**3GPP T****SG-RAN WG2 Meeting #119bis-e R2-2210876**

**Online Meeting, October 10-19 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.306** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **17.2.0** |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Draft 38.306 CR for MBS UE capability corrections | | | | | | | | | |
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| ***Source to WG:*** | MediaTek Inc. | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
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| ***Work item code:*** | NR\_MBS-Core | | | | |  | ***Date:*** | | | 2022-10-13 |
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| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Correction of R17 MBS capabiliy following the agreement made during RAN2#119bis-e:  =>We have a capability bit for FG 33-1-1  =>Change NOTE 4 in section 8 of TS 38.306 to “NOTE 4: The value of parameter #DRBs defines the total number of multicast MRBs and DRBs, and each split-MRB is counted as two RBs”.  =>Add “Supports long DRX cycle for multicast reception as specified in TS 38.321 [8].” in the definition for parameter dynamicMulticastPCell-r17 in section 4.2.7.5 of TS 38.306.  =>Change “DRX with long DRX cycle” to “DRX with long DRX cycle for broadcast” in section 5.10 of TS 38.306.  =>Capture RAN1 components of FG 33-1 in section 5.10 of TS 38.306. | | | | | | | | |
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| ***Summary of change:*** | | 1. Clarify that the UE supporting multicast should support long DRX cycle also in section 4.2.7.5 2. Add one UE capability for FG33-1-1 in the table hosting phy parameters in section 4.2.7.6 3. Capture RAN1 agreement on broadcast capability and reword the support of long DRX cycle for MBS broadcast in section 5.10 4. Reword the sentence on split MRB and it is counted as two in section 8 | | | | | | | | |
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| ***Consequences if not approved:*** | | The agreement made during RAN2#119bis-e for R17 MBS UE capabilities is not captured at 38.306. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.7.5,4.2.7.6, 5.10, 8 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*Start Change*

#### 4.2.7.5 *FeatureSetDownlink* parameters

| Definitions for parameters | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
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| ***additionalDMRS-DL-Alt***  Indicates whether the UE supports the alternative additional DMRS position for co-existence with LTE CRS. It is applied to 15kHz SCS and one additional DMRS case only. | FS | No | N/A | FR1 only |
| ***cbgPDSCH-ProcessingType1-DifferentTB-PerSlot-r16***  Defines whether the UE capable of processing time capability 1 supports CBG based reception with one or with up to two or with up to four or with up to seven unicast PDSCHs per slot per CC. | FS | No | N/A | N/A |
| ***cbgPDSCH-ProcessingType2-DifferentTB-PerSlot-r16***  Defines whether the UE capable of processing time capability 2 supports CBG based reception with one or with up to two or with up to four or with up to seven unicast PDSCHs per slot per CC. | FS | No | N/A | N/A |
| ***crossCarrierSchedulingProcessing-DiffSCS-r16***  Indicates the UE cross carrier scheduling processing capability for DL carrier aggregation processing up to X unicast DCI scheduling for DL per scheduled CC. X is based on pair of (scheduling CC SCS, scheduled CC SCS) where a pair of (15,120), (15,60), (30,120) kHz SCS can have X = {1,2,4} while a pair of (15,30), (30,60), (60,120) kHz SCS can have X = {2}, and X applies per slot of scheduling CC. | FS | No | N/A | N/A |
| ***csi-RS-MeasSCellWithoutSSB***  Defines whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS 38.215 [13], where CSI-RS resource is configured for a cell that does not transmit SS/PBCH block. A UE that supports this feature shall also support scellWithoutSSB. | FS | No | N/A | N/A |
| ***dl-MCS-TableAlt-DynamicIndication***  Indicates whether the UE supports dynamic indication of MCS table for PDSCH. | FS | No | N/A | N/A |
