**3GPP TSG-RAN WG2 Meeting#124 *R2-23xxxxx***

**Chicago, USA, 13th-17th November 2023**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **draftCR** | **rev** | **-** | **Current version:** | **17.6.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |

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

|  |
| --- |
|  |
| ***Title:***  | Introduction of UE Capabilities for MBS Enhancements |
|  |  |
| ***Source to WG:*** | vivo |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_MBS\_enh-Core |  | ***Date:*** | 2023-11-23 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Introduction of UE Capabilities for MBS Enhancements. |
|  |  |
| ***Summary of change:*** | The following new UE capabilities (defined as optional with capability signalling) are added in clause 6.3.3: 1. *ptm-RetransmissionInactive-r18*;
2. *multicastInactive-r18*;
3. *broadcastNonServingCell-r18*.
 |
|  |  |
| ***Consequences if not approved:*** | The Rel-18 MBS Enhancement feature is not completed. |
|  |  |
| ***Clauses affected:*** | 6.3.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.306 CR |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**START OF CHANGE**

### 6.3.3 UE capability information elements

< unchanged part is omitted>

#### – *FeatureSetDownlink*

The IE *FeatureSetDownlink* indicates a set of features that the UE supports on the carriers corresponding to one band entry in a band combination.

*FeatureSetDownlink* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINK-START

FeatureSetDownlink ::= SEQUENCE {

 featureSetListPerDownlinkCC SEQUENCE (SIZE (1..maxNrofServingCells)) OF FeatureSetDownlinkPerCC-Id,

 intraBandFreqSeparationDL FreqSeparationClass OPTIONAL,

 scalingFactor ENUMERATED {f0p4, f0p75, f0p8} OPTIONAL,

 dummy8 ENUMERATED {supported} OPTIONAL,

 scellWithoutSSB ENUMERATED {supported} OPTIONAL,

 csi-RS-MeasSCellWithoutSSB ENUMERATED {supported} OPTIONAL,

 dummy1 ENUMERATED {supported} OPTIONAL,

 type1-3-CSS ENUMERATED {supported} OPTIONAL,

 pdcch-MonitoringAnyOccasions ENUMERATED {withoutDCI-Gap, withDCI-Gap} OPTIONAL,

 dummy2 ENUMERATED {supported} OPTIONAL,

 ue-SpecificUL-DL-Assignment ENUMERATED {supported} OPTIONAL,

 searchSpaceSharingCA-DL ENUMERATED {supported} OPTIONAL,

 timeDurationForQCL SEQUENCE {

 scs-60kHz ENUMERATED {s7, s14, s28} OPTIONAL,

 scs-120kHz ENUMERATED {s14, s28} OPTIONAL

 } OPTIONAL,

 pdsch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {

 scs-15kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-30kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-60kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,

 scs-120kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL

 } OPTIONAL,

 dummy3 DummyA OPTIONAL,

 dummy4 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyB OPTIONAL,

 dummy5 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyC OPTIONAL,

 dummy6 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyD OPTIONAL,

 dummy7 SEQUENCE (SIZE (1.. maxNrofCodebooks)) OF DummyE OPTIONAL

}

FeatureSetDownlink-v1540 ::= SEQUENCE {

 oneFL-DMRS-TwoAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 additionalDMRS-DL-Alt ENUMERATED {supported} OPTIONAL,

 twoFL-DMRS-TwoAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 oneFL-DMRS-ThreeAdditionalDMRS-DL ENUMERATED {supported} OPTIONAL,

 pdcch-MonitoringAnyOccasionsWithSpanGap SEQUENCE {

 scs-15kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-30kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-60kHz ENUMERATED {set1, set2, set3} OPTIONAL,

