetIndicator-r18</i>.</p>
<p>nzp-CSI-RS-ResourceList List of NZP CSI RS resources for the sub-configuration that is a (sub)set of NZP CSI-RS resource(s) of the CSI-RS resource set for channel measurement associated with the sub-configuration in the CSI report configuration. Value 0 refers to the first NZP CSI RS resource of the CSI-RS resource set, value 1 refers to the second NZP CSI RS resource of the CSI-RS resource set, and so on.</p>
<p>port-SubsetIndicator Indicates the number of ports of the NZP CSI-RS resources indicated in <i>nzp-CSI-RS-ResourceList</i> and the (sub)set of CSI-RS antenna ports used for CSI calculation of the sub-configuration. In the bit string, each bit corresponds to an antenna port. When a bit is set to 1, the corresponding port is enabled for CSI calculation corresponding to the sub-configuration. When the bit is set to zero, the corresponding port is not enabled for CSI calculation corresponding to the sub-configuration.</p>
<p>powerOffset When <i>powerControlOffset</i> is configured in a NZP CSI-RS resources indicated by <i>nzp-CSI-RS-Resources</i>, the power offset of PDSCH RE to NZP CSI-RS RE is equal to <i>powerControlOffset - powerOffset</i>.</p>

– *CSI-ReportSubConfigId*

The IE *CSI-ReportSubConfigId* is used to indicate the index of one *CSI-ReportSubConfig* within a CSI report configuration.

***CSI-ReportSubConfigId* information element**

```
-- ASN1START
-- TAG-CSI-REPORTSUBCONFIGID-START

CSI-ReportSubConfigId-r18 ::=          INTEGER (0..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-1-r18)

-- TAG-CSI-REPORTSUBCONFIGID-STOP
-- ASN1STOP
```

– *CSI-ReportSubConfigTriggerList*

The IE *CSI-ReportSubConfigTriggerList* is used to configure a list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a CSI-ReportConfig associated with a triggering state for semi-persistent CSI reporting on PUSCH and aperiodic CSI reporting.

CSI-ReportSubConfigTriggerList information element

```

-- ASN1START
-- TAG-CSI-REPORTSUBCONFIGTRIGGERLIST-START

CSI-ReportSubConfigTriggerList-r18 ::= SEQUENCE (SIZE(1..maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18)) OF CSI-ReportSubConfigId-r18

-- TAG-CSI-REPORTSUBCONFIGTRIGGERLIST-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
<p><i>bwp-Id</i> The DL BWP which the CSI-RS associated with this <i>CSI-ResourceConfig</i> are located in (see TS 38.214 [19], clause 5.2.1.2).</p>
<p><i>csi-IM-ResourceSetList</i> List of references to CSI-IM resources used for CSI measurement and reporting in a CSI-RS resource set. Contains up to <i>maxNrofCSI-IM-ResourceSetsPerConfig</i> resource sets if <i>resourceType</i> is 'aperiodic' and 1 otherwise (see TS 38.214 [19], clause 5.2.1.2).</p>
<p><i>csi-ResourceConfigId</i> Used in <i>CSI-ReportConfig</i> to refer to an instance of <i>CSI-ResourceConfig</i>.</p>
<p><i>csi-SSB-ResourceSetList, csi-SSB-ResourceSetListExt</i> 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 <i>csi-SSB-ResourceSetListExt</i> provides additional references and can only be configured if <i>csi-SSB-ResourceSetList</i> is configured and <i>groupBasedBeamReporting-v1710</i> is configured in the <i>CSI-ReportConfig</i> that indicates this <i>CSI-ResourceConfig</i> as <i>resourceForChannelMeasurement</i>. If <i>groupBasedBeamReporting-v1710</i> is configured in the IE <i>CSI-ReportConfig</i> that indicates this <i>CSI-ResourceConfig</i> as <i>resourceForChannelMeasurement</i>, 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.</p>
<p><i>nzp-CSI-RS-ResourceSetList</i> List of references to NZP CSI-RS resources used for beam measurement and reporting in a CSI-RS resource set. If <i>resourceType</i> is set to 'aperiodic', the network configures up to <i>maxNrofNZP-CSI-RS-ResourceSetsPerConfig</i> resource sets. If <i>resourceType</i> is set to 'periodic' or 'semiPersistent' and <i>groupBasedBeamReporting-v1710</i> is not configured in IE <i>CSI-ReportConfig</i>, the network configures 1 resource set. If <i>resourceType</i> is set to 'periodic' or 'semiPersistent' and <i>groupBasedBeamReporting-v1710</i> 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. If <i>resourceType</i> is set to 'periodic' and <i>reportQuantity</i> is set to 'TDCP', the network configures up to 3 resource sets, see TS 38.214 [19] clause 5.2.1.2.</p>
<p><i>resourceType</i> 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 <i>csi-SSB-ResourceSetList</i>.</p>

– ***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
  ]]
}

-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-STOP
-- ASN1STOP
```

```

CSI-RS-CellMobility ::=
  cellId
  csi-rs-MeasurementBW
    nrofPRBs
    startPRB
  },
  density
  csi-rs-ResourceList-Mobility
}

CSI-RS-Resource-Mobility ::=
  csi-RS-Index
  slotConfig
    ms4
    ms5
    ms10
    ms20
    ms40
  },
  associatedSSB
    ssb-Index
    isQuasiColocated
  }
  frequencyDomainAllocation
    row1
    row2
  },
  firstOFDMsymbolInTimeDomain
  sequenceGenerationConfig
  ...,
  [[
  slotConfig-r17
    ms4
    ms5
    ms10
    ms20
    ms40
  }
  ]]
}

CSI-RS-Index ::=
  INTEGER (0..maxNrofCSI-RS-ResourcesRRM-1)

-- TAG-CSI-RS-RESOURCECONFIGMOBILITY-STOP
-- ASN1STOP

```

```

SEQUENCE {
  PhysCellId,
  SEQUENCE {
    ENUMERATED { size24, size48, size96, size192, size264},
    INTEGER(0..2169)
  },
  ENUMERATED {d1,d3}
  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesRRM)) OF CSI-RS-Resource-Mobility
}
OPTIONAL, -- Need R

```

```

SEQUENCE {
  CSI-RS-Index,
  CHOICE {
    INTEGER (0..31),
    INTEGER (0..39),
    INTEGER (0..79),
    INTEGER (0..159),
    INTEGER (0..319)
  },
  SEQUENCE {
    SSB-Index,
    BOOLEAN
  }
}
OPTIONAL, -- Need R

```

```

CHOICE {
  BIT STRING (SIZE (4)),
  BIT STRING (SIZE (12))
},
INTEGER (0..13),
INTEGER (0..1023),
CHOICE {
  INTEGER (0..255),
  INTEGER (0..319),
  INTEGER (0..639),
  INTEGER (0..1279),
  INTEGER (0..2559)
}
OPTIONAL -- Need R

```

CSI-RS-CellMobility field descriptions
<p><i>csi-rs-ResourceList-Mobility</i> List of CSI-RS resources for mobility. The maximum number of CSI-RS resources that can be configured per <i>measObjectNR</i> depends on the configuration of <i>associatedSSB</i> and the support of <i>increasedNumberOfCSIRSPerMO</i> capability (see TS 38.214 [19], clause 5.1.6.1.3).</p>
<p><i>density</i> Frequency domain density for the 1-port CSI-RS for L3 mobility. See TS 38.211 [16], clause 7.4.1.</p>
<p><i>nrofPRBs</i> Allowed size of the measurement BW in PRBs. See TS 38.211 [16], clause 7.4.1.</p>
<p><i>startPRB</i> Starting PRB index of the measurement bandwidth. See TS 38.211 [16], clause 7.4.1.</p>

CSI-RS-ResourceConfigMobility field descriptions
<p><i>csi-RS-CellList-Mobility</i> List of cells for CSI-RS based RRM measurements.</p>
<p><i>refServCellIndex</i> Indicates the serving cell providing the timing reference for CSI-RS resources without <i>associatedSSB</i>. The field may be present only if there is at least one CSI-RS resource configured without <i>associatedSSB</i>. If this field is absent, the UE shall use the timing of the PCell for measurements on the CSI-RS resources without <i>associatedSSB</i>. The CSI-RS resources and the serving cell indicated by <i>refServCellIndex</i> for timing reference should be located in the same band.</p>
<p><i>subcarrierSpacing</i> 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</p>

CSI-RS-Resource-Mobility field descriptions
<p>associatedSSB If this field is present, the UE may base the timing of the CSI-RS resource indicated in <i>CSI-RS-Resource-Mobility</i> on the timing of the cell indicated by the <i>cellId</i> in the <i>CSI-RS-CellMobility</i>. 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 <i>associatedSSB</i> and <i>cellId</i>. If this field is absent, the UE shall base the timing of the CSI-RS resource indicated in <i>CSI-RS-Resource-Mobility</i> on the timing of the serving cell indicated by <i>refServCellIndex</i>. In this case, the UE is required to measure the CSI-RS resource even if SS/PBCH block(s) with <i>cellId</i> in the <i>CSI-RS-CellMobility</i> are not detected. CSI-RS resources with and without <i>associatedSSB</i> may be configured in accordance with the rules in TS 38.214 [19], clause 5.1.6.1.3.</p>
<p>csi-RS-Index CSI-RS resource index associated to the CSI-RS resource to be measured (and used for reporting).</p>
<p>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.</p>
<p>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.</p>
<p>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.</p>
<p>sequenceGenerationConfig Scrambling ID for CSI-RS (see TS 38.211 [16], clause 7.4.1.5.2).</p>
<p>slotConfig Indicates the CSI-RS periodicity (in milliseconds) and for each periodicity the offset (in number of slots). When <i>subcarrierSpacing</i> is set to <i>kHz15</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 3/4/9/19/39 slots. When <i>subcarrierSpacing</i> is set to <i>kHz30</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 7/9/19/39/79 slots. When <i>subcarrierSpacing</i> is set to <i>kHz60</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 15/19/39/79/159 slots. When <i>subcarrierSpacing</i> is set to <i>kHz120</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 31/39/79/159/319 slots. When <i>subcarrierSpacing</i> is set to <i>kHz480</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 127/159/319/639/1279 slots. When <i>subcarrierSpacing</i> is set to <i>kHz960</i>, the maximum offset values for periodicities <i>ms4/ms5/ms10/ms20/ms40</i> are 255/319/639/1279/2559 slots. If <i>slotConfig-r17</i> is present, UE shall ignore the <i>slotConfig</i> (without suffix).</p>

– 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 ::=
    frequencyDomainAllocation          SEQUENCE {
        row1                           CHOICE {
            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
<p>cdm-Type CDM type (see TS 38.214 [19], clause 5.2.2.3.1).</p>
<p>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 (<i>dot5</i>), 1 (<i>one</i>) and 3 (<i>three</i>) are allowed for X=1, values 0.5 (<i>dot5</i>) and 1 (<i>one</i>) are allowed for X=2, 16, 24 and 32, value 1 (<i>one</i>) 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.</p>
<p>firstOFDMSymbolInTimeDomain2 Time domain allocation within a physical resource block. See TS 38.211 [16], clause 7.4.1.5.3.</p>
<p>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.</p>
<p>freqBand Wideband or partial band CSI-RS, (see TS 38.214 [19], clause 5.2.2.3.1).</p>
<p>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 <i>frequencyDomainAllocation</i> 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 <i>nrofPorts</i>, <i>cdm-Type</i> and <i>density</i> 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 <i>frequencyDomainAllocation</i>.</p>
<p>nrofPorts Number of ports (see TS 38.214 [19], clause 5.2.2.3.1).</p>

– **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
    ]],
    [[
    csi-ReportSubConfigTriggerList-r18 CSI-ReportSubConfigTriggerList-r18 OPTIONAL, -- Need R
    ltm-AssociatedReportConfigInfo-r18 LTM-CSI-ReportConfigId-r18  OPTIONAL -- Need R
    ]]
}

-- TAG-CSI-SEMIPERSISTENTONPUSCHTRIGGERSTATELIST-STOP
-- ASN1STOP

```

CSI-SemiPersistentOnPUSCH-TriggerStateList field descriptions

csi-ReportSubConfigTriggerList

A list of sub-configuration ID(s) of N sub-configurations out of L configured sub-configurations within a CSI-ReportConfig associated with a triggering state for semi-persistent CSI reporting on PUSCH.

ltm-AssociatedReportConfigInfo

This field configures semi-persistent CSI reports on PUSCH of LTM candidate cells. If *ltm-associatedReportConfigInfo* is configured the UE shall ignore the field *associatedReportConfigInfo*.

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***servicingAdditionalPCList***

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}
    priority-r17                ENUMERATED {st1, st2, st3}
}

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),
        }
}
OPTIONAL, -- Cond MultiType
OPTIONAL -- Cond MultiState
```



```

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 <i>length</i> of one slot, value 2 indicates <i>length</i> 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
<i>MultiType</i>	The field is mandatory present when the UE reports its capability on supporting multiple processing types, otherwise it is absent.
<i>MultiState</i>	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
<p><i>pucch-DMRS-Bundling</i> Indicates whether DMRS bundling and time domain window for PUCCH are jointly enabled.</p>
<p><i>pucch-FrequencyHoppingInterval</i> 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 <i>pucch-FrequencyHoppingInterval-r17</i> and <i>pucch-TimeDomainWindowLength-r17</i>. When DMRS bundling for PUCCH is enabled by <i>pucch-DMRS-Bundling-r17</i>, 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 <i>pucch-TimeDomainWindowLength-r17</i>.</p>
<p><i>pucch-TimeDomainWindowLength</i> 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].</p>
<p><i>pucch-WindowRestart</i> 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.</p>

– **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 ::=
    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
<p>pusch-DMRS-Bundling Indicates whether DMRS bundling and time domain window for PUSCH are jointly enabled.</p>
<p>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 <i>pusch-FrequencyHoppingInterval-r17</i> and <i>pusch-TimeDomainWindowLength-r17</i>. This parameter is shared for both DG-PUSCH and CG-PUSCH. When DMRS bundling for PUSCH is enabled by <i>pusch-DMRS-Bundling-r17</i>, 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 <i>pusch-TimeDomainWindowLength-r17</i>. Note: For unpaired spectrum, the UE is not expected to be configured the value of s6, s8, s12, s14 and s16.</p>
<p>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].</p>
<p>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.</p>

– 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
    ]],
    [[
    dmrs-TypeEnh-r18        ENUMERATED {enabled}           OPTIONAL -- Need R
    ]],
}

-- TAG-DMRS-DOWNLINKCONFIG-STOP

```

-- ASN1STOP

DMRS-DownlinkConfig field descriptions	
<i>dmrs-AdditionalPosition</i>	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.
<i>dmrs-Downlink</i>	This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 7.4.1.1.1.
<i>dmrs-Type</i>	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.
<i>dmrs-TypeEnh</i>	Enables the use of enhanced DMRS type1 or enhanced DMRS type2 with field <i>dmrs-Type</i> (see TS 38.211 [16], clause 7.4.1.1.1). If the field is present and <i>dmrs-Type</i> is absent, the UE uses DMRS eType 1. If the field is present and <i>dmrs-Type</i> is present, the UE uses DMRS eType 2.
<i>maxLength</i>	The maximum number of OFDM symbols for DL front loaded DMRS. <i>len1</i> corresponds to value 1. <i>len2</i> corresponds to value 2. If the field is absent, the UE applies value <i>len1</i> . If set to <i>len2</i> , 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).
<i>phaseTrackingRS</i>	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.
<i>scramblingID0</i>	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 <i>physCellId</i> configured for this serving cell.
<i>scramblingID1</i>	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 <i>physCellId</i> 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
  ]]
}
transformPrecodingEnabled SEQUENCE {
```

```

nPUSCH-Identity          INTEGER(0..1007)
sequenceGroupHopping    ENUMERATED {disabled}
sequenceHopping         ENUMERATED {enabled}
...
[[
  dmrs-UplinkTransformPrecoding-r16 SetupRelease {DMRS-UplinkTransformPrecoding-r16}
]]
}
...
[[
  dmrs-TypeEnh-r18          ENUMERATED {enabled}
]]
}

DMRS-UplinkTransformPrecoding-r16 ::= SEQUENCE {
  pi2BPSK-ScramblingID0    INTEGER(0..65535)
  pi2BPSK-ScramblingID1    INTEGER(0..65535)
}

-- TAG-DMRS-UPLINKCONFIG-STOP
-- ASN1STOP

```

```

OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL -- Need M
OPTIONAL, -- Need R
OPTIONAL -- Need R
OPTIONAL, -- Need S
OPTIONAL -- Need S

```

DMRS-UplinkConfig field descriptions
<p>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.</p>
<p>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.</p>
<p>dmrs-TypeEnh Enables the use of enhanced DMRS type1 or enhanced DMRS type2 with field <i>dmrs-Type</i> (see TS 38.211 [16], clause 6.4.1.1.3). If the field is present and <i>dmrs-Type</i> is absent, the UE uses DMRS eType 1. If the field is present and <i>dmrs-Type</i> is present, the UE uses DMRS eType 2</p>
<p>dmrs-Uplink This field indicates whether low PAPR DMRS is used, as specified in TS38.211 [16], clause 6.4.1.1.1.1.</p>
<p>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 <i>tp-pi2BPSK</i> is configured in <i>PUSCH-Config</i>.</p>
<p>maxLength The maximum number of OFDM symbols for UL front loaded DMRS. <i>len1</i> corresponds to value 1. <i>len2</i> corresponds to value 2. If the field is absent, the UE applies value <i>len1</i>. If set to <i>len2</i>, 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).</p>
<p>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 (<i>physCellId</i>). See TS 38.211 [16].</p>
<p>phaseTrackingRS Configures uplink PTRS (see TS 38.211 [16]).</p>
<p>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 (<i>physCellId</i>) of the serving cell.</p>
<p>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 (<i>physCellId</i>).</p>
<p>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 (<i>physCellId</i>).</p>
<p>sequenceGroupHopping For DMRS transmission with transform precoder the NW may configure group hopping by the cell-specific parameter <i>groupHoppingEnabledTransformPrecoding</i> in <i>PUSCH-ConfigCommon</i>. 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 <i>PUSCH-ConfigCommon</i> (see TS 38.211 [16]). If the field is absent, the UE uses the same hopping mode as for Msg3.</p>
<p>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.</p>
<p>transformPrecodingDisabled DMRS related parameters for Cyclic Prefix OFDM.</p>
<p>transformPrecodingEnabled DMRS related parameters for DFT-s-OFDM (Transform Precoding).</p>

– **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 <i>locationAndBandwidth</i> so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain.
initialDownlinkBWP-RedCap	If present, (e)RedCap UEs use this DL BWP instead of <i>initialDownlinkBWP</i> . If absent, (e)RedCap UEs use <i>initialDownlinkBWP</i> provided that it does not exceed the (e)RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Conditional Presence	Explanation
<i>InterFreqHOAndServCellAdd</i>	This field is mandatory present for inter-frequency handover, and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally present, Need M.
<i>ServCellAdd</i>	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.

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
]],
[[
frequencyInfoDL-v1800      FrequencyInfoDL-SIB-v1800  OPTIONAL     -- Need R
]]
}

DownlinkConfigCommonSIB-v1760 ::= SEQUENCE {
    frequencyInfoDL-v1760      FrequencyInfoDL-SIB-v1760
}

BCCH-Config ::=
    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 {
            sCS15KHzZoneT          SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..139),
            sCS30KHzZoneT-SCS15KHzhalfT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..279),
            sCS60KHzZoneT-SCS30KHzhalfT-SCS15KHzquarterT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..559),
            sCS120KHzZoneT-SCS60KHzhalfT-SCS30KHzquarterT-SCS15KHzZoneEighthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..1119),
            sCS120KHzhalfT-SCS60KHzquarterT-SCS30KHzZoneEighthT-SCS15KHzZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..2239),
            sCS480KHzZoneT-SCS120KHzquarterT-SCS60KHzZoneEighthT-SCS30KHzZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..4479),
            sCS480KHzhalfT-SCS120KHzZoneEighthT-SCS60KHzZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..8959),
            sCS480KHzquarterT-SCS120KHzZoneSixteenthT 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 {
            sCS480KHzZoneEighthT      SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
            sCS480KHzZoneSixteenthT    SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
        }
        OPTIONAL -- Need R
    ]
}

```

```

}
PEI-Config-r17 ::=
  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}
  ...
}
SubgroupConfig-r17 ::= SEQUENCE {
  subgroupsNumPerPO-r17    INTEGER (1.. maxNrofPagingSubgroups-r17),
  subgroupsNumForUEID-r17 INTEGER (1.. maxNrofPagingSubgroups-r17)
  ...
}
-- TAG-DOWNLINKCONFIGCOMMONSIB-STOP
-- ASN1STOP

```

OPTIONAL, -- Need R

OPTIONAL, -- Need S

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 <i>locationAndBandwidth</i> so that the initial downlink BWP contains the entire CORESET#0 of this serving cell in the frequency domain. The UE applies the <i>locationAndBandwidth</i> upon reception of this field (e.g. to determine the frequency position of signals described in relation to this <i>locationAndBandwidth</i>) but it keeps CORESET#0 until after reception of <i>RRCSetup/RRCResume/RRCReestablishment</i> .
initialDownlinkBWP-RedCap If present, (e)RedCap UEs use this DL BWP instead of <i>initialDownlinkBWP</i> . If the <i>locationAndBandwidth</i> of this BWP contains the entire CORESET#0, the UE applies the <i>locationAndBandwidth</i> upon reception of this field (e.g. to determine the frequency position of signals described in relation to this <i>locationAndBandwidth</i>) but it keeps CORESET#0 until after reception of <i>RRCSetup/RRCResume/RRCReestablishment</i> . Otherwise, i.e., if the <i>locationAndBandwidth</i> 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, (e)RedCap UEs use <i>initialDownlinkBWP</i> provided that it does not exceed the (e)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 <i>RRCRelease</i> without <i>noLastCellUpdate</i> 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 $m = \text{modificationPeriodCoeff} * \text{defaultPagingCycle}$, 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 $N \times N_s$, 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 N_s when *po-NumPerPEI* is larger than N_s .

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 <i>PEI-Config</i> 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 <i>subgroupsNumPerPO</i> . <i>subgroupsNumPerPO</i> equals to <i>subgroupsNumForUEID</i> when the network does not configure CN-assigned subgrouping. When <i>pei-Config</i> is configured, the field is absent when the network only configures CN-assigned subgrouping. Both this field and <i>subgroupsNumPerPO</i> are equal to 1 when the network does not configure subgrouping. When <i>pei-Config</i> is configured, if the field is absent, the UE uses subgrouping according to TS 38.304 [20], clause 7.3.0.

Conditional Presence	Explanation
<i>SharedSpectrum2</i>	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

```

<i>DownlinkPreemption</i> field descriptions
<i>dci-PayloadSize</i> Total length of the DCI payload scrambled with INT-RNTI (see TS 38.213 [13], clause 11.2).
<i>int-ConfigurationPerServingCell</i> Indicates (per serving cell) the position of the 14 bit INT values inside the DCI payload (see TS 38.213 [13], clause 11.2).
<i>int-RNTI</i> RNTI used for indication pre-emption in DL (see TS 38.213 [13], clause 10).
<i>timeFrequencySet</i> 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.

<i>INT-ConfigurationPerServingCell</i> field descriptions
<i>positionInDCI</i> Starting position (in number of bit) of the 14 bit INT value applicable for this serving cell (<i>servingCellId</i>) 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 ::=
    drx-onDurationTimer          SEQUENCE {
                                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 {
    s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
    s1160, s1320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
    spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1},
drx-RetransmissionTimerUL  ENUMERATED {
    s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
    s1160, s1320, 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
  drx-ShortCycle          SEQUENCE {
    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 },
    INTEGER (1..16)
  }
  drx-ShortCycleTimer    OPTIONAL, -- Need R
}
drx-SlotOffset          INTEGER (0..31)

DRX-ConfigExt-v1700 ::=
  drx-HARQ-RTT-TimerDL-r17
  drx-HARQ-RTT-TimerUL-r17
}

DRX-ConfigExt2-v1800 ::=
SEQUENCE {

```

```

drx-NonIntegerLongCycleStartOffset-r18 CHOICE {
  ms100lover240 INTEGER(0..3),
  ms25over6 INTEGER(0..3),
  ms25over3 INTEGER(0..7),
  ms100lover120 INTEGER(0..7),
  ms100over9 INTEGER(0..10),
  ms25over2 INTEGER(0..11),
  ms40over3 INTEGER(0..12),
  ms125over9 INTEGER(0..12),
  ms50over3 INTEGER(0..15),
  ms100lover60 INTEGER(0..15),
  ms125over6 INTEGER(0..19),
  ms200over9 INTEGER(0..21),
  ms250over9 INTEGER(0..26),
  ms100over3 INTEGER(0..32),
  ms100lover30 INTEGER(0..32),
  ms75over2 INTEGER(0..36),
  ms125over3 INTEGER(0..40),
  ms100lover24 INTEGER(0..40),
  ms200over3 INTEGER(0..65),
  ms100lover15 INTEGER(0..65),
  ms250over3 INTEGER(0..82),
  ms100lover12 INTEGER(0..82),
  ms400over3 INTEGER(0..132),
  ...
},
shortDRX-r18 SEQUENCE {
  drx-NonIntegerShortCycle-r18 ENUMERATED {ms100lover240, ms25over6, ms25over3, ms100lover120, ms100over9, ms25over2,
  ms40over3, ms125over9, ms50over3, ms100lover60, ms125over6, ms200over9,
  ms100over3, ms100lover30, ms125over3, ms100lover24, ms200over3, spare15,
  spare14, spare13, spare12, spare11, spare10, spare9, spare8, spare7, spare6,
  spare5, spare4, spare3, spare2, spare1},
  drx-ShortCycleTimer-r18 INTEGER (1..16)
}
drx-TimeReferenceSFN-r18 ENUMERATED {sfn512}
}
-- TAG-DRX-CONFIG-STOP
-- ASN1STOP

```

OPTIONAL, -- Need R
OPTIONAL -- Need S

DRX-Config field descriptions
<p>drx-HARQ-RTT-TimerDL Value in number of symbols of the BWP where the transport block was received. <i>drx-HARQ-RTT-TimerDL-r17</i> is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore <i>drx-HARQ-RTT-TimerDL</i> (without suffix) for SCS 480 kHz and 960 kHz.</p>
<p>drx-HARQ-RTT-TimerUL Value in number of symbols of the BWP where the transport block was transmitted. <i>drx-HARQ-RTT-TimerUL-r17</i> is only applicable for SCS 480 kHz and 960 kHz. If configured, the UE shall ignore <i>drx-HARQ-RTT-TimerUL</i> (without suffix) for SCS 480 kHz and 960 kHz.</p>
<p>drx-InactivityTimer Value in multiple integers of 1 ms. <i>ms0</i> corresponds to 0, <i>ms1</i> corresponds to 1 ms, <i>ms2</i> corresponds to 2 ms, and so on.</p>
<p>drx-LongCycleStartOffset <i>drx-LongCycle</i> in ms and <i>drx-StartOffset</i> in multiples of 1 ms. If <i>drx-ShortCycle</i> is configured, the value of <i>drx-LongCycle</i> shall be a multiple of the <i>drx-ShortCycle</i> value.</p>
<p>drx-NonIntegerLongCycleStartOffset <i>drx-NonIntegerLongCycle</i> in non-integer number of ms (e.g. <i>ms1001over240</i> corresponds to 1001/240 ms, <i>ms25over6</i> corresponds to 25/6 ms and so on) and <i>drx-StartOffset</i> in multiples of 1 ms. If <i>drx-NonIntegerShortCycle</i> is configured, the value of <i>drx-NonIntegerLongCycle</i> shall be a multiple of the <i>drx-NonIntegerShortCycle</i> value. If <i>drx-NonIntegerLongCycleStartOffset-r18</i> is configured, the UE shall ignore <i>drx-LongCycleStartOffset</i>.</p>
<p>drx-NonIntegerShortCycle Value in non-integer number of ms, e.g. <i>ms1001over240</i> corresponds to 1001/240 ms, <i>ms25over6</i> corresponds to 25/6 ms and so on.</p>
<p>drx-onDurationTimer Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value <i>ms1</i> corresponds to 1 ms, value <i>ms2</i> corresponds to 2 ms, and so on.</p>
<p>drx-RetransmissionTimerDL Value in number of slot lengths of the BWP where the transport block was received. value <i>s0</i> corresponds to 0 slots, <i>s1</i> corresponds to 1 slot, <i>s2</i> corresponds to 2 slots, and so on.</p>
<p>drx-RetransmissionTimerUL Value in number of slot lengths of the BWP where the transport block was transmitted. <i>s0</i> corresponds to 0 slots, <i>s1</i> corresponds to 1 slot, <i>s2</i> corresponds to 2 slots, and so on.</p>
<p>drx-ShortCycleTimer Value in multiples of <i>drx-ShortCycle</i> or <i>drx-NonIntegerShortCycle</i> (depending on which one is configured). A value of 1 corresponds to <i>drx-ShortCycle</i> or <i>drx-NonIntegerShortCycle</i>, a value of 2 corresponds to 2 * <i>drx-ShortCycle</i> or 2 * <i>drx-NonIntegerShortCycle</i> and so on.</p>
<p>drx-ShortCycle Value in ms. <i>ms1</i> corresponds to 1 ms, <i>ms2</i> corresponds to 2 ms, and so on.</p>
<p>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.</p>
<p>drx-TimeReferenceSFN Indicates how the UE initializes the counter DRX_SF_N_COUNTER, see TS 38.321 [3], clause 5.7. If the field <i>drx-TimeReferenceSFN</i> is not present, the reference SFN is 0.</p>
<p>shortDRX Configuration of a short DRX cycle. The network configures only one of <i>shortDRX</i> (without a suffix) or <i>shortDRX-r18</i>.</p>

– 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 {s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
        s1160, s1320, spare15, spare14, spare13, spare12, spare11, spare10, spare9, spare8,
        spare7, spare6, spare5, spare4, spare3, spare2, spare1}
    }
}
-- TAG-DRX-CONFIGSL-STOP
-- ASN1STOP

```

<i>DRX-ConfigSL</i> field descriptions
<p><i>drx-HARQ-RTT-TimerSL</i> 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 <i>sl-PUCCH-Config</i> is not configured and the corresponding resource pool is not configured with PSFCH.</p>
<p><i>drx-RetransmissionTimerSL</i> 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. <i>sl0</i> corresponds to 0 slots, <i>sl1</i> corresponds to 1 slot, <i>sl2</i> corresponds to 2 slots, and so on.</p>

– *EarlyUL-SyncConfig*

The IE *EarlyUL-SyncConfig* is used to configure random access resources for the early UL synchronization procedure.

EarlyUL-SyncConfig information element

```

-- ASN1START
-- TAG-EARLYUL-SYNCCONFIG-START

EarlyUL-SyncConfig-r18 ::=          SEQUENCE {
    frequencyInfoUL-r18             FrequencyInfoUL,
    rach-ConfigGeneric-r18          RACH-ConfigGeneric,
    bwp-GenericParameters-r18       BWP,
    ssb-PerRACH-Occasion-r18        ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen} OPTIONAL, -- Need R
    prach-RootSequenceIndex-r18     CHOICE {
        1839                         INTEGER (0..837),
        1139                         INTEGER (0..137)
    }                                OPTIONAL, -- Need R
    ltm-PRACH-SubcarrierSpacing-r18 SubcarrierSpacing                                OPTIONAL, -- Need L139
    n-TimingAdvanceOffset-r18       ENUMERATED { n0, n25600, n39936, spare1 }        OPTIONAL, -- Need R
    ...
}

-- TAG-EARLYUL-SYNCCONFIG-STOP
-- ASN1STOP

```

<i>EarlyUL-SyncConfig field descriptions</i>
<p>frequencyInfoUL This field provides basic parameters of an uplink carrier for PRACH transmission on a candidate cell.</p>
<p>ltm-PRACH-SubcarrierSpacing Indicates subcarrier spacing of PRACH for LTM (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 <i>prach-ConfigurationIndex</i> in <i>RACH-ConfigGeneric</i> (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]).</p>
<p>n-TimingAdvanceOffset The <i>N_TA</i>-Offset to be applied for all uplink transmissions on a candidate cell.</p>
<p>rach-ConfigGeneric RACH parameters for performing a random access procedure on a candidate cell.</p>
<p>ssb-PerRACH-Occasion This field indicated the number of SSBs for RACH occasion.</p>

Conditional Presence	Explanation
L139	The field is mandatory present if <i>prach-RootSequenceIndex</i> L=139, otherwise the field is absent, Need S.

– 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

```

<i>EphemerisInfo</i> field descriptions
<p><i>eccentricity</i> Satellite orbital parameter: eccentricity e, see NIMA TR 8350.2 [71]. Unit is radian. Step of $1.431 * 10^{-8}$. Actual value = field value * ($1.431 * 10^{-8}$).</p>
<p><i>inclination</i> 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 * ($2.341 * 10^{-8}$).</p>
<p><i>longitude</i> 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 * ($2.341 * 10^{-8}$).</p>
<p><i>meanAnomaly</i> 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 * ($2.341 * 10^{-8}$).</p>
<p><i>periapsis</i> 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 * ($2.341 * 10^{-8}$).</p>
<p><i>positionX, positionY, positionZ</i> 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.</p>
<p><i>semiMajorAxis</i> Satellite orbital parameter: semi major axis a, see NIMA TR 8350.2 [71]. Unit is meter. Step of $4.249 * 10^{-3}$ m. Actual value = $6500000 + \text{field value} * (4.249 * 10^{-3})$.</p>
<p><i>velocityVX, velocityVY, velocityVZ</i> 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.</p>

– *EpochTime*

The IE *EpochTime* is used to indicate the epoch time for the NTN assistance information, and it is defined as the starting time of a DL sub-frame, indicated by a SFN and a sub-frame number signaled together with the assistance information. The reference point for *EpochTime* of the serving or neighbour NTN payload ephemeris and Common TA parameters is the uplink time synchronization reference point when this field is provided in an NTN cell and the gNB when this field is provided in a TN cell.

***EpochTime* information element**

```
-- ASN1START
-- TAG-EPOCHTIME-START

EpochTime-r17 ::=          SEQUENCE {
    sfn-r17                INTEGER(0..1023),
    subFrameNR-r17         INTEGER(0..9)
}

-- TAG-EPOCHTIME-STOP
-- ASN1STOP
```

<i>EpochTime</i> field descriptions
<p><i>sfn</i> For serving cell, it indicates the current SFN or the next upcoming SFN after the frame where the message indicating the <i>epochTime</i> is received. For neighbour cell, it indicates the SFN nearest to the frame where the message indicating the <i>epochTime</i> is received.</p>

– *EUTRA-C-RNTI*

The IE *EUTRA-C-RNTI* identifies a UE having a RRC connection within an E-UTRA cell.

***EUTRA-C-RNTI* information element**

```
-- ASN1START
-- TAG-EUTRACRNTI-START

EUTRA-C-RNTI ::=          BIT STRING (SIZE (16))

-- TAG-EUTRACRNTI-STOP
-- ASN1STOP
```

– *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
    msg1-Repetitions-r18  ENUMERATED {true}        OPTIONAL, -- Need R
    eRedCap-r18         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**eRedCap**

If present, this field indicates that eRedCap is part of this feature combination. The fields *redCap* and *eRedCap* shall not be both set to *true*. If the UE is an eRedCap UE and there is no set of configured RA resources with *eRedCap* set to *true* among all sets of configured RA resources, the UE considers *redCap* to be applicable for random access procedure. This field is not configured in a set of preambles that is configured with 2-step random-access type.

msg1-Repetitions

If present, this field indicates that signalling of msg1 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.

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) per MSG1 repetition number.

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
    . . . ,
    [[
    msg1-RepetitionNum-r18            ENUMERATED {n2, n4, n8, spare1}                OPTIONAL, -- Cond Msg1Rep2
    msg1-RepetitionTimeOffsetROGroup-r18  ENUMERATED {n4, n8, n16, spare1}        OPTIONAL, -- Cond Msg1Rep3
    ]]
}

-- TAG-FEATURECOMBINATIONPREAMBLES-STOP
-- ASN1STOP

```

FeatureCombinationPreambles field descriptions
<p>deltaPreamble Power offset between msg3 or msgA-PUSCH and RACH preamble transmission. If configured, this parameter overrides <i>msg3-DeltaPreamble</i> or <i>msgA-DeltaPreamble</i>, Actual value = field value * 2 [dB] (see TS 38.213 [13], clause 7.1). If <i>msgA-DeltaPreamble</i> is configured in <i>separateMsgA-PUSCH-Config-r17</i>, this field is absent. This field is set to the same value for all <i>FeatureCombinationPreambles</i> for MSG1 repetitions.</p>
<p>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 <i>FeatureCombinationPreambles</i> if any feature within the <i>featureCombination</i> is not supported by the UE or if any of the spare fields within the <i>featureCombination</i> is set to <i>true</i>.</p>
<p>messagePowerOffsetGroupB Threshold for preamble selection. Value is in dB. Value <i>minusinfinity</i> corresponds to $-\infty$. Value <i>dB0</i> corresponds to 0 dB, <i>dB5</i> corresponds to 5 dB and so on (see TS 38.321 [3], clause 5.1.2).</p>
<p>msg1-RepetitionNum Indicates which MSG1-repetition number that this <i>FeatureCombinationPreambles</i> is associated with.</p>
<p>msg1-RepetitionTimeOffsetROGroup Indicates a time offset of the starting ROs between two successive RO groups for a given repetition number (2, 4 or 8) associated with this <i>FeatureCombinationPreambles</i> for each frequency resource index within a time period (see TS 38.213 [13]). If this field is absent, the time offset is implicitly determined (see TS 38.213 [13]).</p> <p>For each MSG1 repetition number, the following values are applicable.</p> <ul style="list-style-type: none"> • {n16}, for RO groups for MSG1 repetition number 8 • {n8, n16}, for RO groups for MSG1 repetition number 4 • {n4, n8, n16}, for RO groups for MSG1 repetition number 2
<p>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 <i>msgA-RSRP-Threshold-r16</i>. If absent, the UE applies <i>msgA-RSRP-Threshold-r16</i>, if configured</p>
<p>numberOfPreamblesPerSSB-ForThisPartition It determines how many consecutive preambles are associated to the Feature Combination starting from the starting preamble(s) per SSB.</p>
<p>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</p>
<p>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 <i>RACH-ConfigCommon-twostepRA</i>, this field correspond to <i>ra-MsgA-SizeGroupA</i>, otherwise it corresponds to <i>ra-Msg3SizeGroupA</i>.</p>
<p>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 <i>FeatureCombinationPreambles</i> which is included in <i>RACH-ConfigCommonTwoStepRA</i>, it corresponds to <i>msgA-RSRP-ThresholdSSB</i>, as defined in TS 38.321 [3]. If this parameter is included in <i>FeatureCombinationPreambles</i> which is included in <i>RACH-ConfigCommon</i>, it corresponds to <i>rsrp-ThresholdSSB</i>, as defined in TS 38.321 [3].</p>
<p>separateMsgA-PUSCH-Config If present it specifies how the 2-step RACH preambles identified by this <i>FeatureCombinationPreambles</i> are mapped to a PUSCH slot separate from the one defined in <i>MsgA-ConfigCommon-r16</i>. If the field is absent, the UE should apply the corresponding parameter in the <i>RACH-ConfigCommonTwoStepRA</i> of the BWP which includes the <i>FeatureCombinationPreambles</i> IE.</p>

<p>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 <i>FeatureCombinationPreambles</i> which is included in <i>RACH-ConfigCommonTwoStepRA</i>:</p> <ul style="list-style-type: none"> - 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 <i>RACH-ConfigCommonTwoStepRA</i>; - in case shared ROs are used for 4-step and 2-step random access, it indicates the subset of ROs configured within <i>RACH-ConfigCommon</i>, which are the subset of ROs configured for 2-step random access. <p>This field is configured when there is more than one RO per SSB. If the field is absent, all ROs configured in <i>RACH-ConfigCommon</i> or <i>RACH-ConfigCommonTwoStepRA</i> containing this <i>FeatureCombinationPreambles</i> are shared.</p>
<p>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 $N \geq 1$, N blocks of preambles associated with the Feature Combination are defined, each having start index $n \cdot N + \text{startPreambleForThisPartition}$, where n refers to SSB block index (see TS 38.213 [13], clause 8.1).</p>

Conditional Presence	Explanation
<i>MsgAConfigCommon</i>	The field is optionally present, Need S, if <i>FeatureCombinationPreambles</i> is included in <i>RACH-ConfigCommonTwoStepRA</i> . Otherwise, it is absent. If the field is absent in <i>FeatureCombinationPreambles</i> included in <i>RACH-ConfigCommonTwoStepRA</i> , the UE applies <i>MsgA-PUSCH-Config</i> included in the corresponding <i>MsgA-ConfigCommon</i> .
<i>Msg1Rep2</i>	The field is mandatory present, Need R, if msg1-Repetitions is included in FeatureCombination for this concerned FeatureCombinationPreambles. Otherwise, it is absent.
<i>Msg1Rep3</i>	The field is optionally present, Need S, if msg1-Repetitions is included in FeatureCombination for this concerned FeatureCombinationPreambles. Otherwise, it is absent.

– *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
    nsag-CellReselectionSubPriority-r17 CellReselectionSubPriority
    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 ::=
    absoluteFrequencySSB          SEQUENCE {
        ARFCN-ValueNR              OPTIONAL, -- Cond SpCellAdd
        MultiFrequencyBandListNR,
        ARFCN-ValueNR,
        SEQUENCE (SIZE (1..maxSCSs)) OF SCS-SpecificCarrier,
        ...,
        [
            referenceCell-r18      ServCellIndex          OPTIONAL -- Cond SSBlessSCell
        ]
    }

-- TAG-FREQUENCYINFODL-STOP
-- ASN1STOP

```

<i>FrequencyInfoDL</i> field descriptions
<p><i>absoluteFrequencyPointA</i> 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 <i>scs-SpecificCarrierList</i>.</p>
<p><i>absoluteFrequencySSB</i> 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. <i>ssb-PositionsInBurst</i>, <i>ssb-periodicityServingCell</i> and <i>subcarrierSpacing</i> in <i>ServingCellConfigCommon</i> IE. If the field is absent, the UE obtains timing reference from the intra-band SpCell or intra-band SCell if applicable as described in TS 38.213 [13], clause 4.1, or from the SpCell or an SCell indicated by <i>referenceCell</i>, or from the "default cell" defined in TS [xx]. This is supported in case the SCell for which the UE obtains the timing reference is in the same or different frequency band as the cell (i.e. the SpCell or the SCell, respectively) from which the UE obtains the timing reference. For cells supporting (e)RedCap, this field corresponds to the CD-SSB.</p>
<p><i>frequencyBandList</i> List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.</p>
<p><i>referenceCell</i> Indicates the reference cell, i.e. the cell which provides the timing reference and AGC source for the inter-band SSB-less SCell. If the reference cell is an SCell or PSCell, it should be an activated SCell or activated PSCell. If this field is absent a "default cell" is the reference cell as defined in TS 38.133 [14].</p>
<p><i>scs-SpecificCarrierList</i> A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a <i>scs-SpecificCarrier</i> at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).</p>

Conditional Presence	Explanation
<i>SpCellAdd</i>	The field is mandatory present if this <i>FrequencyInfoDL</i> is for SpCell. Otherwise the field is optionally present, Need S.
<i>SSBlessSCell</i>	The field is optionally present, Need S, if the inter-band SSB-less SCell is configured for this cell and <i>absoluteFrequencySSB</i> is absent. It is absent otherwise.

– *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
    }

```

```

}
FrequencyInfoDL-SIB-v1800 ::= SEQUENCE {
    frequencyBandListAerial-r18 MultiFrequencyBandListNR-Aerial-SIB-r18
}
-- TAG-FREQUENCYINFODL-SIB-STOP
-- ASN1STOP

```

<i>FrequencyInfoDL-SIB</i> field descriptions
<p>offsetToPointA Represents the offset to Point A as defined in TS 38.211 [16], clause 4.4.4.2.</p>
<p>frequencyBandList List of one or multiple frequency bands to which this carrier(s) belongs. If <i>frequencyBandList-v1760</i> is present, it shall contain the same number of entries, listed in the same order as in <i>frequencyBandList</i> (without suffix).</p>
<p>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.</p>

– *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
    ]],
    [[
    additionalSpectrumEmissionAerial-r18 AdditionalSpectrumEmission-r18 OPTIONAL -- Need S
    ]],
}
-- TAG-FREQUENCYINFOUL-STOP
-- ASN1STOP

```

FrequencyInfoUL field descriptions
<p>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 <i>scs-SpecificCarrierList</i> (see TS 38.211 [16], clause 4.4.4.2).</p>
<p>additionalSpectrumEmission The additional spectrum emission requirements to be applied by the UE on this uplink. If both <i>additionalSpectrumEmission</i> (without suffix) and <i>additionalSpectrumEmission-v1760</i> are absent, the UE uses value 0 for the <i>additionalSpectrumEmission</i> (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 <i>additionalSpectrumEmission</i> for all uplink carrier(s) of the same band with UL configured and if signalled, the same value in <i>additionalSpectrumEmission-v1760</i> for all uplink carrier(s) of the same band with UL configured, except for <i>additionalSpectrumEmission</i> 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 <i>additionalSpectrumEmission</i> is applicable for all uplink carriers of the same band with UL configured.</p>
<p>additionalSpectrumEmissionAerial The additional spectrum emission requirements to be applied by the aerial UE on this uplink (see TS 38.101-1 [15], tables TBD, TS 38.101-2 [39], tables TBD, and TS 38.101-5 [75], table TBD). If the field is absent, the aerial UE uses value indicated by the field <i>additionalSpectrumEmission/ additionalSpectrumEmission-v1760</i>.</p>
<p>frequencyBandList List containing only one frequency band to which this carrier(s) belongs. Multiple values are not supported.</p>
<p>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>
<p>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 <i>p-NR-FR1</i> (configured for the cell group) and by <i>p-UE-FR1</i> (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].</p>
<p>scs-SpecificCarrierList A set of carriers for different subcarrier spacings (numerologies). Defined in relation to Point A. The network configures a <i>scs-SpecificCarrier</i> at least for each numerology (SCS) that is used e.g. in a BWP (see TS 38.211 [16], clause 5.3).</p>

Conditional Presence	Explanation
<i>FDD-OrSUL</i>	The field is mandatory present if this <i>FrequencyInfoUL</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL</i>) or if this <i>FrequencyInfoUL</i> is for a supplementary uplink (SUL). It is absent, Need R, otherwise (if this <i>FrequencyInfoUL</i> is for an unpaired UL (TDD)).
<i>FDD-TDD-OrSUL-Optional</i>	The field is optionally present, Need R, if this <i>FrequencyInfoUL</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL</i>), or if this <i>FrequencyInfoUL</i> 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 <i>FrequencyInfoUL</i> 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 ::=
    frequencyBandList          SEQUENCE {
        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
        . . .
        [
            frequencyBandListAerial-r18      MultiFrequencyBandListNR-Aerial-SIB-r18  OPTIONAL -- Need S
        ]
    }

FrequencyInfoUL-SIB-v1760 ::=
    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).

frequencyBandListAerial

Provides the frequency band indicator and a list of *additionalPmax* and *additionalSpectrumEmission* values for aerial UE as defined in TS 38.101-1 [15], table TBD, TS 38.101-2 [39], table TBD, and TS 38.101-5 [75], table TBD. If the field is present, the aerial UE shall apply the first listed band which it supports in the *frequencyBandListAerial* field. If the field is absent, *frequencyBandList* applies.

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
<i>FDD-OrSUL</i>	The field is mandatory present if this <i>FrequencyInfoUL-SIB</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL-SIB</i>) or if this <i>FrequencyInfoUL-SIB</i> is for a supplementary uplink (SUL). It is absent otherwise (if this <i>FrequencyInfoUL-SIB</i> is for an unpaired UL (TDD)).
<i>FDD-TDD-OrSUL-Optional</i>	The field is optionally present, Need R, if this <i>FrequencyInfoUL-SIB</i> is for the paired UL for a DL (defined in a <i>FrequencyInfoDL-SIB</i>), or if this <i>FrequencyInfoUL-SIB</i> 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 <i>FrequencyInfoUL-SIB</i> 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 and UE supports *ue-PowerClass-v1700* set to *pc6*, the UE shall apply enhanced intra-frequency RRM requirement to the serving frequency of SpCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14].
 If the field is present and the UE supports enhanced inter-frequency RRM requirements for FR2 HST in RRC_IDLE and RRC_INACTIVE, the UE shall apply enhanced inter-frequency RRM requirement to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC_IDLE and RRC_INACTIVE.
 If the field is present for SpCell and the UE supports *measEnhCAInterFreqFR2-r18*, the UE shall apply enhanced inter-frequency RRM requirement to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC_CONNECTED.
 If the field is present for SCell(s) and the UE supports *measEnhCAInterFreqFR2-r18*, the UE shall apply enhanced intra-frequency RRM requirements to the serving frequency of the corresponding SCell to support high speed up to 350 km/h for FR2 as specified in TS 38.133 [14] in RRC_CONNECTED.
 The field value, *set1* or *set2*, is applied as specified in TS38.133 [14].

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
<i>SCellOnly</i>	The field is optionally present, Need R, in <i>ServingCellConfigCommon</i> of an SCell. It is absent otherwise.
<i>SpCellOnly</i>	The field is optionally present, Need R, in <i>ServingCellConfigCommonSIB</i> or in the <i>ServingCellConfigCommon</i> of an SpCell. It is absent otherwise.
<i>SpCellOnly2</i>	The field is optionally present, Need R, in <i>ServingCellConfigCommon</i> 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
```

– *HysteresisAltitude*

The IE *HysteresisAltitude* is a parameter used within the entry and leave condition of an altitude-based event triggered reporting condition and within altitude range based parameter configuration. The actual value is field value in meters.

***HysteresisAltitude* information element**

```
-- ASN1START
-- TAG-HYSTERESISALTITUDE-START

HysteresisAltitude-r18 ::=
    INTEGER (0..64)

-- TAG-HYSTERESISALTITUDE-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
<p>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 <i>configuredGrantType1Allowed</i> 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.</p>
<p>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, SRB4 and DRBs.</p>
<p>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 <i>p0</i>, 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].</p>
<p>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 '<i>allowedSCS-List</i>' 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</p>
<p>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 '<i>allowedServingCells</i>' in TS 38.321 [3].</p>
<p>bitRateMultiplier Bit rate multiplier for recommended bit rate MAC CE as specified in TS 38.321 [3]. Value <i>x40</i> indicates bit rate multiplier 40, value <i>x70</i> indicates bit rate multiplier 70 and so on.</p>
<p>bitRateQueryProhibitTimer The timer is used for bit rate recommendation query in TS 38.321 [3], in seconds. Value <i>s0</i> means 0 s, <i>s0dot4</i> means 0.4 s and so on.</p>
<p>bucketSizeDuration Value in ms. <i>ms5</i> corresponds to 5 ms, value <i>ms10</i> corresponds to 10 ms, and so on.</p>
<p>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.</p>
<p>configuredGrantType1Allowed If present, or if the capability <i>lcp-Restriction</i> 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 '<i>configuredGrantType1Allowed</i>' in TS 38.321 [3]. This field is ignored when SDT procedure is ongoing.</p>
<p>logicalChannelGroup, logicalChannelGroupIAB-Ext ID of the logical channel group, as specified in TS 38.321 [3], which the logical channel belongs to. The <i>logicalChannelGroupIAB-Ext</i> is only applicable to the IAB-MT. When <i>logicalChannelGroupIAB-Ext</i> is configured, <i>logicalChannelGroup</i> shall be ignored.</p>
<p>logicalChannelSR-Mask Controls SR triggering when a configured uplink grant of <i>type1</i> or <i>type2</i> is configured. <i>true</i> indicates that SR masking is configured for this logical channel as specified in TS 38.321 [3].</p>
<p>logicalChannelSR-DelayTimerApplied Indicates whether to apply the delay timer for SR transmission for this logical channel. Set to <i>false</i> if <i>logicalChannelSR-DelayTimer</i> is not included in <i>BSR-Config</i>.</p>

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 <i>kBps0</i> corresponds to 0 kiloBytes/s, value <i>kBps8</i> corresponds to 8 kiloBytes/s, value <i>kBps16</i> corresponds to 16 kiloBytes/s, and so on. For SRBs, the value can only be set to <i>infinity</i> .
schedulingRequestId
If present, it indicates the scheduling request configuration applicable for this logical channel, as specified in TS 38.321 [3].

Conditional Presence	Explanation
<i>PDCP-CA Duplication</i>	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.
<i>UL</i>	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-ChannelConfigPC5*).

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
<i>CRS-IM</i>	For the serving cell with 15kHz SCS, this field is mandatory present for the UE supporting the capability of <i>crs-IM-nonDSS-NWA-15kHzSCS-r17</i> , but not supporting <i>crs-IM-nonDSS-15kHzSCS-r17</i> , if <i>RateMatchPatternLTE-CRS</i> is not configured for this serving cell. Otherwise it is optionally present, Need S if <i>RateMatchPatternLTE-CRS</i> 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 <i>crs-IM-nonDSS-NWA-30kHzSCS-r17</i> , but not supporting <i>crs-IM-nonDSS-30kHzSCS-r17</i> , if <i>RateMatchPatternLTE-CRS</i> is not configured for this serving cell. Otherwise it is optionally present, Need S if <i>RateMatchPatternLTE-CRS</i> is configured for this serving cell; Need M otherwise.
<i>NotCellID</i>	If the field <i>neighCellId</i> is present, this field shall be absent; otherwise, it is optionally present if the IE <i>LTE-NeighCellsCRS-AssistInfoList</i> contains one list entry, Need S, or it is mandatory present if the IE <i>LTE-NeighCellsCRS-AssistInfoList</i> contains multiple list entries.

– *LTM-CandidateId*

The IE *LTM-CandidateId* is used to identify an LTM candidate configuration.

LTM-CandidateId information element

```
-- ASN1START
-- TAG-LTM-CANDIDATEID-START

LTM-CandidateId-r18 ::=                INTEGER (1..maxNrofLTM-Configs-r18)

-- TAG-LTM-CANDIDATEID-STOP
-- ASN1STOP
```

– *LTM-Candidate*

The IE *LTM-Candidate* concerns a LTM candidate configuration to add or modify.

LTM-Candidate information element

```
-- ASN1START
-- TAG-LTM-CANDIDATE-START

LTM-Candidate-r18 ::= SEQUENCE {
    ltm-CandidateId-r18                LTM-CandidateId-r18,
    ltm-CandidatePCI-r18                PhysCellId                                OPTIONAL,    -- Need M
    ltm-SSB-Config-r18                 LTM-SSB-Config-r18                        OPTIONAL,    -- Need M
    ltm-CandidateConfig-r18            OCTET STRING (CONTAINING RRCReconfiguration)  OPTIONAL,    -- Need M
    ltm-ConfigComplete-r18             ENUMERATED {true}                          OPTIONAL,    -- Need R
    ltm-EarlyUL-SyncConfig-r18         OCTET STRING (CONTAINING EarlyUL-SyncConfig-r18)  OPTIONAL,    -- Need R
    ltm-EarlyUL-SyncConfigSUL-r18      OCTET STRING (CONTAINING EarlyUL-SyncConfig-r18)  OPTIONAL,    -- Need R
    ltm-TCI-Info-r18                   LTM-TCI-Info-r18                            OPTIONAL,    -- Need M
    ltm-NoResetID-r18                  INTEGER (1..maxNrofLTM-Configs-plus1-r18)      OPTIONAL,    -- Need N
}
```

```

    ltm-UE-MeasuredTA-ID-r18          INTEGER (1..maxNrofLTM-Configs-plus1-r18)          OPTIONAL,    -- Need N
    ...
}

LTM-SSB-Config-r18 ::= SEQUENCE {
    ssb-Frequency-r18                ARFCN-ValueNR,
    subcarrierSpacing-r18            SubcarrierSpacing,
    ssb-Periodicity-r18              ENUMERATED {ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1} OPTIONAL,    -- Need R
    ssb-PositionsInBurst-r18         CHOICE {
        shortBitmap                   BIT STRING (SIZE (4)),
        mediumBitmap                  BIT STRING (SIZE (8)),
        longBitmap                     BIT STRING (SIZE (64))
    }
    ss-PBCH-BlockPower-r18           INTEGER (-60..50)                                OPTIONAL,    -- Need R
    ...
}

-- TAG-LTM-CANDIDATE-STOP
-- ASN1STOP

```

LTM-Candidate field descriptions	
<i>ltm-CandidateConfig</i>	This field includes an RRCReconfiguration message used to configure an LTM candidate configuration.
<i>ltm-CandidateId</i>	This field indicates an LTM candidate configuration.
<i>ltm-CandidatePCI</i>	This field identifies the PCI of the SpCell of the configuration contained in <i>ltm-CandidateConfig</i> .
<i>ltm-ConfigComplete</i>	This field indicates whether the LTM candidate configuration within <i>ltm-CandidateConfig</i> is a complete configuration.
<i>ltm-EarlyUL-SyncConfig, ltm-EarlyUL-SyncConfigSUL</i>	A configuration used to perform the early UL synchronization procedure over an UL or SUL carrier.

– LTM-Config

The IE *LTM-Config* is used to provide LTM candidate configurations.

LTM-Config information element

```

-- ASN1START
-- TAG-LTM-CONFIG-START

LTM-Config-r18 ::= SEQUENCE {
    ltm-ReferenceConfiguration-r18    SetupRelease {ReferenceConfiguration-r18}          OPTIONAL,    -- Need M
    ltm-CandidateToReleaseList-r18    SEQUENCE (SIZE (1..maxNrofLTM-Configs-r18)) OF LTM-CandidateId-r18          OPTIONAL,    -- Need N
    ltm-CandidateToAddModList-r18     SEQUENCE (SIZE (1..maxNrofLTM-Configs-r18)) OF LTM-Candidate-r18          OPTIONAL,    -- Need N
    ltm-ServingCellNoResetID-r18      INTEGER (1..maxNrofLTM-Configs-plus1-r18)          OPTIONAL,    -- Need N
    ltm-CSI-ResourceConfigToAddModList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ResourceConfigurations-r18)) OF LTM-CSI-ResourceConfig-r18 OPTIONAL,    -- Need N
}

```

```

    ltm-CSI-ResourceConfigToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofLTM-CSI-ResourceConfigurations-r18)) OF LTM-CSI-ResourceConfigId-r18
    attemptLTM-Switch-r18 ENUMERATED {true} OPTIONAL, -- Need N
    ltm-ServingCellUE-MeasuredTA-ID-r18 INTEGER (1..maxNrofLTM-Configs-plus1-r18) OPTIONAL, -- Cond LTM-MCG
    ...
}
-- TAG-LTM-CONFIG-STOP
-- ASN1STOP

```

LTM-Config field descriptions

attemptLTM-Switch

If present, the UE shall execute an LTM cell switch if selected cell is a LTM candidate cell as described in clause 5.3.7.3.

ltm-ReferenceConfiguration

This field includes an RRCReconfiguration message used to configure a reference configuration for LTM.

Conditional Presence	Explanation
<i>LTM-MCG</i>	This field is optional present for the MCG, Need R, if the UE is configured with at least an LTM candidate configuration associated to the MCG. Otherwise, the field absent.

– *LTM-CSI-ReportConfig*

The IE *LTM-CSI-ReportConfig* is used to configure report on the cell in which the *LTM-CSI-ReportConfig* is included.

LTM-CSI-ReportConfig information element

```

-- ASN1START
-- TAG-LTM-CSI-REPORTCONFIG-START

LTM-CSI-ReportConfig-r18 ::= SEQUENCE {
    ltm-CSI-ReportConfigId-r18 LTM-CSI-ReportConfigId-r18,
    ltm-ResourcesForChannelMeasurement-r18 LTM-CSI-ResourceConfigId-r18,
    ltm-ReportConfigType-r18 CHOICE {
        periodic-r18 SEQUENCE {
            reportSlotConfig-r18 CSI-ReportPeriodicityAndOffset,
            pucch-CSI-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
        },
        semiPersistentOnPUCCH-r18 SEQUENCE {
            reportSlotConfig-r18 CSI-ReportPeriodicityAndOffset,
            pucch-CSI-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofBWPs)) OF PUCCH-CSI-Resource
        },
        semiPersistentOnPUSCH-r18 SEQUENCE {
            reportSlotConfig-r18 CSI-ReportPeriodicityAndOffset,
            reportSlotOffsetList-r18 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128),
            reportSlotOffsetListDCI-0-2-r18 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128),
            reportSlotOffsetListDCI-0-1-r18 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128),
            p0alpha P0-PUSCH-AlphaSetId
    }
}

```

```

    },
    aperiodic-r18                               SEQUENCE {
      reportSlotOffsetList-r18                 SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128),
      reportSlotOffsetListDCI-0-2-r18          SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128),
      reportSlotOffsetListDCI-0-1-r18          SEQUENCE (SIZE (1.. maxNrofUL-Allocations-r16)) OF INTEGER (0..128)
    },
    ...
  },
  ltm-ReportContent-r18                         LTM-ReportContent-r18,
  ...
}

LTM-ReportContent-r18 ::= SEQUENCE {
  nrOfReportedCells-r18                        ENUMERATED {n1,n2,n3,n4},
  nrOfReportedRS-PerCell-r18                  ENUMERATED {n1,n2,n3,n4},
  spCellInclusion-r18                          ENUMERATED {true}                                OPTIONAL -- Need R
}

-- TAG-LTM-CSI-REPORTCONFIG-STOP
-- ASN1STOP

```

LTM-CSI-ReportConfig field descriptions
ltm-ReportContent This field defines the content of the LTM L1 measurement report.
reportSlotConfig Periodicity and slot offset (see TS 38.214 [19], clause 5.2.1.4).
reportSlotOffsetList, reportSlotOffsetListDCI-0-1, reportSlotOffsetListDCI-0-2 Timing offset Y for semi persistent reporting using PUSCH and aperiodic reporting.

LTM-ReportContent field descriptions
nrOfReportedCells This field defines how many cells are reported within a single L1 measurement report instance.
nrOfReportedRS-PerCell This field defines how many RSs per cell are reported within a single L1 measurement report instance.
spCellInclusion This field indicates whether the UE shall include a L1 measurement report associated to the current SpCell. This field can only be configured if the current SpCell is configured as an LTM candidate cell.

– **LTM-CSI-ReportConfigId**

The IE *LTM-CSI-ReportConfigId* is used to identify an *LTM-CSI-ReportConfig*.

LTM-CSI-ReportConfigId information element

```

-- ASN1START
-- TAG-LTM-CSI-REPORTCONFIGID-START

```

```
LTM-CSI-ReportConfigId-r18 ::=          INTEGER (0..maxNrofLTM-CSI-ReportConfigurations-1-r18)
-- TAG-LTM-CSI-REPORTCONFIGID-STOP
-- ASN1STOP
```

– *LTM-CSI-ResourceConfig*

The IE *LTM-CSI-ResourceConfig* defines a group of one or more CSI resources for one or more LTM candidate configurations.

LTM-CSI-ResourceConfig information element

```
-- ASN1START
-- TAG-LTM-CSI-RESOURCECONFIG-START

LTM-CSI-ResourceConfig-r18 ::=          SEQUENCE {
    ltm-CSI-ResourceConfigId-r18        LTM-CSI-ResourceConfigId-r18,
    ltm-CSI-SSB-ResourceSet-r18         LTM-CSI-SSB-ResourceSet-r18,
    ...
}

LTM-CSI-SSB-ResourceSet-r18 ::=        SEQUENCE {
    ltm-CSI-SSB-ResourceList-r18        SEQUENCE (SIZE (1..maxNrofLTM-CSI-SSB-ResourcesPerSet-r18)) OF SSB-Index,
    ltm-CandidateIdList-r18            SEQUENCE (SIZE (1..maxNrofLTM-CSI-SSB-ResourcesPerSet-r18)) OF LTM-CandidateId-r18,
    ...
}

-- TAG-LTM-CSI-RESOURCECONFIG-STOP
-- ASN1STOP
```

LTM-CSI-SSB-ResourceSet field descriptions

Itm-CandidateIdList

This field indicates the LTM candidate cell IDs related to the SSBs in the *Itm-CSI-SSB-ResourceList*. The list has the same number of entries as *Itm-CSI-SSB-ResourceList*. The first entry in this list shall be associated to the first entry in *Itm-CSI-SSB-ResourceList*, the second entry of this list shall be associated to the second entry in *Itm-CSI-SSB-ResourceList*, and so on.

Itm-CSI-SSB-ResourceList

This field is used to indicate on SS/PBCH block resources from one or more LTM candidate cells.

– *LTM-CSI-ResourceConfigId*

The IE *LTM-CSI-ResourceConfigId* is used to identify an *LTM-CSI-ResourceConfig*.

LTM-CSI-ResourceConfigId information element

```
-- ASN1START
```



```
-- TAG-LTM-CSI-RESOURCECONFIGID-START
LTM-CSI-ResourceConfigId-r18 ::= INTEGER (0..maxNrofLTM-CSI-ResourceConfigurations-1-r18)
-- TAG-LTM-CSI-RESOURCECONFIGID-STOP
-- ASN1STOP
```

LTM-TCI-Info

The IE *LTM-TCI-Info* is used to configure TCI related information for an LTM candidate configuration.

LTM-TCI-Info information element

```
-- ASN1START
-- TAG-LTM-TCI-INFO-START
LTM-TCI-Info-r18 ::= SEQUENCE {
  ltm-DL-OrJointTCI-StateToAddModList-r18 SEQUENCE (SIZE (1..maxNrofCandidateTCI-State-r18)) OF CandidateTCI-State-r18
  OPTIONAL, -- Need N
  ltm-DL-OrJointTCI-StateToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofCandidateTCI-State-r18)) OF TCI-StateId
  OPTIONAL, -- Need N
  ltm-UL-TCI-StateToAddModList-r18 SEQUENCE (SIZE (1..maxNrofCandidateUL-TCI-r18)) OF CandidateTCI-UL-State-r18
  OPTIONAL, -- Need N
  ltm-UL-TCI-StateToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofCandidateUL-TCI-r18)) OF TCI-UL-StateId-r17
  OPTIONAL, -- Need N
  ltm-NZP-CSI-RS-ResourceToAddModList-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-Resource
  OPTIONAL, -- Need N
  ltm-NZP-CSI-RS-ResourceToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-Resources)) OF NZP-CSI-RS-ResourceId
  OPTIONAL, -- Need N
  ltm-NZP-CSI-RS-ResourceSetToAddModList-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSet
  OPTIONAL, -- Need N
  ltm-NZP-CSI-RS-ResourceSetToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofNZP-CSI-RS-ResourceSets)) OF NZP-CSI-RS-ResourceSetId
  OPTIONAL, -- Need N
  pathlossReferenceRS-ToAddModList-r18 SEQUENCE (SIZE (1..maxNrofPathlossReferenceRSs-r17)) OF PathlossReferenceRS-r17
  OPTIONAL, -- Need N
  pathlossReferenceRS-ToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofPathlossReferenceRSs-r17)) OF PathlossReferenceRS-Id-r17
  OPTIONAL, -- Need N
  unifiedTCI-StateType-r18 ENUMERATED {separate, joint}
  OPTIONAL, -- Need R
  ...
}
-- TAG-LTM-TCI-INFO-STOP
-- ASN1STOP
```

LTM-TCI-Info field descriptions

unifiedTCI-StateType

Indicates the unified TCI states type the UE is configured for this LTM candidate configuration. The value *separate* means this LTM candidate configuration is configured with *ltm-DL-OrJointTCI-StateToAddModList* for DL TCI states and *ltm-UL-TCI-StatesToAddModList* for UL TCI states. The value *joint* means this LTM candidate configuration is configured with *ltm-DL-OrJointTCI-StateToAddModList* for joint TCI states for UL and DL operation.

– **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 ::=
    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
    ]],

```

```

[[
drx-ConfigExt2-v1800          SetupRelease { DRX-ConfigExt2-v1800 }          OPTIONAL, -- Need M
additionalBS-TableAllowed-r18 BIT STRING (SIZE (maxNrofLCGs-r18))          OPTIONAL, -- Need R
dsr-ConfigToAddModList-r18    SEQUENCE (SIZE (1..maxNrofLCGs-r18)) OF LCG-DSR-Config-r18  OPTIONAL, -- Need N
dsr-ConfigToReleaseList-r18   SEQUENCE (SIZE (1..maxNrofLCGs-r18)) OF LCG-Id-r18             OPTIONAL, -- Need N
tar-Config-r18                SetupRelease { TAR-Config-r18 }             OPTIONAL, -- Need M
]]
}

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)

LCG-DSR-Config-r18 ::= SEQUENCE {
  lcg-Id-r18                    LCG-Id-r18,
  remainingTimeThreshold-r18    INTEGER (1..64),
  ...
}

LCG-Id-r18 ::= INTEGER (0..maxLCG-ID)

-- TAG-MAC-CELLGROUPCONFIG-STOP
-- ASN1STOP

```

MAC-CellGroupConfig field descriptions
<p>additionalBS-TableAllowed Indicates whether a UE is allowed to utilize the refined buffer size levels, as specified in TS 38.321 [3], for a certain Logical Channel Group. The leftmost bit corresponds to LCG ID=0, second leftmost bit to LCG ID=1 and so on. The UE is allowed to utilize the refined buffer size levels for a Logical Channel Group only when the corresponding bit is set to 1.</p>
<p>allowCSI-SRS-Tx-MulticastDRX-Active Used to control the CSI/SRS transmission during MBS multicast DRX ActiveTime, see TS 38.321 [3].</p>
<p>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].</p>
<p>dataInactivityTimer Releases the RRC connection upon data inactivity as specified in clause 5.3.8.5 and in TS 38.321 [3]. Value <i>s1</i> corresponds to 1 second, value <i>s2</i> corresponds to 2 seconds, and so on.</p>
<p>drx-Config, drx-ConfigExt, drx-ConfigExt2 Used to configure DRX as specified in TS 38.321 [3]. Network only configures <i>drx-ConfigExt</i> or <i>drx-ConfigExt2</i> when <i>drx-Config</i> is configured.</p>
<p>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.</p>
<p>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 <i>sl-ScheduledConfig</i> is configured and <i>drx-Config</i> is configured.</p>
<p>drx-LastTransmissionUL If this field is present, the start of the <i>drx-HARQ-RTT-TimerUL</i> is after the last transmission within a bundle, see TS 38.321 [3].</p>
<p>dss-ConfigToAddModList List of LCG-specific DSR configurations to add or modify.</p>
<p>dss-ConfigToReleaseList List of LCG-specific DSR configurations to release.</p>
<p>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.</p>
<p>g-RNTI-ConfigToReleaseList List of G-RNTI configurations to release.</p>
<p>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.</p>
<p>g-CS-RNTI-ConfigToReleaseList List of G-CS-RNTI configurations to release.</p>
<p>intraCG-Prioritization Used to enable HARQ process ID selection based on LCH-priority for one CG as specified in TS 38.321 [3].</p>
<p>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 <i>lch-BasedPrioritization</i> with <i>enhancedSkipUplinkTxDynamic</i> simultaneously nor <i>lch-BasedPrioritization</i> with <i>enhancedSkipUplinkTxConfigured</i> simultaneously.</p>
<p>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].</p>
<p>schedulingRequestID-BFR-SCell Indicates the scheduling request configuration applicable for BFR on SCell, as specified in TS 38.321 [3].</p>

schedulingRequestID-BFR
Indicates the scheduling request configuration (SchedulingRequestConfig) that the UE shall use upon detecting a beam failure on the detection resources configured in <i>failureDetectionSet1</i> of a serving cell while beam failure is not detected on resources configured in <i>failureDetectionSet2</i> 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 <i>failureDetectionSet2</i> of a serving cell while beam failure is not detected on resources configured in <i>failureDetectionSet1</i> 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 <i>true</i> , the UE skips UL transmissions as described in TS 38.321 [3]. If the UE is configured with <i>enhancedSkipUplinkTxDynamic</i> or <i>enhancedSkipUplinkTxConfigured</i> with value <i>true</i> , 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. The network does not configure <i>enhancedSkipUplinkTxDynamic</i> or <i>enhancedSkipUplinkTxConfigured</i> with value <i>true</i> together with <i>numberOfSlotsTBoMS-r17</i> .
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 <i>dci-enabler</i> means that whether the UE shall provide HARQ feedback for MBS multicast is indicated by DCI as specified in TS 38.213 [13]. Value <i>enabled</i> 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 <i>groupCommon-RNTI</i> is set to <i>g-RNTI</i> , the UE applies the value 1.

LCG-DSR-Config field descriptions	
lcg-Id	Identifier of the Logical Channel Group which the DSR configuration refers to.
remainingTimeThreshold	Remaining time threshold used for triggering DSR for the Logical Channel Group, as specified in TS 38.321 [3]. Value in number of milliseconds.

Conditional Presence	Explanation
<i>G-RNTI</i>	This field is optionally present, Need S, if <i>groupCommon-RNTI</i> is set to <i>g-RNTI</i> . The field is absent when <i>groupCommon-RNTI</i> is set to <i>g-CS-RNTI</i> .
<i>HARQFeedback</i>	The field is mandatory present when <i>harq-FeedbackEnablerMulticast</i> is present. It is absent otherwise.
<i>MCG-Only</i>	This field is optionally present, Need M, for the <i>MAC-CellGroupConfig</i> of the MCG. It is absent otherwise.
<i>LCH-PrioWithReTxTimer</i>	This field is optionally present, Need R, if <i>lch-BasedPrioritization-r16</i> is configured in this MAC entity and <i>cg-RetransmissionTimer-r16</i> 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 ::=
    measObjectToRemoveList          SEQUENCE {
        measObjectToRemoveList      OPTIONAL, -- Need N
        measObjectToAddModList      OPTIONAL, -- Need N
        reportConfigToRemoveList    OPTIONAL, -- Need N
        reportConfigToAddModList    OPTIONAL, -- Need N
        measIdToRemoveList          OPTIONAL, -- Need N
        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
        ]],
        [[
            effectiveMeasWindowConfig-r18   SetupRelease {MeasWindowConfig-r18}  OPTIONAL, -- Need M
        ]]]
    }

```

```

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

<i>effectiveMeasWindowConfig</i> Used to setup and release effective measurement window in NR for E-UTRA measurements.
<i>interFrequencyConfig-NoGap-r16</i> 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 <i>measConfig</i> associated with MCG, and when configured, it applies to all the inter-frequency measurements configured by MN and SN.
<i>measGapConfig</i> Used to setup and release measurement gaps in NR.
<i>measIdToAddModList</i> List of measurement identities to add and/or modify.
<i>measIdToRemoveList</i> List of measurement identities to remove.
<i>measObjectToAddModList</i> List of measurement objects to add and/or modify.
<i>measObjectToRemoveList</i> List of measurement objects to remove.
<i>reportConfigToAddModList</i> List of measurement reporting configurations to add and/or modify.
<i>reportConfigToRemoveList</i> List of measurement reporting configurations to remove.
<i>s-MeasureConfig</i> Threshold for NR SpCell RSRP measurement controlling when the UE is required to perform measurements on non-serving cells. Choice of <i>ssb-RSRP</i> corresponds to cell RSRP based on SS/PBCH block and choice of <i>csi-RSRP</i> corresponds to cell RSRP of CSI-RS.
<i>measGapSharingConfig</i> 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 ::=
    gapFR2          SEQUENCE {
        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 ::=
    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 ::=
    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 ::=
    measPosPreConfigGapId-r17      SEQUENCE {
        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
<p>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 <i>GapConfig</i> (without suffix), if available. If both per-UE gap and per-FR gap are configured via <i>GapConfig</i> and/or <i>GapConfig-r17</i>, the PRS measurement is always associated with the per-UE gap.</p>
<p>gapFR1 Indicates measurement gap configuration that applies to FR1 only. In (NG)EN-DC, <i>gapFR1</i> cannot be set up by NR RRC (i.e. only LTE RRC can configure FR1 measurement gap). In NE-DC, <i>gapFR1</i> can only be set up by NR RRC (i.e. LTE RRC cannot configure FR1 gap). In NR-DC, <i>gapFR1</i> can only be set up in the <i>measConfig</i> associated with MCG. <i>gapFR1</i> can not be configured together with <i>gapUE</i>. 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].</p>
<p>gapFR2 Indicates measurement gap configuration applies to FR2 only. In (NG)EN-DC or NE-DC, <i>gapFR2</i> can only be set up by NR RRC (i.e. LTE RRC cannot configure FR2 gap). In NR-DC, <i>gapFR2</i> can only be set up in the <i>measConfig</i> associated with MCG. <i>gapFR2</i> cannot be configured together with <i>gapUE</i>. 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].</p>
<p>gapOffset Value <i>gapOffset</i> is the gap offset of the gap pattern with MGRP indicated in the field <i>mgrp</i>. The value range is from 0 to <i>mgrp</i>-1. If <i>ncsglnd-r17</i> is present, this offset value refers to the starting point of VIL1 (the visible interruption length before the ML).</p>
<p>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.</p>
<p>gapSharing Indicates the measurement gap sharing scheme that applies to this <i>GapConfig</i>. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value <i>scheme00</i> corresponds to scheme "00", value <i>scheme01</i> corresponds to scheme "01", and so on.</p>
<p>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]. 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.</p>
<p>gapToReleaseList A list of measurement gap configuration to be released.</p>
<p>gapType Indicates the type of this measurement gap. Value <i>perUE</i> indicates that it is a per UE measurement gap, value <i>perFR1</i> indicates that it is an FR1 measurement gap, and value <i>perFR2</i> indicates that it is an FR2 measurement gap.</p>
<p>gapUE Indicates measurement gap configuration that applies to all frequencies (FR1 and FR2). In (NG)EN-DC, <i>gapUE</i> cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE measurement gap). In NE-DC, <i>gapUE</i> can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap). In NR-DC, <i>gapUE</i> can only be set up in the <i>measConfig</i> associated with MCG. If <i>gapUE</i> is configured, then neither <i>gapFR1</i> nor <i>gapFR2</i> 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].</p>
<p>measGapId The ID of this measurement gap configuration.</p>
<p>mgl Value <i>mgl</i> is the measurement gap length in ms of the measurement gap. If <i>ncsglnd-r17</i> is not present, the measurement gap length is according to in Table 9.1.2-1 in TS 38.133 [14]. If <i>ncsglnd-r17</i> 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 <i>ms1dot5</i> corresponds to 1.5 ms, <i>ms3</i> corresponds to 3 ms and so on. If <i>mgl-r16</i> is present, UE shall ignore the <i>mgl</i> (without suffix). Value <i>ms1</i>, <i>ms2</i>, and <i>ms5</i> can only be configured if <i>ncsglnd</i> is present.</p>

<i>mgrp</i> If <i>ncsglnd-r17</i> is not present, the <i>mgrp</i> 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 <i>ncsglnd-r17</i> is present, the <i>mgrp</i> 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].
<i>mgta</i> Value <i>mgta</i> 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 <i>ncsglnd</i> is present. Value <i>ms0</i> corresponds to 0 ms, <i>ms0dot25</i> corresponds to 0.25 ms, <i>ms0dot5</i> corresponds to 0.5 ms and <i>ms0dot75</i> corresponds to 0.75 ms. For FR2, the network only configures 0 ms and 0.25 ms if <i>ncsglnd</i> is not present. If <i>ncsglnd</i> 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 <i>ms0dot75</i> can only be configured if <i>ncsglnd</i> is present.
<i>ncsglnd</i> Indicates that the measurement gap is a NCSG as specified in 38.133 [14].
<i>posMeasGapPreConfigToAddModList</i> 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.
<i>posMeasGapPreConfigToReleaseList</i> List of preconfigured measurement gap for positioning to release.
<i>preConfigInd</i> Indicates whether the measurement gap is a pre-configured measurement gap.
<i>refFR2ServCellAsyncCA</i> 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).
<i>refServCellIndicator</i> 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
<i>AsyncCA</i>	This field is mandatory present when configuring and reconfiguring FR2 gap pattern to UE in: <ul style="list-style-type: none"> - (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 <i>refServCellIndicator</i> is set to <i>mcg-FR2</i>. Otherwise, it is absent, Need R.
<i>NEDCorNRDC</i>	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.
<i>PRS</i>	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
  ...,
  [[
  measReselectionCarrierListNR-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasReselectionCarrierNR-r18 OPTIONAL,      -- Need S
  measIdleValidityDuration-r18     MeasurementValidityDuration-r18      OPTIONAL,      -- Need S
  measReselectionValidityDuration-r18 MeasurementValidityDuration-r18      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
  ...,
  [[
  measReselectionCarrierListNR-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasReselectionCarrierNR-r18 OPTIONAL,      -- Need S
  measIdleValidityDuration-r18     MeasurementValidityDuration-r18      OPTIONAL,      -- Need S
  measReselectionValidityDuration-r18 MeasurementValidityDuration-r18      OPTIONAL,      -- Need S
  ]]
}

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

ValidityArea-r16 ::= SEQUENCE {
```

```

    carrierFreq-r16                ARFCN-ValueNR,
    validityCellList-r16           ValidityCellList
}
ValidityCellList ::= SEQUENCE (SIZE (1.. maxCellMeasIdle-r16)) OF PCI-Range

MeasIdleCarrierNR-r16 ::= SEQUENCE {
    carrierFreq-r16                ARFCN-ValueNR,
    ssbSubcarrierSpacing-r16       SubcarrierSpacing,
    frequencyBandList              MultiFrequencyBandListNR
    measCellListNR-r16             CellListNR-r16
    reportQuantities-r16           ENUMERATED {rsrp, rsrq, both},
    qualityThreshold-r16           SEQUENCE {
        idlerSRP-Threshold-NR-r16   RSRP-Range
        idlerSRQ-Threshold-NR-r16   RSRQ-Range
    }
    ssb-MeasConfig-r16             SEQUENCE {
        nrofSS-BlocksToAverage-r16  INTEGER (2..maxNrofSS-BlocksToAverage)
        absThreshSS-BlocksConsolidation-r16 ThresholdNR
        smtc-r16                    SSB-MTC
        ssb-ToMeasure-r16           SSB-ToMeasure
        deriveSSB-IndexFromCell-r16 BOOLEAN,
        ss-RSSI-Measurement-r16     SS-RSSI-Measurement
    }
    beamMeasConfigIdle-r16         BeamMeasConfigIdle-NR-r16
    ...
}

MeasIdleCarrierEUTRA-r16 ::= SEQUENCE {
    carrierFreqEUTRA-r16           ARFCN-ValueEUTRA,
    allowedMeasBandwidth-r16       EUTRA-AllowedMeasBandwidth,
    measCellListEUTRA-r16         CellListEUTRA-r16
    reportQuantitiesEUTRA-r16     ENUMERATED {rsrp, rsrq, both},
    qualityThresholdEUTRA-r16     SEQUENCE {
        idlerSRP-Threshold-EUTRA-r16 RSRP-RangeEUTRA
        idlerSRQ-Threshold-EUTRA-r16 RSRQ-RangeEUTRA-r16
    }
    ...
}

MeasReselectionCarrierNR-r18 ::= SEQUENCE {
    carrierFreq-r18                ARFCN-ValueNR,
    ...
}

MeasurementValidityDuration-r18 ::= ENUMERATED { s5, s10, s20, s50, s100, spare3, spare2, spare1}

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

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

BeamMeasConfigIdle-NR-r16 ::= SEQUENCE {
    reportQuantityRS-Indexes-r16  ENUMERATED {rsrp, rsrq, both},

```

```

OPTIONAL  -- Need N
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL  -- Need S
OPTIONAL, -- Need S
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need S
OPTIONAL, -- Need R
OPTIONAL, -- Need S

```

```
    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.
measIdleValidityDuration, measReselectionValidityDuration	Indicates time values for UE to determine validity of reported idle/inactive and reselection measurements as defined in TS 38.133[14]. Value s5 correspond to 5 seconds, value s10 correspond to 10 seconds and so on.
measReselectionCarrierListNR	Indicates the NR carriers for reselection measurement reporting.
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 <i>VarMeasIdleConfig</i> , 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 <i>VarMeasIdleConfig</i> , the UE measures on all SS-blocks.
ss-RSSI-Measurement Indicates the SSB-based RSSI measurement configuration. If the field is absent in <i>VarMeasIdleConfig</i> , 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 ::=
    cli-ResourceConfig-r16
    ...
}

CLI-ResourceConfig-r16 ::=
    srs-ResourceConfig-r16
    rssi-ResourceConfig-r16
}

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-SCS-r16
    refServCellIndex-r16
    refBWP-r16
    ...
}

RSSI-ResourceConfigCLI-r16 ::= SEQUENCE {
    rssi-ResourceId-r16
    rssi-SCS-r16
    startPRB-r16
    nrofPRBs-r16
    startPosition-r16
    nrofSymbols-r16
    rssi-PeriodicityAndOffset-r16
    refServCellIndex-r16
    ...
}

RSSI-ResourceId-r16 ::= INTEGER (0.. maxNrofCLI-RSSI-Resources-1-r16)

RSSI-PeriodicityAndOffset-r16 ::= CHOICE {
    s110
    s120
    s140
    s180
    s1160
    s1320
    s1640
    ...
}

-- 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
<p>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.</p>
<p>nrofSymbols Within a slot that is configured for CLI-RSSI measurement (see slotConfiguration), the UE measures the RSSI from <i>startPosition</i> to <i>startPosition</i> + <i>nrofSymbols</i> - 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 <i>startPosition</i> and <i>nrofSymbols</i> 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 <i>startPosition</i> and <i>nrofSymbols</i> are integer multiple of reference SCS divided by configured BWP SCS.</p>
<p>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.</p>
<p>rssi-PeriodicityAndOffset Periodicity and slot offset for this CLI-RSSI resource. All values are in "number of slots". Value <i>s1</i> corresponds to a periodicity of 1 slot, value <i>s2</i> corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots.</p>
<p>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.</p>
<p>startPosition OFDM symbol location of the CLI-RSSI resource within a slot.</p>
<p>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.</p>

– MeasObjectEUTRA

The IE *MeasObjectEUTRA* specifies information applicable for E-UTRA cells.

MeasObjectEUTRA information element

```
-- ASN1START
-- TAG-MEASOBJECTEUTRA-START
```

```
MeasObjectEUTRA ::=
    carrierFreq                ARFCN-ValueEUTRA,
    allowedMeasBandwidth       EUTRA-AllowedMeasBandwidth,
    cellsToRemoveListEUTRAN    EUTRA-CellIndexList
    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
    widebandRSRQ-Meas                   BOOLEAN,
    . . .
    [[
    associatedMeasGap-r17                 MeasGapId-r17
    ]],
    [[
    measSequence-r18                     MeasSequence-r18
    ]]
}

EUTRA-CellIndexList ::=
SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF EUTRA-CellIndex

EUTRA-CellIndex ::=
INTEGER (1..maxCellMeasEUTRA)

EUTRA-Cell ::=
cellIndexEUTRA                         SEQUENCE {
    physCellId                           EUTRA-CellIndex,
    cellIndividualOffset                 EUTRA-PhysCellId,
                                         EUTRA-Q-OffsetRange
}

EUTRA-ExcludedCell ::=
cellIndexEUTRA                         SEQUENCE {
    physCellIdRange                     EUTRA-CellIndex,
                                         EUTRA-PhysCellIdRange
}

-- TAG-MEASOBJECTEUTRA-STOP
-- ASN1STOP

```

<i>EUTRAN-ExcludedCell</i> field descriptions
cellIndexEUTRA Entry index in the cell list.
physicalCellIdRange Physical cell identity or a range of physical cell identities.

<i>EUTRAN-Cell</i> field descriptions
physicalCellId Physical cell identity of a cell in the cell list.
cellIndividualOffset Cell individual offset applicable to a specific cell. Value <i>dB-24</i> corresponds to -24 dB, <i>dB-22</i> corresponds to -22 dB and so on.

MeasObjectEUTRA field descriptions
<p>allowedMeasBandwidth The maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" TS 36.104 [33].</p>
<p>associatedMeasGap Indicates the associated measurement gap for measuring this EUTRA frequency. If this field is absent, the associated measurement gap is the gap configured via <i>gapFR1</i> or <i>gapUE</i>.</p>
<p>carrierFreq Identifies E-UTRA carrier frequency for which this configuration is valid. Network does not configure more than one <i>MeasObjectEUTRA</i> for the same physical frequency, regardless of the E-ARFCN used to indicate this.</p>
<p>cellsToAddModListEUTRAN List of cells to add/ modify in the cell list.</p>
<p>cellsToRemoveListEUTRAN List of cells to remove from the cell list.</p>
<p>eutra-PresenceAntennaPort1 When set to <i>true</i>, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.</p>
<p>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 <i>dB-24</i> corresponds to -24 dB, value <i>dB-22</i> corresponds to -22 dB and so on.</p>
<p>excludedCellsToAddModListEUTRAN List of cells to add/ modify in the exclude-list of cells.</p>
<p>excludedCellsToRemoveListEUTRAN List of cells to remove from the exclude-list of cells.</p>
<p>measSequence Indicates the recommended sequence for intra/inter-RAT intra/inter-frequency measurement. Value 1 means the corresponding frequency is measured firstly. Value 2 means the corresponding frequency is measured secondly and so on. If more than one frequency is configured with the same value, it means no recommended sequence among these frequencies. If not configured, it means there is no recommended sequence for the corresponding frequency. This field is only configured for NR standalone or if the <i>measObject</i> is associated to the MCG.</p>
<p>widebandRSRQ-Meas If set to <i>true</i>, 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 <i>true</i> if the measurement bandwidth indicated by <i>allowedMeasBandwidth</i> is 50 resource blocks or larger; otherwise the network sets this field to <i>false</i>.</p>

– *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 ::=
    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
    ]],
    [[
    measSequence-r18              MeasSequence-r18            OPTIONAL, -- Need R
    cellsToAddModListExt-v1800    CellsToAddModListExt-v1800  OPTIONAL, -- Cond NeighbourCell
  
```

```

    ]]
  }
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
  ]],
  [[
  ssb-ToMeasureAltitudeBasedList-r18 SetupRelease { SSB-ToMeasureAltitudeBasedList-r18 } OPTIONAL, -- Need M
  ]]
}
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

CellsToAddModListExt-v1800 ::= SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellsToAddModExt-v1800

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
}

CellsToAddModExt-v1800 ::= SEQUENCE {
    ntn-NeighbourCellInfo-r18 NTN-NeighbourCellInfo-r18 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
}

```

```

SSB-ToMeasureAltitudeBasedList-r18 ::= SEQUENCE (SIZE (1..maxNrofAltitudeRanges-r18)) OF SSB-ToMeasureAltitudeBased-r18

SSB-ToMeasureAltitudeBased-r18 ::= SEQUENCE {
  altitudeRange-r18          SEQUENCE {
    altitudeMin-r18          Altitude-r18          OPTIONAL, -- Need S
    altitudeMax-r18          Altitude-r18          OPTIONAL, -- Need S
    altitudeHyst-r18         HysteresisAltitude-r18 OPTIONAL, -- Need R
  },
  ssb-ToMeasure-r18         SSB-ToMeasure         OPTIONAL  -- Need S
}

NTN-NeighbourCellInfo-r18 ::= SEQUENCE {
  epochTime-r18             EpochTime-r17,
  ephemerisInfo-r18        EphemerisInfo-r17
}

-- TAG-MEASOBJECTNR-STOP
-- ASN1STOP

```

<i>CellsToAddMod</i> field descriptions
<i>cellIndividualOffset</i> Cell individual offsets applicable to a specific cell.
<i>physCellId</i> Physical cell identity of a cell in the cell list.

MeasObjectNR field descriptions
<p>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.</p>
<p>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.</p>
<p>allowedCellsToAddModList List of cells to add/modify in the allow-list of cells. It applies only to SSB resources.</p>
<p>allowedCellsToRemoveList List of cells to remove from the allow-list of cells.</p>
<p>associatedMeasGapSSB Indicates the associated measurement gap for SSB measuring identified by <i>ssb-ConfigMobility</i> in this measurement object. When multiple <i>MeasObjectNR</i> with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each <i>MeasObjectNR</i>. If this field is absent, the associated measurement gap is the gap configured via <i>gapFR1</i>, <i>gapFR2</i>, or <i>gapUE</i>.</p>
<p>associatedMeasGapSSB2 Indicates the associated additional measurement gap for SSB measuring identified by <i>ssb-ConfigMobility</i> in this measurement object for NTN deployments. When multiple <i>MeasObjectNR</i> with the same SSB frequency are configured, the network configures the same measurement gap ID in this field for each <i>MeasObjectNR</i>. If this field is absent, the associated measurement gap is the gap indicated by <i>associatedMeasGapSSB</i>.</p>
<p>associatedMeasGapCSIRS Indicates the associated measurement gap for CSI-RS measuring identified by <i>csi-rs-ResourceConfigMobility</i> in this measurement object. If this field is absent, the associated measurement gap is the gap configured via <i>gapFR1</i>, <i>gapFR2</i>, or <i>gapUE</i>.</p>
<p>associatedMeasGapCSIRS2 Indicates the associated additional measurement gap for CSI-RS measuring identified by <i>csi-rs-ResourceConfigMobility</i> in this measurement object for NTN deployments. If this field is absent, the associated measurement gap is the gap indicated by <i>associatedMeasGapCSIRS</i>. In this release of the specification, this field is not configured for NTN deployments.</p>
<p>cellsToAddModList List of cells to add/modify in the cell list.</p>
<p>cellsToRemoveList List of cells to remove from the cell list.</p>
<p>excludedCellsToAddModList List of cells to add/modify in the exclude-list of cells. It applies only to SSB resources.</p>
<p>excludedCellsToRemoveList List of cells to remove from the exclude-list of cells.</p>
<p>freqBandIndicatorNR The frequency band in which the SSB and/or CSI-RS indicated in this <i>MeasObjectNR</i> 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 <i>MeasObjectNR</i>.</p>
<p>measCyclePSCell The parameter is used only when the PSCell is configured on the frequency indicated by the <i>measObjectNR</i> 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 <i>measCyclePSCell</i> for the <i>measObjectNR</i> associated with the PSCell if <i>bfd-and-RLM</i> is set to <i>true</i> and the SCG is deactivated. Value <i>ms160</i> corresponds to 160 ms, value <i>ms256</i> corresponds to 256 ms and so on.</p>
<p>measCycleSCell The parameter is used only when an SCell is configured on the frequency indicated by the <i>measObjectNR</i> 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 <i>measObjectNR</i>, but the field may also be signalled when an SCell is not configured. Value <i>sf160</i> corresponds to 160 sub-frames, value <i>sf256</i> corresponds to 256 sub-frames and so on.</p>

measSequence	Indicates the recommended sequence for intra/inter-RAT intra/inter-frequency measurement. Value 1 means the corresponding frequency is measured firstly. Value 2 means the corresponding frequency is measured secondly and so on. If more than one frequency is configured with the same value, it means no recommended sequence among these frequencies. If not provided, it means there is no recommended sequence for the corresponding frequency. This field is only configured for NR standalone or if the <i>measObject</i> is associated to the MCG.
nrofCSIrofCSI-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 <i>MeasObjectNR</i> .
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 <i>MeasObject</i> .
ntn-NeighbourCellInfo	Includes satellite assistance information of an NTN neighbour cell.
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 <i>ntn-PolarizationDL</i> 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 <i>MeasObjectNR</i> .
quantityConfigIndex	Indicates the <i>n</i> -th element of <i>quantityConfigNR-List</i> provided in <i>MeasConfig</i> .
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 <i>MeasObjectNR</i> with PCI listed in <i>pci-List</i> . For these SS, the periodicity is indicated by <i>periodicity</i> in <i>smtc2</i> and the timing offset is equal to the offset indicated in <i>periodicityAndOffset</i> modulo <i>periodicity</i> . <i>periodicity</i> in <i>smtc2</i> can only be set to a value strictly shorter than the periodicity indicated by <i>periodicityAndOffset</i> in <i>smtc1</i> (e.g. if <i>periodicityAndOffset</i> indicates <i>sf10</i> , <i>periodicity</i> can only be set of <i>sf5</i> , if <i>periodicityAndOffset</i> indicates <i>sf5</i> , <i>smtc2</i> 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 <i>MeasObjectNR</i> . For operation with shared spectrum channel access, this field is a $k \cdot 30$ kHz shift from the sync raster where $k = 0, 1, 2$, and so on if the <i>reportType</i> within the corresponding <i>ReportConfigNR</i> is set to <i>reportCGI</i> (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).

<i>RMTC-Config</i> field descriptions
<p><i>measDurationSymbols</i> Number of consecutive symbols for which the Physical Layer reports samples of RSSI (see TS 38.215 [9], clause 5.1.21). Value <i>sym1</i> corresponds to one symbol, <i>sym14or12</i> corresponds to 14 symbols of the reference numerology for NCP and 12 symbols for ECP, and so on. If <i>measDurationSymbols-v1700</i> is signalled, the UE ignores <i>measDurationSymbols-r16</i>.</p>
<p><i>ref-BWPId</i> Indicates the reference BWP for the TCI state indicated in <i>tc-StateInfo</i>. Network includes this field if <i>tc-StateInfo</i> 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.</p>
<p><i>ref-SCS-CP</i> 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 <i>ref-SCS-CP-v1700</i> is signalled, the UE ignores <i>ref-SCS-CP-r16</i>.</p>
<p><i>ref-ServCellId</i> Indicates the FR2-2 reference serving cell index for the TCI state. Network includes this field if <i>tc-StateInfo</i> 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.</p>
<p><i>rmtc-Bandwidth</i> Indicates the bandwidth for the RSSI measurement (see TS 38. 215 [9], clause 5.1.21).</p>
<p><i>rmtc-Frequency</i> 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).</p>
<p><i>rmtc-Periodicity</i> Indicates the RSSI measurement timing configuration (RMTC) periodicity (see TS 38.215 [9], clause 5.1.21).</p>
<p><i>rmtc-SubframeOffset</i> 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 <i>rmtc-SubframeOffset</i> for <i>measDurationSymbols</i> which shall be selected to be between 0 and the configured <i>rmtc-Periodicity</i> with equal probability.</p>
<p><i>tc-StateId</i> 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.</p>

SSB-ConfigMobility field descriptions
<p>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.</p>
<p>deriveSSB-IndexFromCell If this field is set to <i>true</i>, 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 (<i>absoluteFrequencySSB, subcarrierSpacing</i>) in <i>ServingCellConfigCommon</i> is equal to (<i>ssbFrequency, ssbSubcarrierSpacing</i>) in this <i>MeasObjectNR</i>, 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.</p>
<p>deriveSSB-IndexFromCellInter If this field is present, UE assumes SFN and frame boundary alignment between the reference serving cell indicated by <i>ServCellIndex</i> and all neighbour cells in this <i>MeasObjectNR</i> 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 <i>ServCellIndex</i> to derive the index of SS block transmitted by all inter-frequency neighbour cells on the frequency indicated by the <i>MeasObjectNR</i>. When this field is included, the network should set <i>deriveSSB-IndexFromCell</i> to <i>true</i>.</p>
<p>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 <i>smtc</i> are not to be measured. See TS 38.215 [9] clause 5.1.1.</p>
<p>ssb-ToMeasureAltitudeBasedList List of altitude-dependent <i>ssb-ToMeasure</i>. When the UE is within an altitude range indicated by <i>altitudeRange</i>, it ignores the <i>ssb-ToMeasure</i> (without suffix), and applies the corresponding <i>ssb-ToMeasure-r18</i> if present, otherwise (i.e., the UE is within an altitude range indicated by <i>altitudeRange</i> and <i>ssb-ToMeasure-r18</i> is absent) it measures on all SS-blocks. When the UE is outside all the altitude ranges indicated by <i>altitudeRange</i> (if any), <i>ssb-ToMeasure</i> (without suffix) applies. For each altitude range, <i>altitudeMin</i> indicates the minimum altitude in meters relative to sea level, <i>altitudeMax</i> indicates the maximum altitude in meters relative to sea level, and if included, <i>altitudeHyst</i> indicates hysteresis in meters for determination of the altitude range. I.e., when <i>altitudeHyst</i> is configured for an altitude range, the UE considers itself to have entered the range if $altitudeMin \leq \text{UE altitude} \leq altitudeMax$ and after entering the range considers itself to be in the range while $(altitudeMin - altitudeHyst) \leq \text{UE altitude} \leq (altitudeMax + altitudeHyst)$. For each <i>altitudeRange</i>, if <i>altitudeMin</i> is absent, value <i>minAltitude-r18</i> is used and if <i>altitudeMax</i> is absent, value <i>maxAltitude-r18</i> is used.</p>
SSB-PositionQCL-CellsToAddMod field descriptions
<p>physCellId Physical cell identity of a cell in the cell list.</p>
<p>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 <i>ssb-PositionQCL-Common</i>.</p>

Conditional Presence	Explanation
<i>AssociatedGapCSIIRS</i>	This field is optionally present, Need R if <i>associatedMeasGapCSIIRS</i> is configured, otherwise, it is absent.
<i>AssociatedGapSSB</i>	This field is optionally present, Need R if <i>associatedMeasGapSSB</i> is configured, otherwise, it is absent.
<i>CSI-RS</i>	This field is mandatory present if <i>csi-rs-ResourceConfigMobility</i> is configured, otherwise, it is absent.
<i>IntraFreqConnected</i>	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 (<i>ssbFrequency</i> , <i>ssbSubcarrierSpacing</i>) in this <i>MeasObjectNR</i> , otherwise, it is absent.
<i>SCG</i>	This field is optionally present, Need R, in the <i>measConfig</i> associated with the SCG. It is absent in the <i>measConfig</i> associated with the MCG.
<i>NeighbourCell</i>	This field is mandatory present if this <i>MeasObject</i> is configured by the serving cell for a neighbour cell served by a NTN Earth moving system. Otherwise, it is absent.
<i>SharedSpectrum</i>	This field is mandatory present if this <i>MeasObject</i> is for a frequency which operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
<i>SharedSpectrum2</i>	This field is optionally present if this <i>MeasObject</i> is for a frequency which operates with shared spectrum channel access in FR2-2, Need R. Otherwise, it is absent, Need R.
<i>SSBorAssociatedSSB</i>	This field is mandatory present if <i>ssb-ConfigMobility</i> is configured or <i>associatedSSB</i> 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
}

MeasObjectNR-SL-r18 ::= SEQUENCE {
    sl-Frequency-r18 INTEGER (1..maxNrofFreqSL-r16),
    tx-PoolMeasToRemoveList-r18 Tx-PoolMeasList-r16 OPTIONAL, -- Need N
    tx-PoolMeasToAddModList-r18 Tx-PoolMeasList-r16 OPTIONAL -- Need N
}

Tx-PoolMeasList-r16 ::= SEQUENCE (SIZE (1..maxNrofSL-PoolToMeasureNR-r16)) OF SL-ResourcePoolID-r16

-- TAG-MEASOBJECTNR-SL-STOP
-- ASN1STOP
```


MeasObjectNR-SL field descriptions**sl-Frequency**

Indicates the sidelink frequency associated to this *MeasObjectNR-SL*. The value 1 corresponds to the frequency of first entry in *sl-FreqInfoList* broadcast in *SIB12*, the value 2 corresponds to the frequency of first entry in *sl-FreqInfoListSizeExt* broadcast in *SIB12*, the value 3 corresponds to the frequency of second entry in *sl-FreqInfoListSizeExt* broadcast in *SIB12* and so on.

– **MeasObjectRxTxDiff**

The IE *MeasObjectRxTxDiff* is used to configure the measurement object for UE Rx-Tx time difference measurement.

MeasObjectRxTxDiff information element

```
-- ASN1START
-- TAG-MEASOBJECTRXTXDIF-START

MeasObjectRxTxDiff-r17 ::= SEQUENCE {
  dl-Ref-r17 CHOICE {
    prs-Ref-r17 NULL,
    csi-RS-Ref-r17 NULL,
    ...
  } OPTIONAL, -- Need R
  ...
}

-- TAG-MEASOBJECTRXTXDIF-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 *pdcc-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 ::=
  measObjectId
  measObject
    measObjectNR
    . . .
    measObjectEUTRA
    measObjectUTRA-FDD-r16
    measObjectNR-SL-r16
    measObjectCLI-r16
    measObjectRxTxDiff-r17
    measObjectRelay-r17
    measObjectNR-SL-r18
  }
}

-- TAG-MEASOBJECTTOADDMODLIST-STOP
-- ASN1STOP

```

```

SEQUENCE {
  MeasObjectId,
  CHOICE {
    MeasObjectNR,
    MeasObjectEUTRA,
    MeasObjectUTRA-FDD-r16,
    MeasObjectNR-SL-r16,
    MeasObjectCLI-r16,
    MeasObjectRxTxDiff-r17,
    SL-MeasObject-r16,
    MeasObjectNR-SL-r18
  }
}

```

– *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 ::=
  carrierFreq-r16
  utra-FDD-Q-OffsetRange-r16
  cellsToRemoveList-r16
  cellsToAddModList-r16
  . . .
}

CellsToAddModListUTRA-FDD-r16 ::=
  SEQUENCE (SIZE (1..maxCellMeasUTRA-FDD-r16)) OF CellsToAddModUTRA-FDD-r16

CellsToAddModUTRA-FDD-r16 ::=
  SEQUENCE {
    cellIndexUTRA-FDD-r16
    physCellId-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
    }
-- 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 MeasResultServingMOList,
        measResultNeighCells   CHOICE {
            measResultListNR      MeasResultListNR,
            ...,
            measResultListEUTRA    MeasResultListEUTRA,
            measResultListUTRA-FDD-r16 MeasResultListUTRA-FDD-r16,
            sl-MeasResultsCandRelay-r17 OCTET STRING -- Contains PC5 SL-MeasResultListRelay-r17
        }
        ...,
        [
            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
  ]],
  [[
altitudeUE-r18                Altitude-r18                       OPTIONAL
  ]]
}

MeasResultServMOList ::= SEQUENCE (SIZE (1..maxNrofServingCells)) OF MeasResultServMO

MeasResultServMO ::= SEQUENCE {
  servCellId          ServCellIndex,
  measResultServingCell MeasResultNR,
  measResultBestNeighCell MeasResultNR
  ...
}

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
    }
  },
  ...
  [[
  cgi-Info            CGI-InfoNR          OPTIONAL
  ]],
  [[
  choCandidate-r17    ENUMERATED {true}    OPTIONAL,

```

```

    choConfig-r17
    triggeredEvent-r17
        timeBetweenEvents-r17
        firstTriggeredEvent-r17
    }
}

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

MeasResultEUTRA ::= SEQUENCE {
    eutra-PhysCellId
    measResult
    cgi-Info
    ...
}

MultiBandInfoListEUTRA ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicatorEUTRA

MeasQuantityResults ::= SEQUENCE {
    rsrp
    rsrq
    sinr
}

MeasQuantityResultsEUTRA ::= SEQUENCE {
    rsrp
    rsrq
    sinr
}

ResultsPerSSB-IndexList ::= SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerSSB-Index

ResultsPerSSB-Index ::= SEQUENCE {
    ssb-Index
    ssb-Results
}

ResultsPerCSI-RS-IndexList ::= SEQUENCE (SIZE (1..maxNrofIndexesToReport2)) OF ResultsPerCSI-RS-Index

ResultsPerCSI-RS-Index ::= SEQUENCE {
    csi-RS-Index
    csi-RS-Results
}

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
    measResult-r16
}

```

```

        ultra-FDD-RSCP-r16          INTEGER (-5..91)          OPTIONAL,
        ultra-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
<p>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.</p>
MeasResultNR field descriptions
<p>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.</p>
<p>cellResults Cell level measurement results.</p>
<p>choCandidate This field indicates whether the associated cell is a candidate target cell for conditional handover or conditional PSCell change or addition. This field may be included only in the <i>SuccessHO-Report</i> or <i>SuccessPSCell-Report</i> within <i>UEInformationResponse</i> message.</p>
<p>choConfig If the associated cell is a candidate target cell for conditional handover, this field indicates the conditional handover execution condition for each <i>measId</i> within <i>condTriggerConfig</i> associated to the cell. This field may be included only in the <i>rfl-report</i> within <i>UEInformationResponse</i> message.</p>
<p>drb-Id Indicates DRB value for which uplink PDCP delay ratio or value is provided, according to TS 38.314 [53].</p>
<p>firstTriggeredEvent This field is set to <i>condFirstEvent</i> if the execution condition associated to the first entry of <i>choConfig</i> was fulfilled first in time. This field is set to <i>condSecondEvent</i> if the execution condition associated to the second entry of <i>choConfig</i> was fulfilled first in time. This field may be included in <i>rfl-report</i> within <i>UEInformationResponse</i> message or in <i>SCGFailureInformation</i> message.</p>
<p>locationInfo Positioning related information and measurements.</p>
<p>physCellId The physical cell identity of the NR cell for which the reporting is being performed.</p>
<p>resultsSSB-Cell Cell level measurement results based on SS/PBCH related measurements.</p>
<p>resultsSSB-Indexes Beam level measurement results based on SS/PBCH related measurements.</p>
<p>resultsCSI-RS-Cell Cell level measurement results based on CSI-RS related measurements.</p>
<p>resultsCSI-RS-Indexes Beam level measurement results based on CSI-RS related measurements.</p>
<p>rsIndexResults Beam level measurement results.</p>
<p>timeBetweenEvents Indicates the time elapsed between fulfilling the conditional execution conditions included in <i>choConfig</i>. Value in milliseconds. The maximum value 1023 means 1023ms or longer. This field may be included in the reports associated to <i>UEInformationResponse</i> message, e.g., <i>rfl-Report</i> or in the <i>SCGFailureInformation</i> message.</p>

<i>MeasResult</i> UTRA-FDD field descriptions
<i>physCellId</i> The physical cell identity of the UTRA-FDD cell for which the reporting is being performed.
<i>utra-FDD-EcN0</i> According to CPICH_Ec/No in TS 25.133 [46] for FDD.
<i>utra-FDD-RSCP</i> According to CPICH_RSCP in TS 25.133 [46] for FDD.

MeasResults field descriptions
<p>coarseLocationInfo This field indicates the coarse location information reported by the UE. This field is coded as the <i>Ellipsoid-Point</i> defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of <i>degreesLatitude</i> and <i>degreesLongitude</i> 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</p>
<p>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.</p>
<p>measId Identifies the measurement identity for which the reporting is being performed.</p>
<p>measQuantityResults The value <i>sinr</i> is not included when it is used for <i>LogMeasReport-r16</i>.</p>
<p>measResultCellListSFTD-NR SFTD measurement results between the PCell and the NR neighbour cell(s) in NR standalone.</p>
<p>measResultCLI CLI measurement results.</p>
<p>measResultEUTRA Measured results of an E-UTRA cell.</p>
<p>measResultForRSSI Includes measured RSSI result in dBm (see TS 38.215 [9]) and <i>channelOccupancy</i> which is the percentage of samples when the RSSI was above the configured <i>channelOccupancyThreshold</i> for the associated <i>reportConfig</i>.</p>
<p>measResultListEUTRA List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.</p>
<p>measResultListNR List of measured results for the maximum number of reported best cells for an NR measurement identity.</p>
<p>measResultListUTRA-FDD List of measured results for the maximum number of reported best cells for a UTRA-FDD measurement identity.</p>
<p>measResultNR Measured results of an NR cell.</p>
<p>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.</p>
<p>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.</p>
<p>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 <i>MeasurementReport</i> message is triggered by a measurement configured by the field <i>sl-ConfigDedicatedForNR</i> received within an E-UTRA <i>RRCCONNECTIONRECONFIGURATION</i> message (i.e. CBR measurements), this field is not applicable and its contents is ignored by the network.</p>
<p>measResultSFTD-EUTRA SFTD measurement results between the PCell and the E-UTRA PScell in NE-DC.</p>
<p>measResultSFTD-NR SFTD measurement results between the PCell and the NR PScell in NR-DC.</p>

<i>MeasResults</i> field descriptions
<p><i>coarseLocationInfo</i> This field indicates the coarse location information reported by the UE. This field is coded as the <i>Ellipsoid-Point</i> defined in TS 37.355 [49]. The first/leftmost bit of the first octet contains the most significant bit. The least significant bits of <i>degreesLatitude</i> and <i>degreesLongitude</i> 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</p>
<p><i>excessDelay</i> 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.</p>
<p><i>measResultsSL</i> CBR measurements results for NR sidelink communication/discovery.</p>
<p><i>measResultUTRA-FDD</i> Measured result of a UTRA-FDD cell.</p>
<p><i>sl-MeasResultsCandRelay</i> Measurement result(s) of candidate L2 U2N relay UE(s).</p>
<p><i>sl-MeasResultServingRelay</i> Measurement result of serving L2 U2N relay UE.</p>

– *MeasResult2EUTRA*

The IE *MeasResult2EUTRA* contains measurements on E-UTRA frequencies.

***MeasResult2EUTRA* information element**

```
-- ASN1START
-- TAG-MEASRESULT2EUTRA-START

MeasResult2EUTRA ::= SEQUENCE {
    carrierFreq                ARFCN-ValueEUTRA,
    measResultServingCell      MeasResultEUTRA,
    measResultBestNeighCell    MeasResultEUTRA,
    ...
}

-- TAG-MEASRESULT2EUTRA-STOP
-- ASN1STOP
```

– *MeasResult2NR*

The IE *MeasResult2NR* contains measurements on NR frequencies.

***MeasResult2NR* information element**

```
-- ASN1START
-- TAG-MEASRESULT2NR-START
```

```

MeasResult2NR ::=
  ssbFrequency                SEQUENCE {
    ARFCN-ValueNR              OPTIONAL,
    refFreqCSI-RS              OPTIONAL,
    measResultServingCell      OPTIONAL,
    measResultNeighCellListNR  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

```

<i>MeasResultIdleEUTRA field descriptions</i>
carrierFreqEUTRA Indicates the E-UTRA carrier frequency.
utra-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
    },
    ...,
    [[
    validityStatus-r18          ENUMERATED {checked, spare3, spare2, spare1}  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,
  }
}
-- TAG-MEASRESULTIDLENR-STOP
-- ASN1STOP

```

OPTIONAL,
OPTIONAL
OPTIONAL

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).
validityStatus	Indicates whether UE has checked the validity of measurement results as defined in TS 38.133 [14].

– **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

```

<i>MeasResultsSL</i> field descriptions

<i>measResultNR-SL</i>

Include the measured results for NR sidelink communication/discovery.

<i>MeasResultNR-SL</i> field descriptions

<i>measResultListCBR-NR</i>

CBR measurement results for NR sidelink communication/discovery.
--

<i>sl-poolReportIdentity</i>

The identity of the transmission resource pool which is corresponding to the <i>sl-ResourcePoolID</i> configured in a resource pool for NR sidelink communication/discovery.
--

– *MeasSequence*

The IE *MeasSequence* is used to configure a recommended sequence for intra/inter-RAT intra/inter-frequency measurement.

MeasSequence information element

```

-- ASN1START
-- TAG-MEASSEQUENCE-START

MeasSequence-r18 ::= INTEGER (1..maxMeasSequence-r18)

-- TAG-MEASSEQUENCE-STOP
-- ASN1STOP

```

– *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

```

– *MeasWindowConfig*

The IE *MeasWindowConfig* specifies the effective measurement window configuration for inter-RAT E-UTRA measurement.

***MeasWindowConfig* information element**

```

-- ASN1START
-- TAG-MEASWINDOWCONFIG-START

MeasWindowConfig-r18 ::= SEQUENCE {
    windowOffsetPeriodicity CHOICE {
        periodicityMs40    INTEGER (0..39),
        periodicityMs80    INTEGER (0..79),
        ...
    },
    windowDuration          ENUMERATED {ms2, ms5, ms5dot5, spare1},
    ...
}

-- TAG-MEASWINDOWCONFIG-STOP
-- ASN1STOP

```

***MeasWindowConfig* field descriptions**

windowDuration

Value *windowDuration* is the measurement window length in ms of effective measurement window. Value *ms2* corresponds to 2 ms, value *ms5* corresponds to 5 ms, and Value *ms5dot5* corresponds to 5.5 ms.

windowOffsetPeriodicity

Indicates the periodicity and offset of effective measurement window. The choice determines the periodicity (periodicityMs40 for 40ms and periodicityMs80 for 80 ms). The field value indicates the offset in ms.

– *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
<i>InitialBWPConfig</i>	The field is mandatory present when <i>MsgA-ConfigCommon</i> is configured for the initial uplink BWP, or when <i>MsgA-ConfigCommon</i> is configured for a non-initial uplink BWP and <i>MsgA-ConfigCommon</i> 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 (<i>physCellID</i>).
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 (e)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]).

<i>MsgA-PUSCH-Resource</i> field descriptions
<i>guardBandMsgA-PUSCH</i> 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.
<i>guardPeriodMsgA-PUSCH</i> Guard period between PUSCH occasions in the unit of symbols (see TS 38.213 [13], clause 8.1A).
<i>frequencyStartMsgA-PUSCH</i> Offset of lowest PUSCH occasion in frequency domain with respect to PRB 0 (see TS 38.213 [13], clause 8.1A).
<i>interlaceIndexFirstPO-MsgA-PUSCH</i> 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).
<i>mappingTypeMsgA-PUSCH</i> PUSCH mapping type A or B. If the field is absent, the UE shall use the parameter <i>msgA-PUSCH-TimeDomainAllocation</i> (see TS 38.213 [13], clause 8.1A).
<i>msgA-Alpha</i> Dedicated alpha value for MsgA PUSCH. If the field is absent, the UE shall use the value of <i>msg3-Alpha</i> if configured, else UE applies value 1 (see TS 38.213 [13], clause 7.1.1).
<i>msgA-DMRS-Config</i> DMRS configuration for msgA PUSCH (see TS 38.213 [13], clause 8.1A and TS 38.214 [19] clause 6.2.2).
<i>msgA-HoppingBits</i> 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].
<i>msgA-IntraSlotFrequencyHopping</i> Intra-slot frequency hopping per PUSCH occasion (see TS 38.213 [13], clause 8.1A).
<i>msgA-MCS</i> 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].
<i>msgA-PUSCH-TimeDomainAllocation</i> Indicates a combination of start symbol and length and PUSCH mapping type from the TDRA table (<i>PUSCH-TimeDomainResourceAllocationList</i> if provided in <i>PUSCH-ConfigCommon</i> , or else the default Table 6.1.2.1.1-2 in 38.214 [19] is used if <i>pusch-TimeDomainAllocationList</i> is not provided in <i>PUSCH-ConfigCommon</i>). The parameter K2 in the table is not used for msgA PUSCH. The network configures one of <i>msgA-PUSCH-TimeDomainAllocation</i> and <i>startSymbolAndLengthMsgA-PO</i> , but not both. If the field is absent, the UE shall use the value of <i>startSymbolAndLengthMsgA-PO</i> .
<i>msgA-PUSCH-TimeDomainOffset</i> 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.
<i>nrofDMRS-Sequences</i> 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 <i>len2</i>) or 4 (for <i>len1</i>), then only DMRS port is configured.
<i>nrofInterlacesPerMsgA-PO</i> 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).
<i>nrofMsgA-PO-FDM</i> The number of msgA PUSCH occasions FDMed in one time instance (see TS 38.213 [13], clause 8.1A).
<i>nrofMsgA-PO-PerSlot</i> 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).
<i>nrofPRBs-PerMsgA-PO</i> Number of PRBs per PUSCH occasion (see TS 38.213 [13], clause 8.1A). An eRedcap UE ignores the PRACH and PUSCH resource parameters (for preambles group A and B, or only group B as specified in TS 38.321 [3]) for transmission of MsgA in 2-step random access type procedure if configured number of PRBs per corresponding PUSCH resources is larger than the maximum number of PRBs that can be scheduled per slot or per hop.

<i>nrofSlotsMsgA-PUSCH</i> 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).
<i>startSymbolAndLengthMsgA-PO</i> 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 <i>msgA-PUSCH-TimeDomainAllocation</i> (see TS 38.213 [13], clause 8.1A). The network configures one of <i>msgA-PUSCH-TimeDomainAllocation</i> and <i>startSymbolAndLengthMsgA-PO</i> , but not both. If the field is absent, the UE shall use the value of <i>msgA-PUSCH-TimeDomainAllocation</i> .