| ***dynamicMulticastPCell-r17***  Indicates whether the UE supports dynamic scheduling for multicast for PCell comprised of the following functional components:  - Supports group-common PDCCH/PDSCH with CRC scrambled by G-RNTI for PCell;  - Supports CFR configuration for multicast;  - Supports CORESET and common search space configuration for multicast;  - Supports DCI format 4\_1 with CRC scrambled with G-RNTI for multicast;  - Supports inter-slot TDM between unicast PDSCH and group-common PDSCH in different slots;  - Supports {2, 4, 8} times semi-static slot-level repetition for group-common PDSCH for multicast.  - Supports long DRX cycle for MBS multicast reception as specified in TS38.321 [8]. | FS | No | N/A | N/A |
| ***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) by *FeatureSetDownlinkPerCC-Id*. 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. A fallback per CC feature set resulting from the reported feature set per DL CC is not signalled but the UE shall support it. | FS | N/A | N/A | N/A |
| ***intraBandFreqSeparationDL, intraBandFreqSeparationDL-v1620***  Indicates DL frequency separation class the UE supports, which indicates a maximum frequency separation between lower edge of lowest CC and upper edge of highest CC in a frequency band, for intra-band non-contiguous CA. The UE sets the same value in the FeatureSetDownlink of each band entry within a band. The values mhzX correspond to the values XMHz defined in TS 38.101-2 [3]. It is mandatory to report for UE which supports DL intra-band non-contiguous CA in FR2.  If the UE sets the field *intraBandFreqSeparationDL-v1620* it shall set *intraBandFreqSeparationDL* (without suffix) to the nearest smaller value. | FS | CY | N/A | FR2 only |
| ***intraBandFreqSeparationDL-Only-r16***  Indicates whether the UE supports frequency separation class of DL only extension. If present, the field extends the maximum frequency separation between the lower edge of lowest CC and the upper edge of highest CC in a frequency band that the UE supports according to *intraBandFreqSeparationDL*.The frequency range extension is either above or below the frequency range indicated by *intraBandFreqSeparationDL* and extends it in contiguous manner with no frequency gap, and the network may configure contiguous or non-contiguous downlink serving cells in that extended range. The UE sets the same value in the FeatureSetDownlink of each band entry within a band. The values mhzX correspond to the values XMHz defined in TS38.101-2 [3]. The sum of *intraBandFreqSeparationDL* and *intraBandFreqSeparationDL-Only* shall not exceed 2400 MHz. If the UE sets this field, the sum of *intraBandFreqSeparationDL* and *intraBandFreqSeparationDL-Only* shall be larger than 1400 MHz.  A UE supporting this feature shall also support *intraBandFreqSeparationDL*. | FS | No | N/A | FR2 only |
| ***intraFreqDAPS-r16***  Indicates whether UE supports intra-frequency DAPS handover, e.g. support of simultaneous DL reception of PDCCH and PDSCH from source and target cell. A UE indicating this capability shall also support intra-frequency synchronous DAPS handover, single UL transmission and cancelling UL transmission to the source cell for intra-frequency DAPS handover. The capability signalling comprises of the following parameters:  - *intraFreqAsyncDAPS-r16* indicates whether the UE supports asynchronous DAPS handover.  - *intraFreqDiffSCS-DAPS-r16* indicates whether the UE supports different SCSs in source PCell and intra-frequency target PCell in DAPS handover. The UE only includes this field if different SCSs can be supported in both UL and DL. If absent, the UE does not support either UL or DL SCS being different in DAPS handover. | FS | No | N/A | N/A |
| ***mTRP-PDCCH-Repetition-r17***  Indicates the support of intra-slot PDCCH repetition based on two linked SS sets associated with corresponding CORESETs.  This feature also includes following parameters:  - *numBD-twoPDCCH-r17* indicates the number of BDs for the two PDCCH candidates.  - *maxNumOverlaps-r17* indicates the maximum number of overlaps when one of the linked PDCCH candidates uses the same set of CCEs as an individual (unlinked) PDCCH candidate per scheduled component carrier per slot.  NOTE 1: UE supports PDCCH repetition for the following (basic) PDCCH monitoring capability: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, the monitoring occasion is within the first 3 OFDM symbols of a slot.  NOTE 2: For *maxNumOverlaps-r17*, each unique pair of overlaps is counted as one.  NOTE 3: This feature does not include supporting two QCL-TypeD in time-domain overlapping CORESETs in FR2. | FS | No | N/A | N/A |
