3GPP TSG-RAN WG2 Meeting #128 R2-241xxxx

Orlando, USA, Nov18th–22nd, 2024

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **5187** | **rev** | **1** | **Current version:** | **18.3.0** |  |
|  |
| *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:***  | Correction on the Less than 5M Bandwidth |
|  |  |
| ***Source to WG:*** | ZTE Corporation, vivo |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | [NR\_FR1\_lessthan\_5MHz\_BW-Core](https://portal.3gpp.org/desktopmodules/WorkItem/WorkItemDetails.aspx?workitemId=941112) |  | ***Date:*** | 2024-11-20 |
|  |  |  |  |  |
| ***Category:*** |  **F** |  | ***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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | 1. The modificaiton in the R2-2408249 has been agreed to be merged in this CR in RAN2#127bis meeting, the change reason for the R2-2408249 is:

|  |  |
| --- | --- |
| Need S is used to describe the UE behaviour in case the field is not present.

|  |
| --- |
| Need S SpecifiedUsed 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). |

The need S is used in the presence conditions for the field measIdleCarrierListNR-LessThan5MHz-r18 and the field measReselectionCarrierListNR-LessThan5MHz-r18, while there is not any UE behaviour in case any of the fields is absent in its field description.Similar issues also present for the field dl-CarrierFreq-r18 and the field frequencyBandList-r18. |

1. In the RAN4 LS, it has been agreed that” It should be possible for UE to indicate support of CA/DC with less than 5MHz channel bandwidth starting from Rel-18 (i.e., allow early implementation from Rel-18)”, meanwhile it has also been agreed that “BCS5: if UE indicates support for BCS5 and minimum channel bandwidth of 3MHz as a part of BCS signalling, then it shall support 3 MHz for CA for that band in the combination. The existing BCS5 signalling framework needs to be modified to allow indication of 3 MHz as minimum channel bandwidth.” Based on which, RAN2 further agreed that
	* Extend the supportedBandwidthDL/UL to include 3MHz.
	* On the per band capabilities, do not indicate the 3M in the channelBWs-DL/UL but keep the support3MHz-ChannelBW-Asymmetric-r18/ support3MHz-ChannelBW-Symmetric-r18;
	* Extend supportedMinBandwidthDL/UL-r17 to include 3MHz
	* Remove the single carrier restriction in the field description of support5MHz-ChannelBW-20PRB-CORESET0-r18 and support12PRB-CORESET0-GSCN-41637-r18.
 |
|  |  |
| ***Summary of change:*** | 1. Merge the modification in the R2-2408249: i.e. for the conditional presence “LessThan5MHz” within the filed measIdleCarrierListNR-LessThan5MHz-r18, measReselectionCarrierListNR-LessThan5MHz-r18, dl-CarrierFreq-r18 and frequencyBandList-r18, change the need code in case it is absent to need R.
2. Add *supportedBandwidthDL/UL-v18xy and supportedMinBandwidthDL/UL-v18xy* to support 3M.

**Impact analysis**Impacted 5G architecture options:NR SA, NR-DCImpacted functionality:Less than 5MInter-operability: If the UE is implemented according to the CR and the network is not, the gNB is unable to support the CA/DC with 3M.If the network is implemented according to the CR and the UE is not, the UE is unable to report 3M as the maximum supported bandwidth for both the CA/DC and the single CC case.  |
|  |  |
| ***Consequences if not approved:*** | The UE is unable to report 3M as the maximum supported bandwidth for both the CA/DC and the single CC case and thus the 3M feature can not work normally. |
|  |  |
| ***Clauses affected:*** | 6.3.1, 6.3.2, 6.3.3.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS/TR 38306 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:*** | Revision of the R2-2410769, add more spare bits for the forward compatibility. supportedBandwidthDL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} OPTIONAL,supportedMinBandwidthDL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} OPTIONAL  |

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*the first change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

– *SIB4*

*SIB4* contains information relevant for inter-frequency cell re-selection (i.e. information about other NR frequencies and inter-frequency neighbouring cells relevant for cell re-selection), which can also be used for NR idle/inactive measurements. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