<i>MsgA-DMRS-Config</i> field descriptions
<i>msgA-DMRS-AdditionalPosition</i> Indicates the position for additional DM-RS. If the field is absent, the UE applies value <i>pos2</i> .
<i>msgA-MaxLength</i> indicates single-symbol or double-symbol DMRS. If the field is absent, the UE applies value <i>len1</i> .
<i>msgA-PUSCH-DMRS-CDM-Group</i> 1-bit indication of indices of CDM group(s). If the field is absent, then both CDM groups are used.
<i>msgA-PUSCH-NrofPorts</i> 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).
<i>msgA-ScramblingID0</i> UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (<i>physCellID</i>).
<i>msgA-ScramblingID1</i> UL DMRS scrambling initialization for CP-OFDM. If the field is absent the UE applies the value Physical cell ID (<i>physCellID</i>).

Conditional Presence	Explanation
<i>FreqHopConfigured</i>	This field is mandatory present when the field <i>msgA-IntraSlotFrequencyHopping</i> is configured. Otherwise, the field is absent.
<i>GroupBConfigured</i>	The field is mandatory present if <i>groupB-ConfiguredTwoStepRA</i> is configured in <i>RACH-ConfigCommonTwoStepRA</i> , otherwise the field is absent.
<i>InitialBWPConfig</i>	The field is mandatory present when <i>MsgA-ConfigCommon</i> is configured for the initial uplink BWP, or when <i>MsgA-ConfigCommon</i> is configured for a non-initial uplink BWP and <i>MsgA-ConfigCommon</i> 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          OPTIONAL, -- Cond OptULNotSIB2
    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        OPTIONAL  -- Need S
}

MultiFrequencyBandListNR-Aerial-SIB-r18 ::= SEQUENCE (SIZE (1.. maxNrofMultiBands)) OF NR-MultiBandInfoAerial-r18

NR-MultiBandInfoAerial-r18 ::= SEQUENCE {
    freqBandIndicatorNR-Aerial-r18  OPTIONAL, -- Cond OptULNotSIB2
    nr-NS-PmaxListAerial-r18        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.
freqBandIndicatorNR-Aerial	Provides an NR frequency band number for aerial UE(s), 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 <i>additionalPmax</i> and <i>additionalSpectrumEmission</i> values. If the field is absent the UE uses value 0 for the <i>additionalSpectrumEmission</i> (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 <i>nr-NS-PmaxList-v1760</i> is present, it shall contain the same number of entries, listed in the same order as in <i>nr-NS-PmaxList</i> (without suffix).
nr-NS-PmaxListAerial	Provides a list of <i>additionalPmax</i> and <i>additionalSpectrumEmission</i> values for aerial UE(s). If the field is absent, the value indicated by the corresponding field within <i>frequencyBandList</i> for the corresponding NR frequency band number applies, if present. Otherwise (i.e. the field is not present for the corresponding NR frequency band number in any of the <i>nr-NS-PmaxList</i> , <i>nr-NS-PmaxList-v1760</i> or <i>nr-NS-PmaxListAerial</i>), the UE uses value 0 for the <i>additionalSpectrumEmission</i> (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].

Conditional Presence	Explanation
<i>OptULNotSIB2</i>	The field is absent for <i>SIB2</i> and is mandatory present in <i>SIB4</i> and <i>frequencyInfoDL-SIB</i> . Otherwise, if the field is absent in <i>frequencyInfoUL-SIB</i> in <i>UplinkConfigCommonSIB</i> , the UE will use the frequency band indicated in <i>frequencyInfoDL-SIB</i> in <i>DownlinkConfigCommonSIB</i> .

– 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-GapPriorityToAddModListExt-v1800 SEQUENCE (SIZE (1..3)) OF GapPriority-r17 OPTIONAL, -- Need N
            musim-GapKeep-r18 ENUMERATED {true} OPTIONAL -- Need R
        ]
    }

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
<p>musim-AperiodicGap Indicates the MUSIM aperiodic gap as specified in TS 38.133 [14] clause 9.1.10. If UE indicates the <i>musim-Starting-SFN-AndSubframe</i> when requesting aperiodic gap the network can only configure the aperiodic gap with the same start point or no aperiodic gap. If the field <i>musim-Starting-SFN-AndSubframe</i> is absent for aperiodic gap, network can configure any timing as the starting point for aperiodic gap or configure no aperiodic gap.</p>
<p>musim-GapInfo Indicates the values for <i>musim-GapLength</i> and <i>musim-GapRepetitionAndOffset</i>. When network provides periodic gap, network always signals the <i>musim-GapLength</i> and <i>musim-GapRepetitionAndOffset</i> as indicated by the UE's preferred MUSIM gap configuration.</p>
<p>musim-GapKeep Indicates the UE is allowed to use "keep solution" for collided MUSIM periodic/aperiodic gaps. If "keep solution" is not granted, collisions between MUSIM periodic gaps are resolved based on the assigned MUSIM gap priorities as specified in TS 38.133[14].</p>
<p>musim-GapPriorityToAddModListExt Indicates the priority of MUSIM periodic gap(s). If the network includes <i>musim-GapPriorityToAddModList-r18</i>, it includes the same number of entries, and listed in the same order, as in <i>musim-GapToAddModList-r17</i>. For the priority of MUSIM aperiodic gap, the MUSIM aperiodic gap is always kept (not dropped) from UE perspective in case of collisions with other gaps (i.e. all gaps including MUSIM gaps, etc).</p>
<p>musim-GapToAddModList List of MUSIM periodic gap patterns to add or modify.</p>
<p>musim-GapToReleaseList List of MUSIM periodic gap patterns to release.</p>

– 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
<i>aperiodic</i>	This field is mandatory present in case of aperiodic MUSIM gap configuration. Otherwise it is absent.
<i>gapSetup</i>	The field is mandatory present upon configuration of a new MUSIM gap. The field is optionally present, Need M, otherwise.
<i>periodic</i>	This field is mandatory present in case of periodic MUSIM gap configuration. Otherwise it is absent.

– *N3C-IndirectPathConfigRelay*

The IE *N3C-IndirectPathConfigRelay* indicates the N3C indirect path related configuration used by N3C relay UE in MP.

***N3C-IndirectPathConfigRelay* information element**

```
-- ASN1START
-- TAG-N3C-INDIRECTPATHCONFIGRELAY-START

N3C-IndirectPathConfigRelay-r18 ::= SEQUENCE {
    n3c-MappingToReleaseList-r18 SEQUENCE (SIZE (1..maxLC-ID)) OF SL-RemoteUE-RB-Identity-r17 OPTIONAL, -- Need N
    n3c-MappingToAddModList-r18 SEQUENCE (SIZE (1..maxLC-ID)) OF N3C-MappingConfig-r18 OPTIONAL, -- Need N
    ...
}

N3C-MappingConfig-r18 ::= SEQUENCE {
    n3c-RemoteUE-RB-Identity-r18 SL-RemoteUE-RB-Identity-r17,
    n3c-RLC-ChannelUu-r18 Uu-RelayRLC-ChannelID-r17,
    ...
}

-- TAG-N3C-INDIRECTPATHCONFIGRELAY-STOP
-- ASN1STOP
```

***N3C-IndirectPathConfigRelay* field descriptions**

n3c-MappingToAddModList

Indicates the list of mappings between the bearer identity of the N3C remote UE and the Uu RLC channel to be added or modified. The Uu RLC channel is associated to only one N3C remote UE's end-to-end bearer.

n3c-MappingToReleaseList

Indicates the list of mappings between the bearer identity of the N3C remote UE and the Uu RLC channel to be released.

– *N3C-IndirectPathAddChange*

The IE *N3C-IndirectPathAddChange* indicates the N3C indirect path related configuration used by N3C remote UE.

***N3C-IndirectPathAddChange* information element**

```
-- ASN1START
-- TAG-N3C-INDIRECTPATHADDCHANGE-START
```

```

N3C-IndirectPathAddChange-r18 ::= SEQUENCE {
    n3c-RelayIdentification-r18      N3C-RelayUE-Info-r18,
    ...
}
-- TAG-N3C-INDIRECTPATHADDCHANGE-STOP
-- ASN1STOP

```

<i>N3C-IndirectPathAddChange</i> field descriptions
<p><i>n3c-RelayIdentification</i> Indicates the NCGI and C-RNTI of N3C relay UE.</p>

– *N3C-RelayUE-Info*

The IE *N3C-RelayUE-Info* includes the information of N3C relay UE.

***N3C-RelayUE-Info* information element**

```

-- ASN1START
-- TAG-N3CRELAYUEINFO-START

N3C-RelayUE-Info-r18 ::= SEQUENCE {
    n3c-CellGlobalId-r18      SEQUENCE {
        n3c-PLMN-Id-r18      PLMN-Identity,
        n3c-CellIdentity-r18 CellIdentity
    },
    n3c-C-RNTI-r18           RNTI-Value
}

-- TAG-N3CRELAYUEINFO-STOP
-- ASN1STOP

```

– *NCR-AperiodicFwdConfig*

The IE *NCR-AperiodicFwdConfig* is used to configure a list of aperiodic forwarding time resources for NCR-Fwd access link (see TS 38.212 [17], clause 7.3.1.3.9 and TS 38.213 [13], clause 20).

***NCR-AperiodicFwdConfig* information element**

```

-- ASN1START
-- TAG-NCR-APERIODICFWDCONFIG-START

NCR-AperiodicFwdConfig-r18 ::= SEQUENCE {
    aperiodicFwdTimeRsrcToAddModList-r18 SEQUENCE (SIZE (1..maxNrofAperiodicFwdTimeResource-r18)) OF NCR-AperiodicFwdTimeResource-r18
}

```

```

aperiodicFwdTimeRsrcToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofAperiodicFwdTimeResource-r18)) OF NCR-AperiodicFwdTimeResourceId-r18
OPTIONAL, -- Need N
referenceSCS-r18 SubcarrierSpacing OPTIONAL, -- Need M
aperiodicBeamFieldWidth-r18 INTEGER (1..6) OPTIONAL, -- Need M
numberOfFields-r18 INTEGER (1..32) OPTIONAL, -- Need M
...
}
NCR-AperiodicFwdTimeResource-r18 ::= SEQUENCE {
aperiodicFwdTimeRsrcId-r18 NCR-AperiodicFwdTimeResourceId-r18,
slotOffsetAperiodic-r18 INTEGER (0..14),
symbolOffset-r18 INTEGER (0..maxNrofSymbols-1),
durationInSymbols-r18 INTEGER (1..28),
...
}
NCR-AperiodicFwdTimeResourceId-r18 ::= INTEGER (0..maxNrofAperiodicFwdTimeResource-1-r18)
-- TAG-NCR-APERIODICFWDCONFIG-STOP
-- ASN1STOP

```

<i>NCR-AperiodicFwdConfig</i> field descriptions	
<i>aperiodicBeamFieldWidth</i>	Indicates the bitwidth of each beam index field in DCI carrying aperiodic beam indication.
<i>aperiodicFwdTimeRsrcToAddModList</i>	List of aperiodic forwarding time resources to be added or modified.
<i>durationInSymbols</i>	Indicates the time duration in number of symbols.
<i>numberOfFields</i>	Indicates the number of time resource fields in DCI carrying aperiodic beam indication.
<i>referenceSCS</i>	Indicates the reference subcarrier spacing for all the time resources in the list. Only values <i>kHz15</i> , <i>kHz30</i> , <i>kHz60</i> , <i>kHz120</i> and <i>kHz240</i> are applicable.
<i>slotOffsetAperiodic</i>	Indicates the slot offset used to define the start slot of aperiodic time resource.
<i>symbolOffset</i>	Indicates the symbol offset in one slot.

– *NCR-FwdConfig*

The IE *NCR-FwdConfig* contains configuration related to periodic, aperiodic and semi-persistent beam indication for NCR-Fwd access link.

***NCR-FwdConfig* information element**

```

-- ASN1START
-- TAG-NCR-FWDCONFIG-START

```

```

NCR-FwdConfig-r18 ::= SEQUENCE {
    periodicFwdRsrcSetToAddModList-r18 SEQUENCE (SIZE (1..maxNrofPeriodicFwdResourceSet-r18)) OF NCR-PeriodicFwdResourceSet-r18
    periodicFwdRsrcSetToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofPeriodicFwdResourceSet-r18)) OF NCR-PeriodicFwdResourceSetId-r18
    aperiodicFwdConfig-r18 SetupRelease {NCR-AperiodicFwdConfig-r18}
    semiPersistentFwdRsrcSetToAddModList-r18 SEQUENCE (SIZE (1..maxNrofSemiPersistentFwdResourceSet-r18)) OF NCR-SemiPersistentFwdResourceSet-r18
    semiPersistentFwdRsrcSetToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSemiPersistentFwdResourceSet-r18)) OF NCR-SemiPersistentFwdResourceSetId-r18
    ...
}
-- TAG-NCR-FWDCONFIG-STOP
-- ASN1STOP

```

NCR-FwdConfig field descriptions

aperiodicFwdConfig

Aperiodic time resource configuration for beam indication for NCR. The configuration includes a list of time domain resources that can be selected for aperiodic forwarding.

periodicFwdRsrcSetToAddModList

List of periodic forwarding resource configurations to be added or modified.

periodicFwdRsrcSetToReleaseList

List of periodic forwarding resource configurations to be released.

semiPersistentFwdRsrcSetToAddModList

List of semi-persistent forwarding resource configurations to be added or modified.

– *NCR-PeriodicityAndOffset*

The IE *NCR-PeriodicityAndOffset* is used to indicate the periodicity (in slot or ms) and offset (in slot) for periodic forwarding resource and semi-persistent forwarding resource.

NCR-PeriodicityAndOffset information element

```

-- ASN1START
-- TAG-NCR-PERIODICITYANDOFFSET-START
NCR-PeriodicityAndOffset-r18 ::= CHOICE {
    slot NCR-SlotPeriodicityAndSlotOffset-r18,
    ms NCR-MsPeriodicityAndSlotOffset-r18
}
NCR-SlotPeriodicityAndSlotOffset-r18 ::= CHOICE {
    s11 NULL,
    s12 INTEGER(0..1),
    s14 INTEGER(0..3),
    s15 INTEGER(0..4),
    s18 INTEGER(0..7),
    s110 INTEGER(0..9),
    s116 INTEGER(0..15),

```

```
s120      INTEGER(0..19),
s132      INTEGER(0..31),
s140      INTEGER(0..39),
s164      INTEGER(0..63),
s180      INTEGER(0..79),
s1128     INTEGER(0..127),
s1160     INTEGER(0..159),
s1256     INTEGER(0..255),
s1320     INTEGER(0..319),
s1512     INTEGER(0..511),
s1640     INTEGER(0..639),
s11024    INTEGER(0..1023),
s11280    INTEGER(0..1279),
s12560    INTEGER(0..2559),
s15120    INTEGER(0..5119),
s110240   INTEGER(0..10239),
...
}

NCR-MsPeriodicityAndSlotOffset-r18 ::= CHOICE {
ms1      INTEGER(0..15),
ms2      INTEGER(0..31),
ms4      INTEGER(0..63),
ms5      INTEGER(0..79),
ms8      INTEGER(0..127),
ms10     INTEGER(0..159),
ms16     INTEGER(0..255),
ms20     INTEGER(0..319),
ms32     INTEGER(0..511),
ms40     INTEGER(0..639),
ms64     INTEGER(0..1023),
ms80     INTEGER(0..1279),
ms128    INTEGER(0..2047),
ms160    INTEGER(0..2559),
ms256    INTEGER(0..4095),
ms320    INTEGER(0..5119),
ms512    INTEGER(0..8191),
ms640    INTEGER(0..10239),
ms1024   INTEGER(0..16383),
ms1280   INTEGER(0..20479),
ms2560   INTEGER(0..40959),
ms5120   INTEGER(0..81919),
ms10240  INTEGER(0..163839),
...
}

-- TAG-NCR-PERIODICITYANDOFFSET-STOP
-- ASN1STOP
```

– *NCR-PeriodicFwdResourceSet*

The IE *NCR-PeriodicFwdResourceSet* is used to configure a list of periodic forwarding resources for NCR-Fwd access link (see TS 38.213 [13], clause 20). Each periodic forwarding configuration includes a list of periodic forwarding resources, a common periodicity and a common reference SCS.

***NCR-PeriodicFwdResourceSet* information element**

```
-- ASN1START
-- TAG-NCR-PERIODICFWDRESOURCESET-START

NCR-PeriodicFwdResourceSet-r18 ::= SEQUENCE {
    periodicFwdRsrcSetId-r18          NCR-PeriodicFwdResourceSetId-r18,
    periodicFwdRsrcToAddModList-r18  SEQUENCE (SIZE (1..maxNrofPeriodicFwdResource-r18)) OF NCR-PeriodicFwdResource-r18
                                     OPTIONAL, -- Need N
    periodicFwdRsrcToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofPeriodicFwdResource-r18)) OF NCR-PeriodicFwdResourceId-r18
                                     OPTIONAL, -- Need N
    referenceSCS-r18                 SubcarrierSpacing
                                     OPTIONAL, -- Need M
    priorityFlag-r18                 ENUMERATED {true}
                                     OPTIONAL, -- Need R
    ...
}

NCR-PeriodicFwdResource-r18 ::= SEQUENCE {
    periodicFwdRsrcId-r18             NCR-PeriodicFwdResourceId-r18,
    beamIndex-r18                    INTEGER (0..63),
    periodicTimeRsrc-r18              SEQUENCE {
        periodicityAndOffset-r18     NCR-PeriodicityAndOffset-r18,
        symbolOffset-r18             INTEGER (0..maxNrofSymbols-1),
        durationInSymbols-r18        INTEGER (1..112)
    },
    ...
}

NCR-PeriodicFwdResourceId-r18 ::= INTEGER (0..maxNrofPeriodicFwdResource-1-r18)

-- TAG-NCR-PERIODICFWDRESOURCESET-STOP
-- ASN1STOP
```


<i>NCR-PeriodicFwdResourceSet</i> field descriptions	
<i>beamIndex</i>	Indicates the logical beam index for NCR-Fwd access link. NCR-Fwd is assumed to be ON over the indicated time domain resource if there is beam indication.
<i>durationInSymbols</i>	Indicates the time duration in number of symbols.
<i>periodicFwdRsrcToAddModList</i>	List of periodic forwarding resources to be added or modified.
<i>periodicityAndOffset</i>	Indicates the periodicity and slot offset for the periodic forwarding resource. All the periodic forwarding resources configured within the same resource set should have the same periodicity. If the periodicity is expressed in [ms], the value range of slot offset is from 0 to Periodicity[ms] * referenceSCS[kHz]/15 -1.
<i>priorityFlag</i>	Indicates the priority for the list of periodic forwarding resources, as specified in TS 38.213 [13], clause 20.
<i>referenceSCS</i>	Indicates the reference subcarrier spacing for all the time resources in the list. Only values <i>kHz15</i> , <i>kHz30</i> , <i>kHz60</i> , <i>kHz120</i> and <i>kHz240</i> are applicable.
<i>symbolOffset</i>	Indicates the symbol offset in one slot.

– ***NCR-PeriodicFwdResourceSetId***

The IE *NCR-PeriodicFwdResourceSetId* is used to identify one *NCR-PeriodicFwdResourceSet*.

***NCR-PeriodicFwdResourceSetId* information element**

```
-- ASN1START
-- TAG-NCR-PERIODICFWDRESOURCESETID-START

NCR-PeriodicFwdResourceSetId-r18 ::= INTEGER (0..maxNrofPeriodicFwdResourceSet-1-r18)

-- TAG-NCR-PERIODICFWDRESOURCESETID-STOP
-- ASN1STOP
```

– ***NCR-SemiPersistentFwdResourceSet***

The IE *NCR-SemiPersistentFwdResourceSet* is used to configure a list of semi-persistent forwarding resources for NCR-Fwd access link (see TS 38.213 [13], clause 20). Each semi-persistent forwarding resource configuration includes a list of semi-persistent forwarding resources, a common periodicity and a common reference SCS.

***NCR-SemiPersistentFwdResourceSet* information element**

```
-- ASN1START
-- TAG-NCR-SEMIPERSISTENTFWDRESOURCESET-START

NCR-SemiPersistentFwdResourceSet-r18 ::= SEQUENCE {
    semiPersistentFwdRsrcSetId-r18          NCR-SemiPersistentFwdResourceSetId-r18,
    semiPersistentFwdRsrcToAddModList-r18  SEQUENCE (SIZE (1..maxNrofSemiPersistentFwdResource-r18)) OF
```

```

        NCR-SemiPersistentFwdResource-r18
semiPersistentFwdRsrcToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSemiPersistentFwdResource-r18)) OF
        NCR-SemiPersistentFwdResourceId-r18
referenceSCS-r18 SubcarrierSpacing
priorityFlag-r18 ENUMERATED {true}
...
}

NCR-SemiPersistentFwdResource-r18 ::= SEQUENCE {
    semiPersistentFwdRsrcId-r18 NCR-SemiPersistentFwdResourceId-r18,
    beamIndex-r18 INTEGER (0..63),
    semiPersistentTimeRsrc-r18 SEQUENCE {
        periodicityAndOffset-r18 NCR-PeriodicityAndOffset-r18,
        symbolOffset-r18 INTEGER (0..maxNrofSymbols-1),
        durationInSymbols-r18 INTEGER (1..112)
    },
    ...
}

NCR-SemiPersistentFwdResourceId-r18 ::= INTEGER (0..maxNrofSemiPersistentFwdResource-1-r18)

-- TAG-NCR-SEMI-PERSISTENT-FWD-RESOURCE-SET-STOP
-- ASN1STOP

```

NCR-SemiPersistentFwdResourceSet field descriptions	
beamIndex	Indicates logical beam index for NCR-Fwd access link. NCR-Fwd is assumed to be ON over the indicated time domain resource if there is beam indication.
durationInSymbols	Indicates the time duration in number of symbols.
periodicityAndOffset	Indicates the periodicity and slot offset for the semi-persistent forwarding resource. All the semi-persistent forwarding resources configured within the same resource set should have the same periodicity. If the periodicity is expressed in [ms], the value range of slot offset is from 0 to Periodicity[ms] * referenceSCS[kHz]/15 -1.
priorityFlag	Indicates the priority for the list of semi-persistent forwarding resources, as specified in TS 38.213 [13], clause 20.
referenceSCS	Indicates the reference subcarrier spacing for all the time resources in the list. Only values <i>kHz15</i> , <i>kHz30</i> , <i>kHz60</i> , <i>kHz120</i> and <i>kHz240</i> are applicable.
semiPersistentFwdRsrcToAddModList	List of semi-persistent forwarding resources to be added or modified.
symbolOffset	Indicates the symbol offset in one slot.

– **NCR-SemiPersistentFwdResourceSetId**

The IE *NCR-SemiPersistentFwdResourceSetId* is used to identify one *NCR-SemiPersistentFwdResourceSet*.

***NCR-SemiPersistentFwdResourceSetId* information element**

```

-- ASN1START
-- TAG-NCR-SEMIPERSISTENTFWDRESOURCESETID-START

NCR-SemiPersistentFwdResourceSetId-r18 ::= INTEGER (0..maxNrofSemiPersistentFwdResourceSet-1-r18)

-- TAG-NCR-SEMIPERSISTENTFWDRESOURCESETID-STOP
-- ASN1STOP

```

– ***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. This field shall be set to 'no-gap' for the serving cell(s) belonging to the corresponding band(s) where *bwpOperationMeasWithoutInterrupt-r18* is supported by the UE.

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, ncs, nogap-noncs}
}

-- 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-noncs* indicates neither a measurement gap nor a NCSG is needed. Value *nogap-noncs* 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, ncs, nogap-noncsg}
}

NeedForNCSG-NR-r17 ::= SEQUENCE {
    bandNR-r17                    FreqBandIndicatorNR,
    gapIndication-r17             ENUMERATED {gap, ncs, 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 *servCellMO* 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 *servCellMO* associated with NCD-SSB), no matter the SSB is within the configured BWP or not. This field shall be set to '*nogap-noncsg*' for the serving cell cell(s) belonging to the corresponding band(s) where *bwpOperationMeasWithoutInterrupt-r18* is supported by the UE. 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-noncs* indicates neither a measurement gap nor a NCSG is needed. Value *nogap-noncs* also indicates interruption is not needed.

– **NeedForInterruptionInfoNR**

The IE *NeedForInterruptionInfoNR* indicates whether interruption is needed for the UE to perform SSB based measurements on an NR target band without measurement gap while NR-DC or NE-DC is not configured.

NeedForInterruptionInfoNR information element

```
-- ASN1START
-- TAG-NeedForInterruptionInfoNR-START

NeedForInterruptionInfoNR-r18 ::= SEQUENCE {
    intraFreq-needForInterruption-r18    NeedForInterruptionIntraFreqList-r18,
    interFreq-needForInterruption-r18    NeedForInterruptionBandListNR-r18,
    ...
}

NeedForInterruptionIntraFreqList-r18 ::= SEQUENCE (SIZE (1.. maxNrofServingCells)) OF NeedForInterruptionNR-r18

NeedForInterruptionBandListNR-r18 ::= SEQUENCE (SIZE (1..maxBands)) OF NeedForInterruptionNR-r18

NeedForInterruptionNR-r18 ::= SEQUENCE {
    interruptionIndication-r18          ENUMERATED {no-gap-with-interruption, no-gap-no-interruption} OPTIONAL
}

-- TAG-NeedForInterruptionInfoNR-STOP
-- ASN1STOP
```

NeedForInterruptionInfoNR field descriptions**intraFreq-needForInterruption**

Indicates the interruption requirement information for NR intra-frequency measurement. Each entry in the list is associated to the entry in list *intraFreq-needForGap-r16* with the same index. This field shall be set to *no-gap-no-interruption* for the serving cell(s) belonging to the corresponding band(s) where *bwpOperationMeasWithoutInterrupt-r18* is supported by the UE.

interFreq-needForInterruption

Indicates the interruption requirement information for NR inter-frequency measurement. Each entry in the list is associated to the entry in list *interFreq-needForGap-r16* with the same index.

NeedForInterruptionNR field descriptions***interruptionIndication***

Indicates whether interruption is needed for the UE to perform SSB based measurements without measurement gap. Value *no-gap-with-interruption* indicates that interruption is needed. Value *no-gap-no-interruption* 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 an RedCap-specific initial BWP or a dedicated BWP that does not contain the CD-SSB.

***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, 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 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

```

<i>NPN-Identity</i> field descriptions
<p>cag-Identity A CAG-ID as specified in TS 23.003 [21]. The PLMN ID and a CAG ID in the <i>NPN-Identity</i> identifies a PNI-NPN.</p>
<p>cag-IdentityList The <i>cag-IdentityList</i> contains one or more CAG IDs. All CAG IDs associated to the same PLMN ID are listed in the same <i>cag-IdentityList</i> entry.</p>
<p>manualCAGselectionAllowed The <i>manualCAGselectionAllowed</i> indicates that the CAG ID can be selected manually even if it is outside the UE's allowed CAG list.</p>
<p>NID A NID as specified in TS 23.003 [21]. The PLMN ID and a NID in the <i>NPN-Identity</i> identifies a SNPN.</p>
<p>nid-List The <i>nid-List</i> contains one or more <i>NID</i>.</p>

– *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
    ]],
    [[
        mobileIAB-Support-r18    ENUMERATED {true}                          OPTIONAL      -- Need S
    ]]
}

-- TAG-NPN-IDENTITYINFOLIST-STOP
-- ASN1STOP

```

<i>NPN-IdentityInfoList</i> field descriptions
<p><i>iab-Support</i> 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. This field is absent if <i>mobileIAB-Cell</i> is broadcasted in the cell.</p>
<p><i>gNB-ID-Length</i> Indicates the length of the gNB ID out of the 36-bit long <i>cellIdentity</i>. This field is always present if the <i>mobileIAB-Support</i> is broadcasted in a cell.</p>
<p><i>mobileIAB-Support</i> This field indicates the support of mobile IAB and whether the cell can be considered as a candidate for cell (re)selection for mobile IAB-node. This field is absent if <i>mobileIAB-Cell</i> is broadcasted in the cell. If the field is absent, the cell is barred for mobile IAB-node.</p>
<p><i>NPN-IdentityInfo</i> The <i>NPN-IdentityInfo</i> 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 <i>NPN-IdentityInfo</i> element.</p>
<p><i>nnp-IdentityList</i> The <i>nnp-IdentityList</i> contains one or more NPN Identity elements.</p>
<p><i>trackingAreaCode</i> Indicates the Tracking Area Code to which the cell indicated by <i>cellIdentity</i> field belongs.</p>
<p><i>ranac</i> Indicates the RAN Area Code to which the cell indicated by <i>cellIdentity</i> field belongs.</p>
<p><i>cellReservedForOperatorUse</i> Indicates whether the cell is reserved for operator use (for the NPN(s) identified in the <i>nnp-IdentityList</i>) as defined in TS 38.304 [20]. This field is ignored by NPN capable IAB-MT and NPN capable NCR-MT.</p>

– *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, n1-v1800, 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-ResourceSymbolOffset-v1800 INTEGER (13) OPTIONAL -- Need R
    ]]
}

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. The UE does not expect to be configured for PDC with a PRS with *numSymbols* equals to n1 unless an SSB index is provided as a *typeC* or *typeC-plus-typeD* QCL source, or another PRS resource with *numSymbols* more than n1 is provided as QCL source.

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 *repetitionFactor* 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-DL-PRS-Resource field description***dl-PRS-ResourceSymbolOffset***

This field specifies the starting symbol of the *DL-PRS Resource* within a slot. If *dl-PRS-ResourceSymbolOffset-v1800* is present, the UE shall ignore *dl-PRS-ResourceSymbolOffset-r17*.

– ***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
    }

NR-NS-PmaxListAerial-r18 ::=
    SEQUENCE (SIZE (1..maxNR-NS-Pmax)) OF NR-NS-PmaxValueAerial-r18

NR-NS-PmaxValueAerial-r18 ::=
    SEQUENCE {
        additionalPmax-r18                P-Max                OPTIONAL,    -- Need N
        additionalSpectrumEmission-r18    AdditionalSpectrumEmission-r18
    }

-- 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
}

```

```
    ...
  }
TA-Info-r17 ::=
    ta-Common-r17          SEQUENCE {
                           INTEGER(0..66485757),
    ta-CommonDrift-r17    INTEGER(-257303..257303)
    ta-CommonDriftVariant-r17  INTEGER(0..28949)
    }
-- TAG-NTN-CONFIG-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need R
OPTIONAL  -- Need R
```

NTN-Config field descriptions
<p>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 <i>valueTag</i> in <i>SIB1</i>.</p>
<p>epochTime If this field is absent for the serving cell, the epoch time is the end of SI window where this <i>SIB19</i> is scheduled. This field is mandatory present when <i>ntn-Config</i> is provided in dedicated configuration. If this field is absent in <i>ntn-Config</i> provided via <i>NTN-NeighCellConfig</i> or <i>SatSwitchWithReSync</i> 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 <i>epochTime</i> should neither result in system information change notifications nor in a modification of <i>valueTag</i> in <i>SIB1</i>.</p>
<p>cellSpecificKoffset Scheduling offset used for the timing relationships that are modified for NTN (see TS 38.213 [13]). The unit of the field <i>K_offset</i> is number of slots for a given subcarrier spacing of 15 kHz. If the field is absent UE assumes value 0.</p>
<p>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. The unit of <i>kmac</i> is number of slots for a given subcarrier spacing of 15 kHz.</p>
<p>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.</p>
<p>ntn-PolarizationUL If present, this parameter indicates Polarization information for uplink service link. If not present and <i>ntn-PolarizationDL</i> is present, UE assumes the same polarization for UL and DL.</p>
<p>ntn-UISyncValidityDuration 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 <i>epochTime</i>) during which the UE can apply assistance information without having acquired new assistance information. The unit of <i>ntn-UISyncValidityDuration</i> is second. Value <i>s5</i> corresponds to 5 s, value <i>s10</i> indicate 10 s and so on. This parameter applies to both connected and idle mode UEs. If this field is absent in <i>ntn-Config</i> provided via <i>NTN-NeighCellConfig</i> or <i>SatSwitchWithReSync</i>, 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 <i>ntn-UISyncValidityDuration</i> should neither result in system information change notifications nor in a modification of <i>valueTag</i> in <i>SIB1</i>. <i>ntn-UISyncValidityDuration</i> is only updated when at least one of <i>epochTime</i>, <i>ta-Info</i>, <i>ephemerisInfo</i> is updated.</p>
<p>ta-Common Network-controlled common timing advanced value and it may include any timing offset considered necessary by the network. <i>ta-Common</i> with value of 0 is supported. The granularity of <i>ta-Common</i> 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 <i>ta-Common</i> should neither result in system information change notifications nor in a modification of <i>valueTag</i> in <i>SIB1</i>.</p>
<p>ta-CommonDrift Indicate drift rate of the common TA. The granularity of <i>ta-CommonDrift</i> 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 <i>ta-CommonDrift</i> should neither result in system information change notifications nor in a modification of <i>valueTag</i> in <i>SIB1</i>.</p>
<p>ta-CommonDriftVariant Indicate drift rate variation of the common TA. The granularity of <i>ta-CommonDriftVariant</i> is 0.2×10^{-4} μs/s². Values are given in unit of corresponding granularity. This field is excluded when determining changes in system information, i.e. changes of <i>ta-CommonDriftVariant</i> should neither result in system information change notifications nor in a modification of <i>valueTag</i> in <i>SIB1</i>.</p>
<p>ta-Report When this field is included in <i>SIB19</i>, 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 <i>ServingCellConfigCommon</i> 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).</p>

Conditional Presence	Explanation
<i>SIB19</i>	The field is mandatory present for the serving cell in <i>SIB19</i> . 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 ::=
  nzp-CSI-RS-ResourceId          SEQUENCE {
    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
    ...,
    [
      subcarrierSpacing-r18     SubcarrierSpacing                    OPTIONAL, -- Cond LTM
      absoluteFrequencyPointA-r18 ARFCN-ValueNR                  OPTIONAL, -- Cond LTM
      cyclicPrefix-r18          ENUMERATED {extended}                OPTIONAL, -- Cond LTM
    ]
  }

-- TAG-NZP-CSI-RS-RESOURCE-STOP
-- ASN1STOP

```

NZP-CSI-RS-Resource field descriptions	
periodicityAndOffset	Periodicity and slot offset <i>s1</i> corresponds to a periodicity of 1 slot, <i>s2</i> 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 <i>CSI-ResourceConfig</i>).
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). The UE shall ignore this field in case <i>NZP-CSI-RS-Resources</i> is received as part of an <i>LTM-Candidate</i> IE.
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 <i>TCI-State</i> in <i>TCI-States</i> 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 <i>TCI-State</i> or <i>dl-OrJoint-TCI-State</i> which has this value for <i>tcI-StateId</i> and is defined in <i>tcI-StatesToAddModList</i> or in <i>dl-OrJointTCI-StateList</i> in the <i>PDSCH-Config</i> included in the <i>BWP-Downlink</i> 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). In case <i>NZP-CSI-RS-Resources</i> is received as part of an <i>LTM-Candidate</i> IE, it refers to the TCI state identifier in <i>CandidateTCI-State</i> and is defined in <i>ltn-DL-OrJointTCI-StateToAddModList</i> within the <i>LTM-Candidate</i> IE.
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
<i>LTM</i>	The field is optionally present in an <i>LTM-Candidate</i> IE. Otherwise, the field is absent.
<i>Periodic</i>	The field is optionally present, Need M, for periodic <i>NZP-CSI-RS-Resources</i> (as indicated in <i>CSI-ResourceConfig</i>). The field is absent otherwise.
<i>PeriodicOrSemiPersistent</i>	The field is optionally present, Need M, for periodic and semi-persistent <i>NZP-CSI-RS-Resources</i> (as indicated in <i>CSI-ResourceConfig</i>). 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
  ]],
  [[
    resourceType-r18               ENUMERATED {periodic}                             OPTIONAL -- Cond LTM
  ]]
}

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
<p><i>aperiodicTriggeringOffset, aperiodicTriggeringOffset-r16, aperiodicTriggeringOffset-r17</i> 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 <i>aperiodicTriggeringOffset</i>, 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 <i>aperiodicTriggeringOffset-r16</i> and <i>aperiodicTriggeringOffset-r17</i>, the value indicates the number of slots. <i>aperiodicTriggeringOffset-r17</i> 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. This field is not present in case <i>NZP-CSI-RS-ResourcesSet</i> is received as part of an <i>LTM-Candidate</i> IE.</p>
<p><i>aperiodicTriggeringOffsetL2</i> 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. This field is not present in case <i>NZP-CSI-RS-ResourcesSet</i> is received as part of an <i>LTM-Candidate</i> IE.</p>
<p><i>cmrGroupingAndPairing</i> Configures CMR groups and pairs. The first <i>nrofResourcesGroup1</i> 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. <i>nrofResourcesGroup1</i> 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). This field is not present in case <i>NZP-CSI-RS-ResourcesSet</i> is received as part of an <i>LTM-Candidate</i> IE.</p>
<p><i>pair1OfNZP-CSI-RS, pair2OfNZP-CSI-RS</i> 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).</p>
<p><i>nzp-CSI-RS-Resources</i> 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. If the <i>NZP-CSI-RS-ResourceSet</i> is indicated in a <i>CSI-ResourceConfig</i> indicated by <i>resourcesForChannelMeasurement</i> in a <i>CSI-ReportConfig</i>, if the <i>codebookType</i> in the <i>codebookConfig</i> in the <i>CSI-ReportConfig</i> is <i>typell-Doppler-r18</i> or <i>typell-DopplerPortSelection-r18</i>, there are at most 1 periodic or semi-persistent NZP CSI-RS resource and 4, 8 or 12 aperiodic NZP CSI-RS resources and if the <i>codebookType</i> is <i>typell-CJT-r18</i> or <i>typell-CJT-PortSelection-r18</i>, there are 1, 2, 3, or 4 aperiodic, periodic or semi-persistent NZP-CSI-RS resources, see TS 38.214 5.2.1.4.</p>
<p><i>nzp-CSI-RS-ResourceId1, nzp-CSI-RS-ResourceId2</i> The <i>nzp-CSI-RS-ResourceId1-r17</i> represents the index of the NZP CSI-RS resource in Resource Group 1, and <i>nzp-CSI-RS-ResourceId2-r17</i> represents the index of the NZP CSI-RS resource in Resource Group 2.</p>
<p><i>pdcc-Info</i> Indicates that this NZP-CSI-RS-ResourceSet, if configured also with <i>trs-Info</i>, is used for propagation delay compensation. The field can be present only if <i>trs-info</i> is present. The field can be present in only one <i>NZP-CSI-RS-ResourceSet</i>. If network configures this field for an <i>NZP-CSI-RS-ResourceSet</i>, the UE measures the UE Rx-Tx time difference based on resources configured in this resource set. This field is not present in case <i>NZP-CSI-RS-ResourcesSet</i> is received as part of an <i>LTM-Candidate</i> IE.</p>
<p><i>repetition</i> Indicates whether repetition is on/off. If the field is set to <i>off</i> 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 <i>CSI-ReportConfig</i> with report of L1 RSRP, L1 SINR or "no report". This field is not present in case <i>NZP-CSI-RS-ResourcesSet</i> is received as part of an <i>LTM-Candidate</i> IE.</p>
<p><i>resourceType</i> Time domain behavior of resource configuration (see TS 38.214 [19], clause 5.2.1.2).</p>
<p><i>trs-Info</i> 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 <i>false</i> (see TS 38.214 [19], clause 5.2.2.3.1).</p>

Conditional Presence	Explanation
<i>LTM</i>	The field is optionally present, Need R, in an <i>LTM-Candidate</i> IE. Otherwise, the field is absent.

– *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]. In ATG cell, actual value of *P-Max* = 9 + field value [dBm].

***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
}

-- TAG-PATHLOSSREFERENCERS-STOP
-- ASN1STOP
    
```

OPTIONAL -- Cond RS-SSB

<i>PathlossReferenceRS</i> field descriptions
<p>additionalPCI Indicates the physical cell ID (PCI) of the SSB for the referenceSignal.</p>

Conditional Presence	Explanation
RS-SSB	The field is optionally present, Need R, if <i>ssb-Index</i> is configured for <i>referenceSignal</i> . 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 ::=
    start          SEQUENCE {
                   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 ::=
    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 *downlinkPreemption, 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
  pdccch-SkippingDurationList-r17 SEQUENCE(SIZE (1..3)) OF SCS-SpecificDuration-r17 OPTIONAL, -- Need R
  ]],
  [[
  pdccch-MonitoringResumptionAfterNack-r18 ENUMERATED {true} OPTIONAL, -- Need R
  searchSpacesToAddModListExt-v1800 SEQUENCE(SIZE (1..10)) OF SearchSpaceExt-v1800 OPTIONAL, -- Need N
  ]]
}

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
<p><i>controlResourceSetToAddModList, controlResourceSetToAddModListSizeExt</i> 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 <i>controlResourceSetToAddModList</i> and in <i>controlResourceSetToAddModListSizeExt</i> as a single list, i.e. an entry created using <i>controlResourceSetToAddModList</i> can be modified using <i>controlResourceSetToAddModListSizeExt</i> (or deleted using <i>controlResourceSetToReleaseListSizeExt</i>) and vice-versa. In case network reconfigures control resource set with the same <i>ControlResourceSetId</i> as used for <i>commonControlResourceSet</i> or <i>commonControlResourceSetExt</i> configured via <i>PDCCH-ConfigCommon</i> or via <i>SIB20</i>, the configuration from <i>PDCCH-Config</i> always takes precedence and should not be updated by the UE based on <i>servingCellConfigCommon</i> or based on <i>SIB20</i>.</p>
<p><i>controlResourceSetToReleaseList, controlResourceSetToReleaseListSizeExt</i> List of UE specifically configured Control Resource Sets (CORESETs) to be released by the UE. This field only applies to CORESETs configured by <i>controlResourceSetToAddModList</i> or <i>controlResourceSetToAddModListSizeExt</i> and does not release the field <i>commonControlResourceSet</i> configured by <i>PDCCH-ConfigCommon</i> and <i>commonControlResourceSetExt</i> configured by <i>SIB20</i>.</p>
<p><i>downlinkPreemption</i> Configuration of downlink preemption indications to be monitored in this cell (see TS 38.213 [13], clause 11.2).</p>
<p><i>monitoringCapabilityConfig</i> 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 <i>r15monitoringcapability</i> enables the Rel-15 monitoring capability, and value <i>r16monitoringcapability</i> enables the Rel-16 PDCCH monitoring capability. <i>r17monitoringcapability</i> enables the Rel-17 PDCCH multi-slot monitoring capability. For 480 and 960 kHz SCS, only value <i>r17monitoringcapability</i> is applicable.</p>
<p><i>pdccch-MonitoringResumptionAfterNack</i> This field is used to enable UE PDCCH monitoring resumption after PDCCH skipping has started, if the UE transmits a NACK due to incorrectly decoding a PDSCH scheduled by a DCI format received from the serving cell (see TS 38.213 [13], clause 10.4).</p>
<p><i>pdccch-SkippingDurationList</i> 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}.</p>
<p><i>searchSpacesToAddModList, searchSpacesToAddModListExt</i> 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 <i>searchSpacesToAddModListExt</i>, it includes the same number of entries, and listed in the same order, as in <i>searchSpacesToAddModList</i> in each of them.</p>
<p><i>searchSpaceSwitchConfig</i> 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 <i>searchSpaceSwitchConfig-r16</i> or <i>searchSpaceSwitchConfig-r17</i> for a UE.</p>
<p><i>tpc-PUCCH</i> Enable and configure reception of group TPC commands for PUCCH.</p>
<p><i>tpc-PUSCH</i> Enable and configure reception of group TPC commands for PUSCH.</p>
<p><i>tpc-SRS</i> Enable and configure reception of group TPC commands for SRS.</p>
<p><i>uplinkCancellation</i> Configuration of uplink cancellation indications to be monitored in this cell (see TS 38.213 [13], clause 11.2A).</p>

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)
            }
        ]],
        [[
            commonSearchSpaceListExt-r16      SEQUENCE (SIZE(1..4)) OF SearchSpaceExt-r16  OPTIONAL -- Need R
        ]],
    }
-- ASN1END
```

```

[[
sdt-SearchSpace-r17          CHOICE {
    newSearchSpace           SearchSpace,
    existingSearchSpace     SearchSpaceId
}
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 {
    sCS480KHZZoneEighthT    SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..35839),
    sCS480KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPO-perPF)) OF INTEGER (0..71679)
}
pei-ConfigBWP-r17          SEQUENCE {
    pei-SearchSpace-r17     SearchSpaceId,
    firstPDCCH-MonitoringOccasionOfPEI-O-r17 CHOICE {
        sCS15KHZZoneT          SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..139),
        sCS30KHZZoneT-SCS15KHZhalfT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..279),
        sCS60KHZZoneT-SCS30KHZhalfT-SCS15KHZquarterT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..559),
        sCS120KHZZoneT-SCS60KHZhalfT-SCS30KHZquarterT-SCS15KHZZoneEighthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..1119),
        sCS120KHZhalfT-SCS60KHZquarterT-SCS30KHZZoneEighthT-SCS15KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..2239),
        sCS480KHZZoneT-SCS120KHZquarterT-SCS60KHZZoneEighthT-SCS30KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..4479),
        sCS480KHZhalfT-SCS120KHZZoneEighthT-SCS60KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..8959),
        sCS480KHZquarterT-SCS120KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..17919),
        sCS480KHZZoneEighthT    SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..35839),
        sCS480KHZZoneSixteenthT SEQUENCE (SIZE (1..maxPEI-perPF-r17)) OF INTEGER (0..71679)
    }
}
}],
[[
followUnifiedTCI-State-v1720 ENUMERATED {enabled}          OPTIONAL -- Need R
]],
[[
applyIndicatedTCI-State-r18  ENUMERATED {first, second, both, none} OPTIONAL, -- Cond FollowUTCI
commonSearchSpaceListExt-r18 SEQUENCE (SIZE(1..4)) OF SearchSpaceExt-v1800 OPTIONAL, -- Need R
searchSpaceMulticastMCCH-r18 SearchSpaceId          OPTIONAL, -- Need R
searchSpaceMulticastMTCH-r18 SearchSpaceId          OPTIONAL -- Need S
]]
}

-- TAG-PDCCH-CONFIGCOMMON-STOP
-- ASN1STOP

```


PDCCH-ConfigCommon field descriptions
<p>applyIndicatedTCI-State This field indicates, for PDCCH reception in CORESET #0, if UE applies the first, the second, both or none of the "indicated" DL only TCI or joint TCI as specified in TS 38.213 [13], clause 10.1.</p>
<p>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 <i>ControlResourceSetId</i> other than 0 for this <i>ControlResourceSet</i>. The network configures the <i>commonControlResourceSet</i> in <i>SIB1</i> 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 <i>commonControlResourceSet</i> in the (e)RedCap-specific initial downlink BWP in <i>SIB1</i> for (e)RedCap such that it does not have to be contained in the bandwidth of CORESET#0.</p>
<p>commonSearchSpaceList, commonSearchSpaceListExt, commonSearchSpaceListExt2 A list of additional common search spaces. If the network configures this field, it uses the <i>SearchSpaceIds</i> 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 <i>SearchSpace</i> entries is considered to be newly created and the conditions and Need codes for setup of the entry apply. If the network includes <i>commonSearchSpaceListExt/commonSearchSpaceListExt2</i>, it includes the same number of entries, and listed in the same order, as in <i>commonSearchSpaceList</i>.</p>
<p>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 <i>MIB pdccch-ConfigSIB1</i>. Even though this field is only configured in the initial BWP (BWP#0) <i>controlResourceSetZero</i> 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.</p>
<p>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 <i>po-NumPerPEI</i> is smaller than N_s, UE applies the $(\text{floor}(i_s/\text{po-NumPerPEI})+1)$-th value out of $(N_s/\text{po-NumPerPEI})$ configured values in <i>firstPDCCH-MonitoringOccasionOfPEI-O</i> for the symbol-level offset. When <i>po-NumPerPEI</i> is one or multiple of N_s, UE applies the first configured value in <i>firstPDCCH-MonitoringOccasionOfPEI-O</i> for the symbol-level offset.</p>
<p>firstPDCCH-MonitoringOccasionOfPO Indicates the first PDCCH monitoring occasion of each PO of the PF on this BWP, see TS 38.304 [20]. The field <i>sCS120KHZquarterT-SCS60KHZZoneEighthT-SCS30KHZZoneSixteenthT</i>, <i>sCS120KHZZoneEighthT-SCS60KHZZoneSixteenthT</i> and <i>sCS120KHZZoneSixteenthT</i> can be applied for SCS 480kHz, corresponding to <i>sCS480KHZZoneT-SCS120KHZquarterT-SCS60KHZZoneEighthT-SCS30KHZZoneSixteenthT</i>, <i>sCS480KHZhalfT-SCS120KHZZoneEighthT-SCS60KHZZoneSixteenthT</i> and <i>sCS480KHZquarterT-SCS120KHZZoneSixteenthT</i> in IE <i>DownlinkConfigCommonSIB</i> respectively.</p>
<p>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.</p>
<p>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, an (e)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.</p>
<p>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 <i>initialDownlinkBWP-RedCap</i> not including CD-SSB and the entire CORESET#0, an (e)RedCap UE in RRC_IDLE or RRC_INACTIVE while SDT procedure is not ongoing monitors PEI in the <i>initialDownlinkBWP</i> that includes CORESET#0, if the <i>initialDownlinkBWP</i> is configured with <i>pei-ConfigBWP</i>.</p>
<p>pei-SearchSpace ID of dedicated search space for PEI. It can be configured to one of up to 4 common SS sets configured by <i>commonSearchSpaceList</i> with <i>SearchSpaceId</i> > 0. The CCE aggregation levels and maximum number of PDCCH candidates per CCE aggregation level follows Table 10.1-1 of TS38.213 [13]. <i>SearchSpaceId</i> = 0 can be configured for the case of SS/PBCH block and CORESET multiplexing pattern 2 or 3.</p>
<p>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.</p>

<i>sdt-SearchSpace</i> Common search space for CG-SDT and RA-SDT (see TS 38.213 [13]). If an <i>existingSearchSpace</i> is used, the network only signals the search space ID of the <i>ra-SearchSpace</i> .
<i>searchSpaceMCCH</i> 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.
<i>searchSpaceMTCH</i> ID of the search space for MTCH of MBS broadcast. If the field is absent, the UE applies <i>searchSpaceMCCH</i> 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.
<i>searchSpaceMulticastMCCH</i> ID of the search space for multicast MCCH. If the field is absent, the UE does not receive multicast 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.
<i>searchSpaceMulticastMTCH</i> ID of the search space for multicast MTCH. If the field is absent, the UE applies <i>searchSpaceMulticastMCCH</i> also for multicast 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.
<i>searchSpaceOtherSystemInformation</i> ID of the Search space for other system information, i.e., <i>SIB2</i> 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, an (e)RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor PDCCH to receive other system information using <i>searchSpaceOtherSystemInformation</i> in the initial DL BWP that includes CD-SSB and the entire CORESET#0.
<i>searchSpaceSIB1</i> ID of the search space for <i>SIB1</i> 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 <i>SIB1</i> 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, an (e)RedCap UE in RRC_IDLE or RRC_INACTIVE shall monitor PDCCH to receive <i>SIB1</i> using <i>searchSpaceSIB1</i> in the initial DL BWP that includes CD-SSB and the entire CORESET#0.
<i>searchSpaceZero</i> Parameters of the common SearchSpace#0. The values are interpreted like the corresponding bits in <i>MIB pdcch-ConfigSIB1</i> . Even though this field is only configured in the initial BWP (BWP#0), <i>searchSpaceZero</i> 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
<i>FollowUTC1</i>	The field is absent if the field <i>followUnifiedTCI-State</i> is present. Otherwise, it is optionally present, Need R.
<i>InitialBWP-Only</i>	If <i>SIB1</i> is broadcast the field is mandatory present in the <i>PDCCH-ConfigCommon</i> of the initial BWP (BWP#0) in <i>ServingCellConfigCommon</i> except it is the RedCap-specific initial BWP not including CD-SSB and the entire CORESET#0 in which case the field is absent, Need R; it is absent in other BWPs and when sent in system information. If <i>SIB1</i> is not broadcast and there is an SSB associated to the cell, the field is optionally present, Need M, in the <i>PDCCH-ConfigCommon</i> of the initial BWP (BWP#0) in <i>ServingCellConfigCommon</i> (still with the same setting for all UEs). In other cases, the field is absent.
<i>InitialBWP-Paging</i>	This field is optionally present, Need R, if this BWP is the <i>initialDownlinkBWP</i> or <i>initialDownlinkBWP-RedCap</i> including CD-SSB and the entire CORESET#0, and <i>pei-Config</i> is configured in <i>DownlinkConfigCommonSIB</i> . Otherwise, this field is absent.
<i>OtherBWP</i>	This field is optionally present, Need R, if this BWP is not the <i>initialDownlinkBWP</i> and <i>pagingSearchSpace</i> is configured in this BWP. 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 ::=
    controlResourceSetZero
    searchSpaceZero
}

SEQUENCE {
    ControlResourceSetZero,
    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 ::=
    slotFormatIndicator
    . . .
    [[
    availabilityIndicator-r16
    searchSpaceSwitchTimer-r16
    ]],
    [[
    searchSpaceSwitchTimer-v1710
    ]]
}

SEQUENCE {
    SetupRelease { SlotFormatIndicator } OPTIONAL, -- Need M
    SetupRelease {AvailabilityIndicator-r16} OPTIONAL, -- Need M
    INTEGER (1..80) OPTIONAL -- Need R
    INTEGER (81..1280) OPTIONAL -- Need R
}

-- TAG-PDCCH-SERVINGCELLCONFIG-STOP
-- ASN1STOP
```

PDCCH-ServingCellConfig field descriptions
<p>availabilityIndicator Use to configure monitoring a PDCCH for Availability Indicators (AI).</p>
<p>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 <i>CellGroupForSwitch</i>.</p>
<p>slotFormatIndicator Configuration of Slot-Format-Indicators to be monitored in the correspondingly configured PDCCHs of this serving cell.</p>

– 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)
        profiles
            profile0x0006      SEQUENCE {
                BOOLEAN
            },
            drb-ContinuerOHC    ENUMERATED { true }
        },
        ...
    },
    integrityProtection        ENUMERATED { enabled }
    statusReportRequired       ENUMERATED { true }
    outOfOrderDelivery         ENUMERATED { true }
}
moreThanOneRLC                SEQUENCE {
    primaryPath                SEQUENCE {
        cellGroup              CellGroupId
        logicalChannel          LogicalChannelIdentity
    },
    ul-DataSplitThreshold      UL-DataSplitThreshold
    pdcp-Duplication           BOOLEAN
}
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 }
...
[[
cipheringDisabled            ENUMERATED {true}
]],
[[
discardTimerExt-r16          SetupRelease { DiscardTimerExt-r16 }
moreThanTwoRLC-DRB-r16      SEQUENCE {
    splitSecondaryPath-r16    LogicalChannelIdentity
    duplicationState-r16      SEQUENCE (SIZE (3)) OF BOOLEAN
}
ethernetHeaderCompression-r16 SetupRelease { EthernetHeaderCompression-r16 }
]],
[[
survivalTimeStateSupport-r17 ENUMERATED {true}
uplinkDataCompression-r17    SetupRelease { UplinkDataCompression-r17 }
discardTimerExt2-r17         SetupRelease { DiscardTimerExt2-r17 }
initialRX-DELIV-r17          BIT STRING (SIZE (32))
]],
[[
pdu-SetDiscard-r18           ENUMERATED {true}
discardTimerForLowImportance-r18 SetupRelease { DiscardTimerForLowImportance-r18 }
primaryPathOnIndirectPath-r18 ENUMERATED {true}

```

DEFAULT 15,
 OPTIONAL -- Need N
 OPTIONAL, -- Cond ConnectedTo5GC1
 OPTIONAL, -- Cond Rlc-AM-UM
 OPTIONAL, -- Need R
 OPTIONAL, -- Cond DRB
 OPTIONAL, -- Need R
 OPTIONAL, -- Need R
 OPTIONAL, -- Cond SplitBearer
 OPTIONAL, -- Need R
 OPTIONAL, -- Cond MoreThanOneRLC
 OPTIONAL, -- Need S
 OPTIONAL, -- Cond ConnectedTo5GC
 OPTIONAL, -- Cond DRB2
 OPTIONAL, -- Cond SplitBearer2
 OPTIONAL, -- Need S
 OPTIONAL, -- Cond MoreThanTwoRLC-DRB
 OPTIONAL, -- Need M
 OPTIONAL, -- Cond Drb-Duplication
 OPTIONAL, -- Cond Rlc-AM
 OPTIONAL, -- Need M
 OPTIONAL, -- Cond MRB-Initialization
 OPTIONAL, -- Need R
 OPTIONAL, -- Cond DRB2
 OPTIONAL, -- Cond SplitBearerMP

```

    ]]
  }
EthernetHeaderCompression-r16 ::= SEQUENCE {
  ehc-Common-r16          SEQUENCE {
    ehc-CID-Length-r16    ENUMERATED { bits7, bits15 },
    ...
  },
  ehc-Downlink-r16       SEQUENCE {
    drb-ContinueEHC-DL-r16 ENUMERATED { true }
    ...
  }
  ehc-Uplink-r16         SEQUENCE {
    maxCID-EHC-UL-r16     INTEGER (1..32767),
    drb-ContinueEHC-UL-r16 ENUMERATED { true }
    ...
  }
}
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}
  },
  drb-ContinueUDC   NULL
}

DiscardTimerForLowImportance-r18 ::= ENUMERATED {ms0, ms2, ms4, ms6, ms8, ms10, ms12, ms14, ms18, ms22, ms26, ms30, ms40, ms50, ms75, ms100}

-- TAG-PDCP-CONFIG-STOP
-- ASN1STOP

```

PDCP-Config field descriptions
<p><i>cipheringDisabled</i> 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.</p>
<p><i>discardTimer</i> Value in ms of <i>discardTimer</i> specified in TS 38.323 [5]. Value <i>ms10</i> corresponds to 10 ms, value <i>ms20</i> 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.</p>
<p><i>discardTimerExt</i> Value in ms of <i>discardTimer</i> specified in TS 38.323 [5]. Value <i>ms0dot5</i> corresponds to 0.5 ms, value <i>ms1</i> corresponds to 1ms and so on. If this field is present, the field <i>discardTimer</i> is ignored and <i>discardTimerExt</i> is used instead.</p>
<p><i>discardTimerExt2</i> Value in ms of <i>discardTimerExt</i> specified in TS 38.323 [5]. Value <i>ms2000</i> corresponds to 2000 ms. If this field is present, the field <i>discardTimer</i> and <i>discardTimerExt</i> are ignored and <i>discardTimerExt2</i> is used instead.</p>
<p><i>discardTimerForLowImportance</i> Value in ms of <i>discardTimerForLowImportance</i> specified in TS 38.323 [5]. Value <i>ms0</i> corresponds to 0 ms, value <i>ms2</i> corresponds to 2 ms and so on. The value of this timer for a PDCP entity is always configured shorter than <i>discardTimer</i>, <i>discardTimerExt</i> or <i>discardTimerExt2</i>, whichever is used for the PDCP entity. The presence of this field indicates that PSI-based SDU discard is configured for a DRB. The network configures at most 8 DRBs with <i>discardTimerForLowImportance</i>.</p>
<p><i>drb-ContinueROHC</i> 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 <i>fullConfig</i> 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.</p>
<p><i>duplicationState</i> This field indicates the uplink PDCP duplication state for the associated RLC entities at the time of receiving this IE. If set to <i>true</i>, 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 <i>primaryPath</i> in the order of MCG and SCG, as in clause 6.1.3.32 of TS 38.321 [3]. For MP, the index for the indication is determined by ascending order of direct path (where <i>i</i> is ascending order of logical channel ID of secondary RLC entities) and indirect path, 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.</p>
<p><i>ethernetHeaderCompression</i> 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 <i>ethernetHeaderCompression</i> only upon reconfiguration involving PDCP re-establishment and with neither <i>drb-ContinueEHC-DL</i> nor <i>drb-ContinueEHC-UL</i> configured. Network only configures this field when <i>uplinkDataCompression</i> is not configured.</p>
<p><i>headerCompression</i> If rohc is configured, the UE shall apply the configured ROHC profile(s) in both uplink and downlink. If <i>uplinkOnlyROHC</i> 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 <i>headerCompression</i> only upon reconfiguration involving PDCP re-establishment or involving PDCP entity reconfiguration to configure DAPS bearer(s), and without any <i>drb-ContinueROHC</i>. Network configures <i>headerCompression</i> to <i>notUsed</i> when <i>outOfOrderDelivery</i> is configured. Network only configures this field when <i>uplinkDataCompression</i> is not configured.</p>
<p><i>initialRX-DELIV</i> Indicates the initial value of RX_DELIV during PDCP window initialization for multicast MRB as specified in TS 38.323 [5].</p>
<p><i>integrityProtection</i> 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.</p>

PDCP-Config field descriptions
<p>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 <i>maxNumberROHC-ContextSessions</i> parameter as indicated by the UE.</p>
<p>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.</p>
<p>moreThanTwoRLC-DRB This field configures UL data transmission when more than two RLC entities are associated with the PDCP entity for DRBs.</p>
<p>outOfOrderDelivery Indicates whether or not <i>outOfOrderDelivery</i> specified in TS 38.323 [5] is configured. This field should be either always present or always absent, after the radio bearer is established.</p>
<p>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 <i>true</i>, duplication is activated. The value of this field is always <i>true</i>, 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 <i>moreThanTwoRLC-DRB</i> is present, the value of this field is ignored and the state of the duplication is indicated by <i>duplicationState</i>. For PDCP entity with more than two associated RLC entities, only NR RLC bearer is supported.</p>
<p>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 <i>len12bits</i> is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.</p>
<p>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 <i>len12bits</i> is applicable. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.</p>
<p>pdu-SetDiscard If set to true, the UE shall perform PDU Set based discarding for this PDCP entity, as specified in TS 38.323 [5]. This field is only configured for a DRB.</p>
<p>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 <i>primaryPath</i> to refer to the SCG as specified in clause 5.7.3b.4. In this last case, if the network sends an <i>RRCReconfiguration</i> message (in NR-DC) or an EUTRA <i>RRCConnectionReconfiguration</i> message (in (NG)EN-DC) keeping SRB1 as split SRB, the network explicitly configures the <i>primaryPath</i> 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. In MR-DC, the NW indicates <i>cellGroup</i> for split bearers using logical channels in different cell groups. The NW always indicates <i>logicalChannel</i> if CA based PDCP duplication is configured in the cell group indicated by <i>cellGroup</i> of this field. In MP, when the primary path is set to indirect path, the field <i>cellGroup</i> and <i>logicalChannel</i> are absent, and the field <i>primaryPathOnIndirectPath</i> is set to true.</p>
<p>primaryPathOnIndirectPath Indicates that the primary RLC entity is on SL indirect path, or primary path is associated with the N3C indirect path, for DRB when MP is configured.</p>
<p>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 <i>cellGroup</i> in the field <i>primaryPath</i>.</p>
<p>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].</p>
<p>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].</p>

PDCP-Config field descriptions
<p>t-Reordering Value in ms of t-Reordering specified in TS 38.323 [5]. Value <i>ms0</i> corresponds to 0 ms, value <i>ms20</i> corresponds to 20 ms, value <i>ms40</i> corresponds to 40 ms, and so on. When the field is absent the UE applies the value <i>infinity</i>. The value for this field cannot be changed in case of reconfiguration with sync, if the bearer is configured as DAPS bearer.</p>
<p>ul-DataSplitThreshold Parameter specified in TS 38.323 [5]. Value <i>b0</i> corresponds to 0 bytes, value <i>b100</i> corresponds to 100 bytes, value <i>b200</i> corresponds to 200 bytes, and so on. The network sets this field to <i>infinity</i> for UEs not supporting <i>splitDRB-withUL-Both-MCG-SCG</i> 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 <i>infinity</i> is applied.</p>
<p>uplinkDataCompression Indicates the UDC configuration that the UE shall apply. Network does not configure <i>uplinkDataCompression</i> for a DRB, if <i>headerCompression</i> or <i>ethernetHeaderCompression</i> is already configured or <i>outOfOrderDelivery</i> or DAPS is configured for the DRB. The maximum number of DRBs where <i>uplinkDataCompression</i> can be applied is two. The network reconfigures <i>uplinkDataCompression</i> only upon reconfiguration involving PDCP re-establishment. If the field is set to <i>drb-ContinueUDC</i>, 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 <i>drb-ContinueUDC</i> only in case of resuming an RRC connection or reconfiguration with sync, where the PDCP termination point is not changed and the <i>fullConfig</i> is not indicated.</p>

EthernetHeaderCompression field descriptions
<p>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 <i>fullConfig</i> is not indicated.</p>
<p>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 <i>fullConfig</i> is not indicated.</p>
<p>ehc-CID-Length Indicates the length of the CID field for EHC packet. The value <i>bits7</i> indicates the length is 7 bits, and the value <i>bits15</i> indicates the length is 15 bits. Once the field <i>ethernetHeaderCompression-r16</i> is configured for a DRB or a multicast MRB, the value of the field <i>ehc-CID-Length</i> for this DRB or multicast MRB is not reconfigured to a different value.</p>
<p>ehc-Common Indicates the configurations that apply for both downlink and uplink.</p>
<p>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.</p>
<p>ehc-Uplink Indicates the configurations that apply for only uplink. If the field is configured, then Ethernet header compression is configured for uplink. Otherwise, it is not configured for uplink.</p>
<p>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 <i>maxNumberEHC-Contexts</i> parameter as indicated by the UE.</p>

UplinkDataCompression field descriptions	
bufferSize	This field indicates the buffer size applied for UDC as specified in TS 38.323 [5]. Value <i>kbyte2</i> means 2048 bytes, <i>kbyte4</i> 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 <i>sip-SDP</i> means that UE shall prefill the buffer with standard dictionary for SIP and SDP defined in TS 38.323 [5], and the value <i>operator</i> means that UE shall prefill the buffer with operator-defined dictionary.

Conditional presence	Explanation
<i>DRB</i>	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.
<i>DRB2</i>	This field is optionally present in case of DRB, need M. Otherwise, it is absent for SRBs and MRBs.
<i>Drb-Duplication</i>	For SRBs, this field is absent. For DRBs, this field is absent if duplication is not configured. Otherwise, this field is optional, need R.
<i>MoreThanOneRLC</i>	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 <i>moreThanTwoRLC-DRB</i> is included in <i>PDCP-Config</i> . 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.
<i>MoreThanTwoRLC-DRB</i>	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.
<i>Rlc-AM</i>	For RLC AM, the field is optionally present, need M. Otherwise, the field is absent.
<i>Rlc-AM-UM</i>	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.
<i>Setup</i>	The field is mandatory present in case of DRB setup. Otherwise the field is optionally present, need M.
<i>SplitBearer</i>	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.
<i>SplitBearer2</i>	The field is mandatory present, in case of a split bearer. Otherwise the field is absent.
<i>SplitBearerMP</i>	The field is absent for SRBs. Otherwise, the field is optionally present, need R, when MP is configured.
<i>ConnectedTo5GC</i>	The field is optionally present, need R, if the UE is connected to 5GC. Otherwise the field is absent.
<i>ConnectedTo5GC1</i>	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.
<i>Setup1</i>	This field is mandatory present in case of DRB setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
<i>Setup2</i>	This field is mandatory present in case for radio bearer setup for RLC-AM and RLC-UM. Otherwise, this field is absent, Need M.
<i>MRB-Initialization</i>	This field is mandatory present in case of multicast MRB setup or in case UE configured with multicast reception in RRC_INACTIVE resumes the RRC connection. 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-ConfigDCI-1-3*.

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
```

```

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
  }
}
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
}
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 {x0h6, x0h12, x0h18}                              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
]],
[[
advancedReceiver-MU-MIMO-r18                  SetupRelease { AdvancedReceiver-MU-MIMO-r18 }                OPTIONAL, -- Need M
pdsch-ConfigDCI-1-3-r18                       SetupRelease { PDSCH-ConfigDCI-1-3-r18 }                     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)

PDSCH-ConfigDCI-1-3-r18 ::= SEQUENCE {
  resourceAllocationDCI-1-3-r18      ENUMERATED {resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                     OPTIONAL, -- Need M
  rbg-SizeDCI-1-3-r18                ENUMERATED {config1, config2, config3, spare1}
                                     OPTIONAL, -- Cond DCI-1-3
  resourceAllocationType1GranularityDCI-1-3-r18 ENUMERATED {n2,n4,n8,n16}
                                     OPTIONAL, -- Need S
  numberOfBitsForRV-DCI-1-3-r18      INTEGER (0..2)
                                     OPTIONAL, -- Need R
  harq-ProcessNumberSizeDCI-1-3-r18  INTEGER (0..5)
                                     OPTIONAL, -- Need R
}

```

```
}  
-- TAG-PDSCH-CONFIG-STOP  
-- ASN1STOP
```

PDSCH-Config field descriptions
<p>advancedReceiver-MU-MIMO A set of assistance information for R-ML (reduced complexity ML) receivers with enhanced inter-user interference suppression for MU-MIMO transmissions.</p>
<p>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 <i>dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2</i> nor <i>dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2</i> is configured, this field is absent.</p>
<p>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 <i>ZP-CSI-RS-ResourceSetId</i> and the IDs of one or more <i>ZP-CSI-RS-Resources</i> (the actual resources are defined in the <i>zp-CSI-RS-ResourceToAddModList</i>). The network configures the UE with at most 3 aperiodic <i>ZP-CSI-RS-ResourceSets</i> and it uses only the <i>ZP-CSI-RS-ResourceSetId</i> 1 to 3. The network triggers a set by indicating its <i>ZP-CSI-RS-ResourceSetId</i> in the DCI payload. The DCI codepoint '01' triggers the resource set with <i>ZP-CSI-RS-ResourceSetId</i> 1, the DCI codepoint '10' triggers the resource set with <i>ZP-CSI-RS-ResourceSetId</i> 2, and the DCI codepoint '11' triggers the resource set with <i>ZP-CSI-RS-ResourceSetId</i> 3 (see TS 38.214 [19], clause 5.1.4.2). The field <i>aperiodic-ZP-CSI-RS-ResourceSetsToAddModList</i> applies to DCI format 1_1 and the field <i>aperiodic-ZP-CSI-RS-ResourceSetsToAddModListDCI-1-2</i> 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).</p>
<p>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 <i>simultaneousU-TCI-UpdateListN</i> configured in IE <i>CellGroupConfig</i> based on the smallest SCS of the active BWP.</p>
<p>dataScramblingIdentityPDSCH, dataScramblingIdentityPDSCH2 Identifier(s) used to initialize data scrambling (<i>c_init</i>) for PDSCH as specified in TS 38.211 [16], clause 7.3.1.1. The <i>dataScramblingIdentityPDSCH2</i> is configured if <i>coresetPoolIndex</i> is configured with 1 for at least one CORESET in the same BWP.</p>
<p>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).</p>
<p>dmrs-DownlinkForPDSCH-MappingTypeA, dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2 DMRS configuration for PDSCH transmissions using PDSCH mapping type A (chosen dynamically via <i>PDSCH-TimeDomainResourceAllocation</i>). Only the fields <i>dmrs-Type</i>, <i>dmrs-AdditionalPosition</i> and <i>maxLength</i> may be set differently for mapping type A and B. The field <i>dmrs-DownlinkForPDSCH-MappingTypeA</i> applies to DCI formats 1_1 and 1_3, and the field <i>dmrs-DownlinkForPDSCH-MappingTypeA-DCI-1-2</i> applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).</p>
<p>dmrs-DownlinkForPDSCH-MappingTypeB, dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2 DMRS configuration for PDSCH transmissions using PDSCH mapping type B (chosen dynamically via <i>PDSCH-TimeDomainResourceAllocation</i>). Only the fields <i>dmrs-Type</i>, <i>dmrs-AdditionalPosition</i> and <i>maxLength</i> may be set differently for mapping type A and B. The field <i>dmrs-DownlinkForPDSCH-MappingTypeB</i> applies to DCI formats 1_1 and 1_3, and the field <i>dmrs-DownlinkForPDSCH-MappingTypeB-DCI-1-2</i> applies to DCI format 1_2 (see TS 38.212 [17], clause 7.3.1).</p>
<p>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. If <i>dmrs-TypeEnh-r18</i> is configured, this field is not configured.</p>
<p>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).</p>
<p>dummy This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>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).</p>

<p>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 <i>maxMIMO-Layers</i> configuration in IE <i>PDSCH-ServingCellConfig</i> of the serving cell to which this BWP belongs, when the UE operates in this BWP. The value of <i>maxMIMO-Layers</i> for a DL BWP shall be smaller than or equal to the value of <i>maxMIMO-Layers</i> configured in IE <i>PDSCH-ServingCellConfig</i> 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 <i>maxMIMO-Layers</i> for a CFR shall be smaller than or equal to the value of <i>maxMIMO-Layers</i> configured in <i>PDSCH-ServingCellConfig</i> IE of the serving cell to which this CFR belongs.</p>
<p>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.</p>
<p>mcs-Table Indicates which MCS table the UE shall use for PDSCH for DCI formats 1_0, 1_1 and 1_3 (see TS 38.214 [19], clause 5.1.3.1). If all fields are absent the UE applies the value 64QAM. If the field <i>mcs-Table-r17</i> is present for DCI formats 1_1 and 1_3, the network does not configure the field <i>mcs-Table</i> (without suffix). For an (e)RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.</p>
<p>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 <i>mcs-TableDCI-1-2-r17</i> is present, the network does not configure the field <i>mcs-TableDCI-1-2-r16</i>. For an (e)RedCap UE, the 256QAM MCS table for PDSCH is only supported if the UE indicates support of 256QAM for PDSCH.</p>
<p>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).</p>
<p>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).</p>
<p>pdsch-AggregationFactor Number of repetitions for data (see TS 38.214 [19], clause 5.1.2.1). When the field is absent in <i>PDSCH-Config</i> which is not used for MBS CFR, the UE applies the value 1.</p>
<p>pdsch-HARQ-ACK-EnhType3DCI-1-2 When configured, enhanced Type 3 HARQ-ACK codebook triggering by DCI format 1_2 is enabled.</p>
<p>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.</p>
<p>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).</p>
<p>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).</p>
<p>pdsch-TimeDomainAllocationList, pdsch-TimeDomainAllocationListDCI-1-2, pdsch-TimeDomainAllocationListForMultiPDSCH List of time-domain configurations for timing of DL assignment to DL data. The field <i>pdsch-TimeDomainAllocationList</i> (with or without suffix) applies to DCI format 1_0, DCI format 1_1 and DCI format 1_3 (see table 5.1.2.1.1-1 in TS 38.214 [19]), and if the field <i>pdsch-TimeDomainAllocationListDCI-1-2</i> is not configured, to DCI format 1_2. If the field <i>pdsch-TimeDomainAllocationListDCI-1-2</i> is configured, it applies to DCI format 1_2 (see table 5.1.2.1.1-1A in TS 38.214 [19]). The field <i>pdsch-TimeDomainAllocationListForMultiPDSCH</i> applies to DCI format 1_1. The network does not configure the <i>pdsch-TimeDomainAllocationList-r16</i> simultaneously with the <i>pdsch-TimeDomainAllocationList</i> (without suffix) in the same <i>PDSCH-Config</i>.</p>
<p>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 <i>dynamic</i> is chosen, the actual <i>bundleSizeSet1</i> or <i>bundleSizeSet2</i> to use is indicated via DCI. Constraints on <i>bundleSize(Set)</i> setting depending on <i>vrb-ToPRB-Interleaver</i> and <i>rbg-Size</i> settings are described in TS 38.214 [19], clause 5.1.2.3. If a <i>bundleSize(Set)</i> value is absent, the UE applies the value <i>n2</i>. The field <i>prb-BundlingType</i> applies to DCI formats 1_1 and 1_3, and the field <i>prb-BundlingTypeDCI-1-2</i> 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).</p>

<p>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 <i>priorityIndicatorDCI-1-1</i> applies to DCI format 1_1, the field <i>priorityIndicatorDCI-1-2</i> applies to DCI format 1_2 and the field <i>priorityIndicatorDCI-4-2</i> applies to DCI format 4_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9).</p>
<p>pucch-sCellDynDCI-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>
<p>p-ZP-CSI-RS-ResourceSet A set of periodically occurring ZP-CSI-RS-Resources (the actual resources are defined in the <i>zp-CSI-RS-ResourceToAddModList</i>). The network uses the ZP-CSI-RS-ResourceSetId=0 for this set. If <i>p-ZP-CSI-RS-ResourceSet</i> is configured in both <i>PDSCH-Config</i> for MBS CFR and <i>PDSCH-Config</i> for the associated BWP, it is subject to UE capability whether the <i>p-ZP-CSI-RS-ResourceSet</i> configured in <i>PDSCH-Config</i> for MBS CFR can be different from the <i>p-ZP-CSI-RS-ResourceSet</i> configured in <i>PDSCH-Config</i> for the associated BWP.</p>
<p>rateMatchPatternGroup1, rateMatchPatternGroup1DCI-1-2 The IDs of a first group of <i>RateMatchPatterns</i> defined in <i>PDSCH-Config->rateMatchPatternToAddModList</i> (BWP level) or in <i>ServingCellConfig->rateMatchPatternToAddModList</i> (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field <i>rateMatchPatternGroup1</i> applies to DCI formats 1_1 and 1_3, and the field <i>rateMatchPatternGroup1DCI-1-2</i> applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.1).</p>
<p>rateMatchPatternGroup2, rateMatchPatternGroup2DCI-1-2 The IDs of a second group of <i>RateMatchPatterns</i> defined in <i>PDSCH-Config->rateMatchPatternToAddModList</i> (BWP level) or in <i>ServingCellConfig->rateMatchPatternToAddModList</i> (cell level). These patterns can be activated dynamically by DCI (see TS 38.214 [19], clause 5.1.4.1). The field <i>rateMatchPatternGroup2</i> applies to DCI formats 1_1 and 1_3, and the field <i>rateMatchPatternGroup2DCI-1-2</i> applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.4.1).</p>
<p>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 <i>RateMatchPattern</i> with the same <i>RateMatchPatternId</i> is configured in both MBS CFR and its associated BWP, the entire <i>RateMatchPattern</i> 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].</p>
<p>rbg-Size Selection between config 1 and config 2 for RBG size for PDSCH except PDSCH scheduled by DCI format 1_3. The UE ignores this field if <i>resourceAllocation</i> is set to <i>resourceAllocationType1</i> (see TS 38.214 [19], clause 5.1.2.2.1).</p>
<p>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).</p>
<p>repetitionSchemeConfig Configure the UE with repetition schemes. The network does not configure <i>repetitionSchemeConfig-r16</i> and <i>repetitionSchemeConfig-v1630</i> simultaneously to <i>setup</i> in the same <i>PDSCH-Config</i>. The network does not configure this parameter and <i>sfnSchemePDSCH</i> in <i>MIMOParam-r17</i> simultaneously in the same serving cell.</p>
<p>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 <i>resourceAllocation</i> applies to DCI format 1_1, and the field <i>resourceAllocationDCI-1-2</i> applies to DCI format 1_2 (see TS 38.214 [19], clause 5.1.2.2).</p>
<p>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).</p>
<p>sizeDCI-4-2 Indicates the size of DCI format 4-2 (see TS 38.213 [13], clause 10.1).</p>
<p>sp-ZP-CSI-RS-ResourceSetsToAddModList AddMod/Release lists for configuring semi-persistent zero-power CSI-RS resource sets. Each set contains a <i>ZP-CSI-RS-ResourceSetId</i> and the IDs of one or more <i>ZP-CSI-RS-Resources</i> (the actual resources are defined in the <i>zp-CSI-RS-ResourceToAddModList</i>) (see TS 38.214 [19], clause 5.1.4.2).</p>

<p><i>tcI-StatesToAddModList</i> 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 <i>unifiedTCI-StateType</i> is configured for the serving cell, no element in this list is configured.</p>
<p><i>unifiedTCI-StateRef</i> Provides the serving cell and BWP where the configuration for <i>dl-OrJointTCI-StateToAddModList-r17</i> are defined. When this field is present, <i>dl-OrJointTCI-StateToAddModList</i> and <i>dl-OrJointTCI-StateToReleaseList</i> are not present. The value of <i>unifiedTCI-StateType</i> of current serving cell is the same in the serving cell indicated by <i>unifiedTCI-StateRef</i>.</p>
<p><i>vrB-ToPRB-Interleaver, vrB-ToPRB-InterleaverDCI-1-2</i> 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.</p>
<p><i>xOverheadMulticast</i> Accounts for an overhead from CSI-RS, CORESET etc. If the field is absent, the UE applies value xOh0 (see TS 38.214 [19]).</p>
<p><i>zp-CSI-RS-ResourceToAddModList</i> 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]).</p>

<i>PDSCH-ConfigDCI-1-3</i> field descriptions
<p><i>harq-ProcessNumberSizeDCI-1-3</i> Configure the number of bits for the field "HARQ process number" in DCI format 1_3 (see TS 38.212 [17], clause 7.3.1).</p>
<p><i>numberOfBitsForRV-DCI-1-3</i> Configures the number of bits for "Redundancy version" in the DCI format 1_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 5.1.2.1).</p>
<p><i>rbg-SizeDCI-1-3</i> Selection among config 1, config 2 and config 3 for RBG size for PDSCH scheduled by DCI format 1_3. The UE ignores this field if resourceAllocationDCI-1-3 is set to resourceAllocationType1. (see TS 38.214 [19], clause 5.1.2.2.1).</p>
<p><i>resourceAllocationDCI-1-3</i> Configuration of resource allocation type 0 and resource allocation type 1 for DCI format 1_3 (see TS 38.214 [19], clause 5.1.2.2).</p>
<p><i>resourceAllocationType1GranularityDCI-1-3</i> Configure the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 1_3. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 5.1.2.2.2).</p>

Conditional Presence	Explanation
<i>DCI-1-3</i>	This field is mandatory present when <i>ScheduledCellListDCI-1-3</i> is configured to the serving cell. Otherwise, it is absent, Need R.

– ***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 ::=
    pdsch-TimeDomainAllocationList          SEQUENCE {
        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 <i>codeBlockGroupTransmission</i> 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 <i>pdsch-TimeDomainAllocationListForMultiPDSCH-r17</i> for this serving cell contains <i>pdsch-AllocationList</i> with multiple entries (multiple PDSCH) - Type-2 HARQ-ACK codebook is configured and <i>pdsch-TimeDomainAllocationListForMultiPDSCH-r17</i> for any cell in the same PUCCH cell group associated with this serving cell contains <i>pdsch-AllocationList</i> 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 <i>n2</i> corresponds to 2 HARQ processes, value <i>n4</i> to 4 HARQ processes, and so on. If both <i>nrofHARQ-ProcessesForPDSCH</i> and <i>nrofHARQ-ProcessesForPDSCH-v1700</i> 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
<i>SCellAddOnly</i>	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
```

<i>PDSCH-TimeDomainResourceAllocation</i> field descriptions
<i>k0</i> Slot offset between DCI and its scheduled PDSCH (see TS 38.214 [19], clause 5.1.2.1). <i>k0-v1710</i> 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.
<i>mappingType</i> PDSCH mapping type (see TS 38.214 [19], clause 5.3).
<i>repetitionNumber</i> Indicates the number of PDSCH transmission occasions for slot-based repetition scheme in IE <i>RepetitionSchemeConfig</i> . The parameter is used as specified in 38.214 [19].
<i>startSymbolAndLength</i> 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).

<i>MultiPDSCH-TimeDomainResourceAllocation</i> field descriptions
<i>pdsch-TDRA-List</i> 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
<i>Format1-2</i>	In <i>pdsch-TimeDomainAllocationListDCI-1-2</i> , this field is optionally present, Need R. It is absent, Need R, otherwise.
<i>Formats1-0_1-1_4-0_4-1_4-2</i>	In <i>pdsch-TimeDomainAllocationListDCI-1-2</i> , <i>pdsch-TimeDomainAllocationListForMultiPDSCH</i> , and <i>SIB20</i> , this field is absent. Otherwise, in <i>pdsch-TimeDomainResourceAllocationList-r16</i> , this field is optionally present, Need R.

– *PDU-SessionID*

The IE *PDU-SessionID* identifies the PDU Session.

***PDU-SessionID* information element**

```
-- ASN1START
-- TAG-PDU-SESSIONID-START

PDU-SessionID ::=  INTEGER (0..255)

-- TAG-PDU-SESSIONID-STOP
-- ASN1STOP
```

– *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 ::=
    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
    ]],
    [[
    phr-AssumedPUSCH-Reporting-r18  ENUMERATED {enabled}          OPTIONAL,    -- Need R
    dpc-Reporting-FR1-r18         ENUMERATED {enabled}          OPTIONAL    -- Need R
    ]]
}

MPE-Config-FR2-r16 ::=
    mpe-ProhibitTimer-r16     ENUMERATED {sf0, sf10, sf20, sf50, sf100, sf200, sf500, sf1000},
    mpe-Threshold-r16         ENUMERATED {dB3, dB6, dB9, dB12}
}

MPE-Config-FR2-r17 ::=
    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
<p>dpc-Reporting-FR1 Indicates if the delta power class (DPC) is reported, as specified in TS 38.321 [3].</p>
<p>dummy This field is not used in this version of the specification and the UE ignores the received value.</p>
<p>mpe-ProhibitTimer Value in number of subframes for MPE reporting, as specified in TS 38.321 [3]. Value <i>sf10</i> corresponds to 10 subframes, and so on.</p>
<p>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].</p>
<p>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).</p>
<p>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 <i>true</i> for MR-DC and UL CA for NR, and to <i>false</i> in all other cases.</p>
<p>numberOfN Number of reported P-MPR values in a PHR MAC CE.</p>
<p>phr-AssumedPUSCH-Reporting Indicates if the PHR with an assumed PUSCH is reported, as specified in TS 38.321 [3]. The network ensures <i>phr-AssumedPUSCH-Reporting-r18</i> and <i>twoPHRMode-r17</i> are not configured at the same time for a UE.</p>
<p>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.</p>
<p>phr-PeriodicTimer Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value <i>sf10</i> corresponds to 10 subframes, value <i>sf20</i> corresponds to 20 subframes, and so on.</p>
<p>phr-ProhibitTimer Value in number of subframes for PHR reporting as specified in TS 38.321 [3]. Value <i>sf0</i> corresponds to 0 subframe, value <i>sf10</i> corresponds to 10 subframes, value <i>sf20</i> corresponds to 20 subframes, and so on.</p>
<p>phr-Tx-PowerFactorChange Value in dB for PHR reporting as specified in TS 38.321 [3]. Value <i>dB1</i> corresponds to 1 dB, <i>dB3</i> 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).</p>
<p>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 <i>false</i> if the UE is not configured with an E-UTRA MAC entity.</p>
<p>twoPHRMode Indicates if the power headroom shall be reported as two PHRs (each PHR associated with a SRS resource set) is enabled or not. The network ensures <i>phr-AssumedPUSCH-Reporting-r18</i> and <i>twoPHRMode-r17</i> are not configured at the same time for a UE.</p>

– *PhysCellId*

The *PhysCellId* identifies the physical cell identity (PCI).

PhysCellId information element

```

-- ASN1START
-- TAG-PHYSCCELLID-START

PhysCellId ::=
    INTEGER (0..1007)

-- TAG-PHYSCCELLID-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
        nr-dc-PCmode-FR1-r16                                  ENUMERATED {semi-static-model1, semi-static-mode2, dynamic}  OPTIONAL, -- Cond MCG-Only
        nr-dc-PCmode-FR2-r16                                  ENUMERATED {semi-static-model1, 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
]],
[[
ncr-RNTI-r18                        RNTI-Value                            OPTIONAL,  -- Cond NCR
cellDTRX-DCI-config-r18             SetupRelease { CellDTRX-DCI-config-r18 }  OPTIONAL,  -- Need M
twoQCL-TypeD-ForMultiDCI-r18        ENUMERATED {enabled}                OPTIONAL,  -- Need R
enableType1HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant-r18      ENUMERATED {enabled}                OPTIONAL,  -- Need R
enableType2HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant-r18      ENUMERATED {enabled}                OPTIONAL,  -- Need R
enableType3HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant-r18      ENUMERATED {enabled}                OPTIONAL,  -- Need R
enableDiffPUCCH-Resource-r18        ENUMERATED {enabled}                OPTIONAL,  -- Need R
enableDiffCB-Size-r18               ENUMERATED {enabled}                OPTIONAL,  -- Need R
]]
}

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)
}

CellDTRX-DCI-config-r18 ::=            SEQUENCE {
    cellDTRX-RNTI-r18                    RNTI-Value,
    sizeDCI-2-9-r18                      INTEGER (1..maxDCI-2-9-Size-r18)
}

-- TAG-PHYSICALCELLGROUPCONFIG-STOP
-- ASN1STOP
```

PhysicalCellGroupConfig field descriptions
<p>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).</p>
<p>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.</p>
<p>cs-RNTI RNTI value for downlink SPS (see <i>SPS-Config</i>) and uplink configured grant (see <i>ConfiguredGrantConfig</i>).</p>
<p>downlinkAssignmentIndexDCI-0-2 Indicates if "Downlink assignment index" is present or absent in DCI format 0_2. If the field "<i>downlinkAssignmentIndexDCI-0-2</i>" is absent, then 0 bit for "Downlink assignment index" in DCI format 0_2. If the field "<i>downlinkAssignmentIndexDCI-0-2</i>" is present, then the bitwidth of "Downlink assignment index" in DCI format 0_2 is defined in the same way as that in DCI format 0_1 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).</p>
<p>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 <i>pdsch-HARQ-ACK-Codebook</i> is set to <i>dynamic</i>. 4 bits is applied if more than one serving cell are configured in the DL and <i>pdsch-HARQ-ACK-Codebook</i> is set to <i>dynamic</i> (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 9.1).</p>
<p>enableDiffCB-Size This field indicates whether a different codebook size from the size determined based on HARQ-ACK information associated with PDSCH reception(s) scheduled before a UL grant, is determined or not to include HARQ-ACK information associated with PDSCH reception(s) scheduled after a UL grant scheduling a PUSCH transmission with repetitions and the HARQ-ACK information are multiplexed on a repetition of the PUSCH transmission other than a first repetition. If enabled, a different HARQ codebook size might be determined. See clause 9 in TS 38.213 [13].</p>
<p>enableDiffPUCCH-Resource This field indicates whether a different PUCCH resource in time domain in a slot from the PUCCH resource indicated by the last DCI format before a UL grant in the slot, is determined or not to include HARQ-ACK information associated with PDSCH reception(s) scheduled after a UL grant scheduling a PUSCH transmission with repetitions and the HARQ-ACK information are multiplexed on a repetition of the PUSCH transmission other than a first repetition in the same slot. If enabled, a different PUCCH resource in time domain might be determined. See clause 9 in TS 38.213 [13].</p>
<p>enableType1HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant If enabled, UE multiplexes Type-1 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where the HARQ-ACK codebook includes HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmission. See clause 9 in TS 38.213 [13]. This feature is not simultaneously enabled with PUCCH cell switching.</p>
<p>enableType2HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant If enabled, UE multiplexes Type-2 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where the HARQ-ACK codebook includes HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmission. See clause 9 in TS 38.213 [13]. This feature is not simultaneously enabled with PUCCH cell switching.</p>
<p>enableType3HARQ-ACK-MuxForDL-AssignmentAfterUL-Grant If enabled, UE multiplexes Type-3 HARQ-ACK codebook on a repetition of a PUSCH transmission other than a first repetition, where the HARQ-ACK codebook includes HARQ-ACK information associated with PDSCH reception(s) scheduled after the UL grant scheduling the PUSCH transmission. See clause 9 in TS 38.213 [13]. This feature is not simultaneously enabled with PUCCH cell switching.</p>
<p>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 <i>harq-ACK SpatialBundlingPUCCH-secondaryPUCCHgroup</i> is present, <i>harq-ACK-SpatialBundlingPUCCH</i> is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and <i>codeBlockGroupTransmission</i> within the same cell group.</p>
<p>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 <i>harq-ACK-SpatialBundlingPUCCH</i>. See TS 38.213 [13], clause 9.1.2.1. Network does not configure for a UE both spatial bundling of HARQ ACKs and <i>codeBlockGroupTransmission</i> within the same cell group.</p>

<p>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 <i>harq-ACK SpatialBundlingPUSCH-secondaryPUCCHgroup</i> is present, <i>harq-ACK-SpatialBundlingPUSCH</i> is only applied to primary PUCCH group. Network does not configure for a UE both spatial bundling of HARQ ACKs and <i>codeBlockGroupTransmission</i> within the same cell group.</p>
<p>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 <i>harq-ACK-SpatialBundlingPUSCH</i>. 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 <i>codeBlockGroupTransmission</i> within the same cell group.</p>
<p>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 <i>CellGroupConfig</i> when provided as part of <i>RRCSetup</i> message.</p>
<p>mcs-C-RNTI RNTI to indicate use of <i>qam64LowSE</i> for grant-based transmissions. When the <i>mcs-C-RNTI</i> is configured, RNTI scrambling of DCI CRC is used to choose the corresponding MCS table.</p>
<p>ncr-RNTI RNTI value for NCR-MT, used to scramble the PDCCHs carrying side control information (see TS 38.213 [13], clause 10.1).</p>
<p>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 (<i>pdscH-HARQ-ACK-Codebook</i> is set to <i>enhancedDynamic</i>).</p>
<p>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).</p>
<p>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).</p>
<p>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 <i>pdccH-BlindDetection</i> only if the UE is in NR-DC. The network configures <i>pdccH-BlindDetection2</i> only if the UE is in NR-DC with at least one downlink cell using Rel-16 PDCCH monitoring capability. The network configures <i>pdccH-BlindDetection3</i> only if the UE is in NR-DC with at least one downlink cell using Rel-15 PDCCH monitoring capability. The network configures <i>pdccH-BlindDetection4</i> only if the UE is in NR-DC with at least one downlink cell using Rel-17 PDCCH monitoring capability.</p>
<p>pdccH-BlindDetectionCA-CombIndicator Configure one combination of <i>pdccH-BlindDetectionCA1</i> (for R15) and <i>pdccH-BlindDetectionCA2</i> (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 <i>pdccH-BlindDetectionCA1</i> and <i>pdccH-BlindDetectionCA2</i> as UE capability. The combination of <i>pdccH-BlindDetectionCA1</i> and <i>pdccH-BlindDetectionCA2</i> configured by <i>pdccH-BlindDetectionCA-CombIndicator</i> is from the more than one combination of <i>pdccH-BlindDetectionCA1</i> and <i>pdccH-BlindDetectionCA2</i> reported by UE (see TS 38.213 [13], clause 10). <i>pdccH-BlindDetectionCA-CombIndicator-r17</i> is used to configure one combination of <i>pdccH-BlindDetectionCA1</i> (for R15), <i>pdccH-BlindDetectionCA2</i> (for R16) and <i>pdccH-BlindDetectionCA3</i> (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 <i>pdccH-BlindDetectionCA1</i>, <i>pdccH-BlindDetectionCA2</i> and <i>pdccH-BlindDetectionCA3</i> as UE capability. The combination of <i>pdccH-BlindDetectionCA1</i>, <i>pdccH-BlindDetectionCA2</i> and <i>pdccH-BlindDetectionCA3</i> configured by <i>pdccH-BlindDetectionCA-CombIndicator-r17</i> is from the more than one combination of <i>pdccH-BlindDetectionCA1</i>, <i>pdccH-BlindDetectionCA2</i> and <i>pdccH-BlindDetectionCA3</i> reported by UE (see TS 38.213 [13], clause 10). <i>pdccH-BlindDetectionCA-CombIndicator-r16</i> and <i>pdccH-BlindDetectionCA-CombIndicator-r17</i> are not configured simultaneously.</p>
<p>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 <i>p-Max</i> (configured in <i>FrequencyInfoUL</i>) and by <i>p-UE-FR1</i> (configured total for all serving cells operating on FR1).</p>

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 <i>p-Max</i> (configured in <i>FrequencyInfoUL</i>) and by <i>p-UE-FR2</i> (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 <i>drx-onDurationTimer</i> 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 <i>drx-onDurationTimer</i> 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 <i>drx-onDurationTimer</i> does not start.
ps-TransmitOtherPeriodicCSI
Indicates the UE to transmit periodic CSI report(s) other than L1-RSRP reports when the <i>drx-onDurationTimer</i> 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 <i>drx-onDurationTimer</i> 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 <i>p-Max</i> (configured in <i>FrequencyInfoUL</i>) and by <i>p-NR-FR1</i> (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 <i>p-Max</i> (configured in <i>FrequencyInfoUL</i>) and by <i>p-NR-FR2</i> (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 <i>pdsch-HARQ-ACK-Codebook-r16</i> is signalled, UE shall ignore the <i>pdsch-HARQ-ACK-Codebook</i> (without suffix). For the HARQ-ACK for sidelink, if <i>pdsch-HARQ-ACK-Codebook-r16</i> is signalled, the UE uses <i>pdsch-HARQ-ACK-Codebook</i> (without suffix) and ignores <i>pdsch-HARQ-ACK-Codebook-r16</i> . If the field <i>pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup</i> is present, <i>pdsch-HARQ-ACK-Codebook</i> 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 <i>pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup</i> is present, <i>pdsch-HARQ-ACK-Codebook</i> is applied to primary and secondary PUCCH group and the UE ignores <i>pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup</i> .
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 <i>pdsch-HARQ-ACK-Codebook</i> (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 <i>pdsch-HARQ-ACK-Codebook</i> 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 <i>pdsch-HARQ-ACK-Codebook</i> and ignores <i>pdsch-HARQ-ACK-CodebookList</i> if this field is present.

<p><i>pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup</i> 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.</p>
<p><i>pdsch-HARQ-ACK-EnhType3DCI-Field, pdsch-HARQ-ACK-EnhType3DCI-FieldSecondaryPUCCHgroup</i> 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.</p>
<p><i>pdsch-HARQ-ACK-EnhType3ToAddModList, pdsch-HARQ-ACK-EnhType3SecondaryToAddModList</i> 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 <i>pdsch-HARQ-ACK-EnhType3SecondaryToAddModList</i> only if secondary PUCCH group is configured.</p>
<p><i>pdsch-HARQ-ACK-OneShotFeedback</i> 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).</p>
<p><i>pdsch-HARQ-ACK-OneShotFeedbackCBG</i> 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 <i>pdsch-HARQ-ACK-OneShotFeedback</i> is configured.</p>
<p><i>pdsch-HARQ-ACK-OneShotFeedbackNDI</i> 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 <i>pdsch-HARQ-ACK-OneShotFeedback</i> is configured.</p>
<p><i>pdsch-HARQ-ACK-Retx, pdsch-HARQ-ACK-RetxSecondaryPUCCHgroup</i> 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).</p>
<p><i>pucch-sSCell, pucch-sSCellSecondaryPUCCHgroup</i> indicates 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.</p>
<p><i>pucch-sSCellDyn, pucch-sSCellDynsecondaryPUCCHgroup</i> 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.</p>
<p><i>pucch-sSCellPattern, pucch-sSCellPatternSecondaryPUCCHgroup</i> 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.</p>
<p><i>simultaneousPUCCH-PUSCH, simultaneousPUCCH-PUSCH-SecondaryPUCCHgroup</i> Enables simultaneous PUCCH and PUSCH transmissions with different priorities for the primary PUCCH group and the secondary PUCCH group, respectively.</p>
<p><i>simultaneousPUCCH-PUSCH-SamePriority, simultaneousPUCCH-PUSCH-SamePriority-SecondaryPUCCHgroup</i> Enables simultaneous PUCCH and PUSCH transmissions on different cells in different bands with same priority for the primary PUCCH group and the secondary PUCCH group, respectively, as specified in clause 9 of TS 38.213 [13].</p>
<p><i>simultaneousSR-PUSCH-diffPUCCH-Groups</i> Enables simultaneous SR and PUSCH transmissions in different PUCCH groups (see TS 38.321 [3], clause 5.4.1, clause 5.4.4).</p>
<p><i>sizeDCI-2-6</i> Size of DCI format 2-6 (see TS 38.213 [13], clause 10.3).</p>
<p><i>sp-CSI-RNTI</i> RNTI for Semi-Persistent CSI reporting on PUSCH (see <i>CSI-ReportConfig</i>) (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 <i>CSI-ReportConfig</i> with <i>reportConfigType</i> set to <i>semiPersistentOnPUSCH</i> is configured.</p>
<p><i>tpc-PUCCH-RNTI</i> RNTI used for PUCCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).</p>

<i>tpc-PUSCH-RNTI</i> RNTI used for PUSCH TPC commands on DCI (see TS 38.213 [13], clause 10.1).
<i>tpc-SRS-RNTI</i> RNTI used for SRS TPC commands on DCI (see TS 38.213 [13], clause 10.1).
<i>twoQCL-TypeD-ForMultiDCI</i> Indicates whether a UE is expected to identify and monitor two QCL-TypeD properties for multiple overlapping CORESETs, where the first QCL-TypeD is associated with <i>coresetPoolIndex</i> value 0, and the second QCL-TypeD is associated with <i>coresetPoolIndex</i> value 1. (See TS 38,213 [13], clause 10).
<i>twoQCLTypeDforPDCCHRepetition</i> 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.
<i>uci-MuxWithDiffPrio, uci-MuxWithDiffPrio-secondaryPUCCHgroup</i> 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.
<i>ul-TotalDAI-Included</i> 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 (<i>pdsch-HARQ-ACK-Codebook</i> is set to <i>enhancedDynamic</i>).
<i>xScale</i> 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 <i>xScale</i> 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**

<i>pdsch-HARQ-ACK-CodebookListMulticast</i> 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 <i>pdsch-HARQ-ACK-Codebook</i> (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 <i>pdsch-HARQ-ACK-Codebook</i> 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).
<i>type1CodebookGenerationMode</i> 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**

<i>pdsch-HARQ-ACK-EnhType3CBG</i> 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.
<i>pdsch-HARQ-ACK-EnhType3NDI</i> 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.
<i>perCC</i> Configures enhanced Type 3 HARQ-ACK codebook using per CC configuration.
<i>perHARQ, perHARQ-Ext</i> Configures enhanced Type 3 HARQ-ACK codebook using per HARQ process and CC configuration. <i>perHARQ-Ext</i> is present only when <i>nrofHARQ-ProcessesForPDSCH-v1700</i> is present in <i>pdsch-ServingCellConfig</i> of at least one serving cell in the PUCCH group. If <i>perHARQ-Ext</i> is present, the UE ignores <i>perHARQ</i> .

CellDTRX-DCI-config field descriptions	
cellDTRX-RNTI	The RNTI value for scrambling CRC of DCI format 2_9 for activating and/or deactivating Cell DTX/DRX and/or NES mode for CHO indication.
sizeDCI-2-9	The size of DCI format 2_9.

Conditional Presence	Explanation
<i>MCG-Only</i>	This field is optionally present, Need R, in the <i>PhysicalCellGroupConfig</i> of the MCG. It is absent otherwise.
<i>NCR</i>	This field is optionally present, Need M for NCR-MT. It is absent otherwise.
<i>SCG-Only</i>	This field is optionally present, Need S, in the <i>PhysicalCellGroupConfig</i> of the SCG in (NG)EN-DC as defined in TS 38.213 [13]. It is absent otherwise.
<i>twoPUCCHgroup</i>	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 ::=
    mcc          SEQUENCE {
        MCC          OPTIONAL,          -- Cond MCC
        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
```

<i>PLMN-Identity</i> field descriptions	
<i>mcc</i>	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 <i>mcc</i> of the immediately preceding IE <i>PLMN-Identity</i> . See TS 23.003 [21].
<i>mnc</i>	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           -- Cond eventID-TSS
  ]],
  [[
  mobileIAB-Support-r18             ENUMERATED {true}                OPTIONAL           -- Need S
  ]]
}
-- 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 and NCR-MT.
gNB-ID-Length	Indicates the length of the gNB ID out of the 36-bit long <i>cellIdentity</i> . This field is always present if the <i>mobileIAB-Support</i> is broadcasted in a cell.
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. This field is absent if <i>mobileIAB-Cell</i> is broadcasted in the cell.
mobileIAB-Support	This field indicates the support of mobile IAB and whether the cell can be considered as a candidate for cell (re)selection for mobile IAB-node. This field is absent if <i>mobileIAB-Cell</i> is broadcasted in the cell. If the field is absent, the cell is barred for mobile IAB-node.
trackingAreaCode	Indicates Tracking Area Code to which the cell indicated by <i>cellIdentity</i> 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 <i>cellIdentity</i> field belongs. If this field is present, network does not configure <i>trackingAreaCode</i> . Total number of different TACs across different <i>PLMN-IdentityInfos</i> shall not exceed <i>maxTAC</i> . This field is only present in an NTN cell.

Conditional Presence	Explanation
<i>eventID-TSS</i>	If <i>eventID-TSS</i> is present in SIB9, this field is mandatory present in the <i>PLMN-IdentityInfo</i> IE of <i>PLMN-IdentityInfoList</i> in SIB1. Otherwise, the field is optionally present, Need R.

– *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

```

<i>PTRS-DownlinkConfig</i> field descriptions
<p><i>epre-Ratio</i> 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).</p>
<p><i>frequencyDensity</i> 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).</p>
<p><i>maxNrofPorts</i> 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.</p>
<p><i>resourceElementOffset</i> Indicates the subcarrier offset for DL PTRS. If the field is absent, the UE applies the value <code>offset00</code> (see TS 38.211 [16], clause 7.4.1.2.2).</p>
<p><i>timeDensity</i> 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).</p>

– *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
            }
        ...,
        [ [
            maxNrofPorts-SDM-r18
                ENUMERATED {n1, n2}
                OPTIONAL, -- Need R
            ] ]
    }

-- TAG-PTRS-UPLINKCONFIG-STOP
-- ASN1STOP

```

<i>PTRS-UplinkConfig</i> field descriptions
<i>frequencyDensity</i> 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).
<i>maxNrofPorts, maxNrofPorts-SDM</i> The maximum number of UL PTRS ports for CP-OFDM (see TS 38.214 [19], clause 6.2.3.1).
<i>ptrs-Power</i> UL PTRS power boosting factor per PTRS port (see TS 38.214 [19], clause 6.1, table 6.2.3.1.3).
<i>resourceElementOffset</i> Indicates the subcarrier offset for UL PTRS for CP-OFDM. If the field is absent, the UE applies the value <i>offset00</i> (see TS 38.211 [16], clause 6.4.1.2.2).
<i>sampleDensity</i> Sample density of PT-RS for DFT-s-OFDM, pre-DFT, indicating a set of thresholds $T = \{NRB_n, n=0,1,2,3,4\}$, 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.
<i>timeDensity</i> 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).
<i>timeDensityTransformPrecoding</i> Time density (OFDM symbol level) of PT-RS for DFT-s-OFDM. If the field is absent, the UE applies value <i>d1</i> (see TS 38.214 [19], clause 6.1).
<i>transformPrecoderDisabled</i> Configuration of UL PTRS without transform precoder (with CP-OFDM).
<i>transformPrecoderEnabled</i> 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
    }

```

```

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}
}
dl-DataToUL-ACK-DCI-1-2-r16           SetupRelease { DL-DataToUL-ACK-DCI-1-2-r16 }        OPTIONAL, -- Need R
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 ::=
  interslotFrequencyHopping
  additionalDMRS
  maxCodeRate
  nrofSlots
  pi2BPSK
  simultaneousHARQ-ACK-CSI
}

SEQUENCE {
  ENUMERATED {enabled}
  ENUMERATED {true}
  PUCCH-MaxCodeRate
  ENUMERATED {n2,n4,n8}
  ENUMERATED {enabled}
  ENUMERATED {true}
}

OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need S
OPTIONAL, -- Need R
OPTIONAL, -- Need R

PUCCH-FormatConfigExt-r17 ::=
  maxCodeRateLP-r17
  ...
}

SEQUENCE {
  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 ::=
  pucch-ResourceSetId
  resourceList
  maxPayloadSize
}

SEQUENCE {
  PUCCH-ResourceSetId,
  SEQUENCE (SIZE (1..maxNrofPUCCH-ResourcesPerSet)) OF PUCCH-ResourceId,
  INTEGER (4..256)
}

OPTIONAL -- Need R

PUCCH-ResourceSetId ::=
  INTEGER (0..maxNrofPUCCH-ResourceSets-1)

PUCCH-Resource ::=
  pucch-ResourceId
  startingPRB
  intraSlotFrequencyHopping
  secondHopPRB
  format
  format0
  format1
  format2
  format3
  format4
}

SEQUENCE {
  PUCCH-ResourceId,
  PRB-Id,
  ENUMERATED { enabled }
  PRB-Id
  CHOICE {
    PUCCH-format0,
    PUCCH-format1,
    PUCCH-format2,
    PUCCH-format3,
    PUCCH-format4
  }
}

OPTIONAL, -- Need R
OPTIONAL, -- Need R

PUCCH-ResourceExt-v1610 ::=
  interlaceAllocation-r16
  rb-SetIndex-r16
  interlace0-r16
  scs15
  scs30
}

SEQUENCE {
  SEQUENCE {
    INTEGER (0..4),
    CHOICE {
      INTEGER (0..9),
      INTEGER (0..4)
    }
  }
}

OPTIONAL, --Need R

format-v1610
  interlace1-v1610
  occ-v1610
  occ-Length-v1610
}

CHOICE {
  INTEGER (0..9),
  SEQUENCE {
    ENUMERATED {n2,n4}
  }
}

OPTIONAL, -- Need M

```

```

        occ-Index-v1610          ENUMERATED {n0,n1,n2,n3}          OPTIONAL -- Need M
    }
}
...
[[
format-v1700          SEQUENCE {
    nrofPRBs-r17      INTEGER (1..16)
}
pucch-RepetitionNrofSlots-r17    ENUMERATED { n1,n2,n4,n8 }    OPTIONAL, -- Need R
]],
[[
applyIndicatedTCI-State-r18      ENUMERATED {first, second, both}    OPTIONAL, -- Need R
multipanelSFN-Scheme-r18        ENUMERATED {enabled}          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
<p><i>dl-DataToUL-ACK, dl-DataToUL-ACK-DCI-1-2</i> List of timing for given PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field <i>dl-DataToUL-ACK</i> applies to DCI format 1_1 and the field <i>dl-DataToUL-ACK-DCI-1-2</i> 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 <i>dl-DataToUL-ACK-v1700</i> is applicable for NTN and <i>dl-DataToUL-ACK-r17</i> is applicable for up to 71 GHz. If <i>dl-DataToUL-ACK-r16</i> or <i>dl-DataToUL-ACK-r17</i> or <i>dl-DataToUL-ACK-v1700</i> is signalled, UE shall ignore the <i>dl-DataToUL-ACK</i> (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 <i>dl-DataToUL-ACK-r17</i> and <i>dl-DataToUL-ACK-DCI-1-2-r17</i> are only applicable for SCS of 480 kHz or 960 kHz.</p>
<p><i>dl-DataToUL-ACK-MulticastDCI-Format4-1</i> List of timing for given group-common PDSCH to the DL ACK (see TS 38.213 [13], clause 9.1.2). The field <i>dl-DataToUL-ACK-MulticastDciFormat4-1</i> 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).</p>
<p><i>dmrs-BundlingPUCCH-Config</i> 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.</p>
<p><i>dmrs-UplinkTransformPrecodingPUCCH</i> This field is used for PUCCH formats 3 and 4 according to TS 38.211, Clause 6.4.1.3.3.1.</p>
<p><i>format0</i> Parameters that are common for all PUCCH resources of format 0.</p>
<p><i>format1</i> Parameters that are common for all PUCCH resources of format 1.</p>
<p><i>format2</i> Parameters that are common for all PUCCH resources of format 2.</p>
<p><i>format3</i> Parameters that are common for all PUCCH resources of format 3.</p>
<p><i>format4</i> Parameters that are common for all PUCCH resources of format 4.</p>
<p><i>mappingPattern</i> 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).</p>
<p><i>numberOfBitsForPUCCH-ResourceIndicatorDCI-1-2</i> 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).</p>
<p><i>powerControlSetInfoToAddModList</i> Configures power control sets for repetition of a PUCCH transmission in FR1. This field is not configured if <i>ul-powerControl</i> is configured in the <i>BWP-UplinkDedicated</i> in which the <i>PUCCH-Config</i> is included.</p>
<p><i>pucch-PowerControl</i> Configures power control parameters PUCCH transmission. This field is not configured if <i>unifiedTCI-StateType</i> is configured for the serving cell.</p>
<p><i>resourceGroupToAddModList, resourceGroupToReleaseList</i> Lists for adding and releasing groups of PUCCH resources that can be updated simultaneously for spatial relations with a MAC CE.</p>
<p><i>resourceSetToAddModList, resourceSetToReleaseList</i> Lists for adding and releasing PUCCH resource sets (see TS 38.213 [13], clause 9.2).</p>
<p><i>resourceToAddModList, resourceToAddModListExt, resourceToReleaseList</i> Lists for adding and releasing PUCCH resources applicable for the UL BWP and serving cell in which the <i>PUCCH-Config</i> 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 <i>resourceToAddModListExt</i>, it includes the same number of entries, and listed in the same order, as in <i>resourceToAddModList</i>.</p>
<p><i>secondTPCFieldDCI-1-1, secondTPCFieldDCI-1-2</i> 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).</p>

<p><i>spatialRelationInfoToAddModList</i>, <i>spatialRelationInfoToAddModListSizeExt</i>, <i>spatialRelationInfoToAddModListExt</i> 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 <i>spatialRelationInfoToAddModList</i> and in <i>spatialRelationInfoToAddModListSizeExt</i> as a single list, i.e. an entry created using <i>spatialRelationInfoToAddModList</i> can be modified using <i>spatialRelationInfoToAddModListSizeExt</i> (or deleted using <i>spatialRelationInfoToReleaseListSizeExt</i>) and vice-versa. If the network includes <i>spatialRelationInfoToAddModListExt</i>, it includes the same number of entries, and listed in the same order, as in the concatenation of <i>spatialRelationInfoToAddModList</i> and of <i>spatialRelationInfoToAddModListSizeExt</i>. If <i>unifiedTCI-StateType</i> is configured for the serving cell, no element in this list is configured.</p>
<p><i>spatialRelationInfoToReleaseList</i>, <i>spatialRelationInfoToReleaseListSizeExt</i>, <i>spatialRelationInfoToReleaseListExt</i> Lists of spatial relation configurations between a reference RS and PUCCH to be released by the UE.</p>
<p><i>sps-PUCCH-AN-List</i> Indicates a list of PUCCH resources for DL SPS HARQ ACK. The field <i>maxPayloadSize</i> is absent for the first and the last <i>SPS-PUCCH-AN</i> in the list. If configured, this overrides <i>n1PUCCH-AN</i> in <i>SPS-config</i>.</p>
<p><i>sps-PUCCH-AN-ListMulticast</i> The field is used to configure the list of PUCCH resources per HARQ ACK codebook for MBS multicast.</p>
<p><i>subslotLengthForPUCCH</i> Indicates the sub-slot length for sub-slot based PUCCH feedback in number of symbols (see TS 38.213 [13], clause 9). Value <i>n2</i> corresponds to 2 symbols, value <i>n6</i> corresponds to 6 symbols, value <i>n7</i> corresponds to 7 symbols. For normal CP, the value is either <i>n2</i> or <i>n7</i>. For extended CP, the value is either <i>n2</i> or <i>n6</i>.</p>
<p><i>ul-AccessConfigListDCI-1-1</i>, <i>ul-AccessConfigListDCI-1-2</i> 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 <i>ul-AccessConfigListDCI-1-1-r16</i> and <i>ul-AccessConfigListDCI-1-2-r17</i> are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.2.2-6). The field <i>ul-AccessConfigListDCI-1-1-r17</i> 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).</p>

<i>PUCCH-format3</i> field descriptions
<p><i>nrofPRBs</i> The supported values are 1,2,3,4,5,6,8,9,10,12,15 and 16. The UE shall ignore this field when <i>format-v1610</i> is configured.</p>

<i>PUCCH-FormatConfig, PUCCH-FormatConfigExt</i> field descriptions	
<i>additionalDMRS</i>	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.
<i>interslotFrequencyHopping</i>	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.
<i>maxCodeRate</i>	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.
<i>maxCodeRateLP</i>	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 <i>PUCCH-ConfigurationList-r16</i> 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 <i>PUCCH-ConfigurationList-r16</i> .
<i>nrofSlots</i>	Number of slots with the same PUCCH. When the field is absent the UE applies the value <i>n1</i> . See TS 38.213 [13], clause 9.2.6.
<i>pi2BPSK</i>	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.
<i>rb-SetIndex</i>	Indicates the RB set where PUCCH resource is allocated.
<i>simultaneousHARQ-ACK-CSI</i>	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 <i>off</i> . The field is not applicable for format 0 and 1.

PUCCH-Resource, PUCCH-ResourceExt field descriptions
<p>applyIndicatedTCI-State This field indicates, for PUCCH transmission(s) corresponding to this PUCCH resource, if UE applies the first, the second or both "indicated" UL only TCI or joint TCI as specified in TS 38.213 9.2.2. For PUCCH resources belonging to a PUCCH group, network configures same value. If more than one value for the field <i>coresetPoolIndex</i> is configured in IE <i>controlResourceSet</i> for the BWP, the value 'first' corresponds to the "indicated" joint/UL TCI states specific to <i>coresetPoolIndex</i> value 0 and the value 'second' corresponds to the value 1, respectively. In this case, network does not configure the value 'both'.</p>
<p>format Selection of the PUCCH format (format 0 – 4) and format-specific parameters, see TS 38.213 [13], clause 9.2. <i>format0</i> and <i>format1</i> are only allowed for a resource in a first PUCCH resource set. <i>format2</i>, <i>format3</i> and <i>format4</i> are only allowed for a resource in non-first PUCCH resource set. The network can only configure <i>format-v1610</i> when format is set to <i>format2</i> or <i>format3</i>. The network only configures <i>format-v1700</i> when format is set to <i>format0</i>, <i>format1</i> or <i>format4</i>.</p>
<p>interlace0 This is the only interlace of interlaced PUCCH Format 0 and 1 and the first interlace for interlaced PUCCH Format 2 and 3.</p>
<p>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 <i>interlace1</i> shall satisfy $interlace1 = \text{mod}(interlace0 + X, 10)$ where $X=1, -1, \text{ or } 5$.</p>
<p>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.</p>
<p>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 <i>format0</i>, <i>format1</i>, and <i>format4</i> in FR2-2. The supported values for <i>format4</i> are 1,2,3,4,5,6,8,9,10,12,15 and 16.</p>
<p>multipanelSFN-Scheme Parameter to configure multiple panel simultaneous uplink transmission SFN scheme for PUCCH resources, see TS 38.214 [19] clause 6.1.1.</p>
<p>occ-Index Indicates the orthogonal cover code index (see TS 38.213 [13], clause 9.2.1). This field is applicable when <i>useInterlacePUCCH-PUSCH-16</i> is configured.</p>
<p>occ-Length Indicates the orthogonal cover code length (see TS 38.213 [13], clause 9.2.1). This field is applicable when <i>useInterlacePUCCH-PUSCH-16</i> is configured.</p>
<p>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 <i>pucch-RepetitionNrofSlots</i> and the field <i>nrofSlots</i> are present, the field <i>nrofSlots</i> is ignored and apply the value of <i>pucch-RepetitionNrofSlots</i> 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 <i>nrofSlots</i>.</p>
<p>pucch-ResourceId Identifier of the PUCCH resource.</p>
<p>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).</p>

<i>PUCCH-ResourceSet</i> field descriptions	
<i>maxPayloadSize</i>	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 <i>PUCCH-ResourceSet</i> 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.
<i>resourceList</i>	PUCCH resources of <i>format0</i> and <i>format1</i> are only allowed in the first PUCCH resource set, i.e., in a PUCCH-ResourceSet with <i>pucch-ResourceSetId</i> = 0. This set may contain between 1 and 32 resources. PUCCH resources of <i>format2</i> , <i>format3</i> and <i>format4</i> are only allowed in a <i>PUCCH-ResourceSet</i> with <i>pucch-ResourceSetId</i> > 0. If present, these sets contain between 1 and 8 resources each. The UE chooses a <i>PUCCH-Resource</i> 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 <i>PUCCH-Config</i> .

Conditional Presence	Explanation
<i>PI2-BPSK</i>	The field is optionally present, Need R, if <i>format3</i> and/or <i>format4</i> are configured and <i>pi2BPSK</i> 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

```


<i>PUCCH-ConfigCommon</i> field descriptions	
<i>additionalPRBOffset</i>	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.
<i>hoppingId</i>	Cell-specific scrambling ID for group hopping and sequence hopping if enabled, see TS 38.211 [16], clause 6.3.2.2.
<i>intra-SlotFH-r17</i>	In case a separate initial UL BWP is configured for (e)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 (e)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.
<i>nrofPRBs</i>	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.
<i>p0-nominal</i>	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).
<i>pucch-GroupHopping</i>	Configuration of group- and sequence hopping for all the PUCCH formats 0, 1, 3 and 4. Value <i>neither</i> implies neither group or sequence hopping is enabled. Value <i>enable</i> enables group hopping and disables sequence hopping. Value <i>disable</i> disables group hopping and enables sequence hopping (see TS 38.211 [16], clause 6.3.2.2).
<i>pucch-ResourceCommon</i>	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 <i>PUCCH-Config</i> (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated <i>PUCCH-Config</i> 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).
<i>pucch-ResourceCommonRedCap</i>	An entry into a 16-row table where each row configures a set of cell-specific PUCCH resources/parameters for (e)RedCap UEs. The UE uses those PUCCH resources until it is provided with a dedicated <i>PUCCH-Config</i> (e.g. during initial access) on the initial uplink BWP. Once the network provides a dedicated <i>PUCCH-Config</i> 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
<i>InitialBWP-Only</i>	The field is mandatory present in the <i>PUCCH-ConfigCommon</i> of the initial BWP (BWP#0) in SIB1. It is absent in other BWPs including the RedCap-specific initial uplink BWP, if configured.
<i>InitialBWP-RedCap</i>	The field is mandatory present in the <i>PUCCH-ConfigCommon</i> of the RedCap-specific initial BWP. It is optional present, Need R, in the <i>PUCCH-ConfigCommon</i> of the initial BWP configured by <i>initialUplinkBWP</i> . It is absent in other BWPs.
<i>InitialBWP-RedCapOnly</i>	The field is optional present, Need S, in the <i>PUCCH-ConfigCommon</i> 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-CSI-Resource***

The IE *PUCCH-CSI-Resource* is used to indicate a PUCCH resource to use for reporting on PUCCH.