| ***mTRP-PDCCH-Case2-1SpanGap-r17***  Indicates the support of PDCCH repetition for PDCCH monitoring of any occasions with span gap as defined in *pdcch-MonitoringAnyOccasionsWithSpanGap* for each SCS with the following parameters:  - *supportedMode-r17* indicates supported mode of PDCCH repetition.  - *limitX-PerCC-r17*: limit (X) per CC.  - *limitX-AcrossCC-r17*: limit (X) per across all CCs.  The limit (X) is the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where "received" and "not been received" is with respect to the end of the corresponding span of PDCCH candidate. It is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16.  The UE indicates *limitX-PerCC-r17* and *limitX-AcrossCC-r17* if *supportedMode-r17* is set to *inter-span* or *both*. A candidate value "*nolimit*" does not imply BD limit can be exceeded.  The UE indicating support of this feature shall also indicate support of *pdcch-MonitoringAnyOccasionsWithSpanGap* and *mTRP-PDCCH-Repetition-r17*. | FS | No | N/A | N/A |
| ***mTRP-PDCCH-legacyMonitoring-r17***  Indicates the support of PDCCH repetition with Rel-16 PDCCH monitoring capability as defined in *pdcch-Monitoring-r16* for 15kHz and 30kHz SCS with the following parameters:  - *supportedMode-r17* indicates the supported mode of PDCCH repetition.  - *limitX-PerCC-r17* indicates the limit (X) per CC.  - *limitX-AcrossCC-r17* indicates the limit (X) per across all CCs.  The limit (X) is the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where "received" and "not been received" is with respect to the end of the corresponding span of PDCCH candidate. It is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16.  The UE indicates *limitX-PerCC-r17* and *limitX-AcrossCC-r17* if *supportedMode-r17* is set to *inter-span* or *both*. A candidate value "*nolimit*" does not imply BD limit can be exceeded.  The UE indicating support of this feature shall also indicate support of *pdcch-Monitoring-r16* and *mTRP-PDCCH-Repetition-r17*. | FS | No | N/A | N/A |
| ***mTRP-PDCCH-multiDCI-multiTRP-r17***  Indicates the support of simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP. Two linked PDCCH candidates are not expected to be associated with different CORESETPoolIndex values  The UE indicating support of this feature shall also indicate support of *multiDCI-MultiTRP-r16* and *mTRP-PDCCH-Repetition-r17*. | FS | No | N/A | N/A |
| ***oneFL-DMRS-ThreeAdditionalDMRS-DL***  Defines whether the UE supports DM-RS pattern for DL transmission with 1 symbol front-loaded DM-RS with three additional DM-RS symbols. | FS | No | N/A | N/A |
| ***oneFL-DMRS-TwoAdditionalDMRS-DL***  Defines support of DM-RS pattern for DL transmission with 1 symbol front-loaded DM-RS with 2 additional DM-RS symbols and more than 1 antenna ports. | FS | Yes | N/A | N/A |
| ***pdcch-Monitoring-r16***  Indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation between two consecutive transmissions of PDCCH with span up to two OFDM symbols for two OFDM symbols or span up to three OFDM symbols for four and seven OFDM symbols. The different value can be reported for PDSCH processing type 1 and PDSCH processing type 2, respectively. For each sub-carrier spacing, the leading / leftmost bit (bit 0) corresponds to the supported value set (X,Y) of (7,3). The next bit (bit 1) corresponds to the supported value set (X,Y) of (4,3). The rightmost bit (bit 2) corresponds to the supported value set (X,Y) of (2,2). | FS | No | N/A | N/A |
| ***pdcch-MonitoringAnyOccasions***  Defines the supported PDCCH search space monitoring occasions. withoutDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot for Type 1-PDCCH common search space configured by dedicated RRC signalling, for a Type 3-PDCCH common search space, or for a UE-specific search space with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively. withDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation of two OFDM symbols for 15 kHz, four OFDM symbols for 30 kHz, seven OFDM symbols for 60 kHz with NCP, and 14OFDM symbols for 120kHz between two consecutive transmissions of PDCCH scrambled with C-RNTI, MCS-C-RNTI, or CS-RNTI for Type 1-PDCCH common search space configured by dedicated RRC signalling, for a Type 3-PDCCH common search space, or for a UE-specific search space, with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively. | FS | No | N/A | N/A |