***SIB4* information element**

-- ASN1START

-- TAG-SIB4-START

SIB4 ::= SEQUENCE {

 interFreqCarrierFreqList InterFreqCarrierFreqList,

 lateNonCriticalExtension OCTET STRING OPTIONAL,

 ...,

 [[

 interFreqCarrierFreqList-v1610 InterFreqCarrierFreqList-v1610 OPTIONAL -- Need R

 ]],

 [[

 interFreqCarrierFreqList-v1700 InterFreqCarrierFreqList-v1700 OPTIONAL -- Need R

 ]],

 [[

 interFreqCarrierFreqList-v1720 InterFreqCarrierFreqList-v1720 OPTIONAL -- Need R

 ]],

 [[

 interFreqCarrierFreqList-v1730 InterFreqCarrierFreqList-v1730 OPTIONAL -- Need R

 ]],

 [[

 interFreqCarrierFreqList-v1760 InterFreqCarrierFreqList-v1760 OPTIONAL -- Need R

 ]],

 [[

 interFreqCarrierFreqList-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

 } OPTIONAL, -- Cond RSRQ

 cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

 cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

 q-OffsetFreq Q-OffsetRange DEFAULT dB0,

 interFreqNeighCellList InterFreqNeighCellList OPTIONAL, -- Need R

 interFreqExcludedCellList InterFreqExcludedCellList OPTIONAL, -- Need R

 ...

}

InterFreqCarrierFreqInfo-v1610 ::= SEQUENCE {

 interFreqNeighCellList-v1610 InterFreqNeighCellList-v1610 OPTIONAL, -- Need R

 smtc2-LP-r16 SSB-MTC2-LP-r16 OPTIONAL, -- Need R

 interFreqAllowedCellList-r16 InterFreqAllowedCellList-r16 OPTIONAL, -- Cond SharedSpectrum2

 ssb-PositionQCL-Common-r16 SSB-PositionQCL-Relation-r16 OPTIONAL, -- Cond SharedSpectrum

 interFreqCAG-CellList-r16 SEQUENCE (SIZE (1..maxPLMN)) OF InterFreqCAG-CellListPerPLMN-r16 OPTIONAL -- Need R

}

InterFreqCarrierFreqInfo-v1700 ::= SEQUENCE {

 interFreqNeighHSDN-CellList-r17 InterFreqNeighHSDN-CellList-r17 OPTIONAL, -- Need R

 highSpeedMeasInterFreq-r17 ENUMERATED {true} OPTIONAL, -- Need R

 redCapAccessAllowed-r17 ENUMERATED {true} OPTIONAL, -- Need R

 ssb-PositionQCL-Common-r17 SSB-PositionQCL-Relation-r17 OPTIONAL, -- Cond SharedSpectrum

 interFreqNeighCellList-v1710 InterFreqNeighCellList-v1710 OPTIONAL -- Cond SharedSpectrum2

}

InterFreqCarrierFreqInfo-v1720 ::= SEQUENCE {

 smtc4list-r17 SSB-MTC4List-r17 OPTIONAL -- Need R

}

InterFreqCarrierFreqInfo-v1730 ::= SEQUENCE {

 channelAccessMode2-r17 ENUMERATED {enabled} OPTIONAL -- Need R

}

InterFreqCarrierFreqInfo-v1760 ::= SEQUENCE {

 frequencyBandList-v1760 MultiFrequencyBandListNR-SIB-v1760 OPTIONAL, -- Need R

 frequencyBandListSUL-v1760 MultiFrequencyBandListNR-SIB-v1760 OPTIONAL -- Need R

}

InterFreqCarrierFreqInfo-v1800 ::= SEQUENCE {

 dl-CarrierFreq-r18 ARFCN-ValueNR OPTIONAL, -- Cond LessThan5MHz

 frequencyBandList-r18 MultiFrequencyBandListNR-SIB OPTIONAL, -- Cond LessThan5MHz