***PUCCH-CSI-Resource* information element**

```

-- ASN1START
-- TAG-PUCCH-CSI-RESOURCE-START

PUCCH-CSI-Resource ::= SEQUENCE {
    uplinkBandwidthPartId BWP-Id,
    pucch-Resource PUCCH-ResourceId
}

-- TAG-PUCCH-CSI-RESOURCE-STOP
-- ASN1STOP

```

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.

– ***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-v1610 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

```

<i>P0-PUCCH</i> field descriptions
<p>p0-PUCCH-Value P0 value for PUCCH with 1dB step size.</p>

<i>PUCCH-PowerControl</i> field descriptions
<p>deltaF-PUCCH-f0 deltaF for PUCCH format 0 with 1dB step size (see TS 38.213 [13], clause 7.2).</p>
<p>deltaF-PUCCH-f1 deltaF for PUCCH format 1 with 1dB step size (see TS 38.213 [13], clause 7.2).</p>
<p>deltaF-PUCCH-f2 deltaF for PUCCH format 2 with 1dB step size (see TS 38.213 [13], clause 7.2).</p>
<p>deltaF-PUCCH-f3 deltaF for PUCCH format 3 with 1dB step size (see TS 38.213 [13], clause 7.2).</p>
<p>deltaF-PUCCH-f4 deltaF for PUCCH format 4 with 1dB step size (see TS 38.213 [13], clause 7.2).</p>
<p>p0-Set A set with dedicated P0 values for PUCCH, i.e., {P01, P02,...} (see TS 38.213 [13], clause 7.2).</p>
<p>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 <i>maxNrofPUCCH-PathlossReference-RSs</i> 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 <i>pathlossReferenceRSs</i> (without suffix) and in <i>pathlossReferenceRSs-v1610</i>. The UE maintains <i>pathlossReferenceRSs</i> and <i>pathlossReferenceRSs-v1610</i> separately: Receiving <i>pathlossReferenceRSs-v1610</i> set to <i>release</i> releases only the entries that were configured by <i>pathlossReferenceRSs-v1610</i>, and receiving <i>pathlossReferenceRSs-v1610</i> set to <i>setup</i> replaces only the entries that were configured by <i>pathlossReferenceRSs-v1610</i> with the newly signalled entries.</p>
<p>twoPUCCH-PC-AdjustmentStates Number of PUCCH power control adjustment states maintained by the UE (i.e., <i>g(i)</i>). If the field is present (<i>n2</i>) the UE maintains two power control states (i.e., <i>g(i,0)</i> and <i>g(i,1)</i>). If the field is absent, it maintains one power control state (i.e., <i>g(i,0)</i>) (see TS 38.213 [13], clause 7.2).</p>

– 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 ::=
    pucch-SpatialRelationInfoId          SEQUENCE {
    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 ::=
    pucch-SpatialRelationInfoId-v1610    PUCCH-SpatialRelationInfoId-v1610        OPTIONAL,    -- Need S
    pucch-PathlossReferenceRS-Id-v1610    PUCCH-PathlossReferenceRS-Id-v1610        OPTIONAL,    --Need R
    ...
}

PUCCH-SRS ::=
    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	
<i>tpc-IndexPCell</i>	An index determining the position of the first bit of TPC command (applicable to the SpCell) inside the DCI format 2-2 payload.
<i>tpc-IndexPUCCH-SCell</i>	An index determining the position of the first bit of TPC command (applicable to the PUCCH SCell) inside the DCI format 2-2 payload.
<i>tpc-IndexPUCCH-sSCell, tpc-IndexPUCCH-sSCellSecondaryPUCCHgroup</i>	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
<i>PDCCH-OfSpCell</i>	The field is mandatory present if the <i>PUCCH-TPC-CommandConfig</i> is provided in the <i>PDCCH-Config</i> for the SpCell. Otherwise, the field is absent, Need R.
<i>PDCCH-ofSpCellOrPUCCH-SCell</i>	The field is mandatory present if the <i>PUCCH-TPC-CommandConfig</i> is provided in the <i>PDCCH-Config</i> 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 <i>PUCCH-TPC-CommandConfig</i> is provided in the <i>PDCCH-Config</i> for the SpCell. Otherwise, the field is absent, Need R.
<i>twoPUCCHgroup</i>	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 ::=
    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},  OPTIONAL, -- Need M
    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}
}
frequencyHoppingOffsetListsDCI-0-2-r16  SetupRelease { FrequencyHoppingOffsetListsDCI-0-2-r16 }  OPTIONAL, -- Need M
codebookSubsetDCI-0-2-r16              ENUMERATED {fullyAndPartialAndNonCoherent, partialAndNonCoherent, nonCoherent}
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 }
resourceAllocationType1GranularityDCI-0-2-r16  ENUMERATED { n2,n4,n8,n16 }                    OPTIONAL, -- Need M
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, fullpowerModel1, 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
}],
[[
maxRank-v1810              INTEGER (5..8)          OPTIONAL, -- Need R
sTx-2Panel-r18             ENUMERATED {enabled}          OPTIONAL, -- Need R
multipanelSchemeSDM-r18    SDM-Scheme-r18          OPTIONAL, -- Need R
multipanelSchemeSFN-r18    SFN-Scheme-r18          OPTIONAL, -- Need R
codebookTypeUL-r18        SetupRelease { CodebookTypeUL-r18 }          OPTIONAL, -- Need M
applyIndicatedTCI-State-r18 ENUMERATED {first, second}          OPTIONAL, -- Need R
dynamicTransformPrecoderFieldPresenceDCI-0-1-r18 ENUMERATED {enabled}          OPTIONAL, -- Need R
dynamicTransformPrecoderFieldPresenceDCI-0-2-r18 ENUMERATED {enabled}          OPTIONAL, -- Need R
pusch-ConfigDCI-0-3-r18    SetupRelease { PUSCH-ConfigDCI-0-3-r18 }          OPTIONAL, -- Need M
]]
}

UCI-OnPUSCH ::=
  betaOffsets
    dynamic
    semiStatic
  }
  scaling          ENUMERATED { f0p5, f0p65, f0p8, f1 }          OPTIONAL, -- Need M
}

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 ::=
  betaOffsetsDCI-0-2-r16
    dynamicDCI-0-2-r16
      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)

SDM-Scheme-r18 ::= SEQUENCE {
    maxRankSDM-r18          INTEGER (1..2)                               OPTIONAL, -- Need R
    maxRankSDM-DCI-0-2-r18 INTEGER (1..2)                               OPTIONAL, -- Need R
}

SFN-Scheme-r18 ::= SEQUENCE {
    maxRankSFN-r18          INTEGER (1..2)                               OPTIONAL, -- Need R
    maxRankSFN-DCI-0-2-r18 INTEGER (1..2)                               OPTIONAL, -- Need R
}

CodebookTypeUL-r18 ::= CHOICE {
    codebook1-r18          ENUMERATED {ng1n4n1, ng1n2n2},
    codebook2-r18          ENUMERATED {ng2},
    codebook3-r18          ENUMERATED {ng4},
    codebook4-r18          ENUMERATED {ng8}
}

PUSCH-ConfigDCI-0-3-r18 ::= SEQUENCE {
    resourceAllocationDCI-0-3-r18 ENUMERATED {resourceAllocationType0, resourceAllocationType1, dynamicSwitch}
                                     OPTIONAL, -- Need M
}

```

```
rbg-SizeDCI-0-3-r18          ENUMERATED {config2, config3}
resourceAllocationType1GranularityDCI-0-3-r18 ENUMERATED {n2,n4,n8,n16}
numberOfBitsForRV-DCI-0-3-r18 INTEGER (0..2)
harq-ProcessNumberSizeDCI-0-3-r18 INTEGER (0..5)
uci-OnPUSCH-ListDCI-0-3-r18 SetupRelease { UCI-OnPUSCH-ListDCI-0-1-r16 }
}

-- TAG-PUSCH-CONFIG-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need S
OPTIONAL, -- Need S
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need M
```

PUSCH-Config field descriptions
<p>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 <i>dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2</i> nor <i>dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2</i> is configured, this field is absent.</p>
<p>applyIndicatedTCI-State This field indicates, for a PUSCH transmission, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.1. This field is absent if more than one value for the field <i>coresetPoolIndex</i> is configured in <i>controlResourceSet</i> for a DL BWP used with this UL BWP.</p>
<p>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.</p>
<p>betaOffsetsCrossPrio0, betaOffsetsCrossPrio1, betaOffsetsCrossPrio0DCI-0-2, betaOffsetsCrossPrio1DCI-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 <i>betaOffsetsCrossPrio0</i> indicates multiplexing low priority (LP) HARQ-ACK on dynamically scheduled high priority (HP) PUSCH. The field <i>betaOffsetsCrossPrio1</i> indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH. The field <i>betaOffsetsCrossPrio0DCI-0-2</i> indicates multiplexing LP HARQ-ACK on dynamically scheduled HP PUSCH by DCI format 0_2. The field <i>betaOffsetsCrossPrio1DCI-0-2</i> indicates multiplexing HP HARQ-ACK on dynamically scheduled LP PUSCH by DCI format 0_2.</p>
<p>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 <i>codebookSubset</i> applies to DCI formats 0_1 and 0_3, and the field <i>codebookSubsetDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1).</p>
<p>codebookTypeUL Configures a codebook and the corresponding number of antenna port groups for codebook-based transmission of PUSCH with 8 antenna ports, see TS 38.211 [16], tables 6.3.1.5-9 to 6.3.1.5-47, and table 6.3.1.5-8 respectively). The values <i>ng1n4n1</i> and <i>ng1n2n2</i> correspond to codebooks with one antenna port group ($N_g=1$), while <i>ng2</i>, <i>ng4</i>, and <i>ng8</i> correspond to codebooks with $N_g=2, 4$, and 8 antenna port groups, respectively.</p>
<p>dataScramblingIdentityPUSCH Identifier used to initialise data scrambling (<i>c_init</i>) for PUSCH. If the field is absent, the UE applies the physical cell ID. (see TS 38.211 [16], clause 6.3.1.1).</p>
<p>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.</p>
<p>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).</p>
<p>dmrs-UplinkForPUSCH-MappingTypeA, dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2 DMRS configuration for PUSCH transmissions using PUSCH mapping type A (chosen dynamically via <i>PUSCH-TimeDomainResourceAllocation</i>). Only the fields <i>dmrs-Type</i>, <i>dmrs-AdditionalPosition</i> and <i>maxLength</i> may be set differently for mapping type A and B. The field <i>dmrs-UplinkForPUSCH-MappingTypeA</i> applies to DCI formats 0_1 and 0_3, and the field <i>dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2</i> applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).</p>
<p>dmrs-UplinkForPUSCH-MappingTypeB, dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2 DMRS configuration for PUSCH transmissions using PUSCH mapping type B (chosen dynamically via <i>PUSCH-TimeDomainResourceAllocation</i>). Only the fields <i>dmrs-Type</i>, <i>dmrs-AdditionalPosition</i> and <i>maxLength</i> may be set differently for mapping type A and B. The field <i>dmrs-UplinkForPUSCH-MappingTypeB</i> applies to DCI formats 0_1 and 0_3, and the field <i>dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2</i> applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1).</p>
<p>dynamicTransformPrecoderFieldPresenceDCI-0-1 Configure the presence of "Dynamic Transform Precoder" field in DCI format 0_1. When the field is configured, then the "Dynamic Transform Precoder" field is present in DCI format 0_1. Otherwise, the field size is set to 0 for DCI format 0_1 (See TS 38.212 [17]). The network ensures <i>dynamicTransformPrecoderFieldPresenceDCI-0-1-r18</i> and <i>twoPHRMode-r17</i> cannot be configured at the same time for a UE.</p>

<p>dynamicTransformPrecoderFieldPresenceDCI-0-2 Configure the presence of "Dynamic Transform Precoder" field in DCI format 0_2. When the field is configured, then the "Dynamic Transform Precoder" 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]). The network ensures <i>dynamicTransformPrecoderFieldPresenceDCI-0-2-r18</i> and <i>twoPHRMode-r17</i> cannot be configured at the same time for a UE.</p>
<p>frequencyHopping The value <i>intraSlot</i> enables 'Intra-slot frequency hopping' and the value <i>interSlot</i> 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 <i>frequencyHopping</i> applies to DCI formats 0_0, 0_1 and 0_3 for 'pusch-RepTypeA'.</p>
<p>frequencyHoppingDCI-0-1 Indicates the frequency hopping scheme for DCI format 0_1 when <i>pusch-RepTypeIndicatorDCI-0-1</i> is set to 'pusch-RepTypeB', The value <i>interRepetition</i> enables 'Inter-repetition frequency hopping', and the value <i>interSlot</i> 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).</p>
<p>frequencyHoppingDCI-0-2 Indicate the frequency hopping scheme for DCI format 0_2. The value <i>intraSlot</i> enables 'intra-slot frequency hopping', and the value <i>interRepetition</i> enables 'Inter-repetition frequency hopping', and the value <i>interSlot</i> enables 'Inter-slot frequency hopping'. When <i>pusch-RepTypeIndicatorDCI-0-2</i> 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 <i>pusch-RepTypeIndicatorDCI-0-2</i> 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).</p>
<p>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 <i>frequencyHoppingOffsetLists</i> applies to DCI formats 0_0, 0_1 and 0_3, and the field <i>frequencyHoppingOffsetListsDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.3).</p>
<p>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).</p>
<p>invalidSymbolPattern Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0_1 and 0_2. If <i>InvalidSymbolPattern</i> 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).</p>
<p>invalidSymbolPatternIndicatorDCI-0-1, invalidSymbolPatternIndicatorDCI-0-2 Indicates the presence of an additional bit in the DCI format 0_1/0_2. If <i>invalidSymbolPattern</i> is absent, then both <i>invalidSymbolPatternIndicatorDCI-0-1</i> and <i>invalidSymbolPatternIndicatorDCI-0-2</i> are absent. The field <i>invalidSymbolPatternIndicatorDCI-0-1</i> applies to the DCI format 0_1 and the field <i>invalidSymbolPatternIndicatorDCI-0-2</i> 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.</p>
<p>mappingPattern Indicates whether the UE should follow Cyclical mapping pattern or Sequential mapping pattern for when two SRS resource sets are configured in <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> with usage 'codebook' or 'noncodebook' for PUSCH transmission and the PUSCH transmission occasions are associated with both SRS resource sets.</p>
<p>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 <i>maxRank</i> applies to DCI formats 0_1 and 0_3, and the field <i>maxRankDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.1.1). If network configures <i>maxRank-v1810</i> UE ignores <i>maxRank</i> (without suffix).</p>
<p>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 <i>mcs-Table</i> applies to DCI formats 0_0, 0_1 and 0_3, and the field <i>mcs-TableDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).</p>
<p>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 <i>mcs-TableTransformPrecoder</i> applies to DCI format 0_0, 0_1 and 0_3, and the field <i>mcs-TableTransformPrecoderDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.4.1).</p>

<p>minimumSchedulingOffsetK2 List of minimum K2 values. Minimum K2 parameter denotes minimum applicable value(s) for the <i>Time domain resource assignment</i> table for PUSCH (see TS 38.214 [19], clause 6.1.2.1).</p>
<p>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 <i>additionalPCI</i> is configured only if the resource is SSB. For each resource, if neither <i>cell</i> nor <i>additionalPCI</i> is present, the SSB/CSI-RS resource is from the serving cell where the <i>PUSCH-Config</i> is configured.</p>
<p>multipanelSchemeSDM Configures UE with a multiple panel simultaneous uplink transmission SDM scheme for PUSCH. Network does not configure <i>multipanelSchemeSDM</i> with <i>multipanelSchemeSFN</i>. When this parameter is configured, more than one value for the field <i>coresetPoolIndex</i> are configured and two SRS resource sets for <i>codebook</i> or <i>noncodebook</i> are configured.</p>
<p>multipanelSchemeSFN Configures UE with a multiple panel simultaneous uplink transmission SFN scheme for PUSCH. Network does not configure <i>multipanelSchemeSFN</i> with <i>multipanelSchemeSDM</i>. When this parameter is configured, more than one value for the field <i>coresetPoolIndex</i> are configured and two SRS resource sets for <i>codebook</i> or <i>noncodebook</i> are configured.</p>
<p>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).</p>
<p>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).</p>
<p>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 <i>priorityIndicatorDCI-0-1</i> applies to DCI format 0_1 and the field <i>priorityIndicatorDCI-0-2</i> applies to DCI format 0_2 (see TS 38.212 [17] clause 7.3.1 and TS 38.213 [13] clause 9).</p>
<p>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.</p>
<p>pusch-PowerControl Configures power control parameters PUSCH transmission. This field is not configured if <i>unifiedTCI-StateType</i> is configured for the serving cell.</p>
<p>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 <i>pusch-RepTypeA</i> enables the 'PUSCH repetition type A' and the value <i>pusch-RepTypeB</i> enables the 'PUSCH repetition type B'. The field <i>pusch-RepTypeIndicatorDCI-0-1</i> applies to DCI format 0_1 and the field <i>pusch-RepTypeIndicatorDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2.1).</p>
<p>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 <i>pusch-TimeDomainAllocationList</i> applies to DCI format 0_0, or DCI formats 0_1 and 0_3 when the field <i>pusch-TimeDomainAllocationListDCI-0-1</i> is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and tables 6.1.2.1.1-1A and 6.1.2.1.1-1C). The network does not configure the <i>pusch-TimeDomainAllocationList</i> (without suffix) simultaneously with the <i>pusch-TimeDomainAllocationListDCI-0-2-r16</i> or <i>pusch-TimeDomainAllocationListDCI-0-1-r16</i> or <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i>.</p>
<p>pusch-TimeDomainAllocationListDCI-0-1 Configuration of the time domain resource allocation (TDRA) table for DCI formats 0_1 and 0_3 (see TS 38.214 [19], clause 6.1, tables 6.1.2.1.1-1A and 6.1.2.1.1-1C).</p>
<p>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).</p>
<p>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 <i>PUSCH-TimeDomainResourceAllocationList-r16</i> configured by this field. This field is not configured simultaneously with <i>pusch-AggregationFactor</i>. The network does not configure the <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> simultaneously with the <i>pusch-TimeDomainAllocationListDCI-0-1-r16</i>. The network does not configure the <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> simultaneously with the <i>numberOfSlotsTBoMS-r17</i>.</p>

<p>rbg-Size Selection between configuration 1 and configuration 2 for RBG size for PUSCH except PUSCH scheduled by DCI format 0_3. The UE does not apply this field if <i>resourceAllocation</i> is set to <i>resourceAllocationType1</i>. Otherwise, the UE applies the value <i>config1</i> when the field is absent (see TS 38.214 [19], clause 6.1.2.2.1).</p>
<p>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 <i>resourceAllocation</i> applies to DCI format 0_1 and the field <i>resourceAllocationDCI-0-2</i> applies to DCI format 0_2 (see TS 38.214 [19], clause 6.1.2).</p>
<p>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).</p>
<p>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,</p>
<p>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 <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> with usage 'codebook' or 'noncodebook'.</p>
<p>sTx-2Panel Parameter to enable PUSCH+PUSCH multiple panel simultaneous uplink transmission in multi-DCI based mTRP system. When this parameter is configured, more than one value for the field <i>coresetPoolIndex</i> is configured and two SRS resource sets for <i>codebook</i> or <i>noncodebook</i> are configured.</p>
<p>tp-pi2BPSK Enables pi/2-BPSK modulation with transform precoding if the field is present and disables it otherwise.</p>
<p>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 <i>msg3-transformPrecoder</i> from <i>rach-ConfigCommon</i> included directly within BWP configuration (i.e., not included in <i>additionalRACH-ConfigList</i>).</p>
<p>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.</p>
<p>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 <i>uci-OnPUSCH-ListDCI-0-1</i> applies to DCI format 0_1 and the field <i>uci-OnPUSCH-ListDCI-0-2</i> applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).</p>
<p>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 <i>ul-AccessConfigListDCI-0-1-r16</i> and <i>ul-AccessConfigListDCI-0-2-r17</i> are only applicable for FR1 (see TS 38.212 [17], Table 7.3.1.1.2-35). The field <i>ul-AccessConfigListDCI-0-1-r17</i> 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).</p>
<p>ul-FullPowerTransmission Configures the UE with UL full power transmission mode as specified in TS 38.213 [13]. This field is not configured if <i>ul-powerControl</i> is configured in the <i>BWP-UplinkDedicated</i> in which the <i>PUCCH-Config</i> is included.</p>

PUSCH-ConfigDCI-0-3 field descriptions
<p>harq-ProcessNumberSizeDCI-0-3 Configure the number of bits for the field "HARQ process number" in DCI format 0_3 (see TS 38.212 [17], clause 7.3.1).</p>
<p>numberOfBitsForRV-DCI-0-3 Configures the number of bits for "Redundancy version" in the DCI format 0_3 (see TS 38.212 [17], clause 7.3.1 and TS 38.214 [19], clause 6.1.2.1).</p>
<p>rbg-SizeDCI-0-3 Selection among configuration 1, configuration 2 and configuration 3 for RBG size for PUSCH scheduled by DCI format 0_3. The UE does not apply this field if resourceAllocationDCI-0-3 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).</p>
<p>resourceAllocationDCI-0-3 Configuration of resource allocation type 0 and resource allocation type 1 for DCI format 0_3 (see TS 38.214 [19], clause 6.1.2).</p>
<p>resourceAllocationType1GranularityDCI-0-3 Configures the scheduling granularity applicable for both the starting point and length indication for resource allocation type 1 in DCI format 0_3. If this field is absent, the granularity is 1 PRB (see TS 38.214 [19], clause 6.1.2.2.2).</p>
<p>uci-OnPUSCH-ListDCI-0-3 Selection between and configuration of dynamic and semi-static beta-offset for DCI format 0_3.</p>

SDM-Scheme field descriptions
<p>maxRankSDM, maxRankSDM-DCI-0-2 configure maximal number of MIMO layers of each panel in SDM scheme for codebook based PUSCH or for DCI 0_2 for codebook based PUSCH.</p>

SFN-Scheme field descriptions
<p>maxRankSFN, maxRankSFN-DCI-0-2 configure maximal number of MIMO layers of each panel in SFN scheme for codebook based PUSCH or for DCI 0_2 for codebook based PUSCH.</p>

UCI-OnPUSCH field descriptions
<p>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).</p>
<p>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 <i>f0p5</i> corresponds to 0.5, value <i>f0p65</i> 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).</p>

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
<i>codebookBased</i>	The field is mandatory present if <i>txConfig</i> is set to codebook and absent otherwise.
<i>RepTypeB</i>	The field is optionally present, Need S, if <i>pusch-RepTypeIndicatorDCI-0-1</i> is set to <i>pusch-RepTypeB</i> . It is absent otherwise.
<i>RepTypeB2</i>	The field is optionally present, Need S, if <i>pusch-RepTypeIndicatorDCI-0-1</i> or <i>pusch-RepTypeIndicatorDCI-0-2</i> is set to <i>pusch-RepTypeB</i> . It is absent otherwise.
<i>SRSsets</i>	This field is mandatory present when UE is configured with two SRS sets in either <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> 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

```

<i>PUSCH-ConfigCommon</i> 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
    pathlossReferenceRSToReleaseListSizeExt-v1610 SEQUENCE (SIZE (1..maxNrofPUSCH-PathlossReferenceRSsDiff-r16)) OF PUSCH-PathlossReferenceRS-Id-
v1610
    p0-PUSCH-SetList-r16 SEQUENCE (SIZE (1..maxNrofSRI-PUSCH-Mappings)) OF P0-PUSCH-Set-r16 OPTIONAL, -- Need N
    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
    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
<p>deltaMCS Indicates whether to apply delta MCS. When the field is absent, the UE applies $K_s = 0$ in delta_TFC formula for PUSCH (see TS 38.213 [13], clause 7.1).</p>
<p>dummy This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>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.</p>
<p>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 <i>olpc-ParameterSetDCI-0-1</i> applies to DCI format 0_1 and the field <i>olpc-ParameterSetDCI-0-2</i> applies to DCI format 0_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 11).</p>
<p>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).</p>
<p>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).</p>
<p>p0-PUSCH-SetList Configure one additional <i>P0-PUSCH-Set</i> 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 <i>P0-PUSCH-AlphaSet</i> and the P0 value(s) from the <i>P0-PUSCH-Set</i> (See TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 17).</p>
<p>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 <i>p0-PUSCH-SetList-r16</i> is used. When this field is present the <i>p0-PUSCH-SetList-r16</i> corresponds to the first SRS resource set (see TS 38.213 [13]).</p>
<p>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 <i>pathLossReferenceRSToAddModList</i> and Reference Signals configured using <i>pathlossReferenceRSToAddModListSizeExt</i>. Up to <i>maxNrofPUSCH-PathlossReferenceRSs</i> may be configured (see TS 38.213 [13], clause 7.1).</p>
<p>pathlossReferenceRSToReleaseList, pathlossReferenceRSToReleaseListSizeExt Lists of reference signals for PUSCH path loss estimation to be released by the UE.</p>
<p>sri-PUSCH-MappingToAddModList A list of <i>SRI-PUSCH-PowerControl</i> elements among which one is selected by the SRI field in DCI (see TS 38.213 [13], clause 7.1).</p>
<p>sri-PUSCH-MappingToAddModList2 A list of <i>SRI-PUSCH-PowerControl</i> 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 <i>sri-PUSCH-MappingToAddModList</i> corresponds to the first SRS resource set for PUSCH.</p>
<p>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).</p>
<p>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).</p>

SRI-PUSCH-PowerControl field descriptions
sri-P0-PUSCH-AlphaSetId The ID of a <i>P0-PUSCH-AlphaSet</i> as configured in <i>p0-AlphaSets</i> in <i>PUSCH-PowerControl</i> .
sri-PUSCH-ClosedLoopIndex The index of the closed power control loop associated with this <i>SRI-PUSCH-PowerControl</i> .
sri-PUSCH-PathlossReferenceRS-Id The ID of <i>PUSCH-PathlossReferenceRS</i> as configured in the <i>pathlossReferenceRSToAddModList</i> in <i>PUSCH-PowerControl</i> .
sri-PUSCH-PowerControlId The ID of this <i>SRI-PUSCH-PowerControl</i> 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
        ]],
        [[
            maxMIMO-Layers-v1810          INTEGER (5..8)                            OPTIONAL, -- Need R
            maxMIMO-LayersforSDM-r18      INTEGER (1..2)                            OPTIONAL, -- Need R
            maxMIMO-LayersforSDM-DCI-0-2-r18  INTEGER (1..2)                            OPTIONAL, -- Need R
            maxMIMO-LayersforSFN-r18      INTEGER (1..2)                            OPTIONAL, -- Need R
            maxMIMO-LayersforSFN-DCI-0-2-r18  INTEGER (1..2)                            OPTIONAL, -- Need R
        ]],
    }

PUSCH-CodeBlockGroupTransmission ::=
    SEQUENCE {
        maxCodeBlockGroupsPerTransportBlock  ENUMERATED {n2, n4, n6, n8},
        . . .
    }
-- ASN1END
```

```

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 <i>maxRank</i> to the same value. The field <i>maxMIMO-Layers</i> refers to DCI format 0_1. If network configures <i>maxMIMO-Layers-v1810</i> the UE ignores <i>maxMIMO-Layers</i> (without suffix).
--

maxMIMO-LayersforSDM

Parameter to indicate maximal number of MIMO layers of each panel for PUSCH with SDM scheme for NCB PUSCH

maxMIMO-LayersforSDM-DCI-0-2

Parameter to indicate maximal number of MIMO layers of each panel for PUSCH with SDM scheme for DCI format 0_2 for NCB PUSCH
--

maxMIMO-LayersforSFN

Parameter to indicate maximal number of MIMO layers of each panel for PUSCH with SFN scheme for NCB PUSCH

maxMIMO-LayersforSFN-DCI-0-2

Parameter to indicate maximal number of MIMO layers of each panel for PUSCH with SFN scheme for DCI format 0_2 for NCB PUSCH
--

nrofHARQ-ProcessesForPUSCH

The number of HARQ processes to be used on the PUSCH of a serving cell. Value <i>n32</i> 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 <i>maxRankDCI-0-2</i> 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 <i>HARQmodeA</i> and a bit set to zero identifies a HARQ process with <i>HARQmodeB</i> . 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
    pusAllocationList-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 and for FR1. When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH and <i>k2-r16</i> is absent, or when the field is absent and only one PUSCH is configured per PDCCH and <i>k2-r16</i> 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 <i>extendedK2(n)</i> corresponding to <i>k2</i> of the PUSCH(s) in the <i>n</i> -th slot (<i>n</i> >1), or of the PUSCH(s) except the first PUSCH in the first slot (<i>n</i> =1), is absent, the UE applies <i>k2</i> of the first PUSCH plus <i>n</i> -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. <i>k2</i> is absent/ignored if <i>extendedK2</i> 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 <i>numberOfSlotsTBoMS-r17</i> 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 <i>pusch-RepTypeIndicatorDCI-0-1/pusch-RepTypeIndicatorDCI-0-2</i> is not set to <i>pusch-RepTypeB</i> (see TS 38.214 [19], clause 6.1.2.1). If this field is present, the field <i>numberOfRepetitions-r16</i> 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 <i>K</i> is configured by <i>numberOfRepetitions</i> or <i>numberOfRepetitionsExt</i> , the network configures <i>numberOfSlotsTBoMS</i> (<i>N</i>) and <i>K</i> such that $N \cdot K \leq 32$ (see TS 38.214 [19], clause 6.1.2.1). The network does not configure the <i>numberOfSlotsTBoMS-r17</i> simultaneously with the <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> . The network does not configure <i>numberOfSlotsTBoMS-r17</i> together with <i>enhancedSkipUplinkTxDynamic</i> or <i>enhancedSkipUplinkTxConfigured</i> with value <i>true</i> .
puschAllocationList	The field <i>puschAllocationList-r16</i> indicates one or multiple PUSCH continuous in time domain which share a common <i>k2</i> (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 <i>puschAllocationList-r16</i> only has one element in <i>pusch-TimeDomainAllocationListDCI-0-1-r16</i> and in <i>pusch-TimeDomainAllocationListDCI-0-2-r16</i> .
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
<i>Format01-02</i>	In <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> , the field is absent. In <i>pusch-TimeDomainAllocationListDCI-0-1</i> and in <i>pusch-TimeDomainAllocationListDCI-0-2</i> , the field is mandatory present.
<i>Format01-02-For-TypeA</i>	In <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> , the field is absent. In <i>pusch-TimeDomainAllocationListDCI-0-1</i> , the field is optionally present if <i>pusch-RepTypeIndicatorDCI-0-1</i> is not set to <i>pusch-RepTypeB</i> , Need R. It is absent otherwise, Need R. In <i>pusch-TimeDomainAllocationListDCI-0-2</i> , the field is optionally present if <i>pusch-RepTypeIndicatorDCI-0-2</i> is not set to <i>pusch-RepTypeB</i> , Need R. It is absent otherwise, Need R.
<i>NotFormat01-02-Or-TypeA</i>	In <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> , the field is mandatory present. In <i>pusch-TimeDomainAllocationListDCI-0-1</i> , the field is mandatory present if <i>pusch-RepTypeIndicatorDCI-0-1</i> is not set to <i>pusch-RepTypeB</i> . It is absent otherwise, Need R. In <i>pusch-TimeDomainAllocationListDCI-0-2</i> , the field is mandatory present if <i>pusch-RepTypeIndicatorDCI-0-2</i> is not set to <i>pusch-RepTypeB</i> . It is absent otherwise, Need R.
<i>RepTypeB</i>	In <i>pusch-TimeDomainAllocationListForMultiPUSCH-r16</i> , the field is absent. In <i>pusch-TimeDomainAllocationListDCI-0-1</i> , the field is mandatory present if <i>pusch-RepTypeIndicatorDCI-0-1</i> is set to <i>pusch-RepTypeB</i> . It is absent otherwise, Need R. In <i>pusch-TimeDomainAllocationListDCI-0-2</i> , the field is mandatory present if <i>pusch-RepTypeIndicatorDCI-0-2</i> is set to <i>pusch-RepTypeB</i> . It is absent otherwise, Need R.
<i>MultiPUSCH</i>	In case size of <i>puschAllocationList</i> is higher than 1, the field <i>extendedK2(n)</i> corresponding to <i>k2</i> of the <i>n</i> -th PUSCH, <i>n</i> >1, is mandatory present for all <i>n</i> , 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
<i>SUL-Only</i>	The field is optionally present, Need R, if <i>supplementaryUplink</i> is configured within <i>ServingCellConfig</i> . It is absent otherwise.
<i>SUL</i>	The field is optionally present, Need R, if <i>supplementaryUplink</i> is configured within <i>ServingCellConfig</i> . It is mandatory present otherwise.

– QFI

The IE *QFI* is used to indicate the QoS Flow Identifier.

QFI information element

```
-- ASN1START
-- TAG-QFI-START

QFI ::= INTEGER (0..maxQFI)

-- TAG-QFI-STOP
-- ASN1STOP
```

– 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
```

```
-- 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 $Q_{qualmin} = \text{field value [dB]}$.

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 $Q_{rxlevmin} = \text{field value} * 2 \text{ [dBm]}$.

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 ::=
    quantityConfigNR-List          SEQUENCE {
        ...
        [[
            quantityConfigEUTRA    FilterConfig          OPTIONAL -- Need M
        ]],
        [[
            quantityConfigUTRA-FDD-r16  QuantityConfigUTRA-FDD-r16  OPTIONAL -- Need M
            quantityConfigCLI-r16       FilterConfigCLI-r16         OPTIONAL -- Need M
        ]]
    }

QuantityConfigNR ::=
    quantityConfigCell            SEQUENCE {
        quantityConfigRS-Index      QuantityConfigRS,          OPTIONAL -- Need M
        quantityConfigRS
    }

QuantityConfigRS ::=
    ssb-FilterConfig             SEQUENCE {
        csi-RS-FilterConfig         FilterConfig,
        csi-RS-FilterConfig         FilterConfig
    }

FilterConfig ::=
    filterCoefficientRSRP         SEQUENCE {
        filterCoefficientRSRQ      FilterCoefficient          DEFAULT fc4,
        filterCoefficientRS-SINR   FilterCoefficient          DEFAULT fc4,
        filterCoefficientRS-SINR   FilterCoefficient          DEFAULT fc4
    }

FilterConfigCLI-r16 ::=
    filterCoefficientSRS-RSRP-r16 SEQUENCE {
        filterCoefficientCLI-RSSI-r16 FilterCoefficient          DEFAULT fc4,
        filterCoefficientCLI-RSSI-r16 FilterCoefficient          DEFAULT fc4
    }

QuantityConfigUTRA-FDD-r16 ::=
    filterCoefficientRSCP-r16     SEQUENCE {
        filterCoefficientEcNO-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).

<i>QuantityConfigRS</i> field descriptions
<i>csi-RS-FilterConfig</i> 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].
<i>ssb-FilterConfig</i> 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].

<i>QuantityConfigUTRA-FDD</i> field descriptions
<i>filterCoefficientRSCP</i> Specifies L3 filter coefficient for FDD UTRAN CPICH_RSCP measurement results from L1 filter.
<i>filterCoefficientEcN0</i> Specifies L3 filter coefficient for FDD UTRAN CPICH_EcN0 measurement 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, 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 {
            1839                    INTEGER (0..837),
        }
    }
-- ASN1END
```

```

    1139                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))
}
prach-RootSequenceIndex-r16        CHOICE {
    1571                             INTEGER (0..569),
    11151                            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
<p>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 32 entries.</p>
<p>messagePowerOffsetGroupB Threshold for preamble selection. Value is in dB. Value <i>minusinfinity</i> corresponds to $-\infty$. Value <i>dB0</i> corresponds to 0 dB, <i>dB5</i> corresponds to 5 dB and so on (see TS 38.321 [3], clause 5.1.2). This field is set to the same value for different repetition numbers associated with a specific <i>FeatureCombination</i>.</p>
<p>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 <i>prach-ConfigurationIndex</i> in <i>RACH-ConfigGeneric</i> (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 (<i>RACH-ConfigDedicated</i>), 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 <i>BeamFailureRecoveryConfig</i>).</p>
<p>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).</p>
<p>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 <i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i>.</p>
<p>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 <i>prach-ConfigurationIndex</i> in the <i>RACH-ConfigDedicated</i> (if configured). If <i>prach-RootSequenceIndex-r16</i> is signalled, UE shall ignore the <i>prach-RootSequenceIndex</i> (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: $L=139$</p>
<p>ra-ContentionResolutionTimer The initial value for the contention resolution timer (see TS 38.321 [3], clause 5.1.5). Value <i>sf8</i> corresponds to 8 subframes, value <i>sf16</i> corresponds to 16 subframes, and so on.</p>
<p>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). This field is set to the same value for different repetition numbers associated with a specific <i>FeatureCombination</i>.</p>
<p>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).</p>
<p>ra-PrioritizationForAI Indicates whether the field <i>ra-Prioritization-r16</i> 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 <i>ra-Prioritization-r16</i> applies otherwise the field does not apply (see TS 23.501 [32]).</p>
<p>ra-PrioritizationForSlicing Parameters which apply to configure prioritized CBRA 4-step random access type for slicing.</p>
<p>rach-ConfigGeneric RACH parameters for both regular random access and beam failure recovery.</p>
<p>restrictedSetConfig Configuration of an unrestricted set or one of two types of restricted sets, see TS 38.211 [16], clause 6.3.3.1.</p>

<i>rsrp-ThresholdSSB</i>
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]).
<i>rsrp-ThresholdSSB-SUL</i>
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.
<i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i>
The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value <i>oneEighth</i> corresponds to one SSB associated with 8 RACH occasions, value <i>oneFourth</i> 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 <i>n4</i> corresponds to 4 Contention Based preambles per SSB, value <i>n8</i> corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by <i>CB-preambles-per-SSB * max(1, SSB-per-rach-occasion)</i> . See TS 38.213 [13].
<i>totalNumberOfRA-Preambles</i>
Total number of preambles used for contention based and contention free 4-step or 2-step random access in the RACH resources defined in <i>RACH-ConfigCommon</i> , 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 <i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i> , i.e. it should be a multiple of the number of SSBs per RACH occasion.

Conditional Presence	Explanation
<i>AdditionalRACH</i>	The field is mandatory present if the <i>RACH-ConfigCommon</i> is included in an <i>AdditionalRACH-Config</i> . When included in <i>initialUplinkBWP-RedCap</i> to indicate other feature(s) than <i>redcap</i> and <i>eRedCap</i> , this field is mandatory present with at least <i>FeatureCombinationPreambles</i> list entries: the list entry/entries indicating only <i>redcap</i> or <i>eRedCap</i> and the other(s) indicating both <i>redcap</i> or <i>eRedCap</i> and one or multiple other feature(s) (e.g., <i>smallData</i> , <i>nsag</i> or <i>msg3-Repetitions</i>). Otherwise, it is optional, Need R.
<i>InitialBWP-Only</i>	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
<i>L139</i>	The field is mandatory present if <i>prach-RootSequenceIndex</i> L=139, otherwise the field is absent, Need S.
<i>SUL</i>	The field is mandatory present in <i>rach-ConfigCommon</i> in <i>initialUplinkBWP</i> if <i>supplementaryUplink</i> is configured in <i>ServingCellConfigCommonSIB</i> or if <i>supplementaryUplinkConfig</i> is configured in <i>ServingCellConfigCommon</i> ; otherwise, the field is absent. This field is not configured in <i>additionalRACH-Config</i> .

– *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 ::=
    rach-ConfigGenericTwoStepRA-r16
    msgA-TotalNumberOfRA-Preambles-r16
    msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB-r16
    oneEighth
    oneFourth
    oneHalf
    one
    SEQUENCE {
        RACH-ConfigGenericTwoStepRA-r16,
        INTEGER (1..63) OPTIONAL, -- Need S
        CHOICE {
            ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
            ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
            ENUMERATED {n4,n8,n12,n16,n20,n24,n28,n32,n36,n40,n44,n48,n52,n56,n60,n64},
            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)
  }
  msgA-CB-PreamblesPerSSB-PerSharedRO-r16  INTEGER (1..60)
  msgA-SSB-SharedRO-MaskIndex-r16         INTEGER (1..15)
  groupB-ConfiguredTwoStepRA-r16         GroupB-ConfiguredTwoStepRA-r16
  msgA-PRACH-RootSequenceIndex-r16       CHOICE {
    1839          INTEGER (0..837),
    1139          INTEGER (0..137),
    1571          INTEGER (0..569),
    11151         INTEGER (0..1149)
  }
  msgA-TransMax-r16                       ENUMERATED {n1, n2, n4, n6, n8, n10, n20, n50, n100, n200}
  msgA-RSRP-Threshold-r16                 RSRP-Range
2Step4Step
  msgA-RSRP-ThresholdSSB-r16             RSRP-Range
  msgA-SubcarrierSpacing-r16             SubcarrierSpacing
2StepOnlyL139
  msgA-RestrictedSetConfig-r16           ENUMERATED {unrestrictedSet, restrictedSetTypeA,
                                                    restrictedSetTypeB}
  ra-PrioritizationForAccessIdentityTwoStep-r16 SEQUENCE {
    ra-Prioritization-r16                RA-Prioritization,
    ra-PrioritizationForAI-r16           BIT STRING (SIZE (2))
  }
InitialBWP-Only
  ra-ContentionResolutionTimer-r16       ENUMERATED {sf8, sf16, sf24, sf32, sf40, sf48, sf56, sf64}
  ...
  [[
  ra-PrioritizationForSlicingTwoStep-r17 RA-PrioritizationForSlicing-r17
  featureCombinationPreamblesList-r17 SEQUENCE (SIZE(1..maxFeatureCombPreamblesPerRACHResource-r17)) OF FeatureCombinationPreambles-r17
-- Cond AdditionalRACH
  ]]
}

GroupB-ConfiguredTwoStepRA-r16 ::=
  ra-MsgA-SizeGroupA-r16
  messagePowerOffsetGroupB-r16
  numberOfRA-PreamblesGroupA-r16
}

-- TAG-RACH-CONFIGCOMMONTWOSTEPRA-STOP
-- ASN1STOP

```

<i>RACH-ConfigCommonTwoStepRA</i> field descriptions
<p><i>featureCombinationPreamblesList</i> 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.</p>
<p><i>groupB-ConfiguredTwoStepRA</i> 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.</p>
<p><i>msgA-CB-PreamblesPerSSB-PerSharedRO</i> 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 <i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i> in <i>RACH-ConfigCommon</i>. The field is only applicable for the case of shared ROs with 4-step type random access.</p>
<p><i>msgA-PRACH-RootSequenceIndex</i> PRACH root sequence index. If the field is not configured in <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e., not within <i>AdditionalRACH-Config</i>), the UE applies the value in field <i>prach-RootSequenceIndex</i> in <i>RACH-ConfigCommon</i> in the configured BWP. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE applies the corresponding value of <i>prach-RootSequenceIndex</i> in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. 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</p>
<p><i>msgA-RestrictedSetConfig</i> 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 <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e. not within <i>AdditionalRACH-Config</i>), the UE applies the value in field <i>restrictedSetConfig</i> in <i>RACH-ConfigCommon</i> in the configured BWP. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE applies the value of <i>restrictedSetConfig</i> in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. 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.</p>
<p><i>msgA-RSRP-Threshold</i> 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.</p>
<p><i>msgA-RSRP-ThresholdSSB</i> 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]).</p>
<p><i>msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB</i> The meaning of this field is twofold: the CHOICE conveys the information about the number of SSBs per RACH occasion. Value <i>oneEight</i> corresponds to one SSB associated with 8 RACH occasions, value <i>oneFourth</i> 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 <i>n4</i> corresponds to 4 Contention Based preambles per SSB, value <i>n8</i> corresponds to 8 Contention Based preambles per SSB, and so on. The total number of CB preambles in a RACH occasion is given by <i>CB-preambles-per-SSB * max(1, SSB-per-rach-occasion)</i>. If the field is not configured in <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e. not within <i>AdditionalRACH-Config</i>) and both 2-step and 4-step are configured for the BWP, the UE applies the value in the field <i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i> in <i>RACH-ConfigCommon</i>. If the field is not configured in <i>AdditionalRACH-Config</i> and both 2-step and 4-step are configured in <i>AdditionalRACH-Config</i>, the UE applies the value in the field <i>ssb-perRACH-OccasionAndCB-PreamblesPerSSB</i> in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. The field is not present when RACH occasions are shared between 2-step and 4-step type random access in the BWP.</p>
<p><i>msgA-SSB-SharedRO-MaskIndex</i> 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.</p>

<p><i>msgA-SubcarrierSpacing</i> 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 <i>msgA-PRACH-ConfigurationIndex</i> in <i>RACH-ConfigGenericTwoStepRA</i> (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 <i>Msg1</i> derived from <i>RACH-ConfigCommon</i>. The value also applies to contention free 2-step random access type (<i>RACH-ConfigDedicated</i>).</p>
<p><i>msgA-TotalNumberOfRA-Preambles</i> 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.</p>
<p><i>msgA-TransMax</i> Max number of <i>MsgA</i> 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.</p>
<p><i>ra-ContentionResolutionTimer</i> 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 <i>sf8</i> corresponds to 8 subframes, value <i>sf16</i> 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 <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the corresponding value in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>.</p>
<p><i>ra-Prioritization</i> 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).</p>
<p><i>ra-PrioritizationForAI</i> Indicates whether the field <i>ra-Prioritization-r16</i> 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 <i>ra-Prioritization-r16</i> applies, otherwise the field does not apply.</p>
<p><i>ra-PrioritizationForSlicingTwoStep</i> Parameters which apply to configure prioritized CBRA 2-step random access type for slicing.</p>
<p><i>rach-ConfigGenericTwoStepRA</i> 2-step random access type parameters for both regular random access and beam failure recovery.</p>

<i>GroupB-ConfiguredTwoStepRA</i> field descriptions
<p><i>messagePowerOffsetGroupB</i> Threshold for preamble selection. Value is in dB. Value <i>minusinfinity</i> corresponds to $-\infty$. Value <i>dB0</i> corresponds to 0 dB, <i>dB5</i> corresponds to 5 dB and so on. (see TS 38.321 [3], clause 5.1.1).</p>
<p><i>numberOfRA-PreamblesGroupA</i> 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 <i>msgA-SSB-PerRACH-OccasionAndCB-PreamblesPerSSB</i> or <i>msgA-CB-PreamblesPerSSB-PerSharedRO</i> if configured.</p>
<p><i>ra-MsgA-SizeGroupA</i> 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).</p>

Conditional Presence	Explanation
<i>2Step4Step</i>	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 <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> if both 2-step random access type and 4-step random access type are configured for the same feature combination in the BWP.
<i>2StepOnlyL139</i>	The field is mandatory present if <i>msgA-PRACH-RootSequenceIndex</i> L=139 and no 4-step random access type is configured, otherwise the field is absent, Need S.
<i>2StepOnly</i>	The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> if <i>rach-ConfigCommon</i> field is absent in this <i>BWP-UplinkCommon</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> , Need S. The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> if <i>rach-ConfigCommon</i> field is absent in this <i>AdditionalRACH-Config</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> , Need S.
<i>AdditionalRACH</i>	The field is mandatory present if the <i>msgA-ConfigCommon</i> is included in an <i>AdditionalRACH-Config</i> . When included in <i>initialUplinkBWP-RedCap</i> to indicate other feature(s) than <i>redcap</i> , this field is mandatory present with at least two <i>FeatureCombinationPreambles</i> list entries: one list entry indicating only <i>redcap</i> and the other(s) indicating both <i>redcap</i> and one or multiple other feature(s) (e.g. <i>smallData</i> , <i>nsag</i> or <i>msg3-Repetitions</i>). Otherwise, it is optional, Need R.
<i>InitialBWP-Only</i>	This field is optionally present, Need R, if this BWP is the initial BWP of SpCell. Otherwise, the field is absent.
<i>SharedRO</i>	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
]],
[[
msg1-RepetitionNum-r18     ENUMERATED {n2, n4, n8, spare1}                OPTIONAL -- Cond 4StepCFRAREP
]]
}

CFRA-TwoStep-r16 ::=
  occasionsTwoStepRA-r16 SEQUENCE {
    rach-ConfigGenericTwoStepRA-r16 RACH-ConfigGenericTwoStepRA-r16,
    ssb-PerRACH-OccasionTwoStepRA-r16 ENUMERATED {oneEighth, oneFourth, oneHalf, one,
                                                    two, four, eight, sixteen}
  }
  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 ::=
  ssb                    SSB-Index,
  ra-PreambleIndex      INTEGER (0..63),
  ...,
  [[
msgA-PUSCH-Resource-Index-r16 INTEGER (0..3071)    OPTIONAL -- Cond 2StepCFRA
]]
}

CFRA-CSIRS-Resource ::=
  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
<p>csi-RS The ID of a CSI-RS resource defined in the measurement object associated with this serving cell.</p>
<p>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.</p>
<p>ra-PreambleIndex The RA preamble index to use in the RA occasions associated with this CSI-RS.</p>

CFRA field descriptions
<p>msg1-RepetitionNum Indicates the MSG1 repetition number used for contention free 4-step random access type in TS 38.321 [3]. If this field is absent, the UE performs contention free 4-step random access without MSG1-Repetitions.</p>
<p>occasions RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in <i>RACH-ConfigCommon</i> in the first active UL BWP.</p>
<p>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 <i>ssb-ResourceList</i>.</p>
<p>rach-ConfigGeneric Configuration of contention free random access occasions for CFRA. The UE shall ignore <i>preambleReceivedTargetPower</i>, <i>preambleTransMax</i>, <i>powerRampingStep</i>, <i>ra-ResponseWindow</i> signalled within this field and use the corresponding values provided in <i>RACH-ConfigCommon</i>.</p>
<p>ssb-perRACH-Occasion Number of SSBs per RACH occasion.</p>
<p>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 <i>occasions</i> is present, the UE may assume all the 64 preambles are for RA. The setting should be consistent with the setting of <i>ssb-perRACH-Occasion</i>, if present, i.e. it should be a multiple of the number of SSBs per RACH occasion.</p>

CFRA-SSB-Resource field descriptions
<p>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 $DMRS_{id}$ resource index 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.</p>
<p>ra-PreambleIndex The preamble index that the UE shall use when performing CF-RA upon selecting the candidate beams identified by this SSB.</p>
<p>ssb The ID of an SSB transmitted by this serving cell.</p>

CFRA-<i>TwoStep</i> field descriptions
<p><i>msgA-CFRA-PUSCH</i> PUSCH resource configuration(s) for msgA CFRA.</p>
<p><i>msgA-TransMax</i> 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 <i>cfra-<i>TwoStep</i></i>, switching from 2-step RA type to 4-step RA type is not allowed.</p>
<p><i>occasionsTwoStepRA</i> RA occasions for contention free random access. If the field is absent, the UE uses the RA occasions configured in <i>RACH-ConfigCommonTwoStepRA</i> in the first active UL BWP.</p>
<p><i>ra-SSB-OccasionMaskIndex</i> Explicitly signalled PRACH Mask Index for RA Resource selection in TS 38.321 [3]. The mask is valid for all SSB resources signalled in <i>ssb-ResourceList</i>.</p>
<p><i>rach-ConfigGenericTwoStepRA</i> Configuration of contention free random access occasions for CFRA 2-step random access type.</p>
<p><i>ssb-PerRACH-OccasionTwoStep</i> Number of SSBs per RACH occasion for 2-step random access type.</p>

RACH-ConfigDedicated field descriptions
<p><i>cfra</i> Parameters for contention free random access to a given target cell. If this field and <i>cfra-<i>TwoStep</i></i> are absent, the UE performs contention based random access.</p>
<p><i>cfra-<i>TwoStep</i></i> Parameters for contention free 2-step random access type to a given target cell. Network ensures that <i>cfra</i> and <i>cfra-<i>TwoStep</i></i> are not configured at the same time. If this field and <i>cfra</i> are absent, the UE performs contention based random access. This field may only be present if <i>msgA-ConfigCommon</i> is configured on the BWP.</p>
<p><i>ra-prioritization</i> Parameters which apply for prioritized random access procedure to a given target cell (see TS 38.321 [3], clause 5.1.1).</p>
<p><i>ra-PrioritizationTwoStep</i> 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).</p>

Conditional Presence	Explanation
<i>Mandatory</i>	The field is mandatory present.
<i>Occasions</i>	The field is optionally present, Need S, if the field <i>occasions</i> is present, otherwise it is absent.
<i>2StepCFRA</i>	The field is optionally present for the case of 2-step RA type contention free random access, Need S, otherwise it is absent.
<i>4StepCFRArep</i>	<p>For non-(e)RedCap UEs, the field is optionally present, Need S, if <i>resources</i> is set to <i>ssb</i> and there is one <i>FeatureCombinationPreambles</i> entry indicating only <i>msg1-<i>Repetitions</i></i> which is associated with the same Msg1 repetition number.</p> <p>For RedCap UEs or if RedCap is considered to be applicable for this Random Access procedure for eRedCap UEs, the field is optionally present, Need S, if <i>resources</i> is set to <i>ssb</i> and there is one <i>FeatureCombinationPreambles</i> entry indicating only <i>redCap</i> and <i>msg1-<i>Repetitions</i></i> which is associated with the same Msg1 repetition number.</p> <p>For eRedCap UEs, if eRedCap is considered to be applicable for this Random Access procedure, the field is optional present, Need S, if <i>resource</i> is set to <i>ssb</i> and there is one <i>FeatureCombinationPreambles</i> entry indicating only <i>eRedCap</i> and <i>msg1-<i>Repetitions</i></i> which is associated with the same Msg1 repetition number.</p> <p>Otherwise, it is absent.</p>

– *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 ::=
  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 {s11, s12, s14, s18, s110, s120, s140, s180},
  . . . ,
  [[
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 { s160, s1160}                          OPTIONAL,  -- Need R
prach-ConfigurationIndex-v1610            INTEGER (256..262)                                OPTIONAL,  -- Need R
  ]],
  [[
ra-ResponseWindow-v1700                    ENUMERATED {s1240, s1320, s1640, s1960, s11280, s11920, s12560}  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 respect 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). This field is set to the same value for different repetition numbers associated with a specific <i>FeatureCombination</i> .
prach-ConfigurationFrameOffset-IAB Frame offset for ROs defined in the baseline configuration indicated by <i>prach-ConfigurationIndex</i> and is used only by the IAB-MT. (see TS 38.211 [16], clause 6.3.3.2).
prach-ConfigurationIndex PRACH configuration index. For <i>prach-ConfigurationIndex</i> configured under <i>beamFailureRecoveryConfig</i> , the <i>prach-ConfigurationIndex</i> can only correspond to the short preamble format, (see TS 38.211 [16], clause 6.3.3.2). If the field <i>prach-ConfigurationIndex-v1610</i> is present, the UE shall ignore the value provided in <i>prach-ConfigurationIndex</i> (without suffix).
prach-ConfigurationPeriodScaling-IAB Scaling factor to extend the periodicity of the baseline configuration indicated by <i>prach-ConfigurationIndex</i> 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 <i>prach-ConfigurationIndex</i> 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, ...). This field is set to the same value for different repetition numbers associated with a specific <i>FeatureCombination</i> .
preambleTransMax Max number of RA preamble transmission performed before declaring a failure (see TS 38.321 [3], clauses 5.1.4, 5.1.5). The UE shall ignore this field in case <i>rach-ConfigGeneric</i> is included within an <i>EarlyUL-SyncConfig</i> IE.
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 <i>SCellConfig</i> . If <i>ra-ResponseWindow-v1610</i> or <i>ra-ResponseWindow-v1700</i> is signalled, UE shall ignore the <i>ra-ResponseWindow</i> (without suffix). The field <i>ra-ResponseWindow-v1700</i> is applicable to SCS 480 kHz and SCS 960 kHz. The UE shall ignore this field in case <i>rach-ConfigGeneric</i> is included within an <i>EarlyUL-SyncConfig</i> IE.
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-CONFIGGENERIC2WOSTEPRA-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 {s11, s12, s14, s18, s110, s120, s140, s180, s1160, s1320}
                                          OPTIONAL, -- Cond NoCFRA
preamblesTransMax-r16                   ENUMERATED {n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}
                                          OPTIONAL, -- Cond 2StepOnlyNoCFRA
...
[[
msgB-ResponseWindow-v1700                ENUMERATED {s1240, s1640, s1960, s11280, s11920, s12560}
                                          OPTIONAL, -- Cond NoCFRA2
]]
}

-- TAG-RACH-CONFIGGENERICRACH-STEPRA-STOP
-- ASN1STOP

```

RACH-ConfigGenericTwoStepRA field descriptions
<p>msgA-PreamblePowerRampingStep Power ramping steps for msgA PRACH. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the corresponding value in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. If the field is absent in other cases, UE shall use the value of <i>powerRampingStep</i> in <i>RACH-ConfigGeneric</i> 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 <i>RACH-ConfigGenericTwoStepRA</i> is included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> and then the UE uses the value of <i>msgA-PreamblePowerRampingStep</i> in <i>RACH-ConfigGenericTwoStepRA</i> configured for CBRA.</p>
<p>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 <i>preambleReceivedTargetPower</i> in <i>RACH-ConfigGeneric</i> 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 <i>RACH-ConfigGenericTwoStepRA</i> is included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> and then the UE uses the value of <i>msgA-PreambleReceivedTargetPower</i> in <i>RACH-ConfigGenericTwoStepRA</i> configured for CBRA.</p>
<p>msgA-PRACH-ConfigurationIndex Cell-specific PRACH configuration index for 2-step RA type. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e. not within <i>AdditionalRACH-Config</i>), the UE shall use the value of corresponding 4-step random access parameter in the configured BWP. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the corresponding value in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. If the value is in the range of 256 to 262, the field <i>prach-ConfigurationIndex-v1610</i> 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.</p>
<p>msgA-RO-FDM The number of msgA PRACH transmission occasions Frequency-Division Multiplexed in one time instance. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e. not within <i>AdditionalRACH-Config</i>), UE shall use value of <i>msg1-FDM</i> in <i>RACH-ConfigGeneric</i> in the configured BWP. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the value of <i>msg1-FDM</i> in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i> (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.</p>
<p>msgA-RO-FrequencyStart Offset of lowest PRACH transmissions occasion in frequency domain with respect to PRB 0. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> which is configured directly within a BWP (i.e. not within <i>AdditionalRACH-Config</i>), UE shall use value of <i>msg1-FrequencyStart</i> in <i>RACH-ConfigGeneric</i> in the configured BWP. If the field is absent in <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the value of <i>msg1-FrequencyStart</i> in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i> (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.</p>
<p>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 <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the corresponding value in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. If the field is absent in other cases, UE shall use value <i>zeroCorrelationZoneConfig</i> in <i>RACH-ConfigGeneric</i> 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.</p>
<p>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 <i>msgB-ResponseWindow-r16</i> simultaneously with <i>msgB-ResponseWindow-v1700</i>, and if both fields are absent, the UE uses the value of <i>msgB-ResponseWindow</i> in <i>RACH-ConfigGenericTwoStepRA</i> configured for CBRA.</p>
<p>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 <i>RACH-ConfigCommonTwoStepRA</i> in <i>AdditionalRACH-Config</i>, the UE shall apply the corresponding value in <i>RACH-ConfigCommon</i> in the same <i>AdditionalRACH-Config</i>. If the field is absent in other cases, UE shall use the value of <i>preambleTransMax</i> in <i>RACH-ConfigGeneric</i> in the configured BWP. The field is absent if <i>RACH-ConfigGenericTwoStepRA</i> is included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> and then the UE uses the value of <i>preambleTransMax</i> in <i>RACH-ConfigGenericTwoStepRA</i> configured for CBRA.</p>

Conditional Presence	Explanation
2StepOnly	The field is mandatory present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> if <i>rach-ConfigCommon</i> field is absent in this <i>BWP-UplinkCommon</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>BWP-UplinkCommon</i> , Need S. The field is mandatory present in <i>msgA-ConfigCommon</i> in <i>AdditionalRACH-Config</i> if <i>rach-ConfigCommon</i> field is absent in this <i>AdditionalRACH-Config</i> , otherwise the field is optionally present in <i>msgA-ConfigCommon</i> field in <i>AdditionalRACH-Config</i> , Need S.
2StepOnlyNoCFRA	The field is mandatory present if <i>RACH-ConfigGenericTwoStepRA</i> is included in the <i>RACH-ConfigCommonTwoStepRA</i> 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 <i>RACH-ConfigGenericTwoStepRA</i> is included in the <i>RACH-ConfigDedicated</i> , this field is absent.
NoCFRA	The field is mandatory present if <i>msgB-ResponseWindow-r17</i> is absent and <i>RACH-ConfigGenericTwoStepRA</i> is not included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> , otherwise the field is absent, Need S.
NoCFRA2	The field is mandatory present if <i>msgB-ResponseWindow-r16</i> is absent and <i>RACH-ConfigGenericTwoStepRA</i> is not included in <i>CFRA-TwoStep</i> in <i>RACH-ConfigDedicated</i> , otherwise the field is absent, Need S.

– RACH-ConfigTwoTA

The IE *RACH-ConfigTwoTA* is used to specify random access parameters for each additional PCI configured for the serving cell.

RACH-ConfigTwoTA information element

```
-- ASN1START
-- TAG-RACH-CONFIGTWOTA-START

RACH-ConfigTwoTA-r18 ::= SEQUENCE {
    rach-ConfigTwoTAIndex-r18    RACH-ConfigTwoTAIndex-r18,
    rach-ConfigGeneric-r18      RACH-ConfigGeneric,
    ssb-perRACH-Occasion-r18    ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen} OPTIONAL, -- Need M
    prach-RootSequenceIndex-r18 CHOICE {
        1839                      INTEGER (0..837),
        1139                      INTEGER (0..139)
    },
    msg1-SubcarrierSpacing-r18  SubcarrierSpacing OPTIONAL, -- Cond L139
    ...
}

RACH-ConfigTwoTAIndex-r18 ::= INTEGER(1.. maxNrofAdditionalPRACHConfigs-r18)

-- TAG-RACH-CONFIGTWOTA-STOP
-- ASN1STOP
```

RACH-ConfigTwoTA field descriptions
<p>msg1-SubcarrierSpacing Subcarrier spacing of PRACH when prach-RootSequenceIndex has value set to l139 (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 <i>prach-ConfigurationIndex</i> in <i>RACH-ConfigGeneric</i> (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]).</p>
<p>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. 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</p>
<p>rach-ConfigGeneric RACH parameters for contention free random access occasions for CFRA.</p>
<p>ssb-perRACH-Occasion Number of SSBs per RACH occasion.</p>

Conditional Presence	Explanation
<i>L139</i>	The field is mandatory present if <i>prach-RootSequenceIndex</i> L=139, 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}
    ...
}

-- TAG-RA-PRIORITIZATION-STOP
-- ASN1STOP
OPTIONAL, -- Need R

```

RA-Prioritization field descriptions
<p>powerRampingStepHighPriority Power ramping step applied for prioritized random access procedure.</p>
<p>scalingFactorBI Scaling factor for the backoff indicator (BI) for the prioritized random access procedure. (see TS 38.321 [3], clause 5.1.4). Value <i>zero</i> corresponds to 0, value <i>dot25</i> corresponds to 0.25 and so on.</p>

– *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
    ]],
    [[
```

<pre> srb5-ToAddMod-r18 srb5-ToRelease-r18]] } </pre>	<pre> SRB-ToAddMod ENUMERATED{true} </pre>	<pre> OPTIONAL, -- Need N OPTIONAL -- Need N </pre>
<pre> SRB-ToAddModList ::= </pre>	<pre> SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod </pre>	
<pre> SRB-ToAddMod ::= srb-Identity reestablishPDCP discardOnPDCP pdcp-Config ... [[srb-Identity-v1700]], [[srb-Identity-v1800 n3c-BearerAssociated-r18]] } </pre>	<pre> SEQUENCE { SRB-Identity, ENUMERATED{true} ENUMERATED{true} PDCP-Config SRB-Identity-v1700 SRB-Identity-v1800 ENUMERATED{true} </pre>	<pre> OPTIONAL, -- Need N OPTIONAL, -- Need N OPTIONAL, -- Cond PDCP OPTIONAL -- Need M OPTIONAL, -- Need M OPTIONAL -- Cond N3C MP </pre>
<pre> DRB-ToAddModList ::= </pre>	<pre> SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod </pre>	
<pre> DRB-ToAddMod ::= cnAssociation eps-BearerIdentity sdap-Config } drb-Identity reestablishPDCP recoverPDCP pdcp-Config ... [[daps-Config-r16]], [[n3c-BearerAssociated-r18]] } </pre>	<pre> SEQUENCE { CHOICE { INTEGER (0..15), SDAP-Config DRB-Identity, ENUMERATED{true} ENUMERATED{true} PDCP-Config ENUMERATED{true} ENUMERATED{true} </pre>	<pre> OPTIONAL, -- Cond DRBSetup OPTIONAL, -- Need N OPTIONAL, -- Need N OPTIONAL, -- Cond PDCP OPTIONAL -- Cond DAPS OPTIONAL -- Cond N3C MP </pre>
<pre> DRB-ToReleaseList ::= </pre>	<pre> SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity </pre>	
<pre> SecurityConfig ::= securityAlgorithmConfig keyToUse ... } </pre>	<pre> SEQUENCE { SecurityAlgorithmConfig ENUMERATED{master, secondary} </pre>	<pre> OPTIONAL, -- Cond RBTermChange1 OPTIONAL, -- Cond RBTermChange </pre>
<pre> MRB-ToAddModList-r17 ::= </pre>	<pre> SEQUENCE (SIZE (1..maxMRB-r17)) OF MRB-ToAddMod-r17 </pre>	
<pre> MRB-ToAddMod-r17 ::= mbs-SessionId-r17 mrb-Identity-r17 </pre>	<pre> SEQUENCE { TMGI-r17 MRB-Identity-r17, </pre>	<pre> OPTIONAL, -- Cond MRBSetup </pre>


```

    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
<p>cnAssociation Indicates if the bearer is associated with the <i>eps-bearerIdentity</i> (when connected to EPC) or <i>sdap-Config</i> (when connected to 5GC).</p>
<p>daps-Config Indicates that the bearer is configured as DAPS bearer.</p>
<p>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/indirect path of the configuration.</p>
<p>eps-BearerIdentity The EPS bearer ID determines the EPS bearer.</p>
<p>mbs-SessionId Indicates which multicast MBS session the bearer is associated with.</p>
<p>mrb-Identity Identification of the multicast MRB.</p>
<p>mrb-IdentityNew New identity of the multicast MRB when <i>mrb-Identity</i> needs to be changed, e.g. as a result of a handover.</p>
<p>n3c-BearerAssociated Indicates that the radio bearer is associated with the N3C indirect path.</p>
<p>reestablishPDCP Indicates that PDCP should be re-established. Network sets this to <i>true</i> 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 or if the <i>RadioBearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message within the <i>LTM-Config</i> IE. or if the <i>RadioBearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message associated with subsequent CPAC within the <i>ConditionalReconfiguration</i> IE</p>
<p>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 or if the <i>RadioBearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message within the <i>LTM-Config</i> IE or if the <i>RadioBearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message associated with subsequent CPAC within the <i>ConditionalReconfiguration</i> IE.</p>
<p>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.</p>

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]. For SRB3, network doesn't include this field if the *RadioBearerConfig* IE is part of an *RRCReconfiguration* message associated with subsequent CPAC within the *ConditionalReconfiguration* IE.

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 or if the *RadioBearerConfig* IE is part of an *RRCReconfiguration* message within the *LTM-Config* IE. For SRB3, network doesn't include this field if the *RadioBearerConfig* IE is part of an *RRCReconfiguration* message associated with subsequent CPAC within the *ConditionalReconfiguration* IE.

srb-Identity, srb-Identity-v1700, srb-Identity-v1800

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. Value 5 is applicable for SRB5 only. If *srb-Identity-v1700* or *srb-Identity-v1800* is received for an SRB, the UE shall ignore *srb-Identity* (i.e. without suffix) for this SRB.

Conditional Presence	Explanation
<i>RBTermChange</i>	The field is mandatory present in case of: <ul style="list-style-type: none"> - 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.
<i>RBTermChange1</i>	The field is mandatory present in case of: <ul style="list-style-type: none"> - 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.
<i>PDCP</i>	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.
<i>DRBSetup</i>	The field is mandatory present if the corresponding DRB is being setup; otherwise the field is optionally present, need M.
<i>HO-Conn</i>	The field is mandatory present <ul style="list-style-type: none"> - in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR, - or when the <i>fullConfig</i> is included in the <i>RRCReconfiguration</i> message and NE-DC/NR-DC is not configured, - or in case of <i>RRCSetup</i>. Otherwise the field is optionally present, need N. Upon <i>RRCSetup</i> , only SRB1 can be present.
<i>HO-toNR</i>	If <i>mrbs-ToAddModList</i> is not included, the field is mandatory present for UEs other than NCR-MT <ul style="list-style-type: none"> - in case of inter-system handover from E-UTRA/EPC to E-UTRA/5GC or NR, - or when the <i>fullConfig</i> is included in the <i>RRCReconfiguration</i> message and NE-DC/NR-DC is not configured. In case of <i>RRCSetup</i> , the field is absent; otherwise the field is optionally present, need N.
<i>DAPS</i>	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, <i>supplementaryUplink</i> is not configured, ethernetHeaderCompression is not configured for the DRB, <i>conditionalReconfiguration</i> is not configured, and NR sidelink and V2X sidelink are not configured. Otherwise the field is absent.
<i>MRBSetup</i>	The field is mandatory present if the corresponding multicast MRB is being setup; otherwise the field is optionally present, need M.
<i>N3C MP</i>	The field is optionally present if the corresponding radio bearer is being setup for MP with N3C indirect path, need R. It is absent otherwise.

– *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..maxNrofBFDRResourcePerSet-r17)) OF BeamLinkMonitoringRS-r17
                                          OPTIONAL, -- Need N
    bfdResourcesToReleaseList-r17       SEQUENCE (SIZE(1..maxNrofBFDRResourcePerSet-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
<p>additionalPCI Indicates the physical cell IDs (PCI) of the SSBs in the <i>failureDetectionSet2</i>. If <i>candidateBeamRS-List2</i> is configured in IE <i>BeamFailureRecoveryRSConfig</i> the field indicates the physical cell IDs (PCI) of the SSBs in the <i>candidateBeamRS-List2</i>.</p>
<p>beamFailureDetectionTimer Timer for beam failure detection (see TS 38.321 [3], clause 5.17). See also the <i>BeamFailureRecoveryConfig</i> IE. Value in number of "Q_{out,LR} reporting periods of Beam Failure Detection" Reference Signal (see TS 38.213 [13], clause 6). Value <i>pbfd1</i> corresponds to 1 Q_{out,LR} reporting period of Beam Failure Detection Reference Signal, value <i>pbfd2</i> corresponds to 2 Q_{out,LR} reporting periods of Beam Failure Detection Reference Signal and so on.</p>
<p>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.</p>
<p>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 <i>beamFailure</i> or <i>both</i>. If no RSs are provided for the purpose of beam failure detection, the UE performs beam monitoring based on the activated <i>TCI-State</i> 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 <i>TCI-State</i> 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 <i>failureDetectionSet1-r17</i> and <i>failureDetectionSet2-r17</i> are present, the <i>purpose</i> of <i>RadioLinkMonitoringRS</i> in <i>failureDetectionResourcesToAddModList</i> only can be set to <i>rfl</i>.</p>
<p>failureDetectionSet1, failureDetectionSet2 Configures parameters for beamfailure detection towards beam failure detection resources configured in the set. If additional PCIs are configured using <i>additionalPCI-ToAddModList</i> for the serving cell, each RS in one set can be associated only with one PCI. Network always configures the <i>failureDetectionSet1</i> and <i>failureDetectionSet2</i> together. <i>failureDetectionSetN</i> is present if and only if <i>candidateBeamRS-List2-r17</i> is configured. When a <i>failureDetectionSetN</i> is present, after the reconfiguration, the UE shall consider all the reference signals for this failure detection set as activated if at most <i>maxBFD-RS-resourcesPerSetPerBWP-r17</i> 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 <i>bfdResourcesToAddModList-r17</i> in <i>failureDetectionSetN</i> is not present, the UE determines the RS(es) in each <i>failureDetectionSetN</i> as described in TS 38.213 [13], clause 6.</p>

RadioLinkMonitoringRS field descriptions
<p>detectionResource A reference signal that the UE shall use for radio link monitoring or beam failure detection (depending on the indicated <i>purpose</i>). Only periodic 1-port CSI-RS can be configured on SCell for beam failure detection purpose.</p>
<p>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 <i>beamFailure</i>.</p>

– **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 ::=
  rateMatchPatternId           SEQUENCE {
    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))
        }
      }
    },
    controlResourceSet         OPTIONAL, -- Need S
    controlResourceSetId      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 $\mu=0$, the value *kHz30* corresponds to $\mu=1$, 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
<i>CellLevel</i>	The field is mandatory present if the <i>RateMatchPattern</i> is defined on cell level. The field is absent when the <i>RateMatchPattern</i> is defined on BWP level or defined for MBS broadcast CFR. If the <i>RateMatchPattern</i> is defined on BWP level, the UE applies the SCS of the BWP and if <i>RateMatchPattern</i> is defined for MBS broadcast CFR, the UE applies the SCS of the initial BWP or RedCap-specific initial BWP (if configured) for (e)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
```


<i>RateMatchPattern</i> LTE-CRS field descriptions
<i>carrierBandwidthDL</i> BW of the LTE carrier in number of PRBs (see TS 38.214 [19], clause 5.1.4.2).
<i>carrierFreqDL</i> Center of the LTE carrier (see TS 38.214 [19], clause 5.1.4.2).
<i>mbsfn-SubframeConfigList</i> LTE MBSFN subframe configuration (see TS 38.214 [19], clause 5.1.4.2).
<i>nrofCRS-Ports</i> Number of LTE CRS antenna port to rate-match around (see TS 38.214 [19], clause 5.1.4.2).
<i>v-Shift</i> Shifting value v-shift in LTE to rate match around LTE CRS (see TS 38.214 [19], clause 5.1.4.2).

– *ReferenceConfiguration*

The IE *ReferenceConfiguration* is used provide a configuration that is common, within the same cell group, to all configured non-complete candidate configurations.

***ReferenceConfiguration* information element**

```
-- ASN1START
-- TAG-REFERENCECONFIGURATION-START

ReferenceConfiguration-r18 ::= OCTET STRING (CONTAINING RRCReconfiguration)

-- TAG-REFERENCECONFIGURATION-STOP
-- ASN1STOP
```

– *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
<p>referenceSFN This field indicates the reference SFN corresponding to the reference time information. If <i>referenceTimeInfo</i> field is received in <i>DLInformationTransfer</i> message, this field indicates the SFN of PCell.</p>
<p>time This field indicates time reference with 10ns granularity. If included in <i>DLInformationTransfer</i> 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 <i>DLInformationTransfer</i> 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 <i>refDays</i> field specifies the sequential number of days (with day count starting at 0) from the origin of the <i>time</i> field. If the <i>referenceTimeInfo</i> field is received in <i>DLInformationTransfer</i> message, the time field indicates the <i>time</i> at the ending boundary of the system frame indicated by <i>referenceSFN</i>. The UE considers this frame (indicated by <i>referenceSFN</i>) 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 <i>referenceTimeInfo</i> field is received in <i>SIB9</i>, the <i>time</i> field indicates the time at the SFN boundary at or immediately after the ending boundary of the SI-window in which <i>SIB9</i> is transmitted. If <i>referenceTimeInfo</i> field is received in <i>SIB9</i>, 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 <i>valueTag</i> in <i>SIB1</i>.</p> <p>NOTE: The estimated time in an NTN-cell may be less accurate than the estimated time in a TN-cell.</p>
<p>timeInfoType If <i>timeInfoType</i> is not included, the <i>time</i> indicates the GPS time and the origin of the <i>time</i> field is 00:00:00 on Gregorian calendar date 6 January, 1980 (start of GPS time). If <i>timeInfoType</i> is set to <i>localClock</i>, the origin of the <i>time</i> is unspecified.</p>
<p>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.</p>

Conditional Presence	Explanation
<i>RefTime</i>	The field is mandatory present if <i>referenceTimeInfo</i> is included in <i>DLInformationTransfer</i> 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
<p>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 <i>release</i>. Upon reception of this field in <i>RepetitionSchemeConfig-r16</i>, the UE shall release <i>slotBased</i> if previously configured in the same instance of <i>RepetitionSchemeConfig-r16</i>.</p>
<p>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.</p>
<p>slotBased Configures UE with slot-based repetition scheme. Network always configures this field when the parameter <i>repetitionNumber</i> is present in IE <i>PDSCH-TimeDomainResourceAllocationList</i>. The network does not set this field to <i>release</i>. Upon reception of this field in <i>RepetitionSchemeConfig-r16</i>, the UE shall release <i>fdm-TDM</i> if previously configured in the same instance of <i>RepetitionSchemeConfig-r16</i>.</p>
<p>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 <i>tdmSchemeA</i>, the parameter <i>startingSymbolOffsetK</i> is present, otherwise absent.</p>
<p>tcMapping Enables TCI state mapping method to PDSCH transmission occasions.</p>

– *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 *BN* with *N* equal to 1, 2 and so on. The measurement reporting events for L2 U2N relay UE are labelled *YN* with *N* equal to 1, 2 and so on, and *Z1*.

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;

Event Z1: Serving L2 U2N Relay UE becomes worse than absolute threshold1 AND candidate L2 U2N Relay UE becomes better than another absolute threshold2;

ReportConfigInterRAT information element

```

-- ASN1START
-- TAG-REPORTCONFIGINTERRAT-START

ReportConfigInterRAT ::=
    reportType
        periodical
        eventTriggered
        reportCGI
        ...
        reportSFTD
    }
}

ReportCGI-EUTRA ::=
    cellForWhichToReportCGI
    ...
    [[
        useAutonomousGaps-r16
    ]]
}

ReportSFTD-EUTRA ::=
    reportSFTD-Meas
    reportRSRP
    ...
}

EventTriggerConfigInterRAT ::=
    eventId
        eventB1
            b1-ThresholdEUTRA
            reportOnLeave
            hysteresis
            timeToTrigger
            ...
        },
        eventB2
            b2-Threshold1
            b2-Threshold2EUTRA
            reportOnLeave
            hysteresis
            timeToTrigger
            ...
        },
        ...
    [[
        eventB1-UTRA-FDD-r16
    ]]

```

SEQUENCE {

CHOICE {

PeriodicalReportConfigInterRAT,

EventTriggerConfigInterRAT,

ReportCGI-EUTRA,

ReportSFTD-EUTRA

SEQUENCE {

EUTRA-PhysCellId,

ENUMERATED {setup} OPTIONAL -- Need R

SEQUENCE {

BOOLEAN,

BOOLEAN,

SEQUENCE {

CHOICE {

SEQUENCE {

MeasTriggerQuantityEUTRA,

BOOLEAN,

Hysteresis,

TimeToTrigger,

SEQUENCE {

MeasTriggerQuantity,

MeasTriggerQuantityEUTRA,

BOOLEAN,

Hysteresis,

TimeToTrigger,

SEQUENCE {

```

        b1-ThresholdUTRA-FDD-r16
        reportOnLeave-r16
        hysteresis-r16
        timeToTrigger-r16
        ...
    },
    eventB2-UTRA-FDD-r16
        b2-Threshold1-r16
        b2-Threshold2UTRA-FDD-r16
        reportOnLeave-r16
        hysteresis-r16
        timeToTrigger-r16
        ...
    }
}],
[[
eventY1-Relay-r17
    y1-Threshold1-r17
    y1-Threshold2-Relay-r17
    reportOnLeave-r17
    hysteresis-r17
    timeToTrigger-r17
    ...
},
eventY2-Relay-r17
    y2-Threshold-Relay-r17
    reportOnLeave-r17
    hysteresis-r17
    timeToTrigger-r17
    ...
}
]],
[[
eventZ1-Relay-r18
    z1-Threshold1-Relay-r18
        sl-RSRP-r18
        sd-RSRP-r18
    },
    z1-Threshold2-Relay-r18
    reportOnLeave-r18
    hysteresis-r18
    timeToTrigger-r18
    ...
}
]],
},
rsType
reportInterval
reportAmount
reportQuantity
maxReportCells
...
[[
        MeasTriggerQuantityUTRA-FDD-r16,
        BOOLEAN,
        Hysteresis,
        TimeToTrigger,

SEQUENCE {
    MeasTriggerQuantity,
    MeasTriggerQuantityUTRA-FDD-r16,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,

SEQUENCE {
    MeasTriggerQuantity,
    SL-MeasTriggerQuantity-r16,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,

SEQUENCE {
    SL-MeasTriggerQuantity-r16,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,

SEQUENCE {
    SEQUENCE {
        SL-MeasTriggerQuantity-r16,
        SL-MeasTriggerQuantity-r16
    }
    SL-MeasTriggerQuantity-r16,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,

OPTIONAL -- Need S

NR-RS-Type,
ReportInterval,
ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
MeasReportQuantity,
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
]],
[[
cellIndividualOffsetList-r18        SEQUENCE (SIZE (1..maxCellMeasEUTRA)) OF CellIndividualOffsetList-EUTRA-r18 OPTIONAL -- Need R
]]
}

PeriodicalReportConfigInterRAT ::=
  reportInterval                      SEQUENCE {
    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 ::=
  ultra-FDD-RSCP-r16                 CHOICE {
    ultra-FDD-RSCP-r16                INTEGER (-5..91),
    ultra-FDD-EcN0-r16                INTEGER (0..49)
  }

MeasReportQuantityUTRA-FDD-r16 ::=
  cpich-RSCP                          SEQUENCE {
    cpich-RSCP                        BOOLEAN,
    cpich-EcN0                        BOOLEAN
  }

CellIndividualOffsetList-EUTRA-r18 ::=
  physCellId-r18                      SEQUENCE {
    physCellId-r18                    EUTRA-PhysCellId,
    cellIndividualOffset-r18          EUTRA-Q-OffsetRange
  }

-- TAG-REPORTCONFIGINTERRAT-STOP

```


-- ASN1STOP

<i>ReportConfigInterRAT field descriptions</i>
--

<i>reportType</i>

Type of the configured measurement report. In (NG)EN-DC, and NR-DC, network does not configure report of type <i>ReportCGI-EUTRA</i> for SCG.

<i>ReportCGI-EUTRA field descriptions</i>

<i>useAutonomousGaps</i>

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
<p>b2-Threshold1 NR threshold to be used in inter RAT measurement report triggering condition for event B2.</p>
<p>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 <i>eventB2</i>, the network configures the same CHOICE name (<i>rsrp</i>, <i>rsrq</i> or <i>sinr</i>) for the <i>MeasTriggerQuantity</i> of the <i>b2-Threshold1</i> and for the <i>MeasTriggerQuantityEUTRA</i> of the <i>b2-Threshold2EUTRA</i>.</p>
<p>eventId Choice of inter RAT event triggered reporting criteria.</p>
<p>maxReportCells Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.</p>
<p>reportAmount Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types</p>
<p>reportOnLeave Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in <i>cellsTriggeredList</i>, as specified in 5.5.4.1.</p>
<p>reportQuantity, reportQuantityUTRA-FDD The cell measurement quantities to be included in the measurement report. If the field <i>eventB1-UTRA-FDD</i> or <i>eventB2-UTRA-FDD</i> is present, the UE shall ignore the value(s) provided in <i>reportQuantity</i>.</p>
<p>reportQuantityRelay The L2 U2N Relay UE measurement quantity to be included in measurement report.</p>
<p>timeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a measurement report.</p>
<p>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. <i>utra-FDD-RSCP</i> corresponds to CPICH_RSCP in TS 25.133 [46] for FDD. <i>utra-FDD-EcN0</i> corresponds to CPICH_Ec/No in TS 25.133 [46] for FDD. For <i>utra-FDD-RSCP</i>: The actual value is field value – 115 dBm. For <i>utra-FDD-EcN0</i>: The actual value is (field value – 49)/2 dB.</p>
<p>y1-Threshold1 NR threshold to be used in measurement report triggering condition for event Y1.</p>
<p>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.</p>
<p>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.</p>
<p>z1-Threshold1-Relay L2 U2N Relay threshold value associated with the selected trigger quantity (i.e. SL-RSRP and/or SD-RSRP) to be used in measurement report triggering condition for serving Relay UE in event Z1. If the field <i>sd-RSRP</i> is not included, the UE considers it to be equal to <i>sl-RSRP</i>.</p>
<p>z1-Threshold2-Relay L2 U2N Relay threshold value associated with the selected trigger quantity (i.e. SD-RSRP) to be used in measurement report triggering condition for candidate Relay UE in event Z1.</p>

<i>PeriodicalReportConfigInterRAT</i> field descriptions
<i>maxReportCells</i> Max number of non-serving cells/candidate L2 U2N Relay UEs to include in the measurement report.
<i>reportAmount</i> Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types
<i>reportQuantity, reportQuantityUTRA-FDD</i> The cell measurement quantities to be included in the measurement report. If the field <i>reportQuantityUTRA-FDD</i> is present, the UE shall ignore the value(s) provided in <i>reportQuantity</i> .

<i>CellIndividualOffsetList-EUTRA</i> field descriptions
<i>cellIndividualOffset</i> Cell individual offsets applicable to a specific measurement event.
<i>physCellId</i> Physical cell identity of a E-UTRAN cell in the cell list.

– *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*;

Event D2: Distance between UE and a moving reference location based on *movingReferenceLocation* and its corresponding satellite ephemeris and epoch time broadcast in *SIB19* for the serving cell becomes larger than configured threshold *distanceThreshFromReference1* and distance between UE and a moving reference location determined based on *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 where *condEventA4* can also be used for current PSCell (i.e., in case it is configured as candidate PSCell for CondEvent A4 evaluation) for CHO with candidate SCG(s) case;

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 D2: Distance between UE and a moving reference location determined based on *movingReferenceLocation* and its corresponding satellite ephemeris and epoch time broadcast in *SIB19* for the serving cell becomes larger than configured threshold *distanceThreshFromReference1* and distance between UE and a moving reference location determined based on *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;

The reporting events concerning Aerial UE altitude are labelled *HN* with *N* equal to 1 and 2. Additionally, the reporting events concerning Aerial UE altitude and the neighboring cell measurements simultaneously are labelled *AMHN* with *M* equal to 3, 4, 5 and *N* equal to 1, 2.

Event H1: Aerial UE altitude becomes higher than a threshold;

Event H2: Aerial UE altitude becomes lower than a threshold;

Event A3H1: Neighbour becomes offset better than SpCell and the Aerial UE altitude becomes higher than a threshold;

Event A3H2: Neighbour becomes offset better than SpCell and the Aerial UE altitude becomes lower than a threshold;

Event A4H1: Neighbour becomes better than threshold1 and the Aerial UE altitude becomes higher than a threshold2;

Event A4H2: Neighbour becomes better than threshold1 and the Aerial UE altitude becomes lower than a threshold2;

Event A5H1: SpCell becomes worse than threshold1 and neighbour becomes better than threshold2 and the Aerial UE altitude becomes higher than a threshold3;

Event A5H2: SpCell becomes worse than threshold1 and neighbour becomes better than threshold2 and the Aerial UE altitude becomes lower than a threshold3.

ReportConfigNR information element

```
-- ASN1START
-- TAG-REPORTCONFIGNR-START
```

```
ReportConfigNR ::=
  reportType
    periodical
    eventTriggered
  SEQUENCE {
    CHOICE {
      PeriodicalReportConfig,
      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,
    reportOnScellActivation-r18   ReportOnScellActivation-r18
  }
}

ReportCGI ::=
  cellForWhichToReportCGI        SEQUENCE {
    PhysCellId,
    ...,
    [[
    useAutonomousGaps-r16        ENUMERATED {setup}                OPTIONAL -- Need R
    ]]
  }

ReportSFTD-NR ::=
  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 ::=
  condEventId                    SEQUENCE {
    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)
    },
    condEventD2-r18                  SEQUENCE {
        distanceThreshFromReference1-r18 INTEGER(0.. 65535),
        distanceThreshFromReference2-r18 INTEGER(0.. 65535),
        referenceLocation2-r18       ReferenceLocation-r17,
        hysteresisLocation-r18       HysteresisLocation-r17,
        timeToTrigger-r18            TimeToTrigger
    }
},
rsType-r16                          NR-RS-Type,
...
[[
nesEvent-r18                          ENUMERATED {true}                               OPTIONAL -- Need R
]]
}

EventTriggerConfig ::=
    eventId                            SEQUENCE {
        eventA1                          CHOICE {
            a1-Threshold                  SEQUENCE {
                reportOnLeave              MeasTriggerQuantity,
                hysteresis                  BOOLEAN,
                timeToTrigger              Hysteresis,
            }
            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
    reportOnLeave
    hysteresis
    timeToTrigger
    useAllowedCellList
  },
  eventA6
    a6-Offset
    reportOnLeave
    hysteresis
    timeToTrigger
    useAllowedCellList
  },
  ...,
  [[
  eventX1-r17
    x1-Threshold1-Relay-r17
    x1-Threshold2-r17
    reportOnLeave-r17
    hysteresis-r17
    timeToTrigger-r17
    useAllowedCellList-r17
  },
  eventX2-r17
    x2-Threshold-Relay-r17
    reportOnLeave-r17
    hysteresis-r17
    timeToTrigger-r17
  },
  eventD1-r17
    distanceThreshFromReference1-r17
    distanceThreshFromReference2-r17
    referenceLocation1-r17
    referenceLocation2-r17
    reportOnLeave-r17
    hysteresisLocation-r17
    timeToTrigger-r17
  }
  ]],
  [[
  eventH1-r18
    h1-Threshold-r18
    h1-Hysteresis-r18
    reportOnLeave-r18
    timeToTrigger-r18
    includeAltitudeUE-r18
    simulMultiTriggerSingleMeasReport-r18
  },
  eventH2-r18
    h2-Threshold-r18
    h2-Hysteresis-r18
    reportOnLeave-r18
    timeToTrigger-r18
    includeAltitudeUE-r18

```

```

    MeasTriggerQuantity,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,
    BOOLEAN
  SEQUENCE {
    MeasTriggerQuantityOffset,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,
    BOOLEAN
  SEQUENCE {
    SL-MeasTriggerQuantity-r16,
    MeasTriggerQuantity,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger,
    BOOLEAN
  SEQUENCE {
    SL-MeasTriggerQuantity-r16,
    BOOLEAN,
    Hysteresis,
    TimeToTrigger
  SEQUENCE {
    INTEGER(1.. 65525),
    INTEGER(1.. 65525),
    ReferenceLocation-r17,
    ReferenceLocation-r17,
    BOOLEAN,
    HysteresisLocation-r17,
    TimeToTrigger
  SEQUENCE {
    Altitude-r18,
    HysteresisAltitude-r18,
    BOOLEAN,
    TimeToTrigger,
    BOOLEAN,
    BOOLEAN
  SEQUENCE {
    Altitude-r18,
    HysteresisAltitude-r18,
    BOOLEAN,
    TimeToTrigger,
    BOOLEAN,

```

```

        simulMultiTriggerSingleMeasReport-r18      BOOLEAN
    },
    eventA3H1-r18      SEQUENCE {
        a3-Offset-r18      MeasTriggerQuantityOffset,
        reportOnLeave-r18   BOOLEAN,
        a3-Hysteresis-r18   Hysteresis,
        timeToTrigger-r18  TimeToTrigger,
        useAllowedCellList-r18  BOOLEAN,
        h1-Threshold-r18   Altitude-r18,
        h1-Hysteresis-r18   HysteresisAltitude-r18,
        includeAltitudeUE-r18  BOOLEAN,
        simulMultiTriggerSingleMeasReport-r18     BOOLEAN
    },
    eventA3H2-r18      SEQUENCE {
        a3-Offset-r18      MeasTriggerQuantityOffset,
        reportOnLeave-r18   BOOLEAN,
        a3-Hysteresis-r18   Hysteresis,
        timeToTrigger-r18  TimeToTrigger,
        useAllowedCellList-r18  BOOLEAN,
        h2-Threshold-r18   Altitude-r18,
        h2-Hysteresis-r18   HysteresisAltitude-r18,
        includeAltitudeUE-r18  BOOLEAN,
        simulMultiTriggerSingleMeasReport-r18     BOOLEAN
    },
    eventA4H1-r18      SEQUENCE {
        a4-Threshold-r18   MeasTriggerQuantity,
        reportOnLeave-r18   BOOLEAN,
        a4-Hysteresis-r18   Hysteresis,
        timeToTrigger-r18  TimeToTrigger,
        useAllowedCellList-r18  BOOLEAN,
        h1-Threshold-r18   Altitude-r18,
        h1-Hysteresis-r18   HysteresisAltitude-r18,
        includeAltitudeUE-r18  BOOLEAN,
        simulMultiTriggerSingleMeasReport-r18     BOOLEAN
    },
    eventA4H2-r18      SEQUENCE {
        a4-Threshold-r18   MeasTriggerQuantity,
        reportOnLeave-r18   BOOLEAN,
        a4-Hysteresis-r18   Hysteresis,
        timeToTrigger-r18  TimeToTrigger,
        useAllowedCellList-r18  BOOLEAN,
        h2-Threshold-r18   Altitude-r18,
        h2-Hysteresis-r18   HysteresisAltitude-r18,
        includeAltitudeUE-r18  BOOLEAN,
        simulMultiTriggerSingleMeasReport-r18     BOOLEAN
    },
    eventA5H1-r18      SEQUENCE {
        a5-Threshold1-r18  MeasTriggerQuantity,
        a5-Threshold2-r18  MeasTriggerQuantity,
        reportOnLeave-r18   BOOLEAN,
        a5-Hysteresis-r18   Hysteresis,
        timeToTrigger-r18  TimeToTrigger,
        useAllowedCellList-r18  BOOLEAN,
        h1-Threshold-r18   Altitude-r18,

```



```

    h1-Hysteresis-r18                HysteresisAltitude-r18,
    includeAltitudeUE-r18            BOOLEAN,
    simulMultiTriggerSingleMeasReport-r18    BOOLEAN
  },
  eventA5H2-r18                      SEQUENCE {
    a5-Threshold1-r18                MeasTriggerQuantity,
    a5-Threshold2-r18                MeasTriggerQuantity,
    reportOnLeave-r18                 BOOLEAN,
    a5-Hysteresis-r18                Hysteresis,
    timeToTrigger-r18                TimeToTrigger,
    useAllowedCellList-r18           BOOLEAN,
    h2-Threshold-r18                 Altitude-r18,
    h2-Hysteresis-r18                HysteresisAltitude-r18,
    includeAltitudeUE-r18            BOOLEAN,
    simulMultiTriggerSingleMeasReport-r18    BOOLEAN
  },
  eventD2-r18                        SEQUENCE {
    distanceThreshFromReference1-r18  INTEGER(1.. 65535),
    distanceThreshFromReference2-r18  INTEGER(1.. 65535),
    referenceLocation2-r18             ReferenceLocation-r17,
    reportOnLeave-r18                   BOOLEAN,
    hysteresisLocation-r18             HysteresisLocation-r17,
    timeToTrigger-r18                 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
]],
[[
numberOfTriggeringCells-r18           INTEGER (2..maxCellReport)                OPTIONAL, -- Need R
cellIndividualOffsetList-r18          SEQUENCE (SIZE (1..maxNrofCellMeas)) OF CellIndividualOffsetList-r18  OPTIONAL, -- Need R
eventX1-SD-Threshold1-r18             SL-MeasTriggerQuantity-r16                OPTIONAL, -- Need S
eventX2-SD-Threshold-r18              SL-MeasTriggerQuantity-r16                OPTIONAL, -- Need S
-- Editor's Note: FFS if this is proper place for Event X1 thresholds.

```

```

    ]]
  }

PeriodicalReportConfig ::=
  rsType
  reportInterval
  reportAmount
  reportQuantityCell
  maxReportCells
  reportQuantityRS-Indexes
  maxNrofRS-IndexesToReport
  includeBeamMeasurements
  useAllowedCellList
  ...,
  [[
  measRSSI-ReportConfig-r16
  includeCommonLocationInfo-r16
  includeBT-Meas-r16
  includeWLAN-Meas-r16
  includeSensor-Meas-r16
  ul-DelayValueConfig-r16
  reportAddNeighMeas-r16
  ]],
  [[
  ul-ExcessDelayConfig-r17
  coarseLocationRequest-r17
  reportQuantityRelay-r17
  ]]
}

NR-RS-Type ::=
  ENUMERATED {ssb, csi-rs}

MeasTriggerQuantity ::=
  rsrp
  rsrq
  sinr
}

MeasTriggerQuantityOffset ::=
  rsrp
  rsrq
  sinr
}

MeasReportQuantity ::=
  rsrp
  rsrq
  sinr
}

MeasRSSI-ReportConfig-r16 ::=
  channelOccupancyThreshold-r16
}

```

```

SEQUENCE {
  NR-RS-Type,
  ReportInterval,
  ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
  MeasReportQuantity,
  INTEGER (1..maxCellReport),
  MeasReportQuantity
  OPTIONAL, -- Need R
  INTEGER (1..maxNrofIndexesToReport)
  OPTIONAL, -- Need R
  BOOLEAN,
  BOOLEAN,
  MeasRSSI-ReportConfig-r16
  OPTIONAL, -- Need R
  ENUMERATED {true}
  OPTIONAL, -- Need R
  SetupRelease {BT-NameList-r16}
  OPTIONAL, -- Need M
  SetupRelease {WLAN-NameList-r16}
  OPTIONAL, -- Need M
  SetupRelease {Sensor-NameList-r16}
  OPTIONAL, -- Need M
  SetupRelease { UL-DelayValueConfig-r16 }
  OPTIONAL, -- Need M
  ENUMERATED {setup}
  OPTIONAL, -- Need R
  SetupRelease { UL-ExcessDelayConfig-r17 }
  OPTIONAL, -- Need M
  ENUMERATED {true}
  OPTIONAL, -- Need R
  SL-MeasReportQuantity-r16
  OPTIONAL, -- Need R
}

CHOICE {
  RSRP-Range,
  RSRQ-Range,
  SINR-Range
}

CHOICE {
  INTEGER (-30..30),
  INTEGER (-30..30),
  INTEGER (-30..30)
}

SEQUENCE {
  BOOLEAN,
  BOOLEAN,
  BOOLEAN
}

SEQUENCE {
  RSSI-Range-r16
  OPTIONAL -- Need R
}

```

```

CLI-EventTriggerConfig-r16 ::=
    eventId-r16
        eventI1-r16
            i1-Threshold-r16
            reportOnLeave-r16
            hysteresis-r16
            timeToTrigger-r16
        },
    ...
},
reportInterval-r16
reportAmount-r16
maxReportCLI-r16
...
}

CLI-PeriodicalReportConfig-r16 ::=
    reportInterval-r16
    reportAmount-r16
    reportQuantityCLI-r16
    maxReportCLI-r16
    ...
}

RxTxPeriodical-r17 ::=
    rxTxReportInterval-r17
    reportAmount-r17
    ...
}

RxTxReportInterval-r17 ::= ENUMERATED {ms80,ms120,ms160,ms240,ms320,ms480,ms640,ms1024,ms1280,ms2048,ms2560,ms5120,spare4,spare3,spare2,spare1}

MeasTriggerQuantityCLI-r16 ::=
    srs-RSRP-r16
    cli-RSSI-r16
}

MeasReportQuantityCLI-r16 ::=
    ENUMERATED {srs-rsrp, cli-rssi}

ReportOnScellActivation-r18 ::=
    rsType
    reportQuantityRS-Indexes
    maxNrofRS-IndexesToReport
    includeBeamMeasurements
}

CellIndividualOffsetList-r18 ::=
    physCellId-r18
    cellIndividualOffset-r18
}

-- TAG-REPORTCONFIGNR-STOP
-- ASN1STOP

```

```

SEQUENCE {
    CHOICE {
        SEQUENCE {
            MeasTriggerQuantityCLI-r16,
            BOOLEAN,
            Hysteresis,
            TimeToTrigger
        },
        ReportInterval,
        ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
        INTEGER (1..maxCLI-Report-r16),
    }
}

SEQUENCE {
    ReportInterval,
    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
    MeasReportQuantityCLI-r16,
    INTEGER (1..maxCLI-Report-r16),
}

SEQUENCE {
    RxTxReportInterval-r17
    ENUMERATED {r1, infinity, spare6, spare5, spare4, spare3, spare2, spare1},
    OPTIONAL, -- Need R
}

CHOICE {
    SRS-RSRP-Range-r16,
    CLI-RSSI-Range-r16
}

ENUMERATED {srs-rsrp, cli-rssi}

SEQUENCE {
    NR-RS-Type,
    MeasReportQuantity,
    INTEGER (1..maxNrofIndexesToReport),
    BOOLEAN
}

SEQUENCE {
    PhysCellId,
    Q-OffsetRangeList
}

```

CondTriggerConfig field descriptions
<p>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.</p>
<p>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.</p>
<p>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 <i>condeventA5</i>, the network configures the same quantity for the <i>MeasTriggerQuantity</i> of the <i>a5-Threshold1</i> and for the <i>MeasTriggerQuantity</i> of the <i>a5-Threshold2</i>.</p>
<p>condEventId Choice of NR conditional reconfiguration event triggered criteria.</p>
<p>distanceThreshFromReference1, distanceThreshFromReference2 Distance from a fixed reference location configured with <i>referenceLocation1</i> or <i>referenceLocation2</i> or a moving reference location determined by the UE based on the serving cell <i>movingReferenceLocation</i> broadcast in <i>SIB19</i> or <i>referenceLocation2</i> and their corresponding satellite ephemeris and epoch time. Each step represents 50m.</p>
<p>duration This field is used for defining the leaving condition T1-2 for conditional HO event <i>condEventT1</i>. Each step represents 100ms.</p>
<p>nesEvent Indicates the event is a NES-specific CHO event and the event is only considered to be satisfied if indication from lower layers is received indicating the applicability of NES-specific CHO event and the related entry condition(s) is fulfilled. This field can only be configured for <i>condEventA3</i>, <i>condEventA4</i> or <i>condEventA5</i>. This field cannot be configured for CPAC.</p>
<p>referenceLocation1, referenceLocation2 For <i>condEventD1</i>, the <i>referenceLocation1</i> is associated to serving cell and <i>referenceLocation2</i> is associated to candidate target cell. For <i>condEventD2</i>, the <i>referenceLocation2</i> is associated to candidate target cell.</p>
<p>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).</p>
<p>timeToTrigger Time during which specific criteria for the event needs to be met in order to execute the conditional reconfiguration evaluation.</p>

ReportConfigNR field descriptions
<p>reportType Type of the configured measurement report. In MR-DC, network does not configure report of type <i>reportCGI</i> using SRB3. The <i>condTriggerConfig</i> is used for CHO, CPA or CPC configuration.</p>

ReportCGI field descriptions
<p>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.</p>

EventTriggerConfig field descriptions
<p>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.</p>
<p>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 <i>eventA5</i>, <i>eventA5H1</i>, <i>eventA5H2</i>, the network configures the same quantity for the <i>MeasTriggerQuantity</i> of the <i>a5-Threshold1</i> and for the <i>MeasTriggerQuantity</i> of the <i>a5-Threshold2</i>.</p>
<p>channelOccupancyThreshold RSSI threshold which is used for channel occupancy evaluation.</p>
<p>coarseLocationRequest This field is used to request UE to report coarse location information.</p>
<p>distanceThreshFromReference1, distanceThreshFromReference2 Threshold value associated to the distance from a reference location configured with <i>referenceLocation1</i> or <i>referenceLocation2</i>. Each step represents 50m.</p>
<p>eventId Choice of NR event triggered reporting criteria.</p>
<p>eventXN-SD-Threshold Indicates the SD-RSRP threshold value for the serving L2 U2N Relay UE in event XN (N equals 1 or 2). If this field is not included, the UE considers the SD-RSRP threshold value equals to the one indicated by <i>x1-Threshold1-Relay</i> <i>x2-Threshold-Relay</i>.</p>
<p>includeAltitudeUE This field is used to request UE to report altitude information.</p>
<p>maxNrofRS-IndexesToReport Max number of RS indexes to include in the measurement report for A1-A6 events.</p>
<p>maxReportCells Max number of non-serving cells to include in the measurement report.</p>
<p>numberOfTriggeringCells Indicates the number of cells detected that are required to fulfill an event for a measurement report to be triggered. This field is applicable only for the events concerning neighbor cells, i.e. <i>eventA3</i>, <i>eventA4</i>, <i>eventA5</i>, <i>eventA3H1</i>, <i>eventA3H2</i>, <i>eventA4H1</i>, <i>eventA4H2</i>, <i>eventA5H1</i>, <i>eventA5H2</i>.</p>
<p>referenceLocation1, referenceLocation2 For <i>eventD1</i>, the <i>referenceLocation1</i> is associated to serving cell and <i>referenceLocation2</i> is associated to neighbour cell. For <i>eventD2</i>, the <i>referenceLocation2</i> is associated to neighbour cell.</p>
<p>reportAddNeighMeas Indicates that the UE shall include the best neighbour cells per serving frequency.</p>
<p>reportAmount Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types.</p>
<p>reportOnLeave Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in <i>cellsTriggeredList</i>, 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 <i>eventD1</i>, <i>eventD2</i>, <i>eventH1</i>, <i>eventH2</i> as specified in 5.5.4.1.</p>
<p>reportQuantityCell The cell measurement quantities to be included in the measurement report.</p>
<p>reportQuantityRS-Indexes Indicates which measurement information per RS index the UE shall include in the measurement report.</p>
<p>simulMultiTriggerSingleMeasReport Indicates when multiple events with the same <i>eventId</i> satisfy the entering condition(s), whether to consider only the event with the smallest value between the altitude of the UE and the configured altitude threshold.</p>

<i>timeToTrigger</i> Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
<i>useAllowedCellList</i> Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.
<i>useT312</i> If value <i>TRUE</i> is configured, the UE shall use the timer T312 with the value <i>t312</i> as specified in the corresponding <i>measObjectNR</i> . If value <i>FALSE</i> is configured, the timer T312 is considered as disabled. Network configures value <i>TRUE</i> only if <i>reportType</i> is set to <i>eventTriggered</i> .
<i>xN-ThresholdM</i> 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. <i>x1-Threshold1</i> and <i>x2-Threshold</i> indicates the threshold value for the serving L2 U2N Relay UE, <i>x1-Threshold2</i> indicates the threshold value for the NR Cells.

***CLI-EventTriggerConfig* field descriptions**

<i>i1-Threshold</i> 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.
<i>eventId</i> Choice of CLI event triggered reporting criteria.
<i>maxReportCLI</i> Max number of CLI measurement resource to include in the measurement report.
<i>reportAmount</i> Number of measurement reports.
<i>reportOnLeave</i> Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CLI measurement resource in <i>srsTriggeredList</i> or <i>rssiTriggeredList</i> , as specified in 5.5.4.1.
<i>timeToTrigger</i> Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

***CLI-PeriodicalReportConfig* field descriptions**

<i>maxReportCLI</i> Max number of CLI measurement resource to include in the measurement report.
<i>reportAmount</i> Number of measurement reports.
<i>reportQuantityCLI</i> The CLI measurement quantities to be included in the measurement report.

PeriodicalReportConfig field descriptions
<p>coarseLocationRequest This field is used to request UE to report coarse location information.</p>
<p>maxNrofRS-IndexesToReport Max number of RS indexes to include in the measurement report.</p>
<p>maxReportCells Max number of non-serving cells to include in the measurement report.</p>
<p>reportAddNeighMeas Indicates that the UE shall include the best neighbour cells per serving frequency.</p>
<p>reportAmount Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types</p>
<p>reportQuantityCell The cell measurement quantities to be included in the measurement report.</p>
<p>reportQuantityRS-Indexes Indicates which measurement information per RS index the UE shall include in the measurement report.</p>
<p>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 <i>reportQuantityCell</i> and <i>maxReportCells</i>. The applicable values for the corresponding <i>reportInterval</i> are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30}. The <i>reportInterval</i> indicates the periodicity for performing and reporting of UL PDCP Packet Average Delay per DRB measurement as specified in TS 38.314 [53].</p>
<p>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 <i>reportQuantityCell</i> and <i>maxReportCells</i>. The applicable values for the corresponding <i>reportInterval</i> are (one of the) {ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240, ms20480, ms40960, min1, min6, min12, min30}. The <i>reportInterval</i> indicates the periodicity for performing and reporting of UL PDCP Excess Packet Delay per DRB measurement as specified in TS 38.314 [53].</p>
<p>useAllowedCellList Indicates whether only the cells included in the allow-list of the associated measObject are applicable as specified in 5.5.4.1.</p>

ReportSFTD-NR field descriptions
<p>cellForWhichToReportSFTD Indicates the target NR neighbour cells for SFTD measurement between PCell and NR neighbour cells.</p>
<p>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 <i>drx-SFTD-NeighMeas</i> field when <i>reprtSFTD-NeighMeas</i> is set to true.</p>
<p>reportSFTD-Meas Indicates whether UE is required to perform SFTD measurement between PCell and NR PSCell in NR-DC.</p>
<p>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 <i>reportSFTD-Meas</i> is set to true.</p>
<p>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 <i>ssb-ConfigMobility</i> is included in the measurement object for NR PSCell or NR neighbour cells.</p>

<i>RxTxPeriodical</i> field descriptions
<p>reportAmount This field indicates the number of UE Rx-Tx time difference measurement reports. If configured to <i>r1</i>, the network does not configure <i>rxTxReportInterval</i> and only one measurement is reported. If configured to <i>infinity</i>, UE periodically reports measurements according to the periodicity configured by <i>rxTxReportInterval</i>.</p>
<p>rxTxReportInterval This field indicates the measurement reporting periodicity of UE Rx-Tx time difference.</p>

other field descriptions
<p>MeasTriggerQuantity SINR is applicable only for CONNECTED mode events.</p>

<i>ReportOnScellActivation</i> field descriptions
<p>rsType Indicates which RS is used to provide the measurement result. Only value <i>ssb</i> can be set in this release.</p>
<p>reportQuantityRS-Indexes Indicates which measurement information per RS index is used to sort the reported measurement results and is included in the measurement report.</p>
<p>maxNrofRS-IndexesToReport Max number of RS indexes to include in the measurement report.</p>
<p>includeBeamMeasurements Indicates whether to include the measurement result per RS index in the measurement report.</p>

<i>CellIndividualOffsetList</i> field descriptions
<p>cellIndividualOffset Cell individual offsets applicable to a specific measurement event.</p>
<p>physCellId Physical cell identity of a cell in the cell list.</p>

– *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
      eventTriggered-r16
    }
}

EventTriggerConfigNR-SL-r16 ::= SEQUENCE {
  eventId-r16                     CHOICE {
    eventC1                       SEQUENCE {
      c1-Threshold-r16
      hysteresis-r16
      timeToTrigger-r16
    },
    eventC2-r16                   SEQUENCE {
      c2-Threshold-r16
      hysteresis-r16
      timeToTrigger-r16
    },
    ...
  },
  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.
--

<i>EventTriggerConfigNR-SL</i> field descriptions
<i>cN-Threshold</i> Threshold used for events C1 and C2 specified in clauses 5.5.4.11 and 5.5.4.12, respectively.
<i>eventId</i> Choice of NR event triggered reporting criteria.
<i>reportAmount</i> Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types.
<i>reportQuantity</i> The sidelink measurement quantities to be included in the measurement report. In this release, this is set as the CBR measurement result.
<i>timeToTrigger</i> Time during which specific criteria for the event needs to be met in order to trigger a measurement report.

<i>PeriodicalReportConfigNR-SL</i> field descriptions
<i>reportAmount</i> Number of measurement reports applicable for <i>eventTriggered</i> as well as for <i>periodical</i> report types.
<i>reportQuantity</i> 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, mt-SDT-v1810, srs-PosConfigOrActivationReq-v1800, spare3, spare2, spare1 }

-- 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 ::=
    logicalChannelIdentity          SEQUENCE {
        LogicalChannelIdentity,
        servedRadioBearer          CHOICE {
            srb-Identity            SRB-Identity,
            drb-Identity            DRB-Identity
        }
    }
    reestablishRLC                  ENUMERATED {true}
    rlc-Config                      RLC-Config
    mac-LogicalChannelConfig        LogicalChannelConfig
    . . .
    [[
    rlc-Config-v1610                RLC-Config-v1610
    ]],
    [[
    rlc-Config-v1700                RLC-Config-v1700
    logicalChannelIdentityExt-r17   LogicalChannelIdentityExt-r17
    multicastRLC-BearerConfig-r17   MulticastRLC-BearerConfig-r17
    servedRadioBearerSRB4-r17       SRB-Identity-v1700
    ]],
}

MulticastRLC-BearerConfig-r17 ::=
    servedMBS-RadioBearer-r17      MRB-Identity-r17,
    isPTM-Entity-r17               ENUMERATED {true}
}

OPTIONAL, -- Cond LCH-SetupOnly
OPTIONAL, -- Need N
OPTIONAL, -- Cond LCH-Setup
OPTIONAL, -- Cond LCH-Setup
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Cond LCH-SetupModMRB
OPTIONAL, -- Cond LCH-SetupOnlyMRB
OPTIONAL, -- Need N
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 <i>logicalChannelIdentity</i> .
reestablishRLC	Indicates that RLC should be re-established. Network sets this to <i>true</i> 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 <i>true</i> 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 <i>true</i> . The network does not include this field if <i>servedRadioBearer</i> is set to <i>drb-Identity</i> and the <i>RLC-BearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message contained in <i>Itm-CandidateConfig</i> . For SRB3 and DRBs, network doesn't include this field if the <i>RLC-BearerConfig</i> IE is part of an <i>RRCReconfiguration</i> message associated with subsequent CPAC within the <i>ConditionalReconfiguration</i> IE.
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 <i>rlc-Config-v1610</i> only when <i>rlc-Config</i> (without suffix) is set to <i>am</i> .
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 <i>servedMBS-RadioBearer</i> .
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 <i>servedRadioBearer</i> . Furthermore, the UE shall advertise and deliver uplink PDCP PDUs of the uplink PDCP entity of the <i>servedRadioBearer</i> to the uplink RLC entity of this RLC bearer unless the uplink scheduling restrictions (<i>moreThanOneRLC</i> in <i>PDCP-Config</i> and the restrictions in <i>LogicalChannelConfig</i>) forbid it to do so.

Conditional Presence	Explanation
<i>LCH-Setup</i>	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.
<i>LCH-SetupModMRB</i>	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.
<i>LCH-SetupOnly</i>	This field is mandatory present upon creation of a new logical channel for a DRB or an SRB (<i>servedRadioBearer</i>). It is absent, Need M otherwise.
<i>LCH-SetupOnlyMRB</i>	This field is mandatory present upon creation of a new logical channel for a multicast MRB and upon modification of <i>MRB-Identity</i> 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 ::=
    am
        ul-AM-RLC
        dl-AM-RLC
    },
    um-Bi-Directional
        ul-UM-RLC
        dl-UM-RLC
    },
    um-Uni-Directional-UL
        ul-UM-RLC
    },
    um-Uni-Directional-DL
        dl-UM-RLC
    },
    ...
}

UL-AM-RLC ::=
    sn-FieldLength
    t-PollRetransmit
    pollPDU
    pollByte
    maxRetxThreshold
}

DL-AM-RLC ::=
    sn-FieldLength
    t-Reassembly
    t-StatusProhibit
}

UL-UM-RLC ::=
    sn-FieldLength
}

DL-UM-RLC ::=
    sn-FieldLength
    t-Reassembly
}

T-PollRetransmit ::=

```

CHOICE {	SEQUENCE {		
SEQUENCE {	UL-AM-RLC,		
DL-AM-RLC			
SEQUENCE {	UL-UM-RLC,		
DL-UM-RLC			
SEQUENCE {	UL-UM-RLC		
SEQUENCE {	DL-UM-RLC		
SEQUENCE {	SN-FieldLengthAM	OPTIONAL,	-- Cond Reestab
T-PollRetransmit,			
PollPDU,			
PollByte,			
ENUMERATED { t1, t2, t3, t4, t6, t8, t16, t32 }			
SEQUENCE {	SN-FieldLengthAM	OPTIONAL,	-- Cond Reestab
T-Reassembly,			
T-StatusProhibit			
SEQUENCE {	SN-FieldLengthUM	OPTIONAL	-- Cond Reestab
SEQUENCE {	SN-FieldLengthUM	OPTIONAL,	-- Cond Reestab
T-Reassembly			
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 ::=
    dl-AM-RLC-v1610
    SEQUENCE {
        DL-AM-RLC-v1610
    }
```

```

RLC-Config-v1700 ::=
    dl-AM-RLC-v1700
    dl-UM-RLC-v1700
}
SEQUENCE {
    DL-AM-RLC-v1700,
    DL-UM-RLC-v1700
}

DL-AM-RLC-v1610 ::=
    t-StatusProhibit-v1610
    ...
}
SEQUENCE {
    T-StatusProhibit-v1610
} OPTIONAL, -- Need R

DL-AM-RLC-v1700 ::=
    t-ReassemblyExt-r17
}
SEQUENCE {
    T-ReassemblyExt-r17
} OPTIONAL -- Need R

DL-UM-RLC-v1700 ::=
    t-ReassemblyExt-r17
}
SEQUENCE {
    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
<i>Reestab</i>	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
```

<i>RxTxTimeDiff</i> field descriptions
<p>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.</p>

– *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
```

<i>SCellActivationRS-Config</i> field descriptions
<p>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.</p>
<p>qcl-Info Reference to TCI-State for providing the QCL source and QCL type for each <i>NZP-CSI-RS-Resource</i> listed in <i>nzp-CSI-RS-Resources</i> of the <i>NZP-CSI-RS-ResourceSet</i> indicated by <i>resourceSet</i> (see TS 38.214 [19], clause 5.1.6.1.1.1). <i>TCI-StateId</i> refers to the <i>TCI-State</i> which has this value for <i>tci-StateId</i> and is defined in <i>tci-StatesToAddModList</i> or <i>dl-Or-JointTCI-StateList</i> in the <i>PDSCH-Config</i> included in the <i>BWP-Downlink</i> of this serving cell indicated by <i>firstActiveDownlinkBWP-Id</i> in the <i>ServingCellConfig</i> in which this IE is included.</p>
<p>resourceSet <i>nzp-CSI-ResourceSetId</i> of the <i>NZP-CSI-RS-ResourceSet</i> of this serving cell used as resource configuration for one or two bursts for SCell activation. This <i>NZP-CSI-RS-ResourceSet</i> consists of four <i>NZP-CSI-RS-Resource</i> in two consecutive slots with two <i>NZP-CSI-RS-Resource</i> in each slot (see TS 38.214 [19], clause 5.1.6.1.1.1). The <i>CSI-RS</i> associated with this <i>NZP-CSI-RS-ResourceSet</i> are located in the <i>BWP</i> addressed by <i>firstActiveDownlinkBWP-Id</i>.</p>

– *SCellActivationRS-ConfigId*

The IE *SCellActivationRS-ConfigId* is used to identify one *SCellActivationRS-Config*.