 scs-120kHz ENUMERATED {set1, set2, set3} OPTIONAL

 } OPTIONAL,

 pdsch-SeparationWithGap ENUMERATED {supported} OPTIONAL,

 pdsch-ProcessingType2 SEQUENCE {

 scs-15kHz ProcessingParameters OPTIONAL,

 scs-30kHz ProcessingParameters OPTIONAL,

 scs-60kHz ProcessingParameters OPTIONAL

 } OPTIONAL,

 pdsch-ProcessingType2-Limited SEQUENCE {

 differentTB-PerSlot-SCS-30kHz ENUMERATED {upto1, upto2, upto4, upto7}

 } OPTIONAL,

 dl-MCS-TableAlt-DynamicIndication ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlink-v15a0 ::= SEQUENCE {

 supportedSRS-Resources SRS-Resources OPTIONAL

}

FeatureSetDownlink-v1610 ::= SEQUENCE {

 -- R1 22-4e/4f/4g/4h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 1

 cbgPDSCH-ProcessingType1-DifferentTB-PerSlot-r16 SEQUENCE {

 scs-15kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-30kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-60kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-120kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL

 } OPTIONAL,

 -- R1 22-3e/3f/3g/3h: CBG based reception for DL with unicast PDSCH(s) per slot per CC with UE processing time Capability 2

 cbgPDSCH-ProcessingType2-DifferentTB-PerSlot-r16 SEQUENCE {

 scs-15kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-30kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-60kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL,

 scs-120kHz-r16 ENUMERATED {one, upto2, upto4, upto7} OPTIONAL

 } OPTIONAL,

 intraFreqDAPS-r16 SEQUENCE {

 intraFreqDiffSCS-DAPS-r16 ENUMERATED {supported} OPTIONAL,

 intraFreqAsyncDAPS-r16 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 intraBandFreqSeparationDL-v1620 FreqSeparationClassDL-v1620 OPTIONAL,

 intraBandFreqSeparationDL-Only-r16 FreqSeparationClassDL-Only-r16 OPTIONAL,

 -- R1 11-2: Rel-16 PDCCH monitoring capability

 pdcch-Monitoring-r16 SEQUENCE {

 pdsch-ProcessingType1-r16 SEQUENCE {

 scs-15kHz-r16 PDCCH-MonitoringOccasions-r16 OPTIONAL,

 scs-30kHz-r16 PDCCH-MonitoringOccasions-r16 OPTIONAL

 } OPTIONAL,

 pdsch-ProcessingType2-r16 SEQUENCE {

 scs-15kHz-r16 PDCCH-MonitoringOccasions-r16 OPTIONAL,

 scs-30kHz-r16 PDCCH-MonitoringOccasions-r16 OPTIONAL

 } OPTIONAL

 } OPTIONAL,

 -- R1 11-2b: Mix of Rel. 16 PDCCH monitoring capability and Rel. 15 PDCCH monitoring capability on different carriers

 pdcch-MonitoringMixed-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 18-5c: Processing up to X unicast DCI scheduling for DL per scheduled CC

 crossCarrierSchedulingProcessing-DiffSCS-r16 SEQUENCE {

 scs-15kHz-120kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,

 scs-15kHz-60kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,

 scs-30kHz-120kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,

 scs-15kHz-30kHz-r16 ENUMERATED {n2} OPTIONAL,

 scs-30kHz-60kHz-r16 ENUMERATED {n2} OPTIONAL,

 scs-60kHz-120kHz-r16 ENUMERATED {n2} OPTIONAL

 } OPTIONAL,

 -- R1 16-2b-1: Support of single-DCI based SDM scheme

 singleDCI-SDM-scheme-r16 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlink-v1700 ::= SEQUENCE {