 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** |
| --- |
| ***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]. |
| ***accessAllowed2RxXR***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. |
| ***channelAccessMode2***If present, this field indicates that the neighbor cells on the inter-frequency apply channel access mode procedures for operation with shared spectrum channel access in accordance with TS 37.213 [48], clause 4.4 for FR2-2. If absent, the neighbor cells on the inter-frequency do not apply any channel access procedure. |
| ***deriveSSB-IndexFromCell***This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to *true*, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14]. |
| ***dl-CarrierFreq***This field indicates center frequency of the SS block of the neighbour cells, where the frequency corresponds to a GSCN value as specified in TS 38.101-1 [15] or TS 38.101-5 [75].For a neighbouring carrier frequency when *dl-CarrierFreq-r18* is included, the network sets the corresponding value of *dl-CarrierFreq* (without suffix) to 250, and the UE applies *dl-CarrierFreq-r18* instead of *dl-CarrierFreq* (without suffix). In such case, if the UE does not support the GSCN value corresponding to the *dl-CarrierFreq-r18*, it ignores the corresponding neighbour cell. |
| ***eRedCapAccessAllowed***Indicates whether eRedCap UEs are allowed to access cells on the frequency. |
| ***frequencyBandList***Indicates the list of frequency bands for which the NR cell reselection parameters apply. For a neighbouring carrier frequency when *frequencyBandList-r18* is included, the network sets the corresponding value of *freqBandIndicatorNR* in *frequencyBandList* (without suffix) to 200, and the UE applies *frequencyBandList-r18* instead of *frequencyBandList* (without suffix). |
| ***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 5.2.2.4.5. |
| ***highSpeedMeasInterFreq***If the field is set to *true* and UE supports high speed inter-frequency IDLE/INACTIVE measurements, the UE shall apply the enhanced inter-frequency RRM requirements on the inter-frequency carrier to support high speed up to 500 km/h in RRC\_IDLE/RRC\_INACTIVE as specified in TS 38.133 [14]. |
| ***interFreqAllowedCellList***List of allow-listed inter-frequency neighbouring cells, see TS 38.304 [20], clause 5.2.4. |
| ***interFreqCAG-CellList***List of inter-frequency neighbouring CAG cells (as defined in TS 38.304 [20] per PLMN. |
| ***interFreqCarrierFreqList***List of neighbouring carrier frequencies and frequency specific cell re-selection information. If *interFreqCarrierFreqList-v1610, interFreqCarrierFreqList-v1700, interFreqCarrierFreqList-v1720*, *interFreqCarrierFreqList-v1730,* *interFreqCarrierFreqList-v1760* or *interFreqCarrierFreqInfo-v1800* are present, they shall contain the same number of entries, listed in the same order as in *interFreqCarrierFreqList* (without suffix). |
| ***interFreqExcludedCellList***List of exclude-listed inter-frequency neighbouring cells. |
| ***interFreqNeighCellList***List of inter-frequency neighbouring cells with specific cell re-selection parameters. If *interFreqNeighCellList-v1610* is present, it shall contain the same number of entries, listed in the same order as in *interFreqNeighCellList* (without suffix). |
| ***interFreqNeighHSDN-CellList***List of inter-frequency neighbouring HSDN cells as specified in TS 38.304 [20]. |
| ***mobileIAB-CellList***Contains a PCI range on which mobile IAB cells may be deployed. |
| ***mobileIAB-Freq***If present, it indicates that a mobile IAB node may be deployed on the inter-frequency carrier. |
| ***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]. |
| ***plmn-IdentityIndex***Index of the PLMN across the *plmn-IdentityInfoList* and *npn-IdentityInfoList* fields included in SIB1. |
| ***p-Max***Value in dBm applicable for the neighbouring NR cells on this carrier frequency. If absent the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell, TS 38.101-2 [39] in case of an FR2 cell or TS 38.101-5 [75] in case of an NTN cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. This field is ignored by IAB-MT and NCR-MT. The IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. The NCR-MT applies output power and emissions requirements as specified in TS 38.106 [79]. |
| ***q-OffsetCell***Parameter "Qoffsets,n" in TS 38.304 [20]. |
| ***q-OffsetFreq***Parameter "Qoffsetfrequency" in TS 38.304 [20]. |
| ***q-QualMin***Parameter "Qqualmin" in TS 38.304 [20]. If the field is absent, the UE applies the (default) value of negative infinity for Qqualmin. |