***SCellActivationRS-ConfigId* information element**

```
-- ASN1START
-- TAG-SCCELLACTIVATIONRS-CONFIGID-START

SCellActivationRS-ConfigId-r17 ::=          INTEGER (1.. maxNrofSCellActRS-r17)

-- TAG-SCCELLACTIVATIONRS-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-SCCELLINDEX-START

SCellIndex ::=          INTEGER (1..31)

-- TAG-SCCELLINDEX-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 <i>LogicalChannelConfig</i> , the SR configuration to which a logical channel is mapped and to indicate, in <i>SchedulingRequestResourceConfig</i> , 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 <i>ms1</i> corresponds to 1ms, value <i>ms2</i> corresponds to 2ms, and so on. If <i>sr-ProhibitTimer-v1700</i> is configured, UE shall ignore <i>sr-ProhibitTimer</i> (without suffix). If both <i>sr-ProhibitTimer</i> (without suffix) and <i>sr-ProhibitTimer-v1700</i> are absent, the UE applies the value 0.
sr-TransMax Maximum number of SR transmissions as described in TS 38.321 [3]. Value <i>n4</i> corresponds to 4, value <i>n8</i> 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,
        s11                          NULL, -- Recurs in every slot
        s12                          INTEGER (0..1),
        s14                          INTEGER (0..3),
        s15                          INTEGER (0..4),
        s18                          INTEGER (0..7),
        s110                         INTEGER (0..9),
    }
}
```

```

        s116                INTEGER (0..15),
        s120                INTEGER (0..19),
        s140                INTEGER (0..39),
        s180                INTEGER (0..79),
        s1160               INTEGER (0..159),
        s1320               INTEGER (0..319),
        s1640               INTEGER (0..639)
    }
    resource                PUCCH-ResourceId
}
SchedulingRequestResourceConfigExt-v1610 ::= SEQUENCE {
    phy-PriorityIndex-r16   ENUMERATED {p0, p1}
    ...
}
SchedulingRequestResourceConfigExt-v1700 ::= SEQUENCE {
    periodicityAndOffset-r17 CHOICE {
        s11280               INTEGER (0..1279),
        s12560               INTEGER (0..2559),
        s15120               INTEGER (0..5119)
    }
}
-- TAG-SCHEDULINGREQUESTRESOURCECONFIG-STOP
-- ASN1STOP

```

OPTIONAL, -- Need M
OPTIONAL -- Need M

OPTIONAL, -- Need M

OPTIONAL -- Need M

SchedulingRequestResourceConfig field descriptions
<p>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:</p> <p>SCS = 15 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 8sl, 10sl, 16sl, 20sl, 40sl, 80sl SCS = 30 kHz: 2sym, 7sym, 1sl, 2sl, 4sl, 5sl, 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, 5sl, 8sl, 10sl, 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</p> <p>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 <i>periodicityAndOffset-r17</i> is present, any previously configured <i>periodicityAndOffset</i> (without suffix) is released, and vice versa. UE indicates support of the following SR periodicities in <i>additionalSR-Periodicities</i> (see TS 38.306, clause 4.2.6): SCS = 30 kHz: 5sl SCS = 120 kHz: 5sl, 10sl</p>
<p>phy-PriorityIndex Indicates whether this scheduling request resource is <i>high</i> or <i>low</i> priority in PHY prioritization/multiplexing handling (see TS 38.213 [13], clause 9.2.4). Value <i>p0</i> indicates low priority and value <i>p1</i> indicates high priority.</p>
<p>resource ID of the PUCCH resource in which the UE shall send the scheduling request. The actual <i>PUCCH-Resource</i> is configured in <i>PUCCH-Config</i> of the same UL BWP and serving cell as this <i>SchedulingRequestResourceConfig</i>. The network configures a <i>PUCCH-Resource</i> of <i>PUCCH-format0</i> or <i>PUCCH-format1</i> (other formats not supported) (see TS 38.213 [13], clause 9.2.4)</p>
<p>schedulingRequestID The ID of the <i>SchedulingRequestConfig</i> that uses this scheduling request resource.</p>

– 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
<p>carrierBandwidth Width of this carrier in number of PRBs (using the <i>subcarrierSpacing</i> defined for this carrier) (see TS 38.211 [16], clause 4.4.2).</p>
<p>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 <i>subcarrierSpacing</i> defined for this carrier). The maximum value corresponds to 275*8-1. See TS 38.211 [16], clause 4.4.2.</p>
<p>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 <i>ServingCellConfigCommon</i> and <i>ServingCellConfigCommonSIB</i>, 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 <i>ServingCellConfig</i> or for uplink carriers.</p>
<p>subcarrierSpacing Subcarrier spacing of this carrier. It is used to convert the <i>offsetToCarrier</i> 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</p>

– 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 ::=
    pdu-Session
    sdap-HeaderDL
    sdap-HeaderUL
    defaultDRB
    mappedQoS-FlowsToAdd
    mappedQoS-FlowsToRelease
    ...
}

SEQUENCE {
    PDU-SessionID,
    ENUMERATED {present, absent},
    ENUMERATED {present, absent},
    BOOLEAN,
    SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI OPTIONAL, -- Need N
    SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI OPTIONAL, -- Need N
    ...
}

-- TAG-SDAP-CONFIG-STOP
-- ASN1STOP

```

SDAP-Config field descriptions
<p>defaultDRB Indicates whether or not this is the default DRB for this PDU session. Among all configured instances of <i>SDAP-Config</i> with the same value of <i>pdu-Session</i>, this field shall be set to <i>true</i> in at most one instance of <i>SDAP-Config</i> and to <i>false</i> in all other instances.</p>
<p>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 <i>SDAP-Config</i> with the same value of <i>pdu-Session</i>. For QoS flow remapping, the QFI value of the remapped QoS flow is only included in <i>mappedQoS-FlowsToAdd</i> in <i>sdap-Config</i> corresponding to the new DRB and not included in <i>mappedQoS-FlowsToRelease</i> in <i>sdap-Config</i> corresponding to the old DRB.</p>
<p>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.</p>
<p>pdu-Session Identity of the PDU session whose QoS flows are mapped to the DRB.</p>
<p>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 <i>present</i> if the field <i>defaultDRB</i> is set to <i>true</i>.</p>
<p>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.</p>

– 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 ::=
    searchSpaceId
    controlResourceSetId
    monitoringSlotPeriodicityAndOffset
    s11
    s12
    s14
    s15
    s18
    s110
    s116
    s120
    s140
    s180
    s1160
    s1320
    s1640
    SEQUENCE {
        SearchSpaceId,
        ControlResourceSetId
        CHOICE {
            NULL,
            INTEGER (0..1),
            INTEGER (0..3),
            INTEGER (0..4),
            INTEGER (0..7),
            INTEGER (0..9),
            INTEGER (0..15),
            INTEGER (0..19),
            INTEGER (0..39),
            INTEGER (0..79),
            INTEGER (0..159),
            INTEGER (0..319),
            INTEGER (0..639),
        }
    }
    OPTIONAL, -- Cond SetupOnly
```

s11280	INTEGER (0..1279),		
s12560	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 {s11, s12, s14, s15, s18, s110, s116, s120}	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
]],			
[[
dci-FormatsMC	ENUMERATED {formats0-3, formats1-3, formats0-3-And-1-3}	OPTIONAL,	-- Need R
dci-FormatsNCR-r18	ENUMERATED {formats2-8}	OPTIONAL,	-- Need R
]]			
}			

```

}
}
}
SearchSpaceExt-r16 ::=
    controlResourceSetId-r16      SEQUENCE {
    searchSpaceType-r16          ControlResourceSetId-r16
    common-r16                  SEQUENCE {
        dci-Format2-4-r16      SEQUENCE {
            nrofCandidates-CI-r16 SEQUENCE {
                aggregationLevel1-r16 ENUMERATED {n1, n2}
                aggregationLevel2-r16 ENUMERATED {n1, n2}
                aggregationLevel4-r16 ENUMERATED {n1, n2}
                aggregationLevel8-r16 ENUMERATED {n1, n2}
                aggregationLevel16-r16 ENUMERATED {n1, n2}
            },
            ...
        }
        dci-Format2-5-r16      SEQUENCE {
            nrofCandidates-IAB-r16 SEQUENCE {
                aggregationLevel1-r16 ENUMERATED {n1, n2}
                aggregationLevel2-r16 ENUMERATED {n1, n2}
                aggregationLevel4-r16 ENUMERATED {n1, n2}
                aggregationLevel8-r16 ENUMERATED {n1, n2}
                aggregationLevel16-r16 ENUMERATED {n1, n2}
            },
            ...
        }
        dci-Format2-6-r16      SEQUENCE {
            ...
        }
        ...
    }
    searchSpaceGroupIdList-r16 SEQUENCE (SIZE (1.. 2)) OF INTEGER (0..1)
    freqMonitorLocations-r16  BIT STRING (SIZE (5))
}

SearchSpaceExt-v1700 ::=
    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)
    }
    monitoringSlotsWithinSlotGroup-r17      CHOICE {
        slotGroupLength4-r17  BIT STRING (SIZE (4)),
        slotGroupLength8-r17  BIT STRING (SIZE (8))
    }
    duration-r17      INTEGER (4..20476)

    searchSpaceType-r17 SEQUENCE {
        common-r17      SEQUENCE {

```

```

OPTIONAL -- Cond Setup2
OPTIONAL, -- Cond SetupOnly2
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Cond Setup3
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Cond Setup5
OPTIONAL, -- Need R
OPTIONAL, -- Need R

```

```

    dci-Format4-0-r17          SEQUENCE {
      ...
    }
    dci-Format4-1-r17          SEQUENCE {
      ...
    }
    dci-Format4-2-r17          SEQUENCE {
      ...
    }
    dci-Format4-1-AndFormat4-2-r17 SEQUENCE {
      ...
    }
    dci-Format2-7-r17          SEQUENCE {
      nrofCandidates-PEI-r17 SEQUENCE {
        aggregationLevel4-r17 ENUMERATED {n0, n1, n2, n3, n4}
        aggregationLevel8-r17 ENUMERATED {n0, n1, n2}
        aggregationLevel16-r17 ENUMERATED {n0, n1}
      },
      ...
    }
  }
}
searchSpaceGroupIdList-r17 SEQUENCE (SIZE (1.. 3)) OF INTEGER (0.. maxNrofSearchSpaceGroups-1-r17)
searchSpaceLinkingId-r17  INTEGER (0..maxNrofSearchSpacesLinks-1-r17)
}

SearchSpaceExt-v1800 ::= SEQUENCE {
  searchSpaceType-r18 SEQUENCE {
    common-r18 SEQUENCE {
      dci-Format2-9-r18 SEQUENCE {
        ...
      }
      ...
    }
  }
}

-- TAG-SEARCHSPACE-STOP
-- ASN1STOP

```

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Need R

OPTIONAL, -- Cond DedicatedOnly

OPTIONAL, -- Cond DedicatedOnly

OPTIONAL, -- Need R

OPTIONAL, -- Need R

SearchSpace field descriptions
<p>common Configures this search space as common search space (CSS) and DCI formats to monitor.</p>
<p>controlResourceSetId The CORESET applicable for this SearchSpace. Value 0 identifies the common CORESET#0 configured in MIB and in <i>ServingCellConfigCommon</i>. Values 1..<i>maxNrofControlResourceSets</i>-1 identify CORESETs configured in System Information or by dedicated signalling. The CORESETs with <i>non-zero controlResourceSetId</i> are configured in the same BWP as this <i>SearchSpace</i> except <i>commonControlResourceSetExt</i> which is configured by SIB20. If the field <i>controlResourceSetId-r16</i> is present, UE shall ignore the <i>controlResourceSetId</i> (without suffix).</p>
<p>dummy1, dummy2 This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>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.</p>
<p>dci-Format2-0 If configured, UE monitors the DCI format 2_0 according to TS 38.213 [13], clause 10.1, 11.1.1.</p>
<p>dci-Format2-1 If configured, UE monitors the DCI format 2_1 according to TS 38.213 [13], clause 10.1, 11.2.</p>
<p>dci-Format2-2 If configured, UE monitors the DCI format 2_2 according to TS 38.213 [13], clause 10.1, 11.3.</p>
<p>dci-Format2-3 If configured, UE monitors the DCI format 2_3 according to TS 38.213 [13], clause 10.1, 11.4</p>
<p>dci-Format2-4 If configured, UE monitors the DCI format 2_4 according to TS 38.213 [13], clause 11.2A.</p>
<p>dci-Format2-5 If configured, IAB-MT monitors the DCI format 2_5 according to TS 38.213 [13], clause 14.</p>
<p>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.</p>
<p>dci-Format2-7 If configured, UE monitors the DCI format 2_7 according to TS 38.213 [13], clause 10.1, 10.4A.</p>
<p>dci-Format2-9 If configured, UE monitors the DCI format 2_9 according to TS 38.213 [13], clause 10.1, 11.5.</p>
<p>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].</p>
<p>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].</p>
<p>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].</p>
<p>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].</p>
<p>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.</p>
<p>dci-FormatsExt If this field is present, the field <i>dci-Formats</i> is ignored and <i>dci-FormatsExt</i> 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.</p>

<p><i>dci-FormatsMC</i> Indicate whether the UE monitors in this USS for DCI format 0_3 or for format 1_3 or for formats 0_3 and 1_3. Separate search space sets for DCI format 0_3/1_3 and legacy DCI formats are independently configured. If this field is present, the field <i>dci-Formats</i> is ignored. NOTE: This parameter is used only for SearchSpace configured to the scheduling cell, while another SearchSpace configured to the reference scheduled cell (if any) configures only <i>nrofCandidates</i> (i.e., all other optional fields are absent) with same <i>serachSpaceId</i> with that for scheduling cell.</p>
<p><i>dci-Formats-MT</i> Indicates whether the IAB-MT monitors the DCI formats 2-5 according to TS 38.213 [13], clause 14.</p>
<p><i>dci-FormatsNCR</i> Indicates whether the NCR-MT monitors the DCI formats 2-8 according to TS 38.213 [13], clause 20.</p>
<p><i>dci-FormatsSL</i> 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 <i>dci-Formats</i> is ignored and <i>dci-FormatsSL</i> is used.</p>
<p><i>duration</i> Number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the <i>periodicityAndOffset</i>. 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 <i>periodicity-1</i> (<i>periodicity</i> as given in the <i>monitoringSlotPeriodicityAndOffset</i>). For SCS 480 kHz and SCS 960 kHz, <i>duration-r17</i> is used, and the configured duration is restricted to be an integer multiple of L slots and smaller than <i>periodicity</i>, where L is the configured length of the bitmap <i>monitoringSlotsWithinSlotGroup-r17</i>. If <i>duration-r17</i> is absent, the UE assumes the duration in slots is equal to L. The maximum valid duration is <i>periodicity-L</i>. For IAB-MT, <i>duration</i> indicates number of consecutive slots that a SearchSpace lasts in every occasion, i.e., upon every period as given in the <i>periodicityAndOffset</i>. 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 <i>periodicity-1</i> (<i>periodicity</i> as given in the <i>monitoringSlotPeriodicityAndOffset</i>).</p>
<p><i>freqMonitorLocations</i> 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.</p>

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.

<p><i>nrofCandidates-SFI</i> 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 <i>freqMonitorLocations-r16</i>, only value 'n1' is valid.</p>
<p><i>nrofCandidates</i> 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 <i>searchSpaceType</i>). If configured in the <i>SearchSpace</i> 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).</p>
<p><i>searchSpaceGroupIDList-r16, searchSpaceGroupIDList-r17</i> 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 <i>searchSpaceGroupIDList-r16</i> is included. The network configures at most 3 search space groups per BWP where the group ID is either 0, 1 or 2 if <i>searchSpaceGroupIDList-r17</i> is included. And if <i>searchSpaceGroupIDList-r17</i> is included, <i>searchSpaceGroupIDList-r16</i> is ignored.</p>
<p><i>searchSpaceId</i> Identity of the search space. <i>SearchSpaceId</i> = 0 identifies the <i>searchSpaceZero</i> configured via PBCH (MIB) or <i>ServingCellConfigCommon</i> and may hence not be used in the <i>SearchSpace</i> IE. The <i>searchSpaceId</i> is unique among the BWPs of a Serving Cell. In case of cross carrier scheduling, search spaces with the same <i>searchSpaceId</i> 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 <i>ControlResourceSet</i> and for a scheduled cell in the case of cross carrier scheduling, except for <i>nrofCandidates</i>, all the optional fields are absent.</p>
<p><i>SearchSpaceLinkingId</i> This parameter is used to link two search spaces of same type in the same BWP. If two search spaces have the same <i>SearchSpaceLinkingId</i> 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 (<i>monitoringSlotPeriodicityAndOffset</i>), 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, <i>searchSpaceSIB1</i>, <i>searchSpaceOtherSystemInformation</i>, <i>pagingSearchSpace</i>, <i>ra-SearchSpace</i>, <i>searchSpaceMCCH</i>, <i>searchSpaceMTCH</i>, <i>peiSearchSpace</i>, and <i>sdt-SearchSpace</i>. SS set configured by <i>recoverySearchSpaceId</i> 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 <i>dci-FormatsSL</i> for monitoring format 3-0 or format 3-1 or for monitoring formats 3-0 and format 3-1.</p>
<p><i>searchSpaceType</i> Indicates whether this is a common search space (present) or a UE specific search space as well as DCI formats to monitor for.</p>
<p><i>ue-Specific</i> 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)</p>

Conditional Presence	Explanation
<i>DedicatedOnly</i>	In PDCCH-Config, the field is optionally present, Need R. Otherwise it is absent, Need R.
<i>Setup</i>	This field is mandatory present upon creation of a new <i>SearchSpace</i> . It is optionally present, Need M, otherwise.
<i>Setup2</i>	This field is mandatory present when a new <i>SearchSpace</i> is set up, if the same <i>SearchSpace</i> ID is not included in <i>searchSpacesToAddModListExt-r16</i> of the parent IE with the field <i>searchSpaceType-r16</i> or <i>searchSpaceType-r17</i> included. Otherwise it is optionally present, Need M.
<i>Setup3</i>	This field is mandatory present when a new <i>SearchSpace</i> is set up, if the same <i>SearchSpace</i> ID is not included in <i>searchSpacesToAddModListExt</i> (without suffix) of the parent IE with the field <i>searchSpaceType</i> (without suffix) included. Otherwise it is optionally present, Need M.
<i>Setup4</i>	This field is mandatory present upon creation of a new <i>SearchSpace</i> if <i>monitoringSlotPeriodicityAndOffset-v1710</i> is not included. It is optionally present, Need M, otherwise.
<i>Setup5</i>	This field is mandatory present upon creation of a new <i>SearchSpace</i> if <i>monitoringSlotPeriodicityAndOffset</i> (without suffix) is not included. It is optionally present, Need M, otherwise.
<i>SetupOnly</i>	This field is mandatory present upon creation of a new <i>SearchSpace</i> . It is absent, Need M, otherwise.
<i>SetupOnly2</i>	In PDCCH-Config, the field is optionally present upon creation of a new <i>SearchSpace</i> and absent, Need M upon reconfiguration of an existing <i>SearchSpace</i> . 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.

– *SelectedPSCellForCHO-WithSCG*

The IE *SelectedPSCellForCHO-WithSCG* is used to indicate the information of the selected target PSCell to target MN at execution of a conditional reconfiguration for CHO with candidate SCG(s).

***SelectedPSCellForCHO-WithSCG* information element**

```
-- ASN1START
-- TAG-SELECTEDPSCELLFORCHO-WITHSCG-START

SelectedPSCellForCHO-WithSCG-r18 ::= SEQUENCE {
    ssbFrequency-r18          ARFCN-ValueNR,
    physCellId-r18           PhysCellId
}

-- TAG-SELECTEDPSCELLFORCHO-WITHSCG-STOP
-- ASN1STOP
```

– *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)
            }
        ]],
    }

```


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	TCI-ActivatedConfig-r17	OPTIONAL,	-- Cond
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
[[
lte-CRS-PatternList3-r18	SetupRelease { LTE-CRS-PatternList-r16 }	OPTIONAL,	-- Need M
lte-CRS-PatternList4-r18	SetupRelease { LTE-CRS-PatternList-r16 }	OPTIONAL,	-- Need M
pdccch-CandidateReceptionWithCRS-Overlap-r18	ENUMERATED {enabled}	OPTIONAL,	-- Need R
cjt-Scheme-PDSCH-r18	ENUMERATED {cjtSchemeA, cjtSchemeB}	OPTIONAL,	-- Need R
tag2-r18	SEQUENCE {		
tag2-Id-r18	TAG-Id,		
tag2-flag-r18	BOOLEAN,		
n-TimingAdvanceOffset2-r18	ENUMERATED { n0, n25600, n39936, spare1 }	OPTIONAL,	-- Need S
}		OPTIONAL,	-- Need R
cellDTXDRX-Config-r18	SetupRelease { CellDTXDRX-Config-r18 }	OPTIONAL,	-- Need M
positionInDCI-cellDTRX-r18	INTEGER (0..maxDCI-2-9-Size-1-r18)	OPTIONAL,	-- Need R
cellDTXDRX-L1activation-r18	ENUMERATED {enabled}	OPTIONAL,	-- Need R
mc-DCI-SetOfCellsToAddModList-r18	SEQUENCE (SIZE (1..maxNrofSetsOfCells-r18)) OF MC-DCI-SetOfCells-r18	OPTIONAL,	-- Need N

```

mc-DCI-SetOfCellsToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSetsOfCells-r18)) OF SetOfCellsId-r18 OPTIONAL -- Need N
]]
}

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
        ]],
        [[
            srs-PosTx-Hopping-r18 SetupRelease { SRS-PosTx-Hopping-r18 } OPTIONAL, -- Need M
            enablePL-RS-UpdateForType1CG-PUSCH-r18 ENUMERATED {enabled} OPTIONAL, -- Need R
            powerBoostPi2BPSK-r18 BOOLEAN OPTIONAL, -- Need R
            powerBoostQPSK-r18 BOOLEAN 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 {

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    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
}

MC-DCI-SetOfCells-r18 ::=      SEQUENCE {
    setOfCellsId-r18              SetOfCellsId-r18,
    nCI-Value-r18                 INTEGER (0..7),
    scheduledCellListDCI-1-3-r18 SEQUENCE (SIZE (2..maxNrofCellsInSet-r18)) OF ServCellIndex OPTIONAL, -- Need R
    scheduledCellListDCI-0-3-r18 SEQUENCE (SIZE (2..maxNrofCellsInSet-r18)) OF ServCellIndex OPTIONAL, -- Need R
    scheduledCellComboListDCI-1-3-r18 SEQUENCE (SIZE (1..maxNrofCellCombos-r18)) OF ScheduledCellCombo-r18 OPTIONAL, -- Need R
    scheduledCellComboListDCI-0-3-r18 SEQUENCE (SIZE (1..maxNrofCellCombos-r18)) OF ScheduledCellCombo-r18 OPTIONAL, -- Need R
    antennaPortsDCI1-3-r18        ENUMERATED {type1a, type2}                                OPTIONAL, -- Cond TypeDCI1-3
    antennaPortsDCI0-3-r18        ENUMERATED {type1a, type2}                                OPTIONAL, -- Cond TypeDCI0-3
    tpmi-DCI0-3-r18               ENUMERATED {type1a, type2}                                OPTIONAL, -- Cond TypeDCI0-3
    sri-DCI0-3-r18                ENUMERATED {type1a, type2}                                OPTIONAL, -- Cond TypeDCI0-3
    priorityIndicatorDCI-1-3-r18   ENUMERATED {enabled}                                OPTIONAL, -- Need R
    priorityIndicatorDCI-0-3-r18   ENUMERATED {enabled}                                OPTIONAL, -- Need R
    dormancyDCI-1-3-r18           ENUMERATED {enabled}                                OPTIONAL, -- Need R
    dormancyDCI-0-3-r18           ENUMERATED {enabled}                                OPTIONAL, -- Need R
    pdcchMonAdaptDCI-1-3-r18      ENUMERATED {enabled}                                OPTIONAL, -- Need R
    pdcchMonAdaptDCI-0-3-r18      ENUMERATED {enabled}                                OPTIONAL, -- Need R
}

```

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minimumSchedulingOffsetK0DCI-1-3-r18      ENUMERATED {enabled}          OPTIONAL, -- Need R
minimumSchedulingOffsetK0DCI-0-3-r18      ENUMERATED {enabled}          OPTIONAL, -- Need R
pdsch-HARQ-ACK-OneShotFeedbackDCI-1-3-r18 ENUMERATED {enabled}          OPTIONAL, -- Need R
pdsch-HARQ-ACK-enhType3DCI-1-3-r18        ENUMERATED {enabled}          OPTIONAL, -- Need R
pdsch-HARQ-ACK-enhType3DCIfieldDCI-1-3-r18 ENUMERATED {enabled}          OPTIONAL, -- Need R
pdsch-HARQ-ACK-retxDCI-1-3-r18            ENUMERATED {enabled}          OPTIONAL, -- Need R
pucch-sSCellDynDCI-1-3-r18                ENUMERATED {enabled}          OPTIONAL, -- Need R
tdra-FieldIndexListDCI-1-3-r18            SEQUENCE (SIZE (1..32)) OF TDRA-FieldIndexDCI-1-3-r18  OPTIONAL, -- Need R
tdra-FieldIndexListDCI-0-3-r18            SEQUENCE (SIZE (1..64)) OF TDRA-FieldIndexDCI-0-3-r18  OPTIONAL, -- Need R
rateMatchListDCI-1-3-r18                  SEQUENCE (SIZE (1..16)) OF RateMatchDCI-1-3-r18        OPTIONAL, -- Need R
zp-CSI-RSListDCI-1-3-r18                  SEQUENCE (SIZE (1..8)) OF ZP-CSI-DCI-1-3-r18           OPTIONAL, -- Need R
tci-ListDCI-1-3-r18                        SEQUENCE (SIZE (1..16)) OF TCI-DCI-1-3-r18             OPTIONAL, -- Need R
srs-RequestListDCI-1-3-r18                 SEQUENCE (SIZE (1..16)) OF SRS-RequestCombo-r18       OPTIONAL, -- Need R
srs-OffsetListDCI-1-3-r18                  SEQUENCE (SIZE (1..8)) OF SRS-OffsetCombo-r18          OPTIONAL, -- Need R
srs-RequestListDCI-0-3-r18                 SEQUENCE (SIZE (1..16)) OF SRS-RequestCombo-r18       OPTIONAL, -- Need R
srs-OffsetListDCI-0-3-r18                  SEQUENCE (SIZE (1..8)) OF SRS-OffsetCombo-r18          OPTIONAL, -- Need R
}

SetOfCellsId-r18 ::=
    INTEGER (0..maxNrofSetsOfCells-1-r18)

ScheduledCellCombo-r18 ::=
    SEQUENCE (SIZE (1..maxNrofCellsInSet-r18)) OF INTEGER (0..maxNrofCellsInSet-1-r18)

RateMatchDCI-1-3-r18 ::=
    SEQUENCE (SIZE (1..maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (1..2))

ZP-CSI-DCI-1-3-r18 ::=
    SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (1..2))

TCI-DCI-1-3-r18 ::=
    SEQUENCE (SIZE (2.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (3))

SRS-RequestCombo-r18 ::=
    SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF BIT STRING (SIZE (2..3))

SRS-OffsetCombo-r18 ::=
    SEQUENCE (SIZE (1.. maxNrofCellsInSet-r18)) OF INTEGER (0..3)

TDRA-FieldIndexDCI-1-3-r18 ::=
    SEQUENCE (SIZE (2.. maxNrofBWPsInSetOfCells-r18)) OF INTEGER (0..maxNrofDL-Allocations-1-r18)

TDRA-FieldIndexDCI-0-3-r18 ::=
    SEQUENCE (SIZE (2.. maxNrofBWPsInSetOfCells-r18)) OF INTEGER (0..maxNrofUL-Allocations-1-r18)

-- TAG-SERVINGCELLCONFIG-STOP
-- ASN1STOP

```

ChannelAccessConfig field descriptions
<p>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.</p>
<p>energyDetectionConfig Indicates whether to use the <i>maxEnergyDetectionThreshold</i> or the <i>energyDetectionThresholdOffset</i> (see TS 37.213 [48], clause 4.2.3).</p>
<p>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.</p>
<p>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.</p>
<p>n-TimingAdvanceOffset2 The <i>N_TA-Offset2</i> to be applied for all uplink transmissions on this serving cell associated to <i>tag2</i>. If absent, the <i>N_TA-Offset</i> is applied for all uplink transmissions on this serving cell associated to <i>tag2</i>.</p>
<p>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.</p>

ServingCellConfig field descriptions
<p>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.</p>
<p>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.</p>
<p>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 <i>SCS-SpecificCarrierList</i> in <i>ServingCellConfigCommon</i> or <i>ServingCellConfigCommonSIB</i> and this serving cell's lowest SCS among all the configured SCSs in DL/UL <i>SCS-SpecificCarrierList</i> in <i>ServingCellConfigCommon</i> or <i>ServingCellConfigCommonSIB</i>). 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.</p>
<p>cbg-TxDiffTbsProcessingType1, cbg-TxDiffTbsProcessingType2 Indicates whether processing types 1 and 2 based CBG based operation is enabled according to Rel-16 UE capabilities.</p>
<p>cellDTXDRX-Config Used to configure cell DTX/DRX for the serving cell, as specified in TS 38.321 [3]. A maximum of two cell DTX/DRX patterns can be configured per MAC entity for different serving cells. The two configured patterns are aligned, that the start and slot offset are common and the periodicity of one pattern is an integer multiple of the other. Cell DTX is configured only when connected mode DRX is configured.</p>
<p>cellDTXDRX-L1activation Indicates whether this serving cell has enabled L1 signaling based on DCI 2_9 for dynamic activation/deactivation of cell DTX/DRX configuration.</p>
<p>cjt-Scheme-PDSCH This field is used to configure CJT Tx scheme <i>cjtSchemeA</i> or <i>cjtSchemeB</i> for PDSCH reception, see TS 38.214 [19] clause 5.1.5.</p>
<p>channelAccessConfig List of parameters used for access procedures of operation with shared spectrum channel access (see TS 37.213 [48]).</p>
<p>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 <i>ServingCellConfigCommon</i> or <i>ServingCellConfigCommonSIB</i> for this serving cell.</p>
<p>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 <i>other</i> 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.</p>
<p>crossCarrierSchedulingConfigRelease If this field is included, the UE shall release the cross carrier scheduling configuration configured by <i>crossCarrierSchedulingConfig</i>. The network may only include either <i>crossCarrierSchedulingConfigRelease</i> or <i>crossCarrierSchedulingConfig</i> at a time.</p>
<p>crs-RateMatch-PerCORESETPoolIndex Indicates how UE performs rate matching when both <i>lte-CRS-PatternList1-r16</i> and <i>lte-CRS-PatternList2-r16</i> are configured or when both <i>lte-CRS-PatternList3-r18</i> and <i>lte-CRS-PatternList4-r18</i> are configured as specified in TS 38.214 [19], clause 5.1.4.2.</p>
<p>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).</p>
<p>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).</p>

<p><i>directionalCollisionHandling</i> 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.</p> <p>The network only configures this field for TDD serving cells that are using the same SCS.</p>
<p><i>directionalCollisionHandling-DC</i> 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.</p>
<p><i>dormantBWP-Config</i> The dormant BWP configuration for an SCell. This field can be configured only for a (non-PUCCH) SCell.</p>
<p><i>downlinkBWP-ToAddModList</i> List of additional downlink bandwidth parts to be added or modified. (see TS 38.213 [13], clause 12).</p>
<p><i>downlinkBWP-ToReleaseList</i> List of additional downlink bandwidth parts to be released. (see TS 38.213 [13], clause 12).</p>
<p><i>downlinkChannelBW-PerSCS-List</i> 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 <i>scs-SpecificCarrierList</i> in <i>DownlinkConfigCommon</i> / <i>DownlinkConfigCommonSIB</i>. 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 an (e)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.</p>
<p><i>dummy1, dummy 2</i> This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p><i>enableBeamSwitchTiming</i> 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].</p>
<p><i>enableDefaultTCI-StatePerCoresetPoolIndex</i> 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.</p>
<p><i>enableTwoDefaultTCI-States</i> 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</p>
<p><i>fdmed-ReceptionMulticast</i> Indicates the Type-1 HARQ codebook generation as specified in TS 38.213 [13], clause 9.1.2.1.</p>
<p><i>firstActiveDownlinkBWP-Id</i> 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 <i>RRCReconfiguration</i> 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 <i>reconfigurationWithSync</i>, the network sets the <i>firstActiveDownlinkBWP-Id</i> and <i>firstActiveUplinkBWP-Id</i> to the same value.</p>
<p><i>initialDownlinkBWP</i> 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</p>

<p><i>intraCellGuardBandsDL-List, intraCellGuardBandsUL-List</i> 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.</p>
<p><i>lte-CRS-PatternList1</i> 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 <i>lte-CRS-ToMatchAround</i> simultaneously.</p>
<p><i>lte-CRS-PatternList2</i> 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 <i>lte-CRS-PatternList1</i>, The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in <i>lte-CRS-PatternList1</i>, and so on. Network configures this field only if the field <i>lte-CRS-ToMatchAround</i> is not configured and there is at least one ControlResourceSet in one DL BWP of this serving cell with <i>coresetPoolIndex</i> set to 1.</p>
<p><i>lte-CRS-PatternList3</i> 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 <i>lte-CRS-ToMatchAround</i>, or this field and <i>lte-CRS-PatternList1</i>, or this field and <i>lte-CRS-PatternList2</i> simultaneously.</p>
<p><i>lte-CRS-PatternList4</i> 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 first LTE CRS pattern in this list shall be fully overlapping in frequency with the first LTE CRS pattern in <i>lte-CRS-PatternList3</i>. The second LTE CRS pattern in this list shall be fully overlapping in frequency with the second LTE CRS pattern in <i>lte-CRS-PatternList3</i>, and so on. Network configures this field only if the field <i>lte-CRS-ToMatchAround</i> is not configured and the field <i>lte-CRS-PatternList3</i> is configured.</p>
<p><i>lte-CRS-ToMatchAround</i> Parameters to determine an LTE CRS pattern that the UE shall rate match around.</p>
<p><i>lte-NeighCellsCRS-AssistInfoList</i> 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 <i>LTE-NeighCellsCRS-AssistInfo</i> entries is considered to be newly created and the conditions and Need codes for setup of the entry apply.</p>
<p><i>lte-NeighCellsCRS-Assumptions</i> 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]).</p> <ul style="list-style-type: none"> - The CRS port number is the same as the one indicated in <i>RateMatchPatternLTE-CRS</i> if configured for the serving cell. - The CRS port number is 4 if <i>RateMatchPatternLTE-CRS</i> is not configured for the serving cell. - The channel bandwidth and centre frequency are the same as the ones indicated in <i>RateMatchPatternLTE-CRS</i> if configured for the serving cell. - The MBSFN configuration is the same as the one indicated in <i>RateMatchPatternLTE-CRS</i> if configured for the serving cell. If <i>RateMatchPatternLTE-CRS</i> is not configured for the serving cell, MBSFN subframe is not configured. - Network-based CRS interference mitigation (i.e., CRS muting), as in <i>crs-IntfMitigConfig</i> specified in TS 36.331 [10], is not enabled. <p>If the field is configured (i.e. false) and <i>LTE-NeighCellsCRS-AssistInfoList</i> is configured, the configuration provided in <i>LTE-NeighCellsCRS-AssistInfoList</i> overrides the default network configuration assumptions. If the field is configured (i.e. false) and <i>LTE-NeighCellsCRS-AssistInfoList</i> is not configured, it is up to the UE implementation whether to apply CRS-IM operation.</p>
<p><i>mc-DCI-SetOfCellsToAddModList</i> List of up to N (N<=4) configurations of set(s) of cells for multi-cell PDSCH/PUSCH scheduling from the serving cell, where N is reported as UE capability and up to 4 sets of cells can be configured per PUCCH group. When this field is configured to a SCell, PCell cannot be included in either ScheduledCellListDCI-1-3 or ScheduledCellListDCI-0-3.</p>

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 <i>disabled</i> 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 <i>coresetPoolIndex</i> values are configured, the number of received PDSCHs is per <i>coresetPoolIndex</i> 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 <i>fdmed-ReceptionMulticast</i> 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).
pdccch-CandidateReceptionWith-CRS-Overlap
Presence of this field indicates the UE shall monitor PDCCH candidates that overlap with LTE CRS RE(s).
pdsch-ServingCellConfig
PDSCH related parameters that are not BWP-specific.
positionInDCI-cellIDTRX
The starting bit position of an information block of DCI format 2_9 for this serving cell (see TS 38.212 [17], clause 7.3.1.3.10).
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 <i>RateMatchPattern</i> with the same <i>RateMatchPatternId</i> is configured in both <i>ServingCellConfig/ServingCellConfigCommon</i> and in SIB20/MCCH, the entire <i>RateMatchPattern</i> 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: <i>sfnSchemeA</i> or <i>sfnSchemeB</i> as specified (see TS 38.214 [19], clause 5.1). If network includes both <i>sfnSchemePDCCH</i> and <i>sfnSchemePDSCH</i> , same value shall be configured.
sfnSchemePDSCH
This parameter is used to configure single frequency network scheme for PDSCH: <i>sfnSchemeA</i> or <i>sfnSchemeB</i> as specified (see TS 38.214 [19], clause 5.1). If network includes both <i>sfnSchemePDCCH</i> and <i>sfnSchemePDSCH</i> , same value shall be configured. The network does not configure this parameter and <i>repetitionSchemeConfig</i> in <i>PDSCH-Config</i> simultaneously in the same serving cell.
semiStaticChannelAccessConfigUE
When this field is configured and when <i>channelAccessMode-r16</i> (see IE <i>ServingCellConfigCommon</i> and IE <i>ServingCellConfigCommonSIB</i>) is configured to <i>semiStatic</i> , 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 <i>SemiStaticChannelAccessConfig-r16</i> if the UE indicates the corresponding capability. Otherwise, the periodicity configured by <i>periodUE-r17</i> is an integer multiple of or an integer factor of the periodicity indicated by <i>period</i> in <i>SemiStaticChannelAccessConfig-r16</i> .

<p>servicingCellMO <i>measObjectId</i> of the <i>MeasObjectNR</i> in <i>MeasConfig</i> which is associated to the serving cell. For this <i>MeasObjectNR</i>, the following relationship applies between this <i>MeasObjectNR</i> and <i>frequencyInfoDL</i> in <i>ServingCellConfigCommon/ServingCellConfigCommonSIB</i> of the serving cell: if <i>ssbFrequency</i> is configured, its value is the same as the <i>absoluteFrequencySSB</i> and if <i>csi-rs-ResourceConfigMobility</i> is configured, the value of its <i>subcarrierSpacing</i> is present in one entry of the <i>scs-SpecificCarrierList</i>, <i>csi-RS-CellListMobility</i> includes an entry corresponding to the serving cell (with <i>cellId</i> equal to <i>physCellId</i> in <i>ServingCellConfigCommon</i>) and the frequency range indicated by the <i>csi-rs-MeasurementBW</i> of the entry in <i>csi-RS-CellListMobility</i> is included in the frequency range indicated by in the entry of the <i>scs-SpecificCarrierList</i>.</p>
<p>supplementaryUplink Network may configure this field only when <i>supplementaryUplinkConfig</i> is configured in <i>ServingCellConfigCommon</i> or <i>supplementaryUplink</i> is configured in <i>ServingCellConfigCommonSIB</i>.</p>
<p>supplementaryUplinkRelease If this field is included, the UE shall release the uplink configuration configured by <i>supplementaryUplink</i>. The network only includes either <i>supplementaryUplinkRelease</i> or <i>supplementaryUplink</i> at a time.</p>
<p>tag-Id, tag2-Id Timing Advance Group ID, as specified in TS 38.321 [3], which this cell or set of TCI-States of this cell are associated with. The <i>tag2-Id</i> is optionally configured in a serving cell if and only if the serving cell is configured with more than one value for the <i>coresetPoolIndex</i></p>
<p>tag2-flag If this field is set to <i>true</i>, the <i>tag2-Id</i> is associated to value 0 and <i>tag-Id</i> is associated to value 1 of field TI bit in RAR, fallbackRAR and in the absolute TAC MAC CE, see TS 38.321 [3]. Otherwise, the <i>tag2-Id</i> is associated to value 1 and <i>tag-Id</i> is associated to value 0 of field TI bit in RAR, fallbackRAR and in the absolute TAC MAC CE, see TS 38.321 [3].</p>
<p>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 <i>tci-ActivatedConfig</i> is absent - if <i>bfd-and-RLM</i> is configured and no RS is configured in <i>RadioLinkMonitoringConfig</i> 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 <i>tci-ActivatedConfig</i> is absent - if <i>bfd-and-RLM</i> is configured and no RS is configured in <i>RadioLinkMonitoringConfig</i> for RLM, respectively for BFD, the UE shall use the previously activated TCI states for PDCCH as RS for RLM, respectively for BFD.</p>
<p>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 <i>TDD-UL-DL ConfigurationCommon</i>.</p>
<p>unifiedTCI-StateType Indicates the unified TCI state type the UE is configured for this serving cell. The value <i>separate</i> means this serving cell is configured with <i>dl-OrJointTCI-StateList</i> for DL TCI state and <i>ul-TCI-ToAddModList</i> for UL TCI state. The value <i>joint</i> means this serving cell is configured with <i>dl-OrJointTCI-StateList</i> for joint TCI state for UL and DL operation.</p>
<p>uplinkConfig Network may configure this field only when <i>uplinkConfigCommon</i> is configured in <i>ServingCellConfigCommon</i> or <i>ServingCellConfigCommonSIB</i>. Addition or release of this field can only be done upon SCell addition or release (respectively).</p>
<p>uplink-PowerControlToAddModList Configures UL power control parameters for PUSCH, PUCCH and SRS when field <i>unifiedTCI-StateType</i> is configured for this serving cell.</p>

UplinkConfig field descriptions
<p>carrierSwitching Includes parameters for configuration of carrier based SRS switching (see TS 38.214 [19], clause 6.2.1.3).</p>
<p>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.</p>
<p>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 <i>sri-PUSCH-PowerControl</i>. 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).</p>
<p>enablePL-RS-UpdateForType1CG-PUSCH When this parameter is present, the Rel-18 feature of MAC CE based pathloss RS updates for Type 1 CG-PUSCH is enabled. The network only configures this parameter, when the parameter <i>enablePL-RS-UpdateForPUSCH-SRS</i> is configured. (See TS 38.213 [13], clause 7).</p>
<p>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 <i>BandwidthPartId</i> = 0.</p>
<p>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 <i>uplinkConfig</i>, 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</p>
<p>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.</p>
<p>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.</p>
<p>powerBoostPi2BPSK If this field is set to <i>true</i>, 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. The network ensures that <i>powerBoostPi2BPSK</i> and <i>powerBoostPi2BPSK-r18</i> are not configured at the same time for a UE.</p>
<p>powerBoostQPSK If this field is set to <i>true</i>, the UE determines the maximum output power for PUSCH transmissions that use QPSK modulation according to TS 38.101-1 [15], clause 6.2.4.</p>
<p>pusch-ServingCellConfig PUSCH related parameters that are not BWP-specific.</p>
<p>srs-PosTx-Hopping Contains configuration related to the SRS for Positioning with frequency hopping for RRC_CONNECTED state.</p>
<p>uplinkBWP-ToAddModList The additional bandwidth parts for uplink to be added or modified. In case of TDD uplink- and downlink BWP with the same <i>bandwidthPartId</i> are considered as a BWP pair and must have the same center frequency.</p>
<p>uplinkBWP-ToReleaseList The additional bandwidth parts for uplink to be released.</p>

<p><i>uplinkChannelBW-PerSCS-List</i> 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 <i>scs-SpecificCarrierList</i> in <i>UplinkConfigCommon / UplinkConfigCommonSIB</i>. 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 an (e)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.</p>
<p><i>uplinkTxSwitchingPeriodLocation</i> 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.</p>
<p><i>uplinkTxSwitchingCarrier</i> 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.</p>

<i>DormantBWP-Config</i> field descriptions
<p><i>dormancyGroupWithinActiveTime</i> 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].</p>
<p><i>dormancyGroupOutsideActiveTime</i> 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].</p>
<p><i>dormantBWP-Id</i> 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 <i>defaultDownlinkBWP-Id</i>, and at least one of the <i>withinActiveTimeConfig</i> and <i>outsideActiveTimeConfig</i> should be configured.</p>
<p><i>firstOutsideActiveTimeBWP-Id</i> This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy outside active time.</p>
<p><i>firstWithinActiveTimeBWP-Id</i> This field contains the ID of the downlink bandwidth part to be activated when receiving a DCI indication for SCell dormancy within active time.</p>
<p><i>outsideActiveTimeConfig</i> 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 <i>dcp-Config</i>.</p>
<p><i>withinActiveTimeConfig</i> This field contains the configuration to be used for SCell dormancy within active time, as specified in TS 38.213 [13].</p>

<i>GuardBand</i> field descriptions	
<i>startCRB</i>	Indicates the starting RB of the guard band.
<i>nrofCRB</i>	Indicates the length of the guard band in RBs. When set to 0, zero-size guard band is used.

MC-DCI-SetOfCells field descriptions
<p>antennaPortsDCI1-3, antennaPortsDCI0-3 Configure the indication type for antenna port(s) field in DCI format 1_3 and DCI format 0_3, respectively (see TS 38.212, clauses 7.3.1.2.4 and 7.3.1.1.4).</p>
<p>dormancyDCI-1-3, dormancyDCI-0-3 Configure the presence of Scell dormancy indication field in DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>minimumSchedulingOffsetK0DCI-1-3, minimumSchedulingOffsetK0DCI-0-3 Configure the presence of minimum applicable scheduling offset indicator field in DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>nCI-Value Configure n_CI value used for the set of cells, where unique n_CI value is configured for each set of cells.</p>
<p>pdccchMonAdaptDCI-1-3, pdccchMonAdaptDCI-0-3 Configure the presence of PDCCH monitoring adaptation indication field in DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>pdsch-HARQ-ACK-enhType3DCI-1-3 Enable the enhanced Type 3 HARQ-ACK codebook triggering using DCI format 1_3.</p>
<p>pdsch-HARQ-ACK-enhType3DCIfieldDCI-1-3 Enables the enhanced Type 3 CB through a new DCI field to indicate the enhanced Type 3 HARQ-ACK codebook in DCI format 1_3 if the more than one enhanced Type HARQ-ACK codebook is configured for the primary PUCCH cell group.</p>
<p>pdsch-HARQ-ACK-OneShotFeedbackDCI-1-3 When configured, the DCI_format 1_3 can request the UE to report A/N for all HARQ processes and all CCs configured in the PUCCH group.</p>
<p>pdsch-HARQ-ACK-retxDCI-1-3 When configured, the DCI format 1_3 can request the UE to perform a HARQ-ACK re-transmission on a PUCCH resource (see TS 38.213 [13], clause 9.1.5).</p>
<p>priorityIndicatorDCI-1-3, priorityIndicatorDCI-0-3 Configure the presence of priority indicator field in DCI format 1_3 and DCI format 0_3, respectively (see TS 38.212 [17], clauses 7.3.1.2.4 and 7.3.1.1.4 and TS 38.213 [13] clause 9).</p>
<p>pucch-sSCellDynDCI-1-3 Configure the UE with PUCCH cell switching based on dynamic indication in DCI format 1_3 (see TS 38.213 [13], clause 9.A).</p>
<p>RateMatchDCI-1-3 Configure each row of the joint rate matching indication table for DL scheduling via DCI format 1_3, where bitmap for a cell points to a corresponding rate matching indication applicable for DCI format 1-1 (i.e., MSB and LSB of bitmap refer <i>rateMatchPatternGroup1</i> and <i>rateMatchPatternGroup2</i> for a cell, respectively), the order of rate matching indication bitmap in each row refers the order of cells in <i>ScheduledCell-ListDCI-1-3</i>, that are configured with <i>rateMatchPatternGroup1</i> or <i>rateMatchPatternGroup2</i> on at least one DL BWP (i.e., first bitmap is for the first cell in <i>ScheduledCell-ListDCI-1-X</i>, that are configured with <i>rateMatchPatternGroup1</i> or <i>rateMatchPatternGroup2</i> on at least one DL BWP and so on), the number of entries in a row of <i>rateMatchDCI-1-3</i> should be the same as the number of cells, that are configured with <i>rateMatchPatternGroup1</i> or <i>rateMatchPatternGroup2</i> on at least one DL BWP, included in <i>ScheduledCell-ListDCI-1-3</i>, and entries for co-scheduled cells in a row of <i>rateMatchDCI-1-3</i> are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1_3.</p>
<p>rateMatchListDCI-1-3 Configure joint rate matching indication table for DL scheduling via DCI format 1_3.</p>
<p>ScheduledCellCombo Configure each row of the table for combinations of co-scheduled cells for DL scheduling via DCI format 1_3 and for UL scheduling via DCI format 0_3, where index with value INTEGER (0...3) of co-scheduled cell refers to <i>scheduledCellListDCI-1-3</i> for DL and <i>scheduledCellListDCI-0-3</i> for UL.</p>
<p>scheduledCellComboListDCI-1-3, scheduledCellComboListDCI-0-3 Configure the table for combinations of co-scheduled cells for DL scheduling via DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>scheduledCellListDCI-1-3, scheduledCellListDCI-0-3 Configure the list of possible co-scheduled cells in the set for DL scheduling via DCI format 1_3 and DCI format 0_3 respectively, where the serving cells in the list are in ascending order of serving cell indices and are mapped to index {0, 1, 2, 3} in the set. Total number of cells within the same set of cells i.e., in <i>scheduledCellListDCI-1-3</i> and <i>scheduledCellListDCI-0-3</i>, is up to 4. When a cell is included in either or both of <i>scheduledCellListDCI-1-3</i> or <i>scheduledCellListDCI-0-3</i> for one set of cells <i>MC-DCI-SetofCells</i>, the cell cannot be included in any of <i>scheduledCellListDCI-1-3</i> or <i>scheduledCellListDCI-0-3</i> for any other set of cells.</p>

<p>setOfCellsId Configure index of the set of cells to be indicated in DCI format 0_3/1_3.</p>
<p>sri-DCI0-3 Configure the indication type for SRS resource indicator field in DCI format 0_3 (See TS 38.212, clause 7.3.1.1.4).</p>
<p>SRS-OffsetCombo Configure each row of the joint SRS offset indicator table for DL scheduling via DCI format 1_3 and for UL scheduling via DCI format 0_3, where index for a cell points to a corresponding SRS offset indicator applicable for DCI format 1-1 and 0-1, and the order of SRS offset indicator index in each row refers the order of cells in <i>scheduledCellListDCI-1-3</i> (i.e., first index is for the first cell in <i>scheduledCellListDCI-1-3</i>, that are configured with more than one entry in <i>availableSlotOffsetList</i> for at least one aperiodic SRS resource set on at least one UL BWP and so on) for DL and <i>scheduledCellListDCI-0-3</i> for UL, included in <i>scheduledCellListDCI-1-3</i> for <i>srs-OffsetListDCI-1-3</i> and <i>scheduledCellListDCI-0-3</i> for <i>srs-OffsetListDCI-0-3</i>, and entries for co-scheduled cells in a row of <i>SRS-OffsetCombo</i> are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1_3/0_3.</p>
<p>srs-OffsetListDCI-1-3, srs-OffsetListDCI-0-3 Configure joint SRS offset indicator table for DL scheduling via DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>SRS-RequestCombo Configure each row of the joint SRS request table for DL scheduling via DCI format 1_3 and for UL scheduling via DCI format 0_3, where index for a cell points to a corresponding SRS request applicable for DCI format 1-1 and 0-1, and the order of SRS request index in each row refers the order of cells in <i>scheduledCellListDCI-1-3</i> (i.e., first index is for the first cell in <i>scheduledCellListDCI-1-3</i> and so on) for DL and <i>scheduledCellListDCI-0-3</i> for UL. The number of entries in a row of <i>SRS-RequestCombo</i> should be the same as the number of cells included in <i>scheduledCellListDCI-1-3</i> for <i>srs-RequestListDCI-1-3</i> and <i>scheduledCellListDCI-0-3</i> for <i>srs-RequestListDCI-0-3</i>, and entries for co-scheduled cells in a row of <i>SRS-RequestCombo</i> are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1_3/0_3.</p>
<p>srs-RequestListDCI-1-3, srs-RequestListDCI-0-3 Configure joint SRS request table for DL scheduling via DCI format 1_3 and DCI format 0_3, respectively.</p>
<p>TCI-DCI-1-3 Configure each row of the joint TCI table for DL scheduling via DCI format 1_3, where index for a cell points to a corresponding TCI applicable for DCI format 1-1, and the order of TCI index in each row refers the order of cells in <i>scheduledCellListDCI-1-3</i> (i.e., first index is for the first cell in <i>scheduledCellListDCI-1-3</i> that configured with <i>tcj-StatesToAddModList</i> and so on), the number of entries in a row of <i>TCI-DCI-1-3</i> should be the same as the number of cells that configured with <i>tcj-StatesToAddModList</i> on at least one DL BWP, included in <i>scheduledCellListDCI-1-3</i>, and entries for co-scheduled cells in a row of <i>TCI-DCI-1-3</i> are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1_3.</p>
<p>tcj-ListDCI-1-3 Configure joint TCI table for DL scheduling via DCI format 1_3</p>
<p>TDRA-FieldIndexDC-0-3 Configure each row of the joint TDRA field table for UL scheduling via DCI format 0_3 containing the applicable TDRA field indexes for multiple BWPs/cells, where the TDRA index for a BWP of a cell points to a corresponding TDRA in the TDRA table applicable for DCI format 0-1, the order of TDRA index in each row refers the <i>BWP-Id</i> for a cell and the order of cells in <i>scheduledCellListDCI-0-3</i> (i.e., first TDRA index in a row is for the smallest BWP-Id that can be scheduled by the DCI format 0-3, as specified in 38.212, of the first cell in <i>scheduledCellListDCI-0-3</i>, second TDRA index in a row is for the second smallest BWP-Id 1 that can be scheduled by the DCI format 0-3, as specified in 38.212, of the first cell and so on), and the number of TDRA indices in a row of <i>TDRA-FieldIndexDCI-0-3</i> should be the same as the total number of BWPs that can be scheduled by the DCI format 0-3, as specified in 38.212, across cells included in <i>scheduledCellListDCI-0-3</i>.</p>
<p>TDRA-FieldIndexDCI-1-3 Configure each row of the joint TDRA field table for DL scheduling via DCI format 1_3 containing the applicable TDRA field indexes for multiple BWPs/cells, where the TDRA index for a BWP of a cell points to a corresponding TDRA in the TDRA table applicable for DCI format 1-1, the order of TDRA index in each row refers the BWP-Id for a cell and the order of cells in <i>scheduledCellListDCI-1-3</i> (i.e., first TDRA index in a row is for the smallest BWP-Id that can be scheduled by the DCI format 1-3, as specified in 38.212, of the first cell in <i>scheduledCellListDCI-1-3</i>, second TDRA index in a row is for the second smallest BWP-Id that can be scheduled by the DCI format 1-3, as specified in 38.212, of the first cell and so on), and the number of TDRA indices in a row of <i>TDRA-FieldIndexDCI-1-3</i> should be the same as the total number of BWPs that can be scheduled by the DCI format 1-3, as specified in 38.212, across cells included in <i>scheduledCellListDCI-1-3</i>.</p>
<p>tdra-FieldIndexListDCI-1-3, tdra-FieldIndexListDCI-0-3 Configure joint TDRA table for UL scheduling via DCI format 1_3 and DCI format 0_3, respectively.</p>

<i>tpmi-DCI0-3</i> Configure the indication type for precoding information and number of layers field in DCI format 0_3 (See TS 38.212, clause 7.3.1.1.4).
<i>ZP-CSI-DCI-1-3</i> Configure each row of the joint ZP-CSI-RS trigger table for DL scheduling via DCI format 1_3, where index for a cell points to a corresponding ZP-CSI-RS trigger applicable for DCI format 1-1, and the order of ZP-CSI-RS trigger index in each row refers the order of cells in <i>scheduledCellListDCI-1-3</i> (i.e., first index is for the first cell in <i>scheduledCellListDCI-1-3</i> , that are configured with <i>aperiodic-ZP-CSI-RS-ResourceSetsToAddModList</i> on at least one DL BWP and so on), the number of entries in a row of <i>ZP-CSI-DCI-1-3</i> should be the same as the number of cells, that are configured with <i>aperiodic-ZP-CSI-RS-ResourceSetsToAddModList</i> on at least one DL BWP, included in <i>scheduledCellListDCI-1-3</i> , and entries for co-scheduled cells in a row of <i>ZP-CSI-DCI-1-3</i> are interpreted based on the BWPs of co-scheduled cells that is determined by the BWP indicator field of DCI format 1_3.
<i>zp-CSI-RSListDCI-1-3</i> Configure joint ZP-CSI-RS trigger table for DL scheduling via DCI format 1_3.

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
<i>AsyncCA</i>	This field is mandatory present for SCells whose slot offset between the SpCell is not 0. Otherwise it is absent, Need S.
<i>MeasObject</i>	This field is mandatory present for the SpCell if the UE has a <i>measConfig</i> , and it is optionally present, Need M, for SCells. For (e)RedCap UEs, this field is optionally present, Need M.
<i>SCellOnly</i>	This field is optionally present, Need R, for SCells. It is absent otherwise.
<i>ServingCellWithoutPUCCH</i>	This field is optionally present, Need S, for SCells except PUCCH SCells. It is absent otherwise.
<i>SyncAndCellAdd</i>	This field is mandatory present for a SpCell upon reconfiguration with <i>reconfigurationWithSync</i> and upon <i>RRCSetup/RRCResume</i> . The field is optionally present for an SpCell, Need N, upon reconfiguration without <i>reconfigurationWithSync</i> . The field is mandatory present for an SCell upon addition, and absent for SCell in other cases, Need M.
<i>TCI_ActivatedConfig</i>	This field is optional Need N for SCells if <i>sCellState</i> 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.
<i>TDD</i>	This field is optionally present, Need R, for TDD cells. It is absent otherwise.
<i>TDD_IAB</i>	For IAB-MT, this field is optionally present, Need R, for TDD cells. It is absent otherwise.
<i>TypeDCI0-3</i>	This field is mandatory present if <i>ScheduledCellListDCI-0-3</i> is configured, otherwise it is absent, Need R.
<i>TypeDCI1-3</i>	This field is mandatory present if <i>ScheduledCellListDCI-1-3</i> is configured, otherwise it is absent, Need R.

– *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 ::=
    physCellId                               SEQUENCE {
        physCellId                           OPTIONAL, -- Cond HOAndServCellAdd,
        downlinkConfigCommon                 OPTIONAL, -- Cond HOAndServCellAdd
        uplinkConfigCommon                   OPTIONAL, -- Need M
        supplementaryUplinkConfig             OPTIONAL, -- Need S
        n-TimingAdvanceOffset                OPTIONAL, -- Need S
        ssb-PositionsInBurst                 CHOICE {
            shortBitmap                       BIT STRING (SIZE (4)),
            mediumBitmap                      BIT STRING (SIZE (8)),
            longBitmap                        BIT STRING (SIZE (64))
        }
        ssb-periodicityServingCell           ENUMERATED { ms5, ms10, ms20, ms40, ms80, ms160, spare2, spare1 } OPTIONAL, -- Cond AbsFreqSSB
        dmrs-TypeA-Position                  ENUMERATED {pos2, pos3},
        lte-CRS-ToMatchAround                SetupRelease { RateMatchPatternLTE-CRS }
        rateMatchPatternToAddModList         SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPattern OPTIONAL, -- Need M
        rateMatchPatternToReleaseList        SEQUENCE (SIZE (1..maxNrofRateMatchPatterns)) OF RateMatchPatternId OPTIONAL, -- Need N
        ssbSubcarrierSpacing                 SubcarrierSpacing
        tdd-UL-DL-ConfigurationCommon        TDD-UL-DL-ConfigCommon
        ss-PBCH-BlockPower                   INTEGER (-60..50),
        . . .
        [[
        channelAccessMode-r16                CHOICE {
            dynamic
            semiStatic
        }
        discoveryBurstWindowLength-r16       ENUMERATED {ms0dot5, ms1, ms2, ms3, ms4, ms5}
        ssb-PositionQCL-r16                  SSB-PositionQCL-Relation-r16
        highSpeedConfig-r16                  HighSpeedConfig-r16
        ]],
        [[
        highSpeedConfig-v1700                HighSpeedConfig-v1700
        channelAccessMode2-r17               ENUMERATED {enabled}
        discoveryBurstWindowLength-r17       ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot75, ms1, ms1dot25}
        ssb-PositionQCL-r17                  SSB-PositionQCL-Relation-r17
        highSpeedConfigFR2-r17               HighSpeedConfigFR2-r17
        uplinkConfigCommon-v1700             UplinkConfigCommon-v1700
        ntn-Config-r17                       NTN-Config-r17
        ]],
        [[
        featurePriorities-r17                SEQUENCE {
            redCapPriority-r17                FeaturePriority-r17
            slicingPriority-r17               FeaturePriority-r17
            msg3-Repetitions-Priority-r17    FeaturePriority-r17
            sdt-Priority-r17                 FeaturePriority-r17
        }
        ]],
        [[
        ra-ChannelAccess-r17                 ENUMERATED {enabled}
        ]],

```

```
[[
featurePriorities-v1800          SEQUENCE {
  msg1-Repetitions-Priority-r18  FeaturePriority-r17
  eRedCapPriority-r18           FeaturePriority-r17
}
atg-Config-r18                 ATG-Config-r18
]]

-- TAG-SERVINGCELLCONFIGCOMMON-STOP
-- ASN1STOP
```

```
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
OPTIONAL, -- Need R
```

ServingCellConfigCommon field descriptions
<p>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.</p>
<p>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.</p>
<p>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).</p>
<p>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 <i>controlResourceSetZero</i> and <i>searchSpaceZero</i> which can be configured in <i>ServingCellConfigCommon</i> even if MIB indicates that they are absent.</p>
<p>discoveryBurstWindowLength Indicates the window length of the discovery burst in ms (see TS 37.213 [48]). The field <i>discoveryBurstWindowLength-r17</i> is applicable to SCS 480 kHz and SCS 960 kHz.</p>
<p>featurePriorities Indicates priorities for features, such as (e)RedCap, Slicing, SDT, MSG1-Repetitions, and MSG3-Repetitions for Coverage Enhancements. These priorities are used to determine which <i>FeatureCombinationPreambles</i> the UE shall use when a feature maps to more than one <i>FeatureCombinationPreambles</i>, 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 <i>FeatureCombinationPreambles</i>.</p>
<p>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.</p>
<p>lte-CRS-ToMatchAround Parameters to determine an LTE CRS pattern that the UE shall rate match around.</p>
<p>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.</p>
<p>n-TimingAdvanceOffset The N_TA-Offset to be applied for all uplink transmissions on this serving cell if <i>n-TimingAdvanceOffset</i> is not configured. If <i>tag2</i> is configured for this serving cell, this field is to be applied to all uplink transmissions associated to <i>tag-id</i> configured for 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.</p>
<p>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.</p>
<p>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 <i>RateMatchPattern</i> with the same <i>RateMatchPatternId</i> is configured in both <i>ServingCellConfig/ServingCellConfigCommon</i> and in SIB20/MCCH, the entire <i>RateMatchPattern</i> 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].</p>
<p>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.</p>
<p>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.</p>
<p>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)</p>

<p>ssb-PositionQCL Indicates the QCL relation between SSB positions for this serving cell as specified in TS 38.213 [13], clause 4.1.</p>
<p>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 <i>ServingCellConfigCommonSIB</i>. For operation with shared spectrum channel access, the UE assumes that one or more SS/PBCH blocks indicated by <i>ssb-PositionsInBurst</i> may be transmitted within the discovery burst transmission window and have candidate SS/PBCH blocks indexes corresponding to SS/PBCH block indexes provided by <i>ssb-PositionsInBurst</i> (see TS 38.213 [13], clause 4.1). If the k-th bit of <i>ssb-PositionsInBurst</i> 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 > <i>ssb-PositionQCL</i> 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 <i>ServingCellConfigCommonSIB</i>. For operation with shared spectrum channel access in FR1, only <i>mediumBitmap</i> is used, and for FR2-2, <i>longBitmap</i> is used.</p>
<p>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</p>
<p>supplementaryUplinkConfig The network configures this field only if <i>uplinkConfigCommon</i> is configured. If this field is absent, the UE shall release the <i>supplementaryUplinkConfig</i> and the <i>supplementaryUplink</i> configured in <i>ServingCellConfig</i> of this serving cell, if configured.</p>
<p>tdd-UL-DL-ConfigurationCommon A cell-specific TDD UL/DL configuration, see TS 38.213 [13], clause 11.1.</p>

Conditional Presence	Explanation
<i>AbsFreqSSB</i>	The field is absent when <i>absoluteFrequencySSB</i> in <i>frequencyInfoDL</i> is absent, otherwise the field is mandatory present.
<i>HOAndServCellAdd</i>	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.
<i>HOAndServCellWithSSB</i>	This field is mandatory present upon SpCell change and upon serving cell (SCell with SSB or PSCell) addition. Otherwise, the field is absent.
<i>SharedSpectrum</i>	This field is mandatory present if this cell operates with shared spectrum channel access in FR1. Otherwise, it is absent, Need R.
<i>SharedSpectrum2</i>	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.
<i>TDD</i>	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,
    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 <i>discoveryBurstWindowLength-v1700</i> 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 <i>inOneGroup</i> are absent. Value 1 indicates that the SS/PBCH blocks are transmitted in accordance with <i>inOneGroup</i> .
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 <i>inOneGroup</i> is used and the UE interprets this field same as <i>mediumBitmap</i> in <i>ServingCellConfigCommon</i> . The UE assumes that a bit in <i>inOneGroup</i> at position $k > N_{SSB}^{QCL}$ is 0, where N_{SSB}^{QCL} is obtained from <i>MIB</i> 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 <i>groupPresence</i> is set to 0 for $m > N_{SSB}^{QCL}/8$, where N_{SSB}^{QCL} is obtained from <i>MIB</i> 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 without Msg1 repetition.

***SI-RequestConfig* information element**

```

-- ASN1START
-- TAG-SI-REQUESTCONFIG-START

SI-RequestConfig ::=
    rach-OccasionsSI          SEQUENCE {
        rach-ConfigSI        SEQUENCE {
            rach-ConfigGeneric,
            ssb-perRACH-Occasion  ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}
        }
        si-RequestPeriod      ENUMERATED {one, two, four, six, eight, ten, twelve, sixteen}
        si-RequestResources   SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResources
    }
    OPTIONAL, -- Need R

SI-RequestResources ::=
    ra-PreambleStartIndex     INTEGER (0..63),
    ra-AssociationPeriodIndex  INTEGER (0..15)
    ra-ssb-OccasionMaskIndex  INTEGER (0..15)
    OPTIONAL, -- Need R
    OPTIONAL, -- Need R

-- TAG-SI-REQUESTCONFIG-STOP
-- ASN1STOP

```


<i>SI-RequestConfig</i> field descriptions
<p><i>rach-OccasionsSI</i> Configuration of dedicated RACH Occasions for SI. If the field is absent, the UE uses the corresponding parameters configured in <i>rach-ConfigCommon</i> of the initial uplink BWP.</p>
<p><i>si-RequestPeriod</i> Periodicity of the <i>SI-Request</i> configuration in number of association periods.</p>
<p><i>si-RequestResources</i> If there is only one entry in the list, the configuration is used for all SI messages for which <i>si-BroadcastStatus</i> or <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>. Otherwise:</p> <ul style="list-style-type: none"> - If <i>si-SchedulingInfo-v1700</i> is not present and the <i>SI-RequestConfig</i> is used for on-demand SI request in <i>SI-SchedulingInfo</i> or <i>PosSI-SchedulingInfo</i>, the 1st entry in the list corresponds to the first SI message in <i>schedulingInfoList</i> or <i>posSchedulingInfoList</i> for which <i>si-BroadcastStatus</i> or <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i>, 2nd entry in the list corresponds to the second SI message in <i>schedulingInfoList</i> or <i>posSchedulingInfoList</i> for which <i>si-BroadcastStatus</i> or <i>posSI-BroadcastStatus</i> is set to <i>notBroadcasting</i> and so on. - If <i>si-SchedulingInfo-v1700</i> is present and <i>SI-RequestConfig</i> is configured in <i>SI-SchedulingInfo</i> for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type1 SIB configured by <i>schedulingInfoList2</i> in <i>si-SchedulingInfo-v1700</i> to the SI messages configured by <i>schedulingInfoList</i> in <i>si-SchedulingInfo</i>. The 1st entry in the list corresponds to the first SI message for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>, 2nd entry in the list corresponds to the second SI message for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> and so on. - If <i>si-SchedulingInfo-v1700</i> is present and <i>SI-RequestConfig</i> is configured in <i>PosSI-SchedulingInfo</i> for on-demand SI request, the UE generates a list of concatenated SI messages by appending the SI messages containing type2 SIB configured by <i>schedulingInfoList2</i> in <i>si-SchedulingInfo-v1700</i> to the SI messages configured by <i>posSchedulingInfoList</i> in <i>posSI-SchedulingInfo</i>. The 1st entry in the list corresponds to the first SI message for which <i>posSI-BroadcastStatus</i> or <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>, 2nd entry in the list corresponds to the second SI message for which <i>posSI-BroadcastStatus</i> or <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> and so on. <p>Change of <i>si-RequestResources</i> should not result in system information change notification.</p>

<i>SI-RequestResources</i> field descriptions
<p><i>ra-AssociationPeriodIndex</i> Index of the association period in the <i>si-RequestPeriod</i> in which the UE can send the SI request for SI message(s) corresponding to this <i>SI-RequestResources</i>, using the preambles indicated by <i>ra-PreambleStartIndex</i> and rach occasions indicated by <i>ra-ssb-OccasionMaskIndex</i>.</p>
<p><i>ra-PreambleStartIndex</i> If N SSBs are associated with a RACH occasion, where $N \geq 1$, for the i-th SSB ($i=0, \dots, N-1$) 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.</p>

– *SI-RequestConfigRepetition*

The IE *SI-RequestConfigRepetition* contains configuration for Msg1 based SI request with Msg1 repetition.

***SI-RequestConfigRepetition* information element**

```
-- ASN1START
-- TAG-SI-REQUESTCONFIGREPETITION-START

SI-RequestConfigRepetition-r18 ::= SEQUENCE {
    rach-OccasionsSI-r18 SEQUENCE {
        rach-ConfigSI-r18 RACH-ConfigGeneric,
        ssb-perRACH-Occasion-r18 ENUMERATED {oneEighth, oneFourth, oneHalf, one, two, four, eight, sixteen}
    }
    si-RequestResourcesRepetitionNum2-r18 SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResourcesRepetition-r18 OPTIONAL, -- Need R
}
```

```

    si-RequestResourcesRepetitionNum4-r18 SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResourcesRepetition-r18 OPTIONAL, -- Need R
    si-RequestResourcesRepetitionNum8-r18 SEQUENCE (SIZE (1..maxSI-Message)) OF SI-RequestResourcesRepetition-r18 OPTIONAL, -- Need R
    ...
}

SI-RequestResourcesRepetition-r18 ::= SEQUENCE {
    ra-PreambleStartIndex-r18 INTEGER (0..63),
    ra-ssb-OccasionMaskIndex-r18 INTEGER (0..15) OPTIONAL -- Need R
}

-- TAG-SI-REQUESTCONFIGREPETITION-STOP
-- ASN1STOP

```

SI-RequestConfigRepetition field descriptions

si-RequestResourcesRepetitionNum2, si-RequestResourcesRepetitionNum4, si-RequestResourcesRepetitionNum8

Indicates the configurations for Msg1-based SI request with Msg1 repetition for repetition number 2, 4 and 8, respectively.

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-RequestConfigRepetitionNum2/SI-RequestConfigRepetitionNum4/SI-RequestConfigRepetitionNum8* 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-RequestConfigRepetitionNum2/SI-RequestConfigRepetitionNum4/SI-RequestConfigRepetitionNum8* 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-RequestConfigRepetitionNum2/SI-RequestConfigRepetitionNum4/SI-RequestConfigRepetitionNum8n* 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-RequestResourcesRepetitionNum2/SI-RequestConfigRepetitionNum4/SI-RequestConfigRepetitionNum8* should not result in system information change notification.

– 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 ::=
  si-BroadcastStatus        ENUMERATED {broadcasting, notBroadcasting},
  si-Periodicity           ENUMERATED {rf8, rf16, rf32, rf64, rf128, rf256, rf512},
  sib-MappingInfo         SIB-Mapping
}

SI-SchedulingInfo-v1700 ::=
  schedulingInfoList2-r17 SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo2-r17,
  dummy                  SI-RequestConfig                               OPTIONAL
}

SI-SchedulingInfo-v1740 ::=
  si-RequestConfigRedCap-r17 SI-RequestConfig                               OPTIONAL -- Cond REDCAP-MSG-1
}

SI-SchedulingInfo-v1800 ::=
  si-RequestConfigMSG1-Repetition-r18 SI-RequestConfigRepetition-r18    OPTIONAL, -- Cond MSG-1
  si-RequestConfigRedCap-MSG1-Repetition-r18 SI-RequestConfigRepetition-r18    OPTIONAL, -- Cond REDCAP-MSG-1
  si-RequestConfigSUL-MSG1-Repetition-r18 SI-RequestConfigRepetition-r18    OPTIONAL, -- Cond SUL-MSG-1
}

SchedulingInfo2-r17 ::=
  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 ::=
  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 ::=
  sibType-r17    SEQUENCE {
    type1-r17    CHOICE {
      ENUMERATED {sibType15, sibType16, sibType17, sibType18, sibType19, sibType20, sibType21,
                  sibType22-v1800, sibType23-v1800, sibType24-v1800, sibType25-v1800,
                  spare5, spare4, spare3, spare2, spare1,...},
      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, posSibType1-11-v1800,
                                posSibType1-12-v1800, posSibType2-26-v1800, posSibType2-27-v1800,
                                posSibType6-7-v1800, posSibType7-1-v1800,...,
                                posSibType7-2-v1800, posSibType7-3-v1800, posSibType7-4-v1800},
        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 <i>si-BroadcastStatus</i> 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 <i>broadcasting</i> . When <i>SIB19</i> is scheduled in an NTN cell, the <i>si-BroadcastStatus</i> for the mapped <i>SIB19</i> is set to <i>broadcasting</i> . If <i>si-SchedulingInfo-v1700</i> is present, the network ensures that the total number of SI messages with <i>si-BroadcastStatus</i> set to <i>notBroadcasting</i> in the list of concatenated SI messages configured by <i>schedulingInfoList</i> in <i>si-SchedulingInfo</i> and SI messages containing type1 SIB configured by <i>schedulingInfoList2</i> in <i>si-SchedulingInfo-v1700</i> does not exceed the limit of <i>maxSI-Message</i> when <i>si-RequestConfig</i> , <i>si-RequestConfigRedCap</i> or <i>si-RequestConfigSUL</i> is configured.
si-Periodicity	Periodicity of the SI-message in radio frames. Value <i>rf8</i> corresponds to 8 radio frames, value <i>rf16</i> corresponds to 16 radio frames, and so on.

SI-SchedulingInfo field descriptions
<p>dummy This field is not used in this specification. If received, it is ignored by the UE.</p>
<p>si-RequestConfig Configuration of Msg1 resources that the UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>si-RequestConfigMSG1-Repetition Configuration of Msg1 repetition resources on NUL that the UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>si-RequestConfigRedCap Configuration of Msg1 resources for <i>initialUplinkBWP-RedCap</i> that the (e)RedCap UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>si-RequestConfigRedCap-MSG1-Repetition Configuration of Msg1 repetition resources for <i>initialUplinkBWP-RedCap</i> that the (e)RedCap UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>si-RequestConfigSUL Configuration of Msg1 resources that the UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>.</p>
<p>si-RequestConfigSUL-MSG1-Repetition Configuration of Msg1 repetition resources on SUL that the UE uses for requesting SI-messages for which <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i>. This field is only applicable when Msg1 repetition resources can be used for requesting SI-messages.</p>
<p>si-WindowLength The length of the SI scheduling window. Value <i>s5</i> corresponds to 5 slots, value <i>s10</i> corresponds to 10 slots and so on. The network always configures <i>si-WindowLength</i> to be shorter than or equal to the <i>si-Periodicity</i>. The values <i>s2560-v1710</i> and <i>s5120-v1710</i> are only applicable for SCS 480 kHz.</p>
<p>systemInformationAreaID Indicates the system information area that the cell belongs to, if any. Any SIB with <i>areaScope</i> within the SI is considered to belong to this <i>systemInformationAreaID</i>. The <i>systemInformationAreaID</i> is unique within a PLMN/SNPN.</p>

SchedulingInfo2 field descriptions
<p>encrypted The presence of this field indicates that the <i>pos-sib-type</i> is encrypted as specified in TS 37.355 [49].</p>
<p>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]).</p>
<p>posSibType The <i>posSIBs</i> as defined in TS 37.355 [49] mapped to SI for scheduling using <i>schedulingInfoList2</i>.</p>
<p>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]).</p>
<p>si-WindowPosition This field indicates the SI window position of the associated SI-message. The network provides <i>si-WindowPosition</i> in an ascending order, i.e. <i>si-WindowPosition</i> in the subsequent entry in <i>schedulingInfoList2</i> has always value higher than in the previous entry of <i>schedulingInfoList2</i>. The network configures this field in a way that ensures that SI messages scheduled by <i>schedulingInfoList</i> and/or <i>posSchedulingInfoList</i> do not overlap with SI messages scheduled by <i>schedulingInfoList2</i>.</p>
<p>sib-MappingInfo Indicates which SIBs or <i>posSIBs</i> are contained in the SI message.</p>
<p>sibType The type of SIB(s) mapped to SI for scheduling using <i>schedulingInfoList2</i>. Value <i>type1</i> indicates SIBs and value <i>type2</i> indicates <i>posSIBs</i>.</p>

Conditional presence	Explanation
<i>GNSS-ID-SBAS</i>	The field is mandatory present if <i>gnss-id</i> is set to <i>sbas</i> . It is absent otherwise.
<i>MSG-1</i>	The field is optionally present, Need R, if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>schedulingInfoList</i> or any SI-message containing type1 SIB included in <i>schedulingInfoList2</i> . It is absent otherwise.
<i>SIB-TYPE</i>	The field is mandatory present if the SIB type is different from <i>SIB6</i> , <i>SIB7</i> or <i>SIB8</i> . For <i>SIB6</i> , <i>SIB7</i> and <i>SIB8</i> it is absent.
<i>NonPosSIB</i>	The field is mandatory present if the SIB type is <i>type1</i> . For <i>type2</i> it is absent.
<i>SUL-MSG-1</i>	The field is optionally present, Need R, if <i>supplementaryUplink</i> is configured in <i>ServingCellConfigCommonSIB</i> and if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>schedulingInfoList</i> or any SI-message containing type1 SIB included in <i>schedulingInfoList2</i> . It is absent otherwise.
<i>REDCAP-MSG-1</i>	The field is optionally present, Need R, if <i>initialUplinkBWP-RedCap</i> is configured in <i>UplinkConfigCommonSIB</i> and if <i>si-BroadcastStatus</i> is set to <i>notBroadcasting</i> for any SI-message included in <i>schedulingInfoList</i> or any SI-message containing type1 SIB included in <i>schedulingInfoList2</i> . 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 $S\text{-}K_{\text{gNB}}$ or $S\text{-}K_{\text{eNB}}$ based on the current or newly derived K_{gNB} during RRC Resume or RRC Reconfiguration, as defined in TS 33.501 [11].

```
-- ASN1START
-- TAG-SK-COUNTER-START

SK-Counter ::= INTEGER (0..65535)

-- TAG-SK-COUNTER-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
<p>availableRB-SetsToAddModList A list of <i>AvailableRB-SetsPerCell</i> objects (see TS 38.213 [13], clause 11.1.1).</p>
<p>co-DurationsPerCellToAddModList A list of <i>CO-DurationsPerCell</i> 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).</p>
<p>co-DurationsPerCellToReleaseList A list of <i>CO-DurationsPerCell</i> objects to be released. An entry created using <i>co-DurationsPerCellToAddModList-r16</i> or <i>co-DurationsPerCellToAddModList-r17</i> can be deleted using <i>co-DurationsPerCellToReleaseList</i>.</p>
<p>dci-PayloadSize Total length of the DCI payload scrambled with SFI-RNTI (see TS 38.213 [13], clause 11.1.1).</p>
<p>sfi-RNTI RNTI used for SFI on the given cell (see TS 38.213 [13], clause 11.1.1).</p>
<p>slotFormatCombToAddModList A list of <i>SlotFormatCombinations</i> for the UE's serving cells (see TS 38.213 [13], clause 11.1.1).</p>
<p>switchTriggerToAddModList, switchTriggerToAddModListSizeExt A list of <i>SearchSpaceSwitchTrigger</i> objects. Each <i>SearchSpaceSwitchTrigger</i> object provides position in DCI of the bit field indicating search space switching flag for a serving cell or, if <i>cellGroupsForSwitchList</i> is configured, group of serving cells (see TS 38.213 [13], clause 10.4). If <i>cellGroupsForSwitchList</i> 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 <i>cellGroupsForSwitchList</i> (see TS 38.213 [13], clause 10.4). The network configures more than 4 <i>SearchSpaceSwitchTrigger</i> objects only if <i>cellGroupsForSwitchList</i> is not configured. The UE shall consider entries in <i>switchTriggerToAddModList</i> and in <i>switchTriggerToAddModListSizeExt</i> as a single list, i.e. an entry created using <i>switchTriggerToAddModList</i> can be modified using <i>switchTriggerToAddModListSizeExt</i> and vice-versa.</p>
<p>switchTriggerToReleaseModList, switchTriggerToReleaseListSizeExt A list of <i>SearchSpaceSwitchTriggers</i> to be released. If <i>cellGroupsForSwitchList</i> is configured, the <i>SearchSpaceSwitchTrigger</i> is released for all serving cells belonging to the same <i>CellGroupForSwitch</i>. The UE shall consider entries in <i>switchTriggerToReleaseList</i> and in <i>switchTriggerToReleaseListSizeExt</i> as a single list, i.e. an entry created using <i>switchTriggerToAddModList</i> or <i>switchTriggerToAddModListSizeExt</i> can be deleted using <i>switchTriggerToReleaseList</i> or <i>switchTriggerToReleaseListSizeExt</i>.</p>

AvailableRB-SetsPerCell field descriptions
<p>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).</p>
<p>servingCellId The ID of the serving cell for which the configuration is applicable.</p>

CO-DurationsPerCell field descriptions
<p>co-DurationList A list of Channel Occupancy duration in symbols. The maximum duration that can be configured for the following SCS:</p> <ul style="list-style-type: none"> - 15 kHz: 280. - 30 kHz: 560. - 60 kHz: 1120. - 120 kHz: 560. - 480 kHz: 2240. - 960 kHz: 4480.
<p>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).</p>
<p>servicingellid The ID of the serving cell for which the configuration is applicable.</p>
<p>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</p>

SearchSpaceSwitchTrigger field descriptions
<p>positionInDCI The position of the bit within DCI payload containing a search space switching flag (see TS 38.213 [13], clause 11.1.1).</p>
<p>servicingellid The ID of the serving cell for which the configuration is applicable or the group of serving cells as indicated by <i>CellGroupsForSwitch-r16</i> containing this <i>servicingellid</i>.</p>

– 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
ssf Indicates the S-NSSAI consisting of Slice/Service Type, see TS 23.003 [21].
ssf-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
```

<i>SpeedStateScaleFactors</i> 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 <i>oDot25</i> corresponds to 0.25, value <i>oDot5</i> corresponds to 0.5, <i>oDot75</i> 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 <i>oDot25</i> corresponds to 0.25, value <i>oDot5</i> corresponds to 0.5, value <i>oDot75</i> 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 ::=
    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-ProclD-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 <i>mcs-Table-r17</i> in <i>PDSCH-Config</i> 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 <i>PUCCH-Resource</i> is configured in <i>PUCCH-Config</i> 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 <i>nrofHARQ-Processes-v1710</i> UE shall ignore <i>nrofHARQ-Processes</i> (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 <i>pdsch-AggregationFactor</i> in <i>pdsch-Config</i> 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 <i>periodicity</i> is ignored. The following periodicities are supported depending on the configured subcarrier spacing [ms]: 15 kHz: <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 640. 30 kHz: 0.5 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 1280. 60 kHz with normal CP: 0.25 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 2560. 60 kHz with ECP: 0.25 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 2560. 120 kHz: 0.125 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 5120. 480 kHz: 0.03125 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 20480. 960 kHz: 0.015625 x <i>periodicityExt</i> , where <i>periodicityExt</i> has a value between 1 and 40960. <i>periodicityExt-r17</i> 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
<i>SPS-List</i>	The field is mandatory present when included in <i>sps-ConfigToAddModList-r16</i> or <i>sps-ConfigMulticastToAddModList-r17</i> , 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)
SRB-Identity-v1800 ::= INTEGER (5)
-- 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 ::=
    cc-SetIndex          SEQUENCE {
                        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 α (without suffix) or $\text{pathlossReferenceRS}$ if $\text{unifiedTCI-StateType}$ 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
  ]],
  [[
    dci-TriggeringPosResourceSetLink-r18 ENUMERATED { enabled }                                OPTIONAL, -- Need R
  ]]
}

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
]],
[[
applyIndicatedTCI-State-r18        ENUMERATED {first, second}                       OPTIONAL  -- Cond FollowUTCI
]]
}

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
}
...
}

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
  startPosition-r16        INTEGER (0..13),
  nrofSymbols-r16         ENUMERATED {n1, n2, n4},
  repetitionFactor-r16    ENUMERATED {n1, n2, n4}
}
]],
[[
spatialRelationInfo-PDC-r17 SetupRelease { SpatialRelationInfo-PDC-r17 }    OPTIONAL, -- Need M
resourceMapping-r17
  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}
}
partialFreqSounding-r17   SEQUENCE {
  startRBIndexFScaling-r17 CHOICE{
    startRBIndexAndFreqScalingFactor2-r17 INTEGER (0..1),
    startRBIndexAndFreqScalingFactor4-r17 INTEGER (0..3)
  },
  enableStartRBHopping-r17 ENUMERATED {enable}
}
transmissionComb-n8-r17   SEQUENCE {
  combOffset-n8-r17       INTEGER (0..7),
  cyclicShift-n8-r17      INTEGER (0..5)
}
srs-TCI-State-r17        CHOICE {
  srs-UL-TCI-State        TCI-UL-StateId-r17,
  srs-DLorJointTCI-State  TCI-StateId
}
]],
[[
repetitionFactor-v1730    ENUMERATED {n3}
srs-DLorJointTCI-State-v1730 SEQUENCE {
  cellAndBWP-r17         ServingCellAndBWP-Id-r17
}
]],
[[
nrofSRS-Ports-n8-r18     ENUMERATED {ports8, ports8tdm}
combOffsetHopping-r18    SEQUENCE {
  hoppingId-r18           INTEGER (0..1023)
  hoppingSubset-r18      CHOICE {
    transmissionComb-n4   BIT STRING (SIZE (4)),
    transmissionComb-n8   BIT STRING (SIZE (8))
  }
  hoppingWithRepetition-r18 ENUMERATED {symbol, repetition}
}
cyclicShiftHopping-r18   SEQUENCE {
  hoppingId-r18           INTEGER (0..1023)
  hoppingSubset-r18      CHOICE {
    transmissionComb-n2   BIT STRING (SIZE (8)),
    transmissionComb-n4   BIT STRING (SIZE (12)),

```

```

        transmissionComb-n8                BIT STRING (SIZE (6))
    }
    hoppingFinerGranularity-r18            ENUMERATED {enable}
}
]]
}

SRS-PosResource-r16 ::=
    srs-PosResourceId-r16
    transmissionComb-r16
        n2-r16
            combOffset-n2-r16
            cyclicShift-n2-r16
        },
        n4-r16
            combOffset-n4-r16
            cyclicShift-n4-r16
        },
        n8-r16
            combOffset-n8-r16
            cyclicShift-n8-r16
        },
        ...
    },
    resourceMapping-r16
        startPosition-r16
        nrofSymbols-r16
    },
    freqDomainShift-r16
    freqHopping-r16
        c-SRS-r16
        ...
    },
    groupOrSequenceHopping-r16
    resourceType-r16
        aperiodic-r16
            slotOffset-r16
            ...
        },
        semi-persistent-r16
            periodicityAndOffset-sp-r16
            ...
            [[
            periodicityAndOffset-sp-Ext-r16
            ]]
        },
        periodic-r16
            periodicityAndOffset-p-r16
            ...
            [[
            periodicityAndOffset-p-Ext-r16
            ]]
    }
},

```

SEQUENCE {
SRS-PosResourceId-r16,
CHOICE {
SEQUENCE {
INTEGER (0..1),
INTEGER (0..7)
},
SEQUENCE {
INTEGER (0..3),
INTEGER (0..11)
},
SEQUENCE {
INTEGER (0..7),
INTEGER (0..5)
},
SEQUENCE {
INTEGER (0..13),
ENUMERATED {n1, n2, n4, n8, n12}
},
INTEGER (0..268),
SEQUENCE {
INTEGER (0..63),
},
ENUMERATED { neither, groupHopping, sequenceHopping },
CHOICE {
SEQUENCE {
INTEGER (1..32)
},
SEQUENCE {
SRS-PeriodicityAndOffset-r16,
},
SRS-PeriodicityAndOffsetExt-r16
},
SEQUENCE {
SRS-PeriodicityAndOffset-r16,
},
SRS-PeriodicityAndOffsetExt-r16
},
}

OPTIONAL, -- Need R
OPTIONAL -- Need R
OPTIONAL -- Need R
OPTIONAL, -- Need S
OPTIONAL -- Need R
OPTIONAL -- Need R

```

sequenceId-r16                INTEGER (0..65535),
spatialRelationInfoPos-r16    SRS-SpatialRelationInfoPos-r16
...
[[
srs-PosPeriodicConfigHyperSFN-Index-r18  ENUMERATED {even0, odd1}
txHoppingConfig-r18                TxHoppingConfig-r18
]]
}

SRS-SpatialRelationInfo ::= SEQUENCE {
  servingCellId                ServCellIndex
  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
    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 }
  sfn0-Offset-r16              SEQUENCE {
    sfn-Offset-r16            INTEGER (0..1023),
    integerSubframeOffset-r16 INTEGER (0..9)
  }
  sfn-SSB-Offset-r16           INTEGER (0..15),
  ss-PBCH-BlockPower-r16      INTEGER (-60..50)
}

SSB-InfoNcell-r16 ::= SEQUENCE {

```

OPTIONAL, -- Need R

OPTIONAL, --Need R

OPTIONAL --Need R

OPTIONAL, -- Need S

OPTIONAL, -- Need S

OPTIONAL, -- Need S

OPTIONAL -- Need R

OPTIONAL, -- Need R

OPTIONAL -- Cond Pathloss

```

    physicalCellId-r16          PhysCellId,
    ssb-IndexNcell-r16         SSB-Index
    ssb-Configuration-r16     SSB-Configuration-r16
}
OPTIONAL, -- Need S
OPTIONAL, -- Need S

DL-PRS-Info-r16 ::=
    dl-PRS-ID-r16              SEQUENCE {
    dl-PRS-ResourceSetId-r16   INTEGER (0..255),
    dl-PRS-ResourceId-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 {
    s11                          NULL,
    s12                          INTEGER(0..1),
    s14                          INTEGER(0..3),
    s15                          INTEGER(0..4),
    s18                          INTEGER(0..7),
    s110                         INTEGER(0..9),
    s116                         INTEGER(0..15),
    s120                         INTEGER(0..19),
    s132                         INTEGER(0..31),
    s140                         INTEGER(0..39),
    s164                         INTEGER(0..63),
    s180                         INTEGER(0..79),
    s1160                        INTEGER(0..159),
    s1320                        INTEGER(0..319),
    s1640                        INTEGER(0..639),
    s11280                       INTEGER(0..1279),
    s12560                       INTEGER(0..2559)
}

SRS-PeriodicityAndOffset-r16 ::=
    CHOICE {
    s11                          NULL,
    s12                          INTEGER(0..1),
    s14                          INTEGER(0..3),
    s15                          INTEGER(0..4),
    s18                          INTEGER(0..7),
    s110                         INTEGER(0..9),
    s116                         INTEGER(0..15),
    s120                         INTEGER(0..19),
    s132                         INTEGER(0..31),
    s140                         INTEGER(0..39),
    s164                         INTEGER(0..63),
    s180                         INTEGER(0..79),
    s1160                        INTEGER(0..159),
    s1320                        INTEGER(0..319),
    s1640                        INTEGER(0..639),
    s11280                       INTEGER(0..1279),
    s12560                       INTEGER(0..2559),
    s15120                       INTEGER(0..5119),
    s110240                      INTEGER(0..10239),

```

```

s140960          INTEGER(0..40959),
s181920          INTEGER(0..81919),
...
}

SRS-PeriodicityAndOffsetExt-r16 ::= CHOICE {
  s1128          INTEGER(0..127),
  s1256          INTEGER(0..255),
  s1512          INTEGER(0..511),
  s120480        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
    },
    ...
  },
  ...
}

TxHoppingConfig-r18 ::= SEQUENCE {
  overlapValue-r18      ENUMERATED {zeroRB, oneRB, twoRB, fourRB},
  numberOfHops-r18     INTEGER(2..6),
  slotOffsetForRemainingHopsList-r18 SEQUENCE (SIZE (1..maxNrofHops-r18-1)) OF SlotOffsetForRemainingHops-r18,
  ...
}

SlotOffsetForRemainingHops-r18 ::= SEQUENCE {
  slotOffsetRemainingHops-r18 CHOICE {
    aperiodic-r18 SEQUENCE {
      slotOffset-r18      INTEGER (1..32)          OPTIONAL, -- Need S
      startPosition-r18   INTEGER (0..13)          OPTIONAL, -- Need R
      ...
    },
    semi-persistent-r18 SEQUENCE {
      periodicityAndOffset-sp-r18 SRS-PeriodicityAndOffset-r16          OPTIONAL, -- Need R
      periodicityAndOffset-sp-Ext-r18 SRS-PeriodicityAndOffsetExt-r16          OPTIONAL, -- Need R
      startPosition-r18           INTEGER (0..13)          OPTIONAL, -- Need R
      ...
    },
    periodic-r18 SEQUENCE {
      periodicityAndOffset-p-r18 SRS-PeriodicityAndOffset-r16          OPTIONAL, -- Need R
      periodicityAndOffset-p-Ext-r18 SRS-PeriodicityAndOffsetExt-r16          OPTIONAL, -- Need R
      startPosition-r18           INTEGER (0..13)          OPTIONAL, -- Need R
      ...
    },
    ...
  },
  ...
}

```


}

```
-- TAG-SRS-CONFIG-STOP  
-- ASN1STOP
```

SRS-Config field descriptions***dci-TriggeringPosResourceSetLink***

Indicates whether the single DCI-triggering SRS positioning resource sets across the linked carriers is enabled or not for bandwidth aggregation.

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
<p>cyclicShift-n2 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).</p>
<p>cyclicShift-n4 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).</p>
<p>cyclicShift-n8 Cyclic shift configuration (see TS 38.214 [19], clause 6.2.1).</p>
<p>combOffsetHopping Configures UE with comb offset hopping. The <i>hoppingId</i> is used to initialize pseudo random comb offset hopping. If UE is configured with both comb offset and cyclic shift hopping, only one <i>hoppingId</i> is configured. The <i>hoppingWithRepetition</i> configures time-domain hopping behavior for repetition factor $R > 1$. The <i>hoppingSubset</i> indicates a set of comb offset by a bit string (see clause 6.4.1.4.3 of TS 38.211 [16]). The i-th bit in the bit string is set to 1 to indicate the $s_{coh}^{SRS}(t) = i - 1$, where t is determined by its ordinary position among the positive bits in bit string, i.e., if the i-th bit is a first positive bit, $t=0$; if the i-th bit is a second positive bit, $t=1$, and so on.</p>
<p>cyclicShiftHopping Configures UE with cyclic shift hopping. The <i>hoppingId</i> is used to initialize pseudo random cyclic shift hopping. If UE is configured with both comb offset and cyclic shift hopping, only one <i>hoppingId</i> is configured. The <i>hoppingFinerGranularity</i> enables finer granular hopping, see TS 38.211 [16], clause 6.4.1.4.2. If <i>hoppingSubset</i> is configured, <i>hoppingFinerGranularity</i> is not configured. The <i>hoppingSubset</i> indicates a set of cyclic shift by a bit string (see clause 6.4.1.4.2 of TS 38.211 [16]). The i-th bit in the bit string is set to 1 to indicate the $s_{ch}^{SRS}(t) = i - 1$, where t is determined by its ordinary position among the positive bits in bit string, i.e., if the i-th bit is a first positive bit, $t=0$; if the i-th bit is a second positive bit, $t=1$, and so on.</p>
<p>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/asynchronous SRS as described in clause 6.4.1.4 in TS 38.211.</p>
<p>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 $b-hop > b-SRS$. For SRS for positioning configuration in multiple cells this field is commonly configured across cells within the validity area. <i>c-SRS</i> Indicates the maximum bandwidth. When <i>TxHoppingConfig</i> is configured the valid values for <i>c-SRS</i> are such that the maximum bandwidth is: 104 PRBs, 48 PRBs, 132 PRBs, 64 PRBs, for 15,30,60,120 KHz respectively. The same value for <i>c-SRS</i> is configured for all the hops when <i>TxHoppingConfig</i> is configured.</p>
<p>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'. For SRS for positioning configuration in multiple cells this field is commonly configured across cells within the validity area.</p>
<p>nrofSRS-Ports Number of ports. For CLI SRS-RSRP measurement, the network always configures this parameter to 'port1'.</p>
<p>nrofSRS-Ports-n8 Number of ports if the number of antenna ports is 8. The value 'ports8' configures UE with 8 antenna ports and the value 'ports8tdm' configures the UE with 8 antenna ports which are partitioned into 2 subsets with each subset having 4 different ports, and the subsets are mapped to different OFDM symbols, see TS 38.211 [16], clause 6.4.1.4.2. If <i>combOffsetHopping-r18</i> or <i>cyclicShiftHopping-r18</i> is configured, this field is not set to <i>ports8tdm</i>. If this field is present UE ignores the field <i>nrofSRS-Ports</i>.</p>
<p>periodicityAndOffset-p, periodicityAndOffset-p-Ext Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value <i>s1</i> corresponds to a periodicity of 1 slot, value <i>s2</i> corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity <i>s1</i> the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For CLI SRS-RSRP measurement, <i>s1280</i> and <i>s12560</i> cannot be configured. For <i>SRS-PosResource</i>, values <i>s120480</i>, <i>s140960</i> and <i>s181920</i> cannot be configured for SCS=15kHz, values <i>s140960</i> and <i>s181920</i> cannot be configured for SCS=30kHz, and value <i>s181920</i> cannot be configured for SCS=60kHz except when periodicity of 20480ms is configured. When <i>periodicityAndOffset-p-Ext</i> is present, <i>periodicityAndOffset-p</i> shall be ignored by the UE.</p>
<p>periodicityAndOffset-sp, periodicityAndOffset-sp-Ext Periodicity and slot offset for this SRS resource. All values are in "number of slots". Value <i>s1</i> corresponds to a periodicity of 1 slot, value <i>s2</i> corresponds to a periodicity of 2 slots, and so on. For each periodicity the corresponding offset is given in number of slots. For periodicity <i>s1</i> the offset is 0 slots (see TS 38.214 [19], clause 6.2.1). For <i>SRS-PosResource</i>, values <i>s120480</i>, <i>s140960</i> and <i>s181920</i> cannot be configured for SCS=15kHz, values <i>s140960</i> and <i>s181920</i> cannot be configured for SCS=30kHz, and value <i>s181920</i> cannot be configured for SCS=60kHz. When <i>periodicityAndOffset-sp-Ext</i> is present, <i>periodicityAndOffset-sp</i> shall be ignored by the UE.</p>

<p>ptrs-PortIndex The PTRS port index for this SRS resource for non-codebook based UL MIMO. This is only applicable when the corresponding <i>PTRS-UplinkConfig</i> is set to CP-OFDM. The <i>ptrs-PortIndex</i> configured here must be smaller than the <i>maxNrofPorts</i> configured in the <i>PTRS-UplinkConfig</i> (see TS 38.214 [19], clause 6.2.3.1). This parameter is not applicable to CLI SRS-RSRP measurement.</p>
<p>resourceMapping OFDM symbol location of the SRS resource within a slot including <i>nrofSymbols</i> (number of OFDM symbols), <i>startPosition</i> (value 0 refers to the last symbol, value 1 refers to the second last symbol, and so on) and <i>repetitionFactor</i> (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 <i>resourceMapping-r16</i> is signalled, UE shall ignore the <i>resourceMapping</i> (without suffix). If <i>resourceMapping-r17</i> is signalled, <i>resourceMapping-r16</i> is not signalled and the UE shall ignore the <i>resourceMapping</i> (without suffix) and only the values of <i>nrofSymbols</i> which are integer multiples of the configured <i>repetitionFactor</i> can be configured. The network can only signal <i>repetitionFactor-v1730</i> if <i>resourceMapping-r17</i> is signalled. When <i>repetitionFactor-v1730</i> is signalled, the UE shall ignore <i>repetitionFactor-r17</i>. For CLI SRS-RSRP measurement, the network always configures <i>nrofSymbols</i> and <i>repetitionFactor</i> to 'n1'. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area. <i>nrofSymbols</i> is same for all the hops when <i>TxHoppingConfig</i> is configured.</p>
<p>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 <i>resourceType</i>. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area.</p>
<p>sequenceId Sequence ID used to initialize pseudo random group and sequence hopping (see TS 38.214 [19], clause 6.2.1). If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area.</p>
<p>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 <i>unifiedTCI-StateType</i> is configured for the serving cell.</p>
<p>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 <i>resourceType=periodic</i> and <i>usagePDC-r17=true</i> in the <i>SRS-ResourceSet</i>, otherwise the field is absent.</p>
<p>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 <i>srs-ResourceId-Ext</i> is present, the IE <i>srs-ResourceId</i> in <i>spatialRelationInfoPos</i> represents the index from 0 to 63. Otherwise the IE <i>srs-ResourceId</i> in <i>spatialRelationInfoPos</i> represents the index from 0 to 31.</p>
<p>srs-PosPeriodicConfigHyperSFN-Index Indicates whether the current Hyper SFN is even or odd HSFN for SRS for Positioning transmission. If this field is not configured, the UE assumes that SRS for positioning periodicity longer than one Hyper SFN is not configured.</p>
<p>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 <i>srs-RequestDCI-0-2</i> 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 <i>supplementaryUplink</i>, an extra bit (the first bit of the SRS request field) is used for the non-SUL/SUL indication.</p>
<p>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 <i>supplementaryUplink</i>, 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).</p>
<p>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).</p>
<p>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).</p>

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 *applyIndicatedTCI-State*, 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-n2, transmissionComb-n4, 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*. If *srs-PosRRC-InactiveValidityAreaPreConfig* or *srs-PosRRC-InactiveValidityAreaNonPreConfig* is configured, this field is commonly configured across cells within the validity area.

SRS-ResourceSet, SRS-PosResourceSet field descriptions
<p>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. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area.</p>
<p>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 <i>SRS-ResourceSet</i> of <i>resourceType</i> set to <i>aperiodic</i>, UE maintains this value based on the Need M; that is, this list is not considered as an extension of <i>aperiodicSRS-ResourceTrigger</i> for purpose of applying the general rule for extended list in clause 6.1.3.</p>
<p>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).</p>
<p>applyIndicatedTCI-State This field indicates, for an SRS-ResourceSet, if UE applies the first or the second "indicated" UL only TCI or joint TCI as specified in TS 38.214 [19], clause 6.2.1. If more than one value for the field <i>coresetPoolIndex</i> is configured in IE <i>controlResourceSet</i> for the BWP, the value 'first' corresponds to the "indicated" joint/UL TCI states specific to <i>coresetPoolIndex</i> value 0 and the value 'second' correspond to the value 1, respectively. When UE is configured with two SRS resource sets with <i>usage</i> set to <i>Codebook</i> or <i>nonCodebook</i>, network does not configure the first set with value 'second' or second set with value 'first'.</p>
<p>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).</p>
<p>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 <i>slotOffset</i> (without suffix) as described in clause 6.2.1 of TS 38.214 [19].</p>
<p>csi-RS ID of CSI-RS resource associated with this SRS resource set (see TS 38.214 [19], clause 6.1.1.2).</p>
<p>dl-PRS This field indicates a PRS configuration.</p>
<p>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.</p>
<p>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). If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area.</p>
<p>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).</p>
<p>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).</p>
<p>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 <i>pathlossReferenceRS</i> is not configured in the same <i>SRS-ResourceSet</i>.</p>
<p>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. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, this field is commonly configured across cells within the validity area.</p>
<p>slotOffset An offset in number of slots between the triggering DCI and the actual transmission of this <i>SRS-ResourceSet</i>. If the field is absent the UE applies no offset (value 0).</p>
<p>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).</p>

<i>srs-ResourceIdList, srs-PosResourceIdList</i> The IDs of the SRS-Resources/SRS-PosResource used in this <i>SRS-ResourceSet/SRS-PosResourceSet</i> . If this <i>SRS-ResourceSet</i> is configured with usage set to codebook, the <i>srs-ResourceIdList</i> contains at most 2 entries. If this <i>SRS-ResourceSet</i> is configured with usage set to <i>nonCodebook</i> , the <i>srs-ResourceIdList</i> contains at most 4 entries. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, <i>srs-PosResourceIdList</i> is commonly configured across cells within the validity area.
<i>srs-ResourceSetId, srs-PosResourceSetId</i> The ID of this resource set. It is unique in the context of the BWP in which the parent <i>SRS-Config</i> is defined. If <i>srs-PosRRC-InactiveValidityAreaPreConfigList</i> or <i>srs-PosRRC-InactiveValidityAreaNonPreConfig</i> is configured, <i>srs-PosResourceSetId</i> is commonly configured across cells within the validity area.
<i>ssb-IndexServing</i> Indicates SSB index belonging to a serving cell where the SRS is configured.
<i>ssb-Ncell</i> This field indicates a SSB configuration from neighboring cell.
<i>usage</i> 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.
<i>usagePDC</i> If configured, it indicates that this SRS resource set is used for propagation delay compensation. The field can be present in only one <i>SRS-ResourceSet</i> .

<i>SRS-SpatialRelationInfoPos</i> field descriptions
<i>csi-RS-IndexServing</i> Indicates CSI-RS index belonging to a serving cell.
<i>dl-PRS</i> This field indicates a PRS configuration.
<i>resourceSelection</i> Indicates whether the configured SRS spatial relation resource is a <i>SRS-Resource</i> or <i>SRS-PosResource</i> .
<i>servingCellId</i> 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.
<i>ssb-IndexServing</i> Indicates SSB index belonging to a serving cell.
<i>ssb-Ncell</i> This field indicates a SSB configuration from neighboring cell.

<i>SSB-InfoNCell</i> field descriptions
<i>physicalCellId</i> This field specifies the physical cell ID of the neighbour cell or NCD-SSB of the serving cell for which SSB configuration is provided.
<i>ssb-IndexNcell</i> This field specifies the index of the SSB for a neighbour cell or NCD-SSB of the serving cell. See TS 38.213 [13]. If this field is absent, the UE determines the <i>ssb-IndexNcell</i> of the <i>physicalCellId</i> based on its SSB measurement from the cell.
<i>ssb-Configuration</i> This field specifies the full configuration of the SSB. If this field is absent, the UE obtains the configuration for the SSB from <i>nr-SSB-Config</i> 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 <i>physicalCellId</i> .

DL-PRS-Info field descriptions
<p>dl-PRS-ID This field specifies the UE specific TRP ID (see TS 37.355 [49]) for which PRS configuration is provided.</p>
<p>dl-PRS-ResourceSetId This field specifies the PRS-ResourceSet ID of a PRS resourceSet.</p>
<p>dl-PRS-ResourceId This field specifies the PRS-Resource ID of a PRS resource. If this field is absent, the UE determines the <i>dl-PRS-ResourceID</i> based on its PRS measurement from the TRP (see TS 37.355 [49]) and DL-PRS Resource Set.</p>

SSB-Configuration field descriptions
<p>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.</p>
<p>integerSubframeOffset Indicates the subframe boundary offset of the cell in which SSB is transmitted.</p>
<p>sfn0-Offset Indicates the time offset of the SFN0 slot 0 for the cell with respect to SFN0 slot 0 of serving cell.</p>
<p>sfn-Offset Specifies the SFN offset between the cell in which SSB is transmitted 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.</p>
<p>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 <i>ssb-Periodicity</i> such that the indicated system frame does not exceed the configured SSB periodicity.</p>
<p>ssb-Freq Indicates the frequency of the SSB.</p>
<p>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.</p>
<p>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)</p>
<p>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</p>

<i>TxHoppingConfig</i> field descriptions
<p>numberOfHops This field specifies the number of hops. The configured values are 2,3,4,5,6.</p>
<p>overlapValue This field specifies the overlap during SRS transmission in terms of number of <i>resource blocks</i>. Value <i>zeroRB</i> implies 0 RB, value <i>oneRB</i> corresponds to 1 RB, value <i>twoRB</i> corresponds to 2 RBs and so on. The same value for the <i>overlapValue</i> is configured to all the hops.</p>
<p>slotOffsetForRemainingHopsList This field specifies the starting slot offset and starting symbol for the SRS resource with tx hopping for different resource types (aperiodic, semi-persistent or periodic SRS transmission). Each hop is configured with the same periodicity.</p>

Conditional Presence	Explanation
<i>DLorJointTCI-SRS</i>	The field is mandatory present if <i>srs-DLorJointTCI-State</i> is configured, otherwise it is absent Need R.
<i>FollowUTCi</i>	The field is absent if the field <i>followUnifiedTCI-State</i> is present. Otherwise, it is optionally present, Need R.
<i>NonCodebook</i>	This field is optionally present, Need M, in case of non-codebook based transmission, otherwise the field is absent.
<i>Pathloss</i>	The field is mandatory present if the IE <i>SSB-InfoNcell</i> is included in <i>pathlossReferenceRS-Pos</i> ; otherwise it is optionally present, Need R
<i>Setup</i>	This field is mandatory present upon configuration of SRS-ResourceSet or SRS-Resource and optionally present, Need M, otherwise.

– SRS-PosTx-Hopping

The IE *SRS-PosTx-Hopping* specifies the frequency hopping configuration for SRS for Positioning transmission.

SRS-PosTx-Hopping information element

```

-- ASN1START
-- TAG-SRS-PosTx-Hopping-START

SRS-PosTx-Hopping-r18 ::=
    srs-PosConfig-r18
    bwp-r18
    srs-PosUplinkTransmissionWindowConfig-r18
}

SRS-PosUplinkTransmissionWindowConfig-r18 ::=
    startSFN-r18
    windowPeriodicityAndOffset-r18
    periodicityAndOffset-r18
    periodicityAndOffset-Ext-r18
},
duration-r18
...
}

-- TAG-SRS-PosTx-Hopping-STOP
-- ASN1STOP

```

SEQUENCE {

SRS-PosConfig-r17,

BWP

SetupRelease { SRS-PosUplinkTransmissionWindowConfig-r18 }

OPTIONAL, -- Need R

OPTIONAL -- Need M

SEQUENCE {

INTEGER(0..1023),

CHOICE {

SRS-PeriodicityAndOffset-r16,

SRS-PeriodicityAndOffsetExt-r16

},

ENUMERATED {s1,s2,s4,s6},

SRS-PosTx-Hopping field descriptions
bwp For RRC_CONNECTED state, indicates the frequency region outside of active BWP for SRS for positioning frequency hopping. For RRC_INACTIVE state indicates the BWP configuration for SRS for Positioning during the RRC_INACTIVE.
srs-PosConfig Provides the SRS Configuration to be used for frequency hopping.
srs-PosUplinkTransmissionWindowConfig UL time window for UL SRS for positioning with Tx hopping configured to be periodic with configurable starting SFN, slot and symbol number, periodicity, duration.

SRS-PosUplinkTransmissionWindowConfig field descriptions
duration Indicates the duration of the uplink SRS for positioning transmission window with frequency hopping. Value s1 indicates 1 slot, s2 indicates 2 slot and so on.
periodicityAndOffset Indicates the Periodicity and slot offset for uplink SRS for positioning transmission window occurrence with frequency hopping.
startSFN Indicates the starting SFN of the uplink SRS for positioning transmission window with frequency hopping.

– SRS-PosResourceSetLinkedForAggBW

The IE *SRS-PosResourceSetLinkedForAggBW* provides the SRS Positioning Resource Sets that are linked for bandwidth aggregation.

SRS-PosResourceSetLinkedForAggBW information element

```

-- ASN1START
-- TAG- SRS-POSRESOURCESETLINKEDFORAGGBW-START

SRS-PosResourceSetLinkedForAggBW-r18 ::= SEQUENCE {
    srs-PosResourceSetLinked-r18          SRS-PosResourceSetId-r16,
    freqInfo-r18                          ARFCN-ValueNR                OPTIONAL, -- Need R
    ul-bwp-ID-r18                          BWP-Id                        OPTIONAL, -- Cond ConnectedMode
    scs-SpecificCarrier-r18                 SCS-SpecificCarrier           OPTIONAL, -- Need R
    ...
}

-- TAG- SRS-POSRESOURCESETLINKEDFORAGGBW-STOP
-- ASN1STOP

```

SRS-PosResourceSetLinkedForAggBW field descriptions	
freqInfo	Indicates the SRS Positioning Resource set carrier frequency that is linked for bandwidth aggregation.
scs-SpecificCarrier	A set of UE specific channel bandwidth and location configurations for different subcarrier spacings (numerologies). Defined in relation to Point A and to be used for SRS for positioning bandwidth aggregation.
srs-PosResourceSetLinked	Indicates the SRS Positioning Resource set that is linked for bandwidth aggregation.
ul-bwp-ID	Indicates the SRS Positioning Resource set uplink bandwidth ID that is linked for bandwidth aggregation.

Conditional Presence	Explanation
<i>ConnectedMode</i>	The field is mandatory present when bandwidth aggregation is performed in RRC_CONNECTED state and SRS for positioning is configured in the same carrier as data for bandwidth aggregation, 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 11.4.

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 11.4).

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 11.4).

– 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
            sf5
            CHOICE {
                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 ::=
    pci-List                SEQUENCE {
        periodicity         SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId    OPTIONAL, -- Need M
        periodicity         ENUMERATED {sf5, sf10, sf20, sf40, sf80, spare3, spare2, spare1}
    }

SSB-MTC2-LP-r16 ::=
    pci-List                SEQUENCE {
        periodicity         SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId    OPTIONAL, -- Need R
        periodicity         ENUMERATED {sf10, sf20, sf40, sf80, sf160, spare3, spare2, spare1}
    }

SSB-MTC3-r16 ::=
    periodicityAndOffset-r16 SEQUENCE {
        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 ::=
    pci-List-r17            SEQUENCE {
        offset-r17          SEQUENCE (SIZE (1..maxNrofPCIsPerSMTC)) OF PhysCellId    OPTIONAL, -- Need M
        offset-r17          INTEGER (0..159)
    }

SSB-MTC-AdditionalPCI-r17 ::=
    additionalPCIIndex-r17  SEQUENCE {
        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
<p>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).</p>
<p>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.</p>

SSB-MTC2 field descriptions
<p>pci-List PCIs that follow this SMTC.</p>

SSB-MTC3 field descriptions
<p>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).</p>
<p>pci-List PCIs that follow this SMTC, used for IAB-node discovery.</p>
<p>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.</p>
<p>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 <i>smtc</i> are not to be measured. See TS 38.215 [9] clause 5.1.1.</p>

SSB-MTC4 field descriptions
<p>pci-List PCIs that follow this SMTC.</p>
<p>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.</p>

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
<p>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.</p>
<p>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 <i>ssb-PositionQCL</i> is configured with a value smaller than <i>ssb-PositionQCL-Common</i>, only the leftmost K bits ($K = ssb-PositionQCL$) are applicable for the corresponding cell.</p>
<p>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.</p>

– 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
<p><i>tag-Id</i> 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).</p>
<p><i>timeAlignmentTimer</i> The <i>timeAlignmentTimer</i> for TAG with ID <i>tag-Id</i>, as specified in TS 38.321 [3].</p>

– *TAR-Config*

The IE *TAR-Config* is used to configure Timing Advance reporting in non-terrestrial networks and ATG network.