| ***pdcch-MonitoringAnyOccasionsWithSpanGap***  Indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation between two consecutive transmissions of PDCCH with span up to two OFDM symbols for two OFDM symbols or span up to three OFDM symbols for four and seven OFDM symbols. Value set1 indicates the supported value set (X,Y) is (7,3), value set2 indicates the supported value set (X,Y) is (4,3) and (7,3) and value set 3 indicates the supported value set (X,Y) is (2,2), (4,3) and (7,3). | FS | No | N/A | N/A |
| ***pdcch-MonitoringMixed-r16***  Indicates support of Rel-15 monitoring capability and *pdcch-Monitoring-r16* on different serving cells. | FS | No | N/A | N/A |
| ***pdsch-ProcessingType1-DifferentTB-PerSlot***  Defines whether the UE capable of processing time capability 1 supports reception of up to two, four or seven unicast PDSCHs for several transport blocks with PDSCH scrambled using C-RNTI, TC-RNTI, MCS-C-RNTI or CS-RNTI in one serving cell within the same slot per CC that are multiplexed in time domain only.  NOTE: PDSCH(s) for Msg.4 is included. | FS | No | N/A | N/A |
| ***pdsch-ProcessingType2***  Indicates whether the UE supports PDSCH processing capability 2. The UE supports it only if all serving cells are self-scheduled and if all serving cells in one band on which the network configured processingType2 use the same subcarrier spacing. This capability signalling comprises the following parameters for each sub-carrier spacing supported by the UE.  - *fallback* indicates whether the UE supports PDSCH processing capability 2 when the number of configured carriers is larger than *numberOfCarriers* for a reported value of *differentTB-PerSlot*. If *fallback* = 'sc', UE supports capability 2 processing time on lowest cell index among the configured carriers in the band where the value is reported, if *fallback* = 'cap1-only', UE supports only capability 1, in the band where the value is reported;  - *differentTB-PerSlot* indicates whether the UE supports processing type 2 for 1, 2, 4 and/or 7 unicast PDSCHs for different transport blocks per slot per CC; and if so, it indicates up to which number of CA serving cells the UE supports that number of unicast PDSCHs for different TBs. The UE shall include at least one of *numberOfCarriers* for 1, 2, 4 or 7 transport blocks per slot in this field if *pdsch-ProcessingType2* is indicated. | FS | No | N/A | FR1 only |
| ***pdsch-ProcessingType2-Limited***  Indicates whether the UE supports PDSCH processing capability 2 with scheduling limitation for SCS 30kHz. This capability signalling comprises the following parameter.  - *differentTB-PerSlot-SCS-30kHz* indicates the number of different TBs per slot.  The UE supports this limited processing capability 2 only if:  1) One carrier is configured in the band, independent of the number of carriers configured in the other bands;  2) The maximum bandwidth of PDSCH is 136 PRBs;  3) N1 based on Table 5.3-2 of TS 38.214 [12] for SCS 30 kHz. | FS | No | N/A | FR1 only |
| ***pdsch-SeparationWithGap***  Indicates whether the UE supports separation of two unicast PDSCHs with a gap, applicable to Sub-carrier spacings of 30 kHz and 60 kHz only. For any two consecutive slots n and n+1, if there are more than 1 unicast PDSCH in either slot, the minimum time separation between starting time of any two unicast PDSCHs within the duration of these slots is 4 OFDM symbols for 30kHz and 7 OFDM symbols for 60kHz. | FS | No | N/A | N/A |
| ***rtt-BasedPDC-CSI-RS-ForTracking-r17***  Indicates whether the UE supports RTT-based propagation delay compensation for time synchronization of the Uu interface based on CSI-RS for tracking and SRS.  A UE supporting this feature shall also indicate support of *csi-RS-ForTracking* and *supportedSRS-Resources*. | FS | No | N/A | N/A |
| ***rtt-BasedPDC-PRS-r17***  Indicates whether the UE supports RTT-based Propagation delay compensation for time synchronization of the Uu interface based on DL PRS and SRS. The capability signalling comprises the following parameters:  - *maxNumberPRS-Resource-r17* indicates the maximum number of DL PRS Resources in DL PRS Resource Set for PDC, with value n16, n32, and n64 only applicable to FR2 bands.  - *maxNumberPRS-ResourceProcessedPerSlot-r17* indicates the maximum number of DL PRS resources that UE can process in a slot.  A UE supporting this feature shall also indicate support of *supportedSRS-Resources*. | FS | No | N/A | N/A |