 -- R1 36-2: Scaling factor to be applied to 1024QAM for FR1

 scalingFactor-1024QAM-FR1-r17 ENUMERATED {f0p4, f0p75, f0p8} OPTIONAL,

 -- R1 24 feature for existing UE cap to include new SCS

 timeDurationForQCL-v1710 SEQUENCE {

 scs-480kHz ENUMERATED {s56, s112} OPTIONAL,

 scs-960kHz ENUMERATED {s112, s224} OPTIONAL

 } OPTIONAL,

 -- R1 23-6-1 SFN scheme A (scheme 1) for PDSCH and PDCCH

 sfn-SchemeA-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-1-1 SFN scheme A (scheme 1) for PDCCH only

 sfn-SchemeA-PDCCH-only-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-1a Dynamic switching - scheme A

 sfn-SchemeA-DynamicSwitching-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-1b SFN scheme A (scheme 1) for PDSCH only

 sfn-SchemeA-PDSCH-only-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-2 SFN scheme B (TRP based pre-compensation) for PDSCH and PDCCH

 sfn-SchemeB-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-2a Dynamic switching - scheme B

 sfn-SchemeB-DynamicSwitching-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-6-2b SFN scheme B (TRP based pre-compensation) for PDSCH only

 sfn-SchemeB-PDSCH-only-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-2-1d PDCCH repetition for Case 2 PDCCH monitoring with a span gap

 mTRP-PDCCH-Case2-1SpanGap-r17 SEQUENCE {

 scs-15kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL,

 scs-30kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL,

 scs-60kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL,

 scs-120kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL

 } OPTIONAL,

 -- R1 23-2-1e PDCCH repetition for Rel-16 PDCCH monitoring

 mTRP-PDCCH-legacyMonitoring-r17 SEQUENCE {

 scs-15kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL,

 scs-30kHz-r17 PDCCH-RepetitionParameters-r17 OPTIONAL

 } OPTIONAL,

 -- R1 23-2-4 Simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP

 mTRP-PDCCH-multiDCI-multiTRP-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2: Dynamic scheduling for multicast for PCell

 dynamicMulticastPCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 23-2-1 PDCCH repetition

 mTRP-PDCCH-Repetition-r17 SEQUENCE {

 numBD-twoPDCCH-r17 INTEGER (2..3),

 maxNumOverlaps-r17 ENUMERATED {n1,n2,n3,n5,n10,n20,n40}

 } OPTIONAL

}

FeatureSetDownlink-v1720 ::= SEQUENCE {

 -- R1 25-19: RTT-based Propagation delay compensation based on CSI-RS for tracking and SRS

 rtt-BasedPDC-CSI-RS-ForTracking-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 25-19a: RTT-based Propagation delay compensation based on DL PRS for RTT-based PDC and SRS

 rtt-BasedPDC-PRS-r17 SEQUENCE {

 maxNumberPRS-Resource-r17 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

 maxNumberPRS-ResourceProcessedPerSlot-r17 SEQUENCE {

 scs-15kHz-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64} OPTIONAL,

 scs-30kHz-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64} OPTIONAL,

 scs-60kHz-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64} OPTIONAL,

 scs-120kHz-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24, n32, n48, n64} OPTIONAL

 }

 } OPTIONAL,

 -- R1 33-5-1: SPS group-common PDSCH for multicast on PCell

 sps-Multicast-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlink-v1730 ::= SEQUENCE {

 -- R1 25-19b: Support of PRS as spatial relation RS for SRS

 prs-AsSpatialRelationRS-For-SRS-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlink-v18xy ::= SEQUENCE {

 multicastInactive-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 {mode1, mode1AndMode2},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyC ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p8, p16, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 supportedCodebookMode ENUMERATED {mode1, mode2, both},

 supportedNumberPanels ENUMERATED {n2, n4},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyD ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p4, p8, p12, p16, p24, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband},

 amplitudeSubsetRestriction ENUMERATED {supported} OPTIONAL,

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

DummyE ::= SEQUENCE {

 maxNumberTxPortsPerResource ENUMERATED {p4, p8, p12, p16, p24, p32},

 maxNumberResources INTEGER (1..64),

 totalNumberTxPorts INTEGER (2..256),

 parameterLx INTEGER (2..4),

 amplitudeScalingType ENUMERATED {wideband, widebandAndSubband},

 maxNumberCSI-RS-PerResourceSet INTEGER (1..8)