| ***q-QualMinOffsetCell***Parameter "Qqualminoffsetcell" in TS 38.304 [20]. Actual value Qqualminoffsetcell = field value [dB]. |
| ***q-RxLevMin***Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***q-RxLevMinOffsetCell***Parameter "Qrxlevminoffsetcell" in TS 38.304 [20]. Actual value Qrxlevminoffsetcell = field value \* 2 [dB]. |
| ***q-RxLevMinOffsetCellSUL***Parameter "QrxlevminoffsetcellSUL" in TS 38.304 [20]. Actual value QrxlevminoffsetcellSUL = field value \* 2 [dB]. |
| ***q-RxLevMinSUL***Parameter "Qrxlevmin" in TS 38.304 [20]. |
| ***redCapAccessAllowed***Indicates whether RedCap UEs are allowed to access cells on the frequency. |
| ***smtc***Measurement timing configuration for inter-frequency measurement. If this field is absent, the UE assumes that SSB periodicity is 5 ms in this frequency. If the field is broadcast by an NTN cell, the o*ffset* (derived from parameter *periodicityAndOffset*) is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual o*ffset* based on the actual propagation delay difference. |
| ***smtc2-LP***Measurement timing configuration for inter-frequency neighbour cells with a Long Periodicity (LP) indicated by periodicity in *smtc2-LP*. The timing offset and duration are equal to the offset and duration indicated in *smtc* in *InterFreqCarrierFreqInfo*. The periodicity in *smtc2-LP* can only be set to a value strictly larger than the periodicity in *smtc* in *InterFreqCarrierFreqInfo* (e.g. if *smtc* indicates sf20 the Long Periodicity can only be set to sf40, sf80 or sf160, if *smtc* indicates sf160, *smtc2-LP* cannot be configured). The *pci-List*, if present, includes the physical cell identities of the inter-frequency neighbour cells with Long Periodicity. If *smtc2-LP* is absent, the UE assumes that there are no inter-frequency neighbour cells with a Long Periodicity. |
| ***smtc4list***Measurement timing configuration list for NTN deployments, see clause 5.5.2.10. The offset of each SSB-MTC4 in *smtc4list* is based on the assumption that the gNB-UE propagation delay difference between the serving cell and neighbour cells equals to 0 ms, and UE can adjust the actual *offset* based on the actual propagation delay difference. For a UE that supports less SMTCs than what is included in this list, it is up to the UE to select which SMTCs to consider. |
| ***ssb-PositionQCL***Indicates the QCL relation between SS/PBCH blocks for a specific neighbor cell as specified in TS 38.213 [13], clause 4.1. If provided, the cell specific value overwrites the common value signalled by *ssb-PositionQCL-Common* in *SIB4* for the indicated cell. |
| ***ssb-PositionQCL-Common***Indicates the QCL relation between SS/PBCH blocks for inter-frequency neighbor cells as specified in TS 38.213 [13], clause 4.1. |
| ***ssb-ToMeasure***The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent the UE measures on all SS-blocks. |
| ***ssbSubcarrierSpacing***Subcarrier spacing of SSB.Only the following values are applicable depending on the used frequency:FR1: 15 or 30 kHzFR2-1: 120 or 240 kHzFR2-2: 120, 480, or 960 kHz |
| ***threshX-HighP***Parameter "ThreshX, HighP" in TS 38.304 [20]. |
| ***threshX-HighQ***Parameter "ThreshX, HighQ" in TS 38.304 [20]. |
| ***threshX-LowP***Parameter "ThreshX, LowP" in TS 38.304 [20]. |
| ***threshX-LowQ***Parameter "ThreshX, LowQ" in TS 38.304 [20]. |
| ***tn-AreaIdList***List of TN area identifiers. The associated coverage information is provided in *SIB25*. |
| ***t-ReselectionNR***Parameter "TreselectionNR" in TS 38.304 [20]. |
| ***t-ReselectionNR-SF***Parameter "Speed dependent ScalingFactor for TreselectionNR" in TS 38.304 [20]. If the field is absent, the UE behaviour is specified in TS 38.304 [20]. |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *LessThan5MHz* | The field is mandatory present if the *carrierBandwidth* in SIB1 indicates UL or DL transmission bandwidth other than 15 PRB and the corresponding neighbour cell(s) support(s) 12 PRB, 15 PRB or 20 PRB transmission bandwidth configuration as defined in TS 38.101-1 [15], TS 38.211 [16] and TS 38.213 [13]. Otherwise, the field is optional, Need R. |
| *Mandatory* | The field is mandatory present in SIB4. |
| *RSRQ* | The field is mandatory present if *threshServingLowQ* is present in *SIB2*; otherwise it is absent. |
| *SharedSpectrum* | This field is mandatory present if this inter-frequency operates with shared spectrum channel access. Otherwise, it is absent, Need R. |
| *SharedSpectrum2* | The field is optional present, Need R, if this inter-frequency or neighbor cell operates with shared spectrum channel access. Otherwise, it is absent, Need R. |