| ***scalingFactor***  Indicates the scaling factor to be applied to the band in the max data rate calculation as defined in 4.1.2. Value f0p4 indicates the scaling factor 0.4, f0p75 indicates 0.75, and so on. If absent, the scaling factor 1 is applied to the band in the max data rate calculation. | FS | No | N/A | N/A |
| ***scalingFactor-1024QAM-FR1-r17***  Indicates the scaling factor to be applied to the band in the max data rate calculation for 1024-QAM as defined in 4.1.2 when support of 1024-QAM for PDSCH is signalled for the band. Value f0p4 indicates the scaling factor 0.4, f0p75 indicates 0.75, and so on. If absent, the scaling factor 1 is applied to the band in the max data rate calculation for 1024-QAM.  UE indicating support of this feature shall also indicate support of *pdsch-1024QAM-FR1-r17* or *pdsch-1024QAM-2MIMO-FR1-r17* to the band. | FS | No | N/A | FR1 only |
| ***scellWithoutSSB***  Defines whether the UE supports configuration of SCell that does not transmit SS/PBCH block. This is conditionally mandatory with capability signalling for intra-band CA but not supported for inter-band CA. | FS | CY | N/A | N/A |
| ***searchSpaceSharingCA-DL***  Defines whether the UE supports DL PDCCH search space sharing for carrier aggregation operation. | FS | No | N/A | N/A |
| ***sfn-SchemeA-r17***  Indicates whether the UE supports SFN scheme A for PDCCH scheduling SFN Scheme A PDSCH. | FS | No | N/A | N/A |
| ***sfn-SchemeA-DynamicSwitching-r17***  Indicates whether the UE supports dynamic switching between single-TRP and PDSCH SFN scheme A by TCI state field in DCI formats 1\_1 and 1\_2. The UE supporting this feature shall indicate *sfn-SchemeA-r17* or *sfn-SchemeA-PDSCH-only-r17*. | FS | No | N/A | N/A |
| ***sfn-SchemeA-PDCCH-only-r17***  Indicates whether the UE supports SFN scheme A for PDCCH scheduling single TRP for PDSCH. | FS | No | N/A | N/A |
| ***sfn-SchemeA-PDSCH-only-r17***  Indicates whether the UE supports SFN scheme A for PDSCH scheduled by single TRP PDCCH. | FS | No | N/A | N/A |
| ***sfn-SchemeB-r17***  Indicates whether the UE supports SFN scheme B for PDCCH scheduling SFN Scheme B PDSCH. | FS | No | N/A | N/A |
| ***sfn-SchemeB-DynamicSwitching-r17***  Indicates whether the UE supports dynamic switching between single-TRP and PDSCH SFN scheme B by TCI state field in DCI formats 1\_1 and 1\_2.  The UE supporting this feature shall indicate *sfn-schemeB-r17* or *sfn-schemeB-PDSCH-only-r17.* | FS | No | N/A | N/A |
| ***sfn-SchemeB-PDSCH-only-r17***  Indicates whether the UE supports SFN scheme B for PDSCH scheduled by single TRP PDCCH. | FS | No | N/A | N/A |
| ***singleDCI-SDM-scheme-r16***  Indicates whether the UE supports single DCI based spatial division multiplexing scheme. | FS | No | N/A | N/A |
| ***sps-Multicast-r17***  Indicates whether the UE supports SPS group-common PDSCH for multicast comprised of the following functional components:  - Supports one SPS group-common PDSCH configuration for multicast;  - Supports {2, 4, 8} times semi-static slot-level repetition for SPS group-common PDSCH.  A UE supporting this feature shall also indicate support of *dynamicMulticastPCell-r17*. | FS | No | N/A | N/A |
| ***supportedSRS-Resources***  Defines support of SRS resources for SRS carrier switching for a band without associated FeatureSetuplink. The capability signalling comprising indication of:  - *maxNumberAperiodicSRS-PerBWP* indicates supported maximum number of aperiodic SRS resources that can be configured for the UE per each BWP  - *maxNumberAperiodicSRS-PerBWP-PerSlot* indicates supported maximum number of aperiodic SRS resources per slot in the BWP  - *maxNumberPeriodicSRS-PerBWP* indicates supported maximum number of periodic SRS resources per BWP  - *maxNumberPeriodicSRS-PerBWP-PerSlot* indicates supported maximum number of periodic SRS resources per slot in the BWP  - *maxNumberSemiPersistentSRS-PerBWP* indicate supported maximum number of semi-persistent SRS resources that can be configured for the UE per each BWP  - *maxNumberSemiPersistentSRS-PerBWP-PerSlot* indicates supported maximum number of semi-persistent SRS resources per slot in the BWP  - *maxNumberSRS-Ports-PerResource* indicates supported maximum number of SRS antenna port per each SRS resource  If the UE indicates the support of srs-CarrierSwitch for this band and this field is absent, the UE supports one periodic, one aperiodic, no semi-persistent SRS resources per BWP per slot and one SRS antenna port per SRS resource. | FS | FD | N/A | N/A |