***TAR-Config* information element**

```
-- ASN1START
-- TAG-TAR-CONFIG-START

TAR-Config-r17 ::=
    offsetThresholdTA-r17          SEQUENCE {
                                   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
                                   ...
    }
TAR-Config-r18 ::=
    offsetThresholdTA-r18          SEQUENCE {
                                   INTEGER (1..56)          OPTIONAL,      -- Need R
                                   timingAdvanceSR-r18          ENUMERATED {enabled}          OPTIONAL,      -- Need R
                                   ...
    }

-- TAG-TAR-CONFIG-STOP
-- ASN1STOP
```

<i>TAR-Config</i> field descriptions
<p><i>offsetThresholdTA</i> Offset for TA reporting as specified in TS 38.321 [3]. Network only configures this parameter for MCG. For ATG, network only configures offsetThresholdTA-r18, which is in unit of symbols.</p>
<p><i>timingAdvanceSR</i> Used to configure whether a Timing Advance report may trigger a Scheduling Request as specified in TS 38.321 [3].</p>

– *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**pdccch-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-StateId* 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 ::=
    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
    ]],
    [[
        tag-Id-ptr-r18          ENUMERATED {n0,n1}              OPTIONAL, -- Cond 2TA
    ]]
}

```

```

QCL-Info ::=
  cell                               SEQUENCE {
    bwp-Id                             ServCellIndex                OPTIONAL, -- Need R
    referenceSignal                     BWP-Id                        OPTIONAL, -- Cond CSI-RS-Indicated
      csi-rs                             CHOICE {
        ssb                               NZP-CSI-RS-ResourceId,
      },
      SSB-Index
    },
  qcl-Type                             ENUMERATED {typeA, typeB, typeC, typeD},
  ...
}

-- TAG-TCI-STATE-STOP
-- ASN1STOP

```

QCL-Info field descriptions
<p><i>bwp-Id</i> 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 <i>TCI-State</i> is applied by the UE.</p>
<p><i>cell</i> The UE's serving cell in which the <i>referenceSignal</i> is configured. If the field is absent, the <i>referenceSignal</i> is configured in the serving cell in which the <i>TCI-State</i> is applied by the UE. The RS can be located on a serving cell other than the serving cell for which the <i>TCI-State</i> is applied by the UE only if the <i>qcl-Type</i> is configured as <i>typeC</i> or <i>typeD</i>. If the <i>referenceSignal</i> is set to <i>csi-rs</i> and <i>unifiedTCI-StateType</i> is configured, either both <i>cell</i> and <i>bwp-Id</i> are present or both <i>cell</i> and <i>bwp-Id</i> are absent. See TS 38.214 [19] clause 5.1.5.</p>
<p><i>referenceSignal</i> Reference signal with which quasi-collocation information is provided as specified in TS 38.214 [19] clause 5.1.5.</p>
<p><i>qcl-Type</i> QCL type as specified in TS 38.214 [19] clause 5.1.5.</p>

TCI-State field descriptions
<p>additionalPCI Indicates the physical cell IDs (PCI) of the SSBs when <i>referenceSignal</i> is configured as SSB for both QCL-Type1 and QCL-Type2. In case the <i>cell</i> is present, the <i>additionalPCI</i> refers to a PCI value configured in the list configured using <i>additionalPCI-ToAddModList</i> in the serving cell indicated by the field <i>cell</i>. Otherwise, it refers to a PCI value configured in a list <i>additionalPCI-ToAddModList</i> configured in the serving cell where the <i>TCI-State</i> is applied by the UE. When this field is present the <i>cell</i> for <i>qcl-Type1</i> and <i>qcl-Type2</i> is configured with same value, if present.</p>
<p>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 <i>pathlossReferenceRSToAddModList</i> in the serving cell and UL BWP where the TCI State is applied by the UE.</p>
<p>qcl-Type1, qcl-Type2 QCL information for the TCI state as specified in TS 38.214 [19] clause 5.1.5.</p>
<p>tag-Id-ptr It indicates the TAG that is associated with this TCI state, value n0 means the TCI state associate with the TAG indicated by <i>tag-Id</i>, value n1 means this TCI state associated with the TAG indicated by <i>tag2-Id</i>. The <i>tag-Id-ptr</i> refers to the TAG of the serving cell where the TCI state is applied.</p>
<p>tci-StateId ID number of the TCI state.</p>
<p>ul-PowerControl Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if <i>ul-powerControl</i> is not configured in any <i>BWP-Uplink-Dedicated</i> of this serving cell. This field refers to an element in the list configured using <i>uplink-PowerControlToAddModList</i> in the serving cell where the <i>dl-OrJointTCI-StateToAddModList</i> is configured.</p>

Conditional Presence	Explanation
<i>2TA</i>	This field is mandatory present if <i>tag2</i> is present for the serving cell and the serving cell is configured with <i>unifiedTCI-StateType</i> set to <i>joint</i> . It is absent, Need R, otherwise.
<i>CSI-RS-Indicated</i>	This field is mandatory present if <i>csi-rs</i> is included and <i>unifiedTCI-StateType</i> is not configured. This field is optionally present, Need R, if <i>csi-rs</i> is included and <i>unifiedTCI-StateType</i> is configured. Otherwise, it is absent, Need R.
<i>JointTCI</i>	This field is optionally present, Need R, if this serving cell is configured with <i>unifiedTCI-StateType</i> set to ' <i>joint</i> '. It is absent, Need R, otherwise.
<i>JointTCI1</i>	This field is mandatory present, if this serving cell is configured with <i>unifiedTCI-StateType</i> set to ' <i>joint</i> '. 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 ::=
    tci-UL-StateId-r17          SEQUENCE {
    servingCellId-r17          TCI-UL-StateId-r17,
    bwp-Id-r17                 ServCellIndex          OPTIONAL, -- Need R
    referenceSignal-r17       BWP-Id                OPTIONAL, -- Cond CSI-RSorSRS-Indicated
        ssb-Index-r17          CHOICE {
        csi-RS-Index-r17       SSB-Index,
        srs-r17                NZP-CSI-RS-ResourceId,
                                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-Id-ptr-r18             ENUMERATED {n0,n1}          OPTIONAL -- Cond 2TA
    ]]
}

-- TAG-TCI-UL-STATE-STOP
-- ASN1STOP

```

TCI-UL-State field descriptions
<p>additionalPCI Indicates the physical cell IDs (PCI) of the SSBs when <i>referenceSignal</i> is configured as SSB. In case the <i>servicingCellId</i> is present, the <i>additionalPCI</i> refers to a PCI value configured in the list configured using <i>additionalPCI-ToAddModList</i> in the serving cell indicated by the field <i>servicingCellId</i>. Otherwise, it refers to a PCI value configured in the list configured using <i>additionalPCI-ToAddModList</i> in the serving cell where the <i>ul-TCI-StateList</i> is applied by the UE.</p>
<p>bwp-Id The DL BWP which the CSI-RS is located in or UL BWP where the SRS is located in.</p>
<p>servicingCellId The UE's serving cell in which the <i>referenceSignal</i> is configured. If the field is absent, the <i>referenceSignal</i> is configured in the serving cell in which the <i>TCI-UL-State</i> is applied by the UE.</p>
<p>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 <i>pathlossReferenceRSToAddModList</i> in the serving cell and UL BWP where the UL TCI State is applied by the UE.</p>
<p>tag-Id-Ptr It indicates the TAG that is associated with this TCI state, value n0 means the TCI state associate with the TAG indicated by <i>tag-Id</i>, value n1 means this TCI state associated with the TAG indicated by <i>tag2-Id</i>. The <i>tag-Id-Ptr</i> refers to the TAG of the serving cell where the TCI state is applied.</p>
<p>ul-powerControl Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if <i>ul-powerControl</i> is not configured in any <i>BWP-Uplink-Dedicated</i> of this serving cell. This field refers to an element in the list configured using <i>uplink-PowerControlToAddModList</i> in the serving cell where the <i>ul-TCI-ToAddModList</i> is configured.</p>

Conditional Presence	Explanation
<i>2TA</i>	This field is mandatory present if <i>tag2</i> is present for the serving cell. It is absent, Need R, otherwise.
<i>CSI-RS or SRS-Indicated</i>	This field is mandatory present if <i>referenceSignal</i> is set to <i>csi-RS-index</i> or to <i>srs</i> , absent otherwise
<i>Mandatory</i>	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.

<i>TDD-UL-DL-Pattern</i> field descriptions
<i>dl-UL-TransmissionPeriodicity</i> Periodicity of the DL-UL pattern, see TS 38.213 [13], clause 11.1. If the <i>dl-UL-TransmissionPeriodicity-v1530</i> is signalled, UE shall ignore the <i>dl-UL-TransmissionPeriodicity</i> (without suffix).
<i>nrofDownlinkSlots</i> 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.
<i>nrofDownlinkSymbols</i> Number of consecutive DL symbols in the beginning of the slot following the last full DL slot (as derived from <i>nrofDownlinkSlots</i>). The value 0 indicates that there is no partial-downlink slot. (see TS 38.213 [13], clause 11.1).
<i>nrofUplinkSlots</i> 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.
<i>nrofUplinkSymbols</i> Number of consecutive UL symbols in the end of the slot preceding the first full UL slot (as derived from <i>nrofUplinkSlots</i>). 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
        }
    }
}
-- ASN1END
```



```

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
<p><i>nrofDownlinkSymbols</i> Number of consecutive DL symbols in the beginning of the slot identified by <i>slotIndex</i>. If the field is absent the UE assumes that there are no leading DL symbols. (see TS 38.213 [13], clause 11.1).</p>
<p><i>nrofUplinkSymbols</i> Number of consecutive UL symbols in the end of the slot identified by <i>slotIndex</i>. If the field is absent the UE assumes that there are no trailing UL symbols. (see TS 38.213 [13], clause 11.1).</p>
<p><i>slotIndex</i> Identifies a slot within a slot configuration period given in <i>tdd-UL-DL-configurationCommon</i>, see TS 38.213 [13], clause 11.1.</p>
<p><i>symbols</i> The direction (downlink or uplink) for the symbols in this slot. Value <i>allDownlink</i> indicates that all symbols in this slot are used for downlink; value <i>allUplink</i> indicates that all symbols in this slot are used for uplink; value <i>explicit</i> indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively.</p>

TDD-UL-DL-SlotConfig-IAB-MT field descriptions
<p><i>symbols-IAB-MT</i> The <i>symbols-IAB-MT</i> is used to configure an IAB-MT with the SlotConfig applicable for one serving cell. Value <i>allDownlink</i> indicates that all symbols in this slot are used for downlink; value <i>allUplink</i> indicates that all symbols in this slot are used for uplink; value <i>explicit</i> indicates explicitly how many symbols in the beginning and end of this slot are allocated to downlink and uplink, respectively; value <i>explicit-IAB-MT</i> indicates explicitly how many symbols in the beginning and end of this slot are allocated to uplink and downlink, respectively.</p>

– *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 $T_{reselction_{RAT}}$ 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
```

– *TN-Areald*

The IE *TN-Areald* is used to identify a TN coverage area in an NTN system.

***TN-AreaId* information element**

```

-- ASN1START
-- TAG-TN-AREAID-START

TN-AreaId-r18 ::=
    INTEGER (1..maxTN-AreaInfo-r18)

-- TAG-TN-AREAID-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**

<p><i>uac-BarringInfoSetList</i> List of access control parameter sets. Each access category can be configured with access parameters corresponding to a particular set by <i>uac-barringInfoSetIndex</i>. Association of an access category with an index that has no corresponding entry in the <i>uac-BarringInfoSetList</i> is valid configuration and indicates no barring.</p>
<p><i>uac-BarringForAccessIdentity</i> 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.</p>
<p><i>uac-BarringFactor</i> Represents the probability that access attempt would be allowed during access barring check.</p>
<p><i>uac-BarringFactorForAI3</i> 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.</p>
<p><i>uac-BarringTime</i> 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.</p>

– *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
  }
}
-- TAG-UAC-BARRINGPERPLMN-LIST-STOP
-- ASN1STOP
```

OPTIONAL -- Need S

UAC-BarringPerPLMN-List field descriptions**uac-ACBarringListType**

Access control parameters for each access category valid only for a specific PLMN or SNP. UE behaviour upon absence of this field is specified in clause 5.3.14.2.

plmn-IdentityIndex

Index of the PLMN or SNP 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

<i>t300-RemoteUE</i>	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.
<i>t301-RemoteUE</i>	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.
<i>t319-RemoteUE</i>	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

```

<i>UL-DelayValueConfig</i> field descriptions
<p>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].</p>

– *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

```

<i>UL-ExcessDelayConfig</i> field descriptions
<p>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].</p>
<p>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.</p>

– *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
}
-- TAG-UL-GAPFR2-CONFIG-STOP
-- ASN1STOP

```

OPTIONAL -- Cond AsyncCA

UL-GapFR2-Config field descriptions

gapOffset
Value <i>gapOffset</i> is the gap offset of the FR2 UL gap pattern with UGRP indicated in the field <i>ugrp</i> . The value range is from 0 to <i>ugrp</i> -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 <i>ugl</i> 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 <i>ms0dot125</i> corresponds to 0.125 ms, <i>ms0dot25</i> corresponds to 0.25 ms and so on.
ugrp
Value <i>ugrp</i> 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
<i>AsyncCA</i>	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 <i>ci-PayloadSize</i> 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 (<i>servingCellId</i>) (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 <i>locationAndBandwidth</i> .
positionInDCI	Starting position (in number of bit) of the <i>ci-PayloadSize</i> bit CI value applicable for this serving cell (<i>servingCellId</i>) within the DCI payload (see TS 38.213 [13], clause 11.2A).
positionInDCI-ForSUL	Starting position (in number of bit) of the <i>ci-PayloadSize</i> bit CI value applicable for SUL of this serving cell (<i>servingCellId</i>) 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 (<i>servingCellId</i>) (see TS 38.213 [13], clause 11.2A). If the field is absent, i.e., the configured UL CI monitoring periodicity indicated by <i>monitoringSlotPeriodicityAndOffset</i> 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 (<i>servingCellId</i>) (see TS 38.213 [13], clause 11.2A).
timeGranularityForCI	Configures the number of partitions within the time region of this serving cell (<i>servingCellId</i>) (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
<i>SUL-Only</i>	The field is optionally present, Need R, if <i>supplementaryUplink</i> is configured in <i>ServingCellConfig</i> . It is absent otherwise.
<i>SymbolPeriodicity</i>	This field is mandatory present if the configured UL CI monitoring periodicity indicated by <i>monitoringSlotPeriodicityAndOffset</i> 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, (e)RedCap UEs use this UL BWP instead of *initialUplinkBWP*.

If absent, (e)RedCap UEs use *initialUplinkBWP* provided that it does not exceed the (e)RedCap UE maximum bandwidth (see also clause 5.2.2.4.2).

Conditional Presence	Explanation
<i>InterFreqHOAndServCellAdd</i>	This field is mandatory present for inter-frequency handover and upon serving cell (PSCell/SCell) addition. Otherwise, the field is optionally present, Need M.
<i>ServCellAdd</i>	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, (e)RedCap UEs use this UL BWP instead of <i>initialUplinkBWP</i> . If absent, (e)RedCap UEs use <i>initialUplinkBWP</i> provided that it does not exceed the (e)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 <i>alpha</i> is absent in <i>p0AlphaSetforPUSCH</i> , the UE applies the value 1 for PUSCH power control. When the field <i>alpha</i> is absent in <i>p0AlphaSetforSRS</i> , the UE applies the value 1 for SRS power control. In <i>p0AlphaSetForPUCCH</i> , the field <i>alpha</i> 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, or between a N3C relay UE and network in case of MP.

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
<i>RelayLCH-Setup</i>	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.
<i>RelayLCH-SetupOnly</i>	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.

<i>UplinkTxDirectCurrentCell</i> field descriptions
<i>servCellIndex</i> The serving cell ID of the serving cell corresponding to the <i>uplinkDirectCurrentBWP</i> .
<i>uplinkDirectCurrentBWP</i> The Tx Direct Current locations for all the uplink BWPs configured at the corresponding serving cell.
<i>uplinkDirectCurrentBWP-SUL</i> 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
```


<i>UplinkTxDirectCurrentMoreCarrierList</i> and <i>CC-Group</i> field descriptions
<p><i>CC-Group</i> 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 <i>DefaultDC-Location</i> is set to <i>activeCarrier</i> or <i>activeBWP</i>.</p>
<p><i>defaultDC-Location</i> 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 <i>FrequencyComponent</i> in the associated <i>CC-Group</i>, 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.</p>
<p><i>offsetToDefault</i> Indicates the DC location offset to the default DC location derived from <i>defaultDC-Location</i>. The lowest SCS in the CC group is used as the offset granularity. Value 0 represents no offset. offsetValue is used in case <i>DefaultDC-Location</i> is set to <i>configuredCarrier</i> or <i>configuredBWP</i>. <i>offsetlist</i> is used in case <i>DefaultDC-Location</i> is set to <i>activeCarrier</i> or <i>activeBWP</i>. Each entity in this list corresponds to the entry in carriers combination in <i>IntraBandCC-CombinationReqList</i> 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 <i>CC-CombinationList</i>. If <i>DefaultDC-Location</i> is set the <i>activeCarrier</i>, same offsetValue is signalled for all requested carriers combinations with same active carriers states (regardless of the active BWP index).</p>
<p><i>servCellIndexHigher</i> Indicates the serving cell index of the highest edge of the <i>CC-Group</i>. If absent, there is only one carrier in this group indicated by <i>servCellIndexLower</i>.</p>
<p><i>servCellIndexLower</i> Indicates the serving cell index of the lowest edge of the <i>CC-Group</i>.</p>
<p><i>shift7dot5kHz</i> 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.</p>

<i>DefaultDC-Location</i> field descriptions
<p><i>dl</i> Indicates that the default DC location is derived based on the DL frequencies of the frequency component.</p>
<p><i>ul</i> Indicates that the default DC location is derived based on the UL frequencies of the frequency component.</p>
<p><i>ulAndDL</i> Indicates that the default DC location is derived based on the edge most frequencies among any DL and UL frequency components.</p>

– *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-UPLINKTXDIRECTCURRENTTWCARRIERLIST-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              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-UPLINKTXDIRECTCURRENTTWCARRIERLIST-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 <i>UplinkTxDirectCurrentTwoCarrier</i> entity where <i>deactivatedCarrier</i> of <i>carrierOneInfo</i> or <i>carrierTwoInfo</i> is set to <i>deactivated</i> .

– 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 ::=
    zp-CSI-RS-ResourceId          SEQUENCE {
        resourceMapping          ZP-CSI-RS-ResourceId,
        periodicityAndOffset     CSI-RS-ResourceMapping,
        ...                      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
<i>PeriodicOrSemiPersistent</i>	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, rel18, spare4, spare3, spare2, spare1, ... }

-- TAG-ACCESSSTRATUMRELEASE-STOP
-- ASN1STOP
```

– *AerialParameters*

The IE *AerialParameters* is used to convey the capabilities supported by the UE for aerial operation.

***AerialParameters* information element**

```
-- ASN1START
-- TAG-AERIALPARAMETERS-START

AerialParameters-r18 ::= SEQUENCE {
    -- Support of Aerial UE features
    aerialUE-Capability-r18          ENUMERATED {supported}                OPTIONAL,
    -- Support of altitude measurement and event H1/H2-triggered reporting
    altitudeMeas-r18                ENUMERATED {supported}                OPTIONAL,
    -- Support of altitude based measurement configuration of SSB-ToMeasure
    altitudeBasedSSB-ToMeasure-r18  ENUMERATED {supported}                OPTIONAL,
    -- Support of events A3H1, A3H2, A4H1, A4H2, A5H1, A5H2
    eventAxHy-r18                   ENUMERATED {supported}                OPTIONAL,
    -- Support of flight path reporting
    flightPathReporting-r18          ENUMERATED {supported}                OPTIONAL,
    -- Support of flight path availability indication via UAI
    flightPathAvailabilityIndicationUAI-r18  ENUMERATED {supported}        OPTIONAL,
    -- Support of numberOfTriggeringCells for eventA3, eventA4, and eventA5, and additionally, if the UE supports eventAxHy-r18,
    -- support of numberOfTriggeringCells for eventA3H1, eventA3H2, eventA4H1, eventA4H2, eventA5H1, and eventA5H2
    multipleCellsMeasExtension-r18   ENUMERATED {supported}                OPTIONAL,
    -- Support of handling aerial-specific Ns value(s) and Pmax list broadcasted by the cell
    nr-NS-PmaxListAerial-r18         ENUMERATED {supported}                OPTIONAL,
    -- Support of reporting only the measurement report corresponding to the event with the smallest value between the
    -- altitude of the UAV and the altitude threshold for which the altitude-related entering condition e.g. A3H1-2 is satisfied, when
    -- multiple events of the same type (Hx or AxHy) for the same MO (for AxHy) are triggered simultaneously.
    simulMultiTriggerSingleMeasReport-r18  ENUMERATED {supported}                OPTIONAL,
```

```

-- Support of A2X service(s) using PC5 Sidelink and dedicated resource pool for A2X service(s)
sl-A2X-Service-r18          ENUMERATED {brid, daa, bridAndDAA}          OPTIONAL,
...
}

-- TAG-AERIALPARAMETERS-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,
    ...
    [
    qoe-IdleInactiveMeasReport-r18        ENUMERATED {supported}          OPTIONAL,
    qoe-NRDC-MeasReport-r18              ENUMERATED {supported}          OPTIONAL,
    qoe-AdditionalMemoryMeasReport-r18    ENUMERATED {kB128, kB256, kB512, kB1024}  OPTIONAL,
    qoe-PriorityBasedDiscarding-r18      ENUMERATED {supported}          OPTIONAL,
    srb5-r18                             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-v1780 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1780

BandCombinationList-v1800 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-v1800

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
BandCombinationList-UplinkTxSwitch-v1780 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1780
BandCombinationList-UplinkTxSwitch-v1800 ::= SEQUENCE (SIZE (1..maxBandComb)) OF BandCombination-UplinkTxSwitch-v1800

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 ::=
  ca-ParametersNR-v16a0          SEQUENCE {
    ca-ParametersNR-v16a0          CA-ParametersNR-v16a0          OPTIONAL,
    ca-ParametersNRDC-v16a0       CA-ParametersNRDC-v16a0       OPTIONAL
  }
BandCombination-v1700 ::=
  ca-ParametersNR-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 ::=
  ca-ParametersNR-v1720          SEQUENCE {
    ca-ParametersNR-v1720          CA-ParametersNR-v1720          OPTIONAL,
    ca-ParametersNRDC-v1720       CA-ParametersNRDC-v1720       OPTIONAL
  }
BandCombination-v1730 ::=
  ca-ParametersNR-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 ::=
  ca-ParametersNR-v1740          SEQUENCE {
    ca-ParametersNR-v1740          CA-ParametersNR-v1740          OPTIONAL
  }
BandCombination-v1760 ::=
  ca-ParametersNR-v1760          SEQUENCE {
    ca-ParametersNR-v1760          CA-ParametersNR-v1760,
    ca-ParametersNRDC-v1760       CA-ParametersNRDC-v1760
  }
BandCombination-v1770 ::=
  bandList-v1770                SEQUENCE {
    mrdc-Parameters-v1770         SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1770,
    ca-ParametersNR-v1770         MRDC-Parameters-v1770          OPTIONAL,
    ca-ParametersNR-v1770         CA-ParametersNR-v1770          OPTIONAL
  }
BandCombination-v1780 ::=
  ca-ParametersNR-v1780          SEQUENCE {
    ca-ParametersNR-v1780          CA-ParametersNR-v1780          OPTIONAL,
    ca-ParametersNRDC-v1780       CA-ParametersNRDC-v1780       OPTIONAL,
    bandList-v1780                SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1780 OPTIONAL,
    mrdc-Parameters-v1780         MRDC-Parameters-v1780          OPTIONAL
  }
BandCombination-v1800 ::=
  ca-ParametersNR-v1800          SEQUENCE {
    ca-ParametersNR-v1800          CA-ParametersNR-v1800          OPTIONAL,
    ca-ParametersNRDC-v1800       CA-ParametersNRDC-v1800       OPTIONAL,
    supportedBandCombListPerBC-SL-U2U-RelayDiscovery-r18 BIT STRING (SIZE (1..maxBandComb)) OPTIONAL,
    bandList-v1810                SEQUENCE (SIZE (1..maxSimultaneousBands)) OF BandParameters-v1810 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
}

BandCombination-UplinkTxSwitch-v1780 ::= SEQUENCE {
    bandCombination-v1780          BandCombination-v1780          OPTIONAL
}

BandCombination-UplinkTxSwitch-v1800 ::= SEQUENCE {
    bandCombination-v1800          BandCombination-v1800          OPTIONAL,
    supportedBandPairListNR-r18    SEQUENCE (SIZE (1..maxULTxSwitchingBandPairs)) OF ULTxSwitchingBandPair-r18 OPTIONAL,
    -- R1 49-Y: Minimum separation time for two uplink switching on more than 2 bands within any two consecutive reference slots
    uplinkTxSwitchingMinimumSeparationTime-r18 ENUMERATED {n0us, n500us} OPTIONAL,
    -- R4 38-3: Switching Period for unaffected Band for Dual UL
    uplinkTxSwitchingAdditionalPeriodDualUL-List-r18 SEQUENCE (SIZE (1..maxULTxSwitchingBetweenBandPairs-r18)) OF
        UplinkTxSwitchingAdditionalPeriodDualUL-r18 OPTIONAL,
    switchingPeriodRestriction-r18 ENUMERATED {true} 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
}

ULTxSwitchingBandPair-r18 ::= SEQUENCE {
    bandIndexUL1-r18              INTEGER(1..maxSimultaneousBands),
    bandIndexUL2-r18              INTEGER(1..maxSimultaneousBands),
    -- R1 49-X: Supported switching option for each band pair in the band combination for UL Tx switching across more than 2 bands
    uplinkTxSwitchingOptionForBandPair-r18 ENUMERATED {switchedUL, dualUL, both},
    -- R4 38-1: Switching period for dynamic UL Tx switching across up to 4 bands in case of inter-band CA, SUL up to two TAGs
    uplinkTxSwitchingPeriodForBandPair-r18 SEQUENCE {

```

```

        switchingPeriodFor2T-r18          ENUMERATED {n35us, n140us, n210us}          OPTIONAL,
        switchingPeriodFor1T-r18          ENUMERATED {n35us, n140us, n210us}
    },
    -- R4 38-2: Application of DL interruptions due to dynamic UL Tx switching
    uplinkTxSwitching-DL-Interruption-r18 BIT STRING (SIZE(1..maxSimultaneousBands)) OPTIONAL,
    -- R4 38-3: Switching Period for unaffected Band for Dual UL
    uplinkTxSwitchingPeriodUnaffectedBandDualUL-List-r18 SEQUENCE (SIZE (1..maxSimultaneousBands-2-r18)) OF
        SwitchingPeriodUnaffectedBandDualUL-r18          OPTIONAL
}

UplinkTxSwitchingBandParameters-v1700 ::= SEQUENCE {
    bandIndex-r17          INTEGER(1..maxSimultaneousBands),
    -- R4 38-3: UL-MIMO coherence capability for dynamic Tx switching between 2Tx-2Tx switching among up to 4 bands
    uplinkTxSwitching2T2T-PUSCH-TransCoherence-r17      ENUMERATED {nonCoherent, fullCoherent}          OPTIONAL
}

UplinkTxSwitchingAdditionalPeriodDualUL-r18 ::= SEQUENCE {
    uplinkTxSwitchingBetweenBandPairs-r18              SEQUENCE {
        bandPairIndex1-r18          INTEGER(1.. maxULTxSwitchingBandPairs),
        anotherBandPairOrBand-r18   CHOICE {
            bandPairIndex2-r18      INTEGER(1.. maxULTxSwitchingBandPairs),
            bandIndex-r18           INTEGER(1..maxSimultaneousBands)
        }
    },
    -- 38-4: Additional switching Period for Dual UL
    switchingAdditionalPeriodDualUL-r18                  ENUMERATED {n35us, n140us, n210us}
}

SwitchingPeriodUnaffectedBandDualUL-r18 ::= SEQUENCE {
    bandIndexUnaffected-r18          INTEGER(1..maxSimultaneousBands),
    periodUnaffectedBandDualUL-r18   CHOICE {
        maintainedUL-Trans-r18      NULL,
        periodOnULBands-r18        ENUMERATED {n35us, n140us, n210us}
    }
}

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
        srs-SwitchingTimesListEUTRA SEQUENCE {
            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
}
}
}

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
    }
}

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
}

BandParameters-v1780 ::= SEQUENCE {
    ca-BandwidthClassDL-NR-r17 CA-BandwidthClassNR-r17 OPTIONAL,
    ca-BandwidthClassUL-NR-r17 CA-BandwidthClassNR-r17 OPTIONAL,
    supportedAggBW-FR2-r17 SEQUENCE {
        supportedAggBW-DL-r17 SupportedAggBandwidth-r17 OPTIONAL,
        supportedAggBW-UL-r17 SupportedAggBandwidth-r17 OPTIONAL
    }
    OPTIONAL
}

BandParameters-v1810 ::= SEQUENCE {
    -- R1 40-5-4: SRS 8 Tx ports-antenna switching
    srs-AntennaSwitching8T8R-r18 SEQUENCE {
        antennaSwitch8T8R-r18 ENUMERATED {noTdm, tdmAndNoTdm},
    }
}

```

```
        downgradeConfig-r18      CHOICE {
            empty-r18             NULL,
            downgrade-r18        BIT STRING (SIZE (11))
        }                          OPTIONAL,
        entryNumberAffect-r18     INTEGER (1..32),
        entryNumberSwitich-r18    INTEGER (1..32)
    }                               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
<p><i>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-v1780, BandCombinationList-v1800</i></p> <p>The UE shall include the same number of entries, and listed in the same order, as in <i>BandCombinationList</i> (without suffix). If the field is included in <i>supportedBandCombinationListNEDC-Only-v1610</i>, the UE shall include the same number of entries, and listed in the same order, as in <i>BandCombinationList</i> of <i>supportedBandCombinationListNEDC-Only</i> (without suffix) field.</p> <p>If the field is included in <i>supportedBandCombinationListNEDC-Only-v15a0</i>, the UE shall include the same number of entries, and listed in the same order, as in <i>BandCombinationList</i> (without suffix) of <i>supportedBandCombinationListNEDC-Only</i> (without suffix) field.</p>
<p><i>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-v1780, BandCombinationList-UplinkTxSwitch-v1800</i></p> <p>The UE shall include the same number of entries, and listed in the same order, as in <i>BandCombinationList-UplinkTxSwitch-r16</i>.</p> <p>For the field of <i>supportedBandCombinationList-UplinkTxSwitch-v1700</i>, if the UE does not support 2Tx-2Tx switching for a given band combination, the field of <i>supportedBandPairListNR-v1700</i> in the corresponding entry is absent.</p>
<p><i>ca-ParametersNRDC</i></p> <p>If the field (without suffix) is included for a band combination in the NR capability container, the field (without suffix) indicates support of NR-DC. Otherwise, the field is absent. If a version of the field (with suffix) is absent for a band combination, <i>ca-ParametersNR</i> field version in <i>BandCombination</i> corresponding to the <i>ca-ParametersNR-ForDC</i> field version in the field (with suffix) is applicable to the UE configured with NR-DC for the band combination.</p>
<p><i>featureSetCombinationDAPS</i></p> <p>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.</p>
<p><i>ne-DC-BC</i></p> <p>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.</p>
<p><i>supportedBandPairListNR-r16, supportedBandPairListNR-v1700</i></p> <p>Indicates a list of band pair supporting UL Tx switching as defined in TS 38.101-1 [15] for a given band combination.</p> <p>A UE supporting 2Tx-2Tx switching should include both of <i>supportedBandPairListNR-r16</i> and <i>supportedBandPairListNR-v1700</i>. And the UE shall include the same number of entries listed in the same order as in <i>supportedBandPairListNR-r16</i>.</p> <p>If the UE does not support 2Tx-2Tx switching for a given band pair, the field of <i>uplinkTxSwitchingPeriod2T2T</i> in the corresponding entry is absent.</p>
<p><i>supportedBandPairListNR-r18</i></p> <p>Indicates a list of band pair supporting UL Tx switching up to 4 bands as defined in TS 38.101-1 [15] for a given band combination. The UE shall include all the possible band pairs.</p> <p>For a band pair only supporting 1Tx-1Tx switching, the UE should include <i>switchingPeriodFor1T</i> in <i>ULTxSwitchingBandPair-r18</i>.</p> <p>For a band pair supporting 1Tx-2Tx switching, the UE always supports 1Tx-1Tx switching, and the UE should include <i>switchingPeriodFor1T</i> in <i>ULTxSwitchingBandPair-r18</i>.</p> <p>For a band pair supporting 2Tx-2Tx switching, the UE always supports 1Tx-2Tx switching and 1Tx-1Tx switching, the UE should include <i>switchingPeriodFor2T</i> as well as <i>switchingPeriodFor1T</i> in <i>ULTxSwitchingBandPair-r18</i>.</p>
<p><i>srs-SwitchingTimesListNR</i></p> <p>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:</p> <ul style="list-style-type: none"> - For the first NR band, the UE shall include the same number of entries for NR bands as in <i>bandList</i>, i.e. first entry corresponds to first NR band in <i>bandList</i> 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 <i>bandList</i> 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
  nr
  --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,
      }
    }
    extendedCP-Mode2PartialSensing-r17      ENUMERATED {supported}           OPTIONAL,
    dl-openLoopPC-Sidelink-r17              ENUMERATED {supported}           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-BANDCOMBINATIONLISTSIDELINKEURANR-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,
      }
    }
  },
  extendedCP-Mode2PartialSensing-r17    ENUMERATED {supported}                OPTIONAL,
  dl-openLoopPC-Sidelink-r17            ENUMERATED {supported}                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 {
        maximumSimultaneousNZP-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,
}
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}
}
-- 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}
}
-- 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)
}
pdcch-BlindDetectionSCG-UE-Mixed-r16         SEQUENCE {
    pdcch-BlindDetectionSCG-UE1-r16          INTEGER (0..15),
    pdcch-BlindDetectionSCG-UE2-r16          INTEGER (0..15)
}

```

```

}
-- 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)
}
}

```

```

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
  codebookParametersfetyp2PerBC-r17      CodebookParametersfetyp2PerBC-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 {
    maxNumNRP-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 sCell 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,
}
}

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
}
-- 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
}
-- 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
}
-- 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-BlindDetectionMixed-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

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mode2-TDM-CodebookForMux-UnicastMulticastHARQ-ACK-r17  ENUMERATED {supported}          OPTIONAL,
-- R1 33-3-4: Mode 1 for type1 codebook generation
model-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-common 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
}

CA-ParametersNR-v1780 ::= SEQUENCE {
parallelTxPUCCH-PUSCH-SamePriority-r17                  ENUMERATED {supported}          OPTIONAL,
supportedAggBW-FR1-r17 SEQUENCE {
scalingFactorSCS-r17                                  ENUMERATED {true}              OPTIONAL,
supportedAggBW-FDD-DL-r17                             SupportedAggBandwidth-r17       OPTIONAL,
supportedAggBW-FDD-UL-r17                             SupportedAggBandwidth-r17       OPTIONAL,
supportedAggBW-TDD-DL-r17                             SupportedAggBandwidth-r17       OPTIONAL,
supportedAggBW-TDD-UL-r17                             SupportedAggBandwidth-r17       OPTIONAL,
supportedAggBW-TotalDL-r17                            SupportedAggBandwidth-r17       OPTIONAL,
supportedAggBW-TotalUL-r17                            SupportedAggBandwidth-r17       OPTIONAL
}
OPTIONAL
}

CA-ParametersNR-v1800 ::= SEQUENCE {
codebookParametersetype2DopplerCSI-PerBC-r18          CodebookParametersetype2DopplerCSI-r18  OPTIONAL,
codebookParametersfetype2DopplerCSI-PerBC-r18         CodebookParametersfetype2DopplerCSI-r18  OPTIONAL,
codebookParametersetype2CJT-PerBC-r18                 CodebookParametersetype2CJT-r18          OPTIONAL,
codebookParametersfetype2CJT-PerBC-r18                CodebookParametersfetype2CJT-r18        OPTIONAL,
codebookComboParametersCJT-PerBC-r18                  CodebookComboParametersCJT-r18          OPTIONAL,
codebookParametersHARQ-ACK-PUSCH-PerBC-r18            CodebookParametersHARQ-ACK-PUSCH-r18     OPTIONAL,
-- R1 40-2-8: Maximum number of TAGs across all CCs

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maxNumberTAG-AcrossCC-r18 INTEGER (2..4) OPTIONAL,
-- R1 40-3-3-1: TDCP (Time Domain Channel Properties) report
tdcp-ReportPerBC-r18 SEQUENCE {
  valueX-r18 INTEGER (1..2),
  maxNumberActiveResource-r18 INTEGER (2..32)
} OPTIONAL,
-- R1 40-3-3-5: Number of CSI-RS resources for TDCP
tdcp-ResourcePerBC-r18 SEQUENCE {
  maxNumberConfigPerCC-r18 ENUMERATED {n2,n4,n6,n8,n10,n12},
  maxNumberConfigAcrossCC-r18 INTEGER (1..32),
  maxNumberSimultaneousPerCC-r18 ENUMERATED {n2, n4, n6, n8, n12, n16, n20, n24, n28, n32}
} OPTIONAL,
-- R1 40-3-1-24: Timeline for regular eType-II-CJT CSI, or for port selection FeType-II-CJT CSI
timelineRelax-CJT-CSI-CA-r18 ENUMERATED {n0,n2} OPTIONAL,
-- R1 42-1: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting
spatialAdaptation-CSI-FeedbackPerBC-r18 SEQUENCE {
  maxNumberCSI-ResourceAcrossCC-r18 SEQUENCE {
    sdType1-Resource-r18 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},
    sdType2-Resource-r18 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}
  },
  maxNumberPortsAcrossCC-r18 SEQUENCE {
    sdType1-Resource-r18 INTEGER (1..32),
    sdType2-Resource-r18 INTEGER (1..32)
  }
} OPTIONAL,
-- R1 42-1a: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting on
-- PUSCH
spatialAdaptation-CSI-FeedbackPUSCH-PerBC-r18 SEQUENCE {
  maxNumberCSI-ResourceAcrossCC-r18 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},
  maxNumberPortsAcrossCC-r18 INTEGER (1..32)
} OPTIONAL,
-- R1 42-1b: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting
spatialAdaptation-CSI-FeedbackAperiodicPerBC-r18 SEQUENCE {
  maxNumberCSI-ResourceAcrossCC-r18 SEQUENCE {
    sdType1-Resource-r18 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},
    sdType2-Resource-r18 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}
  },
  maxNumberPortsAcrossCC-r18 SEQUENCE {
    sdType1-Resource-r18 INTEGER (1..32),
    sdType2-Resource-r18 INTEGER (1..32)
  }
} OPTIONAL,
-- R1 42-1c: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI
-- reporting on PUCCH
spatialAdaptation-CSI-FeedbackPUCCH-PerBC-r18 SEQUENCE {

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    maxNumberCSI-ResourceAcrossCC-r18      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},
    maxNumberPortsAcrossCC-r18              INTEGER (1..32)
}
-- R1 42-2: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting
powerAdaptation-CSI-FeedbackPerBC-r18     SEQUENCE {
    maxNumberCSI-ResourceAcrossCC-r18      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},
    maxNumberPortsAcrossCC-r18              INTEGER (1..32)
}
-- R1 42-2a: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting on PUSCH
powerAdaptation-CSI-FeedbackPUSCH-PerBC-r18 SEQUENCE {
    maxNumberCSI-ResourceAcrossCC-r18      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},
    maxNumberPortsAcrossCC-r18              INTEGER (1..32)
}
-- R1 42-2b: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting
powerAdaptation-CSI-FeedbackAperiodicPerBC-r18 SEQUENCE {
    maxNumberCSI-ResourceAcrossCC-r18      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},
    maxNumberPortsAcrossCC-r18              INTEGER (1..32)
}
-- R1 42-2c: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI
-- reporting on PUCCH
powerAdaptation-CSI-FeedbackPUCCH-PerBC-r18 SEQUENCE {
    maxNumberCSI-ResourceAcrossCC-r18      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},
    maxNumberPortsAcrossCC-r18              INTEGER (1..32)
}
-- R1 42-7: Mixed codebook combination for spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s),
-- each containing one port subset configuration
mixCodeBookSpatialAdaptationPerBC-r18     SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource OPTIONAL,

-- R1 49-1: Multi-cell PDSCH scheduling by DCI format 1_3 on a scheduling cell with same SCS between scheduling
-- cell and cells in the set
multiCell-PDSCH-DCI-1-3-SameSCS-r18       SEQUENCE {
    coScheduledCellSCS-r18                  SEQUENCE {
        nonSharedSpectrum-fdd-fr1           ENUMERATED {supported} OPTIONAL,
        nonSharedSpectrum-tdd-fr1           ENUMERATED {supported} OPTIONAL,
        sharedSpectrum-tdd-fr1              ENUMERATED {supported} OPTIONAL,
        fr2-1                                ENUMERATED {supported} OPTIONAL,
        fr2-2                                ENUMERATED {supported} OPTIONAL,
    },
    maxNumberCoScheduledCell-r18             INTEGER (2..4),
    maxNumberSetsOfCellAcrossPUCCH-Group-r18 INTEGER (1..8),
    maxNumberSetsOfCellScheduling-r18        INTEGER (1..4),
    harqFeedbackType-r18                     ENUMERATED {type1, type2, type1And2},
    coScheduledCellIndicationScheme-r18      ENUMERATED {fdra, cellInd, both},
}

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    supportOfSearchSpace-r18                ENUMERATED {supported}                OPTIONAL,
    licensed-fdd-tdd-fr1-r18                ENUMERATED {supported}                OPTIONAL,
}
-- R1 49-1b: Multi-cell PDSCH scheduling by DCI format 1_3 on a scheduling cell not included in a set of cells with different
-- SCS/carrier type between scheduling cell and cells in the set
multiCell-PDSCH-DCI-1-3-DiffSCS-r18        SEQUENCE {
    coScheduledCellSCS-r18                  ENUMERATED {lowScheduling-highScheduled, highScheduling-lowScheduled, both},
    combinationCarrierType-r18              SEQUENCE (SIZE(1..maxSchedulingBandCombination-r18)) OF
                                            CombinationCarrierType-r18,
    maxNumberCoScheduledCell-r18            INTEGER (2..4),
    maxNumberSetsOfCellAcrossPUCCH-Group-r18 INTEGER (1..8),
    maxNumberSetsOfCellScheduling-r18       INTEGER (1..4),
    harqFeedbackType-r18                    ENUMERATED {type1, type2, type1And2},
    coScheduledCellIndicationScheme-r18     ENUMERATED {fdra, cellInd, both}
}
-- R1 49-2: Multi-cell PUSCH scheduling by DCI format 0_3 on a scheduling cell with same SCS between scheduling cell
-- and cells in the set
multiCell-PUSCH-DCI-0-3-SameSCS-r18        SEQUENCE {
    coScheduledCellSCS-r18                  SEQUENCE {
        nonSharedSpectrum-fdd-fr1          ENUMERATED {supported}                OPTIONAL,
        nonSharedSpectrum-tdd-fr1          ENUMERATED {supported}                OPTIONAL,
        sharedSpectrum-tdd-fr1             ENUMERATED {supported}                OPTIONAL,
        fr2-1                               ENUMERATED {supported}                OPTIONAL,
        fr2-2                               ENUMERATED {supported}                OPTIONAL,
    },
    maxNumberCoScheduledCell-r18            INTEGER (2..4),
    maxNumberSetsOfCellAcrossPUCCH-Group-r18 INTEGER (1..8),
    maxNumberSetsOfCellScheduling-r18       INTEGER (1..4),
    coScheduledCellIndicationScheme-r18     ENUMERATED {fdra, cellInd, both},
    supportOfSearchSpace-r18                ENUMERATED {supported}                OPTIONAL,
    licensed-fdd-tdd-fr1-r18                ENUMERATED {supported}                OPTIONAL,
}
-- R1 49-2b: Multi-cell PUSCH scheduling by DCI format 0_3 on a scheduling cell not included in a set of cells with
-- different SCS/carrier type between scheduling cell and cells in the set
multiCell-PUSCH-DCI-0-3-DiffSCS-r18        SEQUENCE {
    coScheduledCellSCS-r18                  ENUMERATED {lowScheduling-highScheduled, highScheduling-lowScheduled, both},
    combinationCarrierType-r18              SEQUENCE (SIZE(1..maxSchedulingBandCombination-r18)) OF
                                            CombinationCarrierType-r18,
    maxNumberCoScheduledCell-r18            INTEGER (2..4),
    maxNumberSetsOfCellAcrossPUCCH-Group-r18 INTEGER (1..8),
    maxNumberSetsOfCellScheduling-r18       INTEGER (1..4),
    coScheduledCellIndicationScheme-r18     ENUMERATED {fdra, cellInd, both}
}
-- R1 49-3x: Advanced UE capability for larger number of unicast DL DCI
advUnicastDCI-DL-r18                       SEQUENCE {
    scs-15kHz-120kHz-r18                   ENUMERATED {n2, n4}                OPTIONAL,
    scs-15kHz-60kHz-r18                     ENUMERATED {n2, n4}                OPTIONAL,
    scs-30kHz-120kHz-r18                     ENUMERATED {n2, n4}                OPTIONAL,
    scs-15kHz-30kHz-r18                      ENUMERATED {n2}                    OPTIONAL,
    scs-30kHz-60kHz-r18                      ENUMERATED {n2}                    OPTIONAL,
    scs-60kHz-120kHz-r18                     ENUMERATED {n2}                    OPTIONAL,
}
-- R1 49-3y: Advanced UE capability for larger number of unicast UL DCI
advUnicastDCI-UL-r18                       SEQUENCE {
    scs-15kHz-120kHz-r18                     ENUMERATED {n2, n4}                OPTIONAL,
}

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    scs-15kHz-60kHz-r18          ENUMERATED {n2, n4}          OPTIONAL,
    scs-30kHz-120kHz-r18         ENUMERATED {n2, n4}          OPTIONAL,
    scs-15kHz-30kHz-r18          ENUMERATED {n2}          OPTIONAL,
    scs-30kHz-60kHz-r18          ENUMERATED {n2}          OPTIONAL,
    scs-60kHz-120kHz-r18         ENUMERATED {n2}          OPTIONAL,
  }
  -- R1 49-5a: Trigger Type 3 HARQ CB based feedback using DCI format 1_3
  type3HARQ-CB-DCI-1-3-r18       ENUMERATED {supported}      OPTIONAL,
  -- R1 49-5b: Trigger enhanced Type 3 HARQ CB based feedback using DCI format 1_3
  type3EnhHARQ-CB-DCI-1-3-r18   SEQUENCE {
    numberOfCodebook-r18         ENUMERATED {n1, n2, n4, n8},
    maxNumberPUCCH-Trans-r18     INTEGER (1..7)
  }
  -- R1 55-6a: 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-r18        SEQUENCE {
    maxNumberOfMonitoringCC-r18  INTEGER (2..16),
    supportedSpanArrangement-r18 ENUMERATED {alignedOnly, alignedAndNonAligned}
  }
  -- R1 55-6c: 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-r18 SEQUENCE {
    blindDetectionCA-Mixed-r18  SEQUENCE(SIZE (1..maxNrofPdcch-BlindDetection-r17)) OF
      PDCCH-BlindDetectionCA-Mixed-r18,
    supportedSpanArrangement-r18 ENUMERATED{ alignedOnly, alignedAndNonAligned }
  }
  -- R1 55-6e: 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-SCG-List-r18 SEQUENCE(SIZE (1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMCG-SCG-r18
  -- R1 55-6g: Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 16 and Rel. 15 PDCCH monitoring capabilities on
  -- different carriers with restriction for non-aligned span case
  pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-r18 SEQUENCE(SIZE (1..maxNrofPdcch-BlindDetection-r17)) OF
    PDCCH-BlindDetectionCA-Mixed-r18
  -- R1 55-6f: 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 with restriction for non-aligned span case
  pdcch-MonitoringCA-NonAlignedSpan-r18 INTEGER (2..16)
  -- R4 33-1: Support of intra-band non-collocated NR CA operation
  intraBandNR-CA-non-collocated-r18 ENUMERATED {supported}
}

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 {

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    pdcch-BlindDetectionCA-MixedExt-r16          CHOICE {
      pdcch-BlindDetectionCA-Mixed-v16a0        PDCCH-BlindDetectionCA-MixedExt-r16,
      pdcch-BlindDetectionCA-Mixed-NonAlignedSpan-v16a0 PDCCH-BlindDetectionCA-MixedExt-r16
    }
    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
    }
  }
}

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
  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
  }
}

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)
  pdcch-BlindDetectionCA2-r17          INTEGER (1..15)
}

PDCCH-BlindDetectionMixed1-r17 ::= SEQUENCE {
  pdcch-BlindDetectionCA-Mixed1-r17    PDCCH-BlindDetectionCA-Mixed1-r17
  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
  }
}

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)
}

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}

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
}

PDCCH-BlindDetectionMCG-SCG-r18 ::= SEQUENCE {
    pdcch-BlindDetectionMCG-UE-Mixed-r18 PDCCH-BlindDetectionCG-UE-Mixed-r18,
    pdcch-BlindDetectionSCG-UE-Mixed-r18 PDCCH-BlindDetectionCG-UE-Mixed-r18
}

PDCCH-BlindDetectionCA-Mixed-r18 ::= SEQUENCE {
    pdcch-BlindDetectionCA1-r18      INTEGER (1..15),
    pdcch-BlindDetectionCA2-r18      INTEGER (1..15)
}

PDCCH-BlindDetectionCG-UE-Mixed-r18 ::= SEQUENCE {
    pdcch-BlindDetectionCG-UE1-r18   INTEGER (0..15),
    pdcch-BlindDetectionCG-UE2-r18   INTEGER (0..15)
}

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
}

CombinationCarrierType-r18 ::= SEQUENCE {
    schedulingCellCarrierType-r18  ENUMERATED {licensed-fdd-fr1, licensed-tdd-fr1, unlicensed-tdd-fr1, fr2-1, fr2-2},
    scheduledCellCarrierType-r18   ENUMERATED {licensed-fdd-fr1, licensed-tdd-fr1, unlicensed-tdd-fr1, fr2-1, fr2-2}
}

-- 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 model between MCG and SCG cells of same FR for NR dual connectivity
    intraFR-NR-DC-PwrSharingModel-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 ::=
    ca-ParametersNR-ForDC-v1610              SEQUENCE {
    ca-ParametersNR-ForDC-v1630              CA-ParametersNR-v1610        OPTIONAL,
                                           CA-ParametersNR-v1630        OPTIONAL
}

CA-ParametersNRDC-v1640 ::=
    ca-ParametersNR-ForDC-v1640              SEQUENCE {
                                           CA-ParametersNR-v1640        OPTIONAL
}

CA-ParametersNRDC-v1650 ::=
    supportedCellGrouping-r16                SEQUENCE {
                                           BIT STRING (SIZE (1..maxCellGroupings-r16)) OPTIONAL
}

CA-ParametersNRDC-v16a0 ::=
    ca-ParametersNR-ForDC-v16a0              SEQUENCE {
                                           CA-ParametersNR-v16a0        OPTIONAL
}

CA-ParametersNRDC-v1700 ::=
    -- 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 ::=
    ca-ParametersNR-ForDC-v1700              SEQUENCE {
    ca-ParametersNR-ForDC-v1720              CA-ParametersNR-v1700        OPTIONAL,
                                           CA-ParametersNR-v1720        OPTIONAL
}

CA-ParametersNRDC-v1730 ::=
    ca-ParametersNR-ForDC-v1730              SEQUENCE {
                                           CA-ParametersNR-v1730        OPTIONAL
}

CA-ParametersNRDC-v1760 ::=
    ca-ParametersNR-ForDC-v1760              SEQUENCE {
                                           CA-ParametersNR-v1760
}

CA-ParametersNRDC-v1780 ::=
    ca-ParametersNR-ForDC-v1780              SEQUENCE {
                                           CA-ParametersNR-v1780        OPTIONAL
}

CA-ParametersNRDC-v1800 ::=
    ca-ParametersNR-ForDC-v1800              SEQUENCE {
    ca-ParametersNR-v1800                    CA-ParametersNR-v1800        OPTIONAL,
    -- R1 55-6d: 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 on all the serving cells
    pdcch-BlindDetectionNRDC-r18            SEQUENCE(SIZE (1..maxNrofPdcch-BlindDetection-r17)) OF PDCCH-BlindDetectionMixed1-r18
                                           OPTIONAL
}

```

```

PDCCH-BlindDetectionMixed1-r18 ::=
    pdcch-BlindDetectionCG-UE-Mixed-r18
    pdcch-BlindDetectionMCG-UE-Mixed-r18
    pdcch-BlindDetectionSCG-UE-Mixed-r18
}
SEQUENCE {
    SEQUENCE {
        PDCCH-BlindDetectionCG-UE-Mixed-r18,
        PDCCH-BlindDetectionCG-UE-Mixed-r18
    }
}
-- 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)
    }
  },
  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}
  },
  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)
    }
    -- 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: CBR with soft amplitude restriction
    amplitudeSubsetRestriction-r16      ENUMERATED {supported} 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)
    }
    -- R1 16-3b-2: Support of rank 3,4
    rank3-4-r16          ENUMERATED {supported} 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)
  }
}

```

```

}
type1MP-Type2-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-Type2PS-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-eType2R1-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-eType2R2-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-eType2R1PS-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-eType2R2PS-null-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
type1MP-Type2-Type2PS-r16 SEQUENCE {
supportedCSI-RS-ResourceListAdd-r16 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
}
}

CodebookParametersfetyp2-r17 ::= SEQUENCE {
-- R1 23-9-1 Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II)
fetyp2basic-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
fetyp2R1-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
fetyp2R2-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
fetyp2Rank3Rank4-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)
        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,

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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
}

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)

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        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,
}

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    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)

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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,
}

CodebookParameterssetType2DopplerCSI-r18 ::= SEQUENCE {
-- R1 40-3-2-1: Support of Rel-16-based doppler CSI
eType2Doppler-r18 SEQUENCE {
supportedCSI-RS-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
(0..maxNrofCSI-RS-ResourcesAlt-1-r16),
valueY-P-SP-CSI-RS-r18 INTEGER (1..3),
valueY-A-CSI-RS-r18 INTEGER (1..3),
scalingfactor-r18 ENUMERATED {n1, n2, n4}
},
-- R1 40-3-2-1a: Support of Rel-16-based doppler measurement with N4>1
eType2DopplerN4-r18 SEQUENCE {
supportedCSI-RS-ReportSettingList1-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
SupportedCSI-RS-ReportSetting-r18,
supportedCSI-RS-ReportSettingList2-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF
SupportedCSI-RS-ReportSetting-r18
}
OPTIONAL,
-- R1 40-3-2-1a-1: DD unit size when A-CSI-RS is configured for CMR N4>1
ddUnitSize-A-CSI-RS-CMR-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-3-2-1b: Maximum number of aperiodic CSI-RS resources that can be configured in the same CSI report setting for
-- Rel-16-based doppler measurement
maxNumberAperiodicCSI-RS-Resource-r18 ENUMERATED {n4, n8, n12} OPTIONAL,
-- R1 40-3-2-2: Support R=2 for Rel-16-based doppler codebook
eType2DopplerR2-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
OPTIONAL,
-- R1 40-3-2-3: Support X=1 based on first and last slot of WCSI, for Rel-16-based doppler codebook
eType2DopplerX1-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-3-2-3a: Support X=2 CQI based on 2 slots for Rel-16-based doppler codebook
eType2DopplerX2-r18 ENUMERATED {supported} OPTIONAL,
--R1 40-3-2-7: support of l = (n - nCSI,ref ) for CSI reference slot for Rel-16 based doppler codebook
eType2DopplerL-N4D1-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-3-2-8: Support of L=6 for Rel-16 based doppler codebook

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eType2DopplerL6-r18          ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-2-9: Support of rank equals 3 and 4 for Rel-16 based doppler codebook
eType2DopplerR3R4-r18      ENUMERATED {supported}          OPTIONAL,
}

CodebookParametersfetype2DopplerCSI-r18 ::= SEQUENCE {
-- R1 40-3-2-4: Support of Rel-17-based doppler CSI
feType2Doppler-r18 SEQUENCE {
  supportedCSI-RS-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
  valueY-A-CSI-RS-r18              INTEGER (1..3),
  scalingfactor-r18                 ENUMERATED {n1, n2, n4}
},
-- R1 40-3-2-4b: Maximum number of aperiodic CSI-RS resources that can be configured in the same CSI report setting for
-- Rel-17-based doppler CSI
maxNumberAperiodicCSI-RS-Resource-r18 ENUMERATED {n4, n8, n12}          OPTIONAL,

-- R1 40-3-2-5: Support of M=2 and R=1 for Rel-17-based doppler codebook
feType2DopplerM2R1-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,

-- R1 40-3-2-6: Support R=2 for Rel-17-based doppler codebook
feType2DopplerR2-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                     OPTIONAL,

--R1 40-3-2-7a: Support of l = (n - nCSI,ref ) for CSI reference slot for Rel-17 based doppler codebook
feType2DopplerL-N4D1-r18 ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-2-10: Support of rank equals 3 and 4 for Rel-17 based doppler codebook
feType2DopplerR3R4-r18 ENUMERATED {supported}          OPTIONAL,
}

CodebookParameterssetype2CJT-r18 ::= SEQUENCE {
-- R1 40-3-1-1: Basic feature for Rel-16-based CJT type-II codebook
eType2CJT-r18 SEQUENCE {
  supportedCSI-RS-ResourceList-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
  scalingfactor-r18                 ENUMERATED {n1, n1dot5, n2},
  maxNumberNZP-CSI-RS-MultiTRP-CJT-r18 INTEGER (2..4)
},
-- R1 40-3-1-1a: Support of mode 1 for Rel-16-based CJT type-II codebook with FD basis selection integer frequency offset
eType2CJT-FD-IO-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,
-- R1 40-3-1-2: Support for FD basis selection fractional offset mode for Rel-16-based CJT codebook with model
eType2CJT-FD-FO-r18 ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-3: Support R=2 for Rel-16-based CJT codebook
eType2CJT-R2-r18 SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,
-- R1 40-3-1-4: Support pv={1/2,1/2,1/2,1/2} and beta=1/2 for Rel-16-based CJT codebook
eType2CJT-PV-Beta-r18 ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-9: Support for 2NN1N2 >32 for Rel-16 based CJT codebook
eType2CJT-2NN1N2-r18 ENUMERATED {n64,n96,n128}          OPTIONAL,
-- R1 40-3-1-12: Support of Rank 3 and 4 for Rel-16-based CJT type-II codebook
eType2CJT-Rank3Rank4-r18 ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-14: Support of Support of L=6 for Rel-16-based CJT type-II codebook
eType2CJT-L6-r18          ENUMERATED {supported}          OPTIONAL,
}

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-- R1 40-3-1-15: dynamic selection of N<=N_TRP for Rel-16-based CJT type-II codebook
eType2CJT-NN-r18          ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-17: Support for N_L>1 combinations of number of SD basis across CSI-RS resources for Rel-16-based CJT
-- type-II codebook
eType2CJT-NL-SD-r18      ENUMERATED {n2,n4}              OPTIONAL,
-- R1 40-3-1-23: Unequal number of spatial basis selection configuration for multi-TRP CJT
eType2CJT-Unequal-r18    ENUMERATED {supported}          OPTIONAL
}

```

```

CodebookParametersfetype2CJT-r18 ::= SEQUENCE {
-- R1 40-3-1-5: Basic feature for Rel-17-based CJT type-II codebook
feType2CJT-r18          SEQUENCE {
    supportedCSI-RS-ResourceList-r18  SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16),
    scalingfactor-r18              ENUMERATED {n1, n1dot5, n2},
    maxNumberNRP-CSI-RS-MultiTRP-CJT-r18  INTEGER (2..4)
},
-- R1 40-3-1-5a: Support of mode 1 for Rel-17-based CJT type-II codebook with FD basis selection integer frequency offset
feType2CJT-FD-IO-r18    SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,
-- R1 40-3-1-6: Support for FD basis selection fractional offset mode for Rel-17-based CJT codebook with model
feType2CJT-FD-FO-r18    ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-7: Support of M=2 and R=1 for Rel-17-based CJT codebook
feType2CJT-M2R1-r18     SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,
-- R1 40-3-1-8: Support of R=2 for Rel-17-based CJT codebook
feType2CJT-R2-r18       SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER
                                     (0..maxNrofCSI-RS-ResourcesAlt-1-r16)          OPTIONAL,
-- R1 40-3-1-9a: Support for 2NN1N2 >32 for Rel-17 based CJT codebook
feType2CJT-2NN1N2-r18   ENUMERATED {n64,n96,n128}       OPTIONAL,
-- R1 40-3-1-13: Support of Rank 3 and 4 for Rel-17-based CJT type-II codebook
feType2CJT-Rank3Rank4-r18  ENUMERATED {supported}       OPTIONAL,
-- R1 40-3-1-16: dynamic selection of N<=N_TRP for Rel-17-based CJT type-II codebook
feType2CJT-NN-r18       ENUMERATED {supported}          OPTIONAL,
-- R1 40-3-1-18: Support for N_L>1 combinations of number of SD basis across CSI-RS resources for Rel-17-based CJT
-- type-II codebook
feType2CJT-NL-r18       ENUMERATED {n2,n4}              OPTIONAL,
-- R1 40-3-1-23a: Unequal number of port selection configuration for multi-TRP CJT
feType2CJT-Unequal-r18   ENUMERATED {supported}          OPTIONAL
}

```

```

CodebookComboParametersCJT-r18 ::= SEQUENCE {
-- R1 40-3-1-11: Active CSI-RS resources and ports for mixed codebook types including Type-II-CJT in any slot
-- {Codebook 1} = Type I SP
cjt-Type1SP-eType2R1-null SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                    OPTIONAL,
cjt-Type1SP-eType2R2-null SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                    OPTIONAL,
cjt-Type1SP-feType2R1M1-null SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                    OPTIONAL,
cjt-Type1SP-feType2R1M2-null SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                    OPTIONAL,
cjt-Type1SP-feType2R2M2-null SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                                                    OPTIONAL,

```

```

-- {Codebook 1} = Type I MP
cjt-Type1MP-eType2R1-null      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                OPTIONAL,
cjt-Type1MP-eType2R2-null      SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                OPTIONAL,
cjt-Type1MP-feType2R1M1-null   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                OPTIONAL,
cjt-Type1MP-feType2R1M2-null   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                OPTIONAL,
cjt-Type1MP-feType2R2M2-null   SEQUENCE (SIZE (1..maxNrofCSI-RS-ResourcesExt-r16)) OF INTEGER (0..maxNrofCSI-RS-ResourcesAlt-1-r16)
                                OPTIONAL
}

CodebookParametersHARQ-ACK-PUSCH-r18 ::= SEQUENCE {
-- R1 55-4a: Multiplexing Type-1 HARQ-ACK codebook in a PUSCH for PDSCH scheduled after UL grant
multiplexingType1-r18           ENUMERATED {supported}                                OPTIONAL,
-- R1 55-4b: Multiplexing Type-2 HARQ-ACK codebook in a PUSCH for PDSCH scheduled after UL grant
multiplexingType2-r18           ENUMERATED {supported}                                OPTIONAL,
-- R1 55-4c: Multiplexing Type-3 HARQ-ACK codebook in a PUSCH for PDSCH scheduled after UL grant
multiplexingType3-r18           ENUMERATED {supported}                                OPTIONAL,
-- R1 55-4d: Determining a different PUCCH resource to transmit HARQ-ACK for PDSCH scheduled after UL grant
pucch-DiffResource-PDSCH-r18    ENUMERATED {supported}                                OPTIONAL,
-- R1 55-4e: Determining different codebook size to transmit HARQ-ACK for PDSCH scheduled after UL grant
diffCB-Size-PDSCH-r18          ENUMERATED {supported}                                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)
}

SupportedCSI-RS-ReportSetting-r18 ::= SEQUENCE {
  maxN4-r18                      ENUMERATED {n1, n2, n4, n8},
  maxNumberTxPortsPerResource-r18 ENUMERATED {p2, p4, p8, p12, p16, p24, p32},
  maxNumberResourcesPerBand-r18  INTEGER (1..64),
  totalNumberTxPortsPerBand-r18  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*.

– *DL-PRS-MeasurementWithRxFH-RRC-Connected*

The IE *DL-PRS-MeasurementWithRxFH-RRC-Connected* is used to convey the capabilities supported by the UE for PRS measurement with Rx frequency hopping within a measurement gap and measurement reporting in RRC_CONNECTED for RedCap UEs.

DL-PRS-MeasurementWithRxFH-RRC-Connected information element

```
-- ASN1START
-- TAG-DL-PRS-MEASUREMENTWITHRXFH-RRC-CONNECTED-START

DL-PRS-MeasurementWithRxFH-RRC-Connected-r18 ::= SEQUENCE {
    maximumPRS-BandwidthAcrossAllHopsFR1-r18      ENUMERATED {mhz40, mhz50, mhz80, mhz100}      OPTIONAL,
    maximumPRS-BandwidthAcrossAllHopsFR2-r18      ENUMERATED {mhz100, mhz200, mhz400}      OPTIONAL,
    maximumFH-Hops-r18                            ENUMERATED {n2, n3, n4, n5, n6}          OPTIONAL,
    processingDuration-r18                         SEQUENCE {
        processingPRS-SymbolsDurationN3-r18        ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms4, ms6, ms8, ms12,
                                                    ms16, ms20, ms25, ms30, ms32, ms35, ms40, ms45, ms50},
        processingDurationT3-r18                  ENUMERATED {ms8, ms16, ms20, ms30, ms40, ms80, ms160, ms320, ms640, ms1280}
    }
    rf-RxRetunTimeFR1-r18                         ENUMERATED {n70, n140, n210}            OPTIONAL,
    rf-RxRetunTimeFR2-r18                         ENUMERATED {n35, n70, n140}            OPTIONAL,
    numOfOverlappingPRB-r18                       ENUMERATED {n0, n1, n2, n4}            OPTIONAL,
    ...
}

-- TAG-DL-PRS-MEASUREMENTWITHRXFH-RRC-CONNECTED-STOP
-- ASN1STOP
```

– *ERedCapParameters*

The IE *ERedCapParameters* is used to indicate the UE capabilities supported by eRedCap UEs.

ERedCapParameters information element

```
-- ASN1START
-- TAG-EREDCAPPARAMETERS-START

ERedCapParameters-r18 ::= SEQUENCE {
    -- R1 48-1: eRedCap UE with reduced peak data rate and reduced baseband bandwidth in FR1
    supportOfERedCap-r18                          ENUMERATED {supported},
    -- R1 48-2: eRedCap UE with reduced peak data rate without reduced baseband bandwidth in FR1
    eRedCapNotReducedBB-BW-r18                    ENUMERATED {supported}                      OPTIONAL,
    eRedCapIgnoreCapabilityFiltering-r18          ENUMERATED {supported}                      OPTIONAL
}

-- TAG-EREDCAPPARAMETERS-STOP
-- ASN1STOP
```


– *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
  downlinkSetNR
  uplinkSetNR
}
SEQUENCE {
  FeatureSetDownlinkId,
  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
  scs-60kHz             ENUMERATED {s7, s14, s28}                OPTIONAL,
  scs-120kHz            ENUMERATED {s14, s28}                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,
}
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,
  }
  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
}
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
  }
  pdsch-ProcessingType2-r16 SEQUENCE {
    scs-15kHz-r16 PDCCH-MonitoringOccasions-r16 OPTIONAL,
    scs-30kHz-r16 PDCCH-MonitoringOccasions-r16 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
}

-- 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
  }
}

-- 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,
}
-- 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,
}
-- 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}
}
}
}

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,
    }
}
-- 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
}

FeatureSetDownlink-v1800 ::=
SEQUENCE {
-- R1 40-4-1: Basic feature of Rel.18 enhanced DMRS ports for PDSCH for mapping type A
pdsch-TypeA-DMRS-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1a: Basic feature of Rel.18 enhanced DMRS ports for PDSCH for mapping type B
pdsch-TypeB-DMRS-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1b: 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PDSCH
pdsch-1SymbolFL-DMRS-Addition2Symbol-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1c: Alternative additional DMRS position for co-existence with LTE CRS for Rel.18 enhanced DMRS ports for PDSCH
pdsch-AlternativeDMRS-Coexistence-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1d: 2 symbols FL-DMRS for Rel.18 enhanced DMRS ports for PDSCH
pdsch-2SymbolFL-DMRS-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1e: 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PDSCH
pdsch-2SymbolFL-DMRS-Addition2Symbol-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1f: 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PDSCH
pdsch-1SymbolFL-DMRS-Addition3Symbol-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1g: DMRS type for Rel.18 enhanced DMRS ports for PDSCH
pdsch-DMRS-Type-r18      ENUMERATED {etype1, etype1And2}      OPTIONAL,
-- R1 40-4-1h: 1 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8
pdsch-1PortDL-PTRS-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1i: 2 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8
pdsch-2PortDL-PTRS-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-1j: Support 1 symbol FL DMRS and 2 additional DMRS symbols for at least one port for mapping type A
mappingTypeA-1SymbolFL-DMRS-Addition2Symbol-r18      ENUMERATED {supported}      OPTIONAL,

-- R1 40-4-4: Reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports
pdsch-ReceptionWithoutSchedulingRestriction-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-4a: Reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports for PDSCH with fdmSchemeA
pdsch-ReceptionSchemeA-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-4b: Reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports for PDSCH with fdmSchemeB
pdsch-ReceptionSchemeB-r18      ENUMERATED {supported}      OPTIONAL,

-- R1 40-4-5: Rel-18 DL DMRS with single DCI based M-TRP
dmrs-MultiTRP-SingleDCI-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-5a: Additional row(s) for antenna ports (0,2,3) for Rel.18 DMRS ports for single-DCI based M-TRP
dmrs-MultiTRP-AddtionRows-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-7: Rel-18 DL DMRS with M-DCI based M-TRP
dmrs-MultiTRP-MultiDCI-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-4-12: Support of Rel-18 DMRS and PDSCH processing capability 2 simultaneously
simulDMRS-PDSCH-r18      SEQUENCE {
    scs-15kHz-r18      INTEGER (0..4)      OPTIONAL,
    scs-30kHz-r18      INTEGER (0..5)      OPTIONAL,
    scs-60kHz-r18      INTEGER (0..7)      OPTIONAL,
}

-- R1 53-1: Support RLM/BM/BFD and gapless L3 intra-frequency measurements based on CD-SSB outside active BWP without interruptions
bwpOperationMeasWithoutInterrupt-r18      ENUMERATED {supported}      OPTIONAL,

-- R1 55-6: (2, 2) span-based PDCCH monitoring with additional restriction(s)
pdcch-MonitoringSpan2-2-r18      SEQUENCE {
    pdsch-ProcessingType1-r18      SEQUENCE {

```

```

        scs-15kHz-r18          ENUMERATED {supported}          OPTIONAL,
        scs-30kHz-r18          ENUMERATED {supported}          OPTIONAL
    },
    pdsch-ProcessingType2-r18    SEQUENCE {
        scs-15kHz-r18          ENUMERATED {supported}          OPTIONAL,
        scs-30kHz-r18          ENUMERATED {supported}          OPTIONAL
    }
}
-- R1 55-6b: Mix of Rel-16 PDCCH monitoring capability and Rel. 15 PDCCH monitoring capability on different carriers
pdcch-MonitoringMixed-r18      ENUMERATED {supported}          OPTIONAL,
-- R4 42-1: Support of SCell without SS/PBCH block for inter-band CA
scellWithoutSSB-InterBandCA-r18  ENUMERATED {supported}          OPTIONAL,
multicastInactive-r18          ENUMERATED {supported}          OPTIONAL,
thresholdBasedMulticastResume-r18  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 {model1, modelAndMode2},
    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: Multit-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-v1710                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
}

FeatureSetDownlinkPerCC-v1780 ::=          SEQUENCE {
    supportedBandwidthDL-v1780              SupportedBandwidth-v1700              OPTIONAL
}

FeatureSetDownlinkPerCC-v1800 ::=          SEQUENCE {
    -- R1 40-2-1: Basic feature for multi-DCI based intra-cell Multi-TRP operation with two TA enhancement
    multiDCI-IntraCellMultiTRP-TwoTA-r18    ENUMERATED {supported}                OPTIONAL,
    -- R1 40-2-2: Basic feature for multi-DCI based inter-cell Multi-TRP operation with two TA enhancement
    multiDCI-InterCellMultiTRP-TwoTA-r18    INTEGER (1..2)                       OPTIONAL,
    -- R1 40-2-6: Rx timing difference larger than CP length
    rxTimingDiff-r18                       ENUMERATED {supported}                OPTIONAL,

    -- R1 55-7: Two QCL TypeD for CORESET monitoring in multi-DCI based multi-TRP
    multiDCI-MultiTRP-CORESET-Monitoring-r18 ENUMERATED {supported}                OPTIONAL,
    broadcastNonServingCell-r18             ENUMERATED {supported}                OPTIONAL,

    -- R4 30-1: Supports scheduling restriction relaxation and measurement restriction relaxation
    schedulingMeasurementRelaxation-r18     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
]],
[[
featureSetsDownlinkPerCC-v1780 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1780 OPTIONAL,
featureSetsUplinkPerCC-v1780 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1780 OPTIONAL
]],
[[
featureSetsDownlink-v1800 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1800 OPTIONAL,
featureSetsDownlinkPerCC-v1800 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v1800 OPTIONAL,
featureSetsUplink-v1800 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v1800 OPTIONAL,
featureSetsUplinkPerCC-v1800 SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v1800 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
}
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
  }
  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}
  }
  -- 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,

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    intraFreqTwoTAGs-DAPS-r16          ENUMERATED {supported}    OPTIONAL,
    dummy1                             ENUMERATED {supported}    OPTIONAL,
    dummy2                             ENUMERATED {supported}    OPTIONAL,
    dummy3                             ENUMERATED {short, long}  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,
}
-- 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}
}
-- 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,

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    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,
  }
  -- R1 16-5b: Supported UL full power transmission mode of fullpowerModel1
  ul-FullPwrModel1-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
  }
}

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
  }
}

FeatureSetUplink-v16d0 ::= SEQUENCE {
  pusch-RepetitionTypeB-v16d0          SEQUENCE {
    maximumPUSCH-Tx-Cap1-r16          ENUMERATED {n2, n3, n4, n7, n8, n12},

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        }
    }
    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)
    }
    -- R4 17-5 Support of UL DC location(s) report
    extendedDC-LocationReport-r17        ENUMERATED {supported}            OPTIONAL
}

FeatureSetUplink-v1800 ::= SEQUENCE {
    -- R1 40-3-3-1a: Supported maximum delay value larger than D_basic
    maxDelayValueBeyondD-Basic-r18       ENUMERATED {s12,s13,s14,s15,s16,s110}    OPTIONAL,
    -- R1 40-3-3-2: Number of delay values

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tdcp-NumberDelayValue-r18                INTEGER (2..4)                OPTIONAL,
-- R1 40-3-3-4: Phase report
phaseReportMoreThanOne-r18              ENUMERATED {supported}        OPTIONAL,
-- R1 40-3-3-6: Maximum number of TRS resource sets in a report configuration
maxNumberTRS-ResourceSet-r18            INTEGER (2..3)                OPTIONAL,
-- R1 40-3-3-7: Maximum number of TDCP report settings per-BWP
maxNumberTDCP-PerBWP-r18                INTEGER (1..4)                OPTIONAL,

-- R1 40-4-6c: DMRS type for Rel.18 enhanced DMRS ports for PUSCH
pusch-DMRS-TypeEnh-r18                   SEQUENCE {
  dmrs-Type-r18                          ENUMERATED {etypel, both},
  pusch-TypeA-DMRS-r18                    SEQUENCE {
    -- R1 40-4-6: Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type A for Rel.18 enhanced DMRS ports
    dmrs-TypeA-r18                        ENUMERATED {supported},
    -- R1 40-4-6d: 2 symbols front-loaded DMRS (uplink) for Rel.18 enhanced DMRS ports for PUSCH
    pusch-2SymbolFL-DMRS-r18              ENUMERATED {supported}        OPTIONAL,
    -- R1 40-4-6e: 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PUSCH
    pusch-2SymbolFL-DMRS-Addition2Symbol-r18  ENUMERATED {supported}        OPTIONAL,
    -- R1 40-4-6f: 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PUSCH
    pusch-1SymbolFL-DMRS-Addition3Symbol-r18  ENUMERATED {supported}        OPTIONAL,
    -- R1 40-4-10: DMRS port configuration for PUSCH with 8Tx
    pusch-DMRS8Tx-r18                     ENUMERATED {rel15, both}        OPTIONAL,
  }
  -- R1 40-4-6a: Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type B for Rel.18 enhanced DMRS ports
  pusch-TypeB-DMRS-r18                    ENUMERATED {supported}        OPTIONAL,
  -- R1 40-4-6g: 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4
  pusch-rank-1-4-1Port-r18                ENUMERATED {supported}        OPTIONAL,
  -- R1 40-4-6h: 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8
  pusch-rank-5-8-1Port-r18                ENUMERATED {supported}        OPTIONAL,
  -- R1 40-4-6i: 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4
  pusch-rank-1-4-2Port-r18                ENUMERATED {supported}        OPTIONAL,
  -- R1 40-4-6j: 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8
  pusch-rank-5-8-2Port-r18                ENUMERATED {supported}        OPTIONAL,
}
-- R1 40-4-13: Support Rel-18 UL DMRS with single-DCI based M-TRP
ul-DMRS-SingleDCI-M-TRP-r18              ENUMERATED {supported}        OPTIONAL,
-- R1 40-4-14: Support Rel-18 UL DMRS with M-DCI based M-TRP
ul-DMRS-M-DCI-M-TRP-r18                  ENUMERATED {supported}        OPTIONAL,
-- R1 40-5-5: Maximum 2 SP and 1 periodic SRS sets for 8T8R antenna switching
srs-AntennaSwitching8T8R2SP-1Periodic-r18  ENUMERATED {supported}        OPTIONAL,

-- R1 40-6-4: Single-DCI based STx2P SFN scheme for PUCCH
pucch-SingleDCI-STx2P-SFN-r18            ENUMERATED {pf0-2, pf1-3-4, pf0-4}  OPTIONAL,

-- R1 41-4-6: Positioning SRS bandwidth aggregation in RRC_CONNECTED
posSRS-BWA-RRC-Connected-r18             PosSRS-BWA-RRC-Connected-r18    OPTIONAL,
-- R1 41-4-7: Positioning SRS bandwidth aggregation independent from UL communication CA in RRC_CONNECTED
posSRS-BWA-IndependentCA-RRC-Connected-r18  PosSRS-BWA-IndependentCA-RRC-Connected-r18  OPTIONAL,
-- R1 41-4-9: Indicate which other bands in the band combination are affected due to the need of a guard period
posSRS-BWA-AffectedBandList-r18          SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR  OPTIONAL,

-- R4 27-1 TxDiversity for 4Tx
txDiversity4Tx-r18                       ENUMERATED {supported}        OPTIONAL,

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-- R4 41-2: Power boosting for DFT-s-OFDM pi/2 BPSK and QPSK transmissions without modified spectrum flatness requirement
powerBoosting-pi2BPSK-QPSK-r18          ENUMERATED {supported}          OPTIONAL,
-- R4 41-3: Power boosting for DFT-s-OFDM pi/2 BPSK and QPSK transmissions with modified spectrum flatness requirement shaping
powerBoosting-pi2BPSK-QPSK-Modified-r18  ENUMERATED {supported}          OPTIONAL,
-- R4 44-1 TxDiversity for 2Tx
txDiversity2Tx-r18                      ENUMERATED {supported}          OPTIONAL
}

SubSlot-Config-r16 ::=
    sub-SlotConfig-NCP-r16                SEQUENCE {
        sub-SlotConfig-ECP-r16            ENUMERATED {n4,n5,n6,n7}          OPTIONAL,
        sub-SlotConfig-ECP-r16            ENUMERATED {n4,n5,n6}          OPTIONAL
    }

SRS-AllPosResources-r16 ::=
    srs-PosResources-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 ::=
    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 ::=
    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 ::=
    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 ::=
    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 ::=
    maxNumberPeriodicCSI-ReportPerBWP      INTEGER (1..4),
    maxNumberAperiodicCSI-ReportPerBWP     INTEGER (1..4),
    maxNumberSemiPersistentCSI-ReportPerBWP  INTEGER (0..4),
    simultaneousCSI-ReportsAllCC           INTEGER (5..32)
}

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PosSRS-BWA-RRC-Connected-r18 ::=
  numOfCarriersIntraBandContiguous-r18      ENUMERATED {two, three, twoandthree}          OPTIONAL,
  maximumAggregatedBW-TwoCarriersFR1-r18    ENUMERATED {mhz80, mhz100, mhz160, mhz200}      OPTIONAL,
  maximumAggregatedBW-TwoCarriersFR2-r18    ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800}  OPTIONAL,
  maximumAggregatedBW-ThreeCarriersFR1-r18  ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz300}      OPTIONAL,
  maximumAggregatedBW-ThreeCarriersFR2-r18  ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800, mhz1000, mhz1200}  OPTIONAL,
  maximumAggregatedResourceSet-r18          ENUMERATED {n1, n2, n4, n8, n12, n16}            OPTIONAL,
  maximumAggregatedResourcePeriodic-r18     ENUMERATED {n1, n2, n4, n8, n16, n32, n64}        OPTIONAL,
  maximumAggregatedResourceAperiodic-r18    ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64}    OPTIONAL,
  maximumAggregatedResourceSemi-r18        ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64}    OPTIONAL,
  maximumAggregatedResourcePeriodicPerSlot-r18  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  maximumAggregatedResourceAperiodicPerSlot-r18  ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  maximumAggregatedResourceSemiPerSlot-r18  ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  supportOfSameSRS-PowerReduction-r18      ENUMERATED {supported}                            OPTIONAL,
  ...
}

PosSRS-BWA-IndependentCA-RRC-Connected-r18 ::=
  numOfCarriersIntraBandContiguous-r18      ENUMERATED {two, three, twoandthree}          OPTIONAL,
  maximumAggregatedBW-TwoCarriersFR1-r18    ENUMERATED {mhz80, mhz100, mhz160, mhz200}      OPTIONAL,
  maximumAggregatedBW-TwoCarriersFR2-r18    ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800}  OPTIONAL,
  maximumAggregatedBW-ThreeCarriersFR1-r18  ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz300}      OPTIONAL,
  maximumAggregatedBW-ThreeCarriersFR2-r18  ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800, mhz1000, mhz1200}  OPTIONAL,
  maximumAggregatedResourceSet-r18          ENUMERATED {n1, n2, n4, n8, n12, n16}            OPTIONAL,
  maximumAggregatedResourcePeriodic-r18     ENUMERATED {n1, n2, n4, n8, n16, n32, n64}        OPTIONAL,
  maximumAggregatedResourceAperiodic-r18    ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64}    OPTIONAL,
  maximumAggregatedResourceSemi-r18        ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64}    OPTIONAL,
  maximumAggregatedResourcePeriodicPerSlot-r18  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  maximumAggregatedResourceAperiodicPerSlot-r18  ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  maximumAggregatedResourceSemiPerSlot-r18  ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  OPTIONAL,
  supportOfSameSRS-PowerReduction-r18      ENUMERATED {supported}                            OPTIONAL,
  guardPeriod-r18                          ENUMERATED {ms0, ms30, ms100, ms140, ms200}      OPTIONAL,
  ...
}

-- 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 ::=
  supportedSubcarrierSpacingUL          SEQUENCE {
    supportedBandwidthUL                SupportedBandwidth,
    channelBW-90mhz                     ENUMERATED {supported}           OPTIONAL,
    mimo-CB-PUSCH                       SEQUENCE {
      maxNumberMIMO-LayersCB-PUSCH      MIMO-LayersUL                OPTIONAL,
      maxNumberSRS-ResourcePerSet       INTEGER (1..2)
    }
    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
}

FeatureSetUplinkPerCC-v1780 ::= SEQUENCE {
supportedBandwidthUL-v1780      SupportedBandwidth-v1700      OPTIONAL
}

FeatureSetUplinkPerCC-v1800 ::= SEQUENCE {
-- R1 40-2-7: Two TAs for multi-DCI STxMP PUSCH+PUSCH
twoPUSCH-MultiDCI-STxMP-TwoTA-r18      ENUMERATED {supported}      OPTIONAL,
-- R1 40-6-1: Single-DCI based STx2P SDM scheme for PUSCH-codebook
pusch-CB-SingleDCI-STx2P-SDM-r18      SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      ENUMERATED {n1,n2,n4},
maxNumberLayerPerPanel-r18           INTEGER (1..2),
maxNumberNZP-PUSCH-PortsPerSet-r18   ENUMERATED {n1,n2,n4},
maxNumberSRS-AntennaPortsPerSet-r18  ENUMERATED {n1,n2,n4}
}      OPTIONAL,
-- R1 40-6-1a: Single-DCI based STx2P SDM scheme for PUSCH-noncodebook
pusch-NonCB-SingleDCI-STx2P-SDM-r18   SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      INTEGER (1..4),
maxNumberLayerPerPanel-r18           INTEGER (1..2),
maxNumberSimulSRS-ResourcePerSet-r18  INTEGER (1..4)
}      OPTIONAL,
-- R1 40-6-2: Single-DCI based STx2P SFN scheme for PUSCH-codebook
pusch-CB-SingleDCI-STx2P-SFN-r18      SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      ENUMERATED {n1,n2,n4},
maxNumberLayerPerSet-r18             INTEGER (1..2),
maxNumberSRS-AntennaPortsPerSet-r18  ENUMERATED {n1,n2,n4},
maxNumberNZP-PUSCH-PortsPerSet-r18   ENUMERATED {n1,n2,n4}
}      OPTIONAL,
-- R1 40-6-2a: Single-DCI based STx2P SFN scheme for PUSCH-noncodebook
pusch-NonCB-SingleDCI-STx2P-SFN-r18   SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      INTEGER (1..4),
maxNumberLayerPerSet-r18             INTEGER (1..2),
maxNumberSimulSRS-ResourcePerSet-r18  INTEGER (1..4)
}      OPTIONAL,
-- R1 40-6-3a: codebook multi-DCI based STx2P PUSCH+PUSCH for DG+DG
twoPUSCH-CB-MultiDCI-STx2P-DG-DG-r18  SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      ENUMERATED {n1, n2, n4},
maxNumberLayerOverlapping-r18        INTEGER (1..2),
maxNumberNZP-PUSCH-Overlapping-r18   ENUMERATED {n1, n2, n4},
maxNumberPUSCH-PerCORESET-PerSlot-r18 SEQUENCE {
scs-60kHz-r18                        ENUMERATED {n1,n2,n3,n4,n7}      OPTIONAL,
scs-120kHz-r18                       ENUMERATED {n1,n2,n3,n4,n7}      OPTIONAL
}
maxNumberTotalLayerOverlapping-r18   INTEGER (2..4),
maxNumberSRS-AntennaPortsPerSet-r18  ENUMERATED {n1,n2,n4}
}      OPTIONAL,
-- R1 40-6-3b: Noncodebook multi-DCI based STx2P PUSCH+PUSCH for DG+DG
twoPUSCH-NonCB-MultiDCI-STx2P-DG-DG-r18 SEQUENCE {
maxNumberSRS-ResourcePerSet-r18      INTEGER (1..4),
maxNumberLayerOverlapping-r18        INTEGER (1..2),
maxNumberSimulSRS-ResourcePerSet-r18  INTEGER (1..4),
maxNumberPUSCH-PerCORESET-PerSlot-r18 SEQUENCE {

```

```
        scs-60kHz-r18                          ENUMERATED {n1,n2,n3,n4,n7}  OPTIONAL,  
        scs-120kHz-r18                         ENUMERATED {n1,n2,n3,n4,n7}  OPTIONAL,  
    }                                           OPTIONAL,  
    maxNumberTotalLayerOverlapping-r18        INTEGER (2..4)                OPTIONAL,  
}                                           OPTIONAL,  
-- R1 40-6-6: Out-of-order operation for multi-DCI based STx2P PUSCH+PUSCH  
twoPUSCH-MultiDCI-STx2P-OutOfOrder-r18      ENUMERATED {supported}        OPTIONAL,  
  
codebookParameter8TxPUSCH-r18               SEQUENCE {  
    -- R1 40-7-1: Basic features for Codebook-based 8Tx PUSCH  
    codebook-8TxBasic-r18                     SEQUENCE {  
        maxNumberPUSCH-MIMO-Layer-r18        INTEGER (1..8),  
        maxNumberSRS-Resource-r18            INTEGER (1..2),  
        srs-8TxPorts-r18                     ENUMERATED {noTDM, both}  
    },  
    -- R1 40-7-1a: Codebook-based 8Tx PUSCH-codebook1  
    codebook1-8TxPUSCH-r18                     ENUMERATED {n4-1,n2-2,both}    OPTIONAL,  
    -- R1 40-7-1b: Codebook-based 8Tx PUSCH-codebook2  
    codebook2-8TxPUSCH-r18                     ENUMERATED {supported}        OPTIONAL,  
    -- R1 40-7-1c: Codebook-based 8Tx PUSCH-codebook3  
    codebook3-8TxPUSCH-r18                     ENUMERATED {supported}        OPTIONAL,  
    -- R1 40-7-1d: Codebook-based 8Tx PUSCH-codebook4  
    codebook4-8TxPUSCH-r18                     ENUMERATED {supported}        OPTIONAL,  
    -- R1 40-7-1e: UL full power transmission mode 0  
    ul-FullPwrTransMode0-r18                  ENUMERATED {supported}        OPTIONAL,  
    -- R1 40-7-1f: UL full power transmission mode 1  
    ul-FullPwrTransMode1-r18                  ENUMERATED {supported}        OPTIONAL,  
    -- R1 40-7-1g: UL full power transmission mode 2 with 1/2/4 resources  
    ul-FullPwrTransMode2-r18                  ENUMERATED {n1,n2,n4}        OPTIONAL,  
    -- R1 40-7-1g-1: SRS resources for UL full power transmission mode 2  
    ul-SRS-TransMode2-r18                     BIT STRING (SIZE(3))        OPTIONAL,  
    -- R1 40-7-1g-2: TPMI group(s) which delivers full power for codebook2  
    tpmi-FullPwrCodebook2-r18                 ENUMERATED {first, second}    OPTIONAL,  
}                                           OPTIONAL,  
-- R1 40-7-2: Basic features for Non-Codebook-based 8Tx PUSCH  
nonCodebook-8TxPUSCH-r18                     SEQUENCE {  
    maxNumberPUSCH-MIMO-Layer-r18             INTEGER (1..8),  
    maxNumberSRS-Resource-r18                 INTEGER (1..8),  
    maxNumberSimultaneousSRS-r18             INTEGER (1..8)  
}                                           OPTIONAL,  
    -- R1 40-7-2a: Association between CSI-RS and SRS for non-codebook case  
nonCodebook-CSI-RS-SRS-r18                   CodebookVariantsList-r16      OPTIONAL,  
    -- R1 40-7-3: CBG based 2 CWs PUSCH with rank >4  
cgb-2CW-PUSCH-r18                            ENUMERATED {supported}        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. This is also used to request lower MSD capability for specific NR frequency bands for the UE supporting lower MSD.

***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 *FreqSeparationClass* 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,
  }
  -- 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,
  }
  ...
  [[
  -- 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 ::=
    eutra                               SEQUENCE {
        . . . ,
        [[
            utra-FDD-r16                UTRA-FDD-Parameters-r16    OPTIONAL
        ]]
    }

EUTRA-Parameters ::=
    supportedBandListEUTRA              SEQUENCE {
        eutra-ParametersCommon          SEQUENCE (SIZE (1..maxBandsEUTRA)) OF FreqBandIndicatorEUTRA,
        eutra-ParametersCommon          EUTRA-ParametersCommon      OPTIONAL,
        eutra-ParametersXDD-Diff        EUTRA-ParametersXDD-Diff    OPTIONAL,
        . . .
    }

EUTRA-ParametersCommon ::=
    SEQUENCE {
        mfbf-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
]],
[[
sr-TriggeredByTA-ReportATG-r18   ENUMERATED {supported}    OPTIONAL,
-- similar to R1 26-4: UE reporting of information related to TA pre-compensation defined for ATG
uplinkTA-ReportingATG-r18       ENUMERATED {supported}    OPTIONAL,
extendedDRX-CycleInactive-r18   ENUMERATED {supported}    OPTIONAL,
additionalBS-Table-r18         ENUMERATED {supported}    OPTIONAL,
delayStatusReport-r18          ENUMERATED {supported}    OPTIONAL,
disableCG-RetransmissionMonitoring-r18  ENUMERATED {supported}    OPTIONAL,
non-IntegerDRX-r18             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,
}
...
}

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
  sharedSpectrumChAccess-r17
}
...
}

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
  ]],
  [[
  ptm-Retransmission-r18       ENUMERATED {supported}    OPTIONAL,
  ptm-RetransmissionInactive-r18     ENUMERATED {supported}    OPTIONAL
  ]]
}

MinTimeGap-r16 ::= SEQUENCE {
  scs-15kHz-r16                ENUMERATED {s11, s13}      OPTIONAL,
  scs-30kHz-r16                ENUMERATED {s11, s16}      OPTIONAL,
  scs-60kHz-r16                ENUMERATED {s11, s112}     OPTIONAL,
  scs-120kHz-r16               ENUMERATED {s12, s124}     OPTIONAL
}

MinTimeGapFR2-2-r17 ::= SEQUENCE {
  scs-120kHz-r17               ENUMERATED {s12, s124}     OPTIONAL,
  scs-480kHz-r17               ENUMERATED {s18, s196}     OPTIONAL,
  scs-960kHz-r17               ENUMERATED {s116, s1192}   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 ::=
    MeasAndMobParametersCommon          SEQUENCE {
        measAndMobParametersCommon      OPTIONAL,
        measAndMobParametersXDD-Diff    MeasAndMobParametersXDD-Diff  OPTIONAL,
        measAndMobParametersFRX-Diff    MeasAndMobParametersFRX-Diff  OPTIONAL
    }

MeasAndMobParameters-v1700 ::=
    MeasAndMobParametersFR2-2-r17      SEQUENCE {
        MeasAndMobParametersFR2-2-r17  OPTIONAL
    }

MeasAndMobParametersCommon ::=
    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
    }
    ]],
    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,
    mfbf-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
]],
[[
eventDl-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
}
]],
[[
interSatMeas-r17                    ENUMERATED {supported}   OPTIONAL,
deriveSSB-IndexFromCellInterNon-NCSG-r17  ENUMERATED {supported}   OPTIONAL
]],
[[
-- R4 31-1 Enhanced L3 measurement reporting for unknown SCell activation if the valid L3 measurement results are available
l3-MeasUnknownSCellActivation-r18     ENUMERATED {supported}   OPTIONAL,
-- R4 31-3 Shorter measurement interval for unknown SCell activation
shortMeasInterval-r18                ENUMERATED {supported}   OPTIONAL,
nr-NeedForInterruptionReport-r18      ENUMERATED {supported}   OPTIONAL,
measSequenceConfig-r18               ENUMERATED {supported}   OPTIONAL,
cellIndividualOffsetPerMeasEvent-r18  ENUMERATED {supported}   OPTIONAL,
ltm-MCG-r18                          ENUMERATED {supported}   OPTIONAL,
ltm-SCG-r18                          ENUMERATED {supported}   OPTIONAL,
ltm-MCG-NRDC-r18                    ENUMERATED {supported}   OPTIONAL,
ltm-RACH-LessDG-r18                 ENUMERATED {supported}   OPTIONAL,
ltm-RACH-LessCG-r18                 ENUMERATED {supported}   OPTIONAL,
ltm-Recovery-r18                    ENUMERATED {supported}   OPTIONAL,
ltm-ReferenceConfig-r18             ENUMERATED {supported}   OPTIONAL,
eventD2-MeasReportTrigger-r18       ENUMERATED {supported}   OPTIONAL,
-- R4 32-1: Concurrent gaps with Pre-MG in a FR
concurrentMeasGapsPreMG-r18          ENUMERATED {supported}   OPTIONAL,
-- R4 32-4: Concurrent gaps with NCSG in a FR
concurrentMeasGapsNCSG-r18          ENUMERATED {supported}   OPTIONAL,
-- R4 32-7: Inter-RAT EUTRAN measurement without gap
eutra-NoGapMeasurement-r18          ENUMERATED {supported}   OPTIONAL,
-- R4 32-8: Effective measurement window for inter-RAT EUTRAN measurements
eutra-MeasEMW-r18                   BIT STRING (SIZE(6))    OPTIONAL,
-- R4 32-9: Simultaneous reception of NR data and EUTRAN CRS within BWP with different numerology
concurrentMeasCRS-InsideBWP-EUTRA-r18  ENUMERATED {supported}   OPTIONAL,
-- R4 39-2a: SSB based inter-frequency L1-RSRP measurements with measurement gaps
ltm-InterFreqMeasGap-r18            ENUMERATED {supported}   OPTIONAL,
-- R4 39-7: Faster UE processing time during cell switch
ltm-FastUE-Processing-r18           SEQUENCE {
    fr1-r18                          ENUMERATED {ms10, ms15},
    fr2-r18                          ENUMERATED {ms10, ms15},
    fr1-AndFR2-r18                   ENUMERATED {ms20, ms30}
}
-- R4 39-8: Measurement validation based on EMR measurement during connection setup/resume
measValidationReportEMR-r18         ENUMERATED {supported}   OPTIONAL,
-- R4 39-9: Measurement validation based on non-EMR measurement during connection setup/resume
measValidationReportNonEMR-r18      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-v1810 ::= SEQUENCE {
    measAndMobParametersMRDC-Common-v1810 MeasAndMobParametersMRDC-Common-v1810 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,
    }
    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,
    }
    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-Common-v1810 ::= SEQUENCE {
    mn-ConfiguredMN-TriggerSCPAC-r18      ENUMERATED {supported}          OPTIONAL,
    mn-ConfiguredSN-TriggerSCPAC-r18      ENUMERATED {supported}          OPTIONAL,
    sn-ConfiguredSCPAC-r18                 ENUMERATED {supported}          OPTIONAL,
    mn-ConfiguredMN-TriggerSCPAC-afterSCG-release-r18    ENUMERATED {supported}          OPTIONAL,
    mn-ConfiguredReferenceConfigSCPAC-r18    ENUMERATED {supported}          OPTIONAL,
    sn-ConfiguredReferenceConfigSCPAC-r18    ENUMERATED {supported}          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 {
    maximumConfiguredTCI-StatesPerCC ENUMERATED {n4, n8, n16, n32, n64, n128} OPTIONAL,
    maximumActiveTCI-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,
  maximumRxBeam INTEGER (2..8) OPTIONAL,
  maximumRxTxBeamSwitchDL 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
}
-- 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,
  }
  -- 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}
  }
}
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,
}
-- 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)
}
-- 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
}
]],
[[
-- 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
}
-- 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}
}
-- 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}
}
-- 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}
}
-- 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}
    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}
}
-- 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}
}
-- R1 23-1-4   UE capability value reporting
srs-PortReport-r17                          SEQUENCE {
  capVal1-r17                             ENUMERATED {n1, n2, n4}
  capVal2-r17                             ENUMERATED {n1, n2, n4}
  capVal3-r17                             ENUMERATED {n1, n2, n4}
  capVal4-r17                             ENUMERATED {n1, n2, n4}
}
-- R1 23-2-1a   Monitoring of individual candidates
mTRP-PDCCH-individual-r17                   ENUMERATED {supported}
-- 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}
-- R1 23-2-2   Two QCL TypeD for CORESET monitoring in PDCCH repetition
mTRP-PDCCH-TwoQCL-TypeD-r17                ENUMERATED {supported}
-- 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)
}
-- R1 23-3-1a   Cyclic mapping for Multi-TRP PUSCH repetition
mTRP-PUSCH-cyclicMapping-r17               ENUMERATED {typeA,typeB,both}
-- R1 23-3-1b   Second TPC field for Multi-TRP PUSCH repetition
mTRP-PUSCH-secondTPC-r17                   ENUMERATED {supported}
-- R1 23-3-1c   Two PHR reporting
mTRP-PUSCH-twoPHR-Reporting-r17            ENUMERATED {supported}
-- R1 23-3-1e   A-CSI report
mTRP-PUSCH-A-CSI-r17                      ENUMERATED {supported}
-- R1 23-3-1f   SP-CSI report
mTRP-PUSCH-SP-CSI-r17                     ENUMERATED {supported}
-- R1 23-3-1g   CG PUSCH transmission
mTRP-PUSCH-CG-r17                         ENUMERATED {supported}
-- 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}
-- 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)
-- R1 23-4     IntCell-mTRP
mTRP-inter-Cell-r17                        SEQUENCE {
  maxNumAdditionalPCI-Case1-r17           INTEGER (1..7),
  maxNumAdditionalPCI-Case2-r17           INTEGER (0..7)
}
-- R1 23-5-1   Group based L1-RSRP reporting enhancements
mTRP-GroupBasedL1-RSRP-r17                SEQUENCE {
  maxNumBeamGroups-r17                   INTEGER (1..4),

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    maxNumRS-WithinSlot-r17          ENUMERATED {n2,n3,n4,n8,n16,n32,n64},
    maxNumRS-AcrossSlot-r17         ENUMERATED {n8, n16, n32, n64, n128}
}
-- 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}
-- 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}
}
-- R1 23-7-1b    Active CSI-RS resources and ports in the presence of multi-TRP CSI
codebookComboParameterMultiTRP-r17 CodebookComboParameterMultiTRP-r17
-- R1 23-7-1a    Additional CSI report mode 1
mTRP-CSI-additionalCSI-r17        ENUMERATED {x1,x2}
-- R1 23-7-4    Support of Nmax=2 for Multi-TRP CSI
mTRP-CSI-N-Max2-r17               ENUMERATED {supported}
-- R1 23-7-5    CMR sharing
mTRP-CSI-CMR-r17                  ENUMERATED {supported}
-- R1 23-8-11    Partial frequency sounding of SRS for non-frequency hopping case
srs-partialFreqSounding-r17       ENUMERATED {supported}
-- R1-24 feature: Extend beamSwitchTiming for FR2-2
beamSwitchTiming-v1710            SEQUENCE {
    scs-480kHz                      ENUMERATED {sym56, sym112, sym192, sym896, sym1344}
    scs-960kHz                      ENUMERATED {sym112, sym224, sym384, sym1792, sym2688}
}
-- R1-24 feature: Extend beamSwitchTiming-r16 for FR2-2
beamSwitchTiming-r17              SEQUENCE {
    scs-480kHz-r17                  ENUMERATED {sym896, sym1344}
    scs-960kHz-r17                  ENUMERATED {sym1792, sym2688}
}
-- R1-24 feature: Extend beamReportTiming for FR2-2
beamReportTiming-v1710           SEQUENCE {
    scs-480kHz-r17                  ENUMERATED {sym56, sym112, sym224}
    scs-960kHz-r17                  ENUMERATED {sym112, sym224, sym448}
}
-- 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}
    scs-960kHz-r17                  ENUMERATED {n1, n2, n4, n7}
}
]],
[[
-- R1-23-1-4a: Semi-persistent/aperiodic capability value report
srs-PortReportSP-AP-r17          ENUMERATED {supported}
maxNumberRxBeam-v1720            INTEGER (9..12)
-- R1-23-6-5    Support implicit configuration of RS(s) with two TCI states for beam failure detection
sfn-ImplicitRS-twoTCI-r17        ENUMERATED {supported}
-- R1-23-6-6    QCL-TypeD collision handling with CORESET with 2 TCI states
sfn-QCL-TypeD-Collision-twoTCI-r17 ENUMERATED {supported}
-- R1-23-7-1c    Basic Features of CSI Enhancement for Multi-TRP - number of CPUs
mTRP-CSI-numCPU-r17              ENUMERATED {n2, n3, n4}
]],

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OPTIONAL,

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[[
supportRepNumPDSCH-TDRA-DCI-1-2-r17      ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16}      OPTIONAL
]],
[[
codebookParametersetype2DopplerCSI-r18    CodebookParametersetype2DopplerCSI-r18      OPTIONAL,
codebookParametersfetype2DopplerCSI-r18  CodebookParametersfetype2DopplerCSI-r18    OPTIONAL,
codebookParametersetype2CJT-r18          CodebookParametersetype2CJT-r18            OPTIONAL,
codebookParametersfetype2CJT-r18         CodebookParametersfetype2CJT-r18          OPTIONAL,
codebookComboParametersCJT-r18          CodebookComboParametersCJT-r18            OPTIONAL,
codebookParametersHARQ-ACK-PUSCH-r18     CodebookParametersHARQ-ACK-PUSCH-r18      OPTIONAL,
-- R1 40-1-1: Unified TCI with joint DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI
-- codepoint per CC
tci-JointTCI-UpdateSingleActiveTCI-PerCC-r18 SEQUENCE {
    maxNumberConfigJointTCIPerCC-PerBWP-r18      ENUMERATED {n8,n12,n16,n24,n32,n48,n64,n128},
    maxNumberActiveJointTCI-AcrossCC-r18          ENUMERATED {n2,n4,n6,n8,n16,n32}
}
-- R1 40-1-1a: Unified TCI with joint DL/UL TCI update for single-DCI based intra-cell multi-TRP with multiple activated TCI
-- codepoints per CC
tci-JointTCI-UpdateMultiActiveTCI-PerCC-r18 SEQUENCE {
    tci-StateInd-r18                             ENUMERATED {withAssignment, withoutAssignment},
    maxNumberActiveJointTCI-PerCC-r18             INTEGER (2..8)
}
-- R1 40-1-1c: DCI format 1_1 and if supported 1_2 configured with TCI selection field
tci-SelectionDCI-r18                             ENUMERATED {supported}
-- R1 40-1-2: Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI
-- codepoint per CC
tci-SeparateTCI-UpdateSingleActiveTCI-PerCC-r18 SEQUENCE {
    maxNumConfigDL-TCI-PerCC-PerBWP-r18          ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64, n128},
    maxNumConfigUL-TCI-PerCC-PerBWP-r18          ENUMERATED {n4, n8, n12, n16, n24, n32, n48, n64},
    maxNumActiveDL-TCI-AcrossCC-r18              ENUMERATED {n2, n4, n8, n16},
    maxNumActiveUL-TCI-AcrossCC-r18              ENUMERATED {n2, n4, n8, n16}
}
-- R1 40-1-2a: Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with multiple
-- activated TCI codepoints per CC
tci-SeparateTCI-UpdateMultiActiveTCI-PerCC-r18 SEQUENCE {
    maxNumActiveDL-TCI-AcrossCC-r18              ENUMERATED {n2, n4, n8, n16},
    maxNumActiveUL-TCI-AcrossCC-r18              ENUMERATED {n2, n4, n8, n16}
}
-- R1 40-1-3: Per aperiodic CSI-RS resource/resource set configuration for TCI selection in S-DCI based MTRP
tci-SelectionAperiodicCSI-RS-r18              ENUMERATED {perResource, perResourceSet, both}
-- R1 40-1-4: Two TCI states for CJT Tx scheme for PDSCH
twoTCI-StatePDSCH-CJT-TxScheme-r18           ENUMERATED {cjtSchemeA, cjtSchemeB, both}
-- R1 40-1-7: Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI
-- codepoint per CORESETPoolIndex per CC
tci-JointTCI-UpdateSingleActiveTCI-PerCC-PerCORESET-r18 SEQUENCE {
    mTRP-Operation-r18                           ENUMERATED {intraCell, intraCellAndInterCell},
    maxNumberConfigJointTCIPerCC-PerBWP-r18      ENUMERATED {n8,n12,n16,n24,n32,n48,n64,n128},
    maxNumberActiveJointTCIAcrossCC-PerCORESET-r18 ENUMERATED {n1,n2,n4,n8,n16}
}
-- R1 40-1-7a: Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI
-- codepoints per CORESETPoolIndex per CC
tci-JointTCI-UpdateMultiActiveTCI-PerCC-PerCORESET-r18 INTEGER (2..8)
-- R1 40-1-8: TRP-specific BFR with unified TCI framework with Unified TCI
tci-TRP-BFR-r18                               ENUMERATED {supported}

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-- R1 40-1-9: Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI
-- codepoint per CORESETPoolIndex per CC
tci-SeparateTCI-UpdateSingleActiveTCI-PerCC-PerCORESET-r18 SEQUENCE {
  mTRP-Operation-r18 ENUMERATED {intraCell, intraCellAndInterCell},
  maxNumConfigDL-TCI-PerCC-PerBWP-r18 ENUMERATED {n8, n12, n16, n24, n32, n48, n64, n128},
  maxNumConfigUL-TCI-PerCC-PerBWP-r18 ENUMERATED {n8, n12, n16, n24, n32, n48, n64},
  maxNumActiveDL-TCI-AcrossCC-r18 ENUMERATED {n1, n2, n4, n8, n16},
  maxNumActiveUL-TCI-AcrossCC-r18 ENUMERATED {n1, n2, n4, n8, n16}
}
-- R1 40-1-9a: Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI
-- codepoints per CORESETPoolIndex per CC
tci-SeparateTCI-UpdateMultiActiveTCI-PerCC-PerCORESET-r18 SEQUENCE {
  maxNumConfigDL-TCI-PerCC-PerBWP-r18 INTEGER (1..8),
  maxNumConfigUL-TCI-PerCC-PerBWP-r18 INTEGER (1..8)
}
-- R1 40-1-12: Common multi-CC TCI state ID update and activation for single-DCI based multi-TRP
commonTCI-SingleDCI-r18 INTEGER (1..4)
-- R1 40-1-13: Common multi-CC TCI state ID update and activation for multi-DCI based multi-TRP
commonTCI-MultiDCI-r18 INTEGER (1..4)
-- R1 40-2-3: TAG ID indication via absolute TA command MAC CE
spCell-TAG-Ind-r18 ENUMERATED {supported}
-- R1 40-2-4: PDCCH order sent by one TRP triggers RACH procedure (specifically PRACH) towards a different TRP based on CFRA for
-- inter-cell
interCellCrossTRP-PDCCH-OrderCFRA-r18 ENUMERATED {supported}
-- R1 40-2-4a: PDCCH order sent by one TRP triggers RACH procedure (specifically PRACH) towards a different TRP based on CFRA for
-- intra-cell
intraCellCrossTRP-PDCCH-OrderCFRA-r18 ENUMERATED {supported}
-- R1 40-2-9: Overlapping UL transmission reduction
overlapUL-TransReduction-r18 ENUMERATED {supported}
-- R1 40-3-3-1: TDCP (Time Domain Channel Properties) report
tdcp-Report-r18 SEQUENCE {
  valueX-r18 INTEGER (1..2),
  maxNumberActiveResource-r18 INTEGER (2..32)
}
-- R1 40-3-3-5: Number of CSI-RS resources for TDCP
tdcp-Resource-r18 SEQUENCE {
  maxNumberConfigPerCC-r18 ENUMERATED {n2,n4,n6,n8,n10,n12},
  maxNumberConfigAcrossCC-r18 INTEGER (1..32),
  maxNumberSimultaneousPerCC-r18 ENUMERATED {n2, n4, n6, n8, n12, n16, n20, n24, n28, n32}
}
-- R1 40-3-1-24: Timeline for regular eType-II-CJT CSI, or for port selection FeType-II-CJT CSI
timelineRelax-CJT-CSI-r18 ENUMERATED {n0,n2}
-- R1 40-4-11: Joint configuration of Rel.18 DMRS ports and Rel.18 dynamic switching between DFT-S-OFDM and CP-OFDM for PUSCH
jointConfigDMRSPortDynamicSwitching-r18 ENUMERATED {supported}
-- R1 40-5-1: SRS comb offset hopping
srs-combOffsetHopping-r18 ENUMERATED {supported}
-- R1 40-5-1a: Comb offset hopping time-domain behavior when repetition factor R>1
srs-combOffsetInTime-r18 ENUMERATED {srs, rsrs, both}
-- R1 40-5-1b: SRS comb offset hopping combined with legacy group/sequence hopping
srs-combOffsetCombinedGroupSequence-r18 ENUMERATED {supported}
-- R1 40-5-1c: Comb offset hopping within a subset
srs-combOffsetHoppingWithinSubset-r18 ENUMERATED {supported}
-- R1 40-5-2: SRS cyclic shift hopping
srs-cyclicShiftHopping-r18 ENUMERATED {supported}

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-- R1 40-5-2a: Smaller cyclic shift granularity for cyclic shift hopping
srs-cyclicShiftHoppingSmallGranularity-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-5-2b: SRS cyclic shift hopping combined with legacy group/sequence hopping
srs-cyclicShiftCombinedGroupSequence-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-5-2c: Cyclic shift hopping within a subset
cyclicShiftHoppingWithinSubset-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-5-3: SRS cyclic shift hopping combined with SRS comb offset hopping
srs-cyclicShiftCombinedCombOffset-r18 ENUMERATED {supported} OPTIONAL,

-- R1 40-6-1-1: 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH-codebook
pusch-CB-2PTRS-SingleDCI-STx2P-SDM-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-1a-1: 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH-noncodebook
pusch-NonCB-2PTRS-SingleDCI-STx2P-SDM-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-1b: Association between CSI-RS and SRS for noncodebook single-DCI based STx2P SDM scheme for PUSCH
pusch-NonCB-SingleDCI-STx2P-SDM-CSI-RS-SRS-r18 SEQUENCE {
  maxNumberPeriodicSRS-Resource-PerBWP-r18 INTEGER (1..8),
  maxNumberAperiodicSRS-Resource-PerBWP-r18 INTEGER (1..8),
  maxNumberSemiPersistentSRS-ResourcePerBWP-r18 INTEGER (0..8),
  valueY-SRS-ResourceAssociate-r18 INTEGER (1..16),
  valueX-CSI-RS-ResourceAssociate-r18 INTEGER (1..2)
} OPTIONAL,
-- R1 40-6-3b-1: Associated CSI-RS resources for noncodebook multi-DCI based STx2P PUSCH+PUSCH
twoPUSCH-NonCB-Multi-DCI-STx2P-CSI-RS-Resource-r18 SEQUENCE {
  maxNumberPeriodicSRS-r18 INTEGER (1..8),
  maxNumberAperiodicSRS-r18 INTEGER (1..8),
  maxNumberSemiPersistentSRS-r18 INTEGER (0..8),
  simultaneousSRS-PerCC-r18 INTEGER (1..16),
  simultaneousCSI-RS-NonCB-r18 INTEGER (1..2)
} OPTIONAL,
-- R1 40-6-1-2: New DMRS port entry for single-DCI based SDM scheme
dmrs-PortEntrySingleDCI-SDM-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-2-1: 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH-codebook
pusch-CB-2PTRS-SingleDCI-STx2P-SFN-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-2a-1: 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH-codebook
pusch-NonCB-2PTRS-SingleDCI-STx2P-SFN-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-2b: Association between CSI-RS and SRS for noncodebook single-DCI based STx2P SFN scheme for PUSCH
pusch-NonCB-SingleDCI-STx2P-SFN-CSI-RS-SRS-r18 SEQUENCE {
  maxNumberPeriodicSRS-Resource-PerBWP-r18 INTEGER (1..8),
  maxNumberAperiodicSRS-Resource-PerBWP-r18 INTEGER (1..8),
  maxNumberSemiPersistentSRS-ResourcePerBWP-r18 INTEGER (0..8),
  valueY-SRS-ResourceAssociate-r18 INTEGER (1..16),
  valueX-CSI-RS-ResourceAssociate-r18 INTEGER (1..2)
} OPTIONAL,
-- R1 40-6-3c: Codebook multi-DCI based STx2P PUSCH+PUSCH -Fully overlapping PUSCHs in time and fully overlapping in frequency
twoPUSCH-CB-MultiDCI-STx2P-FullTimeFullFreqOverlap-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-3d: Codebook multi-DCI based STx2P PUSCH+PUSCH - Fully overlapping PUSCHs in time and partially overlapping in frequency
twoPUSCH-CB-MultiDCI-STx2P-FullTimePartialFreqOverlap-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-3e: Codebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time and fully overlapping in frequency
twoPUSCH-CB-MultiDCI-STx2P-PartialTimeFullFreqOverlap-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-3f: Codebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time, partially overlapping in frequency
twoPUSCH-CB-MultiDCI-STx2P-PartialTimePartialFreqOverlap-r18 ENUMERATED {supported} OPTIONAL,
-- R1 40-6-3g: Codebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time, partially or non-overlapping
-- in frequency
twoPUSCH-CB-MultiDCI-STx2P-PartialTimeNonFreqOverlap-r18 ENUMERATED {supported} OPTIONAL,

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-- R1 40-6-3h: Codebook multi-DCI based STx2P PUSCH+PUSCH for CG+CG
twoPUSCH-CB-MultiDCI-STx2P-CG-CG-r18      ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3i: Codebook multi-DCI based STx2P PUSCH+PUSCH for DG+CG
twoPUSCH-CB-MultiDCI-STx2P-CG-DG-r18      ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3j: Noncodebook multi-DCI based STx2P PUSCH+PUSCH - Fully overlapping PUSCHs in time and fully overlapping in frequency
twoPUSCH-NonCB-MultiDCI-STx2P-FullTimeFullFreqOverlap-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3k: Noncodebook multi-DCI based STx2P PUSCH+PUSCH - Fully overlapping PUSCHs in time and partially overlapping in
-- frequency
twoPUSCH-NonCB-MultiDCI-STx2P-FullTimePartialFreqOverlap-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3l: Noncodebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time and fully overlapping in
-- frequency
twoPUSCH-NonCB-MultiDCI-STx2P-PartialTimeFullFreqOverlap-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3m: Noncodebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time, partially overlapping in
-- frequency
twoPUSCH-NonCB-MultiDCI-STx2P-PartialTimePartialFreqOverlap-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3n: Noncodebook multi-DCI based STx2P PUSCH+PUSCH - Partially overlapping PUSCHs in time, non-overlapping in frequency
twoPUSCH-NonCB-MultiDCI-STx2P-PartialTimeNonFreqOverlap-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3o: Noncodebook multi-DCI based STx2P PUSCH+PUSCH for CG+CG
twoPUSCH-NonCB-MultiDCI-STx2P-CG-CG-r18      ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-3p: Noncodebook multi-DCI based STx2P PUSCH+PUSCH for DG+CG
twoPUSCH-NonCB-MultiDCI-STx2P-CG-DG-r18      ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-4a: Dynamic indication of repetition number for SFN scheme for PUCCH
pucch-RepetitionDynamicIndicationSFN-r18      ENUMERATED {supported}          OPTIONAL,
-- R1 40-6-5: Support grouped-based beam reporting for STx2P
groupBeamReporting-STx2P-r18                  SEQUENCE {
    groupL1-RSRP-Reporting-r18                  ENUMERATED {jointULandDL, ulOnly, both},
    maxNumberBeamGroups-r18                    INTEGER (1..4),
    maxNumberResWithinSlotAcrossCC-r18          ENUMERATED {n2,n3,n4,n8,n16,n32,n64},
    maxNumberResAcrossCC-r18                    ENUMERATED {n8,n16,n32,n64,n128}
}
}}
}

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)
}

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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 ::=
    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 ::=
    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 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
    }
}
```

```

}
-- R1 18-2 Single UL TX operation for TDD PCell in EN-DC
tdm-restrictionTDD-enc-r16          ENUMERATED {supported}          OPTIONAL,
-- R1 18-2a Single UL TX operation for FDD PCell in EN-DC
tdm-restrictionFDD-enc-r16          ENUMERATED {supported}          OPTIONAL,
-- R1 18-2b Support of HARQ-offset for SUO case 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-enc-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,
}

-- 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

```

– NCR-Parameters

The IE *NCR-Parameters* is used to indicate the UE capabilities supported by NCR-MT.