– *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

 ...,

 [[

 measIdleCarrierListNR-LessThan5MHz-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasIdleCarrierNR-r16 OPTIONAL, -- Cond LessThan5MHz

 measReselectionCarrierListNR-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasReselectionCarrierNR-r18 OPTIONAL, -- Need S

 measReselectionCarrierListNR-LessThan5MHz-r18 SEQUENCE (SIZE (1..maxFreqIdle-r16)) OF MeasReselectionCarrierNR-r18 OPTIONAL, -- Cond LessThan5MHz

 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 OPTIONAL -- Need N

}

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

MeasIdleCarrierNR-r16 ::= SEQUENCE {

 carrierFreq-r16 ARFCN-ValueNR,

 ssbSubcarrierSpacing-r16 SubcarrierSpacing,

 frequencyBandList MultiFrequencyBandListNR OPTIONAL, -- Need R

 measCellListNR-r16 CellListNR-r16 OPTIONAL, -- Need R

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

 qualityThreshold-r16 SEQUENCE {

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

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

 } OPTIONAL, -- Need R

 ssb-MeasConfig-r16 SEQUENCE {

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

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

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

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

 deriveSSB-IndexFromCell-r16 BOOLEAN,

 ss-RSSI-Measurement-r16 SS-RSSI-Measurement OPTIONAL -- Need S

 } OPTIONAL, -- Need S

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

 ...

}

MeasIdleCarrierEUTRA-r16 ::= SEQUENCE {

 carrierFreqEUTRA-r16 ARFCN-ValueEUTRA,

 allowedMeasBandwidth-r16 EUTRA-AllowedMeasBandwidth,

 measCellListEUTRA-r16 CellListEUTRA-r16 OPTIONAL, -- Need R

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

 qualityThresholdEUTRA-r16 SEQUENCE {

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

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

 } OPTIONAL, -- Need S

 ...

}

MeasReselectionCarrierNR-r18 ::= SEQUENCE {

 carrierFreq-r18 ARFCN-ValueNR,

 ...