}

-- TAG-FEATURESETDOWNLINK-STOP

-- ASN1STOP

|  |
| --- |
| *FeatureSetDownlink* field descriptions |
| ***featureSetListPerDownlinkCC***Indicates which features the UE supports on the individual DL carriers of the feature set (and hence of a band entry that refer to the feature set). The UE shall hence include at least as many *FeatureSetDownlinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassDL*, except if indicating additional functionality by reducing the number of *FeatureSetDownlinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetDownlinkPerCC-Id* in this list. |
| ***supportedSRS-Resources***Indicates supported SRS resources for SRS carrier switching to the band associated with this *FeatureSetDownlink*. The UE is only allowed to set this field for a band with associated *FeatureSetUplinkId* set to 0. |

< unchanged part is omitted>

#### – *FeatureSetDownlinkPerCC*

The IE *FeatureSetDownlinkPerCC* indicates a set of features that the UE supports on the corresponding carrier of one band entry of a band combination.

*FeatureSetDownlinkPerCC* information element

-- ASN1START

-- TAG-FEATURESETDOWNLINKPERCC-START

FeatureSetDownlinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingDL SubcarrierSpacing,

 supportedBandwidthDL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 maxNumberMIMO-LayersPDSCH MIMO-LayersDL OPTIONAL,

 supportedModulationOrderDL ModulationOrder OPTIONAL

}

FeatureSetDownlinkPerCC-v1620 ::= SEQUENCE {

 -- R1 16-2a: Mulit-DCI based multi-TRP

 multiDCI-MultiTRP-r16 MultiDCI-MultiTRP-r16 OPTIONAL,

 -- R1 16-2b-3: Support of single-DCI based FDMSchemeB

 supportFDM-SchemeB-r16 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v1700 ::= SEQUENCE {

 supportedMinBandwidthDL-r17 SupportedBandwidth-v1700 OPTIONAL,

 broadcastSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-2g: MIMO layers for multicast PDSCH

 maxNumberMIMO-LayersMulticastPDSCH-r17 ENUMERATED {n2, n4, n8} OPTIONAL,

 -- R1 33-2h: Dynamic scheduling for multicast for SCell

 dynamicMulticastSCell-r17 ENUMERATED {supported} OPTIONAL,

 supportedBandwidthDL-v1710 SupportedBandwidth-v1700 OPTIONAL,

 -- R4 24-1/24-2/24-3/24-4/24-5

 supportedCRS-InterfMitigation-r17 CRS-InterfMitigation-r17 OPTIONAL

}

FeatureSetDownlinkPerCC-v1720 ::= SEQUENCE {

 -- R1 33-2j: Supported maximum modulation order used for maximum data rate calculation for multicast PDSCH

 maxModulationOrderForMulticastDataRateCalculation-r17 ENUMERATED {qam64, qam256, qam1024} OPTIONAL,

 -- R1 33-1-2: FDM-ed unicast PDSCH and group-common PDSCH for broadcast

 fdm-BroadcastUnicast-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-3-2: FDM-ed unicast PDSCH and one group-common PDSCH for multicast

 fdm-MulticastUnicast-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v1730 ::= SEQUENCE {

 -- R1 33-3-3: Intra-slot TDM-ed unicast PDSCH and group-common PDSCH

 intraSlotTDM-UnicastGroupCommonPDSCH-r17 ENUMERATED {yes, no} OPTIONAL,

 -- R1 33-5-3: One SPS group-common PDSCH configuration for multicast for SCell

 sps-MulticastSCell-r17 ENUMERATED {supported} OPTIONAL,

 -- R1 33-5-4: Up to 8 SPS group-common PDSCH configurations per CFR for multicast for SCell

 sps-MulticastSCellMultiConfig-r17 INTEGER (1..8) OPTIONAL,

 -- R1 33-1-1: Dynamic slot-level repetition for broadcast MTCH

 dci-BroadcastWith16Repetitions-r17 ENUMERATED {supported} OPTIONAL

}

FeatureSetDownlinkPerCC-v18xy ::= SEQUENCE {

 broadcastNonServingCell-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

< unchanged part is omitted>

#### – *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

]],

[[

 featureSetsDownlink-v18xy SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v18xy OPTIONAL,

 featureSetsDownlinkPerCC-v18xy SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetDownlinkPerCC-v18xy OPTIONAL