NCR-Parameters information element

```

-- ASN1START
-- TAG-NCR-PARAMETERS-START

NCR-Parameters-r18 ::= SEQUENCE {
    inactiveStateNCR-r18                      ENUMERATED {supported}          OPTIONAL,
    supportedNumberOfDRBs-NCR-r18            ENUMERATED {n1,n16}            OPTIONAL,
    nonDRB-NCR-r18                          ENUMERATED {supported}          OPTIONAL
}

```

```

}
-- TAG-NCR-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 ::=
  measAndMobParametersNRDC          SEQUENCE {
    generalParametersNRDC            MeasAndMobParametersMRDC          OPTIONAL,
    fdd-Add-UE-NRDC-Capabilities     GeneralParametersMRDC-XDD-Diff  OPTIONAL,
    tdd-Add-UE-NRDC-Capabilities     UE-MRDC-CapabilityAddXDD-Mode  OPTIONAL,
    fr1-Add-UE-NRDC-Capabilities     UE-MRDC-CapabilityAddXDD-Mode  OPTIONAL,
    fr2-Add-UE-NRDC-Capabilities     UE-MRDC-CapabilityAddFRX-Mode  OPTIONAL,
    dummy2                           OCTET STRING                  OPTIONAL,
    dummy                             SEQUENCE {}                  OPTIONAL
  }

NRDC-Parameters-v1570 ::=
  sfn-SyncNRDC                       ENUMERATED {supported}        OPTIONAL
}

NRDC-Parameters-v15c0 ::=
  pdcp-DuplicationSplitSRB           ENUMERATED {supported}        OPTIONAL,
  pdcp-DuplicationSplitDRB          ENUMERATED {supported}        OPTIONAL
}

NRDC-Parameters-v1610 ::=
  measAndMobParametersNRDC-v1610    MeasAndMobParametersMRDC-v1610  OPTIONAL
}

NRDC-Parameters-v1700 ::=
  flc-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

<i>fdd-Add-UE-NR-CapabilitiesNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>fdd-Add-UE-NR-Capabilities</i> applies to NTN.
<i>fr1-Add-UE-NR-CapabilitiesNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>fr1-Add-UE-NR-Capabilities</i> applies to NTN.
<i>mac-ParametersNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>mac-Parameters</i> applies to NTN.
<i>measAndMobParametersNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>measAndMobParameters</i> applies to NTN.
<i>phy-ParametersNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>phy-Parameters</i> applies to NTN.
<i>son-ParametersNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>son-Parameters-r16</i> applies to NTN.
<i>ue-BasedPerfMeas-ParametersNTN</i>
NTN related capabilities which the UE supports in NTN differently than in TN. If absent, <i>ue-BasedPerfMeas-Parameters-r16</i> 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
    }
    continueUDC-r17                   ENUMERATED {supported}          OPTIONAL,
    supportOfBufferSize-r17           ENUMERATED {kbyte4, kbyte8}     OPTIONAL
}
]],
[[
longSN-NCR-r18                       ENUMERATED {supported}          OPTIONAL,
pdu-SetDiscard-r18                   ENUMERATED {supported}          OPTIONAL,
psi-BasedDiscard-r18                 ENUMERATED {supported}          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 ::=
    phy-ParametersCommon          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 ::=
    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 symbol 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
}

```

```

}
maxNumberSRS-PosPathLossEstimateAllServingCells-r16 ENUMERATED {n1, n4, n8, n16} OPTIONAL, 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,
}
-- 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}
}
-- 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,
}
-- 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}
}
]],
[[
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}
}
-- 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,
}
-- 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
]],
[[
-- R1 42-6: Joint operation of power domain and spatial domain adaptation
jointPowerSpatialAdaptation-r18        ENUMERATED {supported}          OPTIONAL,
-- R1 43-3: Aperiodic beam indication for access link
ncr-AperiodicBeamInd-AccessLink-r18    SEQUENCE {
    scs-15kHz-r18                       INTEGER (0..1)                 OPTIONAL,
    scs-30kHz-r18                       INTEGER (0..1)                 OPTIONAL,
    scs-60kHz-r18                       INTEGER (0..2)                 OPTIONAL,
    scs-120kHz-r18                      INTEGER (0..2)                 OPTIONAL,
}
-- R1 43-4: Semi-persistent beam indication for access link
ncr-Semi-PersistentBeamInd-AccessLink-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 43-5: Simultaneous UL transmission of backhaul link and C-Link
ncr-SimultaneousUL-BackhaulAndC-Link-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 43-6: Dedicated signalling for backhaul link beam indication
ncr-BackhaulBeamInd-r18                 ENUMERATED {nonUnifiedTCI, unifiedTCI, both}  OPTIONAL,
-- R1 43-8: Adaptive beam for NCR backhaul link/C-link
ncr-AdaptiveBeamBackhaulAndC-Link-r18    ENUMERATED {nonUnifiedTCI, unifiedTCI, both}  OPTIONAL,

-- R1 49-4a: Nominal RBG size of Configuration 3 for FDRA type 0 for DCI format 1_3
nominalRBG-SizeOfConfig-3-FDRA-Type-0-DCI-1-3-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 49-4b: Nominal RBG size of Configuration 3 for FDRA type 0 for DCI format 0_3
nominalRBG-SizeOfConfig-3-FDRA-Type-0-DCI-0-3-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 49-4c: Configurable Type-1A fields for DCI format 0_3/1_3
configurableType-1A-FieldsForDCI-0-3-And-1-3-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 49-4d: FDRA Type 1 granularity of 2, 4, 8, or 16 consecutive RBs based RIV for DCI format 1_3/0_3
fdra-Type-1-Gty-2-4-8-16-RBs-RIV-DCI-1-3-And-0-3-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 50-1c: Multi-PUSCHs Type 2 configured grant release by DCI format 0_1
multiPUSCH-DCI-0-1-r18                  ENUMERATED {supported}          OPTIONAL,
-- R1 50-1d: Multi-PUSCHs Type 2 configured grant release by DCI format 0_2
multiPUSCH-DCI-0-2-r18                  ENUMERATED {supported}          OPTIONAL,
-- R1 51-3: Support 5 MHz channel bandwidth with 20 PRB CORESET0
support-5MHz-ChannelBW-20PRB-CORESET0-r18  ENUMERATED {supported}          OPTIONAL,

-- R1 55-1: Additional SR periodicities
additionalSR-Periodicities-r18          SEQUENCE {
    scs-30kHz-r18                       ENUMERATED {supported}          OPTIONAL,
    scs-120kHz-r18                      ENUMERATED {supported}          OPTIONAL,
}
-- R1 55-5: Enable MAC CE based pathloss RS updates for Type 1 CG-PUSCH
pathlossRS-UpdateForType1CG-PUSCH-r18    ENUMERATED {supported}          OPTIONAL
]]
}

Phy-ParametersCommon-v16a0 ::=
srs-PeriodicityAndOffsetExt-r16        SEQUENCE {
    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,
    almostContinuousCP-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,

```



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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
}
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)
}
mux-HARQ-ACK-PUSCH-DiffSymbol         ENUMERATED {supported}              OPTIONAL,
]],
[[
-- R1 11-1b: Type 1 HARQ-ACK codebook support for relative TDM 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}
}
-- 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
  ]],
  [[
  -- similar to NTN R1 26-10: K1 range extension defined for ATG as well
  k1-RangeExtensionATG-r18                   ENUMERATED {supported}          OPTIONAL,
  -- similar to NTN R1 26-5: Increasing the number of HARQ processes defined for ATG as well
  maxHARQ-ProcessNumberATG-r18              ENUMERATED {u16d32, u32d16, u32d32}          OPTIONAL,
  -- similar to NTN R1 26-1: Uplink Time and Frequency pre-compensation and timing relationship enhancements defined for ATG as well
  uplinkPreCompensationATG-r18              ENUMERATED {supported}          OPTIONAL,
  -- R4 36-1: MU-MIMO Interference Mitigation advanced receiver
  advReceiver-MU-MIMO-r18                   ENUMERATED {supported}          OPTIONAL,
  -- R4 41-1: Support of delta PPowerClass reporting mechanism
  deltaPowerClassReporting-r18              ENUMERATED {type1, type2}          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-PARAMETERSSSHAREDSPECTRUMCHACCESS-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,
  }
  -- 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-BWA-RRC-Inactive*

The IE *PosSRS-BWA-RRC-Inactive* is used to convey the capabilities supported by the UE for support of positioning SRS bandwidth aggregation in RRC_INACTIVE

PosSRS-BWA-RRC-Inactive information element

```

-- ASN1START
-- TAG-POSSRS-BWA-RRC-INACTIVE-START

PosSRS-BWA-RRC-Inactive-r18 ::=          SEQUENCE {
    numOfCarriersIntraBandContiguous-r18  ENUMERATED {two, three, twoandthree}          OPTIONAL,
    maximumAggregatedBW-TwoCarriersFR1-r18  ENUMERATED {mhz80, mhz100, mhz160, mhz200}          OPTIONAL,
    maximumAggregatedBW-TwoCarriersFR2-r18  ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800}          OPTIONAL,
    maximumAggregatedBW-ThreeCarriersFR1-r18  ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz300}          OPTIONAL,
    maximumAggregatedBW-ThreeCarriersFR2-r18  ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800, mhz1000, mhz1200}          OPTIONAL,
    maximumAggregatedResourceSet-r18          ENUMERATED {n1, n2, n4, n8, n12, n16}          OPTIONAL,
    maximumAggregatedResourcePeriodic-r18     ENUMERATED {n1, n2, n4, n8, n16, n32, n64}          OPTIONAL,
    maximumAggregatedResourceSemi-r18         ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64}          OPTIONAL,
    maximumAggregatedResourcePeriodicPerSlot-r18  ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}          OPTIONAL,
    maximumAggregatedResourceSemiPerSlot-r18    ENUMERATED {n0, n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}          OPTIONAL,
    supportOfSameSRS-PowerReduction-r18        ENUMERATED {supported}          OPTIONAL,
    guardPeriod-r18                            ENUMERATED {ms0, ms30, ms100, ms140, ms200}          OPTIONAL,
    ...
}

-- TAG-POSSRS-BWA-RRC-INACTIVE-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 SRS for Positioning 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

```

– *PosSRS-TxFrequencyHoppingRRC-Connected*

The IE *PosSRS-TxFrequencyHoppingRRC-Connected* is used to convey the capabilities supported by the RRC_CONNECTED UE for support of positioning SRS with Tx frequency hopping for RedCap UEs.

PosSRS-TxFrequencyHoppingRRC-Connected information element

```

-- ASN1START
-- TAG-POSSRS-TXFREQUENCYHOPPINGRRCCONNECTED-START
PosSRS-TxFrequencyHoppingRRC-Connected-r18 ::= SEQUENCE {
  maximumSRS-BandwidthAcrossAllHopsFR1-r18      ENUMERATED {mhz40, mhz50, mhz80, mhz100}                                OPTIONAL,
  maximumSRS-BandwidthAcrossAllHopsFR2-r18      ENUMERATED {mhz100, mhz200, mhz400}                                OPTIONAL,
  maximumTxFH-Hops-r18                          ENUMERATED {n2, n3, n4, n5, n6}                                OPTIONAL,
  rf-TxRetunTimeFR1-r18                        ENUMERATED {n70, n140, n210}                                OPTIONAL,
  rf-TxRetunTimeFR2-r18                        ENUMERATED {n35, n70, n140}                                OPTIONAL,
  switchTimeBetweenActiveBWP-FrequencyHop-r18   ENUMERATED {n100, n140, n200, n300, n500}                                OPTIONAL,
  numOfOverlappingPRB-r18                      ENUMERATED {n0, n1, n2, n4}                                OPTIONAL,
  maximumSRS-ResourcePeriodic-r18              ENUMERATED {n1, n2, n4, n8, n16, n32, n64}                                OPTIONAL,
  maximumSRS-ResourceAperiodic-r18             ENUMERATED {n0,n1, n2, n4, n8, n16, n32, n64}                                OPTIONAL,
  maximumSRS-ResourceSemipersistent-r18        ENUMERATED {n0,n1, n2, n4, n8, n16, n32, n64}                                OPTIONAL,
  ...
}
-- TAG-POSSRS-TXFREQUENCYHOPPINGRRCCONNECTED-STOP
-- ASN1STOP

```

– *PosSRS-TxFrequencyHoppingRRC-Inactive*

The IE *PosSRS-TxFrequencyHoppingRRC-Inactive* is used to convey the capabilities supported by the RRC_INACTIVE UE for support of positioning SRS with Tx frequency hopping for RedCap UEs.

PosSRS-TxFrequencyHoppingRRC-Inactive information element

```
-- ASN1START
-- TAG-POSSRS-TXFREQUENCYHOPPINGRRCCINACTIVE-START

PosSRS-TxFrequencyHoppingRRC-Inactive-r18 ::= SEQUENCE {
    maximumSRS-BandwidthAcrossAllHops-FR1-r18      ENUMERATED {mhz40, mhz50, mhz80, mhz100}          OPTIONAL,
    maximumSRS-BandwidthAcrossAllHops-FR2-r18      ENUMERATED {mhz100, mhz200, mhz400}          OPTIONAL,
    maximumTxFH-Hops-r18                           ENUMERATED {n2, n3, n4, n5, n6}              OPTIONAL,
    rf-TxRetunTimeFR1-r18                          ENUMERATED {n70, n140, n210}                OPTIONAL,
    rf-TxRetunTimeFR2-r18                          ENUMERATED {n35, n70, n140}                 OPTIONAL,
    switchTimeBetweenActiveBWP-FrequencyHop        ENUMERATED {n100, n140, n200, n300, n500}    OPTIONAL,
    numOfOverlappingPRB-r18                        ENUMERATED {n0, n1, n2, n4}                 OPTIONAL,
    maximumSRS-Resource-Periodic-r18              ENUMERATED {n1, n2, n4, n8, n16, n32, n64}   OPTIONAL,
    maximumSRS-Resource-Semipersistent-r18        ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64} OPTIONAL,
    ...
}

-- TAG-POSSRS-TXFREQUENCYHOPPINGRRCCINACTIVE-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-POSAV-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
    }
}

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}
    }
  },
  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}
  }
}

-- 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
]],
[[
dummy1      BandCombinationList-v1770      OPTIONAL,
dummy2      BandCombinationList-UplinkTxSwitch-v1770  OPTIONAL
]],
[[
supportedBandCombinationList-v1780      BandCombinationList-v1780      OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-v1780  BandCombinationList-UplinkTxSwitch-v1780  OPTIONAL
]],
[[
supportedBandCombinationList-v1800      BandCombinationList-v1800      OPTIONAL,
supportedBandCombinationList-UplinkTxSwitch-v1800  BandCombinationList-UplinkTxSwitch-v1800  OPTIONAL,
supportedBandCombinationListSL-U2U-Relay-r18      SEQUENCE {
    supportedBandCombinationListSL-U2U-RelayDiscovery-r18  OCTET STRING      OPTIONAL, -- Contains PC5
-- BandCombinationListSidelinkNR-r16
    supportedBandCombinationListSL-U2U-DiscoveryExt  BandCombinationListSL-Discovery-r17      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
    }
}
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
    }
}
}
...
[[
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
    }
}
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
    }
}
}
]],

```

```

[[
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)
}
-- 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
  }
}
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
  }
}
rasterShift7dot5-IAB-r16             ENUMERATED {supported}          OPTIONAL,
ue-PowerClass-v1610                 ENUMERATED {p1dot5}            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

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activeConfiguredGrant-r16          SEQUENCE {
maxNumberConfigsPerBWP-r16        ENUMERATED {n1, n2, n4, n8, n12},
maxNumberConfigsAllCC-r16         INTEGER (2..32)
}
-- 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}
-- R1 12-2: Multiple SPS configurations
sps-r16                             SEQUENCE {
maxNumberConfigsPerBWP-r16        INTEGER (1..8),
maxNumberConfigsAllCC-r16         INTEGER (2..32)
}
-- 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}
-- R1 13-19: Simultaneous positioning SRS and MIMO SRS transmission within a band across multiple CCs
simulSRS-TransWithinBand-r16        ENUMERATED {n2}
trs-AdditionalBandwidth-r16          ENUMERATED {trs-AddBW-Set1, trs-AddBW-Set2}
handoverIntraF-IAB-r16              ENUMERATED {supported}
]],
[[
-- 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
-- R1 10: NR-unlicensed
sharedSpectrumChAccessParamsPerBand-v1630  SharedSpectrumChAccessParamsPerBand-v1630
]],
[[
handoverUTRA-FDD-r16                ENUMERATED {supported}
-- R4 7-4: Report the shorter transient capability supported by the UE: 2, 4 or 7us
enhancedUL-TransientPeriod-r16        ENUMERATED {us2, us4, us7}
sharedSpectrumChAccessParamsPerBand-v1640  SharedSpectrumChAccessParamsPerBand-v1640
]],
[[
type1-PUSCH-RepetitionMultiSlots-v1650    ENUMERATED {supported}
type2-PUSCH-RepetitionMultiSlots-v1650    ENUMERATED {supported}
pusch-RepetitionMultiSlots-v1650         ENUMERATED {supported}
configuredUL-GrantType1-v1650           ENUMERATED {supported}
configuredUL-GrantType2-v1650           ENUMERATED {supported}
sharedSpectrumChAccessParamsPerBand-v1650  SharedSpectrumChAccessParamsPerBand-v1650
]],
[[
enhancedSkipUplinkTxConfigured-v1660      ENUMERATED {supported}
enhancedSkipUplinkTxDynamic-v1660        ENUMERATED {supported}
]],
[[
maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16    ENUMERATED {n10, n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100}
txDiversity-r16                          ENUMERATED {supported}
]],
[[
-- R1 36-1: Support of 1024QAM for PDSCH for FR1
pdsch-1024QAM-FR1-r17                   ENUMERATED {supported}
-- R4 22-1 support of FR2 HST operation
ue-PowerClass-v1700                     ENUMERATED {pc5, pc6, pc7}
-- R1 24: NR extension to 71GHz (FR2-2)
fr2-2-AccessParamsPerBand-r17           FR2-2-AccessParamsPerBand-r17
]]

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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,
eventA4BasedHandover-r17	ENUMERATED {supported}	OPTIONAL,
mn-InitiatedCondPSCellChangeNRDC-r17	ENUMERATED {supported}	OPTIONAL,
sn-InitiatedCondPSCellChangeNRDC-r17	ENUMERATED {supported}	OPTIONAL,
-- R1 29-3a: PDCCH skipping		
pdccch-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		
pdccch-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,


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-- 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,
}
-- 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}
}
-- 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 (e)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}
}
-- 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},

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    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
]],

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```

[[
-- 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,
]],
[[
-- R1 41-3-1a UE automomous TA adjustment when cell-reselection happens
posUE-TA-AutoAdjustment-r18               ENUMERATED {supported}          OPTIONAL,
-- R1 41-3-1: SRS for positioning configuration in multiple cells for UEs in RRC_INACTIVE state for initial UL BWP
posSRS-ValidityAreaRRC-InactiveInitialUL-BWP-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 41-3-2: SRS for positioning configuration in multiple cells for UEs in RRC_INACTIVE state for configured outside
-- initial UL BWP
posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP-r18  ENUMERATED {supported}          OPTIONAL,
-- R1 41-5-1: PRS measurement with Rx frequency hopping within a MG and measurement reporting RRC_CONNECTED for RedCap UEs
dl-PRS-MeasurementWithRxFH-RRC-ConnectedForRedCap-r18  DL-PRS-MeasurementWithRxFH-RRC-Connected-r18  OPTIONAL,
-- R1 41-5-2: Support of positioning SRS with Tx frequency hopping in RRC_CONNECTED for RedCap UEs
posSRS-TxFH-RRC-ConnectedForRedCap-r18        PosSRS-TxFrequencyHoppingRRC-Connected-r18    OPTIONAL,
-- R1 41-5-2a: Support of positioning SRS with Tx frequency hopping in RRC_INACTIVE for RedCap UEs
posSRS-TxFH-RRC-InactiveForRedCap-r18        PosSRS-TxFrequencyHoppingRRC-Inactive-r18     OPTIONAL,
-- R1 41-4-8: Support of Positioning SRS bandwidth aggregation in RRC_INACTIVE

```

```

posSRS-BWA-RRC-Inactive-r18                               PosSRS-BWA-RRC-Inactive-r18                               OPTIONAL,
-- R1 41-4-6a support a Rel-17 single DCI scheduling positioning SRS resource sets across the linked carriers
-- for SRS bandwidth aggregation in RRC_CONNECTED state
posJointTriggerBySingleDCI-RRC-Connected-r18            ENUMERATED {supported}                               OPTIONAL,
-- R1 41-5-1a PRS measurement with Rx frequency hopping in RRC_INACTIVE for RedCap UEs
dl-PRS-MeasurementWithRxFH-RRC-InactiveforRedCap-r18    ENUMERATED {supported}                               OPTIONAL,
-- R1 41-5-1b PRS measurement with Rx frequency hopping in RRC_IDLE for RedCap UEs
dl-PRS-MeasurementWithRxFH-RRC-IdleforRedCap-r18        ENUMERATED {supported}                               OPTIONAL,
-- R1 42-1: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting
spatialAdaptation-CSI-Feedback-r18                      SEQUENCE {
  csiFeedbackType-r18                                  ENUMERATED {sdType1, sdType2, both},
  maxNumberLmax-r18                                    INTEGER (2..4),
  maxNumberCSI-ResourcePerCC-r18                      SEQUENCE {
    sdType1-Resource-r18                               INTEGER (1..32),
    sdType2-Resource-r18                               INTEGER (1..32)
  },
  maxNumberTotalCSI-ResourcePerCC-r18                 SEQUENCE {
    sdType1-Resource-r18                               ENUMERATED {n8, n16, n24, n32, n64, n128},
    sdType2-Resource-r18                               ENUMERATED {n8, n16, n24, n32, n64, n128}
  },
  totalNumberCSI-Reporting-r18                        INTEGER (2..4)
}
-- R1 42-1a: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI
-- reporting on PUSCH
spatialAdaptation-CSI-FeedbackPUSCH-r18                SEQUENCE {
  csiFeedbackType-r18                                  ENUMERATED {sdType1, sdType2, both},
  maxNumberLmax-r18                                    INTEGER (2..8),
  subReportCSI-r18                                     INTEGER (2..4),
  maxNumberCSI-ResourcePerCC-r18                      INTEGER (1..32),
  maxNumberTotalCSI-ResourcePerCC-r18                 ENUMERATED {n8, n16, n24, n32, n64, n128},
  totalNumberCSI-Reporting-r18                        INTEGER (2..12)
}
-- R1 42-1b: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting
spatialAdaptation-CSI-FeedbackAperiodic-r18            SEQUENCE {
  csiFeedbackType-r18                                  ENUMERATED {sdType1, sdType2, both},
  maxNumberLmax-r18                                    INTEGER (2..8),
  subReportCSI-r18                                     INTEGER (2..4),
  maxNumberCSI-ResourcePerCC-r18                      SEQUENCE {
    sdType1-Resource-r18                               INTEGER (1..32),
    sdType2-Resource-r18                               INTEGER (1..32)
  },
  maxNumberTotalCSI-ResourcePerCC-r18                 SEQUENCE {
    sdType1-Resource-r18                               ENUMERATED {n8, n16, n24, n32, n64, n128},
    sdType2-Resource-r18                               ENUMERATED {n8, n16, n24, n32, n64, n128}
  },
  totalNumberCSI-Reporting-r18                        INTEGER (2..12)
}
-- R1 42-1c: Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent
-- CSI reporting on PUCCH
spatialAdaptation-CSI-FeedbackPUCCH-r18                SEQUENCE {
  csiFeedbackType-r18                                  ENUMERATED {sdType1, sdType2, both},
  maxNumberLmax-r18                                    INTEGER (2..4),
  subReportCSI-r18                                     INTEGER (2..4),
  maxNumberCSI-ResourcePerCC-r18                      INTEGER (1..32),

```

```

    maxNumberTotalCSI-ResourcePerCC-r18      ENUMERATED {n8, n16, n24, n32, n64, n128},
    totalNumberCSI-Reporting-r18             INTEGER (2..4)
}
-- R1 42-2: Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting
powerAdaptation-CSI-Feedback-r18            SEQUENCE {
    maxNumberLmax-r18                       INTEGER (2..4),
    maxNumberCSI-ResourcePerCC-r18         INTEGER (1..32),
    maxNumberTotalCSI-ResourcePerCC-r18    ENUMERATED {n8, n16, n24, n32, n64, n128},
    totalNumberCSI-Reporting-r18           INTEGER (2..4)
}
-- R1 42-2a: Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI
-- reporting on PUSCH
powerAdaptation-CSI-FeedbackPUSCH-r18      SEQUENCE {
    maxNumberLmax-r18                       INTEGER (2..8),
    subReportCSI-r18                       INTEGER (2..4),
    maxNumberCSI-ResourcePerCC-r18         INTEGER (1..32),
    maxNumberTotalCSI-ResourcePerCC-r18    ENUMERATED {n8, n16, n24, n32, n64, n128},
    totalNumberCSI-Reporting-r18           INTEGER (2..12)
}
-- R1 42-2b: Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting
powerAdaptation-CSI-FeedbackAperiodic-r18  SEQUENCE {
    maxNumberLmax-r18                       INTEGER (2..8),
    subReportCSI-r18                       INTEGER (2..4),
    maxNumberCSI-ResourcePerCC-r18         INTEGER (1..32),
    maxNumberTotalCSI-ResourcePerCC-r18    ENUMERATED {n8, n16, n24, n32, n64, n128},
    totalNumberCSI-Reporting-r18           INTEGER (2..12)
}
-- R1 42-2c: Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI
-- reporting on PUCCH
powerAdaptation-CSI-FeedbackPUCCH-r18      SEQUENCE {
    maxNumberLmax-r18                       INTEGER (2..4),
    subReportCSI-r18                       INTEGER (2..4),
    maxNumberCSI-ResourcePerCC-r18         INTEGER (1..32),
    maxNumberTotalCSI-ResourcePerCC-r18    ENUMERATED {n8, n16, n24, n32, n64, n128},
    totalNumberCSI-Reporting-r18           INTEGER (2..4)
}
-- R1 42-4: Cell DTX and/or DRX operation based on RRC configuration
nes-CellDTX-DRX-r18                        ENUMERATED {cellDTXonly, cellDRXonly, both}
-- R1 42-5: Cell DTX/DRX operation triggered by DCI format 2_9
nes-CellDTX-DRX-DCI2-9-r18                ENUMERATED {supported}
-- R1 42-7: Mixed codebook combination for spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s),
-- each containing one port subset configuration
mixCodeBookSpatialAdaptation-r18          ENUMERATED {supported}
-- R1 44-2: NTN DMRS bundling enhancement for PUSCH in NGSO scenarios
ntn-DMRS-BundlingNGSO-r18                 ENUMERATED {n4, n8, n16, n32}
-- R1 45-3: Beam indication with joint DL/UL LTM TCI states
ltm-BeamIndicationJointTCI-r18            SEQUENCE {
    maxNumberJointTCI-PerCell-r18          ENUMERATED {n8,n12,n16,n24,n32,n48,n64,n128},
    qcl-Resource-r18                      ENUMERATED {srs, trs, both},
    maxNumberJointTCI-AcrossCells-r18     INTEGER (1..128),
    maxNumberCells-r18                    INTEGER (1..8)
}
-- R1 45-3a: MAC-CE activated joint LTM TCI states
ltm-MAC-CE-JointTCI-r18                   SEQUENCE {

```

```

    qcl-Resource-r18
    maxNumberJointTCI-PerCell-r18
    maxNumberJointTCI-AcrossCells-r18
}
-- R1 45-4: Beam indication with separate DL/UL LTM TCI states
ltm-BeamIndicationSeparateTCI-r18
    maxNumberDL-TCI-PerCell-r18
    maxNumberUL-TCI-PerCell-r18
    qcl-Resource-r18
    maxNumberDL-TCI-AcrossCells-r18
    maxNumberUL-TCI-AcrossCells-r18
    maxNumberCells-r18
}
-- R1 45-4a: MAC-CE activated DL/UL LTM TCI states
ltm-MAC-CE-SeparateTCI-r18
    qcl-Resource-r18
    maxNumberDL-TCI-PerCell-r18
    maxNumberUL-TCI-PerCell-r18
    maxNumberDL-TCI-AcrossCells-r18
    maxNumberUL-TCI-AcrossCells-r18
}
-- R1 45-5: RACH-based early TA acquisition
rach-EarlyTA-Measurement-r18
-- R1 45-6: UE-based TA measurement
ue-TA-Measurement-r18
-- R1 45-7: TA indication in cell switch command
ta-IndicationCellSwitch-r18

-- R1 50-1: Multi-PUSCHs for Configured Grant
multiPUSCH-CG-r18
-- R1 50-1a: Multiple active multi-PUSCHs configured grant configurations for a BWP of a serving cell
multiPUSCH-ActiveConfiguredGrant-r18
    maxNumberConfigsPerBWP
    maxNumberConfigsAllCC-FR1
    maxNumberConfigsAllCC-FR2
}
-- R1 50-1b: Joint release in a DCI for two or more configured grant Type 2 configurations, including multi-PUSCH CG
-- configuration(s), for a given BWP of a serving cell
jointReleaseDCI-r18
-- R1 50-2: UCI indication of unused CG-PUSCH transmission occasions
cg-PUSCH-UTO-UCI-Ind-r18
-- R1 50-3: PDCCH monitoring resumption after UL NACK
pdcch-MonitoringResumptionAfterUL-NACK-r18

-- R1 51-1: support for 3MHz channel bandwidth
support-3MHz-ChannelBW-r18
-- R1 51-2: support 12 PRB CORESET0
support-12PRB-CORESET0-r18

-- R1 52-1: Reception of NR PDCCH candidates overlapping with LTE CRS REs
nr-PDCCH-OverlapLTE-CRS-RE-r18
    overlapInRE-r18
    overlapInSymbol-r18
}

```

ENUMERATED {srs, trs, both},
 INTEGER (1..16),
 ENUMERATED {n1,n2,n3,n4,n8,n16,n32}

OPTIONAL,

SEQUENCE {
 ENUMERATED {n4,n8,n12,n16,n24,n32,n48,n64,n128},
 ENUMERATED {n4,n8,n12,n16,n24,n32,n48,n64},
 ENUMERATED {srs, trs, both},
 INTEGER (1..128),
 INTEGER (1..64),
 INTEGER (1..8)

OPTIONAL,

SEQUENCE {
 ENUMERATED {srs, trs, both},
 INTEGER (1..8),
 INTEGER (1..8),
 ENUMERATED {n1,n2,n4,n8,n16},
 ENUMERATED {n1,n2,n4,n8,n16}

OPTIONAL,

INTEGER (1..8) OPTIONAL,

INTEGER (1..8) OPTIONAL,

ENUMERATED {supported} OPTIONAL,

ENUMERATED {n16, n32}

OPTIONAL,

SEQUENCE {
 ENUMERATED {n1, n2, n4, n8, n12},
 INTEGER (2..32),
 INTEGER (2..32)

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

SEQUENCE {
 ENUMERATED {oneSymbolNoOverlap, someOrAllSymOverlap},
 ENUMERATED {symbol12, symbol1And2}

OPTIONAL,

```

-- Editor's Note: someOrAllSymOverlap considers to be supported in overlapInRE-r18 only if RAN4 performance requirements for
-- someOrAllSymOverlap are not defined
-- R1 52-1a: Reception of NR PDCCH candidates overlapping with LTE CRS REs with multiple non-overlapping CRS rate matching patterns
nr-PDCCH-OverlapLTE-CRS-RE-MultiPatterns-r18          ENUMERATED {supported}          OPTIONAL,
-- R1 52-1b: NR PDCCH reception that overlaps with LTE CRS within a single span of 3 consecutive OFDM symbols that is within the
-- first 4 OFDM symbols in a slot
nr-PDCCH-OverlapLTE-CRS-RE-Span-3-4-r18             ENUMERATED {supported}          OPTIONAL,
-- R1 52-2: Two LTE-CRS overlapping rate matching patterns within NR 15 kHz carrier overlapping with LTE carrier (regardless of
-- support or configuration of multi-TRP)
twoRateMatchingEUTRA-CRS-patterns-3-4-r18         SEQUENCE {
  maxNumberPatterns-r18                            INTEGER (2..6),
  maxNumberNon-OverlapPatterns-r18                 INTEGER (1..3)
}
-- R1 52-2a: Two LTE-CRS overlapping rate matching patterns with two different values of coresetPoolIndex within NR 15 kHz carrier
-- overlapping with LTE carrier
overlapRateMatchingEUTRA-CRS-Patterns-3-4-Diff-CS-Pool-r18  ENUMERATED {supported}          OPTIONAL,

-- R1 53-3: Support RLM/BM/BFD measurements based on NCD-SSB within active BWP
ncd-SSB-BWP-Wor-r18                                ENUMERATED {supported}          OPTIONAL,
-- R1 53-4: Support Support RLM/BM/BFD measurements based on CSI-RS when CD-SSB is outside active BWP
rlm-BM-BFD-CSI-RS-OutsideActiveBWP-r18            ENUMERATED {supported}          OPTIONAL,
-- R1 54-1: PRACH coverage enhancements
prach-CoverageEnh-r18                              ENUMERATED {supported}          OPTIONAL,
-- R1 54-1a: PRACH repetitions with less than N symbols gap
prach-Repetition-r18                               ENUMERATED {supported}          OPTIONAL,
-- R1 54-3: Dynamic waveform switching
dynamicWaveformSwitch-r18                          ENUMERATED {supported}          OPTIONAL,
-- R1 54-3a: PHR enhancement for dynamic waveform switching
dynamicWaveformSwitchPHR-r18                       ENUMERATED {supported}          OPTIONAL,
-- R1 54-3b: Dynamic waveform switching for intra-band UL CA
dynamicWaveformSwitchIntraCA-r18                   INTEGER (2..8)                  OPTIONAL,

-- R1 55-3: Multiple PUSCHs scheduling by single DCI for non-consecutive slots in FR1
multiPUSCH-SingleDCI-NonConsSlots-r18             ENUMERATED {supported}          OPTIONAL,
-- R1 55-2d: single-symbol DL-PRS used in RTT-based Propagation delay compensation
pdc-maxNumberPRS-ResourceProcessedPerSlot-r18     SEQUENCE {
  fr1-r18 SEQUENCE {
    scs-15kHz-r18                                  ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}  OPTIONAL,
    scs-30kHz-r18                                  ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}  OPTIONAL,
    scs-60kHz-r18                                  ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}  OPTIONAL,
  },
  fr2-r18 SEQUENCE {
    scs-60kHz-r18                                  ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}  OPTIONAL,
    scs-120kHz-r18                                 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64}  OPTIONAL,
  }
}
-- R4 27-2: LowerMSD for inter-band NR CA and EN-DC
lowerMSD-r18                                        SEQUENCE (SIZE (1..maxLowerMSD-r18)) OF LowerMSD-r18  OPTIONAL,
lowerMSD-ENDC-r18                                  SEQUENCE (SIZE (1..maxLowerMSD-r18)) OF LowerMSD-r18  OPTIONAL,
-- R4 28-1: Enhanced channel raster
enhancedChannelRaster-r18                           ENUMERATED {supported}          OPTIONAL,
-- R4 31-2 Beam sweeping factor reduction for FR2 unknown SCell activation

```

```

beamSweepingFactorReduction-r18          SEQUENCE {
  reduceForCellDetection                  ENUMERATED {n1, n2, n4, n6},
  reduceForSSB-L1-RSRP-Meas              INTEGER (0..7)
}
-- R4 34-1: Support of NR FR2 HST with simultaneous DL reception with two different QCL TypeD RSs
simultaneousReceptionTwoQCL-r18          ENUMERATED {supported}
-- R4 34-2: Enhanced FR2 HST RRM requirements for intra-band CA and inter-frequency measurements in connected mode
measEnhCAInterFreqFR2-r18                ENUMERATED {supported}
-- R4 34-4: Support of enhanced MAC CE for TCI state switch indication for FR2 HST
tci-StateSwitchInd-r18                    ENUMERATED {supported}
-- R4 35-2: the requirements defined for ATG UE with antenna array or omni-direction antenna requirements.
antennaArrayType-r18                      ENUMERATED {supported}
locationBasedCondHandoverATG-r18         ENUMERATED {supported}
-- R4 35-3: rated maximum output power value range from 23dBm to 40dBm with 1dB as granularity at maximum modulation order and full
-- PRB configurations.
maxOutputPowerATG-r18                     INTEGER (1..18)

eventA4BasedCondHandoverNES-r18          ENUMERATED {supported}
nesBasedCondHandoverWithDCI-r18          ENUMERATED {supported}
rachLessHandoverNTN-r18                  ENUMERATED {supported}
locationBasedCondHandoverEMC-r18         ENUMERATED {supported}
mt-CG-SDT-r18                             ENUMERATED {supported}
posSRS-PreconfigureRRC-InactiveInitialUL-BWP-r18
posSRS-PreconfigureRRC-InactiveOutsideInitialUL-BWP-r18
cg-SDT-PeriodicityExt-r18                ENUMERATED {supported}
-- R2: 2Rx XR UEs
supportOf2RxXR-r18                       ENUMERATED {supported}
}

BandNR-v16c0 ::=
  pusch-RepetitionTypeA-v16c0
  ...
}

LowerMSD-r18 ::=
  aggressorband1-r18 SEQUENCE {
    nr CHOICE {
      FreqBandIndicatorNR,
      FreqBandIndicatorEUTRA
    },
    aggressorband2-r18 FreqBandIndicatorNR
  }
  msd-Information-r18 SEQUENCE (SIZE (1..maxLowerMSDInfo-r18)) OF MSD-Information-r18
}

MSD-Information-r18 ::=
  msd-Type-r18 ENUMERATED {harmonic, harmonicMixing, crossBandIsolation, imd2, imd3, imd4, imd5, all, spare8, spare7,
    spare6, spare5, spare4, spare3, spare2, spare1},
  msd-PowerClass-r18 ENUMERATED {pc1dot5, pc2, pc3},
  msd-Class-r18 ENUMERATED {classI, classII, classIII, classIV, classV, classVI, classVII, classVIII }
}

-- TAG-RF-PARAMETERS-STOP
-- ASN1STOP

```


RF-Parameters field descriptions
<p><i>appliedFreqBandListFilter</i> In this field the UE mirrors the <i>FreqBandList</i> that the NW provided in the capability enquiry, if any, as described in clause 5.6.1.4. The UE filtered the band combinations in the <i>supportedBandCombinationList</i> in accordance with this <i>appliedFreqBandListFilter</i>. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field <i>eutra-nr-only</i> [10].</p>
<p><i>dummy1, dummy2</i> The fields are not used in the specification and the network ignores the received values.</p>
<p><i>supportedBandCombinationList</i> A list of band combinations that the UE supports for NR (and NR-DC, if requested). The <i>FeatureSetCombinationId</i>s in this list refer to the <i>FeatureSetCombination</i> entries in the <i>featureSetCombinations</i> list in the <i>UE-NR-Capability</i> IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field <i>eutra-nr-only</i> [10].</p>
<p><i>supportedBandCombinationListSidelinkEUTRA-NR</i> 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 <i>eutra-nr-only</i>.</p>
<p><i>supportedBandCombinationListSL-NonRelayDiscovery</i> A list of band combinations that the UE supports for NR sidelink non-relay discovery. The encoding is defined in PC5 <i>BandCombinationListSidelinkNR-r16</i>.</p>
<p><i>supportedBandCombinationListSL-RelayDiscovery</i> A list of band combinations that the UE supports for NR sidelink relay discovery. The encoding is defined in PC5 <i>BandCombinationListSidelinkNR-r16</i>.</p>
<p><i>supportedBandCombinationListSL-U2U-DiscoveryExt</i> This field indicates the band parameter in <i>BandCombinationListSL-Discovery-r17</i> that the UE supports for NR U2U sidelink relay discovery in a band included in <i>supportedBandCombinationListSL-U2U-RelayDiscovery</i>.</p>
<p><i>supportedBandCombinationListSL-U2U-RelayDiscovery</i> A list of band combinations that the UE supports for NR U2U sidelink relay discovery. The encoding is defined in PC5 <i>BandCombinationListSidelinkNR-r16</i>.</p>
<p><i>supportedBandCombinationList-UplinkTxSwitch</i> A list of band combinations that the UE supports dynamic uplink Tx switching for NR UL CA and SUL. The <i>FeatureSetCombinationId</i>s in this list refer to the <i>FeatureSetCombination</i> entries in the <i>featureSetCombinations</i> list in the <i>UE-NR-Capability</i> IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field <i>eutra-nr-only</i> [10].</p>
<p><i>supportedBandListNR</i> A list of NR bands supported by the UE. If <i>supportedBandListNR-v16c0</i> is included, the UE shall include the same number of entries, and listed in the same order, as in <i>supportedBandListNR</i> (without suffix).</p>

– *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 ::=
    supportedBandCombinationList          SEQUENCE {
        appliedFreqBandListFilter          BandCombinationList          OPTIONAL,
        . . .                               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
}
]],
[[
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
    }
    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
  ]],
  [[
    dummy1                                           BandCombinationList-v1770              OPTIONAL,
    dummy2                                           BandCombinationList-UplinkTxSwitch-v1770  OPTIONAL
  ]],
  [[
    supportedBandCombinationList-v1780              BandCombinationList-v1780              OPTIONAL,
    supportedBandCombinationListNEDC-Only-v1780      BandCombinationList-v1780              OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1780  BandCombinationList-UplinkTxSwitch-v1780  OPTIONAL
  ]],
  [[
    supportedBandCombinationList-v1800              BandCombinationList-v1800              OPTIONAL,
    supportedBandCombinationList-UplinkTxSwitch-v1800  BandCombinationList-UplinkTxSwitch-v1800  OPTIONAL
  ]]
}

RF-ParametersMRDC-v15g0 ::=
    supportedBandCombinationList-v15g0          SEQUENCE {
        supportedBandCombinationList-v15g0      BandCombinationList-v15g0          OPTIONAL,
        supportedBandCombinationListNEDC-Only-v15g0  BandCombinationList-v15g0          OPTIONAL
    }

RF-ParametersMRDC-v15n0 ::=
    supportedBandCombinationList-v15n0          SEQUENCE {
        BandCombinationList-v15n0              OPTIONAL
    }

RF-ParametersMRDC-v16e0 ::=
    supportedBandCombinationList-UplinkTxSwitch-v16e0  SEQUENCE {
        BandCombinationList-UplinkTxSwitch-v16e0  OPTIONAL
    }

-- TAG-RF-PARAMETERSMRDC-STOP
-- ASN1STOP

```

<i>RF-ParametersMRDC</i> field descriptions
<p><i>appliedFreqBandListFilter</i> In this field the UE mirrors the <i>FreqBandList</i> that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the <i>supportedBandCombinationList</i> in accordance with this <i>appliedFreqBandListFilter</i>.</p>
<p><i>dummy1, dummy2</i> The fields are not used in the specification and the network ignores the received values.</p>
<p><i>supportedBandCombinationList</i> A list of band combinations that the UE supports for (NG)EN-DC, or both (NG)EN-DC and NE-DC. The <i>FeatureSetCombinationId</i>s in this list refer to the <i>FeatureSetCombination</i> entries in the <i>featureSetCombinations</i> list in the <i>UE-MRDC-Capability</i> IE.</p>
<p><i>supportedBandCombinationListNE-DC-Only, supportedBandCombinationListNE-DC-Only-v1610, supportedBandCombinationListNE-DC-Only-v1780</i> A list of band combinations that the UE supports only for NE-DC. The <i>FeatureSetCombinationId</i>s in this list refer to the <i>FeatureSetCombination</i> entries in the <i>featureSetCombinations</i> list in the <i>UE-MRDC-Capability</i> IE.</p>
<p><i>supportedBandCombinationList-UplinkTxSwitch</i> A list of band combinations that the UE supports dynamic UL Tx switching for (NG)EN-DC. The <i>FeatureSetCombinationId</i>s in this list refer to the <i>FeatureSetCombination</i> entries in the <i>featureSetCombinations</i> list in the <i>UE-MRDC-Capability</i> IE.</p>

– *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
    ]],
    [[
    am-WithLongSN-NCR-r18        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
    ]],
    [[
    sdap-QoS-NCR-r18        ENUMERATED {supported}     OPTIONAL,
    sdap-HeaderNCR-r18      ENUMERATED {supported}     OPTIONAL
    ]]
}

-- TAG-SDAP-PARAMETERS-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

```

– *SharedSpectrumChAccessParamsSidelinkPerBand*

The IE *SharedSpectrumChAccessParamsSidelinkPerBand* is used to convey shared channel access related parameters related to NR sidelink communication, specific for a certain frequency band (not per feature set or band combination).

***SharedSpectrumChAccessParamsSidelinkPerBand* information element**

```
-- ASN1START
-- TAG-SHAREDSPECTRUMCHACCESSPARAMSSIDELINKPERBAND-START

SharedSpectrumChAccessParamsSidelinkPerBand-r18 ::= SEQUENCE {
  -- R1 47-k1:
  sl-DynamicChannelAccess-r18                ENUMERATED {supported}                OPTIONAL,
  -- R1 47-k6: Type1 LBT blocking Option 1
  sl-LBT-Option1-r18                         ENUMERATED {supported}                OPTIONAL,
  -- R1 47-k7: Type1 LBT blocking Option 2
  sl-LBT-Option2-r18                         ENUMERATED {supported}                OPTIONAL,
  -- R1 47-m1: Interlace RB-based SL transmission/reception
  sl-Interlace-RB-TxRx-r18                   ENUMERATED {supported}                OPTIONAL,
  -- R4 45-3: Power class for sidelink unlicensed
  sl-PowerClassUnlicensed-r18                ENUMERATED {pc5, spare7, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL
}

-- TAG-SHAREDSPECTRUMCHACCESSPARAMSSIDELINKPERBAND-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
]],
[[
pdcp-ParametersSidelink-r18        PDCP-ParametersSidelink-r18        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
  ]],
  [[
  sl-LBT-FailureDetectionRecovery-r18 ENUMERATED {supported}                OPTIONAL
  ]]
}

MAC-ParametersSidelinkXDD-Diff-r16 ::= SEQUENCE {
  multipleSR-ConfigurationsSidelink-r16 ENUMERATED {supported}                OPTIONAL,
  logicalChannelSR-DelayTimerSidelink-r16 ENUMERATED {supported}                OPTIONAL,
  ...
}

```

```

BandSidelinkEUTRA-r16 ::=
    freqBandSidelinkEUTRA-r16          SEQUENCE {
        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}
        }
        -- R1 15-9: Transmitting LTE sidelink mode 4 configured by NR Uu
        gnb-ScheduledMode4SidelinkEUTRA-r16 ENUMERATED {supported}
    }
    OPTIONAL,
    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
            }
        }
        extendedCP-RxSidelink-r16 ENUMERATED {supported}
    }
    OPTIONAL,
    OPTIONAL,
    OPTIONAL,
    --15-2
    sl-TransmissionModel-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}
        harq-ReportOnPUCCH-r16    ENUMERATED {supported}
    }
    OPTIONAL,
    OPTIONAL,
    OPTIONAL,
    --15-4
    sync-Sidelink-r16           SEQUENCE {
        gNB-Sync-r16              ENUMERATED {supported}
        gNB-GNSS-UE-SyncWithPriorityOnGNB-ENB-r16 ENUMERATED {supported}
        gNB-GNSS-UE-SyncWithPriorityOnGNSS-r16  ENUMERATED {supported}
    }
    OPTIONAL,
    OPTIONAL,
    OPTIONAL

```

```

}
--15-10
sl-Tx-256QAM-r16
--15-11
psfch-FormatZeroSidelink-r16
  psfch-RxNumber
  psfch-TxNumber
}
--15-12
lowSE-64QAM-MCS-TableSidelink-r16
--15-15
enb-sync-Sidelink-r16
...
[[
--15-3
sl-TransmissionMode2-r16
  harq-TxProcessModeTwoSidelink-r16
  scs-CP-PatternTxSidelinkModeTwo-r16
  dl-openLoopPC-Sidelink-r16
}
--15-5
congestionControlSidelink-r16
  cbr-ReportSidelink-r16
  cbr-CR-TimeLimitSidelink-r16
}
--15-22
fewerSymbolSlotSidelink-r16
--15-23
sl-openLoopPC-RSRP-ReportSidelink-r16
--13-1
sl-Rx-256QAM-r16
]],
[[
ue-PowerClassSidelink-r16
]],
[[
--32-4a
sl-TransmissionMode2-RandomResourceSelection-r17
  harq-TxProcessModeTwoSidelink-r17
  scs-CP-PatternTxSidelinkModeTwo-r17
    fr1-r17
      scs-15kHz-r17
      scs-30kHz-r17
      scs-60kHz-r17
    },
    fr2-r17
      scs-60kHz-r17
      scs-120kHz-r17
  }
  extendedCP-Mode2Random-r17
  dl-openLoopPC-Sidelink-r17
}

```

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

SEQUENCE {

ENUMERATED {n5, n15, n25, n32, n35, n45, n50, n64},

ENUMERATED {n4, n8, n16}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

SEQUENCE {

ENUMERATED {n8, n16},

ENUMERATED {supported}

ENUMERATED {supported}

OPTIONAL,

OPTIONAL

OPTIONAL,

SEQUENCE {

ENUMERATED {supported}

ENUMERATED {time1, time2}

OPTIONAL,

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL,

ENUMERATED {supported}

OPTIONAL

ENUMERATED {pc2, pc3, spare6, spare5, spare4, spare3, spare2, spare1}

OPTIONAL

SEQUENCE {

ENUMERATED {n8, n16},

CHOICE {

SEQUENCE {

BIT STRING (SIZE (16))

BIT STRING (SIZE (16))

BIT STRING (SIZE (16))

OPTIONAL,

OPTIONAL,

OPTIONAL

SEQUENCE {

BIT STRING (SIZE (16))

BIT STRING (SIZE (16))

OPTIONAL,

OPTIONAL

ENUMERATED {supported}

OPTIONAL,

OPTIONAL,

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,
}
--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
]],
[[
sharedSpectrumChAccessParamsSidelinkPerBand-r18 SharedSpectrumChAccessParamsSidelinkPerBand-r18 OPTIONAL,
-- R1 41-1-2: Receiving SL-PRS in a shared resource pool
sl-PRS-RxInSharedResourcePool-r18               ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-3: Receiving SL-PRS in a dedicated resource pool
sl-PRS-RxInDedicatedResourcePool-r18            ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-4a: Transmitting SL-PRS in a shared resource pool
sl-PRS-TxInSharedResourcePool-r18               ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-4b: Transmitting SL-PRS scheme 1 in a dedicated resource pool
sl-PRS-TxScheme1InDedicatedResourcePool-r18    ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-4c: Transmitting SL-PRS mode 2 in a dedicated resource pool
sl-PRS-TxScheme2InDedicatedResourcePool-r18    ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-5: SL-PRS congestion control in a dedicated resource pool
sl-PRS-CongestionCtrl-r18                       ENUMERATED {supported}           OPTIONAL,
-- R1 41-1-8: Support of random selection in a dedicated resource pool
sl-PRS-TxRandomSelection-r18                    ENUMERATED {supported}           OPTIONAL,
-- R1 47-sl: Transmission/Reception using dynamic resource pool sharing
sl-DynamicSharingTxRx-r18                       ENUMERATED {supported}           OPTIONAL,
-- R4 45-2: SL reception in intra-carrier guard band
sl-ReceptionIntraCarrierGuardBand-r18          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,
  ...,
  [[
  relayUE-U2U-OperationL2-r18                   ENUMERATED {supported}           OPTIONAL,
  remoteUE-U2U-OperationL2-r18                 ENUMERATED {supported}           OPTIONAL,
  remoteUE-U2N-PathSwitchOperationL2-r18       ENUMERATED {supported}           OPTIONAL,
  multipathRemoteUE-PC5L2-r18                  ENUMERATED {supported}           OPTIONAL,
  multipathRelayUE-N3C-r18                     ENUMERATED {supported}           OPTIONAL,

```

```

multipathRemoteUE-N3C-r18          ENUMERATED {supported}          OPTIONAL,
remoteUE-IndirectPathAddChangeToIdleInactiveRelay-r18  ENUMERATED {supported}          OPTIONAL,
pdcp-DuplicationMoreThanOneUuRLC-r18  ENUMERATED {supported}          OPTIONAL,
pdcp-CADuplicationDirectpath-DRB-r18  ENUMERATED {supported}          OPTIONAL,
pdcp-CADuplicationDirectpath-SRB-r18  ENUMERATED {supported}          OPTIONAL,
pdcp-DuplicationMP-SplitDRB-r18       ENUMERATED {supported}          OPTIONAL,
pdcp-DuplicationMP-SplitSRB-r18       ENUMERATED {supported}          OPTIONAL,
directpathRLF-RecoveryViaSRB1-r18     ENUMERATED {supported}          OPTIONAL
}}
}

PDCP-ParametersSidelink-r18 ::= SEQUENCE {
  pdcp-DuplicationSRB-sidelink-r18     ENUMERATED {supported}          OPTIONAL,
  pdcp-DuplicationDRB-sidelink-r18     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
    ]],
    [[
    spr-Report-r18          ENUMERATED {supported}    OPTIONAL,
    successIRAT-HO-Report-r18  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
```

– SupportedAggBandwidth

The IE *SupportedAggBandwidth* is used to indicate the aggregated bandwidth supported by the UE.

SupportedAggBandwidth information element

```
-- ASN1START
-- TAG-SUPPORTEDAGGBANDWIDTH-START

SupportedAggBandwidth-r17 ::= CHOICE {
    fr1-r17      ENUMERATED {mhz20, mhz30, mhz35, mhz40, mhz50, mhz60, mhz70, mhz80, mhz90, mhz100, mhz110, mhz120, mhz130, mhz140,
                            mhz150, mhz160, mhz180, mhz200, mhz220, mhz230, mhz250, mhz280, mhz290, mhz300, mhz350, mhz400, mhz450,
                            mhz500, mhz600, mhz700, mhz800, spare1},
    fr2-r17      ENUMERATED {mhz200, mhz300, mhz400, mhz500, mhz600, mhz700, mhz800, mhz900, mhz1000, mhz1100, mhz1200, mhz1300, mhz1400,
                            mhz1500, mhz1600, mhz1700, mhz1800, mhz1900, mhz2000, mhz2100, mhz2200, mhz2300, mhz2400, spare9, spare8,
                            spare7, spare6, spare5, spare4, spare3, spare2, spare1}
}
-- TAG-SUPPORTEDAGGBANDWIDTH-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
    ]],
    [[
    loggedMDT-PNI-NPN-r18                ENUMERATED {supported}  OPTIONAL,
    loggedMDT-SNPN-r18                   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 ::=
    mrdc-Request          SEQUENCE {
        omitEN-DC        ENUMERATED {true}          OPTIONAL,    -- Need N
        includeNR-DC     ENUMERATED {true}          OPTIONAL,    -- Need N
        includeNE-DC     ENUMERATED {true}          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
}
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
]],
    [[
lowerMSDRequest-r18      SEQUENCE {
    pc1dot5-r18           ENUMERATED {true}          OPTIONAL,    -- Need N

```

```
        pc2-r18          ENUMERATED {true}
        pc3-r18          ENUMERATED {true}
    }
}
}

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 <i>SupportedCSI-RS-Resource</i> 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 <i>codebookVariantsList</i> , <i>codebookParametersPerBand</i> and <i>codebookParametersPerBC</i> . If this field is present and none of the codebook types is requested within this field (i.e. empty field), the UE includes <i>SupportedCSI-RS-Resource</i> supported for all codebook types into <i>codebookVariantsList</i> , <i>codebookParametersPerBand</i> and <i>codebookParametersPerBC</i> .
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 <i>supportedBandCombinationList</i> , band combinations supporting only NE-DC shall be included in <i>supportedBandCombinationListNE-DC-Only</i> .
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.
lowerMSDRequest	Only if this field is present, the UE supporting lower MSD shall indicate the lower MSD capability for the requested power class if supported. If no power class is explicitly requested, the UE supporting lower MSD shall indicate the lower MSD capability for the highest supported power class of the band combination consisting of victim band and aggressor band(s).
mode	The mode of NR-DC operation that the NW is interested in for this cell grouping. The value <i>sync</i> 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 <i>async</i> 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 <i>mcg</i> bands on MCG and at least one of the <i>scg</i> bands on the SCG. In its <i>supportedBandCombinationList</i> , 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: <i>requestedCellGrouping</i> is set to <i>mcg</i> =[n1, n7, n41, n66] and <i>scg</i> =[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 <i>requestedCellGrouping</i> is set to <i>mcg</i> =[n1, n7, n41, n66] and <i>scg</i> =[n78, n261] and another <i>requestedCellGrouping</i> is set to <i>mcg</i> =[n1, n7, n66] and <i>scg</i> =[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 <i>includeNR-DC</i> 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 UE-MRDC-Capability-v1800 OPTIONAL
}

UE-MRDC-Capability-v1800 ::= SEQUENCE {
    -- R4 33-2: Support network control of requirementnetwork applicability for UE supporting interBandMRDC-WithOverlapDL-Bands-r16
    requirementTypeIndication-r18 ENUMERATED {supported} OPTIONAL,
    measAndMobParametersMRDC-v1810 MeasAndMobParametersMRDC-v1810 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 {
    flc-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 ::=
    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 ::=
    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 ::=
    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 ::=
    reducedCP-Latency                ENUMERATED {supported}             OPTIONAL,
    nonCriticalExtension              UE-NR-Capability-v1560            OPTIONAL
}

UE-NR-Capability-v1560 ::=
    nrDC-Parameters                 NRDC-Parameters                   OPTIONAL,
    receivedFilters                   OCTET STRING (CONTAINING UECapabilityEnquiry-v1560-IEs) OPTIONAL,
    nonCriticalExtension              UE-NR-Capability-v1570            OPTIONAL
}

UE-NR-Capability-v1570 ::=
    nrDC-Parameters-v1570            NRDC-Parameters-v1570              OPTIONAL,
    nonCriticalExtension              UE-NR-Capability-v1610            OPTIONAL
}

-- Late non-critical Rel-15 extensions:
UE-NR-Capability-v15c0 ::=
    nrDC-Parameters-v15c0            NRDC-Parameters-v15c0              OPTIONAL,
    partialFR2-FallbackRX-Req        ENUMERATED {true}                  OPTIONAL,
    nonCriticalExtension              UE-NR-Capability-v15g0            OPTIONAL
}

```

```
UE-NR-Capability-v15g0 ::=
  rf-Parameters-v15g0
  nonCriticalExtension
}
SEQUENCE {
  RF-Parameters-v15g0
  UE-NR-Capability-v15j0
}
OPTIONAL,
OPTIONAL

UE-NR-Capability-v15j0 ::=
  -- Following field is only for REL-15 late non-critical extensions
  lateNonCriticalExtension
  nonCriticalExtension
}
OCTET STRING
UE-NR-Capability-v16a0
OPTIONAL,
OPTIONAL

-- Regular non-critical Rel-16 extensions:
UE-NR-Capability-v1610 ::=
  inDeviceCoexInd-r16
  dl-DedicatedMessageSegmentation-r16
  nrdc-Parameters-v1610
  powSav-Parameters-r16
  fr1-Add-UE-NR-Capabilities-v1610
  fr2-Add-UE-NR-Capabilities-v1610
  bh-RLF-Indication-r16
  directSN-AdditionFirstRRR-IAB-r16
  bap-Parameters-r16
  referenceTimeProvision-r16
  sidelinkParameters-r16
  highSpeedParameters-r16
  mac-Parameters-v1610
  mcgRLF-RecoveryViaSCG-r16
  resumeWithStoredMCG-SCells-r16
  resumeWithStoredSCG-r16
  resumeWithSCG-Config-r16
  ue-BasedPerfMeas-Parameters-r16
  son-Parameters-r16
  onDemandSIB-Connected-r16
  nonCriticalExtension
}
SEQUENCE {
  ENUMERATED {supported}
  ENUMERATED {supported}
  NRDC-Parameters-v1610
  PowSav-Parameters-r16
  UE-NR-CapabilityAddFRX-Mode-v1610
  UE-NR-CapabilityAddFRX-Mode-v1610
  ENUMERATED {supported}
  ENUMERATED {supported}
  BAP-Parameters-r16
  ENUMERATED {supported}
  SidelinkParameters-r16
  HighSpeedParameters-r16
  MAC-Parameters-v1610
  ENUMERATED {supported}
  ENUMERATED {supported}
  ENUMERATED {supported}
  ENUMERATED {supported}
  UE-BasedPerfMeas-Parameters-r16
  SON-Parameters-r16
  ENUMERATED {supported}
  UE-NR-Capability-v1640
}
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
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OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL,
OPTIONAL

UE-NR-Capability-v1640 ::=
  redirectAtResumeByNAS-r16
  phy-ParametersSharedSpectrumChAccess-r16
  nonCriticalExtension
}
SEQUENCE {
  ENUMERATED {supported}
  Phy-ParametersSharedSpectrumChAccess-r16
  UE-NR-Capability-v1650
}
OPTIONAL,
OPTIONAL,
OPTIONAL

UE-NR-Capability-v1650 ::=
  mpsPriorityIndication-r16
  highSpeedParameters-v1650
  nonCriticalExtension
}
SEQUENCE {
  ENUMERATED {supported}
  HighSpeedParameters-v1650
  UE-NR-Capability-v1690
}
OPTIONAL,
OPTIONAL,
OPTIONAL

UE-NR-Capability-v1690 ::=
  ul-RRR-Segmentation-r16
  nonCriticalExtension
}
SEQUENCE {
  ENUMERATED {supported}
  UE-NR-Capability-v1700
}
OPTIONAL,
OPTIONAL

-- Late non-critical extensions from Rel-16 onwards:
```



```

-- Regular non-critical Rel-18 extensions:
UE-NR-Capability-v1800 ::= SEQUENCE {
    airToGroundNetwork-r18          ENUMERATED {supported}           OPTIONAL,
    eRedCapParameters-r18          ERedCapParameters-r18         OPTIONAL,
    ncr-Parameters-r18             NCR-Parameters-r18           OPTIONAL,
    softSatelliteSwitchResyncNTN-r18 ENUMERATED {supported}           OPTIONAL,
    hardSatelliteSwitchResyncNTN-r18 ENUMERATED {supported}           OPTIONAL,
    mt-SDT-r18                     ENUMERATED {supported}           OPTIONAL,
    mt-SDT-NTN-r18                 ENUMERATED {supported}           OPTIONAL,
    inDeviceCoexIndAutonomousDenial-r18 ENUMERATED {supported}           OPTIONAL,
    inDeviceCoexIndFDM-r18        ENUMERATED {supported}           OPTIONAL,
    inDeviceCoexIndTDM-r18        ENUMERATED {supported}           OPTIONAL,
    musim-GapPriorityPreference-r18 ENUMERATED {supported}           OPTIONAL,
    musim-CapabilityRestriction-r18 ENUMERATED {supported}           OPTIONAL,
    multiRx-FR2-Preference-r18    ENUMERATED {supported}           OPTIONAL,
    ra-InsteadCG-SDT-r18          ENUMERATED {supported}           OPTIONAL,
    resumeAfterSDT-Release-r18    ENUMERATED {supported}           OPTIONAL,
    ul-TrafficInfo-r18            ENUMERATED {supported}           OPTIONAL,
    aerialParameters-r18          AerialParameters-r18         OPTIONAL,
    --R4 40-2: beam steering
    ntn-VSAT-AntennaType-r18      ENUMERATED {electronic, mechanical} OPTIONAL,
    --R4 40-1: VSAT UE type in NTN
    ntn-VSAT-MobilityType-r18     ENUMERATED {fixed, mobile}       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 ::=
  bapHeaderRewriting-Rerouting-r17      SEQUENCE {
  bapHeaderRewriting-Routing-r17       ENUMERATED {supported}          OPTIONAL,
}                                         ENUMERATED {supported}          OPTIONAL
MBS-Parameters-r17 ::=
  maxMRB-Add-r17                        SEQUENCE {
}                                         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 ::=
  -- R1 29-1: Paging enhancement
  pei-SubgroupingSupportBandList-r17    SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR  OPTIONAL,
  ...
}
-- TAG-UE-RADIOPAGINGINFO-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
```

– *AppLayerIdleInactiveConfig*

The IE *AppLayerIdleInactiveConfig* indicates parameters specific to application layer measurements applicable to RRC_IDLE and RRC_INACTIVE.

***AppLayerIdleInactiveConfig* information element**

```
-- ASN1START
-- TAG-APPLAYERIDLEINACTIVECONFIG-START

AppLayerIdleInactiveConfig-r18 ::= SEQUENCE {
    measConfigAppLayerId-r18      MeasConfigAppLayerId-r17,
    serviceType-r18              ENUMERATED {streaming, mtsi, vr, spare5, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M
    appLayerMeasPriority-r18      INTEGER (1..16) OPTIONAL, -- Need M
    qoe-Reference-r18            OCTET STRING (SIZE (6)) OPTIONAL, -- Need M
    qoe-MeasurementType-r18      ENUMERATED {sbased, mbased} OPTIONAL, -- Need M
    qoe-AreaScope-r18           Qoe-AreaScope-r18 OPTIONAL, -- Need M
    mce-Id-r18                  OCTET STRING (SIZE (1)) OPTIONAL, -- Need M
    availableRAN-VisibleMetrics-r18 AvailableRAN-VisibleMetrics-r18 OPTIONAL, -- Need M
    ...
}

Qoe-AreaScope-r18 ::= CHOICE {
    cellGlobalIdList           CellGlobalIdList-r16,
    trackingAreaCodeList       TrackingAreaCodeList-r16,
    trackingAreaIdentityList    TrackingAreaIdentityList-r16,
    plmn-IdentityList          PLMN-IdentityList2-r16,
    ...
}

AvailableRAN-VisibleMetrics-r18 ::= SEQUENCE {
    appLayerBufferLevellist-r18 ENUMERATED {true} OPTIONAL, -- Need M
```

```

    playoutDelayForMediaStartup-r18    ENUMERATED {true}                                OPTIONAL, -- Need M
    ...
}
-- TAG-APPLAYERIDLEINACTIVECONFIG-STOP
-- ASN1STOP

```

***AppLayerIdleInactiveConfig* field descriptions**

<i>appLayerBufferLevelList</i>
The field defines whether the buffer level for DASH streaming and VR service types can be collected as a RAN visible QoE metric from the UE.
<i>qoe-AreaScope</i>
The field contains the area where the application layer measurement shall start if an application layer session starts.
<i>qoe-MeasurementType</i>
Indicates whether the application layer measurement is signalling based or management based.
<i>qoe-Reference</i>
Indicates the QoE Reference as defined in TS 28.405 [55], clause 5.2.
<i>mce-id</i>
The field contains the Measurement Collection Entity Id.
<i>playoutDelayForMediaStartup</i>
The field defines whether the playout delay for DASH streaming and VR service types can be collected as a RAN visible QoE metric from the UE.

– ***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-SegAllowedSRB4-r17 ENUMERATED {enabled} OPTIONAL, -- Need R
    ...
    [[
    rrc-SegAllowedSRB5-r18 ENUMERATED {enabled} OPTIONAL, -- Need R
    idleInactiveReportAllowed-r18 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
...
[[
reportingSRB-r18                   ENUMERATED {srb4, srb5}                          OPTIONAL, -- Cond QoENRDC
appLayerMeasPriority-r18            INTEGER (1..16)                          OPTIONAL, -- Cond Need M
appLayerIdleInactiveConfig-r18    SetupRelease {AppLayerIdleInactiveConfig-r18}  OPTIONAL -- Need M
]]
}

RAN-VisibleParameters-r17 ::=      SEQUENCE {
ran-VisiblePeriodicity-r17         ENUMERATED {ms120, ms240, ms480, ms640, ms1024}  OPTIONAL, -- Need S
numberOfBufferLevelEntries-r17    INTEGER (1..8)                                    OPTIONAL, -- Need R
reportPayoutDelayForMediaStartup-r17 BOOLEAN                                             OPTIONAL, -- Need M
...
[[
ran-VisibleReportingSRB-r18       ENUMERATED {srb4, srb5}                          OPTIONAL -- Cond QoENRDC
]]
}

-- TAG-APPLAYERMEASCONFIG-STOP
-- ASN1STOP

```


AppLayerMeasConfig field descriptions
<p>appLayerMeasPriority The field indicates the priority of the application layer measurement configuration, where a higher value indicates lower priority. If the field is not configured, the application layer measurement configuration has the lowest priority.</p>
<p>idleInactiveReportAllowed The field indicates whether transmission of application layer measurement reports collected in RRC_IDLE and/or RRC_INACTIVE is allowed and if transmission of application layer measurement configurations applicable to RRC_IDLE and/or RRC_INACTIVE is allowed. If the field is not configured, transmission of application layer measurement reports and/or configurations for RRC_IDLE/RRC_INACTIVE is not allowed.</p>
<p>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].</p>
<p>measConfigAppLayerId The field contains the identity of the application layer measurements. When application layer measurements are configured for an SCG, the <i>measConfigAppLayerId</i> is obtained according to TS 38.423 [37], clauses 8.3.1 and 8.3.3.</p>
<p>pauseReporting The field indicates whether the transmission of <i>measReportAppLayerContainer</i> is paused or not. Value <i>true</i> indicates the transmission of <i>measReportAppLayerContainer</i> is paused; value <i>false</i> indicates the transmission of <i>measReportAppLayerContainer</i> is not paused.</p>
<p>ran-VisibleParameters The field indicates whether RAN visible application layer measurements shall be reported or not.</p>
<p>ran-VisibleReportingSRB The field indicates the SRB to be used for transmission of RAN visible application layer measurement reports.</p>
<p>reportingSRB The field indicates the SRB to be used for transmission of encapsulated application layer measurement reports.</p>
<p>rrc-SegAllowedSRB4 This field indicates that RRC segmentation of <i>MeasurementReportAppLayer</i> is enabled on SRB4. The field is only configured for an MCG. It may be present only if the UE supports RRC segmentation of the <i>MeasurementReportAppLayer</i> message.</p>
<p>rrc-SegAllowedSRB5 This field indicates that RRC segmentation of <i>MeasurementReportAppLayer</i> is enabled on SRB5. The field is only configured for an SCG. It may be present only if the UE supports RRC segmentation of the <i>MeasurementReportAppLayer</i> message.</p>
<p>serviceType Indicates the type of application layer measurement. Value <i>streaming</i> indicates Quality of Experience Measurement Collection for streaming services (see TS 26.247 [68]), value <i>mtsi</i> indicates Quality of Experience Measurement Collection for MTSI (see TS 26.114 [69]) and value <i>vr</i> indicates Quality of Experience Measurement Collection for VR service (see TS 26.118 [70]). The network always configures <i>serviceType</i> when application layer measurements are initially configured and at <i>fullConfig</i>.</p>
<p>transmissionOfSessionStartStop Value <i>true</i> indicates that the UE shall transmit indications when the measurement session in the application layer starts and stops. Value <i>false</i> 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 <i>true</i> if a session already has started in the application layer.</p>

<i>RAN-VisibleParameters</i> field descriptions
<p><i>numberOfBufferLevelEntries</i> 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 <i>numberOfBufferLevelEntries</i>.</p>
<p><i>ran-VisiblePeriodicity</i> The field indicates the periodicity of RAN visible application layer measurements reporting. Value <i>ms120</i> indicates 120 ms, value <i>ms240</i> 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 <i>measConfigAppLayerContainer</i>.</p>
<p><i>reportPlayoutDelayForMediaStartup</i> The field indicates whether the UE shall report Playout Delay for Media Startup for RAN visible application layer measurements.</p>

Conditional Presence	Explanation
<i>QoENRDC</i>	This field is optionally present, Need M, when QoE for an NR-DC configuration is configured, i.e. when either QoE for an SCG is configured or when SRB5 is configured. Otherwise, it is absent.
<i>ServiceType</i>	This field is optionally present, Need M, when <i>serviceType</i> is set to <i>streaming</i> or <i>vr</i> . 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
}

AreaConfiguration-v1800 ::= SEQUENCE {
    cag-ConfigList-r18      CAG-ConfigList-r18 OPTIONAL, -- Need R
    snpn-ConfigList-r18    SNPN-ConfigList-r18 OPTIONAL -- Need R
}

AreaConfig-r16 ::= CHOICE {
    cellGlobalIdList-r16    CellGlobalIdList-r16,
    trackingAreaCodeList-r16 TrackingAreaCodeList-r16,
    trackingAreaIdentityList-r16 TrackingAreaIdentityList-r16
}

```

```
}
InterFreqTargetInfo-r16 ::= SEQUENCE {
    dl-CarrierFreq-r16
    cellList-r16
}
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
    trackingAreaCode-r16
}
CAG-ConfigList-r18 ::= SEQUENCE (SIZE (1..maxNPN-r16)) OF CAG-Config-r18
CAG-Config-r18 ::= SEQUENCE {
    plmn-Identity-r18
    cag-IdentityList-r18
}
SNPN-ConfigList-r18 ::= CHOICE {
    snpn-ConfigCellIdList-r18
    snpn-ConfigTAILList-r18
    snpn-ConfigIDList-r18
}
SNPN-ConfigCellIdList-r18 ::= SEQUENCE (SIZE (1..maxSNPN-ConfigCellId-r18)) OF SNPN-ConfigCellId-r18
SNPN-ConfigCellId-r18 ::= SEQUENCE {
    cgi-Identity-r18
    nid-IdentityList-r18
}
SNPN-ConfigTAILList-r18 ::= SEQUENCE (SIZE (1..maxSNPN-ConfigTAI-r18)) OF SNPN-ConfigTAI-r18
SNPN-ConfigTAI-r18 ::= SEQUENCE {
    tai-Identity-r18
    nid-IdentityList-r18
}
SNPN-ConfigIDList-r18 ::= SEQUENCE (SIZE (1..maxSNPN-ConfigID-r18)) OF SNPN-ConfigID-r18
SNPN-ConfigID-r18 ::= SEQUENCE {
    plmn-Identity-r18
    nid-IdentityList-r18
}
-- TAG-AREACONFIGURATION-STOP
-- ASN1STOP
```

AreaConfiguration field descriptions**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.

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.

nid-IdentityList

The *nid-IdentityList* contains one or more NID. All NIDs associated to the same PLMN ID are listed in the same *nid-IdentityList* entry.

– **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))
        }
    }
    ...
}

-- TAG-EUTRA-MBSFN-SUBFRAMECONFIGLIST-STOP
-- ASN1STOP
```

OPTIONAL, -- Need R

<i>EUTRA-MBSFN-SubframeConfig</i> field descriptions
radioframeAllocationOffset Field as defined in <i>MBSFN-SubframeConfig</i> in TS 36.331 [10].
radioframeAllocationPeriod Field as defined in <i>MBSFN-SubframeConfig</i> in TS 36.331 [10], where <i>SFN</i> refers to the SFN of the NR serving cell.
subframeAllocation1 Field as defined in <i>MBSFN-SubframeConfig</i> in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the <i>E-UTRA-MBSFN-SubframeConfig</i> is provided.
subframeAllocation2 Field as defined in <i>MBSFN-SubframeConfig-v1430</i> in TS 36.331 [10], where the UE assumes the duplex mode (FDD or TDD) of the NR cell for which the <i>E-UTRA-MBSFN-SubframeConfig</i> 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-MultiBandInfoListAerial*

The IE *EUTRA-MultiBandInfoListAerial* indicates the list of frequency bands for aerial UE in addition to the band represented by *CarrierFreq* for which cell reselection parameters are common, and a list of *additionalPmax* and *additionalSpectrumEmission*.

EUTRA-MultiBandInfoListAerial information element

```
-- ASN1START
-- TAG-EUTRA-MULTIBANDINFOLISTAERIAL-START

EUTRA-MultiBandInfoListAerial-r18 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF EUTRA-MultiBandInfoAerial-r18

EUTRA-MultiBandInfoAerial-r18 ::= SEQUENCE {
```

```

    eutra-FreqBandIndicator-r18          FreqBandIndicatorEUTRA,
    eutra-NS-PmaxListAerial-r18        EUTRA-NS-PmaxList          OPTIONAL    -- Need R
}
-- TAG-EUTRA-MULTIBANDINFOLISTAERIAL-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, TS 36.101 [22], table 6.2.4E-1 for UEs in CE or BL UEs, and TS 36.101 [22], table TBD for Aerial 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-PHYSCCELLID-START

EUTRA-PhysCellId ::=
    INTEGER (0..503)

-- TAG-EUTRA-PHYSCCELLID-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-PHYSCCELLIDRANGE-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}
}
-- TAG-EUTRA-PHYSCCELLIDRANGE-STOP
-- ASN1STOP
```

OPTIONAL -- Need N

– *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

```

<i>LogMeasResultListWLAN</i> 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].

<i>LogMeasResultListWLAN</i> field descriptions
<p><i>rssiWLAN</i> 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.</p>
<p><i>rtt-WLAN</i> 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].</p>
<p><i>rttValue</i> 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].</p>
<p><i>rttUnits</i> 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].</p>
<p><i>rttAccuracy</i> 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].</p>
<p><i>Ssid</i> Service Set Identifier (SSID) defined in IEEE 802.11-2012 [50].</p>
<p><i>Wlan-Identifiers</i> Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.</p>

– *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
            delayBudgetReportingProhibitTimer SEQUENCE {
                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}
    drx-PreferenceConfig-r16 SetupRelease {DRX-PreferenceConfig-r16}
    maxBW-PreferenceConfig-r16 SetupRelease {MaxBW-PreferenceConfig-r16}
    maxCC-PreferenceConfig-r16 SetupRelease {MaxCC-PreferenceConfig-r16}
    maxMIMO-LayerPreferenceConfig-r16 SetupRelease {MaxMIMO-LayerPreferenceConfig-r16}
    minSchedulingOffsetPreferenceConfig-r16 SetupRelease {MinSchedulingOffsetPreferenceConfig-r16}
    releasePreferenceConfig-r16 SetupRelease {ReleasePreferenceConfig-r16}
    referenceTimePreferenceReporting-r16 ENUMERATED {true}
    btNameList-r16 SetupRelease {BT-NameList-r16}
    wlanNameList-r16 SetupRelease {WLAN-NameList-r16}
    sensorNameList-r16 SetupRelease {Sensor-NameList-r16}
    obtainCommonLocation-r16 ENUMERATED {true}
    sl-AssistanceConfigNR-r16 ENUMERATED{true}
}
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need R

OtherConfig-v1700 ::= SEQUENCE {
    ul-GapFR2-PreferenceConfig-r17 ENUMERATED {true}
    musim-GapAssistanceConfig-r17 SetupRelease {MUSIM-GapAssistanceConfig-r17}
    musim-LeaveAssistanceConfig-r17 SetupRelease {MUSIM-LeaveAssistanceConfig-r17}
    successHO-Config-r17 SetupRelease {SuccessHO-Config-r17}
    maxBW-PreferenceConfigFR2-2-r17 ENUMERATED {true}
    maxMIMO-LayerPreferenceConfigFR2-2-r17 ENUMERATED {true}
    minSchedulingOffsetPreferenceConfigExt-r17 ENUMERATED {true}
    rlm-RelaxationReportingConfig-r17 SetupRelease {RLM-RelaxationReportingConfig-r17}
    bfd-RelaxationReportingConfig-r17 SetupRelease {BFD-RelaxationReportingConfig-r17}
    scg-DeactivationPreferenceConfig-r17 SetupRelease {SCG-DeactivationPreferenceConfig-r17}
    rrm-MeasRelaxationReportingConfig-r17 SetupRelease {RRM-MeasRelaxationReportingConfig-r17}
    propDelayDiffReportConfig-r17 SetupRelease {PropDelayDiffReportConfig-r17}
}
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Cond maxBW
OPTIONAL, -- Cond maxMIMO
OPTIONAL, -- Cond minOffset
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Cond SCG
OPTIONAL, -- Need M
OPTIONAL, -- Need M

OtherConfig-v1800 ::= SEQUENCE {
    idc-AssistanceConfig-v1800 SetupRelease {IDC-AssistanceConfig-v1800}
    multiRx-PreferenceReportingConfigFR2-r18 SetupRelease {MultiRx-PreferenceReportingConfigFR2-r18}
    aerial-FlightPathAvailabilityConfig-r18 ENUMERATED {true}
    ul-TrafficInfoReportingConfig-r18 SetupRelease {UL-TrafficInfoReportingConfig-r18}
    n3c-RelayUE-InfoReportConfig-r18 ENUMERATED {true}
    successPSCell-Config-r18 SetupRelease {SuccessPSCell-Config-r18}
    sn-InitiatedPSCellChange-r18 ENUMERATED {true}
    musim-GapPriorityAssistanceConfig-r18 ENUMERATED {true}
    musim-CapabilityRestrictionConfig-r18 SetupRelease {MUSIM-CapabilityRestrictionConfig-r18}
}
OPTIONAL, -- Need M
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Cond musimGapConfig
OPTIONAL, -- Need M

```

```

IDC-AssistanceConfig-v1800 ::= SEQUENCE {
    idc-FDM-AssistanceConfig-r18      SetupRelease {IDC-FDM-AssistanceConfig-r18}      OPTIONAL, -- Need M
    idc-TDM-AssistanceConfig-r18      ENUMERATED {setup}                          OPTIONAL, -- Cond FDM
}

MultiRx-PreferenceReportingConfigFR2-r18 ::= SEQUENCE {
    multiRx-PreferenceReportingConfigFR2ProhibitTimer-r18 ENUMERATED {
        s0, s0dot5, s1, s2, s3, s4, s5, s6, s7,
        s8, s9, s10, s20, s30, spare2, spare1}
}

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}
}

MUSIM-CapabilityRestrictionConfig-r18 ::= SEQUENCE {
    musim-CandidateBandList-r18      MUSIM-CandidateBandList-r18      OPTIONAL, -- Need M
    musim-WaitTimer-r18              ENUMERATED {ms10, ms20, ms40, ms60, ms80, ms100, spare2, spare1},
    musim-ProhibitTimer-r18          ENUMERATED {ms0, ms10, ms20, ms40, ms60, ms80, spare2, spare1}
}

MUSIM-CandidateBandList-r18 ::= SEQUENCE (SIZE (1..maxCandidateBandIndex-r18)) OF FreqBandIndicatorNR

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
    ...
}

SuccessPSCell-Config-r18 ::= SEQUENCE {
    thresholdPercentageT304-SCG-r18  ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}      OPTIONAL, --Need R
    thresholdPercentageT310-SCG-r18  ENUMERATED {p40, p60, p80, spare5, spare4, spare3, spare2, spare1}      OPTIONAL, --Need R
    thresholdPercentageT312-SCG-r18  ENUMERATED {p20, p40, p60, p80, spare4, spare3, spare2, spare1}      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}
}

RLM-RelaxationReportingConfig-r17 ::= SEQUENCE {
    rlm-RelaxtionReportingProhibitTimer    ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
        s60, s90, s120, s300, s600, infinity, spare2, spare1}
}

bfd-RelaxtionReportingConfig-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}
}

```

OPTIONAL -- Need R


```

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
}

IDC-FDM-AssistanceConfig-r18 ::= SEQUENCE {
    candidateServingFreqRangeListNR-r18 CandidateServingFreqRangeListNR-r18 OPTIONAL, -- Need R
    ...
}

CandidateServingFreqRangeListNR-r18 ::= SEQUENCE (SIZE (1..maxFreqIDC-r16)) OF CandidateServingFreqRangeNR-r18

CandidateServingFreqRangeNR-r18 ::= SEQUENCE {
    candidateCenterFreq-r18            ARFCN-ValueNR,
    candidateBandwidth-r18             ENUMERATED {khz200, khz400, khz600, khz800, mhz1, mhz2, mhz3, mhz4, mhz5,
                                                mhz6, mhz8, mhz10, mhz20, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100,
                                                mhz200, mhz300, mhz400} OPTIONAL -- Need R
}

UL-TrafficInfoReportingConfig-r18 ::= SEQUENCE {
    pdu-SessionsToReportUL-TrafficInfoList-r18 SEQUENCE (SIZE (1..maxNrofPDU-Sessions-r17)) OF PDU-SessionToReportUL-TrafficInfo-r18,
    ul-TrafficInfoProhibitTimer-r18          ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20, s30,
                                                s60, s90, s120, s300, s600, spare3, spare2, spare1}
}

PDU-SessionToReportUL-TrafficInfo-r18 ::= SEQUENCE {
    pdu-SessionID                      PDU-SessionID,
    qfi-ToReportUL-TrafficInfoList-r18 SEQUENCE (SIZE (1..maxNrofQFIs)) OF QFI
}

-- TAG-OTHERCONFIG-STOP
-- ASN1STOP

```

OtherConfig field descriptions
aerial-FlightPathAvailabilityConfig Configuration for the UE to indicate the availability of flight path information for Aerial UE operation.
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 <i>includeBT-Meas</i> is configured for one or more measurements.
candidateBandwidth Indicates the bandwidth of the candidate frequency range around the center frequency.
candidateCenterFreq Indicates the center frequency of the candidate frequency range.
candidateServingFreqListNR Indicates for each candidate NR serving cells, the center frequency around which UE is requested to report IDC issues.
candidateServingFreqRangeListNR Indicates the candidate frequency range with the combination of the center frequency and the candidate bandwidth, around which the 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot4</i> 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on.

<i>minSchedulingOffsetPreferenceConfig</i> Configuration for the UE to report assistance information to inform the gNB about the UE's preferred <i>minimumSchedulingOffset</i> value for cross-slot scheduling for power saving.
<i>minSchedulingOffsetPreferenceConfigExt</i> Configuration for the UE to report assistance information to inform the gNB about the UE's preferred <i>minimumSchedulingOffset</i> value for cross-slot scheduling for power saving for SCS 480 kHz and/or 960 kHz.
<i>minSchedulingOffsetPreferenceProhibitTimer</i> Prohibit timer for preferred <i>minimumSchedulingOffset</i> assistance information reporting. Value in seconds. Value <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on.
<i>multiRx-PreferenceReportingConfigFR2</i> Configuration for the UE to report assistance information to inform gNB about the UE's preference on multi-Rx operation for FR2.
<i>multiRx-PreferenceReportingConfigFR2ProhibitTimer</i> Prohibit timer for multi-Rx operation preference reporting for FR2. Value in seconds. Value <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on.
<i>musim-CandidateBandList</i> A list of candidate bands that the network intends to use, e.g., for serving cells and for which the UE is requested to provide information on temporary restricted capabilities for MUSIM operation as specified in clause 5.7.4.3.
<i>musim-GapAssistanceConfig</i> Configuration for the UE to report assistance information for gap preference.
<i>musim-GapPriorityAssistanceConfig</i> Indicates the UE is allowed to provide MUSIM assistance information for gap(s) priority or MUSIM gaps keep preference.
<i>musim-GapProhibitTimer</i> Prohibit timer for MUSIM assistance information reporting for gap preference.
<i>musim-LeaveAssistanceConfig</i> Configuration for the UE to report assistance information for leaving RRC_CONNECTED for MUSIM purpose.
<i>musim-LeaveWithoutResponseTimer</i> Indicates the timer for the UE to enter RRC_IDLE for MUSIM purpose as defined in clause 5.3.8.6.
<i>musim-ProhibitTimer</i> Indicates the prohibit timer for UE temporary restricted capabilities for MUSIM operation. Value in milliseconds. Value <i>ms0</i> means prohibit timer is set to 0 milliseconds, value <i>ms10</i> means prohibit timer is set to 10 milliseconds and so on.
<i>musim-WaitTimer</i> Indicates the wait timer for UE temporary restricted capabilities for MUSIM operation. Value in milliseconds. Value <i>ms10</i> means wait timer is set to 10 milliseconds, value <i>ms20</i> means wait timer is set to 20 milliseconds and so on.
<i>obtainCommonLocation</i> Requests the UE to attempt to have detailed location information available using GNSS. NR configures the field if <i>includeCommonLocationInfo</i> is configured for one or more measurements.
<i>overheatingAssistanceConfig</i> Configuration for the UE to report assistance information to inform the gNB about UE detected internal overheating.
<i>overheatingIndicationProhibitTimer</i> Prohibit timer for overheating assistance information reporting. Value in seconds. Value <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on.
<i>pdu-SessionsToReportUL-TrafficInfoList</i> A list of PDU sessions for which the UE shall report UL traffic information.
<i>propDelayDiffReportConfig</i> Configuration for the UE to report service link propagation delay difference between serving cell and neighbour cell(s).
<i>qfi-ToReportUL-TrafficInfoList</i> A list of QFIs of a PDU session for which the UE shall report UL traffic information.

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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on. Value <i>infinity</i> 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-StationaryConnected} " in 5.7.4.4. Value <i>dB2</i> corresponds to 2 dB, <i>dB3</i> 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 <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s1</i> 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 <i>includeSensor-Meas</i> is configured for one or more measurements.
sl-AssistanceConfigNR Indicate whether UE is configured to provide configured grant assistance information for NR sidelink communication.
sn-InitiatedPSCellChange This field indicates whether the PSCell change procedure included in the <i>RRCReconfiguration</i> message is SN initiated or not.
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 <i>otherConfig</i> configured by the source cell of the DAPS handover.
successHO-Config Configuration for the UE to report the successful handover information to the network.
successPSCell-Config Configuration for the UE to report the successful PSCell change or addition information to the network. When this field is configured in CG-Config, the <i>thresholdPercentageT304-SCG</i> is absent.
t-SearchDeltaP-Stationary Parameter "T _{SearchDeltaP-StationaryConnected} " in 5.7.4.4. Value in seconds. Value <i>s5</i> means 5 seconds, value <i>s10</i> 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 <i>p40</i> corresponds to 40%, value <i>p60</i> corresponds to 60% and so on. This field is set in the <i>otherConfig</i> 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 <i>p40</i> corresponds to 40%, value <i>p60</i> corresponds to 60% and so on. This field is set in the <i>otherConfig</i> 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 <i>p20</i> corresponds to 20%, value <i>p40</i> corresponds to 40% and so on. This field is set in the <i>otherConfig</i> configured by the source cell of the handover.
thresholdPercentageT304-SCG This field indicates the threshold for the ratio in percentage between the elapsed T304 timer associated to the target PSCell and the configured value of the T304 timer. Value <i>p40</i> corresponds to 40%, value <i>p60</i> corresponds to 60% and so on. This field is set in the <i>otherConfig</i> configured by the target PSCell of the PSCell change or addition.

thresholdPercentageT310-SCG This field indicates the threshold for the ratio in percentage between the elapsed T310 timer associated to the source PSCell and the configured value of the T310 timer. Value <i>p40</i> corresponds to 40%, value <i>p60</i> corresponds to 60% and so on. This field is set in the <i>otherConfig</i> configured by the source PSCell of the PSCell change, or in the <i>otherConfig</i> configured by the PCell for the PSCell change.
thresholdPercentageT312-SCG This field indicates the threshold for the ratio in percentage between the elapsed T312 timer associated to the measurement identity of the target PSCell and the configured value of the T312 timer. Value <i>p20</i> corresponds to 20%, value <i>p40</i> corresponds to 40% and so on. This field is set in the <i>otherConfig</i> configured by the source PSCell of the PSCell change, or in the <i>otherConfig</i> configured by the PCell for the PSCell change.
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 <i>includeWLAN-Meas</i> is configured for one or more measurements.
ul-TrafficInfoProhibitTimer Prohibit timer for UL traffic information reporting. Value in seconds. Value <i>s0</i> means prohibit timer is set to 0 seconds, value <i>s0dot5</i> means prohibit timer is set to 0.5 seconds, value <i>s1</i> means prohibit timer is set to 1 second and so on.
ul-TrafficInfoReportingConfig Configuration for the UE to report UL traffic information.

NeighbourCellInfo field descriptions

epochTime Indicates the epoch time used along with the <i>ephemerisInfo</i> 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
<i>FDM</i>	This field is optionally present, need M, if <i>idc-AssistanceConfig-r16</i> or <i>idc-FDM-AssistanceConfig</i> is setup. Otherwise, it is absent, need R.
<i>maxBW</i>	This field is optionally present, need R, if <i>maxBW-PreferenceConfig-r16</i> is setup; otherwise it is absent, need R.
<i>maxMIMO</i>	This field is optionally present, need R, if <i>maxMIMO-LayerPreferenceConfig-r16</i> is setup; otherwise it is absent, need R.
<i>minOffset</i>	This field is optionally present, need R, if <i>minSchedulingOffsetPreferenceConfig-r16</i> is setup; otherwise it is absent, need R.
<i>musimGapConfig</i>	This field is optionally present, need R, if <i>musim-GapAssistanceConfig-r17</i> is configured; otherwise it is absent, need R.
<i>SCG</i>	This field is optionally present, need M, in an <i>RRCReconfiguration</i> message not within <i>mrdc-SecondaryCellGroup</i> and received, either via SRB3 within <i>DLInformationTransferMRDC</i> 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
```

<i>Sensor-NameList</i> field descriptions
<i>measUncomBarPre</i> If configured, the UE reports the uncompensated Barometric pressure measurement as defined in TS 37.355 [49].
<i>measUeSpeed</i> If configured, the UE reports the UE speed measurement as defined in TS 37.355 [49].
<i>measUeOrientation</i> 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
        ]],
        [[
```

```

    successPSCell-InfoAvailable-r18
    ]]
}

-- 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
    }
  }
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
    }
  }
  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/positioning 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-PoolConfigA2X-r18   SetupRelease {SL-BWP-PoolConfig-r16}    OPTIONAL, -- Need M
            sl-BWP-PRS-PoolConfig-r18  SetupRelease {SL-BWP-PRS-PoolConfig-r18}  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
        ...,
        [[
            sl-LBT-FailureRecoveryConfig-r18 SetupRelease { SL-LBT-FailureRecoveryConfig-r18 }  OPTIONAL, -- Need M
            sl-StartingSymbolFirst-r18    ENUMERATED {sym0, sym1, sym2, sym3, sym4, sym5, sym6}  OPTIONAL, -- Need M
        ]]
```

```

sl-StartingSymbolSecond-r18          ENUMERATED {sym3, sym4, sym5, sym6, sym7}          OPTIONAL, -- Need M
sl-TransmissionStructureForPSCCHandPSSCH-r18 ENUMERATED {contiguousRB, interlaceRB}          OPTIONAL, -- Need M
sl-GapOfAdditionalSSSB-Occasion-r18    INTEGER (0..639)          OPTIONAL, -- Need M
sl-AbsoluteFrequencySSB-NonAnchorList-r18 SEQUENCE (SIZE (1.. maxSL-NonAnchorRBsets)) OF ARFCN-ValueNR          OPTIONAL, -- Need M
sl-CPE-StartingPositionS-SSB-r18      INTEGER (1..9)          OPTIONAL, -- Need M
sl-CWS-ForPsschWithoutHarqAck-r18     ENUMERATED {t1, t8, t16, t32, infinity}          OPTIONAL, -- Need M
sl-NumOfAdditionalSSSBOccasion-r18    INTEGER (0..4)          OPTIONAL, -- Need M
sl-SSSBPowerOffsetOfAnchorRBSet-r18   ENUMERATED {value1, value2}          OPTIONAL, -- Need M
sl-RBSetConfigList-r18                SEQUENCE (SIZE (1..5)) OF SL-RBSetConfig-r18          OPTIONAL, -- Need M
sl-IntraCellGuardBandsSL-List-r18    SEQUENCE (SIZE (1..maxSCSs)) OF IntraCellGuardBandsPerSCS-r16          OPTIONAL, -- Need M
]]
}

-- TAG-SL-BWP-CONFIG-STOP
-- ASN1STOP

```

SL-BWP-Config field descriptions

<i>sl-BWP-DiscPoolConfig</i>
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. <i>maxNrofRXPool-r16/maxNrofTXPool-r16</i>).
<i>sl-BWP-Generic</i>
This field indicates the generic parameters on the configured sidelink BWP.
<i>sl-BWP-Id</i>
An identifier for this sidelink bandwidth part.
<i>sl-BWP-PoolConfig</i>
This field indicates the resource pool configurations on the configured sidelink BWP.
<i>sl-BWP-PoolConfigA2X</i>
This field indicates the resource pool configurations for A2X services on the configured sidelink BWP. This field does not include <i>sl-TxPoolScheduling</i> . This field does not include <i>sl-TxPoolExceptional</i> .
<i>sl-BWP-PoolConfigPS</i>
This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include <i>sl-TxPoolExceptional</i> .
<i>sl-BWP-PRS-PoolConfig</i>
This field indicates the sidelink PRS dedicated resource pool configurations for SL-PRS on the configured sidelink BWP. This field does not include <i>sl-PRS-TxPoolExceptional</i> .

SL-BWP-Generic field descriptions
<p><i>sl-AbsoluteFrequencySSB-NonAnchorList</i> Indicates the lowest S-SSB in a non-anchor RB set via each parameter in this list. Anchor RB set refers to the RB set where S-SSB indicated by <i>sl-AbsoluteFrequencySSB-r16</i> locates.</p>
<p><i>sl-CPE-StartingPositionS-SSB</i> Indicates the CPE starting position within the GP symbol before S-SSB transmission. The value is an index of the set of all candidate CPE starting positions specified in Table 5.3.1-3 of [16, TS 38.211] for $C_i=1$ and the corresponding SCS of the SL BWP.</p>
<p><i>sl-CWS-ForPsschWithoutHarqAck</i> The latest CW_p is autonomously increased to the next higher allowed value for every priority class p of $\{1,2,3,4\}$ if the same CW_p which is different from $CW_(max,p)$ is consecutively used for general of N_init in SL Type 1 LBT for a number of times indicated by this parameter. This operation is restricted only to PSCCH/PSSCH transmission(s) with "HARQ feedback enabled/disabled indicator" in the 2nd stage SCI set to disabled, regardless of whether PSFCH resources being configured in a resource pool.</p>
<p><i>sl-GapOfAdditionalSSSB-Occasion</i> Indicate the gap between each R16/R17 NR SL S-SSB slot and its first corresponding additional candidate S-SSB occasion, and the gap between adjacent two additional candidate S-SSB occasions corresponding to a R16/R17 NR SL S-SSB slot.</p>
<p><i>sl-IntraCellGuardBandsSL-List</i> List of intra-cell guard bands for operation with shared spectrum channel access. 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. NOTE: Value '0' is not expected to be (pre-)configured for <i>nrofCRBs</i> when the SL BWP is larger than UE supported RF bandwidth for SL-U operation.</p>
<p><i>sl-LBT-FailureRecoveryConfig</i> Configures parameters used for detection and cancellation of sidelink consistent LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].</p>
<p><i>sl-LengthSymbols</i> 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.</p>
<p><i>sl-NumOfAdditionalSSSBOccasion</i> Indicate the number of additional candidate S-SSB occasion(s) for each R16/R17 NR SL S-SSB slot.</p>
<p><i>sl-SSSBPowerOffsetOfAnchorRBSet</i> Indicate the power offset for one S-SSB transmission on anchor RB set, where anchor RB set refers to the RB set where S-SSB indicated by <i>sl-AbsoluteFrequencySSB-r16</i> locates. Value <i>value1</i> corresponds to the power offset of $10\lg(N)$, where N is the number of S-SSB repetitions within the anchor RB set, and <i>value2</i> corresponds to the power offset of $10\lg(W)$, where W is the maximum total number of S-SSB repetitions on RB sets within the SL-BWP.</p>
<p><i>sl-StartingSymbolFirst</i> Indicates the location of first starting symbol within a slot. Value <i>sym0</i> corresponds to first symbol, value <i>sym1</i> corresponds to the second symbol and so on. If the field is not configured, the UE shall use value <i>sym0</i>.</p>
<p><i>sl-StartingSymbolSecond</i> Indicates the location of second starting symbol within a slot. Value <i>sym3</i> corresponds to fourth symbol, value <i>sym4</i> corresponds to the fifth symbol and so on. The number of symbols used for PSCCH/PSSCH transmission from second starting symbol is not smaller than 6. Within a slot, the second starting symbol is later than the first starting symbol. PSCCH/PSSCH transmission starting from first or second starting symbol shall have the same ending symbol within a slot.</p>
<p><i>sl-StartSymbol</i> 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.</p>
<p><i>sl-TransmissionStructureForPSCCHandPSSCH</i> Indicate a SL-BWP is (pre-)configured with contiguous RB-based or interlace RB-based PSCCH/PSSCH transmission. Contiguous RB-based PSCCH/PSSCH are applicable in region with no OCB requirement, or with OCB exemption.</p>
<p><i>sl-TxDirectCurrentLocation</i> 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.</p>

– *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
        ],
        [
            sl-BWP-PoolConfigCommonA2X-r18        SL-BWP-PoolConfigCommon-r16          OPTIONAL -- Need R
        ]
    }

-- TAG-SL-BWP-CONFIGCOMMON-STOP
-- ASN1STOP
```

***SL-BWP-ConfigCommon* field descriptions**

<i>sl-BWP-DiscPoolConfigCommon</i>
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. <i>maxNrofRXPool-r16/maxNrofTXPool-r16</i>).
<i>sl-BWP-Generic</i>
This field indicates the generic parameters on the configured sidelink BWP.
<i>sl-BWP-PoolConfigCommon</i>
This field indicates the resource pool configurations on the configured sidelink BWP.
<i>sl-BWP-PoolConfigCommonA2X</i>
This field indicates the resource pool configurations for A2X services on the configured sidelink BWP. This field does not include <i>sl-TxPoolExceptional</i> .
<i>sl-BWP-PoolConfigCommonPS</i>
This field indicates the resource pool configurations for power saving on the configured sidelink BWP. This field does not include <i>sl-TxPoolExceptional</i> .

– *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 <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> ; 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 <i>SL-ResourcePool</i> 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 <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> ; 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-BWP-PRS-PoolConfig*

The IE *SL-BWP-PRS-PoolConfig* is used to configure UE specific NR sidelink PRS dedicated resource pool.

***SL-BWP-PRSPoolConfig* information element**

```
-- ASN1START
-- TAG-SL-BWP-PRS-POOLCONFIG-START

SL-BWP-PRS-PoolConfig-r18 ::= SEQUENCE {
    sl-PRS-RxPool-r18                SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-PRS-ResourcePool-r18      OPTIONAL, -- Cond HO
    sl-PRS-TxPoolSelectedNormal-r18 SL-PRS-TxPoolDedicated-r18                                     OPTIONAL, -- Need M
    sl-PRS-TxPoolScheduling-r18      SL-PRS-TxPoolDedicated-r18                                     OPTIONAL, -- Need M
    sl-PRS-TxPoolExceptional-r18     SL-PRS-ResourcePoolConfig-r18                                     OPTIONAL  -- Need R
}

SL-PRS-TxPoolDedicated-r18 ::= SEQUENCE {
    sl-PRS-PoolToReleaseList-r1      SEQUENCE (SIZE (1..maxNrofSL-PRS-TxPool-r18)) OF SL-PRS-ResourcePoolID-r18  OPTIONAL, -- Need N
    sl-PRS-PoolToAddModList-r18     SEQUENCE (SIZE (1..maxNrofSL-PRS-TxPool-r18)) OF SL-PRS-ResourcePoolConfig-r18  OPTIONAL  -- Need N
}

SL-PRS-ResourcePoolConfig-r18 ::= SEQUENCE {
    sl-PRS-ResourcePoolID-r18        SL-PRS-ResourcePoolID-r18,
    sl-PRS-ResourcePool-r18          SL-PRS-ResourcePool-r18                                     OPTIONAL  -- Need M
}

-- TAG-SL-BWP-PRS-POOLCONFIG-STOP
-- ASN1STOP
```



```
SL-PRS-ResourcePoolID-r18 ::= INTEGER (1.. maxNrofSL-PRS-TxPool-r18)
```

```
-- TAG-SL-BWP-PRS-POOLCONFIG-STOP
-- ASN1STOP
```

SL-BWP-PRSPoolConfig field descriptions

sl-PRS-TxPoolSelectedNormal

Indicates the resources by which the UE is allowed to perform SL-PRS transmission by UE autonomous resource selection on the configured BWP.

sl-PRS-TxPoolScheduling

Indicates the resources by which the UE is allowed to perform SL-PRS transmission based on network selection on the configured BWP.

sl-PRS-TxPoolExceptional

Indicates the resources by which the UE is allowed to perform SL-PRS transmission in exceptional conditions on the configured BWP.

Conditional Presence	Explanation
<i>HO</i>	This field is optionally present, need M, in an <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> ; otherwise it is absent, Need M.

– *SL-BWP-PRS-PoolConfigCommon*

The IE *SL-BWP-PRSPoolConfigCommon* is used to configure the cell-specific NR sidelink PRS dedicated resource pool.

SL-BWP-PRS-PoolConfigCommon information element

```
-- ASN1START
-- TAG-SL-BWP-PRS-POOLCONFIGCOMMON-START

SL-BWP-PRS-PoolConfigCommon-r18 ::= SEQUENCE {
  sl-PRS-RxPool-r18          SEQUENCE (SIZE (1..maxNrofRXPool-r16)) OF SL-PRS-ResourcePool-r18          OPTIONAL, -- Need R
  sl-PRS-TxPoolSelectedNormal-r18 SEQUENCE (SIZE (1..maxNrofSL-PRS-TxPool-r18)) OF SL-PRS-ResourcePoolConfig-r18 OPTIONAL, -- Need R
  sl-PRS-TxPoolExceptional-r18   SL-PRS-ResourcePoolConfig-r18                               OPTIONAL, -- Need R
  ...
}

-- TAG-SL-BWP-PRSPoolConfigCommon-STOP
-- ASN1STOP
```

SL-BWP-PRS-PoolConfigCommon field descriptions

sl-PRS-TxPoolExceptional

Indicates the resources by which the UE is allowed to perform NR sidelink transmission in exceptional conditions on the configured BWP. This field is not present when *SL-BWP-PRS-PoolConfigCommon* is included in *SL-PreconfigurationNR*

– *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-CBR-CommonTxDedicated-SL-PRS-RP-List*

The IE *SL-CBR-CommonTxConfigListDedicated-SL-PRS-RP* indicates the list of SL PRS transmission parameters (such as Maximum SL PRS transmission power, Maximum Number of SL PRS (re-)transmissions, and CR limit) in *sl-CBR-SL-PRS-TxConfigList*, and the list of CBR ranges in *sl-CBR-RangeConfigList-Dedicated-SL-PRS-RP*, to configure congestion control to the UE for sidelink positioning.

SL-CBR-CommonTxDedicatedSL-PRS-RP-List information element

```

-- ASN1START
-- TAG- SL-CBR-COMMONTXDEDICATEDSL-PRS-RP-LIST-START

SL-CBR-CommonTxDedicatedSL-PRS-RP-List-r18 ::= SEQUENCE {
    sl-CBR-RangeDedicatedSL-PRS-RP-List-r18      SEQUENCE (SIZE (1..maxCBR-ConfigDedSL-PRS-1-r18)) OF SL-CBR-LevelsDedicatedSL-PRS-RP-r18
                                                    OPTIONAL,      -- Need M
    sl-CBR-SL-PRS-TxConfigList-r18                SEQUENCE (SIZE (1.. maxNrofSL-PRS-TxConfig-r18)) OF SL-CBR-SL-PRS-TxConfig-r18
                                                    OPTIONAL      -- Need M
}

SL-CBR-LevelsDedicatedSL-PRS-RP-r18 ::= SEQUENCE (SIZE (0..maxCBR-LevelDedSL-PRS-1-r18)) OF SL-CBR-Dedicated-SL-PRS-RP-r18

SL-CBR-SL-PRS-TxConfig-r18 ::= SEQUENCE {
    sl-PRS-CR-Limit-r18                          INTEGER(0..10000)                                OPTIONAL,      -- Need M
    sl-PRS-MaxTx-power-r18                       INTEGER (-30..33)                               OPTIONAL,      -- Need M
    sl-PRS-MaxNum-Transmissions-r18              INTEGER(1..32)                                OPTIONAL      -- Need M
}

SL-CBR-Dedicated-SL-PRS-RP-r18 ::= INTEGER (0..100)

-- TAG-SL-CBR-COMMONTXDEDICATEDSL-PRS-RP-LIST-STOP
-- ASN1STOP

```

SL-CBR-CommonTxDedicatedSL-PRS-RP-List field descriptions**sl-CBR-RangeDedicatedSL-PRS-RP-List**

Indicates the list of CBR ranges. Each entry of the list indicates in *SL-CBR-LevelsConfig-Dedicated-SL-PRS-RP* the upper bound of the CBR range for the respective entry. The upper bounds of the CBR ranges are configured in ascending order for consecutive entries of *SL-CBR-LevelsConfig-Dedicated-SL-PRS-RP*. For the first entry of *SL-CBR-LevelsConfig-Dedicated-SL-PRS-RP* 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-CBR-SL-PRS-TxConfigList

Indicates the list of available SL PRS transmission parameters configurations.

sl-PRS-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-PRS-MaxNum-Transmissions

Indicates maximum Number of SL PRS (re-)transmissions.

sl-PRS-MaxTx-power

Indicates maximum SL PRS transmission power. The unit is dBm.

– **SL-ConfigDedicatedNR**

The IE *SL-ConfigDedicatedNR* specifies the dedicated configuration information for NR sidelink communication/discovery/positioning.

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-DiscConfig-v1800                SL-DiscConfig-v1800                                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-RLC-BearerToAddModListSizeExt-v1800 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16  OPTIONAL,    -- Need N
    sl-RLC-BearerToReleaseListSizeExt-v1800 SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfigIndex-v1800 OPTIONAL,    -- Need N
    sl-FreqInfoToAddModListExt-v1800     SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigExt-v1800  OPTIONAL,    -- Need N
    sl-LBT-SchedulingRequestId-r18       SetupRelease {SchedulingRequestId}              OPTIONAL,    -- Need M
    sl-SyncFreqList-r18                  SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-Freq-Id-r16          OPTIONAL,    -- Need M
    sl-SyncTxMultiFreq-r18               ENUMERATED {true}                               OPTIONAL,    -- Need R
    sl-MaxTransPowerCA-r18               P-Max                                           OPTIONAL,    -- Need R
    sl-SCCH-CarrierSetConfig-r18        SetupRelease {SL-SCCH-CarrierSetConfigList-r18} OPTIONAL,    -- Need M
    sl-PRS-SchedulingRequestId-r18       SetupRelease {SchedulingRequestId}              OPTIONAL,    -- Need M
  ]]]
}

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
}

SL-DiscConfig-v1800 ::=          SEQUENCE {
    sl-RelayUE-ConfigU2U-r18      SetupRelease { SL-RelayUE-ConfigU2U-r18}    OPTIONAL, -- Cond U2URelayUE
    sl-RemoteUE-ConfigU2U-r18    SetupRelease { SL-RemoteUE-ConfigU2U-r18}    OPTIONAL  -- Cond U2URemoteUE
}

SL-SCCH-CarrierSetConfigList-r18 ::= SEQUENCE (SIZE (1..maxNrofSL-CarrierSetConfig-r18)) OF SL-SCCH-CarrierSetConfig-r18

SL-SCCH-CarrierSetConfig-r18 ::= SEQUENCE {
    sl-DestinationList-r18        SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIdentity-r16,
    sl-SRB-Identity-r18           SEQUENCE (SIZE (1..3)) OF SRB-Identity,
    sl-AllowedCarrierFreqSet1-r18 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16),
    sl-AllowedCarrierFreqSet2-r18 SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16)
}

-- TAG-SL-CONFIGDEDICATEDNR-STOP
-- ASN1STOP

```

SL-ConfigDedicatedNR field descriptions

sl-LBT-SchedulingRequestId

Indicates the scheduling request configuration applicable for sidelink consistent LBT failure report, as specified in TS 38.321 [3].

sl-MaxTransPowerCA

The maximum total transmit power to be used by the UE across all sidelink carriers.

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
<p>networkControlledSyncTx This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value <i>on</i> indicates the UE to transmit synchronisation information while value <i>off</i> indicates the UE to not transmit such information.</p>
<p>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].</p>
<p>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.</p>
<p>sl-FreqInfoToAddModList, sl-FreqInfoToAddModListExt This field indicates the NR sidelink communication configuration on some carrier frequency (ies) to add and/or modify. If the network includes <i>sl-FreqInfoToAddModListExt</i>, it includes the same number of entries, and listed in the same order, as in <i>sl-FreqInfoToAddModList</i>.</p>
<p>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.</p>
<p>sl-RLC-BearerToAddModList, sl-RLC-BearerToAddModListSizeExt This field indicates one or multiple sidelink RLC bearer configurations to add and/or modify.</p>
<p>sl-RLC-BearerToReleaseList, sl-RLC-BearerToReleaseListSizeExt This field indicates one or multiple sidelink RLC bearer configurations to remove.</p>
<p>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.</p>
<p>sl-RLC-ChannelToReleaseList This field indicates one or multiple PC5 Relay RLC Channel configurations to remove.</p>
<p>sl-ScheduledConfig Indicates the configuration for UE to transmit NR sidelink communication based on network scheduling. This field is not configured simultaneously with <i>sl-UE-SelectedConfig</i>. This field is not configured to a L2 U2N Remote UE.</p>
<p>sl-UE-SelectedConfig Indicates the configuration used for UE autonomous resource selection. This field is not configured simultaneously with <i>sl-ScheduledConfig</i>.</p>
<p>sl-CSI-Acquisition Indicates whether CSI reporting is enabled in sidelink unicast. If the field is absent, sidelink CSI reporting is disabled.</p>
<p>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].</p>
<p>sl-PRS-SchedulingRequestId If present, it indicates the scheduling request configuration applicable for Sidelink PRS Request MAC CE, as specified in TS 38.321 [3].</p>
<p>sl-SSB-PriorityNR This field indicates the priority of NR sidelink SSB transmission and reception.</p>
<p>sl-SyncFreqList Indicates a list of candidate carrier frequencies that can be used for the synchronisation of NR sidelink communication.</p>
<p>sl-SyncTxMultiFreq Indicates that the UE transmits S-SSB on multiple carrier frequencies for NR sidelink communication. If this field is absent, the UE transmits S-SSB only on the synchronisation carrier frequency.</p>

SL-SCCH-CarrierSetConfig field descriptions**sl-AllowedCarrierFreqSet1, sl-AllowedCarrierFreqSet2**

Indicates the set of carrier frequencies applicable for the transmission of the MAC SDUs from the sidelink SRB logical channels whose associated destination is included in sl-destinationList. If present, network ensures sl-AllowedCarrierFreqSet1 and sl-AllowedCarrierFreqSet2 do not include the same carrier frequency. The value 1 corresponds to the frequency of first entry in sl-FreqInfoList broadcast in SIB12, the value 2 corresponds to the frequency of first entry in sl-FreqInfoListSizeExt broadcast in SIB12, the value 3 corresponds to the frequency of second entry in sl-FreqInfoListSizeExt broadcast in SIB12 and so on.

sl-DestinationList

This field indicates the list of destination identify that the sl-AllowedCarrierFreqSet1 and sl-AllowedCarrierFreqSet2 apply. Only destination identity for unicast link can be included in this field.

sl-SRB-Identity

This field indicates the list of sidelink SRB identities that the sl-AllowedCarrierFreqSet1 and sl-AllowedCarrierFreqSet2 apply.

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.
U2URelayUE	For U2U Relay UE, the field is optionally present, Need M. Otherwise, it is absent.
U2URemoteUE	For U2U Remote UE, the field is optionally present, Need M. 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 ::=
    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
        }
    ...,
    [[
        sl-N1PUCCH-AN-Type2-r16          PUCCH-ResourceId            OPTIONAL, -- Need M
```



```
    ]],
    [[
    sl-StartRBsetCG-Type1-r18                INTEGER (0..4)                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
<p>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).</p>
<p>sl-ConfigIndexCG This field indicates the ID to identify sidelink configured grant.</p>
<p>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. <i>sl-Priority</i> corresponds to the logical channel priority.</p>
<p>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].</p>
<p>sl-HARQ-ProclD-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.</p>
<p>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 <i>sl-PUCCH-Config</i> and referred to by its ID.</p>
<p>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 <i>sl-PUCCH-Config</i> and referred to by its ID.</p>
<p>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.</p>
<p>sl-PeriodCG This field indicates the period of sidelink configured grant in the unit of ms.</p>
<p>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.</p>
<p>sl-ResourcePoolID Indicates the resource pool in which the sidelink configured grant type 1 is applied.</p>
<p>sl-StartRBsetCG-Type1 Indicates starting RB set index of the initial PSSCH transmission of the sidelink configured grant Type 1 for interlace RB-based PSSCH transmission.</p>
<p>sl-StartSubchannelCG-Type1 This field indicates the starting sub-channel of sidelink configured grant type 1. An index giving valid sub-channel index.</p>
<p>sl-TimeOffsetCG-Type1 This field indicates the slot offset with respect to logical slot defined by <i>sl-TimeReferenceSFN-Type1</i>, as specified in TS 38.321 [3].</p>
<p>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.</p>
<p>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].</p>

– *SL-ConfiguredGrantConfigDedicated-SL-PRS-RP*

The IE *SL-ConfiguredGrantConfig-Dedicated-SL-PRS-RP* specifies the configured grant configuration information for NR sidelink positioning in a dedicated SL-PRS resource pool.

***SL-ConfiguredGrantConfigDedicated-SL-PRS-RP* information element**

```
-- ASN1START
-- TAG-SL-CONFIGUREDGRANTCONFIGDEDICATEDSL-PRS-RP-START

SL-ConfiguredGrantConfigDedicatedSL-PRS-RP-r18 ::= SEQUENCE {
  sl-ConfigIndexCG-r18          SL-ConfigIndexCG-r16,
  sl-PeriodCG-r18              SL-PeriodCG-r16                      OPTIONAL, -- Need M
  sl-ResourcePoolID-r18        SL-ResourcePoolID-r16              OPTIONAL, -- Need M
  rrc-ConfiguredSidelinkGrantDedicated-SL-PRS-RP-r18 SEQUENCE {
    sl-TimeOffsetCG-Type1-r18   INTEGER (0..7999)                OPTIONAL, -- Need R
    sl-TimeReferenceSFN-Type1-r18 ENUMERATED {sfn512}          OPTIONAL, -- Need S
    sl-TimeResourceCG-Type1-r18 INTEGER (0..496)                OPTIONAL, -- Need M
    sl-PRS-ResourceIndicationFirstType1-r18 INTEGER(0..11)          OPTIONAL, -- Need M
    sl-PRS-ResourceIndicationFutureType1-r18 INTEGER(0..143)        OPTIONAL, -- Need M
  }
}

-- TAG-SL-CONFIGUREDGRANTCONFIGDEDICATEDSL-PRS-RP-STOP
-- ASN1STOP
```

***SL-ConfiguredGrantConfigDedicated-SL-PRS-RP* field descriptions**

sl-ConfigIndexCG

This field indicates the ID to identify sidelink configured grant. The field value should not be duplicated with *sl-ConfigIndexCG* in IE *SL-ConfiguredGrantConfig*.

sl-PeriodCG

This field indicates the period of SL PRS configured grant in a dedicated resources in ms for either CG type 1 or CG type 2.

sl-ResourcePoolID

Indicates the resource pool in which the configured sidelink grant Type 1 is applied. The field value should not be duplicated with *sl-ResourcePoolID* in IE *SL-ConfiguredGrantConfig*.

sl-TimeOffsetCG-Type1

This field indicates the slot offset with respect to logical slot defined by *sl-TimeReferenceSFN-Type1-Dedicated-SL-PRS-RP*, 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-PRS-ResourceIndicationFirstType1

Indicates SL-PRS Resource ID for the first SL-PRS transmission.

sl-PRS-ResourceIndicationFutureType1

Indicates SL-PRS resource IDs for future SL PRS transmissions. An index giving valid combinations of up to two SL PRS resource IDs (jointly encoded) .