}

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

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

BeamMeasConfigIdle-NR-r16 ::= SEQUENCE {

 reportQuantityRS-Indexes-r16 ENUMERATED {rsrp, rsrq, both},

 maxNrofRS-IndexesToReport-r16 INTEGER (1.. maxNrofIndexesToReport),

 includeBeamMeasurements-r16 BOOLEAN

}

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

-- TAG-MEASIDLECONFIG-STOP

-- ASN1STOP

|  |
| --- |
| ***MeasIdleConfig* field descriptions** |
| ***absThreshSS-BlocksConsolidation***Threshold for consolidation of L1 measurements per RS index. |
| ***beamMeasConfigIdle***Indicates the beam level measurement configuration. |
| ***carrierFreq***Indicates the NR carrier frequency to be used for measurements during RRC\_IDLE or RRC\_INACTIVE. |
| ***carrierFreqEUTRA***Indicates the E-UTRA carrier frequency to be used for measurements during RRC\_IDLE or RRC\_INACTIVE. |
| ***deriveSSB-IndexFromCell***This field indicates whether the UE may use the timing of any detected cell on that frequency to derive the SSB index of all neighbour cells on that frequency. If this field is set to true, the UE assumes SFN and frame boundary alignment across cells on the neighbor frequency as specified in TS 38.133 [14]. |
| ***frequencyBandList***Indicates the list of frequency bands for which the NR idle/inactive measurement parameters apply. The UE shall select the first listed band which it supports in the frequencyBandList field to represent the NR neighbour carrier frequency. |
| ***includeBeamMeasurements***Indicates whether or not the UE shall include beam measurements in the NR idle/inactive measurement results. |
| ***maxNrofRS-IndexesToReport***Max number of beam indices to include in the idle/inactive measurement result. |
| ***measCellListEUTRA***Indicates the list of E-UTRA cells which the UE is requested to measure and report for idle/inactive measurements. |
| ***measCellListNR***Indicates the list of NR cells which the UE is requested to measure and report for idle/inactive measurements. |
| ***measIdleCarrierListEUTRA***Indicates the E-UTRA carriers to be measured during RRC\_IDLE or RRC\_INACTIVE. |
| ***measIdleCarrierListNR***Indicates the NR carriers to be measured during RRC\_IDLE or RRC\_INACTIVE. |
| ***measIdleCarrierListNR-LessThan5MHz***Indicates the NR carriers to be measured during RRC\_IDLE or RRC\_INACTIVE for the cell(s) supporting 12 PRB, 15 PRB or 20 PRB transmission bandwidth configuration as defined in TS 38.101-1 [15], TS 38.211 [16] and TS 38.213 [13]. Total number of *MeasIdleCarrierNR* included in *measIdleCarrierListNR* and *measIdleCarrierListNR-LessThan5MHz* does not exceed *maxFreqIdle-r16*. |
| ***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. |
| ***measReselectionCarrierListNR-LessThan5MHz***Indicates the NR carriers for reselection measurement reporting for the cell(s) supporting 12 PRB, 15 PRB or 20 PRB transmission bandwidth configuration as defined in TS 38.101-1 [15], TS 38.211 [16] and TS 38.213 [13]. Total number of *MeasReselectionCarrierNR* included in *measReselectionCarrierListNR* and *measReselectionCarrierListNR-LessThan5MHz* does not exceed *maxFreqIdle-r16*. |
| ***nrofSS-BlocksToAverage***Number of SS blocks to average for cell measurement derivation. |
| ***qualityThreshold***Indicates the quality thresholds for reporting the measured cells for idle/inactive NR measurements. |
| ***qualityThresholdEUTRA***Indicates the quality thresholds for reporting the measured cells for idle/inactive E-UTRA measurements. |
| ***reportQuantities***Indicates which measurement quantities UE is requested to report in the idle/inactive measurement report.  |
| ***reportQuantitiesEUTRA***Indicates which E-UTRA measurement quantities the UE is requested to report in the idle/inactive measurement report. |
| ***reportQuantityRS-Indexes***Indicates which measurement information per beam index the UE shall include in the NR idle/inactive measurement results. |
| ***smtc***Indicates the measurement timing configuration for inter-frequency measurement. If this field is absent in *VarMeasIdleConfig*, the UE assumes that SSB periodicity is 5 ms in this frequency. |
| ***ssbSubcarrierSpacing***Indicates subcarrier spacing of SSB.Only the following values are applicable depending on the used frequency:FR1: 15 or 30 kHzFR2-1: 120 or 240 kHzFR2-2: 120, 480, or 960 kHz |
| ***ssb-ToMeasure***The set of SS blocks to be measured within the SMTC measurement duration (see TS 38.215 [9]). When the field is absent in *VarMeasIdleConfig*, the UE measures on all SS-blocks. |
| ***ss-RSSI-Measurement***Indicates the SSB-based RSSI measurement configuration. If the field is absent in *VarMeasIdleConfig*, the UE behaviour is defined in TS 38.215 [89], clause 5.1.3. |
| ***validityAreaList***Indicates the list of frequencies and optionally, for each frequency, a list of cells within which the UE is required to perform measurements while in RRC\_IDLE and RRC\_INACTIVE.  |

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *LessThan5MHz* | The field is mandatory present if the *carrierBandwidth* in SIB1 indicates UL or DL transmission bandwidth other than 15 PRB and the corresponding neighbour cell(s) support(s) 12 PRB, 15 PRB or 20 PRB transmission bandwidth configuration as defined in TS 38.101-1 [15], TS 38.211 [16] and TS 38.213 [13]. Otherwise, the field is optional, Need R. |