]]

}

FeatureSets-v16d0 ::= SEQUENCE {

 featureSetsUplink-v16d0 SEQUENCE (SIZE (1..maxUplinkFeatureSets)) OF FeatureSetUplink-v16d0 OPTIONAL

}

-- TAG-FEATURESETS-STOP

-- ASN1STOP

< unchanged part is omitted>

#### – *MAC-Parameters*

The IE *MAC-Parameters* is used to convey capabilities related to MAC.

*MAC-Parameters* information element

-- ASN1START

-- TAG-MAC-PARAMETERS-START

MAC-Parameters ::= SEQUENCE {

 mac-ParametersCommon MAC-ParametersCommon OPTIONAL,

 mac-ParametersXDD-Diff MAC-ParametersXDD-Diff OPTIONAL

}

MAC-Parameters-v1610 ::= SEQUENCE {

 mac-ParametersFRX-Diff-r16 MAC-ParametersFRX-Diff-r16 OPTIONAL

}

MAC-Parameters-v1700 ::= SEQUENCE {

 mac-ParametersFR2-2-r17 MAC-ParametersFR2-2-r17 OPTIONAL

}

MAC-ParametersCommon ::= SEQUENCE {

 lcp-Restriction ENUMERATED {supported} OPTIONAL,

 dummy ENUMERATED {supported} OPTIONAL,

 lch-ToSCellRestriction ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 recommendedBitRate ENUMERATED {supported} OPTIONAL,

 recommendedBitRateQuery ENUMERATED {supported} OPTIONAL

 ]],

 [[

 recommendedBitRateMultiplier-r16 ENUMERATED {supported} OPTIONAL,

 preEmptiveBSR-r16 ENUMERATED {supported} OPTIONAL,

 autonomousTransmission-r16 ENUMERATED {supported} OPTIONAL,

 lch-PriorityBasedPrioritization-r16 ENUMERATED {supported} OPTIONAL,

 lch-ToConfiguredGrantMapping-r16 ENUMERATED {supported} OPTIONAL,

 lch-ToGrantPriorityRestriction-r16 ENUMERATED {supported} OPTIONAL,

 singlePHR-P-r16 ENUMERATED {supported} OPTIONAL,

 ul-LBT-FailureDetectionRecovery-r16 ENUMERATED {supported} OPTIONAL,

 -- R4 8-1: MPE

 tdd-MPE-P-MPR-Reporting-r16 ENUMERATED {supported} OPTIONAL,

 lcid-ExtensionIAB-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 spCell-BFR-CBRA-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 srs-ResourceId-Ext-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 enhancedUuDRX-forSidelink-r17 ENUMERATED {supported} OPTIONAL,

 --27-10: Support of UL MAC CE based MG activation request for PRS measurements

 mg-ActivationRequestPRS-Meas-r17 ENUMERATED {supported} OPTIONAL,

 --27-11: Support of DL MAC CE based MG activation request for PRS measurements

 mg-ActivationCommPRS-Meas-r17 ENUMERATED {supported} OPTIONAL,

 intraCG-Prioritization-r17 ENUMERATED {supported} OPTIONAL,

 jointPrioritizationCG-Retx-Timer-r17 ENUMERATED {supported} OPTIONAL,

 survivalTime-r17 ENUMERATED {supported} OPTIONAL,

 lcg-ExtensionIAB-r17 ENUMERATED {supported} OPTIONAL,

 harq-FeedbackDisabled-r17 ENUMERATED {supported} OPTIONAL,

 uplink-Harq-ModeB-r17 ENUMERATED {supported} OPTIONAL,

 sr-TriggeredBy-TA-Report-r17 ENUMERATED {supported} OPTIONAL,

 extendedDRX-CycleInactive-r17 ENUMERATED {supported} OPTIONAL,

 simultaneousSR-PUSCH-DiffPUCCH-groups-r17 ENUMERATED {supported} OPTIONAL,

 lastTransmissionUL-r17 ENUMERATED {supported} OPTIONAL

 ]]