– *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 ::=
    SL-DRX-ConfigGC-BC-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 ::=
    SL-DestinationIndex-r17          SEQUENCE {
        SL-DestinationIndex-r16          SL-DestinationIndex-r16          OPTIONAL,      -- Need N
        SL-DRX-ConfigUC-r17             SL-DRX-ConfigUC-r17             OPTIONAL,      -- Need N
        ...
    }

-- TAG-SL-DRX-CONFIG-STOP
-- ASN1STOP
```

<i>SL-DRX-Config</i> field descriptions	
<i>sl-DRX-ConfigGC-BC</i>	This field indicates the sidelink DRX configurations for groupcast and broadcast communication, as specified in TS 38.321 [3].
<i>sl-DRX-ConfigUC-ToReleaseList</i>	This field indicates the sidelink DRX configurations for corresponding unicast destinations to remove.
<i>sl-DRX-ConfigUC-ToAddModList</i>	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 <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> ; 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 ::=
  sl-DRX-GC-HARQ-RTT-Timer1-r17
  sl-DRX-GC-HARQ-RTT-Timer2-r17
  sl-DRX-GC-RetransmissionTimer-r17
SEQUENCE {
  ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M
  ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M
  ENUMERATED {
    s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
    s1160, s1320, 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 s10 corresponds to 0 slots, s11 corresponds to 1 slot, s12 corresponds to 2 slots, and so on. <i>sl-DRX-GC-HARQ-RTT-Timer1</i> is used for HARQ feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). <i>sl-DRX-GC-HARQ-RTT-Timer2</i> 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 s10 corresponds to 0 slots, s11 corresponds to 1 slot, s12 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 ::=
  sl-drx-onDurationTimer-r17

  sl-drx-InactivityTimer-r17

  sl-drx-HARQ-RTT-Timer1-r17
  sl-drx-HARQ-RTT-Timer2-r17
  sl-drx-RetransmissionTimer-r17

  sl-drx-CycleStartOffset-r17
    ms10
    ms20
    ms32
    ms40
    ms60
    ms64
    ms70
    ms80
    ms128
    ms160
    ms256
    ms320
    ms512
    ms640
    ms1024
    ms1280
    ms2048
    ms2560
    ms5120
    ms10240
  },
  sl-drx-SlotOffset
}

SEQUENCE {
  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}
    },
    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},
    ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M
    ENUMERATED {s10, s11, s12, s14, spare4, spare3, spare2, spare1} OPTIONAL, -- Need M
    ENUMERATED {
      s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
      s1160, s1320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
      spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1},
    CHOICE {
      INTEGER(0..9),
      INTEGER(0..19),
      INTEGER(0..31),
      INTEGER(0..39),
      INTEGER(0..59),
      INTEGER(0..63),
      INTEGER(0..69),
      INTEGER(0..79),
      INTEGER(0..127),
      INTEGER(0..159),
      INTEGER(0..255),
      INTEGER(0..319),
      INTEGER(0..511),
      INTEGER(0..639),
      INTEGER(0..1023),
      INTEGER(0..1279),
      INTEGER(0..2047),
      INTEGER(0..2559),
      INTEGER(0..5119),
      INTEGER(0..10239)
    }
  },
  sl-drx-SlotOffset
  INTEGER (0..31)
}

-- TAG-SL-DRX-CONFIGUC-STOP
-- ASN1STOP

```

<i>SL-DRX-ConfigUC</i> field descriptions
<i>sl-drx-CycleStartOffset</i> Sidelink <i>drx-Cycle</i> in ms and sidelink <i>drx-StartOffset</i> in multiples of 1 ms.
<i>sl-drx-HARQ-RTT-Timer1</i>, <i>sl-drx-HARQ-RTT-Timer2</i> Value in number of slot lengths of the BWP where the transport block was received. Value <i>sl0</i> corresponds to 0 slots, <i>sl1</i> corresponds to 1 slot, <i>sl2</i> corresponds to 2 slots, and so on. <i>sl-drx-HARQ-RTT-Timer1</i> is used for HARQ feedback enabled sidelink retransmission if SCI does not indicate retransmission resource(s). <i>sl-drx-HARQ-RTT-Timer2</i> is used for HARQ feedback disabled sidelink retransmission in resource pool configured with PSFCH if SCI does not indicate retransmission resource(s).
<i>sl-drx-InactivityTimer</i> Value in number of slot lengths of the BWP where the transport block was received, <i>sl0</i> corresponds to 0, <i>sl1</i> corresponds to 1 slot, <i>sl2</i> corresponds to 2 slots, and so on.
<i>sl-drx-onDurationTimer</i> Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value <i>ms1</i> corresponds to 1 ms, value <i>ms2</i> corresponds to 2 ms, and so on.
<i>sl-drx-RetransmissionTimer</i> Value in number of slot lengths of the BWP where the transport block was received. Value <i>sl0</i> corresponds to 0 slots, <i>sl1</i> corresponds to 1 slot, <i>sl2</i> corresponds to 2 slots, and so on.
<i>sl-drx-SlotOffset</i> 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 ::=
    sl-drx-onDurationTimer-r17

sl-drx-CycleStartOffset-r17
    ms10
    ms20
    ms32
    ms40
    ms60
    ms64
    ms70
    ms80
    ms128
    ms160
    ms256
    ms320
    ms512

SEQUENCE {
    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}
    },
    CHOICE {
        INTEGER (0..9),
        INTEGER (0..19),
        INTEGER (0..31),
        INTEGER (0..39),
        INTEGER (0..59),
        INTEGER (0..63),
        INTEGER (0..69),
        INTEGER (0..79),
        INTEGER (0..127),
        INTEGER (0..159),
        INTEGER (0..255),
        INTEGER (0..319),
        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)

SL-FreqConfigExt-v1800 ::= SEQUENCE {
  absenceOfAnyOtherTechnology-r18 ENUMERATED {true} OPTIONAL, -- Need M
  sl-FreqSelectionConfigList-r18 SEQUENCE (SIZE (1..8)) OF SL-FreqSelectionConfig-r18 OPTIONAL, -- Need M
  sl-SyncTxDisabled-r18 ENUMERATED {true} OPTIONAL, -- Need M
  sl-EnergyDetectionConfig-r18 CHOICE {
    sl-MaxEnergyDetectionThreshold-r18 INTEGER (-85..-52),
    sl-EnergyDetectionThresholdOffset-r18 INTEGER (-13..20)
  } OPTIONAL, -- Need M
  ue-ToUE-COT-SharingED-Threshold-r18 INTEGER (-85..-52) OPTIONAL, -- Need M
  harq-ACK-FeedbackRatioforCW-AdjustmentGC-Option2-r18 INTEGER (10..100) OPTIONAL, -- Need M
  ...
}

```

```
-- TAG-SL-FREQCONFIG-STOP  
-- ASN1STOP
```

SL-FreqConfig field descriptions
<p><i>absenceOfAnyOtherTechnology</i> 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 4.5. This parameter is not expected to be provided if the sidelink carrier is overlapped with uplink carrier.</p>
<p><i>sl-EnergyDetectionConfig</i> Indicates whether to use the <i>maxEnergyDetectionThreshold</i> or the <i>energyDetectionThresholdOffset</i> (see TS 37.213 [48], clause 4.5.5).</p>
<p><i>sl-EnergyDetectionThresholdOffset</i> 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 4.5.5.</p>
<p><i>frequencyShift7p5khzSL</i> 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.</p>
<p><i>harq-ACK-FeedbackRatioforCW-AdjustmentGC-Option2</i> Indicates the ratio threshold for contention window adjustment for SL groupcast option 2 as specified in TS 37.213 [48], clause 4.5.4. Unit is percentage.</p>
<p><i>sl-MaxEnergyDetectionThreshold</i> 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 4.5.5.</p>
<p><i>sl-AbsoluteFrequencyPointA</i> Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.</p>
<p><i>sl-AbsoluteFrequencySSB</i> Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.</p>
<p><i>sl-BWP-ToAddModList</i> 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.</p>
<p><i>sl-BWP-ToReleaseList</i> This field indicates the list of sidelink BWP(s) on which the NR sidelink communication configuration is to be released.</p>
<p><i>sl-Freq-Id</i> This field indicates the identity of the dedicated configuration information on the carrier frequency for NR sidelink communication.</p>
<p><i>sl-SCS-SpecificCarrierList</i> 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 <i>SCS-SpecificCarrier</i> is allowed to be configured for NR sidelink communication.</p>
<p><i>sl-SyncTxDisabled</i> Indicates that the carrier, even though equipped with synchronisation resources, cannot be used as a synchronisation carrier frequency to transmit S-SSB.</p>
<p><i>sl-SyncPriority</i> This field indicates synchronization priority order, as specified in clause 5.8.6. <i>sl-SyncPriority</i> is configured with the same value across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies.</p>
<p><i>ue-ToUE-COT-SharingED-Threshold</i> Indicates the energy detection threshold that a UE uses to initiate a channel occupancy with other UE(s), and the other UE(s) that shares the initiated channel occupancy shall use this configured parameter for accessing the channel(s) as specified in TS 37.213 [48], clause 4.5.5 for sidelink channel access. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm).</p>
<p><i>valueN</i> Indicate the NR SL transmission with a valueN *5kHz shift to the LTE raster. (see TS 38.101-1 [15], clause 5.4E.2).</p>

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
    ...,
    [[
    sl-UnlicensedFreqConfigCommon-r18 SEQUENCE {
        absenceOfAnyOtherTechnology-r18 ENUMERATED {true} OPTIONAL, -- Need R
        sl-FreqSelectionConfigList-r18 SEQUENCE (SIZE (1..8)) OF SL-FreqSelectionConfig-r18 OPTIONAL, -- Need R
        sl-SyncTxDisabled-r18 ENUMERATED {true} OPTIONAL, -- Need R
        sl-EnergyDetectionConfig-r18 CHOICE {
            sl-MaxEnergyDetectionThreshold-r18 INTEGER (-85..-52),
            sl-EnergyDetectionThresholdOffset-r18 INTEGER (-13..20)
        } OPTIONAL, -- Need R
        ue-ToUE-COT-SharingED-Threshold-r18 INTEGER (-85..-52) OPTIONAL, -- Need R
        harq-ACK-FeedbackRatioforCW-AdjustmentGC-Option2-r18 INTEGER (10..100) OPTIONAL, -- Need R
    } OPTIONAL, -- Cond SIB12
    sl-PosBWP-List-r18 SEQUENCE ( SIZE (1..maxNrofSL-BWPs-r16)) OF SL-PosBWP-ConfigCommon-r18 OPTIONAL -- Cond SIB23
    ]]
}
-- TAG-SL-FREQCONFIGCOMMON-STOP
-- ASN1STOP

```

SL-FreqConfigCommon field descriptions
<p>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 4.5.5. This parameter is not expected to be provided if the sidelink carrier is overlapped with uplink carrier.</p>
<p>sl-EnergyDetectionConfig Indicates whether to use the <i>maxEnergyDetectionThreshold</i> or the <i>energyDetectionThresholdOffset</i> (see TS 37.213 [48], clause 4.5.5).</p>
<p>sl-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 4.5.5.</p>
<p>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.</p>
<p>harq-ACK-FeedbackRatioforCW-AdjustmentGC-Option2 Indicates the ratio threshold for contention window adjustment for SL groupcast option 2 as specified in TS 37.213 [48], clause 4.5.4. Unit is percentage.</p>
<p>sl-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 4.5.5.</p>
<p>sl-AbsoluteFrequencyPointA Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.</p>
<p>sl-AbsoluteFrequencySSB Indicates the frequency location of sidelink SSB. The transmission bandwidth for sidelink SSB is within the bandwidth of this sidelink BWP.</p>
<p>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.</p>
<p>sl-NbAsSync This field indicates whether the network can be selected as synchronization reference directly/indirectly only, if <i>sl-SyncPriority</i> is set to gss. 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 <i>SidelinkPreconfigNR</i>. Otherwise it is absent. All values in <i>sl-NbAsSync</i> are same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies.</p>
<p>sl-SyncTxDisabled Indicates that the carrier, even though equipped with synchronisation resources, cannot be used as a synchronisation carrier frequency to transmit S-SSB.</p>
<p>sl-SyncPriority This field indicates synchronization priority order, as specified in clause 5.8.6. All values in <i>sl-SyncPriority</i> are same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies.</p>
<p>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 <i>sl-SyncConfig</i> including <i>txParameters</i> when configuring UEs to transmit synchronisation information. If this field is configured in <i>SL-PreconfigurationNR-r16</i>, only one entry is configured in <i>sl-SyncConfigList</i>.</p>
<p>ue-ToUE-COT-SharingED-Threshold Indicates the energy detection threshold that a UE uses to initiate a channel occupancy with to other UE(s), and the other UE(s) that shares the initiated channel occupancy shall use this configured parameter for accessing the channel(s) as specified in TS 37.213 [48], clause 4.5.5 for sidelink channel access. Unit in dBm. Value -85 corresponds to -85 dBm, value -84 corresponds to -84 dBm, and so on (i.e. in steps of 1dBm).</p>
<p>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).</p>

Conditional Presence	Explanation
<i>SIB12</i>	This field is optional present if included within <i>SIB12</i> , need R. Otherwise, the field is absent.
<i>SIB23</i>	This field is optional present if included within <i>SIB23</i> , need R. Otherwise, the field is absent.
<i>V2X-SL-Shared</i>	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-FreqSelectionConfig*

The IE *SL-FreqSelectionConfig* specifies the configuration information for carrier selection for NR sidelink transmission using UE autonomous resource selection.

SL-FreqSelectionConfig information element

```
-- ASN1START
-- TAG-SL-FREQSELECTIONCONFIG-START

SL-FreqSelectionConfig-r18 ::= SEQUENCE {
    sl-priorityList-r18          SEQUENCE (SIZE (1..8)) OF INTEGER (1..8),
    sl-threshCBR-FreqReselection-r18 SL-CBR-r16,
    sl-threshCBR-FreqKeeping-r18  SL-CBR-r16
}

-- TAG-SL-FREQSELECTIONCONFIG-STOP
-- ASN1STOP
```

SL-FreqSelectionConfig field descriptions

sl-priorityList

Indicates the list of sidelink logical channel priority which is associated with the configurations in *sl-threshCBR-FreqReselection* and in *sl-threshCBR-FreqKeeping*.

sl-threshCBR-FreqReselection

Indicates the CBR threshold based on which UE determines whether the carrier frequency can be (re)selected for the transmission of NR sidelink. See TS 38.321 [3].

sl-threshCBR-FreqKeeping

Indicates the CBR threshold based on which UE determines whether the UE can keep using the carrier which was selected for the transmission of NR sidelink. See TS 38.321 [3].

– *SL-IndirectPathAddChange*

The IE *SL-IndirectPathAddChange* specifies the configuration information of SL indirect path for SL indirect path addition/change in MP.

SL-IndirectPathAddChange information element

```
-- ASN1START
-- TAG-SL-INDIRECTPATHADDCHANGE-START

SL-IndirectPathAddChange-r18 ::= SEQUENCE {
    sl-IndirectPathRelayUE-Identity-r18  SL-SourceIdentity-r17,
```

```

sl-IndirectPathCellIdentity-r18      CellIdentity,
t421-r18                             ENUMERATED {ms50, ms100, ms150, ms200, ms500, ms1000, ms2000, ms10000} OPTIONAL, -- Need M
...
}

-- TAG-SL-INDIRECTPATHADDCHANGE-STOP
-- ASN1STOP

```

SL-IndirectPathAddChange field descriptions

sl-IndirectPathRelayUEIdentity
Indicates the L2 source ID of the L2 U2N Relay UE of SL indirect path.
sl-IndirectPathCellIdentity
Identifies the serving cell of the indicated L2 U2N Relay UE.
t421
Indicates the timer value of T421 to be used during indirect path addition or change.

– 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)
sl-DetermineResourceType-r17      ENUMERATED {uea, ueb}
...
}

SL-InterUE-CoordinationScheme2-r17 ::= SEQUENCE {
  sl-IUC-Scheme2-r17      ENUMERATED {enabled}
  sl-RB-SetPSFCH-r17     BIT STRING (SIZE (10..275))
  sl-TypeUE-A-r17        ENUMERATED {enabled}
  sl-PSFCH-Occasion-r17  INTEGER (0..1)
  sl-SlotLevelResourceExclusion-r17  ENUMERATED {enabled}
  sl-OptionForCondition2-A-1-r17  INTEGER (0..1)
  sl-IndicationUE-B-r17  ENUMERATED {enabled, disabled}
  ...,
  [[
  sl-DeltaRSRP-Thresh-v1720  INTEGER (-30..30)
  ]]
}

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

```

OPTIONAL, -- Need M
OPTIONAL, -- Need M

OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need R
OPTIONAL, -- Need M
OPTIONAL, -- Need M

OPTIONAL -- Need M

<i>SL-InterUE-CoordinationScheme1</i> field descriptions
<p><i>sl-Condition1-A-2</i> 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.</p>
<p><i>sl-ContainerCoordInfo</i> 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.</p>
<p><i>sl-ContainerRequest</i> 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.</p>
<p><i>sl-DetermineResourceType</i> 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.</p>
<p><i>sl-IUC-Condition</i> Indicates whether inter-UE coordination information triggered by a condition is enabled or not other than explicit request reception.</p>
<p><i>sl-IUC-Explicit</i> Indicates whether inter-UE coordination information triggered by an explicit request is enabled or not.</p>
<p><i>sl-MaxSlotOffsetTRIV</i> 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].</p>
<p><i>sl-NumSubCH-PreferredResourceSet</i> 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.</p>
<p><i>sl-PriorityCoordInfoCondition</i> 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".</p>
<p><i>sl-PriorityCoordInfoExplicit</i> 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".</p>
<p><i>sl-PriorityPreferredResourceSet</i> 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.</p>
<p><i>sl-PriorityRequest</i> 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".</p>
<p><i>sl-ReservedPeriodPreferredResourceSet</i> 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 <i>sl-ResourceReservePeriodList-r16</i>.</p>
<p><i>sl-TriggerConditionCoordInfo</i> 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.</p>

<i>sl-TriggerConditionRequest</i>
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 or SL-PRS to be transmitted to UE-A.
<i>sl-ThresholdRSRP-Condition1-B-1-Option1List</i>
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.
<i>sl-ThresholdRSRP-Condition1-B-1-Option2List</i>
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

<i>sl-DeltaRSRP-Thresh</i>
Indicates the RSRP threshold delta value corresponding to <i>deltaRSRPThresh</i> 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.
<i>sl-IndicationUE-B</i>
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.
<i>sl-IUC-Scheme2</i>
Indicates whether inter-UE coordination Scheme 2 is enabled or not.
<i>sl-OptionForCondition2-A-1</i>
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 <i>sl-Thres-RSRP-List</i> , in its resource pool configuration <i>sl-UE-SelectedConfigRP</i> , corresponding to <i>ThresPSSCH-RSRP-List</i> specified in clause 16.3.0 of TS 38.213 [13]. Value 1 corresponds to using a (pre)configured RSRP threshold delta value <i>sl-DeltaRSRP-Thresh</i> , corresponding to <i>deltaRSRPThresh</i> specified in clause 16.3.0 of TS 38.213 [13].
<i>sl-PSFCH-Occasion</i>
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.
<i>sl-RB-SetPSFCH</i>
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.
<i>sl-SlotLevelResourceExclusion</i>
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.
<i>sl-TypeUE-A</i>
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-LBT-FailureRecoveryConfig*

The IE *SL-LBT-FailureRecoveryConfig-r18* is used to configure the parameters used for detection and cancellation of sidelink consistent LBT failures for operation with shared spectrum channel access, as specified in TS 38.321 [3].

SL-LBT-FailureRecoveryConfig information element

```
-- ASN1START
-- TAG-SL-LBT-FAILURERECOVERYCONFIG-START

SL-LBT-FailureRecoveryConfig-r18 ::= SEQUENCE {
    sl-lbt-FailureInstanceMaxCount-r18    ENUMERATED {n4, n8, n16, n32, n64, n128, spare2, spare1}    OPTIONAL, -- Need M
    sl-lbt-FailureDetectionTimer-r18      ENUMERATED {ms10, ms20, ms40, ms80, ms160, ms320, spare2, spare1}    OPTIONAL, -- Need M
    sl-lbt-RecoveryTimer-r18              ENUMERATED {ms10, ms20, ms40, ms80, ms160, ms320, spare2, spare1}    OPTIONAL, -- Need M
    ...
}

-- TAG-SL-LBT-FAILURERECOVERYCONFIG-STOP
-- ASN1STOP
```

SL-LBT-FailureRecoveryConfig field descriptions

sl-lbt-FailureDetectionTimer

Timer for consistent sidelink LBT failure detection (see TS 38.321 [3]). Value ms10 corresponds to 10 ms, value ms20 corresponds to 20 ms, and so on.

sl-lbt-FailureInstanceMaxCount

This field determines after how many LBT failure indications received from the physical layer the UE triggers sidelink LBT failure recovery (see TS 38.321 [3]). Value n4 corresponds to 4, value n8 corresponds to 8, and so on.

sl-lbt-RecoveryTimer

Timer for consistent sidelink LBT failure cancellation (see TS 38.321 [3]). Value ms10 corresponds to 10 ms, value ms20 corresponds to 20 ms, and so on.

– *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
}
```

```
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
                                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
...
[[
sl-ChannelAccessPriority-r18     INTEGER (1..4)          OPTIONAL, -- Need R
sl-AllowedCarriers-r18         SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF INTEGER (1..maxNrofFreqSL-r16) OPTIONAL -- Cond CONNECTED
]]
}
-- TAG-SL-LOGICALCHANNELCONFIG-STOP
-- ASN1STOP
```

SL-LogicalChannelConfig field descriptions
<p>sl-AllowedCarriers If present, SL MAC SDUs from this logical channel can only be mapped to the sidelink carriers indicated in this list. Otherwise, SL MAC SDUs from this logical channel can be mapped to any configured sidelink carriers. The value 1 corresponds to the frequency of first entry in <i>sl-FreqInfoList</i> broadcast in <i>SIB12</i>, the value 2 corresponds to the frequency of first entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i>, the value 3 corresponds to the frequency of second entry in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i> and so on.</p>
<p>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 <i>sl-ConfiguredGrantType1Allowed</i> 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].</p>
<p>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].</p>
<p>sl-BucketSizeDuration Value in ms. <i>ms5</i> corresponds to 5 ms, value <i>ms10</i> corresponds to 10 ms, and so on.</p>
<p>sl-ChannelAccessPriority Indicates the Channel Access Priority Class (CAPC), as specified in TS 38.300 [2], to be used on sidelink transmissions for operation with shared spectrum channel access in FR1. The network configures this field only for DRBs.</p>
<p>sl-ConfiguredGrantType1Allowed If present and set to true, or if the capability <i>lcp-RestrictionSidelink</i> 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].</p>
<p>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 <i>enabled</i>, the sidelink logical channel will be multiplexed only with a logical channel which enabling the HARQ feedback. If set to <i>disabled</i>, 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, <i>sl-PSFCH-Config</i> should be mandatory present in configuration <i>SL-ResourcePool</i> of at least one of the sidelink resource pools.</p>
<p>sl-LogicalChannelGroup ID of the sidelink logical channel group, as specified in TS 38.321 [3], which the sidelink logical channel belongs to.</p>
<p>sl-LogicalChannelSR-DelayTimerApplied Indicates whether to apply the delay timer for SR transmission for this sidelink logical channel. Set to false if <i>logicalChannelSR-DelayTimer</i> is not included in <i>sl-BSR-Config</i>.</p>
<p>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].</p>
<p>sl-PrioritisedBitRate Value in kiloBytes/s. Value <i>kBps0</i> corresponds to 0 kiloBytes/s, value <i>kBps8</i> corresponds to 8 kiloBytes/s, value <i>kBps16</i> corresponds to 16 kiloBytes/s, and so on.</p>
<p>sl-Priority Sidelink logical channel priority, as specified in TS 38.321 [3].</p>
<p>sl-SchedulingRequestld If present, it indicates the scheduling request configuration applicable for this sidelink logical channel, as specified in TS 38.321 [3].</p>

Conditional Presence	Explanation
<i>CONNECTED</i>	This field is optionally present, Need M, in an RRCReconfiguration message, for a SL DRB with additional RLC bearer being configured. The field is absent otherwise.

– *SL-L2RelayUE-Config*

The IE *SL-L2RelayUE-Config* is used to configure L2 U2N relay operation related configurations used by L2 U2N Relay UE, or L2 U2U relay operation related configurations used by L2 U2U 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-U2U-RemoteUE-ToAddModList-r18 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-U2U-RemoteUE-ToAddMod-r18 OPTIONAL, -- Need N
        sl-U2U-RemoteUE-ToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) 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
    ...
}

SL-U2U-RemoteUE-ToAddMod-r18 ::= SEQUENCE {
    sl-L2IdentityRemoteUE-r18 SL-DestinationIdentity-r16,
    sl-SourceRemoteUE-ToAddModList-r18 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-SourceRemoteUE-ToAddMod-r18 OPTIONAL, -- Need N
    sl-SourceRemoteUE-ToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-SourceIdentity-r17 OPTIONAL, -- Need N
    ...
}

SL-SourceRemoteUE-ToAddMod-r18 ::= SEQUENCE {
    sl-SourceUE-Identity-r18 SL-SourceIdentity-r17,
    sl-SRAP-ConfigU2U-r18 SL-SRAP-ConfigU2U-r18,
    ...
}

-- 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-U2U-RemoteUE-ToAddModList List of target L2 U2U Remote UEs for which the related configuration is to be added and modified to the L2 U2U Relay UE.
sl-U2U-RemoteUE-ToReleaseList List of target L2 U2U Remote UEs for which the related configuration is to be released by the L2 U2U Relay UE.
sl-U2U-SourceRemoteUE-ToAddModList List of Source L2 U2U Remote UEs for which the related configuration is to be added and modified relative to the destination L2 U2U Remote UE identified by the <i>sl-L2IdentityRemoteUE</i> .
sl-U2U-SourceRemoteUE-ToReleaseList List of Source L2 U2U Remote UEs for which the related configuration is to be released relative to the destination L2 U2U Remote UE identified by the <i>sl-L2IdentityRemoteUE</i> .

– SL-L2RemoteUE-Config

The IE *SL-L2RemoteUE-Config* is used to configure L2 U2N relay operation related configurations used by L2 U2N Remote UE, or L2 U2U relay operation related configurations used by L2 U2U 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
    ..,
    [[
    sl-U2U-RelayUE-ToAddModList-r18   SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-U2U-RelayUE-ToAddMod-r18  OPTIONAL, -- Need N
    sl-U2U-RelayUE-ToReleaseList-r18  SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIdentity-r16  OPTIONAL, -- Need N
    ]]
}

SL-U2U-RelayUE-ToAddMod-r18 ::=      SEQUENCE {
    sl-L2IdentityRelay-r18             SL-DestinationIdentity-r16,
    sl-PeerRemoteUE-ToAddModList-r18  SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-PeerRemoteUE-ToAddMod-r18  OPTIONAL, -- Need N
    sl-PeerRemoteUE-ToReleaseList-r18 SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIdentity-r16  OPTIONAL, -- Need N
    ..
}

SL-PeerRemoteUE-ToAddMod-r18 ::=     SEQUENCE {
    sl-TargetUE-Identity-r18          SL-DestinationIdentity-r16,
    sl-SRAP-ConfigU2U-r18             SL-SRAP-ConfigU2U-r18,
    ..
}

```

```
-- 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.
sl-U2U-RelayUE-ToAddModList List of L2 U2U Relay UEs for which the related configuration is to be added and modified to the L2 U2U Remote UE.
sl-U2U-RelayUE-ToReleaseList List of L2 U2U Relay UEs for which the related configuration is to be released by the L2 U2U Remote UE.
sl-U2U-PeerRemoteUE-ToAddModList List of Peer L2 U2U Remote UEs for which the related configuration is to be added and modified relative to the L2 U2U Relay UE identified by the <i>sl-L2IdentityRelay</i> .
sl-U2U-PeerRemoteUE-ToReleaseList List of Peer L2 U2U Remote UEs for which the related configuration is to be released relative to the L2 U2U Relay UE identified by the <i>sl-L2IdentityRelay</i> .

Conditional Presence	Explanation
<i>FirstRRCReconfig</i>	This field is mandatory present in the first <i>RRCReconfiguration</i> for L2 U2N Remote UE when PCell is on indirect path, i.e. MP configuration is not present. 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
```


<i>SL-MeasConfigCommon</i> field descriptions
<i>sl-MeasIdListCommon</i> List of sidelink measurement identities
<i>sl-MeasObjectListCommon</i> List of sidelink measurement objects.
<i>sl-QuantityConfigCommon</i> Indicates the layer 3 filtering coefficient for sidelink measurement.
<i>sl-ReportConfigListCommon</i> 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-MeasObjectId-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, SL-PRS 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 ::=
sl-AllowedResourceSelectionConfig-r17 SEQUENCE {
sl-MinNumCandidateSlotsPeriodic-r17   ENUMERATED {c1, c2, c3, c4, c5, c6, c7}           OPTIONAL, -- Need M
sl-PBPS-OccasionReservePeriodList-r17 INTEGER (1..32)                       OPTIONAL, -- Need M
sl-Additional-PBPS-Occasion-r17        SEQUENCE (SIZE (1..16)) OF INTEGER (1..16)  OPTIONAL, -- Need M
sl-CPS-WindowPeriodic-r17              ENUMERATED { monitored }                OPTIONAL, -- Need M
sl-MinNumCandidateSlotsAperiodic-r17   INTEGER (5..30)                       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 <i>discardTimer</i> specified in TS 38.323 [5]. Value <i>ms50</i> corresponds to 50 ms, value <i>ms100</i> corresponds to 100 ms and so on.
sl-OutOfOrderDelivery	Indicates whether or not <i>outOfOrderDelivery</i> 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-PosBWP-ConfigCommon

The IE *SL-PosBWP-ConfigCommon* is used to configure the cell-specific configuration for sidelink positioning on one particular sidelink bandwidth part.

SL-PosBWP-ConfigCommon information element

```
-- ASN1START
```

```

-- TAG-SL-POSBWP-CONFIGCOMMON
SL-PosBWP-ConfigCommon-r18 ::=          SEQUENCE {
    sl-BWP-Generic-r18                    SL-BWP-Generic-r16                OPTIONAL, -- Need R
    sl-BWP-PRS-PoolConfigCommon-r18      SL-BWP-PRS-PoolConfigCommon-r18  OPTIONAL, -- Need R
    ...
}
-- TAG- SL-POSBWP-CONFIGCOMMON
-- ASN1STOP

```

SL-PosBWP-ConfigCommon field descriptions

sl-BWP-Generic

This field indicates the generic parameters on the configured sidelink BWP.

– *SL-PRS-ResourcePool*

The IE *SL-PRS-ResourcePool* specifies the configuration information for NR sidelink PRS dedicated resource pool.

SL-PRS-ResourcePool information element

```

-- ASN1START
-- TAG-SL-PRS-RESOURCEPOOL-START
SL-PRS-ResourcePool-r18 ::=          SEQUENCE {
    sl-PRS-PSCCH-Config-r18            SetupRelease { SL-PSCCH-ConfigDedicatedSL-PRS-RP-r18}  OPTIONAL, -- Need M
    sl-StartRB-SubchannelDedicatedSL-PRS-RP-r18  INTEGER (0..265)                                OPTIONAL, -- Need M
    sl-FilterCoefficient-r18           FilterCoefficient                                OPTIONAL, -- Need M
    sl-ThreshS-RSSI-PRS-CBR-r18        INTEGER (0..45)                                OPTIONAL, -- Need M
    sl-RB-Number-r18                   INTEGER (10..275)                                OPTIONAL, -- Need M
    sl-TimeResource-r18                 BIT STRING (SIZE (10..160))                    OPTIONAL, -- Need M
    sl-PosAllowedResourceSelectionConfig-r18    ENUMERATED {c1, c2, c3}                        OPTIONAL, -- Need M
    sl-PRS-ResourceReservePeriodList-r18        SEQUENCE (SIZE (1..16)) OF SL-ReservationPeriodAllowedDedicatedSL-PRS-RP-r18  OPTIONAL,
                                                                                               OPTIONAL,
    sl-PRS-ResourcesDedicatedSL-PRS-RP-r18      SEQUENCE (SIZE (1..12)) OF SL-PRS-ResourceDedicatedSL-PRS-RP-r18  OPTIONAL, -- Need M
    sl-PRS-PowerControl-r18                SL-PRS-PowerControl-r18                            OPTIONAL, -- Need M
    sl-SensingWindowDedicatedSL-PRS-RP-r18      ENUMERATED {ms100, ms1100}                        OPTIONAL, -- Need M
    sl-TxPercentageDedicatedSL-PRS-RP-List-r18    SEQUENCE (SIZE (8)) OF SL-TxPercentageDedicatedSL-PRS-RP-Config-r18  OPTIONAL, -- Need M
    sl-SCI-basedSL-PRS-TxTriggerSCI1-B-r18      BOOLEAN                                              OPTIONAL, -- Need M
    sl-NumSubchannelDedicatedSL-PRS-RP-r18      INTEGER (1..27)                                    OPTIONAL, -- Need M
    sl-SubchannelSizeDedicatedSL-PRS-RP-r18      ENUMERATED {n10, n12, n15, n20, n25, n50, n75, n100}  OPTIONAL, -- Need M
    sl-MaxNumPerReserveDedicatedSL-PRS-RP-r18    ENUMERATED {n2, n3}                                OPTIONAL, -- Need M
    sl-NumReservedBitsSCI1B-DedicatedSL-PRS-RP-r18  INTEGER (0..20)                                    OPTIONAL, -- Need R
    sl-SRC-ID-LenDedicatedSL-PRS-RP-r18         ENUMERATED {n12, n24}                                OPTIONAL, -- Need M
    sl-CBR-PriorityTxConfigDedicatedSL-PRS-RP-List-r18  SEQUENCE (SIZE (1..8)) OF SL-PriorityTxConfigIndexDedicatedSL-PRS-RP-r18  OPTIONAL,
                                                                                               OPTIONAL,
    sl-TimeWindowSizeCBR-DedicatedSL-PRS-RP-r18    ENUMERATED {ms100, slot100}                        OPTIONAL, -- Need M
    sl-TimeWindowSizeCR-DedicatedSL-PRS-RP-r18    ENUMERATED {ms1000, slot1000}                      OPTIONAL, -- Need M
    sl-CBR-CommonTxDedicatedSL-PRS-RP-List-r18    SL-CBR-CommonTxDedicatedSL-PRS-RP-List-r18        OPTIONAL, -- Need M
}
-- ASN1STOP

```

```

    sl-PriorityThreshold-UL-URLLC-r18          INTEGER (1..9)          OPTIONAL, -- Need M
    sl-PriorityThreshold-r18                  INTEGER (1..9)          OPTIONAL, -- Need M
}

SL-PSCCH-ConfigDedicatedSL-PRS-RP-r18 ::= SEQUENCE {
    timeResourcePSCCH-DedicatedSL-PRS-RP-r18  ENUMERATED {n2, n3}          OPTIONAL, -- Need M
    freqResourcePSCCH-DedicatedSL-PRS-RP-r18  ENUMERATED {n10,n12, n15, n20, n25}  OPTIONAL, -- Need M
    ...
}

SL-ReservationPeriodAllowedDedicatedSL-PRS-RP-r18 ::= CHOICE {
    sl-ResourceReservePeriod1-r18             ENUMERATED {ms0, ms100, ms200, ms300, ms400, ms500, ms600, ms700, ms800, ms900, ms1000},
    sl-ResourceReservePeriod2-r18             INTEGER (1..99)
}

SL-PRS-ResourceDedicatedSL-PRS-RP-r18 ::= SEQUENCE {
    sl-PRS-ResourceID-r18                     INTEGER (0..11)           OPTIONAL, -- Need M
    sl-NumberOfSymbols-r18                   INTEGER (1..9)           OPTIONAL, -- Need M
    sl-CombSize-r18                          ENUMERATED {n2,n4,n6}    OPTIONAL, -- Need R
    sl-PRS-starting-symbol-r18               INTEGER (4..12)          OPTIONAL, -- Need M
    sl-PRS-comb-offset-r18                   INTEGER(1..5)            OPTIONAL, -- Need M
}

SL-PRS-PowerControl-r18 ::= SEQUENCE {
    dl-P0-SL-PRS-r18                         INTEGER (-202..24)       OPTIONAL, -- Need M
    dl-Alpha-SL-PRS-r18                      ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL, -- Need M
    sl-P0-SL-PRS-r18                         INTEGER (-202..24)       OPTIONAL, -- Need M
    sl-Alpha-SL-PRS-r18                      ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1}  OPTIONAL, -- Need S
}

SL-TxPercentageDedicatedSL-PRS-RP-Config-r18 ::= SEQUENCE {
    sl-TxPercentageDedicatedSL-PRS-RP-r18    INTEGER (1..8)           OPTIONAL, -- Need M
    sl-Priority-DedicatedSL-PRS-RP           ENUMERATED {p20, p35, p50}  OPTIONAL, -- Need M
}

SL-PriorityTxConfigIndexDedicatedSL-PRS-RP-r18 ::= SEQUENCE {
    sl-PriorityThresholdDedicatedSL-PRS-RP-r18  INTEGER (1..8)           OPTIONAL, -- Need M
    sl-DefaultTxConfigIndexDedicatedSL-PRS-RP-r18  INTEGER (0..maxCBR-LevelDedSL-PRS-1-r18)  OPTIONAL, -- Need M
    sl-CBR-ConfigIndexDedicatedSL-PRS-RP-r18    INTEGER (0..maxCBR-ConfigDedSL-PRS-1-r18)  OPTIONAL, -- Need M
    sl-PRS-TxConfigIndexList-r18                SEQUENCE (SIZE (1.. maxCBR-LevelDedSL-PRS-1-r18)) OF SL-PRS-TxConfigIndex-r18  OPTIONAL, -- Need M
}

SL-PRS-TxConfigIndex-r18 ::= INTEGER (0.. maxNrofSL-PRS-TxConfig-r18)

-- TAG-SL-PRS-RESOURCEPOOL-STOP
-- ASN1STOP

```

SL-PRS-ResourcePool field descriptions

<i>sl-CBR-ConfigIndexDedicatedSL-PRS-RP</i>
--

Indicates the CBR ranges to be used by an index to the entry of the CBR range configuration in <i>sl-CBR-RangeConfigList-Dedicated-SL-PRS-RP</i> .
--

<i>sl-CBR-PriorityTxConfigDedicatedSL-PRS-RP-List</i>
--

<p>Indicates the mapping between SL-PRS transmission parameter (such as transmission power, etc.) sets by using the indexes of the configurations in <i>sl-CBR-SL-PRS-TxConfigList</i>, CBR ranges by using the indexes to the entry of the CBR range configurations in <i>sl-CBR-SL-PRS-RangeConfigList</i>, and priority ranges. It also indicates the default SL-PRS transmission parameters to be used when CBR measurement results are not available.</p>
<p><i>sl-DefaultTxConfigIndexDedicatedSL-PRS-RP</i> Indicates the SL PRS 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 <i>sl-PRS-TxConfigIndexList</i>. Value 0 indicates the first entry in <i>sl-PRS-Tx-ConfigIndexList</i>. The field is ignored if the UE has available CBR measurement results.</p>
<p><i>sl-FilterCoefficient</i> This field indicates the filtering coefficient for long-term measurement and reference signal power derivation used for sidelink open-loop power control.</p>
<p><i>sl-MaxNumPerReserveDedicatedSL-PRS-RP</i> Indicates the maximum number of SL PRS reservations that can be indicated by an SCI.</p>
<p><i>sl-NumReservedBitsSCI1B-DedicatedSL-PRS-RP</i> Indicates the number of reserved bits in SCI format 1-B.</p>
<p><i>sl-NumSubchannelDedicatedSL-PRS-RP</i> Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only.</p>
<p><i>sl-PosAllowedResourceSelectionConfig</i> Indicates allowed resource allocation method configured per resource pool. C1: only sensing allowed c2: only random resource selection allowed c3: sensing and random resource selection allowed</p>
<p><i>sl-PriorityThreshold</i> Indicates the threshold used to determine whether NR sidelink transmission in dedicated SL PRS resource pool 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.</p>
<p><i>sl-PriorityThresholdDedicatedSL-PRS-RP</i> Indicates the upper bound of priority range which is associated with the configurations in <i>sl-CBR-ConfigIndex-Dedicated-SL-PRS-RP</i> and in <i>sl-PRS-Tx-ConfigIndex</i>. The upper bounds of the priority ranges are configured in ascending order for consecutive entries of <i>SL-PriorityTxConfigIndex-Dedicated-SL-PRS-RP</i> in <i>SL-PriorityTxConfigList-Dedicated-SL-PRS-RP</i>. For the first entry of <i>sl-PriorityThreshold-Dedicated-SL-PRS-RP</i>, the lower bound of the priority range is 1.</p>
<p><i>sl-PriorityThresholdUL-URLLC</i> Indicates the threshold used to determine whether NR sidelink transmission in dedicated SL PRS resource pool 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.</p>
<p><i>sl-PRS-ResourceReservePeriodList</i> Indicates set of possible resource reservation period in the unit of ms allowed in the resource pool. Up to 16 values can be configured per resource pool. The possible resource reservation period are periodicities for SL communication and the ones defined for DL-PRS.</p>
<p><i>sl-PRS-ResourcesDedicatedSL-PRS-RP</i> Indicates SL PRS resources in a slot of dedicated SL PRS resource pool as defined in TS 38.211 [16].</p>
<p><i>sl-PRS-TxConfigIndex</i> Indicates SL PRS transmission Configuration index.</p>
<p><i>sl-PRS-TxConfigIndexList</i> Indicates List of <i>sl-PRS-Tx-ConfigIndex</i> indicating the SL PRS transmission index</p>
<p><i>sl-RB-Number</i> Indicates the number of PRBs in the corresponding SL PRS dedicated resource pool, which consists of contiguous PRBs only.</p>
<p><i>sl-SCI-basedSL-PRS-TxTriggerSCI1-B</i> Indicates presence of a bit-field in SCI format 1-B to trigger SL-PRS transmission by a receiving UE.</p>
<p><i>sl-SensingWindowDedicated-SL-PRS-RP</i> Indicates Parameter that indicates the start of the sensing window for SL PRS in a dedicated resource pool.</p>
<p><i>sl-SRC-ID-LenDedicatedSL-PRS-RP</i></p>

Indicates the number of bits used for the source ID in SCI format 1-B.
<i>sl-StartRB-Subchannel-DedicatedSL-PRS-RP</i> Indicates the lowest RB index of the SL PRS dedicated resource pool with respect to the lowest RB index of a SL BWP.
<i>sl-SubchannelSizeDedicatedSL-PRS-RP</i> Indicates size of a subchannel for PSCCH in number of RBs.
<i>sl-ThreshS-RSSI-PRS-CBR</i> Indicates the S-RSSI threshold for determining the contribution of a sub-channel to the SL-PRS CBR measurement in a dedicated SL-PRS resource pool. Value 0 corresponds to -112 dBm, value 1 to -110 dBm, value n to $(-112 + n*2)$ dBm, and so on.
<i>sl-TimeResource</i> This field indicates the bitmap of the SL PRS dedicated resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle.
<i>sl-TimeWindowSizeCBR-DedicatedSL-PRS-RP</i> Indicates the time window size for CBR measurement in a dedicated SL-PRS resource pool.
<i>sl-TimeWindowSizeCR-DedicatedSL-PRS-RP</i> Indicates the time window size for CR evaluation in a dedicated SL-PRS resource pool.
<i>sl-TxPercentageDedicatedSL-PRS-RP-List</i> Indicates List of minimum Tx percentage (list per priority)

SL-PRS-PSCCH-Config field descriptions

<i>freqResourcePSCCH-Dedicated-SL-PRS-RP</i> Indicates the number of PRBs for PSCCH in a dedicated SL PRS resource pool.
<i>timeResourcePSCCH-Dedicated-SL-PRS-RP</i> Indicates the number of symbols for PSCCH in a dedicated SL PRS resource pool.

SL-PRS-PowerControl field descriptions

<i>dl-P0-SL-PRS</i> Indicates P0 value for DL pathloss based open loop power control for SL PRS transmission in dedicated SL PRS resource pool.
<i>dl-AlphaSL-PRS</i> Indicates alpha value for DL pathloss based open loop power control for SL PRS transmission in dedicated SL PRS resource pool.
<i>sl-P0-SL-PRS</i> Indicates P0 value for SL pathloss based open loop power control for SL PRS transmission in dedicated SL PRS resource pool.
<i>sl-AlphaSL-PRS</i> Indicates alpha value for downlink pathloss based power control for PSCCH/PSSCH when <i>dl-P0-PSSCH-PSCCH</i> is configured. When the field is absent the UE applies the value 1.

– ***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 <i>sl-ParametersAboveThres-r16</i> and <i>sl-ParametersBelowThres-r16</i> if <i>sl-ParametersAboveThres-v1650</i> and <i>sl-ParametersBelowThres-v1650</i> 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 <i>gnbEnb</i> 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 <i>SL-PSSCH-TxParameters</i> is present in <i>SL-CBR-CommonTxConfigList</i> , <i>SL-UE-SelectedConfig</i> , <i>SIB12</i> or <i>SidelinkPreconfigNR</i> ; 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 ::=
    sl-FilterCoefficientDMRS-r16          SEQUENCE {
        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 filter(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
<i>SLRBSetup</i>	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-RBSetConfig**

The IE SL-RBSetConfig specifies the configuration information for RB set for NR Sidelink Communication.

SL-RBSetConfig information element

```

-- ASN1START
-- TAG-SL-RBSETCONFIG-START

SL-RBSetConfig-r18 ::= SEQUENCE {
  sl-RBSetIndex-r18 INTEGER (0..4),
  sl-NumOfSSSBRepetition-r18 INTEGER (2..9) OPTIONAL, -- Need R
  sl-GapBetweenSSSBRepetition-r18 INTEGER (1..84) OPTIONAL, -- Need R
}

-- TAG-SL-RBSETCONFIG-STOP
-- ASN1STOP

```

<i>SL-RBSetConfig</i> field descriptions
<p><i>sl-GapBetweenSSSBRepetition</i> Indicate the gap between two adjacent S-SSB repetitions in frequency domain in one RB set, and the gap is between the lowest subcarrier of the upper PSBCH and the highest subcarrier of the lower PSBCH. The Unit is PRB.</p>
<p><i>sl-NumOfSSSBRepetition</i> Indicate the number of S-SSB repetitions in frequency domain in one RB set. S-SSB in the frequency domain indicated by <i>sl-AbsoluteFrequencySSB</i> is applicable in region with no OCB requirement, or with OCB exemption.</p>
<p><i>sl-RBSetIndex</i> Indicates the index of RB-set for which the configuration applies.</p>

– *SL-RelayIndicationMP*

The IE *SL-RelayIndicationMP* is used to indicate the L2 U2N Relay UE supporting RRC connection establishment/resume for MP operation triggered by receiving *RemoteUEInformationSidelink* containing the *connectionForMP* as specified in 5.3.3.1a and 5.3.13.1a in Rel-18.

***SL-RelayIndicationMP* information element**

```
-- ASN1START
-- TAG-SL-RELAYINDICATIONMP-START

SL-RelayIndicationMP-r18 ::= ENUMERATED {support}

-- TAG-SL-RELAYINDICATIONMP-STOP
-- ASN1STOP
```

– *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
```


<i>SL-RelayUE-Config</i> field descriptions	
<i>threshHighRelay</i>	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.
<i>threshLowRelay</i>	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
<i>ThreshHighRelay</i>	This field is mandatory present if <i>threshHighRelay</i> is included. Otherwise, the field is absent, Need R.
<i>ThreshLowRelay</i>	This field is mandatory present if <i>threshLowRelay</i> is included. Otherwise, the field is absent, Need R.

– *SL-RelayUE-ConfigU2U*

The IE *SL-RelayUE-ConfigU2U* specifies the threshold configuration information for NR sidelink U2U Relay UE.

SL-RelayUE-ConfigU2U information element

```
-- ASN1START
-- TAG-SL-RELAYUE-CONFIGU2U-START

SL-RelayUE-ConfigU2U-r18 ::= SEQUENCE {
    sl-RSRP-Thresh-DiscConfig-r18 SL-RSRP-Range-r16 OPTIONAL, -- Need R
    sd-RSRP-ThreshDiscConfig-r18 SL-RSRP-Range-r16 OPTIONAL, -- Need R
    sd-hystMaxRelay-r18 Hysteresis OPTIONAL -- Cond SD-RSRP-ThreshRelay
}

-- TAG-SL-RELAYUE-CONFIGU2U-STOP
-- ASN1STOP
```

<i>SL-RelayUE-ConfigU2U</i> field descriptions	
<i>sl-RSRP-Thresh-DiscConfig</i>	Indicates the threshold of SL-RSRP for a U2U Relay UE to evaluate AS layer conditions for discovery. The U2U relay UE applies the value of this field to decide which UE(s) can be announced as proximity UE(s) in the discovery message when performing U2U Relay Discovery with Model A, and decide whether to forward the discovery message when performing the U2U Relay Discovery with Model B as specified in [65].
<i>sd-RSRP-ThreshDiscConfig</i>	Indicates the threshold of SD-RSRP for a U2U Relay UE to evaluate AS layer conditions for discovery. The U2U relay UE applies the value of this field to evaluate AS layer conditions to decide which UE(s) can be announced as proximity UE(s) in the discovery message when performing U2U Relay Discovery with Model A, and decide whether to forward the discovery message when performing the U2U Relay Discovery with Model B or U2U relay communication with integrated Discovery as specified in TS 23.304 [65].

Conditional Presence	Explanation
<i>SL-RSRP-ThreshRelay</i>	This field is mandatory present if <i>sl-RSRP-Thresh-DiscConfig</i> is included. Otherwise, the field is absent, Need R.
<i>SD-RSRP-ThreshRelay</i>	This field is mandatory present if <i>sd-RSRP-ThreshDiscConfig</i> 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
    
```

<i>SL-RemoteUE-Config</i> field descriptions
<i>sl-ReselectionConfig</i> Includes the parameters used by the U2N remote UE when selecting/ reselecting a U2N relay UE.
<i>threshHighRemote</i> Indicates the threshold of Uu RSRP for a UE that is in network coverage to evaluate AS layer conditions for U2N remote UE operation.

<i>SL-ReselectionConfig</i> field descriptions
<i>sl-FilterCoefficientRSRP</i> Specifies L3 filter coefficient for SL communication/ discovery RSRP measurement results from L1 filter.
<i>sl-RSRP-Thresh</i> Indicates the threshold of SL communication/ discovery RSRP for a U2N remote UE to perform relay UE selection/ reselection.

Conditional Presence	Explanation
<i>SL-RSRP-Thresh</i>	This field is mandatory present if <i>sl-RSRP-Thresh</i> is included. Otherwise, the field is absent, Need R.
<i>ThreshHighRemote</i>	This field is mandatory present if <i>threshHighRemote</i> is included. Otherwise, the field is absent, Need R.

– *SL-RemoteUE-ConfigU2U*

The IE *SL-RemoteUE-ConfigU2U* specifies the threshold configuration information for NR sidelink U2U Remote UE.

***SL-RemoteUE-ConfigU2U* information element**

```

-- ASN1START
-- TAG-SL-REMOTEUE-CONFIGU2U-START

SL-RemoteUE-ConfigU2U-r18 ::= SEQUENCE {
    sl-RSRP-ThreshU2U-r18          SL-RSRP-Range-r16          OPTIONAL, -- Need R
    sl-FilterCoefficientU2U-r18    FilterCoefficient          OPTIONAL, -- Need R
    sl-HystMinU2U-r18              Hysteresis                  OPTIONAL, -- Cond SL-RSRP-ThreshU2U
    sd-RSRP-ThreshU2U-r18          SL-RSRP-Range-r16          OPTIONAL, -- Need R
    sd-FilterCoefficientU2U-r18    FilterCoefficient          OPTIONAL, -- Need R
    sd-HystMinU2U-r18              Hysteresis                  OPTIONAL, -- Cond SD-RSRP-ThreshU2U
}

-- TAG-SL-REMOTEUE-CONFIGU2U-STOP
-- ASN1STOP
    
```

<i>SL-RemoteUE-ConfigU2U</i> field descriptions	
<i>sl-RSRP-ThreshU2U</i>	Indicates the threshold of SL-RSRP for a U2U Remote UE to perform Relay UE selection/ reselection. The U2U remote UE applies the value of this field to evaluate AS layer conditions on direct PC5 link with the peer U2U Remote UE to trigger relay selection, and evaluate AS layer conditions on U2U relay link with U2U Relay UE to trigger relay reselection.
<i>sl-FilterCoefficientU2U</i>	Specifies L3 filter coefficient for SL-RSRP measurement results from L1 filter.
<i>sd-RSRP-ThreshU2U</i>	Indicates the threshold of SD-RSRP for a U2U Remote UE to perform discovery and Relay UE selection/ reselection. For discovery, the U2U Remote UE applies the value of this field to evaluate AS layer conditions to decide whether to respond the discovery message when performing the U2U Relay Discovery with Model B as specified in TS 23.304 [65]. For relay selection and reselection, the U2U remote UE applies the value of this field to evaluate AS layer conditions on direct PC5 link to trigger relay selection, and evaluate AS layer conditions on U2U relay link to trigger relay reselection. The target U2U remote UE applies the value of this field to evaluate AS layer conditions trigger relay selection when performing U2U relay communication with integrated Discovery as specified in TS 23.304 [65].
<i>sd-FilterCoefficientU2U</i>	Specifies L3 filter coefficient for SD-RSRP measurement results from L1 filter.

Conditional Presence	Explanation
<i>SL-RSRP-ThreshU2U</i>	This field is mandatory present if <i>sl-RSRP-ThreshU2U</i> is included. Otherwise, the field is absent, Need R.
<i>SD-RSRP-ThreshU2U</i>	This field is mandatory present if <i>sd-RSRP-ThreshU2U</i> 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 {
            sl-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, sl-prs, spare2, spare1}
-- TAG-SL-REPORTCONFIGLIST-STOP
-- ASN1STOP

```

SL-ReportConfig field descriptions
<p>sl-ReportType Type of the configured sidelink measurement report.</p>

SL-EventTriggerConfig field descriptions
<p>sl-EventId Choice of sidelink measurement event triggered reporting criteria.</p>
<p>sl-ReportAmount Number of sidelink measurement reports applicable for <i>sl-EventTriggered</i> report type.</p>
<p>sl-ReportInterval Indicates the interval between periodical reports (i.e., when <i>sl-ReportAmount</i> exceeds 1) for <i>sl-EventTriggered</i> report type.</p>
<p>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 <i>sl-FrequencyTriggeredList</i>, as specified in 5.8.10.4.1.</p>
<p>sl-ReportQuantity The sidelink measurement quantities to be included in the sidelink measurement report.</p>
<p>sl-TimeToTrigger Time during which specific criteria for the event needs to be met in order to trigger a sidelink measurement report.</p>
<p>sN-Threshold Threshold used for events S1 and S2 specified in clauses 5.8.10.4.2 and 5.8.10.4.3, respectively.</p>

<i>SL-PeriodicalReportConfig</i> field descriptions
<i>sl-ReportAmount</i> Number of sidelink measurement reports applicable for <i>sl-Periodical</i> report type.
<i>sl-ReportInterval</i> Indicates the interval between periodical reports (i.e., when <i>sl-ReportAmount</i> exceeds 1) for <i>sl-Periodical</i> report type.
<i>sl-ReportQuantity</i> 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)
        }
        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, p11, p12, p13, p14, p15, p16, p17, p18}  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-CPE-StartingPositionsPSCCH-PSSCH-InitiateCOT-List-r18
      SetupRelease { SL-CPE-StartingPositionsPSCCH-PSSCH-List-r18 }    OPTIONAL,  -- Need M
sl-CPE-StartingPositionsPSCCH-PSSCH-InitiateCOT-Default-r18 INTEGER (1..9)                OPTIONAL,  -- Need M
sl-CPE-StartingPositionsPSCCH-PSSCH-WithinCOT-List-r18
      SetupRelease { SL-CPE-StartingPositionsPSCCH-PSSCH-List-r18 }    OPTIONAL,  -- Need M
sl-CPE-StartingPositionsPSCCH-PSSCH-WithinCOT-Default-r18 INTEGER (1..9)                OPTIONAL,  -- Need M
sl-Type1-LBT-BlockingOption1-r18  ENUMERATED {enabled}          OPTIONAL,  -- Need R
sl-Type1-LBT-BlockingOption2-r18  ENUMERATED {enabled}          OPTIONAL,  -- Need R
sl-NumInterlacePerSubchannel-r18  ENUMERATED {sc1, sc2}         OPTIONAL,  -- Need M
sl-NumReferencePRBs-OfInterlace-r18 ENUMERATED {prb10, prb11}     OPTIONAL,  -- Need M
sl-TransmissionStructureForPSFCH-r18 ENUMERATED {commonInterlace, dedicatedInterlace} OPTIONAL,  -- Need M
sl-NumDedicatedPRBs-ForPSFCH-r18  ENUMERATED {prb1, prb2, prb5}     OPTIONAL,  -- Need M
sl-NumPSFCH-Occasions-r18         ENUMERATED {o1, o2, o3, o4}     OPTIONAL,  -- Need M
sl-PSFCH-CommonInterlaceIndex-r18 INTEGER (0..9)                OPTIONAL,  -- Need M
sl-CPE-StartingPositionPSFCH-r18  INTEGER (1..9)                OPTIONAL,  -- Need M
sl-NumRefSymbolLength-r18         ENUMERATED {sym7, sym8, sym9, sym10, sym11, sym12, sym13, sym14} OPTIONAL,  -- Need M
sl-PSFCH-RB-SetList-r18           SEQUENCE (SIZE (1..4)) OF BIT STRING (SIZE (10..275)) OPTIONAL,  -- Need M
sl-IUC-RB-SetList-r18            SEQUENCE (SIZE (1..4)) OF BIT STRING (SIZE (10..275)) OPTIONAL,  -- Need M
sl-PSFCH-PowerOffset-r18         INTEGER (0..10)                OPTIONAL,  -- Need M
sl-RBSetIndexOfResourcePool-r18   SEQUENCE (SIZE (1..5)) OF INTEGER (0..4)    OPTIONAL,  -- Need M
sl-A2X-Service-r18               ENUMERATED {brid, daa, bridAndDAA, spare1} OPTIONAL,  -- Cond A2X
sl-PRS-ResourcesSharedSL-PRS-RP-r18 SEQUENCE (SIZE (1..17)) OF SL-PRS-ResourceSharedSL-PRS-RP-r18 OPTIONAL,  -- Need M
numSym-SL-PRS-2ndStageSCI-r18     INTEGER (1..4)                OPTIONAL,  -- Need M
sl-SCI-based-SL-PRS-Tx-Trigger-SCI2-D-r18 BOOLEAN                    OPTIONAL,  -- Need M
sl-TriggerConditionRequest-r18    INTEGER (0..1)                OPTIONAL,  -- Need M
]]
}

SL-CPE-StartingPositionsPSCCH-PSSCH-List-r18 ::= SEQUENCE (SIZE (8)) OF SL-CPE-StartingPositionsPSCCH-PSSCH-r18

SL-CPE-StartingPositionsPSCCH-PSSCH-r18 ::= SEQUENCE {
  sl-Priority-r18                INTEGER (1..8),
  sl-CPE-StartingPositions-r18   SEQUENCE (SIZE (1..9)) OF INTEGER (1..9)
}

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}
  sl-ZoneConfig-r16             SL-ZoneConfig-r16
  ...
}

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 ::=
  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 ::=
  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 ::=
  sl-PSFCH-Period-r16           ENUMERATED {s10, s11, s12, s14}          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 {s12, s13}                    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 ::=
  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 ::=
  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-NRPSSCH-EUTRA-ThresRSRP-List-r18 SL-Thres-RSRP-List-r16              OPTIONAL, -- Need M
  sl-NRPSFCH-EUTRA-ThresRSRP-List-r18 SL-Thres-RSRP-List-r16              OPTIONAL, -- Need M
  ]],
}

SL-ResourceReservePeriod-r16 ::=
  sl-ResourceReservePeriod1-r16 CHOICE {
    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
    ]]
}

SL-PRS-ResourceSharedSL-PRS-RP-r18 ::= SEQUENCE {
    sl-PRS-ResourceID-r18             INTEGER (0..16),
    mNumberOfSymbols-r18              INTEGER (1..9),
    sl-PRS-starting-symbol-r18        INTEGER (4..12),
    sl-PRS-CombSizeN-AndReOffset-r18 CHOICE {
        n2-r18                        INTEGER (0..1),
        n4-r18                        INTEGER (0..3),
        n6-r18                        INTEGER (0..5),
        ...
    }
}
OPTIONAL -- Need M

```

-- TAG-SL-RESOURCEPOOL-STOP
-- ASN1STOP

Editor's note: The value range of *sl-PSFCH-PowerOffset* may need to be updated based on RAN4 reply LS.

SL-ZoneConfigMCR field descriptions	
<i>sl-TransRange</i>	Indicates the communication range requirement for the corresponding <i>sl-ZoneConfigMCR-Index</i> . The unit is meter.
<i>sl-ZoneConfig</i>	Indicates the zone configuration for the corresponding <i>sl-ZoneConfigMCR-Index</i> .
<i>sl-ZoneConfigMCR-Index</i>	Indicates the codepoint of the communication range requirement field in SCI.

SL-ResourcePool field descriptions
<p>dummy This field is not used in the specification. If received it shall be ignored by the UE.</p>
<p>numSym-SL-PRS-2ndStageSCI Indicates the number symbols to be assumed for SL PRS in determining the number of coded modulation symbols for second stage SCI in a slot of a shared SL PRS resource pool.</p>
<p>sl-A2X-Service Presence of this field indicates the resource pool is dedicated for A2X service, i.e., not to be used for other than A2X service. Value <i>brid</i> indicates the resource pool is for BRID, value <i>daa</i> indicates the resource pool is for DAA, and value <i>bridAndDAA</i> indicates the resource pool is for both BRID and DAA. If this field is absent in all the configured resource pools, the UE may choose non-dedicated resource pool for A2X service.</p>
<p>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.</p>
<p>sl-CPE-StartingPositionsPSCCH-PSSCH-InitiateCOT-Default Indicates CPE starting position index for the default CPE starting position, to be used for PSCCH/PSSCH transmission when UE initiating a COT.</p>
<p>sl-CPE-StartingPositionsPSCCH-PSSCH-InitiateCOT-List Indicates a set of selected indices that correspond to multiple candidate CPE starting positions to be used for PSCCH/PSSCH transmission when UE initiating a COT, associated per L1 priority of PSSCH.</p>
<p>sl-CPE-StartingPositionsPSCCH-PSSCH-WithinCOT-Default Indicates CPE starting position index for the default CPE starting position, to be used by UE for PSCCH/PSSCH transmission within a COT.</p>
<p>sl-CPE-StartingPositionsPSCCH-PSSCH-WithinCOT-List Indicates a set of one or multiple selected indices that correspond to one or multiple candidate CPE starting positions to be used by UE for PSCCH/PSSCH transmission within a COT, associated per L1 priority of PSSCH.</p>
<p>sl-CPE-StartingPositionPSFCH Indicates CPE starting position within the GP symbol before PSFCH transmission. The value is an index of the set of all candidate CPE starting positions specified in Table 5.3.1-3 of [16, TS38.211] for Ci=1 and the corresponding SCS of the SL BWP.</p>
<p>sl-FilterCoefficient This field indicates the filtering coefficient for long-term measurement and reference signal power derivation used for sidelink open-loop power control.</p>
<p>sl-InterUE-CoordinationConfig Indicates the configured sidelink inter-UE coordination parameters.</p>
<p>sl-IUC-RB-SetList The n-th value in the list indicates the set of PRBs of n-th PSFCH occasion that are actually used for inter-UE coordination information transmission and reception in Scheme 2. It shall be (pre-)configured such that N candidate PSFCH occasion(s) are associated with N different PRB sets. PRBs within intra-cell guard band are not used for PSFCH transmission. The length of this list is aligned with <i>sl-NumPSFCH-Occasions</i>. For each PSFCH occasion, the set of PRBs are indicated in the same format as in <i>sl-PSFCH-RB-Set</i>.</p>
<p>sl-NumDedicatedPRBs-ForPSFCH Indicates the value of K3 when each PSFCH transmission occupies "1 common interlace and K3 dedicated PRB(s)" (as indicated by <i>sl-TransmissionStructureForPSFCH</i>). Value prb1 corresponds to K3=1, value prb2 corresponds to K3=2, and so on. UE expects the same (pre-)configured value of <i>sl-NumDedicatedPRBs-ForPSFCH</i> across all resource pools.</p>
<p>sl-NumInterlacePerSubchannel Indicates the number of (K) interlaces per sub-channel within a resource pool. Value <i>sc1</i> corresponds to 1 interlace per sub-channel, and value <i>sc2</i> corresponds to 2 interlaces per sub-channel. The applicable values are related to the subcarrier spacing as below: For SCS = 15 kHz: K=1 or 2 For SCS = 30 kHz: K=1</p>

<i>sl-NumPSFCH-Occasions</i>
Indicates one PSCCH/PSSCH transmission has N associated candidate PSFCH occasion(s). Value <i>o1</i> corresponds to N=1, value <i>o2</i> corresponds to N=2, and so on. If the field is not configured, the UE shall use value <i>o1</i> .
<i>sl-NumReferencePRBs-OfInterlace</i>
Indicate reference number of PRBs of one interlace within 1 RB set. Value <i>prb10</i> corresponds to 10 PRBs, and value <i>prb11</i> corresponds to 11 PRBs.
<i>sl-NumRefSymbolLength</i>
Indicates a reference number of symbols for TBS determination.
<i>sl-NumSubchannel</i>
Indicates the number of subchannels in the corresponding resource pool, which consists of contiguous PRBs only.
<i>sl-PBPS-CPS-Config</i>
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 <i>sl-TxPoolExceptional</i> .
<i>sl-PreemptionEnable</i>
Indicates whether pre-emption is disabled or enabled in a resource pool. If the field is present and the value is <i>p1</i> , <i>p2</i> , and so on (but not <i>enabled</i>), it means that pre-emption is enabled and a priority level <i>p_preemption</i> is configured. If the field is present and the value is <i>enabled</i> , the pre-emption is enabled (but <i>p_preemption</i> is not configured) and pre-emption is applicable to all levels.
<i>sl-PriorityThreshold-UL-URLLC</i>
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.
<i>sl-PriorityThreshold</i>
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.
<i>sl-PRS-ResourcesSharedSL-PRS-RP</i>
Indicates SL PRS resources in a slot of shared SL PRS resource pool as defined in TS 38.211 [16].
<i>sl-PSFCH-CommonInterlaceIndex</i>
Indicate the index of common interlace to meet OCB requirements when <i>transmissionStructureForPSFCH</i> is set to common interlace. Value 0 corresponds to interlace 0 is used as common interlace, value 1 corresponds to interlace 1 is used as common interlace and so on.
<i>sl-PSFCH-PowerOffset</i>
Indicates the power offset between Tx power on one common PRB (<i>P_common</i>) and Tx power on one dedicated PRB (<i>P_dedicated</i>) when <i>sl-TransmissionStructureForPSFCH</i> is (pre-)configured as <i>commonInterlace</i> , i.e., $P_{common} = P_{dedicated} - offset$. UE expects the same (pre-)configured value of <i>sl-PSFCH-PowerOffset</i> across all resource pools. The unit is dB.
<i>sl-PSFCH-RB-SetList</i>
The n-th value in the list indicates the set of PRBs that are actually used for PSFCH transmission and reception of n-th PSFCH occasion of a PSCCH/PSSCH transmission. It shall be (pre-)configured such that N candidate PSFCH occasion(s) are associated with N different PRB sets. PRBs within intra-cell guard band are not used for PSFCH transmission. The length of this list is aligned with <i>sl-NumPSFCH-Occasions</i> . For each PSFCH occasion, the set of PRBs are indicated in the same format as in <i>sl-PSFCH-RB-Set</i> .
<i>sl-RB-Number</i>
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).
<i>sl-RBSetIndexOfResourcePool</i>
For interlace RB based PSCCH/PSSCH, indicates the RB set index(s) included in the resource pool. Contiguous RB sets are (pre-)configured for a resource pool.
<i>sl-SCI-based-SL-PRS-Tx-Trigger-SCI2-D</i>
Indicates presence of a bit-field in SCI format 2-D to trigger SL-PRS transmission by a receiving UE.
<i>sl-StartRB-Subchannel</i>
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.

<i>sl-SubchannelSize</i>
Indicates the minimum granularity in frequency domain for the sensing for PSSCH resource selection in the unit of PRB.
<i>sl-SyncAllowed</i>
Indicates the allowed synchronization reference(s) which is (are) allowed to use the configured resource pool.
<i>sl-SyncConfigIndex</i>
Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry <i>SL-SyncConfigList</i> of in <i>SIB12</i> for NR sidelink communication.
<i>sl-TDD-Configuration</i>
Indicates the TDD configuration associated with the reception pool of the cell indicated by <i>sl-SyncConfigIndex</i> .
<i>sl-ThreshS-RSSI-CBR</i>
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 $(-112 + n \cdot 2)$ dBm, and so on.
<i>sl-TimeResource</i>
Indicates the bitmap of the resource pool, which is defined by repeating the bitmap with a periodicity during a SFN or DFN cycle.
<i>sl-TimeWindowSizeCBR</i>
Indicates the time window size for CBR measurement.
<i>sl-TimeWindowSizeCR</i>
Indicates the time window size for CR evaluation.
<i>sl-TransmissionStructureForPSFCH</i>
Indicate each PSFCH transmission occupies "1 common interlace and K3 dedicated PRB(s)", or "1 dedicated interlace". Value <i>commonInterlace</i> corresponds to "1 common interlace and K3 dedicated PRB(s)", and value <i>dedicatedInterlace</i> corresponds to "1 dedicated interlace". UE expects the same (pre-)configured value of <i>transmissionStructureForPSFCH</i> across all resource pools.
<i>sl-TriggerConditionRequest</i>
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 SL-PRS to be transmitted to UE-A.
<i>sl-TxPercentageList</i>
Indicates the portion of candidate single-slot PSSCH resources over the total resources. Value <i>p20</i> corresponds to 20%, and so on.
<i>sl-Type1-LBT-BlockingOption1</i>
Indicates UE may avoid selection of N consecutive resource(s) before a reserved resource of another UE when the L1 SL priority value for the transmission is higher than the L1 SL priority value of the reserved resource, and UE may also avoid selection of M consecutive resource(s) after a reserved resource of another UE when the transmitting symbols of the reserved resource overlap with LBT of the selected resource. The selection of the value N is up to UE implementation from {0, 1, 2}. M is determined based on UE implementation (at least including 0).
<i>sl-Type1-LBT-BlockingOption2</i>
Indicates UE may prioritize/select resource(s) in the slot(s) for transmission, if UE's transmission in slot(s) before a reserved resource is able to share its initiated COT to the reservation.
<i>sl-X-Overhead</i>
Accounts for overhead from CSI-RS, PT-RS. If the field is absent, the UE applies value <i>n0</i> (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	
<i>sl-MinTimeGapPSFCH</i>	The minimum time gap between PSFCH and the associated PSSCH in the unit of slots.
<i>sl-NumMuxCS-Pair</i>	Indicates the number of cyclic shift pairs used for a PSFCH transmission that can be multiplexed in a PRB.
<i>sl-PSFCH-CandidateResourceType</i>	Indicates the number of PSFCH resources available for multiplexing HARQ-ACK information in a PSFCH transmission (see TS 38.213 [13], clause 16.3).
<i>sl-PSFCH-HopID</i>	Scrambling ID for sequence hopping of the PSFCH used in the resource pool.
<i>sl-PSFCH-Period</i>	Indicates the period of PSFCH resource in the unit of slots within this resource pool. If set to <i>s/0</i> , no resource for PSFCH, and HARQ feedback for all transmissions in the resource pool is disabled.
<i>sl-PSFCH-RB-Set</i>	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	
<i>sl-PTRS-FreqDensity</i>	Presence and frequency density of SL PT-RS as a function of scheduled BW. If the field is not configured, the UE uses $K_{PT-RS} = 2$
<i>sl-PTRS-TimeDensity</i>	Presence and time density of SL PT-RS as a function of MCS. If the field is not configured, the UE uses $L_{PT-RS} = 1$
<i>sl-PTRS-RE-Offset</i>	Indicates the subcarrier offset for SL PT-RS . If the field is not configured, the UE applies the value <i>offset00</i> (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 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-NRPSFCH-EUTRA-ThresRSRP-List

Indicates a list of 64 thresholds from which a threshold should be selected based on the priority in the decoded EUTRA SCI and the priority in the NR SCI to be transmitted. A NR SL resource is excluded if the corresponding PSFCH transmission occasions overlap with resources indicated or reserved by the decoded EUTRA SCI in time domain and EUTRA PSSCH RSRP in the associated data resource is above the threshold.

sl-NRPSSCH-EUTRA-ThresRSRP-List

Indicates a list of 64 thresholds, and a threshold should be selected based on the priority in the decoded EUTRA SCI and the priority in the NR SCI to be transmitted. A NR SL resource is excluded if it is indicated or reserved by the decoded EUTRA SCI and EUTRA PSSCH RSRP in the associated data resource is above the threshold. If the field is present, the UE shall perform the dynamic co-channel coexistence of LTE sidelink and NR sidelink as specified in TS 38.214; otherwise it shall not perform it.

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 $1 \cdot 2^\mu$, value $n5$ corresponds to $5 \cdot 2^\mu$, and so on, where $\mu = 0,1,2,3$ 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
<p><i>sl-MaxTransPower</i> 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 <i>sl-MaxTransPower</i> over multiple resource pools, as specified in TS 38.101-1 [15].</p>
<p><i>sl-Alpha-PSSCH-PSCCH</i> Indicates alpha value for sidelink pathloss based power control for PSCCH/PSSCH when <i>sl-P0-PSSCH-PSCCH</i> is configured. When the field is absent the UE applies the value 1.</p>
<p><i>sl-P0-PSSCH-PSCCH</i> 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 <i>sl-P0-PSSCH-PSCCH-r17</i> is configured, the UE ignores <i>sl-P0-PSSCH-PSCCH-r16</i>.</p>
<p><i>dl-Alpha-PSSCH-PSCCH</i> Indicates alpha value for downlink pathloss based power control for PSCCH/PSSCH when <i>dl-P0-PSSCH-PSCCH</i> is configured. When the field is absent the UE applies the value 1.</p>
<p><i>dl-P0-PSSCH-PSCCH</i> 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 <i>dl-P0-PSSCH-PSCCH-r17</i> is configured, the UE ignores <i>dl-P0-PSSCH-PSCCH-r16</i>. A Remote UE which is out of coverage, considers downlink pathloss based power control is disabled for PSCCH/PSSCH when <i>dl-P0-PSSCH-PSCCH</i> is configured.</p>
<p><i>dl-Alpha-PSFCH</i> Indicates alpha value for downlink pathloss based power control for PSFCH when <i>dl-P0-PSFCH</i> 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.</p>
<p><i>dl-P0-PSFCH</i> Indicates P0 value for downlink pathloss based power control for PSFCH. If not configured, downlink pathloss based power control is disabled for PSFCH. When <i>dl-P0-PSFCH-r17</i> is configured, the UE ignores <i>dl-P0-PSFCH-r16</i>. 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 <i>dl-P0-PSFCH</i> is configured.</p>

SL-MinMaxMCS-Config field descriptions
<p><i>sl-MaxMCS-PSSCH</i> 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.</p>
<p><i>sl-MinMCS-PSSCH</i> 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.</p>

SL-CPE-StartingPositionsPSCCH-PSSCH field descriptions
<p><i>sl-Priority</i> Indicates L1 priority of PSSCH.</p>
<p><i>sl-CPE-StartingPositions</i> Indicates a set of candidate CPE starting positions specified in Table 5.3.1-3 [16, TS38.211],</p>

Conditional Presence	Explanation
A2X	The field is mandatory present in <i>sl-BWP-PoolConfigA2X</i> and <i>sl-BWP-PoolConfigCommonA2X</i> ; otherwise the field is optionally present, Need M.

– *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             OPTIONAL, -- Cond LCH-SetupOnly
        sl-RLC-Config-r16                    OPTIONAL, -- Cond LCH-Setup
        sl-MAC-LogicalChannelConfig-r16      OPTIONAL, -- Cond LCH-Setup
        . . .
        [[
            sl-RLC-BearerConfigIndex-v1800    SL-RLC-BearerConfigIndex-v1800 OPTIONAL -- Need R
        ]]
    }

-- 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. If the field <i>sl-RLC-BearerConfigIndex-v1800</i> is present, the UE shall ignore the <i>sl-RLC-BearerConfigIndex-r16</i> field.
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)

SL-RLC-BearerConfigIndex-v1800 ::=             INTEGER (maxSL-LCID-Plus1-r18..maxSL-LCID-r18)

-- 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, or between L2 U2U Remote UE and L2 U2U Relay 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
```

<i>SL-RLC-ChannelConfig</i> field descriptions
<i>sl-MAC-LogicalChannelConfig</i> The field is used to configure MAC SL logical channel parameters.
<i>sl-RLC-ChannelID</i> Indicates the PC5 Relay RLC channel in the link between L2 U2N Relay UE and L2 U2N Remote UE, or between L2 U2U Remote UE and L2 U2U Relay UE.
<i>sl-RLC-Config</i> Determines the RLC mode (UM, AM) and provides corresponding parameters.
<i>sl-PacketDelayBudget</i> Indicates the Packet Delay Budget for a PC5 Relay RLC channel used in L2 U2N relay operation. 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, or between L2 U2U Relay UE and L2 U2U 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
<p>sl-MaxRetxThreshold Parameter value of <i>maxRetxThreshold</i> for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value <i>t1</i> corresponds to 1 retransmission, value <i>t2</i> corresponds to 2 retransmissions and so on.</p>
<p>sl-PollByte Parameter value of <i>pollByte</i> for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value <i>kB25</i> corresponds to 25 kBytes, value <i>kB50</i> corresponds to 50 kBytes and so on. <i>infinity</i> corresponds to an infinite amount of kBytes.</p>
<p>sl-PollPDU Parameter value of <i>pollPDU</i> for RLC AM for NR sidelink communications, see TS 38.322 [4]. Value <i>p4</i> corresponds to 4 PDUs, value <i>p8</i> corresponds to 8 PDUs and so on. <i>infinity</i> corresponds to an infinite number of PDUs.</p>
<p>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 <i>size6</i> (6 bits) is configured for the field <i>sl-SN-FieldLengthUM</i>.</p>
<p>sl-T-PollRetransmit Timer value of <i>t-PollRetransmit</i> for RLC AM for NR sidelink communications, see TS 38.322 [4], in milliseconds. Value <i>ms5</i> means 5 ms, value <i>ms10</i> means 10 ms and so on.</p>

Conditional Presence	Explanation
<i>SLRBSetup</i>	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/positioning configurations used for network scheduled NR sidelink communication/positioning.

SL-ScheduledConfig information element

```

-- ASN1START
-- TAG-SL-SCHEDULEDCONFIG-START

```

```

SL-ScheduledConfig-r16 ::=
  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
]],
[[
sl-ConfiguredGrantConfigDedicated-SL-PRS-RP-List-r18 SL-ConfiguredGrantConfigDedicated-SL-PRS-RP-List-r18  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
}

SL-ConfiguredGrantConfigDedicated-SL-PRS-RP-List-r18 ::= SEQUENCE {
  sl-ConfiguredGrantConfigDedicated-SL-PRS-RPToAddModList-r18 SEQUENCE (SIZE (1..maxNrofCG-SL-r16)) OF SL-ConfigIndexCG-r16          OPTIONAL, -- Need N
  sl-ConfiguredGrantConfigDedicated-SL-PRS-RPToAddModList-r18 SEQUENCE (SIZE (1..maxNrofCG-SL-r16)) OF SL-ConfiguredGrantConfigDedicatedSL-PRS-RP-r18  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 ::=
    sl-SDAP-Header-r16
    sl-DefaultRB-r16
    sl-MappedQoS-Flows-r16
        sl-MappedQoS-FlowsList-r16
        sl-MappedQoS-FlowsListDedicated-r16
    }
    sl-CastType-r16
    ...
}

SL-MappedQoS-FlowsListDedicated-r16 ::= SEQUENCE {
    sl-MappedQoS-FlowsToAddList-r16
    sl-MappedQoS-FlowsToReleaseList-r16
}

-- TAG-SL-SDAP-CONFIG-STOP
-- ASN1STOP

```

SEQUENCE {
 ENUMERATED {present, absent},
 BOOLEAN,
 CHOICE {
 SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-Profile-r16,
 SL-MappedQoS-FlowsListDedicated-r16
 }
 ENUMERATED {broadcast, groupcast, unicast, spare1}
 OPTIONAL, -- Need M
 OPTIONAL, -- Need M

SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-FlowIdentity-r16 OPTIONAL, -- Need N
 SEQUENCE (SIZE (1..maxNrofSL-QFIs-r16)) OF SL-QoS-FlowIdentity-r16 OPTIONAL -- Need N

SL-SDAP-Config field descriptions
<p>sl-DefaultRB Indicates whether or not this is the default sidelink DRB for this NR sidelink communication transmission destination. Among all configured instances of <i>SL-SDAP-Config</i> for this destination, this field shall be set to <i>true</i> in at most one instance of <i>SL-SDAP-Config</i> and to <i>false</i> in all other instances.</p>
<p>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 <i>sl-MappedQoS-FlowsListDedicated</i>; otherwise, it is set to <i>sl-MappedQoS-FlowsList</i>.</p>
<p>sl-MappedQoS-FlowsList Indicates the list of QoS profiles of the NR sidelink communication transmission destination mapped to this sidelink DRB.</p>
<p>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.</p>
<p>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.</p>
<p>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 <i>sl-DefaultRB</i> is set to <i>true</i>.</p>

– 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
<p>sl-CarrierFreqNR Indicates the DL frequency of the cell indicated by <i>sl-PhysCellId</i>.</p>
<p>sl-PhysCellId Indicates the PCI of the PCell.</p>

– *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 <i>srb-identity-r17</i> (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
<i>L2RelayUE</i>	For L2 U2N Relay UE, the field is optionally present, Need M. Otherwise, it is absent.

– SL-SRAP-ConfigU2U

The IE *SL-SRAP-ConfigU2U* is used to set the configurable SRAP parameters used by L2 U2U Relay UE and L2 U2U Remote UE as specified in TS 38.351 [66].

SL-SRAP-ConfigU2U information element

```

-- ASN1START
-- TAG-SL-SRAP-CONFIGU2U-START

SL-SRAP-ConfigU2U-r18 ::=
    sl-MappingToAddMod-U2U-List-r18      SEQUENCE {
    sl-MappingToRelease-U2U-List-r18     SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-MappingConfig-U2U-r18    OPTIONAL, -- Need N
    }
    SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SLRB-Uu-ConfigIndex-r16    OPTIONAL -- Need N

SL-MappingConfig-U2U-r18 ::=
    sl-RemoteUE-SLRB-Identity-r18        SEQUENCE {
    sl-EgressRLC-ChannelPC5-r18          SLRB-Uu-ConfigIndex-r16,
    SL-RLC-ChannelID-r17,
    ...
    }

-- TAG-SL-SRAP-CONFIGU2U-STOP
-- ASN1STOP

```

SL-SRAP-ConfigU2U field descriptions
<i>sl-MappingToAddMod-U2U-List</i> Indicates the list of mappings between the end-to-end sidelink bearer of a given L2 U2U Remote UE and the egress PC5 Relay RLC channel used by L2 U2U Remote UE and L2 U2U Relay UE when acting as Tx UE, as specified in TS 38.351 [66] to be added or modified.
<i>sl-MappingToRelease-U2U-List</i> Indicates the list of mappings between the end-to-end sidelink bearer of a given L2 U2U Remote UE and the egress PC5 Relay RLC channel as specified in TS 38.351 [66] to be released,
<i>sl-EgressRLC-ChannelPC5</i> Indicates the egress PC5 Relay RLC channel for sidelink transmissions at the L2 U2U Relay UE and at the L2 U2U Remote UE.
<i>sl-RemoteUE-SLRB-Identity</i> Identity of the end-to-end sidelink bearer of the L2 U2U Remote UE.

– 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
<p>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.</p>
<p>sl-SyncRefMinHyst Hysteresis when evaluating a SyncRef UE using absolute comparison.</p>
<p>sl-SyncRefDiffHyst Hysteresis when evaluating a SyncRef UE using relative comparison.</p>
<p>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 All values in <i>sl-NumSSB-WithinPeriod</i> in <i>sl-SSB-TimeAllocation1</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-NumSSB-WithinPeriod</i> in <i>sl-SSB-TimeAllocation2</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-NumSSB-WithinPeriod</i> in <i>sl-SSB-TimeAllocation3</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured.</p>
<p>sl-TimeOffsetSSB Indicates the slot offset from the start of sidelink SSB period to the first sidelink SSB. All values in <i>sl-TimeOffsetSSB</i> in <i>sl-SSB-TimeAllocation1</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-TimeOffsetSSB</i> in <i>sl-SSB-TimeAllocation2</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-TimeOffsetSSB</i> in <i>sl-SSB-TimeAllocation3</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured.</p>
<p>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. All values in <i>sl-TimeInterval</i> in <i>sl-SSB-TimeAllocation1</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-TimeInterval</i> in <i>sl-SSB-TimeAllocation2</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured. All values in <i>sl-TimeInterval</i> in <i>sl-SSB-TimeAllocation3</i> is set to be same across all carrier frequencies configured for UEs performing NR sidelink communication on multiple carrier frequencies, if configured.</p>
<p>sl-SSID Indicates the ID of sidelink synchronization signal associated with different synchronization priorities.</p>
<p>syncInfoReserved Reserved for future use.</p>
<p>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.</p>

– *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*. A NR sidelink resource is excluded if the corresponding PSFCH transmission occasions overlap with resources indicated or reserved by the decoded EUTRA SCI in time domain and EUTRA PSSCH RSRP in the associated data resource is above the threshold defined by IE *sl-NRPSFCH-EUTRA-ThresRSRP-List*. A NR sidelink resource is excluded if it is indicated or reserved by the decoded EUTRA SCI and EUTRA PSSCH RSRP in the associated data resource is above the threshold defined by IE *sl-NRPSSCH-EUTRA-ThresRSRP-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, -- Cond SIB12
        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
        . . .
        [[
        sl-CBR-CommonTxDedicatedSL-PRS-RP-List-r18 SL-CBR-CommonTxDedicatedSL-PRS-RP-List-r18 OPTIONAL -- Cond notSIB12
        ]]
    }

-- TAG-SL-UE-SELECTEDCONFIG-STOP
-- ASN1STOP

```

<i>SL-UE-SelectedConfig</i> field descriptions
<p><i>sl-PrioritizationThres</i> 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 <i>sl-PrioritizationThres</i> and the <i>ul-PrioritizationThres</i> to the UE separately.</p>
<p><i>sl-ProbResourceKeep</i> 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]).</p>
<p><i>sl-PSSCH-TxConfigList</i> 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.</p>
<p><i>sl-ReselectAfter</i> Indicates the number of consecutive skipped transmissions before triggering resource reselection for sidelink communication (see TS 38.321 [3]).</p>
<p><i>ul-PrioritizationThres</i> 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 <i>sl-PrioritizationThres</i> and the <i>ul-PrioritizationThres</i> to the UE separately.</p>

Conditional Presence	Explanation
<i>SIB12</i>	This field is optional present if included within <i>SIB12</i> , need R. Otherwise, the field is absent.
<i>notSIB12</i>	The field is absent in <i>SIB12</i> . Otherwise, it is optional present, Need R

– *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

```

<i>SL-ZoneConfig</i> field descriptions
<p><i>sl-ZoneLength</i> Indicates the length of each geographic zone.</p>

– *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
    locationAndBandwidth
}

-- TAG-CFR-CONFIGMCCH-MTCH-STOP
-- ASN1STOP
```

CFR-ConfigMCCH-MTCH field descriptions
<p>commonControlResourceSetExt An additional common control resource set which may be configured and used for <i>searchSpaceMCCH/searchSpaceMTCH</i> or UE-specific search space in the BWP where <i>searchSpaceMCCH</i> is configured. It is contained in the bandwidth of the CFR for broadcast and larger than CORESET#0.</p>
<p>locationAndBandwidthBroadcast Indicates starting PRB and the number of PRBs of CFR used for MCCH and MTCH reception. Value <i>sameAsSib1ConfiguredLocationAndBW</i> means the CFR for broadcast has the same location and size as the <i>locationAndBandwidth</i> for initial BWP (for (e)RedCap UEs: <i>initialDownlinkBWP-RedCap</i> if it is configured and includes CD-SSB and the entire CORESET#0) configured in <i>SIB1</i>. Value <i>locationAndBandwidth</i> is used to configure CFR with bandwidth that is larger than and fully contains the bandwidth for the initial DL BWP (for (e)RedCap UEs: <i>initialDownlinkBWP-RedCap</i> if it is configured and includes CD-SSB and the entire CORESET#0) configured in <i>SIB1</i> 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]. This field is not included in <i>cfrr-ConfigMCCH-MTCH-RedCap</i> if <i>initialDownlinkBWP-RedCap</i> in <i>SIB1</i> is configured but does not include CD-SSB and the entire CORESET#0. If the field is absent, the CFR for broadcast has the same location and size as CORESET#0.</p>
<p>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 <i>initialDownlinkBWP</i> in <i>SIB1</i>.</p>

Conditional Presence	Explanation
<i>NotSIB1CommonControlResource</i>	The field is optional present in case <i>commonControlResourceSet</i> is not configured in <i>SIB1</i> , 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 {
    s10, s11, s12, s14, s16, s18, s116, s124, s133, s140, s164, s180, s196, s1112, s1128,
    s1160, s1320, spare15, spare14, spare13, spare12, spare11, spare10, spare9,
    spare8, spare7, spare6, spare5, spare4, spare3, spare2, spare1
}
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. <i>ms0</i> corresponds to 0, <i>ms1</i> corresponds to 1 ms, <i>ms2</i> corresponds to 2 ms, and so on.
drx-LongCycleStartOffsetPTM <i>drx-LongCycle-PTM</i> in ms and <i>drx-StartOffset-PTM</i> in multiples of 1 ms.
drx-onDurationTimerPTM Value in multiples of 1/32 ms (subMilliSeconds) or in ms (milliSecond). For the latter, value <i>ms1</i> corresponds to 1 ms, value <i>ms2</i> 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 <i>s0</i> corresponds to 0 slots, <i>s1</i> corresponds to 1 slot, <i>s2</i> 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
<i>HARQFeedback</i>	The field is mandatory present if HARQ feedback is enabled for a G-RNTI/G-CS-RNTI associated with this DRX configuration. It is optionally present. Need R, 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
```

<i>MBS-NeighbourCellList</i> field descriptions
<i>carrierFreq</i> Indicates the frequency of the neighbour cell indicated by <i>physCellId</i> . Absence of the IE means that the neighbour cell is on the same frequency as the current cell.

– *MBS-NonServingInfoList*

The IE *MBS-NonServingInfoList* is used to inform network of the frequencies, CFR information and subcarrier spacing for MBS broadcast reception on the non-serving cell.

***MBS-NonServingInfoList* information element**

```
-- ASN1START
-- TAG-MBS-NONSERVINGINFOLIST-START

MBS-NonServingInfoList-r18 ::= SEQUENCE (SIZE (1..maxFreqMBS-r17)) OF NonServingInfo-r18

NonServingInfo-r18 ::= SEQUENCE {
    freqInfoMBS-r18          FreqInfoMBS-r18          OPTIONAL,
    cfr-InfoMBS-r18         CHOICE {
        cfr-Bandwidth-r18   INTEGER (1..maxNrofPhysicalResourceBlocks),
        cfr-LocationAndBW-r18 CFR-LocationAndBW-r18
    }
    subcarrierSpacing-r18   SubcarrierSpacing          OPTIONAL,
}

FreqInfoMBS-r18 ::= SEQUENCE {
    carrierFreqMBS-r18     ARFCN-ValueNR,
    freqBandIndicatorMBS-r18 FreqBandIndicatorNR
}

CFR-LocationAndBW-r18 ::= SEQUENCE {
    locationAndBandwidthMBS-r18 INTEGER (0..37949)          OPTIONAL,
    absoluteFrequencyPointA-MBS-r18 ARFCN-ValueNR          OPTIONAL,
    offsetToCarrierMBS-r18         INTEGER (0..2199)          OPTIONAL,
}

-- TAG-MBS-NONSERVINGINFOLIST-STOP
-- ASN1STOP
```

***MBS-NonServingInfoList* field descriptions**

<i>freqInfoMBS</i>	Indicates MBS frequency of interest and the frequency band of the non-serving cell for MBS broadcast reception acquired from the <i>SIB21</i> or the USD as specified in clause 5.9.4.3.
<i>cfr-infoMBS</i>	Indicates the CFR information of the non-serving cell for MBS broadcast reception. It is up to UE implementation to choose <i>cfr-Bandwidth</i> or <i>cfr-LocationAndBW</i> as the reported CFR information.
<i>cfr-Bandwidth</i>	Indicates the CFR bandwidth of the non-serving cell for MBS broadcast reception.
<i>cfr-LocationAndBW</i>	Indicates the CFR location and bandwidth of the non-serving cell for MBS broadcast reception.
<i>subcarrierSpacing</i>	Indicates the subcarrier spacing of the CORESET#0 of the non-serving cell for MBS broadcast reception.

CFR-LocationAndBW field descriptions**locationAndBandwidthMBS**

Indicates the starting PRB and the number of PRBs of CFR used for MBS broadcast reception from non-serving cell. 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]. The first PRB is a PRB determined by *subcarrierSpacing*, *offsetToCarrierMBS* and *absoluteFrequencyPointA-MBS* of the non-serving cell.

absoluteFrequencyPointA-MBS

Indicates the absolute frequency position of the reference resource block (common RB 0) of the non-serving cell for MBS broadcast reception. Its lowest subcarrier is also known as Point A (see TS 38.211 [16], clause 4.4.4.2).

offsetToCarrierMBS

Indicates the 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* indicated for the non-serving 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 {
    pdcpc-Config-r17          MRB-PDCP-ConfigBroadcast-r17,
    rlc-Config-r17           MRB-RLC-ConfigBroadcast-r17,
    ...
}

MRB-PDCP-ConfigBroadcast-r17 ::= SEQUENCE {
    pdcpc-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 <i>rohc</i> 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.
mrbs-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 <i>mbs-NeighbourCellList</i> , 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 <i>mbs-NeighbourCellList</i> , and so on. If the service is not available in any neighbouring cell and <i>mbs-NeighbourCellList</i> is signalled, the network sets all bits in this field to 0. The field is absent when <i>mbs-NeighbourCellList</i> is absent or an empty <i>mbs-NeighbourCellList</i> is signalled. If this field is absent when <i>mbs-NeighbourCellList</i> is absent or a non-empty <i>mbs-NeighbourCellList</i> 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 <i>mbs-NeighbourCellList</i> is signalled, then the UE shall assume that MBS broadcast services signalled in <i>mbs-SessionInfoList</i> in the <i>MBSBroadcastConfiguration</i> message are not provided in any neighbour cell.
mtch-schedulingInfo	Indicates the index of DRX configuration entry in <i>drx-ConfigPTM-List</i> that is used for scheduling the MTCH. The value 0 corresponds to the first entry in <i>drx-ConfigPTM-List</i> , the value 1 corresponds to the second entry in <i>drx-ConfigPTM-List</i> and so on. In case <i>mtch-schedulingInfo</i> 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 <i>MTCH-SSB-MappingWindowCycleOffset</i> configuration entry in <i>MTCH-SSB-MappingWindowList</i> . The value 0 corresponds to the first entry in <i>MTCH-SSB-MappingWindowList</i> , the value 1 corresponds to the second entry in <i>MTCH-SSB-MappingWindowList</i> 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 <i>pdschConfigList</i> for MTCH. Value 0 corresponds to the first entry in <i>pdschConfigList</i> , the value 1 corresponds to the second entry in <i>pdschConfigList</i> and so on. When the field is absent the UE applies the first entry in <i>pdschConfigList</i> 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
<i>MTCH-Mapping</i>	The field is mandatory present if the number of actual transmitted SSBs determined according to <i>ssb-PositionsInBurst</i> in SIB1 is more than 1, and <i>searchspaceMTCH</i> is not set to zero (including the case where <i>searchSpaceMTCH</i> is absent and <i>searchSpaceMCCH</i> is not set to zero). Otherwise, it is absent, Need R.

– *MBS-SessionInfoListMulticast*

The IE *MBS-SessionInfoListMulticast* provides a list of MBS multicast sessions transmitted via multicast MRB for RRC_INACTIVE UEs and, for each MBS multicast session, the associated G-RNTI and scheduling information.

***MBS-SessionInfoListMulticast* information element**

```
-- ASN1START
-- TAG-MBS-SESSIONINFOLISTMULTICAST-START

MBS-SessionInfoListMulticast-r18 ::= SEQUENCE (SIZE (1..maxNrofMBS-Session-r17)) OF MBS-SessionInfoMulticast-r18

MBS-SessionInfoMulticast-r18 ::= SEQUENCE {
  mbs-SessionId-r18          TMGI-r17,
  g-RNTI-r18                 RNTI-Value                               OPTIONAL, -- Need R
  mrb-ListMulticast-r18     MRB-ListMulticast-r18                 OPTIONAL, -- Need R
  mtch-SchedulingInfo-r18   DRX-ConfigPTM-Index-r17                OPTIONAL, -- Need S
  mtch-NeighbourCell-r18   BIT STRING (SIZE(maxNeighCellMBS-r17))  OPTIONAL, -- Need S
  pdsch-ConfigIndex-r18    PDSCH-ConfigIndex-r17                 OPTIONAL, -- Need S
  mtch-SSB-MappingWindowIndex-r18 MTCH-SSB-MappingWindowIndex-r17  OPTIONAL, -- Cond MTCH-Mapping
  thresholdIndex-r18       INTEGER (0..maxNrofThresholdMBS-1-r18)  OPTIONAL, -- Need R
  pdcp-SyncIndicator-r18   ENUMERATED {true}                       OPTIONAL, -- Cond RRCRelease
  stopMonitoringRNTI-r18   ENUMERATED {true}                       OPTIONAL, -- Cond G-RNTI
  ...
}

MRB-ListMulticast-r18 ::= SEQUENCE (SIZE (1.. maxMRB-r17)) OF MRB-InfoMulticast-r18

MRB-InfoMulticast-r18 ::= SEQUENCE {
  pdcp-Config-r18          MRB-PDCP-ConfigMulticast-r18,
  rlc-Config-r18           MRB-RLC-ConfigMulticast-r18,
  ...
}

MRB-PDCP-ConfigMulticast-r18 ::= SEQUENCE {
  pdcp-SN-SizeDL-r18       ENUMERATED {len12bits, len18bits},
  headerCompression-r18   CHOICE {
    notUsed                NULL,
    rohc                    SEQUENCE {
      maxCID-r18           INTEGER (1..16)                DEFAULT 15,
      profiles-r18        SEQUENCE {
        profile0x0000-r18  BOOLEAN,
        profile0x0001-r18  BOOLEAN,
        profile0x0002-r18  BOOLEAN
      }
    }
  },
  t-Reordering-r18        ENUMERATED {ms1, ms10, ms40, ms160, ms500, ms1000, ms1250, ms2750}  OPTIONAL -- Need R
}

MRB-RLC-ConfigMulticast-r18 ::= SEQUENCE {
  logicalChannelIdentity-r18 CHOICE {
```



```
        logicalChannelIdentitymulticast-r18 LogicalChannelIdentity,
        logicalChannelIdentityExt-r18      LogicalChannelIdentityExt-r17
    },
    sn-FieldLength-r18                      ENUMERATED {size6, size12},
    t-Reassembly-r18                        T-Reassembly                OPTIONAL -- Need R
}

-- TAG-MBS-SESSIONINFOLISTMULTICAST-STOP
-- ASN1STOP
```

MBS-SessionInfoListMulticast field descriptions
<p>g-RNTI G-RNTI used to scramble the scheduling and transmission of multicast MTCH.</p>
<p>mbs-SessionId Indicates an identifier of the MBS session to be received by the UE in RRC_INACTIVE.</p>
<p>mrb-ListMulticast A list of multicast MRBs to which the associated MBS multicast session is mapped to.</p>
<p>mtch-NeighbourCell Indicates neighbour cells which provide this service on MTCH for RRC_INACTIVE. The first bit is set to 1 if the service is provided on MTCH in the first cell in <i>mbs-NeighbourCellList</i>, 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 <i>mbs-NeighbourCellList</i>, and so on. If the service is not available in any neighbouring cell and <i>mbs-NeighbourCellList</i> is signalled, the network sets all bits in this field to 0. The field is absent when <i>mbs-NeighbourCellList</i> is absent or an empty <i>mbs-NeighbourCellList</i> is signalled. If this field is absent when <i>mbs-NeighbourCellList</i> is absent or a non-empty <i>mbs-NeighbourCellList</i> 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 <i>mbs-NeighbourCellList</i> is signalled, then the UE shall assume that MBS multicast services signalled in <i>mbs-SessionInfoListMulticast</i> in the <i>MBSMulticastConfiguration</i> message are not provided in any neighbour cell.</p>
<p>mtch-SchedulingInfo Indicates the index of DRX configuration entry in <i>drx-ConfigPTM-List</i> that is used for scheduling the MTCH. The value 0 corresponds to the first entry in <i>drx-ConfigPTM-List</i>, the value 1 corresponds to the second entry in <i>drx-ConfigPTM-List</i> and so on. In case <i>mtch-schedulingInfo</i> 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.</p>
<p>mtch-SSB-MappingWindowIndex Indicates the index of <i>MTCH-SSB-MappingWindowCycleOffset</i> configuration entry in <i>MTCH-SSB-MappingWindowList</i>. The value 0 corresponds to the first entry in <i>MTCH-SSB-MappingWindowList</i>, the value 1 corresponds to the second entry in <i>MTCH-SSB-MappingWindowList</i> and so on. This field is set to the same value for all MBS sessions mapped to the same G-RNTI.</p>
<p>pdcp-SN-SizeDL Indicates PDCP sequence number size of 12 or 18 bits, as specified in TS 38.323 [5].</p>
<p>pdsch-ConfigIndex Indicates the index of PDSCH configuration entry in <i>pdsch-ConfigList</i> for MTCH. Value 0 corresponds to the first entry in <i>pdsch-ConfigList</i>, the value 1 corresponds to the second entry in <i>pdsch-ConfigList</i> and so on. When the field is absent the UE applies the first entry in <i>pdsch-ConfigList</i> for MTCH.</p>
<p>pdcp-SyncIndicator Indicates the PDCP COUNT of the corresponding multicast session is synchronized in the RNA, i.e. the cells in the RNA follow a common QoS flow to MRB mapping rule and at the same time PDCP COUNT is set according to the MBS QoS Flow SN.</p>
<p>sn-FieldLength Indicates RLC SN field size of 6 or 12 bits, as specified in TS 38.322 [4].</p>
<p>stopMonitoringRNTI Indicates the UE to stop monitoring the G-RNTI for the corresponding multicast session.</p>
<p>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.</p>
<p>t-Reordering Value in ms of <i>t-Reordering</i> specified in TS 38.323 [5]. Value ms1 corresponds to 1 ms, value ms10 corresponds to 10 ms, and so on.</p>
<p>thresholdIndex Indicates the index of <i>thresholdMBS</i> entry in <i>thresholdMBS-List</i> that is used for RRC connection resume for a UE receiving the corresponding multicast session in RRC_INACTIVE. Value 0 corresponds to the first entry in <i>thresholdMBS-List</i>, the value 1 corresponds to the second entry in <i>thresholdMBS-List</i> and so on.</p>

Conditional Presence	Explanation
<i>G-RNTI</i>	The field is optionally present, Need R, if <i>g-RNTI</i> is included. Otherwise, it is absent.
<i>MTCH-Mapping</i>	The field is mandatory present if the number of actual transmitted SSBs determined according to <i>ssb-PositionsInBurst</i> in <i>SIB1</i> is more than 1, and <i>searchSpaceMulticastMTCH</i> is not set to zero (including the case where <i>searchSpaceMulticastMTCH</i> is absent and <i>searchSpaceMulticastMCCH</i> is not set to zero). Otherwise, it is absent, Need R.
<i>RRCRelease</i>	The field is optionally present, Need R, if <i>mbs-SessionInfoListMulticast</i> is included in <i>RRCRelease</i> message. Otherwise, it is absent.

– *MTCH-SSB-MappingWindowList*

The IE *MTCH-SSB-MappingWindowList* is used to configure MTCH PDCCH occasions 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 occasions 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 $[(\text{SFN number} \times 10) + \text{subframe number}] \bmod (\text{cycle}) = \text{offset}$.

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 mapping window. The $[xN+K]^{\text{th}}$ PDCCH monitoring occasion for MTCH in this mapping window corresponds to the K^{th} transmitted SSB, where $x = 0, 1, \dots, X-1$, $K = 1, 2, \dots, N$, N is the number of actual transmitted SSBs determined according to *ssb-PositionsInBurst* in *SIB1* and X is equal to $\text{CEIL}(\text{number of PDCCH monitoring occasions in MTCH to SSB mapping transmission window}/N)$. 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 {x0h6, x0h12, x0h18} 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

<i>lte-CRS-ToMatchAround</i>
Parameters to determine an LTE CRS pattern that the UE shall rate match around.
<i>pdschConfigList</i>
List of PDSCH parameters which can be configured per G-RNTI. Only one entity is allowed to be configured if included in SIB20.
<i>pdsch-TimeDomainAllocationList</i>
List of time-domain configurations for timing of DL assignment to DL data. The field <i>pdsch-TimeDomainAllocationList</i> 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.
<i>rateMatchPatternToAddModList</i>
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).
<i>mcs-Table</i>
Indicates which MCS table the UE shall use for PDSCH. If the field is absent the UE applies the value 64QAM. The field <i>mcs-Table</i> applies to DCI format 4_0 with CRC scrambled by MCCH-RNTI/G-RNTI (see TS 38.214 [19], clause 5.1.3.1).
<i>xOverhead</i>
Accounts for an overhead from CSI-RS, CORESET, etc. If the field is absent, the UE applies value x0h0 (see TS 38.214 [19], clause 5.1.3.2).

PDSCH-ConfigPTM field descriptions
<p><i>dataScramblingIdentityPDSCH</i> 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.</p>
<p><i>dmrs-ScramblingID0</i> 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 <i>physCellId</i> configured for this serving cell.</p>
<p><i>pdsch-AggregationFactor</i> 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.</p>

– *TMGI*

The IE *TMGI* is used to identify the MBS session.

TMGI information element

```

-- ASN1START
-- TAG-TMGI-START

TMGI-r17 ::=
    plmn-Id-r17
        plmn-Index
            explicitValue
    },
    serviceId-r17
}

SEQUENCE {
    CHOICE {
        INTEGER (1..maxPLMN),
        PLMN-Identity
    }
    OCTET STRING (SIZE (3))
}

-- TAG-TMGI-STOP
-- ASN1STOP

```

TMGI field descriptions
<p><i>plmn-Index</i> PLMN index or NPN index according to the <i>plmn-IdentityInfoList</i> and <i>npr-IdentityInfoList</i> fields included in <i>SIB1</i>. If this field is included in the <i>MRB-ToAddMod-r17</i>, the UE translates the <i>plmn-Index</i> into the PLMN Identity or SNPN Identity based on the configuration in <i>SIB1</i> (which is the <i>SIB1</i> of the target cell in case of handover). The <i>explicitValue</i> is not used for MBS service(s) of an SNPN.</p>
<p><i>serviceId</i> 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.</p>

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
maxBandComb-MUSIM-r18              INTEGER ::= 8      -- Maximum number of MUSIM band combinations
maxBandsUTRA-FDD-r16              INTEGER ::= 64      -- Maximum number of bands listed in UTRA-FDD UE caps
maxCandidateBandIndex-r18         INTEGER ::= 8      -- Maximum number of band entry index for MUSIM capability
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
maxCellATG-r18                   INTEGER ::= 8        -- Maximum number of ATG neighbour cells for which assistance information is
-- provided
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

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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
maxNrofAperiodicFwdTimeResource-r18  INTEGER ::= 112 -- Max number of aperiodic forwarding time resources for NCR
maxNrofAperiodicFwdTimeResource-1-r18  INTEGER ::= 111 -- Max number of aperiodic forwarding time resources for NCR minus 1
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

maxNrofAppLayerReports-r18  INTEGER ::= 16    -- Max number of application layer measurement reports with the same
-- measConfigAppLayerId included in the same
-- MeasurementReportAppLayerMessage

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
maxNrofPeriodicFwdResourceSet-r18  INTEGER ::= 32 -- Max number of periodic forwarding resource sets for NCR
maxNrofPeriodicFwdResourceSet-1-r18  INTEGER ::= 31 -- Max number of periodic forwarding resource sets for NCR minus 1
maxNrofPeriodicFwdResource-r18  INTEGER ::= 1024 -- Max number of periodic forwarding resources for NCR
maxNrofPeriodicFwdResource-1-r18  INTEGER ::= 1023 -- Max number of periodic forwarding resources for NCR minus 1
maxNrofSemiPersistentFwdResourceSet-r18  INTEGER ::= 32 -- Max number of semi-persistent forwarding resource sets for NCR
maxNrofSemiPersistentFwdResourceSet-1-r18  INTEGER ::= 31 -- Max number of semi-persistent forwarding resource sets for NCR minus 1
maxNrofSemiPersistentFwdResource-r18  INTEGER ::= 128 -- Max number of semi-persistent forwarding resources for NCR
maxNrofSemiPersistentFwdResource-1-r18  INTEGER ::= 127 -- Max number of semi-persistent forwarding resources for NCR 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

maxNrofDL-Allocations-1-r18  INTEGER ::= 15 -- Maximum number of PDSCH time domain resource allocations minus 1
maxNrofPDU-Sessions-r17     INTEGER ::= 256 -- Maximum number of PDU Sessions
maxNrofSR-ConfigPerCellGroup  INTEGER ::= 8 -- Maximum number of SR configurations per cell group
maxNrofLCGs-r18            INTEGER ::= 8 -- Maximum number of LCGs
maxLCG-ID                 INTEGER ::= 7 -- Maximum value of LCG ID
maxLCG-ID-IAB-r17         INTEGER ::= 255 -- Maximum value of LCG ID for IAB-MT

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maxLC-ID	INTEGER	::= 32	-- Maximum value of Logical Channel ID
maxLC-ID-Tab-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
maxNrofNWP-CSI-RS-Resources	INTEGER	::= 192	-- Maximum number of Non-Zero-Power (NWP) CSI-RS resources
maxNrofNWP-CSI-RS-Resources-1	INTEGER	::= 191	-- Maximum number of Non-Zero-Power (NWP) CSI-RS resources minus 1
maxNrofNWP-CSI-RS-ResourcesPerSet	INTEGER	::= 64	-- Maximum number of NWP CSI-RS resources per resource set
maxNrofNWP-CSI-RS-ResourcesPerSet-1-r18	INTEGER	::= 63	-- Maximum number of NWP CSI-RS resources per resource set minus 1
maxNrofNWP-CSI-RS-ResourceSets	INTEGER	::= 64	-- Maximum number of NWP CSI-RS resource sets per cell
maxNrofNWP-CSI-RS-ResourceSets-1	INTEGER	::= 63	-- Maximum number of NWP CSI-RS resource sets per cell minus 1
maxNrofNWP-CSI-RS-ResourceSetsPerConfig	INTEGER	::= 16	-- Maximum number of resource sets per resource configuration
maxNrofNWP-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 NWP CSI-IM resource sets per cell
maxNrofCSI-IM-ResourceSets-1	INTEGER	::= 63	-- Maximum number of NWP 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
maxNrofFreqSL-1-r18	INTEGER	::= 7	-- Maximum number of carrier frequency for NR sidelink communication minus 1
maxNrofSL-BWPs-r16	INTEGER	::= 4	-- Maximum number of BWP for NR sidelink communication
maxNrofSL-CarrierSetConfig-r18	INTEGER	::= 96	-- Maximum number of SCCH carrier set configuration 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
maxNrofSL-PRS-PerDest-r18	INTEGER	::= 8	-- Max number of SL-PRS transmission supported per destination UE
maxNrofSLRB-r16	INTEGER	::= 512	-- Maximum number of radio bearer for NR sidelink communication per UE without duplication
maxSL-LCID-Plus1-r18	INTEGER	::= 513	-- Maximum number of RLC bearer for NR sidelink communication per UE without duplication plus 1
maxSL-LCID-r18	INTEGER	::= 1024	-- Maximum number of RLC bearer for NR sidelink communication per UE with duplication
maxSL-NonAnchorRBsets	INTEGER	::= 4	-- Maximum number of non-anchor RB sets
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
maxSimultaneousBands-2-r18	INTEGER ::= 30	-- Maximum number of simultaneously aggregated bands minus 2.
maxULTxSwitchingBandPairs	INTEGER ::= 32	-- Maximum number of band pairs supporting dynamic UL Tx switching in a band -- combination.
maxULTxSwitchingBetweenBandPairs-r18	INTEGER ::= 32	-- Maximum number of combinations of a band pair and another band pair/band -- between which dynamic UL Tx switching requires additional switching -- period.
maxSchedulingBandCombination-r18	INTEGER ::= 32	-- Maximum number of combinations of scheduling cell and co-scheduled cells -- have same or different carrier type.
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

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maxNrofPUSCH-PathlossReferenceRSsDiff-r16  INTEGER ::= 60
-- extended minus 1
-- 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 CandidateBeamRSLExt
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
maxNrofAdditionalPRACHConfigs-r18          INTEGER ::= 7
-- Maximum number of additional PRACH configurations for 2TA
maxNrofdelayD-r18                         INTEGER ::= 4
-- Maximum number of delayD values.
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

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maxNrofServingCellsEUTRA	INTEGER ::= 32	
maxMBSFN-Allocations	INTEGER ::= 8	
maxNrofMultiBands	INTEGER ::= 8	
maxCellsSFTD	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
maxSNPN-ConfigCellId-r18	INTEGER ::= 32	-- Maximum number of Cell ID subject for SNPNS for MDT scope
maxSNPN-ConfigID-r18	INTEGER ::= 16	-- Maximum number of SNPNS in the MDT SNPN list
maxSNPN-ConfigTAI-r18	INTEGER ::= 8	-- Maximum number of TA subject for MDT scope
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
maxDCI-2-9-Size-r18	INTEGER ::= 140	-- Maximum DCI format 2-9 size
maxDCI-2-9-Size-1-r18	INTEGER ::= 139	-- Maximum DCI format 2-9 size minus 1
maxNrofUL-Allocations-r16	INTEGER ::= 64	-- Maximum number of PUSCH time domain resource allocations
maxNrofUL-Allocations-1-r18	INTEGER ::= 63	-- Maximum number of PUSCH time domain resource allocations minus 1
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
maxRARReport-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
maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-r18 INTEGER ::= 8 -- Maximum number of CSI report subconfigurations per CSI report
-- configuration
maxNrofCSI-ReportSubconfigPerCSI-ReportConfig-1-r18 INTEGER ::= 7 -- Maximum number of CSI report subconfigurations per CSI report
-- configuration 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 or multicast 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
maxNrofAltitudeRanges-r18	INTEGER ::= 8	-- Maximum number of altitude ranges for altitude-based measurement configurations
maxWayPoint-r18	INTEGER ::= 20	-- Maximum number of flight path information waypoints
maxAltitude-r18	INTEGER ::= 10000	-- Maximum altitude in meters
minAltitude-r18	INTEGER ::= -420	-- Minimum altitude in meters
maxMeasSequence-r18	INTEGER ::= 64	-- Maximum number of configured sequence for measurement
maxNrofHops-r18-1	INTEGER ::= 5	-- Maximum number of Hops that can be configured for Positioning SRS Transmission
maxNrOfCellsInVA-r18	INTEGER ::= 16	-- Maximum number of cells in validity area for Positioning SRS is FFS
maxNrOfLinkedSRS-PosResourceSet-r18	INTEGER ::= 2	-- Maximum number of linked SRSPosResourceSets that can be aggregated across CCs
maxCBR-ConfigDedSL-PRS-1-r18	INTEGER ::= 7	-- Maximum number of CBR ranges for dedicated SL PRS resource pool
maxCBR-LevelDedSL-PRS-1-r18	INTEGER ::= 15	-- Maximum number of CBR levels for dedicated SL PRS resource pool
maxNrofSL-PRS-TxPool-r18	INTEGER ::= 8	-- Maximum number of Tx dedicated SL-PRS resource pool for NR sidelink positioning is FFS
maxNrofSL-PRS-TxConfig-r18	INTEGER ::= 64	-- Maximum number of SL PRS transmission parameter configurations
maxNrOfVA-r18	INTEGER ::= 16	-- Maximum number of validity area is FFS
maxNrofLTM-Configs-r18	INTEGER ::= 8	-- Maximum number of LTM candidate cells
maxNrofLTM-Configs-plus1-r18	INTEGER ::= 9	-- Maximum number of LTM candidate cells plus 1
maxNrofLTM-CSI-ReportConfigurations-r18	INTEGER ::= 48	-- Maximum number of LTM CSI reporting configurations
maxNrofLTM-CSI-ReportConfigurations-1-r18	INTEGER ::= 47	-- Maximum number of LTM CSI reporting configurations minus 1
maxNrofLTM-CSI-SSB-ResourcesPerSet-r18	INTEGER ::= 512	-- Maximum number of LTM CSI SSB resource per set
maxNrofLTM-CSI-ResourceConfigurations-r18	INTEGER ::= 112	-- Maximum number of LTM CSI resource configurations
maxNrofLTM-CSI-ResourceConfigurations-1-r18	INTEGER ::= 111	-- Maximum number of LTM CSI resource configurations minus 1
maxNrofCandidateTCI-State-r18	INTEGER ::= 128	-- Maximum number of LTM TCI states
maxNrofCandidateUL-TCI-r18	INTEGER ::= 64	-- Maximum number of LTM UL TCI states
maxSecurityCellSet-r18	INTEGER ::= 9	-- Maximum number of cell sets for subsequent CPAC.
maxSK-Counter-r18	INTEGER ::= 8	-- Maximum number of SK-counters configured for a cell set for subsequent CPAC.
maxNrofThresholdMBS-r18	INTEGER ::= 8	-- Max number of thresholds of MBS sessions for RRC connection resume for a UE receiving multicast in RRC_INACTIVE
maxNrofThresholdMBS-1-r18	INTEGER ::= 7	-- Max number of thresholds of MBS sessions for RRC connection resume for a UE receiving multicast in RRC_INACTIVE minus 1
maxTN-AreaInfo-r18	INTEGER ::= 32	-- Maximum number of TN coverage areas for which assistance info is

```

maxNrofSetsOfCells-r18          INTEGER ::= 4      -- provided in an NTN cell
maxNrofSetsOfCells-1-r18       INTEGER ::= 3      -- Maximum number of sets of cells for multi-cell PDSCH/PUSCH scheduling
                                -- Maximum number of sets of cells for multi-cell PDSCH/PUSCH scheduling
                                -- minus 1
maxNrofCellsInSet-r18          INTEGER ::= 4      -- Maximum number of cells configured in a set of cells for multi-cell
                                -- PDSCH/PUSCH scheduling
maxNrofCellsInSet-1-r18        INTEGER ::= 3      -- Maximum number of cells configured in a set of cells for multi-cell
                                -- PDSCH/PUSCH scheduling minus 1
maxNrofCellCombos-r18          INTEGER ::= 16     -- Maximum number of combinations of co-scheduled cells for multi-cell
                                -- PDSCH/PUSCH scheduling
maxNrofBWPsInSetOfCells-r18    INTEGER ::= 16     -- Maximum number of BWPs configured in a set of cells for multi-cell
                                -- PDSCH/PUSCH scheduling
maxLowerMSD-r18                INTEGER ::= 256   -- Maximum number of lower MSD capability sets for a victim band
maxLowerMSDInfo-r18            INTEGER ::= 64    -- Maximum number of lower MSD capability sets for a band combination

-- 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 <i>SIB6</i> , <i>SIB7</i> , <i>SIB8</i> and <i>posSIBs</i> .
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 <i>nrofPDCCH-MonitoringOccasionPerSSB-InPO</i> 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 <i>SIB6</i> , <i>SIB7</i> , <i>SIB8</i> and <i>posSIBs</i> . 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
    ARFCN-ValueNR,
    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,
GNSS-ID-r16,
maxNrofRelayMeas-r17,
maxSimultaneousBands,
maxBandComb,
maxBands,
maxSIB,
maxSIB-MessagePlus1-r17,
maxSL-LCID-r16,
maxNrofFreqSL-l-r18,
BandParametersSidelink-r16,
PagingRecord-v1700,
RLC-ParametersSidelink-r16,
SBAS-ID-r16,
SIB1,
SL-DRX-ConfigUC-r17,
SL-DRX-ConfigUC-SemiStatic-r17,
SL-PagingIdentityRemoteUE-r17,
SL-RLC-ChannelID-r17,
SL-SourceIdentity-r17,
SystemInformation,
maxNrofSL-Dest-r16,
SL-DestinationIdentity-r16,
SL-RelayIndicationMP-r18,
SL-RSRP-Range-r16,
SL-QoS-FlowIdentity-r16,
SL-QoS-Info-r16,
maxNrofPhysicalResourceBlocks,
SubcarrierSpacing
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,
            ueInformationRequestSidelink-r18 UEInformationRequestSidelink-r18,
            ueInformationResponseSidelink-r18 UEInformationResponseSidelink-r18, 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 ::=
    sl-TDD-Config-r16
    inCoverage-r16
    directFrameNumber-r16
    slotIndex-r16
    reservedBits-r16
}

-- TAG-MASTERINFORMATIONBLOCKSIDELINK-STOP
-- ASN1STOP
```

```
SEQUENCE {
    BIT STRING (SIZE (12)),
    BOOLEAN,
    BIT STRING (SIZE (10)),
    BIT STRING (SIZE (7)),
    BIT STRING (SIZE (2))
}
```

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 ::=
    criticalExtensions
        measurementReportSidelink-r16
        criticalExtensionsFuture
    }
}

MeasurementReportSidelink-r16-IEs ::=
    sl-MeasResults-r16
    lateNonCriticalExtension
    nonCriticalExtension
}

SL-MeasResults-r16 ::=
    sl-MeasId-r16
    sl-MeasResult-r16
    ...
}

SL-MeasResult-r16 ::=
    sl-ResultDMRS-r16
    ...
    [[
    sl-Result-SL-PRS-r18
    ]]
}

SL-MeasQuantityResult-r16 ::=
    sl-RSRP-r16
    ...
    [[
    sl-RSRP-DedicatedSL-PRS-RP-r18
    ]]
}

SL-MeasResultListRelay-r17 ::=
    SEQUENCE (SIZE (1..maxNrofRelayMeas-r17)) OF SL-MeasResultRelay-r17

SL-MeasResultRelay-r17 ::=
    cellIdentity-r17
    sl-RelayUE-Identity-r17
    sl-MeasResult-r17
    ...
    [[
    sl-MeasQuantity-r18
    sl-RelayIndicationMP-r18
    ]]
}

-- TAG-MEASUREMENTREPORTSIDELINK-STOP

```

```

SEQUENCE {
    CHOICE {
        MeasurementReportSidelink-r16-IEs,
        SEQUENCE {}
    }
}

SEQUENCE {
    SL-MeasResults-r16,
    OCTET STRING
    SEQUENCE{}
}

SEQUENCE {
    SL-MeasId-r16,
    SL-MeasResult-r16,
    ...
}

SEQUENCE {
    SL-MeasQuantityResult-r16
}

SEQUENCE {
    SL-MeasQuantityResult-r16
}

SEQUENCE {
    RSRP-Range
}

SEQUENCE {
    SL-RSRP-Range-r16
}

SEQUENCE (SIZE (1..maxNrofRelayMeas-r17)) OF SL-MeasResultRelay-r17

SEQUENCE {
    CellAccessRelatedInfo,
    SL-SourceIdentity-r17,
    SL-MeasResult-r16,
    ENUMERATED { sl-rsrp, sd-rsrp }
    SL-RelayIndicationMP-r18
}

```

OPTIONAL,
OPTIONAL

OPTIONAL,
OPTIONAL

OPTIONAL,
OPTIONAL

OPTIONAL,
OPTIONAL

OPTIONAL,
OPTIONAL

OPTIONAL,
OPTIONAL

-- ASN1STOP

<i>MeasurementReportSidelink</i> field descriptions
<i>sl-MeasId</i> Identifies the sidelink measurement identity for which the reporting is being performed.
<i>sl-MeasResult</i> Measured RSRP results of a unicast destination.
<i>sl-RSRP-DedicatedSL-PRS-RP</i> Measured SL PRS-based filtered RSRP.
<i>sl-RelayIndicationMP</i> Indicate the reported L2 U2N Relay UE supports RRC connection establishment/resume for MP operation triggered by receiving <i>RemoteUEInformationSidelink</i> containing the <i>connectionForMP</i> as specified in 5.3.3.1a and 5.3.13.1a in Rel-18.

– *NotificationMessageSidelink*

The *NotificationMessageSidelink* message is used to send notification message from U2N Relay UE to the connected U2N Remote UE or from U2U Relay UE to the connected U2U Remote UE.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: U2N Relay UE to U2N Remote UE or U2U Relay UE to U2U Remote UE

NotificationMessageSidelink message

```
-- ASN1START
-- TAG-NOTIFICATIONMESSAGESIDELINK-START

NotificationMessageSidelink-r17 ::= SEQUENCE {
    criticalExtensions          CHOICE {
        notificationMessageSidelink-r17
        criticalExtensionsFuture SEQUENCE {}
    }
}

NotificationMessageSidelink-r17-IEs ::= SEQUENCE {
    indicationType-r17          ENUMERATED {
        relayUE-Uu-RLF, relayUE-HO, relayUE-CellReselection,
        relayUE-Uu-RRC-Failure
    }
    lateNonCriticalExtension    OCTET STRING OPTIONAL, -- Need N
    nonCriticalExtension        NotificationMessageSidelink-v1800-IEs OPTIONAL
}

```

```

NotificationMessageSidelink-v1800-IEs ::= SEQUENCE {
  sl-IndicationType-r18          ENUMERATED {relayUE-PC5-RLF, spare1} OPTIONAL, -- Need N
  sl-DestinationIdentityRemoteUE-r18 SL-DestinationIdentity-r16  OPTIONAL, -- Need N
  nonCriticalExtension           SEQUENCE {}                       OPTIONAL
}
-- TAG-NOTIFICATIONMESSAGESIDELINK -STOP
-- ASN1STOP

```

– RemoteUEInformationSidelink

The *RemoteUEInformationSidelink* message is used to request SIB(s) or provide paging related information, or provide other remote UE 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, or L2 U2U Remote UE to L2 U2U 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          RemoteUEInformationSidelink-v1800-IEs  OPTIONAL
}

RemoteUEInformationSidelink-v1800-IEs ::= SEQUENCE {
  sl-RequestedPosSIB-List-r18   SetupRelease { SL-RequestedPosSIB-List-r18 }          OPTIONAL, -- Need M
  sl-SFN-DFN-OffsetRequested-r18 ENUMERATED { true }                                     OPTIONAL, -- Need R
  connectionForMP-r18          ENUMERATED {true}                                               OPTIONAL, -- Need N
  sl-DestinationIdentityRemoteUE-r18 SL-DestinationIdentity-r16  OPTIONAL, -- Need N
  nonCriticalExtension          SEQUENCE {}                                                     OPTIONAL
}

SL-RequestedSIB-List-r17 ::= SEQUENCE (SIZE (maxSIB-MessagePlus1-r17)) OF SL-SIB-ReqInfo-r17

```

```
SL-PagingInfo-RemoteUE-r17 ::=
    sl-PagingIdentityRemoteUE-r17
    sl-PagingCycleRemoteUE-r17
}
SEQUENCE {
    SL-PagingIdentityRemoteUE-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, ... }

SL-RequestedPosSIB-List-r18 ::=
    SEQUENCE (SIZE (1..maxSIB)) OF SL-PosSIB-ReqInfo-r18

SL-PosSIB-ReqInfo-r18 ::=
    gnss-id-r18
    sbas-id-r18
    posSibType-r18
    SEQUENCE {
        GNSS-ID-r16
        SBAS-ID-r16
        posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6,
        posSibType1-7, posSibType1-8, posSibType1-9, posSibType1-10, posSibType1-11,
        posSibType1-12, 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, posSibType2-18a, posSibType2-19, posSibType2-20,
        posSibType2-20a, posSibType2-21, posSibType2-22, posSibType2-23, posSibType2-24,
        posSibType2-25, posSibType2-26, posSibType2-27, posSibType3-1, posSibType4-1,
        posSibType5-1, posSibType6-1, posSibType6-2, posSibType6-3, posSibType6-4, posSibType6-5,
        posSibType6-6, posSibType6-7, posSibType7-1, posSibType7-2, posSibType7-3, posSibType7-4,
        ... }
}

-- TAG-REMOTEUEINFORMATIONSIDELINK-STOP
-- ASN1STOP
```

RemoteUEInformationSidelink-IEs field descriptions	
connectionForMP	Indicates the connected L2 U2N Relay UE by the L2 U2N Remote UE that the access is for MP.
sl-DestinationIdentityRemoteUE-r18	Indicates the peer L2 U2U Remote UE upon end-to-end PC5 connection failure or release.
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.
sl-PagingIdentityRemoteUE	Indicates the L2 U2N Remote UE's paging UE ID.
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-RequestedPosSIB-List	Contains a list of requested PosSIBs.
sl-RequestedSIB-List	Contains a list of requested SIBs.
sl-SFN-DFN-OffsetRequested	If present, this field indicates that the L2 U2N Remote UE requests the L2 U2N Relay UE to provide the SFN-DFN offset in a subsequent <i>RRCReconfigurationSidelink</i> message.
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).