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*the second change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

6.3.3 UE capability information elements

#### – *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-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

}

FeatureSetDownlinkPerCC-v18xy ::= SEQUENCE {

supportedBandwidthDL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} OPTIONAL,

 supportedMinBandwidthDL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} 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

#### – *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

 ]],

 [[

 featureSetsDownlink-v1830 SEQUENCE (SIZE (1..maxDownlinkFeatureSets)) OF FeatureSetDownlink-v1830 OPTIONAL

]]，

[[

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

featureSetsUplinkPerCC-v18xy SEQUENCE (SIZE (1..maxPerCC-FeatureSets)) OF FeatureSetUplinkPerCC-v18xy OPTIONAL

 ]]

}

FeatureSets-v16d0 ::= SEQUENCE {

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

}

-- TAG-FEATURESETS-STOP

-- ASN1STOP

#### – *FeatureSetUplinkPerCC*

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

*FeatureSetUplinkPerCC* information element

-- ASN1START

-- TAG-FEATURESETUPLINKPERCC-START

FeatureSetUplinkPerCC ::= SEQUENCE {

 supportedSubcarrierSpacingUL SubcarrierSpacing,

 supportedBandwidthUL SupportedBandwidth,

 channelBW-90mhz ENUMERATED {supported} OPTIONAL,

 mimo-CB-PUSCH SEQUENCE {

 maxNumberMIMO-LayersCB-PUSCH MIMO-LayersUL OPTIONAL,

 maxNumberSRS-ResourcePerSet INTEGER (1..2)

 } OPTIONAL,

 maxNumberMIMO-LayersNonCB-PUSCH MIMO-LayersUL OPTIONAL,

 supportedModulationOrderUL ModulationOrder OPTIONAL

}

FeatureSetUplinkPerCC-v1540 ::= SEQUENCE {

 mimo-NonCB-PUSCH SEQUENCE {

 maxNumberSRS-ResourcePerSet INTEGER (1..4),

 maxNumberSimultaneousSRS-ResourceTx INTEGER (1..4)

 } OPTIONAL

}

FeatureSetUplinkPerCC-v1700 ::= SEQUENCE {

 supportedMinBandwidthUL-r17 SupportedBandwidth-v1700 OPTIONAL,

 -- R1 23-3-1-3 FeMIMO: Multi-TRP PUSCH repetition (type B) - non-codebook based

 mTRP-PUSCH-RepetitionTypeB-r17 ENUMERATED {n1,n2,n3,n4} OPTIONAL,

 -- R1 23-3-1-1 -codebook based Multi-TRP PUSCH repetition (type B)

 mTRP-PUSCH-TypeB-CB-r17 ENUMERATED {n1,n2,n4} OPTIONAL,

 supportedBandwidthUL-v1710 SupportedBandwidth-v1700 OPTIONAL

}

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-STx2P-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-OneResourcePerSet-r18 INTEGER (1..4),

 maxNumberSimulSRS-TwoResourcePerSet-r18 INTEGER (1..8)

 } 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-OneResourcePerSet-r18 INTEGER (1..4),

 maxNumberSimulSRS-TwoResourcePerSet-r18 INTEGER (1..8)

 } 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

 } 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,

 -- 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 SEQUENCE {

 codebookN1N4-r18 ENUMERATED {ng1n4n1,ng1n2n2,both} OPTIONAL,

 srs-8TxPorts-r18 ENUMERATED {noTDM, both}

 },

 -- 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 ENUMERATED {supported} OPTIONAL,

 -- R1 40-7-3: CBG based 2 CWs PUSCH with rank >4

 cgb-2CW-PUSCH-r18 ENUMERATED {supported} OPTIONAL

}

FeatureSetUplinkPerCC-v18xy ::= SEQUENCE {

supportedBandwidthUL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} OPTIONAL,

 supportedMinBandwidthUL-v18xy ENUMERATED {mhz3, spare3, spare2, spare1} OPTIONAL

}

-- TAG-FEATURESETUPLINKPERCC-STOP

-- ASN1STOP