}

MAC-ParametersFRX-Diff-r16 ::= SEQUENCE {

 directMCG-SCellActivation-r16 ENUMERATED {supported} OPTIONAL,

 directMCG-SCellActivationResume-r16 ENUMERATED {supported} OPTIONAL,

 directSCG-SCellActivation-r16 ENUMERATED {supported} OPTIONAL,

 directSCG-SCellActivationResume-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 19-1: DRX Adaptation

 drx-Adaptation-r16 SEQUENCE {

 non-SharedSpectrumChAccess-r16 MinTimeGap-r16 OPTIONAL,

 sharedSpectrumChAccess-r16 MinTimeGap-r16 OPTIONAL

 } OPTIONAL,

 ...

}

MAC-ParametersFR2-2-r17 ::= SEQUENCE {

 directMCG-SCellActivation-r17 ENUMERATED {supported} OPTIONAL,

 directMCG-SCellActivationResume-r17 ENUMERATED {supported} OPTIONAL,

 directSCG-SCellActivation-r17 ENUMERATED {supported} OPTIONAL,

 directSCG-SCellActivationResume-r17 ENUMERATED {supported} OPTIONAL,

 drx-Adaptation-r17 SEQUENCE {

 non-SharedSpectrumChAccess-r17 MinTimeGapFR2-2-r17 OPTIONAL,

 sharedSpectrumChAccess-r17 MinTimeGapFR2-2-r17 OPTIONAL

 } OPTIONAL,

 ...

}

MAC-ParametersXDD-Diff ::= SEQUENCE {

 skipUplinkTxDynamic ENUMERATED {supported} OPTIONAL,

 logicalChannelSR-DelayTimer ENUMERATED {supported} OPTIONAL,

 longDRX-Cycle ENUMERATED {supported} OPTIONAL,

 shortDRX-Cycle ENUMERATED {supported} OPTIONAL,

 multipleSR-Configurations ENUMERATED {supported} OPTIONAL,

 multipleConfiguredGrants ENUMERATED {supported} OPTIONAL,

 ...,

 [[

 secondaryDRX-Group-r16 ENUMERATED {supported} OPTIONAL

 ]],

 [[

 enhancedSkipUplinkTxDynamic-r16 ENUMERATED {supported} OPTIONAL,

 enhancedSkipUplinkTxConfigured-r16 ENUMERATED {supported} OPTIONAL

 ]],

[[

ptm-RetransmissionInactive-r18 ENUMERATED {supported} OPTIONAL

]]

}

MinTimeGap-r16 ::= SEQUENCE {

 scs-15kHz-r16 ENUMERATED {sl1, sl3} OPTIONAL,

 scs-30kHz-r16 ENUMERATED {sl1, sl6} OPTIONAL,

 scs-60kHz-r16 ENUMERATED {sl1, sl12} OPTIONAL,

 scs-120kHz-r16 ENUMERATED {sl2, sl24} OPTIONAL

}

MinTimeGapFR2-2-r17 ::= SEQUENCE {

 scs-120kHz-r17 ENUMERATED {sl2, sl24} OPTIONAL,

 scs-480kHz-r17 ENUMERATED {sl8, sl96} OPTIONAL,

 scs-960kHz-r17 ENUMERATED {sl16, sl192} OPTIONAL

}

-- TAG-MAC-PARAMETERS-STOP

-- ASN1STOP

**END OF CHANGE**