Conditional presence	Explanation
<i>GNSS-ID-SBAS</i>	The field is mandatory present if <i>gnss-id</i> is set to <i>sbas</i> . It is absent otherwise.

– *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
        criticalExtensionsFuture
    }
}

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                  RRCReconfigurationSidelink-v1800-IEs                                OPTIONAL
}

RRCReconfigurationSidelink-v1800-IEs ::= SEQUENCE {
    sl-SFN-DFN-Offset-r18                SetupRelease { SL-SFN-DFN-Offset-r18 }                                OPTIONAL, -- Need M
    sl-CarrierToAddModList-r18           SEQUENCE (SIZE (1..maxNrofFreqSL-1-r18)) OF SL-CarrierConfig-r18  OPTIONAL, -- Need N
    sl-CarrierToReleaseList-r18         SEQUENCE (SIZE (1..maxNrofFreqSL-1-r18)) OF SL-CarrierId-r18     OPTIONAL, -- Need N
    sl-RLC-BearerToAddModList-r18       SEQUENCE (SIZE(1..maxNrofSLRB-r16)) OF SL-RLC-BearerConfig-r18   OPTIONAL, -- Need N
    sl-RLC-BearerToReleaseList-r18      SEQUENCE (SIZE(1..maxNrofSLRB-r16)) OF SL-RLC-BearerConfigIndex-r18 OPTIONAL, -- Need N
    sl-LocalID-PairToReleaseList-r18    SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-DestinationIdentity-r16 OPTIONAL, -- Need N
    sl-LocalID-PairToAddModList-r18     SEQUENCE (SIZE (1..maxNrofSL-Dest-r16)) OF SL-SRAP-ConfigPC5-r18  OPTIONAL, -- Need N
    nonCriticalExtension                  SEQUENCE {}                                                         OPTIONAL
}

SL-CarrierConfig-r18 ::= SEQUENCE {
    sl-CarrierId-r18                     SL-CarrierId-r18,
    sl-OffsetToCarrier-r18               INTEGER (0..2199),
    subcarrierSpacing-r18                SubcarrierSpacing,
    carrierBandwidth-r18                 INTEGER (1..maxNrofPhysicalResourceBlocks),
    sl-AbsoluteFrequencyPointA-r18       ARFCN-ValueNR
}

SL-CarrierId-r18 ::= INTEGER (1..maxNrofFreqSL-1-r18)

SL-RLC-BearerConfig-r18 ::= CHOICE {
    srb SEQUENCE {
        sl-SRB-IdentityWithDuplication  INTEGER (1..3),
        sL-RLC-BearerConfigIndex-r18   SL-RLC-BearerConfigIndex-r18,
        ...
    },
    drb SEQUENCE {
        slrb-PC5-ConfigIndex-r18       SLRB-PC5-ConfigIndex-r16,
        sL-RLC-BearerConfigIndex-r18   SL-RLC-BearerConfigIndex-r18,
    }
}

```

```

        sl-RLC-ConfigPC5-r18          SL-RLC-ConfigPC5-r16          OPTIONAL, -- Need M
        sl-MAC-LogicalChannelConfigPC5-r18 SL-LogicalChannelConfigPC5-r16  OPTIONAL, -- Need M
        ...
    }
}

SL-RLC-BearerConfigIndex-r18 ::=      INTEGER (1..maxSL-LCID-r16)

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-LogicalChannelIdentity-v1800   INTEGER (33..38)                OPTIONAL -- Need M

```

```

    }}
  }
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))
            }
        sl-CSI-RS-FirstSymbol-r16
            INTEGER (3..12)
        ...
    }
SL-RLC-ChannelConfigPC5-r17 ::=
    SEQUENCE {
        sl-RLC-ChannelID-PC5-r17
            SL-RLC-ChannelID-r17,
        sl-RLC-ConfigPC5-r17
            SL-RLC-ConfigPC5-r16
        sl-MAC-LogicalChannelConfigPC5-r17
            SL-LogicalChannelConfigPC5-r16
        ...
    }
SL-SFN-DFN-Offset-r18 ::=
    SEQUENCE {
        sl-FrameOffset-r18
            INTEGER (0..1023),
        sl-SubframeOffset-r18
            INTEGER (0..9),
        sl-SlotOffset-r18
            INTEGER (0..31)
    }
SL-SRAP-ConfigPC5-r18 ::=
    SEQUENCE {
        sl-PeerRemoteUE-L2Identity-r18
            SL-DestinationIdentity-r16
        sl-PeerRemoteUE-LocalIdentity-r18
            INTEGER (0..255)
        sl-RemoteUE-L2Identity-r18
            SL-SourceIdentity-r17
        sl-RemoteUE-LocalIdentity-r18
            INTEGER (0..255)
        ...
    }
-- TAG-RRCRECONFIGURATIONSIDELINK-STOP
-- ASN1STOP

```

OPTIONAL, -- Need M
 OPTIONAL, -- Need M

OPTIONAL, -- Need M
 OPTIONAL, -- Need M

OPTIONAL, -- Need M
 OPTIONAL, -- Need M
 OPTIONAL, -- Need M
 OPTIONAL, -- Need M

<i>RRCReconfigurationSidelink</i> field descriptions
<i>sl-AbsoluteFrequencyPointA</i> Absolute frequency of the reference resource block (Common RB 0). Its lowest subcarrier is also known as Point A.
<i>sl-CarrierToAddModList</i> Indicate the carrier(s) to be added/modified for transmission by UE transmitting <i>RRCReconfigurationSidelink</i> message, corresponding to the frequency in <i>sl-FreqInfoListSizeExt</i> broadcast in <i>SIB12</i> or corresponding to the frequency in <i>sl-PreconfigFreqInfoListSizeExt</i> in <i>SL-PreconfigurationNR</i> .
<i>sl-CarrierToReleaseList</i> Indicate the carrier(s) to be released for the transmission by UE transmitting <i>RRCReconfigurationSidelink</i> message.
<i>sl-CSI-RS-FreqAllocation</i> Indicates the frequency domain position for sidelink CSI-RS.
<i>sl-CSI-RS-FirstSymbol</i> Indicates the position of first symbol of sidelink CSI-RS.
<i>sl-DRX-ConfigUC-PC5</i> Indicates the NR sidelink DRX configuration for unicast communication, as specified in TS 38.321 [3]
<i>sl-LatencyBoundCSI-Report</i> Indicates the latency bound of SL CSI report from the associated SL CSI triggering in terms of number of slots.
<i>sl-LatencyBoundIUC-Report</i> 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.
<i>sl-LocalID-PairToAddModList</i> Indicate a list of local ID pair which is assigned for one end-to-end PC5 connection by the L2 U2U Relay UE.
<i>sl-LocalID-PairToReleaseList</i> Indicate the list of local ID pair to be released.
<i>sl-LogicalChannelIdentity</i> Indicates the identity of the sidelink logical channel, as specified in TS 38.321 [3], clause 6.2.4. If the <i>sl-LogicalChannelIdentity-v1800</i> is present, the UE shall ignore the <i>sl-LogicalChannelIdentity-r16</i> field.
<i>sl-MappedQoS-FlowsToAddList</i> Indicate the QoS flows to be mapped to the configured sidelink DRB. Each entry is indicated by the <i>SL-PQFI</i> , which is used between UEs, as defined in TS 23.287 [55].
<i>sl-MappedQoS-FlowsToReleaseList</i> Indicate the QoS flows to be released from the configured sidelink DRB. Each entry is indicated by the <i>SL-PQFI</i> , which is used between UEs, as defined in TS 23.287 [55].
<i>sl-MeasConfig</i> Indicates the sidelink measurement configuration for the unicast destination.
<i>sl-OffsetToCarrier</i> 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 $275 \cdot 8 - 1$. See TS 38.211 [16], clause 4.4.2.
<i>sl-OutOfOrderDelivery</i> 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.
<i>sl-PDCP-SN-Size</i> Indicates the PDCP SN size of the configured sidelink DRB.
<i>sl-Resetconfig</i> Indicates that the full configuration should be applicable for the <i>RRCReconfigurationSidelink</i> message.
<i>sl-RLC-BearerToAddModList</i> Indicate the additional Sidelink RLC bearer to be added / modified for the configured sidelink DRB.
<i>sl-RLC-BearerToReleaseList</i> Indicate the additional Sidelink RLC bearer to be released for the configured sidelink DRB.

<i>sl-SDAP-Header</i> Indicates whether or not a SDAP header is present on this sidelink DRB.
<i>sl-SFN-DFN-Offset</i> Indicates the SFN-DFN offset to be used for determining the SFN timeline based on the DFN timeline.
<i>sl-SRB-IdentityWithDuplication</i> Indicate the sidelink SRB for which duplication is configured.
<i>slrb-PC5-ConfigIndex</i> Indicates the identity of the configuration of a sidelink DRB. In case of L2 U2U relay, only value 4-31 can be signaled for end-to-end sidelink DRB, and all other values are reserved.

<i>SL-SRAP-ConfigPC5</i> field descriptions
<i>sl-RemoteUE-LocalIdentity</i> Indicates the local UE ID of the L2 U2U Remote UE used in SRAP as specified in TS 38.351 [66].
<i>sl-RemoteUE-L2Identity</i> Indicates the Source L2 ID of the L2 U2U Remote UE as specified in TS 23.304 [65].
<i>sl-PeerRemoteUE-LocalIdentity</i> Indicates the local UE ID of the peer L2 U2U Remote UE used in SRAP as specified in TS 38.351 [66].
<i>sl-PeerRemoteUE-L2Identity</i> Indicates the destination L2 ID identifying the peer L2 U2U Remote UE as specified in TS 23.304 [65].

– *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},          OPTIONAL
    nonCriticalExtension          RRCReconfigurationCompleteSidelink-v1720-IEs
}

RRCReconfigurationCompleteSidelink-v1720-IEs ::= SEQUENCE {
    sl-DRX-ConfigReject-v1720   ENUMERATED {true}          OPTIONAL,
    nonCriticalExtension          SEQUENCE {}                  OPTIONAL
}

-- TAG-RRCRECONFIGURATIONCOMPLETESIDELINK-STOP
-- ASN1STOP

```

<i>RRCReconfigurationCompleteSidelink</i> 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
        criticalExtensionsFuture
    }
}
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                  UECapabilityInformationSidelink-v1800-IEs  OPTIONAL
}

UECapabilityInformationSidelink-v1800-IEs ::= SEQUENCE {
    sfn-DFN-OffsetSupported-r18          ENUMERATED { supported }                OPTIONAL,
    possIB-ForwardingSupported-r18       ENUMERATED { supported }                OPTIONAL,
    nonCriticalExtension                  SEQUENCE {}                              OPTIONAL
}

MAC-ParametersSidelink-r17 ::= SEQUENCE {
    drx-OnSidelink-r17                  ENUMERATED {supported}                  OPTIONAL,
    ...
}

```

```

AccessStratumReleaseSidelink-r16 ::= ENUMERATED { rel16, rel17, rel18, spare5, spare4, spare3, spare2, spare1, ... }

PDCP-ParametersSidelink-r16 ::= SEQUENCE {
  outOfOrderDeliverySidelink-r16      ENUMERATED {supported}      OPTIONAL,
  ...
  [[
  pdcp-DuplicationSRB-sidelink-r18    ENUMERATED {supported}      OPTIONAL,
  pdcp-DuplicationDRB-sidelink-r18    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
      }
    }
  },
  extendedCP-RxSidelink-r16          ENUMERATED {supported}      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}
  }
  --15-19
  rankTwoReception-r16              ENUMERATED {supported}
  --15-23
  sl-openLoopPC-RSRP-ReportSidelink-r16 ENUMERATED {supported}
  --13-1
  sl-Rx-256QAM-r16                  ENUMERATED {supported}
  ]],
  [[
  --32-5a-2
  rx-IUC-Scheme1-PreferredMode2Sidelink-r17  ENUMERATED {supported}
  --32-5a-3
  rx-IUC-Scheme1-NonPreferredMode2Sidelink-r17 ENUMERATED {supported}
  --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}
  --32-6-2
  rx-IUC-Scheme1-SCI-ExplicitReq-r17       ENUMERATED {supported}
  --32-7
  scheme2-ConflictDeterminationRSRP-r17    ENUMERATED {supported}
  ]],
  [[
  -- R1 41-1-17: Open loop SL pathloss based power control for SL-PRS and associated PSCCH and SL RSRP report for dedicated resource
  -- pool
  sl-PathlossBasedOLPC-SL-RSRP-Report-r18  ENUMERATED {supported}
  -- R4 45-2: SL reception in intra-carrier guard band
  sl-ReceptionIntraCarrierGuardBand-r18    ENUMERATED {supported}
  -- R4 45-3: Power class for sidelink unlicensed
  sl-PowerClassUnlicensed-r18              ENUMERATED {pc5, spare7, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL
  ]]
}

-- TAG-UECAPABILITYINFORMATIONSIDELINK-STOP
-- ASN1STOP

```

– *UEInformationRequestSidelink*

The *UEInformationRequestSidelink* message is used to transfer UE information in sidelink, e.g. the end-to-end QoS information for L2 U2U Relay operation.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2U Remote UE to L2 U2U Relay UE

***UEInformationRequestSidelink* message**

```

-- ASN1START
-- TAG-UEINFORMATIONREQUESTSIDELINK-START

UEInformationRequestSidelink-r18 ::= SEQUENCE {
    rrc-TransactionIdentifier-r18      RRC-TransactionIdentifier,
    criticalExtensions                 CHOICE {
        ueInformationRequestSidelink-r18 UEInformationRequestSidelink-r18-IEs,
        criticalExtensionsFuture        SEQUENCE {}
    }
}

UEInformationRequestSidelink-r18-IEs ::= SEQUENCE {
    sl-E2E-QoS-ConnectionListPC5-r18 SEQUENCE (SIZE (1.. maxNrofSL-Dest-r16)) OF SL-E2E-QoS-ConnectionPC5-r18 OPTIONAL, -- Need N
    lateNonCriticalExtension          OCTET STRING OPTIONAL,
    nonCriticalExtension              SEQUENCE {} OPTIONAL
}

SL-E2E-QoS-ConnectionPC5-r18 ::= SEQUENCE {
    sl-DestinationIdentityRemoteUE-r18 SL-DestinationIdentity-r16,
    sl-QoS-InfoList-r18                SEQUENCE (SIZE (1..maxNrofSL-QFIsPerDest-r16)) OF SL-QoS-Info-r16
}

-- TAG-UEINFORMATIONREQUESTSIDELINK-STOP
-- ASN1STOP

```

UEInformationRequestSidelink* field descriptions**sl-E2E-QoS-ConnectionListPC5***

Indicates the QoS info for a list of end-to-end PC5 connections with each connection indicated by the destination L2 ID of the peer L2 U2U Remote UE.

SL-E2E-QoS-ConnectionPC5* field descriptions**sl-DestinationIdentityRemoteUE***

Indicates the destination L2 ID of the peer L2 U2U Remote UE for an end-to-end PC5 connection.

sl-QoS-InfoList

List of QoS profile of the sidelink QoS flow for an end-to-end PC5 connection, with each QoS flow indicated by *sl-QoS-FlowIdentity* which is unique for different end-to-end PC5 connection in the scope of UE, and uniquely identifies one sidelink QoS flow between the L2 U2U Remote UE and the L2 U2U Relay UE.

UEInformationResponseSidelink

The *UEInformationResponseSidelink* message is used to deliver UE information in sidelink, e.g. the split QoS information for L2 U2U Relay operation.

Signalling radio bearer: SL-SRB3

RLC-SAP: AM

Logical channel: SCCH

Direction: L2 U2U Relay UE to L2 U2U Remote UE

***UEInformationResponseSidelink* message**

```
-- ASN1START
-- TAG-UEINFORMATIONRESPONSESIDELINK-START

UEInformationResponseSidelink-r18 ::= SEQUENCE {
    rrc-TransactionIdentifier-r18      RRC-TransactionIdentifier,
    criticalExtensions                 CHOICE {
        ueInformationResponseSidelink-r18  UEInformationResponseSidelink-r18-IEs,
        criticalExtensionsFuture           SEQUENCE {}
    }
}

UEInformationResponseSidelink-r18-IEs ::= SEQUENCE {
    sl-SplitQoS-InfoListPC5-r18      SEQUENCE (SIZE (1.. maxNrofSL-QFIs-r16)) OF SL-SplitQoS-InfoPC5-r18 OPTIONAL, -- Need N
    lateNonCriticalExtension          OCTET STRING OPTIONAL,
    nonCriticalExtension              SEQUENCE {} OPTIONAL
}

SL-SplitQoS-InfoPC5-r18 ::= SEQUENCE {
    sl-QoS-FlowIdentity-r18          SL-QoS-FlowIdentity-r16,
    sl-SplitPacketDelayBudget-r18   INTEGER (0..1023)
}

-- TAG-UEINFORMATIONRESPONSESIDELINK-STOP
-- ASN1STOP
```

***UEInformationResponseSidelink* field descriptions**

sl-SplitQoS-InfoListPC5

Indicates the split PDB on the first PC5 hop between L2 U2U Relay UE and the L2 U2U Remote UE for a list of QoS flow indicated by *sl-QoS-FlowIdentity* for one or more end-to-end PC5 connections.

– ***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 ::=
    criticalExtensions
        uuMessageTransferSidelink-r17
        criticalExtensionsFuture
    }
}

UuMessageTransferSidelink-r17-IEs ::=
    sl-PagingDelivery-r17
    sl-SIB1-Delivery-r17
    sl-SystemInformationDelivery-r17
    lateNonCriticalExtension
    nonCriticalExtension

UuMessageTransferSidelink-v1800-IEs ::=
    sl-PagingDelivery-r18
    nonCriticalExtension

-- TAG-UUMESSAGETRANSFERSIDELINK-STOP
-- ASN1STOP

```

SEQUENCE {
CHOICE {
UuMessageTransferSidelink-r17-IEs,
SEQUENCE {}
}

SEQUENCE {
OCTET STRING (CONTAINING PagingRecord) OPTIONAL, -- Need N
OCTET STRING (CONTAINING SIB1) OPTIONAL, -- Need N
OCTET STRING (CONTAINING SystemInformation) OPTIONAL, -- Need N
OCTET STRING OPTIONAL,
UuMessageTransferSidelink-v1800-IEs OPTIONAL

SEQUENCE {
OCTET STRING (CONTAINING PagingRecord-v1700) OPTIONAL, -- Need N
SEQUENCE {} OPTIONAL

***UuMessageTransferSidelink-IEs* field descriptions**

sl-PagingDelivery

This field is used to transfer PagingRecord and *PagingRecord-v1700* 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 and posSIBs 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 <i>RRCSetupRequest</i> .	Upon reception of <i>RRCSetup</i> or <i>RRCReject</i> 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 <i>RRCReestablishmentRequest</i>	Upon reception of <i>RRCReestablishment</i> or <i>RRCSetup</i> message as well as when the selected cell becomes unsuitable or the (re)selected L2 U2N Relay UE becomes unsuitable, upon reception of <i>NotificationMessageSidelink</i> indicating <i>relayUE-HO</i> or <i>relayUE-CellReselection</i> .	Go to RRC_IDLE
T302	Upon reception of <i>RRCReject</i> while performing RRC connection establishment or resume, upon reception of <i>RRCRelease</i> with <i>waitTime</i> .	Upon entering RRC_CONNECTED or RRC_IDLE, upon cell re-selection, upon cell change due to relay (re)selection, and upon reception of <i>RRCReject</i> message.	Inform upper layers about barring alleviation as specified in 5.3.14.4

Timer	Start	Stop	At expiry
T304	<p>Upon reception of <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> for the MCG which does not include <i>sI-PathSwitchConfig</i>, or upon reception of <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> for the SCG not indicated as deactivated in the NR or E-UTRA message containing the <i>RRCReconfiguration</i> message or upon conditional reconfiguration execution i.e. when applying a stored <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i>.</p> <p>Also, for the MCG and SCG upon an indication from lower layer that an LTM cell switch procedure is triggered and, for the MCG, upon performing an LTM cell switch procedure following cell selection performed while timer T311 is running.</p>	<p>Upon successful completion of random access on the corresponding SpCell.</p> <p>Upon receiving an indication from lower layers of successful completion of RACH-less handover, or upon receiving an indication from lower layers of successful completion of an LTM RACH-less cell switch.</p> <p>For T304 of SCG, upon SCG release.</p>	<p>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, or an LTM cell switch procedure, 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.</p> <p>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.</p>

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 <i>reconfigurationWithSync</i> for that cell group, upon reception of <i>MobilityFromNRCommand</i> , upon the reconfiguration of <i>rlf-TimersAndConstant</i> , upon initiating the connection re-establishment procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including <i>reconfigurationWithSync</i> 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	<p>If T312 is configured in MCG: Upon triggering a measurement report for a measurement identity for which T312 has been configured and <i>useT312</i> has been set to true, while T310 in PCell is running.</p> <p>If T312 is configured in SCG and <i>useT312</i> 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.</p>	<p>Upon receiving N311 consecutive in-sync indications from lower layers for the SpCell, receiving <i>RRCReconfiguration with reconfigurationWithSync</i> for that cell group, upon reception of <i>MobilityFromNRCommand</i>, upon initiating the connection re-establishment procedure, upon the reconfiguration of <i>rfl-TimersAndConstant</i>, upon initiating the MCG failure information procedure, upon conditional reconfiguration execution i.e. when applying a stored RRCReconfiguration message including <i>reconfigurationWithSync</i> for that cell group, and upon the expiry of T310 in corresponding SpCell.</p> <p>Upon SCG release, if the T312 is kept in SCG</p>	<p>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.</p> <p>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.</p>
T316	Upon transmission of the <i>MCGFailureInformation</i> message	Upon receiving <i>RRCRelease</i> , <i>RRCReconfiguration with reconfigurationwithSync</i> for the PCell, <i>MobilityFromNRCommand</i> , or upon initiating the re-establishment procedure	Perform the actions as specified in 5.7.3b.5.
T319	Upon transmission of <i>RRCResumeRequest</i> or <i>RRCResumeRequest1</i> when the resume procedure is not initiated for SDT.	Upon reception of <i>RRCResume</i> , <i>RRCSetup</i> , <i>RRCRelease</i> , <i>RRCRelease</i> with <i>suspendConfig</i> or <i>RRCReject</i> message, upon cell re-selection or upon relay (re)selection.	Perform the actions as specified in 5.3.13.5.
T319a	Upon transmission of <i>RRCResumeRequest</i> or <i>RRCResumeRequest1</i> when the resume procedure is initiated for SDT.	Upon reception of <i>RRCResume</i> , <i>RRCSetup</i> , <i>RRCRelease</i> , <i>RRCReject</i> 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 <i>t320</i> 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 <i>RRCRelease</i> , 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 <i>measConfig</i> including a <i>reportConfig</i> with the <i>reportType</i> set to <i>reportCGI</i>	Upon acquiring the information needed to set all fields of <i>cgi-info</i> , upon receiving <i>measConfig</i> that includes removal of the <i>reportConfig</i> with the <i>reportType</i> set to <i>reportCGI</i> and upon detecting that a cell is not broadcasting SIB1.	Initiate the measurement reporting procedure, stop performing the related measurements.
T322	Upon receiving <i>measConfig</i> including <i>reportConfigNR</i> with the <i>reportType</i> set to <i>reportSFTD</i> and <i>drx-SFTD-NeighMeas</i> is set to <i>true</i> .	Upon acquiring the SFTD measurement results, upon receiving <i>measConfig</i> that includes removal of the <i>reportConfig</i> with the <i>reportType</i> set to <i>reportSFTD</i> .	Initiate the measurement reporting procedure, stop performing the related measurements.
T325	Upon reception of <i>RRCRelease</i> message with <i>deprioritisationTimer</i> .		Stop deprioritisation of all frequencies or NR signalled by <i>RRCRelease</i> .
T330	Upon receiving <i>LoggedMeasurementConfiguration</i> message	Upon log volume exceeding the suitable UE memory, upon initiating the release of <i>LoggedMeasurementConfiguration</i> procedure	Perform the actions specified in 5.5a.1.4
T331	Upon receiving <i>RRCRelease</i> message with <i>measIdleDuration</i>	Upon receiving <i>RRCSetup</i> , <i>RRCResume</i> , <i>RRCRelease</i> with idle/inactive measurement configuration, upon cell selection/reselection to a cell that does not belong to the <i>validityArea</i> (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 <i>UEAssistanceInformation</i> message with <i>DelayBudgetReport</i> .	Upon releasing <i>delayBudgetReportingConfig</i> during the connection re-establishment/resume procedures, and upon receiving <i>delayBudgetReportingConfig</i> set to <i>release</i> .	No action.
T345	Upon transmitting <i>UEAssistanceInformation</i> message with <i>overheatingAssistance</i>	Upon releasing <i>overheatingAssistanceConfig</i> during the connection re-establishment procedure, upon initiating the connection resumption procedure, and upon receiving <i>overheatingAssistanceConfig</i> set to <i>release</i> .	No action.
T346a (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>drx-Preference</i> .	Upon releasing <i>drx-PreferenceConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>drx-PreferenceConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346b (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>maxBW-Preference</i> .	Upon releasing <i>maxBW-PreferenceConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>maxBW-PreferenceConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346c (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>maxCC-Preference</i> .	Upon releasing <i>maxCC-PreferenceConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>maxCC-PreferenceConfig</i> set to <i>release</i> , 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 <i>UEAssistanceInformation</i> message with <i>maxMIMO-LayerPreference</i> .	Upon releasing <i>maxMIMO-LayerPreferenceConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>maxMIMO-LayerPreferenceConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346e (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>minSchedulingOffsetPreference</i> .	Upon releasing <i>minSchedulingOffsetPreferenceConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>minSchedulingOffsetPreferenceConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346f	Upon transmitting <i>UEAssistanceInformation</i> message with <i>releasePreference</i> .	Upon releasing <i>releasePreferenceConfig</i> during the connection re-establishment/resume procedures, or upon receiving <i>releasePreferenceConfig</i> set to <i>release</i> .	No action.
T346g	Upon transmitting <i>UEAssistanceInformation</i> message with <i>musim-PreferredRRC-State</i> .	Upon receiving <i>RRCRelease</i> , or upon receiving <i>musim-LeaveAssistanceConfig</i> set to <i>release</i> .	Perform the actions as specified in 5.3.8.6.
T346h	Upon transmitting <i>UEAssistanceInformation</i> message with <i>musim-GapPreferenceList</i> or <i>musim-GapPriorityPreferenceList</i> and/or <i>musim-GapKeepPreferenceInformation</i> .	Upon releasing <i>musim-GapAssistanceConfig</i> during the connection re-establishment/resume procedures, or upon receiving <i>musim-GapAssistanceConfig</i> set to <i>release</i> .	No action.
T346i	Upon transmitting <i>UEAssistanceInformation</i> message with <i>scg-DeactivationPreference</i>	Upon releasing <i>scg-DeactivationPreferenceConfig</i> during RRC connection re-establishment/resume or upon receiving <i>scg-DeactivationPreferenceConfig</i> set to <i>release</i> .	No action.

Timer	Start	Stop	At expiry
T346j (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>rlm-RelaxationReportingConfig</i> .	Upon releasing <i>rlm-RelaxationReportingConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>rlm-RelaxationReportingConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346k (The UE maintains one instance of this timer per cell group)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>bfd-RelaxationReportingConfig</i> .	Upon releasing <i>bfd-RelaxationReportingConfig</i> during the connection re-establishment/resume procedures, upon receiving <i>bfd-RelaxationReportingConfig</i> set to <i>release</i> , or upon performing MR-DC release.	No action.
T346l (The UE maintains one instance of this timer per QoS flow)	Upon transmitting <i>UEAssistanceInformation</i> message with <i>ul-TrafficInfo</i> for the concerned QoS flow.	Upon releasing <i>ul-TrafficInfoReportingConfig</i> during the connection re-establishment/resume procedures, or upon receiving <i>ul-TrafficInfoReportingConfig</i> set to <i>release</i> .	No action.
T346m	Upon transmitting <i>UEAssistanceInformation</i> message with <i>multiRx-PreferenceFR2</i> .	Upon releasing <i>multiRx-PreferenceReportingConfigFR2</i> during the connection re-establishment/resume procedures, upon receiving <i>multiRx-PreferenceReportingConfigFR2</i> set to <i>release</i> .	No action.
T346n	Upon transmission of MUSIM temporary restriction of <i>musim-CapRestriction</i> for constraint combination of bands and/or band(s) or combination bands to avoid	Upon releasing <i>musim-CapabilityRestrictionConfig</i> during the connection re-establishment/resume procedures, or upon receiving <i>musim-CapabilityRestrictionConfig</i> set to <i>release</i> .	No action.

Timer	Start	Stop	At expiry
T348	Upon transmission of MUSIM temporary restriction of <i>musim-CapRestriction</i> for serving cell(s) with capabilities restricted, release of SCell or release of SCG.	Upon reception of <i>RRCReconfiguration</i> message that does not exceed UE temporary capability restriction transmitted via <i>musim-CapRestriction</i> .	UE may apply the temporary UE capability restriction in accordance with the one indicated in the last transmission of the <i>UEAssistanceInformation</i> message including <i>musim-CapRestriction</i> .
T350	Upon transmitting <i>DedicatedSIBRequest</i> message with <i>requestedSIB-List</i> and/or <i>requestedPosSIB-List</i> .	Upon acquiring the requested SIB(s) or posSIB(s), upon releasing <i>onDemandSIB-Request</i> during the connection re-establishment procedures, upon receiving <i>onDemandSIB-Request</i> set to release, upon reception of <i>RRCRelease</i> or upon successful change of PCell while in RRC_CONNECTED.	No action
T380	Upon reception of t380 in <i>RRCRelease</i> .	Upon reception of <i>RRCResume</i> , <i>RRCSetup</i> or <i>RRCRelease</i> .	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 <i>RRCReconfiguration</i> including <i>reconfigurationWithSync</i> , upon change of PCell while in RRC_CONNECTED, upon reception of <i>MobilityFromNRCommand</i> , or upon reception of <i>RRCRelease</i> .	Perform the actions as specified in 5.3.14.4.
T400	Upon transmission of <i>RRCReconfigurationSidelink</i>	Upon reception of <i>RRCReconfigurationFailureSidelink</i> or <i>RRCReconfigurationCompleteSidelink</i>	Perform the Sidelink radio link failure related actions as specified in 5.8.9.3.
T420	Upon reception of the <i>RRCReconfiguration</i> message including <i>sl-PathSwitchConfig</i>	Upon successfully sending <i>RRCReconfigurationComplete</i> 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.

Timer	Start	Stop	At expiry
T421	Upon reception of the <i>RRCReconfiguration</i> message including <i>sI-IndirectPathAddChange</i>	Upon successfully sending <i>RRCReconfigurationComplete</i> message (i.e., PC5 RLC acknowledgement is received from target L2 U2N Relay UE) if split SRB1 with duplication is configured, or upon reception of <i>RRCReconfigurationCompleteSi delink</i> if split SRB1 with duplication is not configured, or upon initiation of indirect path failure information procedure.	Perform the Failure Information Reporting as specified in 5.7.3c.
T430	Start or restart from the subframe indicated by <i>epochTime</i> upon reception of <i>SIB19</i> , or upon reception of <i>RRCReconfiguration</i> message for the target cell including <i>reconfigurationWithSync</i> , or upon conditional reconfiguration execution i.e. when applying a stored <i>RRCReconfiguration</i> message for the target cell including <i>reconfigurationWithSync</i> , or upon satellite switch with resynchronization.	Stop T430, if it is running, for the source cell upon reception of <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> , or upon conditional reconfiguration execution i.e. when applying a stored <i>RRCReconfiguration</i> message including <i>reconfigurationWithSync</i> , or upon satellite switch with resynchronization.	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 <i>RRCReconfiguration</i> with <i>reconfigurationWithSync</i> 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 <i>RRCReconfiguration</i> with <i>reconfigurationWithSync</i> 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,
    MeasReselectionCarrierNR-r18,
    MeasurementValidityDuration-r18,
    MeasObjectToAddModList,
    MeasConfigAppLayerId-r17,
    MeasConfigAppLayer-r17,
    maxNrofAppLayerMeas-r17,
    AppLayerIdleInactiveConfig-r18,
    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,
SuccessPSCell-Report-r18,
maxNPN-r16,
SNPN-ConfigIDList-r18,
AreaConfiguration-v1800,
NID-r16,
SK-CounterConfig-r18,
ReferenceConfiguration-r18,
maxNrofLTM-Configs-plus1-r18,
maxSecurityCellSet-r18

```

```
FROM NR-RRC-Definitions;
```

```
-- NR-UE-VARIABLES-STOP
-- ASN1STOP
```

– *VarAppLayerIdleConfig*

The UE variable *VarAppLayerIdleConfig* includes the parameters of the application layer measurements stored in the UE while in RRC_IDLE.

VarAppLayerIdleConfig UE variable

```
-- ASN1START
-- TAG-VARAPPLAYERIDLECONFIG-START
```

```
VarAppLayerIdleConfig-r18-IEs ::= SEQUENCE {
  appLayerIdleConfigList-r18      SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF VarAppLayerIdle-r18
}
```

```
VarAppLayerIdle-r18 ::= SEQUENCE {
  measConfigAppLayerId-r17,
  serviceType-r18      ENUMERATED {streaming, mtsi, vr, spare5, spare4, spare3, spare2, spare1},
}
```

```

    appLayerIdleInactiveConfig-r18    AppLayerIdleInactiveConfig-r18,
    appLayerMeasPriority-r18          INTEGER (1..16)
}
-- TAG-VARAPPLAYERIDLECONFIG-STOP
-- ASN1STOP

```

OPTIONAL

– *VarAppLayerPLMN-ListConfig*

The UE variable *VarAppLayerPLMN-ListConfig* includes the PLMNs to which application layer measurement reports and application layer measurement configurations are allowed to be sent.

VarAppLayerPLMN-ListConfig UE variable

```

-- ASN1START
-- TAG-VARAPPLAYERPLMN-LISTCONFIG-START

VarAppLayerPLMN-ListConfig-r18-IEs ::= SEQUENCE {
    plmnConfigList-r18                SEQUENCE (SIZE (1..maxNrofAppLayerMeas-r17)) OF VarAppLayerPLMN-List-r18
}

VarAppLayerPLMN-List-r18 ::=
    SEQUENCE {
        measConfigAppLayerId-r18      MeasConfigAppLayerId-r17,
        plmn-IdentityList-r18         PLMN-IdentityList2-r16
    }

-- TAG-VARAPPLAYERPLMN-LISTCONFIG-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, conditional PSCell change, or subsequent CPAC execution condition (associated *measId(s)*), the stored target candidate SpCell *RRCRConfiguration*, the stored reference configuration, and the stored *SK-Counter* configuration.

VarConditionalReconfig UE variable

```

-- ASN1START
-- TAG-VARCONDITIONALRECONFIG-START

VarConditionalReconfig ::=
    SEQUENCE {
        condReconfigList              CondReconfigToAddModList-r16
        scpac-ReferenceConfiguration-r18 ReferenceConfiguration-r18
        sk-CounterConfiguration-r18   SEQUENCE (SIZE (1..maxSecurityCellSet-r18)) OF SK-CounterConfig-r18
    }

-- TAG-VARCONDITIONALRECONFIG-STOP

```

OPTIONAL,
OPTIONAL,
OPTIONAL

```
-- ASN1STOP
```

– *VarConnEstFailReport*

The UE variable *VarConnEstFailReport* includes the connection establishment failure and/or connection resume failure information.

***VarConnEstFailReport* UE variable**

```
-- ASN1START
-- TAG-VARCONNЕСТFАILREPORT-START

VarConnEstFailReport-r16 ::= SEQUENCE {
    connEstFailReport-r16      ConnEstFailReport-r16,
    networkIdentity-r18       CHOICE {
        plmn-Identity-r18      PLMN-Identity,
        snpn-Identity-r18      SNPN-Identity-r18
    }
}

SNPN-Identity-r18 ::= SEQUENCE {
    plmn-Identity-r18          PLMN-Identity,
    nid-r18                    NID-r16
}
-- TAG-VARCONNЕСТFАILREPORT-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-VARCONNЕСТFАILREPORTLIST-START

VarConnEstFailReportList-r17 ::= SEQUENCE {
    connEstFailReportList-r17 SEQUENCE (SIZE (1..maxCEFReport-r17)) OF VarConnEstFailReport-r16
}

-- TAG-VARCONNЕСТFАILREPORTLIST-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,
    areaConfiguration-v1800    AreaConfiguration-v1800  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,
    sigLoggedMeasType-r17     ENUMERATED {true},
    identityList-r18          CHOICE {
        plmn-IdentityList-r18    PLMN-IdentityList2-r16,
        snpn-ConfigIDList-r18    SNPN-ConfigIDList-r18
    }
}
-- TAG-VARLOGMEASREPORT-STOP
-- ASN1STOP
```

```
-- TAG-VARLOGMEASREPORT-STOP
-- ASN1STOP
```

– *VarLTM-ServingCellNoResetID*

The IE *VarLTM-ServingCellNoResetID* is used to store the serving cell ID based on which the UE determines whether a L2 reset is needed or not upon an LTM cell switch procedure.

***VarLTM-ServingCellNoResetID* UE variable**

```
-- ASN1START
-- TAG-VARLTM-SERVINGCELLNORESETID-START

VarLTM-ServingCellNoResetID-r18-IEs ::= SEQUENCE {
    ltm-ServingCellNoResetID-r18          INTEGER (1..maxNrofLTM-Configs-plus1-r18)          OPTIONAL
}

-- TAG-VARLTM-SERVINGCELLNORESETID-STOP
-- ASN1STOP
```

– *VarLTM-ServingCellUE-MeasuredTA-ID*

The IE *VarLTM-ServingCellUE-MeasuredTA-ID* is used to store the serving cell ID based on which the UE determines whether UE-based TA measurements are needed or not.

***VarLTM-ServingCellUE-MeasuredTA-ID* UE variable**

```
-- ASN1START
-- TAG-VARLTM-SERVINGCELLUE-MEASUREDTA-ID-START

VarLTM-ServingCellUeMeasuredTA-ID-r18-IEs ::= SEQUENCE {
    ltm-ServingCellUE-MeasuredTA-ID-r18    INTEGER (1..maxNrofLTM-Configs-plus1-r18)    OPTIONAL
}

-- TAG-VARLTM-SERVINGCELLUE-MEASUREDTA-ID-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 ::=
  -- 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
  }
}
-- 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 ::=
  -- 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
}

VarEnhMeasIdleConfig-r18 ::= SEQUENCE {
    measIdleValidityDuration-r18 MeasurementValidityDuration-r18 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 ::=
    -- List of measurement that have been triggered
    SEQUENCE {
    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

```

– *VarMeasReselectionConfig*

The UE variable *VarMeasReselectionConfig* includes the configuration for reporting the NR inter-frequency and inter-RAT (i.e. EUTRA) reselection measurements while in RRC_IDLE or RRC_INACTIVE for.

***VarMeasReselectionConfig* UE variable**

```
-- ASN1START
-- TAG-VARMEASRESELECTIONCONFIG-START

VarMeasReselectionConfig-r18 ::= SEQUENCE {
    measReselectionCarrierListNR-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasReselectionCarrierNR-r18 OPTIONAL,
    measReselectionValidityDuration-r18 MeasurementValidityDuration-r18 OPTIONAL
}

-- TAG-VARMEASRESELECTIONCONFIG-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 ::=
    pendingRNA-Update          SEQUENCE {
                                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,
    identityList-r18      CHOICE {
        plmn-IdentityList-r18  PLMN-IdentityList2-r16,
        snpn-IdentityList-r18  SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-Identity-r18
    }
}

-- 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* UE variable**

```

-- ASN1START
-- TAG-VARRESUMEMAC-INPUT-START

VarResumeMAC-Input ::= SEQUENCE {
    sourcePhysCellId      PhysCellId,
    targetCellIdentity     CellIdentity,
    source-c-RNTI         RNTI-Value
}

-- TAG-VARRESUMEMAC-INPUT-STOP
-- ASN1STOP

```

<i>VarResumeMAC-Input</i> field descriptions
targetCellIdentity An input variable used to calculate the <i>resumeMAC-I</i> . Set to the <i>cellIdentity</i> of the first <i>PLMN-Identity</i> included in the <i>PLMN-IdentityInfoList</i> broadcasted in <i>SIB1</i> 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,
    identityList-r18       CHOICE {
        plmn-IdentityList-r18  PLMN-IdentityList2-r16,
        snpn-IdentityList-r18  SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-Identity-r18
    }
}

-- TAG-VARRLF-REPORT-STOP
-- ASN1STOP
```

– *VarServingSecurityCellSetID*

The UE variable *VarServingSecurityCellSetID* includes the security cell set ID of serving PSCell.

VarServingSecurityCellSetID UE variable

```
-- ASN1START
-- TAG-VARSERVINGSECURITYCELLSETID-START

VarServingSecurityCellSetID ::= SEQUENCE {
    servingSecurityCellSetId-r18  INTEGER (1.. maxSecurityCellSet-r18)
}

-- TAG-VARSERVINGSECURITYCELLSETID-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 UE 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.

VarSuccessHO-Report UE variable

```
-- ASN1START
-- TAG-VARSUCCESSHO-Report-START

VarSuccessHO-Report-r17-IEs ::= SEQUENCE {
    successHO-Report-r17      SuccessHO-Report-r17,
    identityList-r18          CHOICE {
        plmn-IdentityList-r18    PLMN-IdentityList2-r16,
        snpn-IdentityList-r18    SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-Identity-r18
    }
}

-- TAG-VARSUCCESSHO-Report-STOP
-- ASN1STOP
```

– *VarSuccessPSCell-Report*

The UE variable *VarSuccessPSCell-Report* includes the successful PSCell change or addition information.

***VarSuccessPSCell-Report* UE variable**

```
-- ASN1START
-- TAG-VARSUCCESSPSCELL-Report-START

VarSuccessPSCell-Report-r18-IEs ::= SEQUENCE {
    successPSCell-Report-r18      SuccessPSCell-Report-r18,
    identityList-r18              CHOICE {
        plmn-IdentityList-r18    PLMN-IdentityList2-r16,
        snpn-IdentityList-r18    SEQUENCE (SIZE (1..maxNPN-r16)) OF SNPN-Identity-r18
    }
}

-- TAG-VARSUCCESSPSCELL-Report-STOP
-- ASN1STOP
```

– *VarTSS-Info*

The UE variable *VarTSS-Info* includes information about the current value of *eventID-TSS* and the current value of gNB Identity.

***VarTSS-Info* UE variable**

```
-- ASN1START
-- TAG-VARTSS-INFO-START

VarTSS-Info-r18 ::= SEQUENCE {
    storedEventID      INTEGER (0..63),
    storedGnbID        BIT STRING (SIZE (32))
}

-- TAG-VARTSS-INFO-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.

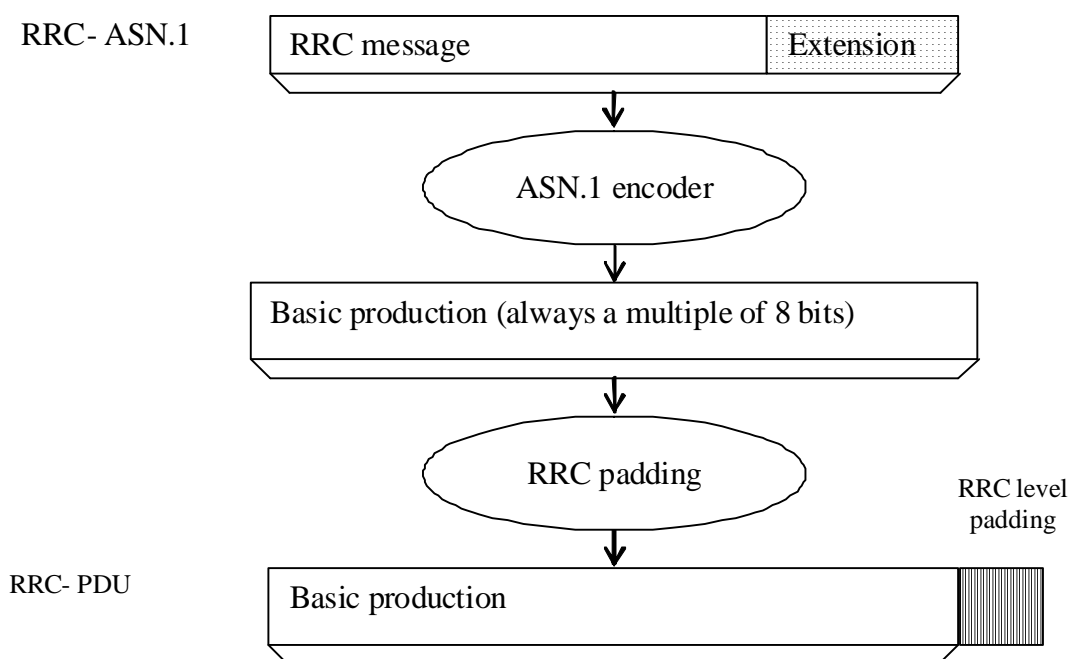


Figure 8.5-1: RRC level padding

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			
> <i>t-Reordering</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>pdcp-SN-Size</i>	12		
SRAP configuration		Specified for L2 U2U relay operation, which is used for U2U Remote UE's SL-SRB3 with the peer U2U Remote UE.	
> <i>sl-RemoteUE-SLRB-Identity</i>	3	This parameter is only applicable to L2 U2U relay operation.	
RLC configuration		AM RLC	
> <i>sn-FieldLength</i>	12		
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>logicalChannelIdentity</i>	3		
MAC configuration			
> <i>priority</i>	1		
> <i>prioritisedBitRate</i>	infinity		
> <i>logicalChannelGroup</i>	0		
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
Additional RLC configuration		AM RLC This RLC is used for PDCP duplication	v1800
> <i>sn-FieldLength</i>	12		v1800
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>logicalChannelIdentity</i>	22		v1800
MAC configuration associated to additional RLC configuration		This logical channel is used for PDCP duplication	v1800
> <i>priority</i>	1		v1800
> <i>prioritisedBitRate</i>	infinity		v1800
> <i>logicalChannelGroup</i>	0		v1800
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	v1800
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800

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			
> <i>t-Reordering</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>pdcp-SN-Size</i>	12		
SRAP configuration		Specified for L2 U2U relay operation, which is used for U2U Remote UE's SL-SRB0 with the peer U2U Remote UE.	
> <i>sl-RemoteUE-SLRB-Identity</i>	0	This parameter is only applicable to L2 U2U relay operation.	
RLC configuration		UM RLC	
> <i>sn-FieldLength</i>	6		
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>logicalChannelIdentity</i>	0		
MAC configuration			
> <i>priority</i>	1		
> <i>prioritisedBitRate</i>	infinity		
> <i>logicalChannelGroup</i>	0		
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
> <i>sl-HARQ-FeedbackEnabled</i>	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			
> <i>t-Reordering</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>pdcp-SN-Size</i>	12		
SRAP configuration		Specified for L2 U2U relay operation, which is used for U2U Remote UE's SL-SRB1 with the peer U2U Remote UE.	
> <i>sl-RemoteUE-SLRB-Identity</i>	1	This parameter is only applicable to L2 U2U relay operation.	
RLC configuration		AM RLC	
> <i>sn-FieldLength</i>	12		
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>logicalChannelIdentity</i>	1		
MAC configuration			
> <i>priority</i>	1		
> <i>prioritisedBitRate</i>	infinity		
> <i>logicalChannelGroup</i>	0		
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
RLC configuration		AM RLC This RLC is used for PDCP duplication	v1800
> <i>sn-FieldLength</i>	12		v1800
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>logicalChannelIdentity</i>	20		v1800
MAC configuration associated to additional RLC configuration		This logical channel is used for PDCP duplication	v1800
> <i>priority</i>	1		v1800
> <i>prioritisedBitRate</i>	infinity		v1800
> <i>logicalChannelGroup</i>	0		v1800
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	v1800
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800

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			
> <i>t-Reordering</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>pdcp-SN-Size</i>	12		
SRAP configuration		Specified for L2 U2U relay operation, which is used for U2U Remote UE's SL-SRB2 with the peer U2U Remote UE.	
> <i>sl-RemoteUE-SLRB-Identity</i>	2	This parameter is only applicable to L2 U2U relay operation.	
RLC configuration		AM RLC	
> <i>sn-FieldLength</i>	12		
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>logicalChannelIdentity</i>	2		
MAC configuration			
> <i>priority</i>	1		
> <i>prioritisedBitRate</i>	infinity		
> <i>logicalChannelGroup</i>	0		
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
RLC configuration		AM RLC This RLC is used for PDCP duplication	v1800
> <i>sn-FieldLength</i>	12		v1800
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	v1800
> <i>logicalChannelIdentity</i>	21		v1800
MAC configuration associated to additional RLC configuration		This logical channel is used for PDCP duplication	v1800
> <i>priority</i>	1		v1800
> <i>prioritisedBitRate</i>	infinity		v1800
> <i>logicalChannelGroup</i>	0		v1800
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	v1800
> <i>sl-HARQ-FeedbackEnabled</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1800

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			
>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			
>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	56		
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. 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	

Parameters that are specified for NR sidelink L2 U2U Relay operations, which is used for the PC5 Relay RLC channel for U2U Remote UE's SL-SRB0/1/2/3 message transmission/reception with the peer U2U Remote UE. The PC5 Relay RLC channel using this configuration is named as SL-U2U-RLC.

Name	Value	Semantics description	Ver
RLC configuration		AM	
> <i>sn-FieldLength</i>	12		
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>t-PollRetransmit</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollPDU</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>pollByte</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>maxRetxThreshold</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
> <i>t-StatusProhibit</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>logicalChannelIdentity</i>	55		
MAC configuration			
> <i>priority</i>	1		
> <i>prioritisedBitRate</i>	Infinity		
> <i>logicalChannelGroup</i>	0		
> <i>schedulingRequestId</i>	0	The scheduling request configuration with this value is applicable for this SCCH if configured by the network.	
> <i>sl-HARQ-FeedbackEnabled</i>	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			
> <i>t-Reordering</i>	Undefined	Selected by the receiving UE, up to UE implementation	
> <i>pdcp-SN-Size</i>	12	For broadcast and groupcast of NR sidelink communication	
> <i>maxCID</i>	15	For broadcast and groupcast of NR sidelink communication	
> <i>profiles</i>			
RLC configuration		For broadcast and groupcast of NR sidelink communication, uni-directional UM RLC UM window size is set to 32	
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to Up to UE implementation	
> <i>sn-FieldLength</i>	6	For broadcast and groupcast of NR sidelink communication	
> <i>logicalChannelIdentity</i>	Undefined	Selected by the transmitting UE, up to UE implementation	
MAC configuration			
> <i>priority</i>			
RLC configuration		For broadcast and groupcast of NR sidelink communication, uni-directional UM RLC UM window size is set to 32 This RLC is used for PDCP duplication	v1810
> <i>t-Reassembly</i>	Undefined	Selected by the receiving UE, up to Up to UE implementation	v1810
> <i>sn-FieldLength</i>	6	For broadcast and groupcast of NR sidelink communication	v1810
> <i>logicalChannelIdentity</i>	Undefined	Selected by the transmitting UE, up to UE implementation	v1810
MAC configuration			
> <i>priority</i>			

9.1.1.6 MCCH configuration

Parameters that are specified for MCCH.

Name	Value	Semantics description	Ver
RLC configuration		UM RLC	
> <i>sn-FieldLength</i>	6		
> <i>t-Reassembly</i>	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			
> <i>t-Reordering</i>	ms0		
> <i>pdcp-SN-SizeDL</i>	18		
RLC configuration		UM RLC	
> <i>sn-FieldLength</i>	12		
> <i>t-Reassembly</i>	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		
<i>PDCP-Config</i>					
> <i>t-Reordering</i>	infinity				
<i>RLC-Config CHOICE</i>	Am				
<i>ul-AM-RLC</i>					
> <i>sn-FieldLength</i>	size12				
> <i>t-PollRetransmit</i>	ms45				
> <i>pollPDU</i>	infinity				
> <i>pollByte</i>	infinity				
> <i>maxRetxThreshold</i>	t8				
<i>dl-AM-RLC</i>					
> <i>sn-FieldLength</i>	size12				
> <i>t-Reassembly</i>	ms35				
> <i>t-StatusProhibit</i>	ms0				
<i>logicalChannelIdentity</i>	1	2	3		
<i>LogicalChannelConfig</i>					
> <i>priority</i>	1	3	1		
> <i>prioritisedBitRate</i>	infinity				
> <i>logicalChannelGroup</i>	0				

9.2.2 Default MAC Cell Group configuration

Parameters

Name	Value	Semantics description	Ver
MAC Cell Group configuration			
<i>bsr-Config</i>			
> <i>periodicBSR-Timer</i>	sf10		
> <i>retxBSR-Timer</i>	sf80		
<i>phr-Config</i>			
> <i>phr-PeriodicTimer</i>	sf10		
> <i>phr-ProhibitTimer</i>	sf10		
> <i>phr-Tx-PowerFactorChange</i>	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 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	57		
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.	

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-RelayUE-ConfigU2U-r18,
    SL-RemoteUE-ConfigU2U-r18,
    SL-RemoteUE-Config-r17,
    SL-DRX-ConfigGC-BC-r17,
    SL-Freq-Id-r16,
    maxNrofFreqSL-l-r18,
    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-PreconfigFreqInfoListSizeExt-v1800  SEQUENCE (SIZE (1..maxNrofFreqSL-r18)) OF SL-FreqConfigCommon-r16  OPTIONAL,
    sl-RLC-BearerConfigListSizeExt-v1800  SEQUENCE (SIZE (1..maxSL-LCID-r16)) OF SL-RLC-BearerConfig-r16  OPTIONAL,
    sl-SyncFreqList-r18                SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-Freq-Id-r16  OPTIONAL,
    sl-SyncTxMultiFreq-r18              ENUMERATED {true}  OPTIONAL,
    sl-PreconfigDiscConfig-v1800        SL-PreconfigDiscConfig-v1800  OPTIONAL,
    sl-PosPreconfigFreqInfoList-r18     SEQUENCE (SIZE (1..maxNrofFreqSL-r16)) OF SL-FreqConfigCommon-r16  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  
}  
  
SL-PreconfigDiscConfig-v1800 ::= SEQUENCE {  
    sl-RelayUE-PreconfigU2U-r18  SL-RelayUE-ConfigU2U-r18,  
    sl-RemoteUE-PreconfigU2U-r18 SL-RemoteUE-ConfigU2U-r18  
}  
  
-- TAG-SL-PRECONFIGURATIONNR-STOP  
-- ASN1STOP
```

Editor's Note: The mapping configuration (from e2e SLRB to RLC channel) is needed in pre-configuration. The existing table format is used as a baseline, subject to discussion during maintenance.

SL-PreconfigurationNR field descriptions
<p>sl-DRX-PreConfig-GC-BC This field indicates the sidelink DRX configuration for groupcast and broadcast communication, as specified in TS 38.321 [3].</p>
<p>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.</p>
<p>sl-PosPreconfigFreqInfoList This field indicates the NR sidelink positioning configuration for a set of carrier frequency(ies). In this release, only one SL-FreqConfig can be configured in the list.</p>
<p>sl-PreconfigDiscConfig This field indicates the configuration for discovery message transmission used by NR sidelink U2N Remote UE, used by NR sidelink U2U Relay UE or used by NR sidelink U2U Remote UE.</p>
<p>sl-PreconfigEUTRA-AnchorCarrierFreqList This field indicates the EUTRA anchor carrier frequency list, which can provide the NR sidelink communication configuration.</p>
<p>sl-PreconfigFreqInfoList, sl-PreconfigFreqInfoListSizeExt 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 sl-PreconfigFreqInfoList. More entries of SL-FreqConfig can be configured in sl-PreconfigFreqInfoListSizeExt.</p>
<p>sl-PreconfigNR-AnchorCarrierFreqList This field indicates the NR anchor carrier frequency list, which can provide the NR sidelink communication configuration.</p>
<p>sl-RadioBearerPreConfigList This field indicates one or multiple sidelink radio bearer configurations.</p>
<p>sl-RLC-BearerPreConfigList, sl-RLC-BearerPreConfigListSizeExt This field indicates one or multiple sidelink RLC bearer configurations.</p>
<p>sl-RoHC-Profiles This field indicates the supported RoHC profiles for NR sidelink communications.</p>
<p>sl-SSB-PriorityNR This field indicates the priority of NR sidelink SSB transmission and reception.</p>
<p>sl-SyncFreqList Indicates a list of candidate carrier frequencies that can be used for the synchronisation of NR sidelink communication. For SL-Freq-Id-r16, the value 1 corresponds to the frequency of first entry in sl-PreconfigFreqInfoList, the value 2 corresponds to the frequency of first entry in sl-PreconfigFreqInfoListSizeExt, the value 3 corresponds to the frequency of second entry in sl-PreconfigFreqInfoListSizeExt and so on.</p>
<p>sl-SyncTxMultiFreq Indicates that the UE transmits S-SSB on multiple carrier frequencies for NR sidelink communication. If this field is absent, the UE transmits S-SSB only on the synchronisation carrier frequency.</p>
<p>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.</p>

– *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,
    SL-RelayIndicationMP-r18
FROM NR-RRC-Definitions;

SL-AccessInfo-L2U2N-r17 ::=
    cellAccessRelatedInfo-r17
    sl-ServingCellInfo-r17
    ...
    [[
    sl-RelayIndication-r18
    ]]
}

SEQUENCE {
    CellAccessRelatedInfo,
    SL-ServingCellInfo-r17,
    SL-RelayIndicationMP-r18 OPTIONAL
}

END

-- TAG-SL-ACCESSINFO-L2U2N-STOP
-- ASN1STOP
```

9.5 Void

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)) OF ItemInfo

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 {
            ...
        }
    }

-- 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
    AffectedCarrierFreqCombList-r16,
    AffectedCarrierFreqRangeCombList-r18,
    ARFCN-ValueNR,
    ARFCN-ValueEUTRA,
    CandidateServingFreqListNR-r16,
    CandidateServingFreqRangeListNR-r18,
    CellIdentity,
    CGI-InfoEUTRA,
    CGI-InfoNR,
    CondReconfigExecCondSCG-r17,
    CSI-RS-Index,
    CSI-RS-CellMobility,
    DRX-Config,
    EUTRA-PhysCellId,
    FeatureSetDownlinkPerCC-Id,
    FeatureSetUplinkPerCC-Id,
    FlightPathInfoReport-r18,
    FreqBandIndicatorNR,
    GapConfig,
    IDC-TDM-Assistance-r18,
    maxBandComb,
```

maxBands,
maxBandsEUTRA,
maxCandidateBandIndex-r18,
maxCellsSFTD,
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,
MUSIM-CandidateBandList-r18,
MUSIM-CapRestriction-r18,
MUSIM-GapConfig-r17,
NeedForGapsInfoNR-r16,
NeedForGapNCSG-InfoNR-r17,
NeedForGapNCSG-InfoEUTRA-r17,
NeedForInterruptionInfoNR-r18,
OverheatingAssistance,
OverheatingAssistance-r17,
P-Max,
PhysCellId,
RadioBearerConfig,
RAN-NotificationAreaInfo,
ReferenceConfiguration-r18,
ReportConfigNR,
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,
    SuccessPSCell-Config-r18,
    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), Conditional PSCell Change (CPC), subsequent CPAC, or CHO with candidate SCG(s) 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 ::=
    criticalExtensions
        c1
            cg-CandidateList-r17
            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 {}
    }

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
<p>cg-CandidateToAddModList Contains information regarding candidate target cells to be added or modified for Conditional PSCell Addition (CPA), Conditional PSCell Change (CPC), subsequent CPAC, or CHO with candidate SCG(s) from the candidate target secondary node to the master node.</p>
<p>cg-CandidateToReleaseList Contains information regarding candidate target cells for CPA, CPC, subsequent CPAC, or CHO with candidate SCG(s) to be removed from the candidate target secondary node to the master node. This list is not used in CPA, CPC, subsequent CPAC, or CHO with candidate SCG(s) preparation.</p>
CG-CandidateInfo field descriptions
<p>cg-CandidateInfo SSB frequency and Physical Cell Identity of the candidate target cell.</p>
<p>candidateCG-Config CG-Config message corresponding to the cell indicated by <i>cg-CandidateInfo</i>.</p>

– *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
                        spare3 NULL, spare2 NULL, spare1 NULL
                    }
                criticalExtensionsFuture SEQUENCE {}
            }
    }

HandoverCommand-IEs ::=
    SEQUENCE {
        handoverCommandMessage OCTET STRING (CONTAINING RRCReconfiguration),
        nonCriticalExtension HandoverCommand-v1800-IEs OPTIONAL
    }

HandoverCommand-v1800-IEs ::=
    SEQUENCE {
        candPSCellExecutionConditionInfo-r18 CandPSCellExecutionConditionInfo-r18 OPTIONAL,
        nonCriticalExtension SEQUENCE {} OPTIONAL
    }
```

```

}
CandPSCellExecutionConditionInfo-r18 ::= SEQUENCE {
    candPSCellExecCondReportConfigNR-r18    ReportConfigNR,
    ...
}
-- TAG-HANDOVER-COMMAND-STOP
-- ASN1STOP

```

HandoverCommand field descriptions

candPSCellExecCondReportConfigNR

Contains execution condition parameters of candidate PSCells in case of CHO with candidate SCG(s). This fields can include only *a4-Threshold*, *hysteresis*, *timeToTrigger*, and *rsType* associated to *condEventA4*.

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 ::=
reestablishmentInfo        SEQUENCE {
  ReestablishmentInfo      OPTIONAL,
  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
  ]],
  [[
needForInterruptionInfoNR-r18 NeedForInterruptionInfoNR-r18  OPTIONAL,
flightPathInfoReport-r18    FlightPathInfoReport-r18    OPTIONAL
  ]],
}

ConfigRestrictInfoDAPS-r16 ::=
powerCoordination-r16      SEQUENCE {
  p-DAPS-Source-r16        SEQUENCE {
    P-Max,
    p-DAPS-Target-r16      P-Max,
    uplinkPowerSharingDAPS-Mode-r16 ENUMERATED {semi-static-model, 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}
    candidateCellInfoList MeasResultList2NR OPTIONAL,
    ...,
    [[
    candidateCellInfoListSN-EUTRA MeasResultServFreqListEUTRA-SCG OPTIONAL
    ]]
}

-- TAG-HANDOVER-PREPARATION-INFORMATION-STOP
-- ASN1STOP

```

HandoverPreparationInformation field descriptions
<p>as-Context Local RAN context required by the target gNB or DU.</p>
<p>rrm-Config Local RAN context used mainly for RRM purposes.</p>
<p>sourceConfig The radio resource configuration as used in the source cell.</p>
<p>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.</p>
<p>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 <i>s1</i> corresponds to 1 second, <i>s2</i> corresponds to 2 seconds and so on. Value <i>min1</i> corresponds to 1 minute, value <i>min1s20</i> corresponds to 1 minute and 20 seconds, value <i>min1s40</i> corresponds to 1 minute and 40 seconds and so on. Value <i>hr1</i> corresponds to 1 hour, <i>hr1min30</i> corresponds to 1 hour and 30 minutes and so on.</p>

AS-Config field descriptions
<p>rrcReconfiguration Contains the <i>RRCReconfiguration</i> configuration as generated entirely by the MN. If the <i>TMGI-r17</i> is included in the <i>MRB-ToAddMod-r17</i> in the <i>RadioBearerConfig</i>, the <i>plmn-Index</i> is replaced by the PLMN ID, if needed.</p>
<p>sdt-Config Contains the IE <i>SDT-Config</i> 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.</p>
<p>sourceRB-SN-Config Contains the IE <i>RadioBearerConfig</i> as generated entirely by the SN. This field is only used when the UE is configured with SN terminated RB(s).</p>
<p>sourceSCG-Configured Value <i>true</i> 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 <i>sourceSCG-NR-Config</i> and <i>sourceSCG-EUTRA-Config</i> are absent.</p>
<p>sourceSCG-EUTRA-Config Contains the current dedicated SCG configuration in <i>RRCConnectionReconfiguration</i> message as specified in TS 36.331 [10] and generated entirely by the SN. In this version of the specification, the E-UTRA <i>RRCConnectionReconfiguration</i> message can only include the field <i>scg-Configuration</i>. This field is only used in NE-DC.</p>
<p>sourceSCG-NR-Config Contains the current dedicated SCG configuration in <i>RRCReconfiguration</i> message as generated entirely by the SN. In this version of the specification, the <i>RRCReconfiguration</i> message can only include fields <i>secondaryCellGroup</i>, <i>measConfig</i>, and <i>conditionalReconfiguration</i>. This field is only used in NR-DC.</p>

AS-Context field descriptions
<p>configRestrictInfoDAPS Includes fields for which source cell explicitly indicates the restriction to be observed by target cell during DAPS handover.</p>
<p>mbsInterestIndication Includes the information last reported by the UE in the NR <i>MBSInterestIndication</i> message, where the <i>plmn-Index</i> (if included by the UE in <i>tmgi</i>) is replaced by the PLMN ID, if needed. A TMGI for which the <i>plmn-Index</i> points to a non-serving SNPN is removed from the NR <i>MBSInterestIndication</i> message.</p>
<p>needForGapsInfoNR Includes measurement gap requirement information of the UE for NR target bands.</p>
<p>selectedBandCombinationSN Indicates the band combination selected by SN in (NG)EN-DC, NE-DC, and NR-DC.</p>
<p>sidelinkUEInformationEUTRA This field includes <i>SidelinkUEInformation</i> IE as specified in TS 36.331 [10].</p>
<p>sidelinkUEInformationNR This field includes <i>SidelinkUEInformationNR</i> IE.</p>
<p>ueAssistanceInformation Includes for each UE assistance feature the information last reported by the UE, if any.</p>
<p>ueAssistanceInformationSCG Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR <i>UEAssistanceInformation</i> message for the SCG, if any.</p>

ConfigRestrictInfoDAPS field descriptions
<p>sourceFeatureSetPerUplinkCC/sourceFeatureSetPerDownlinkCC Indicates an index referring to the position of the <i>FeatureSetUplinkPerCC/FeatureSetDownlinkPerCC</i> selected by source in the <i>featureSetsUplinkPerCC/featureSetsDownlinkPerCC</i>.</p>

RRM-Config field descriptions
<p>candidateCellInfoList A list of the best cells on each frequency for which measurement information was available</p>
<p>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.</p>

Conditional Presence	Explanation
<i>HO</i>	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.
<i>HO2</i>	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 <i>radioBearerConfig</i> is included in the <i>RRCReconfiguration</i> .	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 ::=
    criticalExtensions
        c1
            cg-Config
            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 ::=
  pSCellFrequency                SEQUENCE {                      OPTIONAL,
  reportCGI-RequestNR            SEQUENCE {                      OPTIONAL,
    requestedCellInfo            SEQUENCE {
      ssbFrequency                ARFCN-ValueNR,
      cellForWhichToReportCGI    PhysCellId
    }
  }
  ph-InfoSCG                     PH-TypeListSCG                  OPTIONAL,
  nonCriticalExtension            CG-Config-v1560-IEs            OPTIONAL,
}

CG-Config-v1560-IEs ::=
  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
    }
  }
  nonCriticalExtension            CG-Config-v1590-IEs            OPTIONAL,
}

CG-Config-v1590-IEs ::=
  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 ::=
  drx-InfoSCG2                  DRX-Info2                      OPTIONAL,
  nonCriticalExtension            CG-Config-v1620-IEs            OPTIONAL,
}

CG-Config-v1620-IEs ::=
  ueAssistanceInformationSCG-r16 OCTET STRING (CONTAINING UEAssistanceInformation) OPTIONAL,
  nonCriticalExtension            CG-Config-v1630-IEs            OPTIONAL,
}

CG-Config-v1630-IEs ::=
  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 ::=
candidateCellInfoListCPC-r17    SEQUENCE {                      CandidateCellInfoListCPC-r17    OPTIONAL,
twoPHRModeSCG-r17              ENUMERATED {enabled}           OPTIONAL,
nonCriticalExtension            CG-Config-v1730-IEs            OPTIONAL
}

CG-Config-v1730-IEs ::=
fr1-Carriers-SCG-r17            SEQUENCE {                      INTEGER (1..32)                 OPTIONAL,
fr2-Carriers-SCG-r17            INTEGER (1..32)                 OPTIONAL,
nonCriticalExtension            CG-Config-v1800-IEs            OPTIONAL
}

CG-Config-v1800-IEs ::=
candidateServingFreqRangeListNR-r18  CandidateServingFreqRangeListNR-r18  OPTIONAL,
candidateServingFreqListNR-r16       CandidateServingFreqListNR-r16       OPTIONAL,
idc-TDM-AssistanceConfig-r18         ENUMERATED {enabled}               OPTIONAL,
candidateCellInfoListSubsequentCPC-r18 CandidateCellInfoListCPC-r17          OPTIONAL,
scpac-ReferenceConfigurationSCG-r18  ReferenceConfiguration-r18           OPTIONAL,
subsequentCPAC-Information-r18       CandidateCellInfoListCPC-r17          OPTIONAL,
successPSCell-Config-r18             SuccessPSCell-Config-r18             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 ::=
  servCellIndex          SEQUENCE {
    ServCellIndex,
    ph-UplinkCarrierSCG,
    ph-SupplementaryUplink          OPTIONAL,
    ...,
    [[
      twoSRS-PUSCH-Repetition-r17  ENUMERATED{enabled}          OPTIONAL
    ]]
  }

PH-UplinkCarrierSCG ::=
  ph-Type1or3          SEQUENCE {
    ...,
    ENUMERATED {type1, type3},
  }

MeasConfigSN ::=
  measuredFrequenciesSN SEQUENCE {
    SEQUENCE (SIZE (1..maxMeasFreqsSN)) OF NR-FreqInfo  OPTIONAL,
    ...,
  }

NR-FreqInfo ::=
  measuredFrequency    SEQUENCE {
    ARFCN-ValueNR          OPTIONAL,
    ...,
  }

ConfigRestrictModReqSCG ::=
  requestedBC-MRDC      SEQUENCE {
    BandCombinationInfoSN  OPTIONAL,
    requestedP-MaxFR1      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 ::=
  bandCombinationIndex SEQUENCE {
    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
<p>candidateCellInfoListCPC Contains information regarding candidate target cells for Conditional PSCell Change (CPC) or subsequent CPAC that the source secondary gNB suggests the target secondary gNB to consider configuring for CPC or subsequent CPAC. This field is only used in SN initiated CPC and SN initiated subsequent CPAC.</p>
<p>candidateCellInfoListSN Contains information regarding cells that the source secondary node suggests the target secondary gNB to consider configuring.</p>
<p>candidateCellInfoListSN-EUTRA Includes the <i>MeasResultList3EUTRA</i> 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.</p>
<p>candidateCellInfoListSubsequentCPC Contains information regarding candidate target cells for subsequent CPAC that candidate secondary gNB suggests the master gNB to consider configuring for subsequent CPAC. This field is only used in MN initiated and SN initiated subsequent CPAC.</p>
<p>candidateServingFreqListNR, candidateServingFreqListEUTRA Indicates frequencies of candidate serving cells for In-Device Co-existence Indication (see TS 36.331 [10]).</p>
<p>candidateServingFreqListNR-r16 indicates the candidate frequencies configured by SN for IDC. This field is only used in NR-DC.</p>
<p>candidateServingFreqRangeListNR indicates the candidate frequency ranges configured by SN for IDC. This field is only used in NR-DC.</p>
<p>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.</p>
<p>drx-ConfigSCG This field contains the complete DRX configuration of the SCG. This field is only used in NR-DC.</p>
<p>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.</p>
<p>drx-InfoSCG2 This field contains the drx-onDurationTimer configuration of the SCG. This field is only used in (NG)EN-DC.</p>
<p>fr-InfoListSCG Contains information of FR information of serving cells that include PSCell and SCells configured in SCG.</p>
<p>fr1-Carriers-SCG, fr2-Carriers-SCG Indicates the number of FR1 or FR2 serving cells configured in SCG.</p>
<p>idc-TDM-AssistanceConfig Indicates if the IDC TDM reporting is enabled for the UE by SN. This field is only used in NR-DC.</p>
<p>measuredFrequenciesSN Used by SN to indicate a list of frequencies measured by the UE.</p>
<p>needForGaps In NE-DC, indicates whether the SN requests gNB to configure measurements gaps.</p>
<p>ph-InfoSCG Power headroom information in SCG that is needed in the reception of PHR MAC CE of MCG</p>
<p>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.</p>
<p>ph-Type1or3 Type of power headroom for a certain serving cell in SCG (PSCell and activated SCells). Value <i>type1</i> refers to type 1 power headroom, value <i>type3</i> refers to type 3 power headroom. (See TS 38.321 [3]).</p>

ph-Uplink Power headroom information for uplink.
pSCellFrequency, pSCellFrequencyEUTRA Indicates the frequency of PSCell in NR (i.e., <i>pSCellFrequency</i>) or E-UTRA (i.e., <i>pSCellFrequencyEUTRA</i>). In this version of the specification, <i>pSCellFrequency</i> is not used in NE-DC whereas <i>pSCellFrequencyEUTRA</i> is only used in NE-DC. <i>pSCellFrequency</i> indicates the <i>absoluteFrequencySSB</i> .
reportCGI-RequestNR, reportCGI-RequestEUTRA Used by SN to indicate to MN about configuring <i>reportCGI</i> procedure. The request may optionally contain information about the cell for which SN intends to configure <i>reportCGI</i> procedure. In this version of the specification, the <i>reportCGI-RequestNR</i> is used in (NG)EN-DC and NR-DC whereas <i>reportCGI-RequestEUTRA</i> 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 <i>allowedBC-ListMRDC</i>) 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. $T_{proc,SCG}^{max}$, see TS 38.213 [13]). This field is used in NR-DC only when the fields <i>nrdc-PC-mode-FR1-r16</i> or <i>nrdc-PC-mode-FR2-r16</i> 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 <i>scellFrequenciesSN-EUTRA</i> is used in NE-DC; the field <i>scellFrequenciesSN-NR</i> is used in (NG)EN-DC and NR-DC. In (NG)EN-DC, the field is optionally provided to the MN. <i>scellFrequenciesSN-NR</i> indicates <i>absoluteFrequencySSB</i> .

scg-CellGroupConfig

Contains the *RRCReconfiguration* message (containing only *secondaryCellGroup* and/or *measConfig* and/or *otherConfig* and/or *appLayerMeasConfig* and/or *conditionalReconfiguration*, *Itm-Config*, 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 *RRCCConnectionReconfiguration* 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 *RRCCConnectionReconfiguration* 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.

scpac-ReferenceConfigurationSCG

Includes the reference configuration associated with the SCG for the candidate supporting subsequent CPAC.

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 <i>nrdc-PC-mode-FR1-r16</i> or <i>nrdc-PC-mode-FR2-r16</i> are set to dynamic. The SN can only indicate a value that is less than or equal to <i>maxToffset</i> received from MN. This field is used in NR-DC only when MN has included the field <i>maxToffset</i> in <i>CG-ConfigInfo</i> . Value <i>ms0dot5</i> corresponds to 0.5 ms, value <i>ms0dot75</i> corresponds to 0.75 ms, value <i>ms1</i> 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.
subsequentCPAC-Information
Contains information about handling of stored subsequent CPAC configurations for the UE that the target secondary gNB suggests the master gNB to consider configuring for normal PSCell addition or change. It includes information about updates of execution conditions for the subsequent CPAC configurations that are to be kept at the PSCell addition/change.
successPSCell-Config
Include the successful PSCell change or addition report configuration in case of SN initiated PSCell change or CPC. The <i>thresholdPercentageT304-SCG</i> is not configured in this message.
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 <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> 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 <i>UEAssistanceInformation</i> 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 <i>supportedBandCombinationList</i> . In case of NE-DC, this field indicates the position of a band combination in the <i>supportedBandCombinationList</i> and/or <i>supportedBandCombinationListNEDC-Only</i> . In case of (NG)EN-DC, this field indicates the position of a band combination in the <i>supportedBandCombinationList</i> and/or <i>supportedBandCombinationList-UplinkTxSwitch</i> . Band combination entries in <i>supportedBandCombinationList</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationList</i> . Band combination entries in <i>supportedBandCombinationListNEDC-Only</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationListNEDC-Only</i> increased by the number of entries in <i>supportedBandCombinationList</i> . Band combination entries in <i>supportedBandCombinationList-UplinkTxSwitch</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationList-UplinkTxSwitch</i> increased by the number of entries in <i>supportedBandCombinationList</i> .
requestedFeatureSets
The position in the <i>FeatureSetCombination</i> which identifies one <i>FeatureSetUplink/Downlink</i> 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 {
                cl
                    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
    }
    nonCriticalExtension          CG-ConfigInfo-v1560-IEs
}

CG-ConfigInfo-v1560-IEs ::= SEQUENCE {
    candidateCellInfoListMN-EUTRA OCTET STRING
    candidateCellInfoListSN-EUTRA OCTET STRING
    sourceConfigSCG-EUTRA         OCTET STRING
    scgFailureInfoEUTRA           SEQUENCE {
        failureTypeEUTRA          ENUMERATED { t313-Expiry, randomAccessProblem,
                                                rlc-MaxNumRetx, scg-ChangeFailure},
        measResultSCG-EUTRA       OCTET STRING
    }
    drx-ConfigMCG                 DRX-Config
    measResultReportCGI-EUTRA     SEQUENCE {
        eutraFrequency            ARFCN-ValueEUTRA,
        cellForWhichToReportCGI-EUTRA EUTRA-PhysCellId,
        cgi-InfoEUTRA             CGI-InfoEUTRA
    }
    measResultCellListSFTD-EUTRA  MeasResultCellListSFTD-EUTRA
    fr-InfoListMCG               FR-InfoList
    nonCriticalExtension          CG-ConfigInfo-v1570-IEs
}

CG-ConfigInfo-v1570-IEs ::= SEQUENCE {
    sftdFrequencyList-NR          SFTD-FrequencyList-NR
    sftdFrequencyList-EUTRA      SFTD-FrequencyList-EUTRA
    nonCriticalExtension          CG-ConfigInfo-v1590-IEs
}

CG-ConfigInfo-v1590-IEs ::= SEQUENCE {
    servFrequenciesMN-NR          SEQUENCE (SIZE (1.. maxNrofServingCells-1)) OF ARFCN-ValueNR
    nonCriticalExtension          CG-ConfigInfo-v1610-IEs
}

CG-ConfigInfo-v1610-IEs ::= SEQUENCE {
    drx-InfoMCG2                 DRX-Info2
    alignedDRX-Indication         ENUMERATED {true}
    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)
    }
    dummy1                       SEQUENCE {
        failureTypeEUTRA-r16      ENUMERATED { scg-lbtFailure-r16, beamFailureRecoveryFailure-r16,
                                                t312-Expiry-r16, spare5,
                                                spare4, spare3, spare2, spare1},
        measResultSCG-EUTRA-r16   OCTET STRING
    }
}

```

```

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                  CG-ConfigInfo-v1800-IEs                                OPTIONAL
}

CG-ConfigInfo-v1800-IEs ::=      SEQUENCE {
  musim-GapConfigInfo-r18              MUSIM-GapConfig-r17                                    OPTIONAL,
  musim-CapRestrictionInfo-r18         SEQUENCE {
    musim-CapRestriction-r18           MUSIM-CapRestriction-r18                             OPTIONAL,
    musim-CandidateBandList-r18       MUSIM-CandidateBandList-r18                         OPTIONAL
  }
  scpac-ReferenceConfiguration-r18     ReferenceConfiguration-r18                            OPTIONAL,
  subsequentCPAC-Candidates-r18       CandidateCellListCPC-r17                              OPTIONAL,
  nonCriticalExtension                  SEQUENCE {}                                           OPTIONAL
}

-- Editor Note: FFS whether all fields in musim-CapRestriction should be sent to SN.

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..maxCellsSFTD)) OF ARFCN-ValueNR

SFTD-FrequencyList-EUTRA ::=         SEQUENCE (SIZE (1..maxCellsSFTD)) 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,
    }
    servCellIndexRangeSCG          SEQUENCE {
        lowBound                    ServCellIndex,
        upBound                      ServCellIndex
    }
    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,
    }
    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
    ]],
    [[
    affectedCarrierFreqRangeCombList-r18 AffectedCarrierFreqRangeCombList-r18          OPTIONAL,
    affectedCarrierFreqCombList-r18     AffectedCarrierFreqCombList-r16          OPTIONAL,
    idc-TDM-Assistance-r18              IDC-TDM-Assistance-r18              OPTIONAL
    ]]
}

AffectedCarrierFreqCombInfoMRDC ::= SEQUENCE {
    victimSystemType                VictimSystemType,
    interferenceDirectionMRDC        ENUMERATED {eutra-nr, nr, other, ultra-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
}

```

```
AffectedCarrierFreqCombeEUTRA ::= 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
<p>affectedCarrierFreqCombList This field is signalled upon MN not addressing IDC issue and contains the list of NR carrier frequency combinations reported by UE to MN for IDC problem caused by the NR-DC frequency combination.</p>
<p>affectedCarrierFreqRangeCombList This field is signalled upon MN not addressing IDC issue and contains the list of NR carrier frequency range combinations reported by UE to MN for IDC problem caused by the NR-DC frequency combination.</p>
<p>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).</p>
<p>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 <i>supportedBandCombinationList</i> and <i>supportedBandCombinationList-UplinkTxSwitch</i> in the <i>UE-MRDC-Capability</i> (in case of (NG)EN-DC), or according to <i>supportedBandCombinationList</i> and <i>supportedBandCombinationListNEDC-Only</i> in the <i>UE-MRDC-Capability</i> (in case of NE-DC), or according to <i>supportedBandCombinationList</i> in the <i>UE-NR-Capability</i> (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.</p>
<p>allowedReducedConfigForOverheating Indicates the reduced configuration that the SCG is allowed to configure. <i>reducedMaxCCs</i> in <i>allowedReducedConfigForOverheating</i> 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. <i>reducedMaxBW-FR1</i> and <i>reducedMaxBW-FR2</i> in <i>allowedReducedConfigForOverheating</i> indicates the maximum aggregated bandwidth across all downlink/uplink carriers of FR1 and FR2-1, respectively that the SCG is allowed to configure. <i>reducedMaxBW-FR2-2</i> in <i>allowedReducedConfigForOverheating-r17</i> 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. <i>reducedMaxMIMO-LayersFR1</i> and <i>reducedMaxMIMO-LayersFR2</i> in <i>allowedReducedConfigForOverheating</i> 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. <i>reducedMaxMIMO-LayersFR2-2</i> in <i>allowedReducedConfigForOverheating-r17</i> 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.</p>
<p>allowedResourceConfigNRDC Used to indicate the maximum number of resources reserved for the SCG. This field is only used in NR-DC.</p>
<p>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, CPC or CHO with candidate SCG(s), the field <i>candidateCellInfoListMN</i> contains information regarding cells that the MN suggests the candidate target secondary node to consider configuring for MN initiated CPA, CPC, CHO with candidate SCG(s), or subsequent CPAC. For (NG)EN-DC, including CSI-RS measurement results in <i>candidateCellInfoListMN</i> is not supported in this version of the specification. For NR-DC, including SSB and/or CSI-RS measurement results in <i>candidateCellInfoListMN</i> is supported.</p>
<p>candidateCellInfoListMN-EUTRA, candidateCellInfoListSN-EUTRA Includes the <i>MeasResultList3EUTRA</i> 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.</p>
<p>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) or SN initiated inter-SN subsequent CPAC.</p>
<p>configRestrictInfo Includes fields for which SgNB is explicitly indicated to observe a configuration restriction.</p>
<p>drx-ConfigMCG This field contains the complete DRX configuration of the MCG. This field is only used in NR-DC.</p>

<i>drx-InfoMCG</i>
This field contains the DRX long and short cycle configuration of the MCG. This field is used in (NG)EN-DC and NE-DC.
<i>drx-InfoMCG2</i>
This field contains the <i>drx-onDurationTimer</i> configuration of the MCG. This field is only used in (NG)EN-DC.
<i>dummy, dummy1</i>
These fields are not used in the specification and SN ignores the received value(s).
<i>fr-InfoListMCG</i>
Contains information of FR information of serving cells that include PCell and SCell(s) configured in MCG.
<i>fr1-Carriers-MCG, fr2-Carriers-MCG</i>
Indicates the number of FR1 or FR2 serving cells configured in MCG.
<i>idc-TDM-Assistance</i>
This field is signalled upon MN not addressing IDC issue and contains IDC TDM assistance information reported by UE to MN for IDC problem.
<i>interFreqNoGap</i>
Indicates that the field <i>interFrequencyConfig-NoGap-r16</i> has been included within the <i>MeasConfig</i> IE generated by the MN.
<i>lowMobilityEvaluationConnectedInPCell</i>
Indicates if low mobility criterion has been configured in NR PCell.
<i>maxInterFreqMeasIdentitiesSCG</i>
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.
<i>maxIntraFreqMeasIdentitiesSCG</i>
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.
<i>maxMeasCLI-ResourceSCG</i>
Indicates the maximum number of CLI RSSI resources that the SCG is allowed to configure.
<i>maxMeasFreqsSCG</i>
Indicates the maximum number of NR inter-frequency carriers the SN is allowed to configure with PSCell for measurements.
<i>maxMeasSRS-ResourceSCG</i>
Indicates the maximum number of SRS resources that the SCG is allowed to configure for CLI measurement.
<i>maxNumberCPCandidates</i>
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 <i>maxNrofCondCells-r16</i> conditional reconfigurations for SN-initiated CPC.
<i>maxNumberROHC-ContextSessionsSN</i>
Indicates the maximum number of ROHC context sessions allowed to SN terminated bearer, excluding context sessions that leave all headers uncompressed.
<i>maxNumberEHC-ContextsSN</i>
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].
<i>maxNumberUDC-DRB</i>
Indicates the maximum number of UDC DRBs allowed to SN terminated bearer. This field is used in NGEN-DC, NR-DC and NE-DC.
<i>maxToffset</i>
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 <i>nrdc-PC-mode-FR1-r16</i> or <i>nrdc-PC-mode-FR2-r16</i> are set to dynamic. Value <i>ms0dot5</i> corresponds to 0.5 ms, value <i>ms0dot75</i> corresponds to 0.75 ms, value <i>ms1</i> corresponds to 1 ms and so on.
<i>measuredFrequenciesMN</i>
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 <i>RadioBearerConfig</i> 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 <i>measResultReportCGI</i> is used for (NG)EN-DC and NR-DC and the <i>measResultReportCGI-EUTRA</i> is used only for NE-DC.
measResultSCG-EUTRA This field includes the <i>MeasResultSCG-FailureMRDC</i> 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]).
musim-CapRestrictionInfo Indicates the UE's preference on SCell(s) to be released, serving cell(s) with restricted capability, band(s) or combination(s) of bands with restricted capability, or band(s) or band combination(s) to be avoided for UE temporary capabilities restriction purpose with the <i>musim-candidateBandList-r18</i> only for <i>musim-AffectedBandsList-r18</i> and <i>musim-AvoidedBandsList-r18</i> . All fields in <i>musim-CapRestriction-r18</i> can be sent from MN to SN, i.e., it is up to MN implementation to decide which field(s) need to be sent.
musim-GapConfigInfo Indicates the MUSIM gap configuration configured by MN.
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.
pdccch-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). <i>type1</i> refers to type 1 power headroom, <i>type3</i> 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 <i>measResultPerMOList</i> . 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.
scpac-ReferenceConfiguration
Includes the reference configuration associated with the SCG for the candidate supporting subsequent CPAC.
selectedBandEntriesMNList
A list of indices referring to the position of a band entry selected by the MN, in each band combination entry in <i>allowedBC-ListMRDC</i> IE. <i>BandEntryIndex</i> 0 identifies the first band in the <i>bandList</i> of the <i>BandCombination</i> , <i>BandEntryIndex</i> 1 identifies the second band in the <i>bandList</i> of the <i>BandCombination</i> , and so on. This <i>selectedBandEntriesMNList</i> includes the same number of entries, and listed in the same order as in <i>allowedBC-ListMRDC</i> . The SN uses this information to determine which bands out of the NR band combinations in <i>allowedBC-ListMRDC</i> it can configure in SCG in NR-DC. The SN can use this information to determine for which band pair(s) it should check <i>SimultaneousRxTxPerBandPair</i> .
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.

<i>servFrequenciesMN-NR</i> 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. <i>servFrequenciesMN-NR</i> indicates <i>absoluteFrequencySSB</i> .
<i>sftdFrequencyList-NR</i> Includes a list of SSB frequencies. Each entry identifies the SSB frequency of a PCell, which corresponds to one <i>MeasResultCellSFTD-NR</i> entry in the <i>MeasResultCellListSFTD-NR</i> .
<i>sftdFrequencyList-EUTRA</i> Includes a list of E-UTRA frequencies. Each entry identifies the carrier frequency of a PCell, which corresponds to one <i>MeasResultSFTD-EUTRA</i> entry in the <i>MeasResultCellListSFTD-EUTRA</i> .
<i>sidelinkUEInformationEUTRA</i> This field contains the E-UTRA <i>SidelinkUEInformation</i> message as specified in TS 36.331 [10].
<i>sidelinkUEInformationNR</i> This field contains the NR <i>SidelinkUEInformationNR</i> message.
<i>sourceConfigSCG</i> 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 <i>RRCReconfiguration</i> message which may include <i>secondaryCellGroup</i> , <i>measConfig</i> , and <i>conditionalReconfiguration</i> . The field is signalled upon change of SN, unless MN uses full configuration option. Otherwise, the field is absent.
<i>sourceConfigSCG-EUTRA</i> Includes the E-UTRA <i>RRCConnectionReconfiguration</i> message as specified in TS 36.331 [10]. In this version of the specification, the E-UTRA RRC message can only include the field <i>scg-Configuration</i> . 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.
<i>subsequentCPAC-Candidates</i> Includes the subsequent CPAC candidate PSCells that the UE has stored in MCG <i>VarConditionalReconfig</i> .
<i>twoPHRModeMCG</i> 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.
<i>twoSRS-PUSCH-Repetition</i> Indicates whether the indicated serving cell is configured for PUSCH repetition corresponding to two SRS resource sets configured in either <i>srs-ResourceSetToAddModList</i> or <i>srs-ResourceSetToAddModListDCI-0-2</i> with usage 'codebook' or 'noncodebook'.
<i>ueAssistanceInformationSourceSCG</i> Includes for each UE assistance feature associated with the SCG, the information last reported by the UE in the NR <i>UEAssistanceInformation</i> message for the source SCG, if any.
<i>ue-CapabilityInfo</i> Contains the IE <i>UE-CapabilityRAT-ContainerList</i> 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
<p>allowedFeatureSetsList Defines a subset of the entries in a <i>FeatureSetCombination</i>. Each index identifies a position in the <i>FeatureSetCombination</i>, which corresponds to one <i>FeatureSetUplink/Downlink</i> for each band entry in the associated band combination.</p>
<p>bandCombinationIndex In case of NR-DC, this field indicates the position of a band combination in the <i>supportedBandCombinationList</i>. In case of NE-DC, this field indicates the position of a band combination in the <i>supportedBandCombinationList</i> and/or <i>supportedBandCombinationListNEDC-Only</i>. In case of (NG)EN-DC, this field indicates the position of a band combination in the <i>supportedBandCombinationList</i> and/or <i>supportedBandCombinationList-UplinkTxSwitch</i>. Band combination entries in <i>supportedBandCombinationList</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationList</i>. Band combination entries in <i>supportedBandCombinationListNEDC-Only</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationListNEDC-Only</i> increased by the number of entries in <i>supportedBandCombinationList</i>. Band combination entries in <i>supportedBandCombinationList-UplinkTxSwitch</i> are referred by an index which corresponds to the position of a band combination in the <i>supportedBandCombinationList-UplinkTxSwitch</i> increased by the number of entries in <i>supportedBandCombinationList</i>.</p>

Conditional Presence	Explanation
<i>SN-AddMod</i>	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
<p>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.</p>
<p>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 <i>periodicityAndOffset</i>) 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.</p>
<p>ss-RSSI-Measurement Provides the configuration which can be used for RSSI measurements of the cell for which the message is included.</p>

MeasurementTimingConfiguration field descriptions
<p>campOnFirstSSB Value <i>true</i> indicates that the SSB indicated in the first instance of <i>MeasTiming</i> in the <i>measTiming</i> list can be used for camping and for a PCell configuration (i.e. in <i>spCellConfigCommon</i> of the <i>masterCellGroup</i>).</p>
<p>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 <i>refSSBFreq</i>.</p>
<p>csi-RS-SubcarrierSpacing Indicates the subcarrier spacing of the CSI-RS resources included in <i>csi-rs-CellMobility</i>.</p>
<p>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.</p>
<p>physCellId Physical Cell Identity of the SSB on the ARFCN indicated by <i>carrierFreq</i>.</p>
<p>psCellOnlyOnFirstSSB Value <i>true</i> indicates that only the SSB indicated in the first instance of <i>MeasTiming</i> in the <i>measTiming</i> list can be used for a PSCell configuration (i.e. in <i>spCellConfigCommon</i> of the <i>secondaryCellGroup</i>).</p>
<p>ssb-ToMeasure The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]).</p>

– 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
                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                    UERadioPagingInformation-v1800-IEs          OPTIONAL
}

UERadioPagingInformation-v1800-IEs ::= SEQUENCE {
    numberOfRxERedCap-r18                    ENUMERATED {one, two}          OPTIONAL,
    supportOf2RxXR-r18                      ENUMERATED {supported}          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 <i>UE-NR-Capability</i> .
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 (e)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>i_s</i> to determine PO in RRC_INACTIVE state as in RRC_IDLE state.
numberOfRxERedCap Indicates the number of Rx branches supported by an eRedCap UE.
numberOfRxRedCap Indicates the number of Rx branches supported by a RedCap UE.
supportOf2RxXR Indicates whether the UE is a 2Rx XR UE.
ue-RadioPagingInfo The field is used to transfer UE capability information used for paging. The gNB generates the <i>ue-RadioPagingInfo</i> 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*;
- *musim-GapConfigInfo-r18*;
- *musim-CapRestrictionInfo-r18*.

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

```

<i>ResourceConfigNRDC</i> field descriptions
<i>fr1-ResourceConfig, fr2-ResourceConfig</i> Indicates the maximum number of resources that SCG is allowed to configure for FR1/FR2, respectively.
<i>maxNumberResAcrossCC-AcrossFR</i> Indicates the maximum number of configured CSI-RS resources. Corresponds to the UE capability <i>maxNumberResAcrossCC-AcrossFR-r16</i> in <i>maxTotalResourcesForAcrossFreqRanges-r16</i> .

<i>ResourceConfigPerFR</i> field descriptions
<i>bm-MaxNumberAperiodicCSI-RS-Resource</i> 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 <i>maxNumberAperiodicCSI-RS-Resource</i> in <i>beamManagementSSB-CSI-RS</i> .
<i>bm-MaxNumberCSI-RS-Resource</i> 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 <i>maxNumberCSI-RS-Resource</i> in <i>beamManagementSSB-CSI-RS</i> .
<i>cg-MaxNumberConfigsAllCC</i> Indicates the maximum number of active configured grant configurations. Corresponds to the UE capability <i>maxNumberConfigsAllCC-r16</i> in <i>activeConfiguredGrant-r16</i> .
<i>maxNumberCSI-RS-BFD</i> Indicates the maximal number of different CSI-RS resources for the UE to monitor PDCCH quality. Corresponds to the UE capability <i>maxNumberCSI-RS-BFD</i> .
<i>maxNumberCSI-RS-SSB-CBD</i> Indicates the maximal number of different CSI-RS (and/or SSB) resources for new beam identifications. Corresponds to the UE capability <i>maxNumberCSI-RS-SSB-CBD</i> .
<i>maxNumberSSB-BFD</i> Indicates the maximal number of different SSBs for the UE to monitor PDCCH quality. Corresponds to the UE capability <i>maxNumberSSB-BFD</i> .
<i>sps-MaxNumberConfigsAllCC</i> Indicates the maximum number of SPS configurations. Corresponds to the UE capability <i>maxNumberConfigsAllCC-r16</i> in <i>sps-r16</i> .
<i>trs-MaxConfResourceSetsAllCC</i> Indicates the maximum configured CSI-RS for tracking (i.e. TRS) resource sets. Corresponds to the UE capability <i>maxConfiguredResourceSetsAllCC</i> in <i>csi-RS-ForTracking</i> .

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.

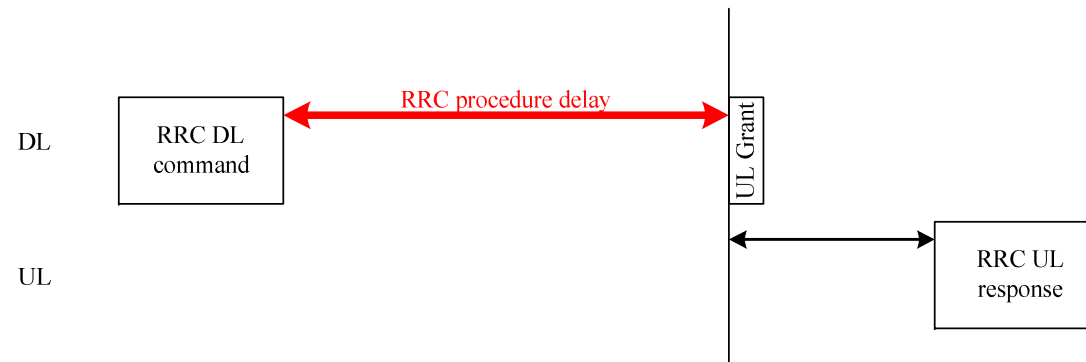


Figure 12.1-1: Illustration of RRC procedure delay

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	<i>RRCReconfiguration</i>	<i>RRCReconfigurationComplete</i>	10	
RRC reconfiguration (scell addition/release)	<i>RRCReconfiguration</i>	<i>RRCReconfigurationComplete</i>	16	
RRC reconfiguration (LTE/NR SCG establishment/ modification/ release)	<i>RRCReconfiguration</i>	<i>RRCReconfigurationComplete</i>	16	
RRC reconfiguration (Intra-NR mobility with LTE/NR SCG establishment/ modification/ release)	<i>RRCReconfiguration</i>	<i>RRCReconfigurationComplete</i>	16	
RRC reconfiguration	<i>DL DedicatedMessage Segment</i>	<i>RRCReconfigurationComplete</i>	16+(Nseg-1)*10	Nseg is number of RRC segments
RRC setup	<i>RRCSetup</i>	<i>RRCSetupComplete</i>	10	
RRC Release	<i>RRCRelease</i>		NA	
RRC re-establishment	<i>RRCReestablishment</i>	<i>RRCReestablishmentComplete</i>	10	

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
RRC resume	<i>RRCResume</i>	<i>RRCResumeComplete</i>	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 <i>RRCResumeComplete</i> 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)	<i>RRCResume</i>	<i>RRCResumeComplete</i>	16	
RRC resume (SCG establishment/restoration/release)	<i>RRCResume</i>	<i>RRCResumeComplete</i>	16	
RRC resume	<i>DLDedicatedMessageSegment</i>	<i>RRCResumeComplete</i>	16+(Nseg-1)*10	Nseg is number of RRC segments
Initial AS security activation	<i>SecurityModeCommand</i>	<i>SecurityModeComplete/SecurityModeFailure</i>	5	
Inter RAT mobility				

Procedure title:	Network -> UE	UE -> Network	Value [ms]	Notes
Handover to NR	<i>RRCReconfiguration (sent by other RAT)</i>	<i>RRCReconfigurationComplete</i>	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	<i>MobilityFromNRCommand</i>		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		<i>UEAssistanceInformation</i>	NA	
UE capability transfer	<i>UECapabilityEnquiry</i>	<i>UECapabilityInformation</i>	80	
UE capability transfer	<i>UECapabilityEnquiry</i>	<i>ULDedicatedMessageSegment</i>	80	
Counter check	<i>CounterCheck</i>	<i>CounterCheckResponse</i>	5	
UE information	<i>UEInformationRequest</i>	<i>UEInformationResponse</i>	15	
DL Information transfer MR-DC	<i>DLInformationTransferMRDC</i>		NA	The UE shall apply the performance requirements of the RRC message included within the DLInformationTransferMRDC message.
IAB other information		<i>IABOtherInformation</i>	NA	
Sidelink UE information		<i>SidelinkUEInformationNR</i>	NA	
UE Positioning assistance information		<i>UEPositioningAssistanceInfo</i>	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 *RRCCConnectionModificationCommand*, 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 ::=
    ul-SpecificParameters
        priority
        SEQUENCE {
            SEQUENCE {
                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,
        mobilityFromEUTRACCommand      MobilityFromEUTRACCommand,
        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

RRConnectionReconfiguration ::= SEQUENCE {
    rrc-TransactionIdentifier      RRC-TransactionIdentifier,
    criticalExtensions             CHOICE {
        c1                        CHOICE {
            rrcConnectionReconfiguration-r8      RRCConnectionReconfiguration-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture      SEQUENCE {}
    }
}

RRConnectionReconfiguration-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 ::=
    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 ::=
    rootSequenceIndex
    prach-ConfigInfo
}
SEQUENCE {
    INTEGER (0..1023),
    PRACH-ConfigInfo
}

PRACH-Config ::=
    rootSequenceIndex
    prach-ConfigInfo
}
SEQUENCE {
    INTEGER (0..1023),
    PRACH-ConfigInfo OPTIONAL -- Need N
}

PRACH-ConfigInfo ::=
    prach-ConfigIndex
    highSpeedFlag
    zeroCorrelationZoneConfig
}
SEQUENCE {
    ENUMERATED {ffs},
    ENUMERATED {ffs},
    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 ::=
    numberOfRA-Preambles          SEQUENCE {
        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 ::=
    rootSequenceIndex            SEQUENCE {
        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 ::=
    ul-SpecificParameters
        priority
        ...
    } 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 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
}
-- /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., "*RRConnectionReconfiguration-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 ::=
  rrc-TransactionIdentifier
  criticalExtensions
    c1
      rrcMessage-r8
      spare3 NULL, spare2 NULL, spare1 NULL
    },
  criticalExtensionsFuture
}
-- ASN1STOP
```

```

-- /example/ ASN1START                -- Later release
RRCMessage ::=
  rrc-TransactionIdentifier            SEQUENCE {
  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 ::=
  rrc-TransactionIdentifier            SEQUENCE {
  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 ::=
  listElementToAddModList      SEQUENCE {
    ...'                        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 ::=
    field1
    field2
        field2a
        field2b
        ...,
        field2c-v960
    },
    ...,
    [[
    field3-r9
    ]],
    [[
    field3-v9a0
    field4-r9
    ]],
}

InformationElement1-r10 ::=
    field1
    SEQUENCE {
        ENUMERATED {
            value1, value2, value3, value4-v880,
            ..., value5-v960 },
        CHOICE {
            BOOLEAN,
            InformationElement2b,
            InformationElement2c-r9
        }
    }
    [[
    field3-r9
    ]],
    [[
    field3-v9a0
    InformationElement3-v9a0
    InformationElement4
    ]],
}

InformationElement1-r10 ::=
    field1
    SEQUENCE {
        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 *childIE1-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
<i>ConfigF</i>	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
        setup
        -- Root encoding
    }
ChildIE2-WithoutEM-vNx0 ::=
    SEQUENCE {
        chIE2-NewField-rN
    }
-- ASN1STOP
```

Conditional presence	Explanation
<i>ConfigF</i>	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 -vNx0 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 ::=
    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 ::=
    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 ::=
    elementId
    field1
    field2
}
SEQUENCE {
    ListElementId,
    INTEGER (0..3),
    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
<i>FieldAsetToX</i>	The field is mandatory present if fieldA is included and set to valueX. Otherwise the field is optionally present, need R.
<i>FieldCsetToY</i>	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
<i>CounterCheck</i>	-	-	-	
<i>CounterCheckResponse</i>	-	-	-	
<i>DedicatedSIBRequest</i>	+	-	-	
<i>DLDedicatedMessageSegment</i>	NOTE 1			
<i>DLInformationTransfer</i>	+	-	-	
<i>DLInformationTransferMRDC</i>	-	-	-	
<i>FailureInformation</i>	-	-	-	
<i>IndirectPathFailureInformation</i>	-	-	-	
<i>LocationMeasurementIndication</i>	-	-	-	
<i>MCGFailureInformation</i>	-	-	-	
<i>MeasurementReportAppLayer</i>	-	-	-	
<i>MBSBroadcastConfiguration</i>	+	+	+	
<i>MBSInterestIndication</i>	-	-	-	
<i>MBSMulticastConfiguration</i>	+	+	+	
<i>MIB</i>	+	+	+	
<i>MeasurementReport</i>	-	-	-	Measurement configuration may be sent prior to AS security activation. But: In order to protect privacy of UEs, <i>MeasurementReport</i> is only sent from the UE after successful AS security activation.
<i>MobilityFromNRCommand</i>	-	-	-	
<i>Paging</i>	+	+	+	
<i>RRCReconfiguration</i>	+	-	-	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.
<i>RRCReconfigurationComplete</i>	+	-	-	Unprotected, if sent as response to <i>RRCReconfiguration</i> which was sent before AS security activation.
<i>RRCReestablishment</i>	-	-	+	Integrity protection applied, but no ciphering.
<i>RRCReestablishmentComplete</i>	-	-	-	
<i>RRCReestablishmentRequest</i>	-	-	+	This message is not protected by PDCP operation. However, a <i>shortMAC-I</i> is included.
<i>RRCReject</i>	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
<i>RRCRelease</i>	+	-	-	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. <i>RRCRelease</i> message sent before AS security activation cannot include <i>deprioritisationReq</i> , <i>suspendConfig</i> , <i>redirectedCarrierInfo</i> , <i>cellReselectionPriorities</i> information fields.
<i>RRCResume</i>	-	-	-	
<i>RRCResumeComplete</i>	-	-	-	
<i>RRCResumeRequest</i>	-	-	+	This message is not protected by PDCP operation. However, a <i>resumeMAC-I</i> is included.
<i>RRCResumeRequest1</i>	-	-	+	This message is not protected by PDCP operation. However, a <i>resumeMAC-I</i> is included.
<i>RRCSetup</i>	+	+	+	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.
<i>RRCSetupComplete</i>	+	NA	NA	
<i>RRCSetupRequest</i>	+	NA	NA	
<i>RRCSystemInfoRequest</i>	+	+	+	Justification for A-I and A-C: the message can be sent in SRB0 in RRC_INACTIVE state, after the AS security is activated.
<i>SIB1</i>	+	+	+	
<i>SCGFailureInformation</i>	-	-	-	
<i>SCGFailureInformationEUTRA</i>	-	-	-	

Message	P	A-I	A-C	Comment
<i>SecurityModeCommand</i>	+	NA	NA	Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC).
<i>SecurityModeComplete</i>	-	-	+	The message is sent after AS security activation. Integrity protection applied, but no ciphering. Ciphering is applied after completing the procedure.
<i>SecurityModeFailure</i>	+	NA	NA	Neither integrity protection nor ciphering applied.
<i>SidelinkUEInformationNR</i>	+	-	-	The message shall not be sent unprotected before AS security activation if <i>s/-CapabilityInformationSidelink</i> information field is included in the message.
<i>SystemInformation</i>	+	+	+	
<i>UEAssistanceInformation</i>	-	-	-	
<i>UECapabilityEnquiry</i>	+	-	-	The network should retrieve UE capabilities only after AS security activation.
<i>UECapabilityInformation</i>	+	-	-	
<i>ULDedicatedMessageSegment</i>	NOTE 1			
<i>UEInformationRequest</i>	-	-	-	
<i>UEInformationResponse</i>	-	-	-	In order to protect privacy of UEs, <i>UEInformationResponse</i> is only sent from the UE after successful security activation
<i>UEPositioningAssistanceInfo</i>	-	-	-	
<i>ULInformationTransfer</i>	+	-	-	
<i>ULInformationTransferIRAT</i>	NOTE 2			
<i>ULInformationTransferMRDC</i>	-	-	-	
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.

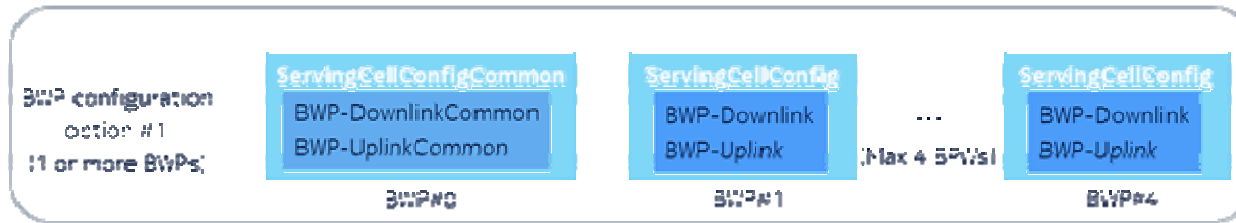


Figure B2-1: BWP#0 configuration without dedicated configuration

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).

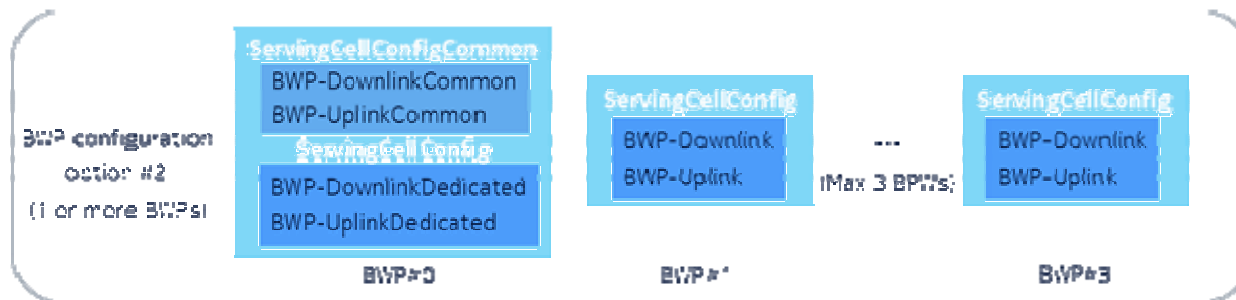


Figure B2-2: BWP#0 configuration with dedicated configuration

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 an 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 <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - 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	
RP-233882: Enhancing SCell A2 event reporting	4375	2	Release 15	
RP-233890: PTM retransmission reception for multicast DRX with HARQ feedback disabled [PTM_ReTx_Mcast_HARQ_Disb]	4504	-	Release 17	
RP-240667: UE capability for Enhanced channel raster	4445	3	Release 16	
RP-240658: Introduction of TxDiversity for 2Tx capability	4639	2	Release 17	

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	Category	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 contents 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#I1611)	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 procedural text corrections	15.4.0
RP-82	RP-182651	0344	1	F	Clarification for absence 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 descriptions 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 pussh-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 Clarification 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 upon 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
	RP-85	RP-192190	1226	-	F	Release of unnecessary power restrictions upon RRC connection re-establishment in NE-DC and NR-DC	15.7.0
	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
	RP-85	RP-192193	1257	2	F	maxMIMO-Layers for the normal uplink and the supplementary uplink_Option 1	15.7.0
	RP-85	RP-192193	1261	1	F	Correction on overheating indication	15.7.0
	RP-85	RP-192192	1262	-	F	Handling lists other than AddMod	15.7.0
	RP-85	RP-192193	1263	1	F	Releasing source cell ConfigCommon fields not present in target cell	15.7.0

	RP-85	RP-192347	1265	-	C	Introduction of UE capability for NR-DC with SFN synchronization between PCell and PSCell	15.7.0
12/2019	RP-86	RP-192934	1147	2	C	Security requirement for UE capability enquiry for NR	15.8.0
	RP-86	RP-192934	1267	1	F	Corrections on CG-Config	15.8.0
	RP-86	RP-192934	1273	1	F	CR to introduce timer for DRX based SFTD measurement	15.8.0
	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
	RP-86	RP-192935	1283	2	F	Clarifying the alignment of capability filtering across LTE and NR in MR-DC	15.8.0
	RP-86	RP-192934	1292	1	F	Correction for P-Max in FR2	15.8.0
	RP-86	RP-192934	1296	2	F	Correction on frequency indication in SIB1 and SIB2	15.8.0
	RP-86	RP-192937	1300	2	F	Handling of AS-Config in HandoverPreparationInformation	15.8.0
	RP-86	RP-192936	1301	2	F	Corrections on scg-RB-Config in CG-Config	15.8.0
	RP-86	RP-192937	1305	2	F	Correction on MCG measurements in SCGFailureInformation	15.8.0
	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
	RP-86	RP-192935	1332	4	F	Security Algorithms for Radio Bearers	15.8.0
	RP-86	RP-192934	1333	1	F	Correction on the Msg3 based on demand system information	15.8.0
	RP-86	RP-192935	1335	2	F	Clarification for aggregated bandwidth for overheating	15.8.0
	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
	RP-86	RP-192936	1357	1	F	Restoring SDAP and RoHC contexts during Resumption	15.8.0
	RP-86	RP-192934	1358	-	F	Conditional presence on ue-CapabilityInfo and servCellIndexRangeSCG for inter-MN handover without SN change	15.8.0
	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
	RP-86	RP-192936	1406	1	F	Clarification regarding inter-node transfer of UE capability containers	15.8.0
	RP-86	RP-192749	1421	1	F	NE-DC dynamic power sharing capability	15.8.0
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
	RP-87	RP-200335	1440	2	F	Clarification on the PLMN-IdentityInfoList	15.9.0
	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
	RP-87	RP-200357	1168	3	F	Support of releasing UL configuration	16.0.0
	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
	RP-87	RP-200358	1505	-	B	Support of inter-RAT handover from NR to EN-DC in TS 38.331	16.0.0
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
	RP-88	RP-201163	1624	1	A	Clarification on the maxPUSCH-Duration for LCP Restriction	16.1.0
	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
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	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
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	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

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	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	SMT-C 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
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	RP-89	RP-201922	1823	-	F	Correction to field condition on reffR2ServCellAsyncCA	16.2.0
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	RP-89	RP-201921	1844	3	F	RRC clarifications 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	Correction on the RLF for NR DAPS	16.2.0
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	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 Enhancements	16.2.0
	RP-89	RP-201930	1868	1	F	Correction of description of CHO events for Mobility Enhancements	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 Enhancements	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 description 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-ProclD-offset	16.4.0
	RP-91	RP-210693	2317	1	F	Clarifications 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 extensibility	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	Misc 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	Miscellaneous 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 candidateBeamRSLExt-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-SpatialRelationInfo-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 reconfigaiton 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 [uHARQ_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
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	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
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	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
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	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
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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
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	RP-99	RP-230689	3818	1	F	CP corrections for NR operation to 71GHz	17.4.0
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	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
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	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
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History

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V18.1.0	May 2024	Publication