| ***timeDurationForQCL, timeDurationForQCL-v1710***  Defines minimum number of OFDM symbols required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [12] clause 5.1.5. The number of OFDM symbols is measured from the end of the last symbol of the PDCCH reception to the start of the first symbol of the PDSCH reception. UE shall indicate one value of the minimum number of OFDM symbols per each subcarrier spacing of 60kHz, 120kHz, 480kHz and 960kHz. | FS | Yes | N/A | FR2 only |
| ***twoFL-DMRS-TwoAdditionalDMRS-DL***  Defines whether the UE supports DM-RS pattern for DL transmission with 2 symbols front-loaded DM-RS with one additional 2 symbols DM-RS. | FS | No | N/A | N/A |
| ***type1-3-CSS***  Defines whether the UE is able to receive PDCCH in FR2 in a Type1-PDCCH common search space configured by dedicated RRC signalling, in a Type3-PDCCH common search space or a UE-specific search space if those are associated with a CORESET with a duration of 3 symbols. | FS | Yes | N/A | FR2 only |
| ***ue-SpecificUL-DL-Assignment***  Indicates whether the UE supports dynamic determination of UL and DL link direction and slot format based on Layer 1 scheduling DCI and higher layer configured parameter *TDD-UL-DL-ConfigDedicated* as specified in TS 38.213 [11]. | FS | No | N/A | N/A |

*Next Change*

#### 4.2.7.6 *FeatureSetDownlinkPerCC* parameters

| **Definitions for parameters** | **Per** | **M** | **FDD-TDD**  **DIFF** | **FR1-FR2**  **DIFF** |
| --- | --- | --- | --- | --- |
| ***broadcastSCell-r17***  Indicates whether the UE supports MBS reception via broadcast in RRC\_CONNECTED, on one frequency indicated in an *MBSInterestIndication* message, when an SCell is configured and activated on that frequency, as specified in TS 38.331 [9].  NOTE: The UE is not required to receive MBS via broadcast on PCell and SCell simultaneously | FSPC | No | No | No |
| ***dci-BroadcastWith16Repetitions-r17***  Indicates whether the UE supports up to 16 times dynamic slot-level repetition for broadcast MTCH. | FSPC | No | No | No |
| ***channelBW-90mhz***  Indicates whether the UE supports the channel bandwidth of 90 MHz.  For FR1, the UE shall indicate support according to TS 38.101-1 [2], Table 5.3.5-1. | FSPC | CY | N/A | FR1 only |
| ***fdm-BroadcastUnicast-r17***  Indicates whether the UE supports FDM between one unicast PDSCH and one group-common PDSCH for broadcast in RRC CONNECTED in a slot.  A UE supporting this feature shall also support broadcast reception as specified in clause 5.10. | FSPC | No | N/A | N/A |
| ***fdm-MulticastUnicast-r17***  Indicates whether the UE supports FDM between one unicast PDSCH and one group-common PDSCH for multicast in RRC CONNECTED in a slot.  A UE supporting this feature shall also indicate support of *dynamicMulticastPCell-r17.* | FSPC | No | N/A | N/A |
| ***supportedCRS-InterfMitigation-r17***  Indicates whether the UE supports CRS interference mitigation (CRS-IM) in both DSS and non-DSS scenarios with overlapping spectrum for LTE and NR, which is defined in TS 38.101-4 [18]. The capability signalling contains the following:  - *crs-IM-DSS-15kHzSCS-r17* indicates whether the UE supports neighboring LTE cell CRS-IM in DSS scenario with NR 15 kHz SCS. UE can indicate support of this capability on the CC(s) in a band only if the UE indicates support of *rateMatchingLTE-CRS* on that band.  - *crs-IM-nonDSS-15kHzSCS-r17* indicates whether the UE supports neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signalling on LTE channel bandwidth.  - *crs-IM-nonDSS-NWA-15kHzSCS-r17* indicates whether the UE supports neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signalling on LTE channel bandwidth.  - *crs-IM-nonDSS-30kHzSCS-r17* indicates whether the UE supports neighboring LTE cell CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signalling on LTE channel bandwidth.  - crs*-IM-nonDSS-NWA-30kHzSCS-r17* indicates whether the UE supports neighboring LTE cell CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signalling on LTE channel bandwidth.  For the UE supporting the capability of *crs-IM-DSS-15kHzSCS-r17*, the UE can perform CRS-IM without the assistant configuration information of neighbour LTE cells when *RateMatchPatternLTE-CRS* is configured for the serving cell, and if *lte-NeighCellsCRS-Assumptions-r17* is not configured.  For the UE supporting the capability of *crs-IM-nonDSS-15kHzSCS-r17*, the UE can perform CRS-IM without the assistant configuration information of neighbour LTE cells with 15 kHz SCS when *RateMatchPatternLTE-CRS* is not configured for the serving cell, and if *MeasObjectEUTRA* is configured, the configured measurement gaps overlap with neighbour LTE cell PBCH position and *lte-NeighCellsCRS-Assumptions-r17* is not configured*.*  For the UE supporting the capabilities of *crs-IM-nonDSS-30kHzSCS-r17*, the UE can perform CRS-IM without the assistant configuration information of neighbour LTE cells with 30 kHz SCS when *RateMatchPatternLTE-CRS* is not configured for the serving cell, and if *MeasObjectEUTRA* is configured, the configured measurement gaps overlap with neighbour LTE cell PBCH position and *lte-NeighCellsCRS-Assumptions-r17* is not configured.  NOTE 1: In the DSS scenario, serving and neighboring cells are both operating with dynamic spectrum sharing (DSS) of NR and LTE.  NOTE 2: In the non-DSS scenario, serving cell is operating in NR, and neighboring cells are operating in LTE. | FSPC | No | No | FR1 only |
| ***dynamicMulticastSCell-r17***  Indicates whether the UE supports to receive group-common PDCCH/PDSCH with CRC scrambled by G-RNTI for SCell on one frequency, when an SCell is configured and activated on that frequency, as specified in TS 38.331 [9].  A UE supporting this feature shall also indicate support of *dynamicMulticastPCell-r17*.  NOTE: UE is not expected to be configured simultaneously with more than one component carrier for multicast reception. | FSPC | No | N/A | N/A |
| ***maxModulationOrderForMulticastDataRateCalculation-r17***  Defines the maximum modulation order used for maximum data rate calculation for multicast PDSCH.  - For FR1, up to 1024QAM is supported as maximum modulation order used for maximum data rate calculation for multicast PDSCH, with candidate values {qam256, qam1024}.  - For FR2, up to 256QAM is supported as maximum modulation order used for maximum data rate calculation for multicast PDSCH, with candidate values {qam64, qam256}. | FSPC | No | N/A | N/A |
| ***maxNumberMIMO-LayersPDSCH***  Defines the maximum number of spatial multiplexing layer(s) supported by the UE for DL reception. For single CC standalone NR, it is mandatory with capability signalling to support at least 4 MIMO layers in the bands where 4Rx is specified as mandatory for the given UE and at least 2 MIMO layers in FR2. If absent, the UE does not support MIMO on this carrier. | FSPC | CY | N/A | N/A |
| ***maxNumberMIMO-LayersMulticastPDSCH-r17***  Defines the maximum number of spatial multiplexing layer(s) supported by the UE for multicast PDSCH. If not reported, UE supports 1 MIMO layer only for multicast PDSCH.  A UE supporting this feature shall also indicate support of *dynamicMulticastPCell-r17*.  NOTE: If the UE supports up to 8 layers, the UE supports second TB (TB2). | FSPC | No | N/A | N/A |
| ***multiDCI-MultiTRP-r16***  Indicates whether the UE supports multi-DCI based multi-TRP PDSCH/PUSCH operation and support of fully/partially overlapping PDSCHs in time and non-overlapping in frequency. This capability applies only to BWPs where two values of *coresetPoolIndex* are configured. The capability signalling contains the following:  - *maxNumberCORESET-r16* indicates maximum number of CORESETs configured per BWP per cell in addition to CORESET 0 for multi-DCI based multi-TRP PDSCH/PUSCH operation.  - *maxNumberCORESETPerPoolIndex-r16* indicates maximum number of CORESETs configured per *coresetPoolIndex* per BWP per cell in addition to CORESET 0 for multi-DCI based multi-TRP PDSCH/PUSCH operation.  - *maxNumberUnicastPDSCH-PerPool-r16* indicates maximum number of unicast PDSCHs per *coresetPoolIndex* per slot.  NOTE 1: A UE may assume that its maximum receive timing difference between the DL transmissions from two TRPs is within a Cyclic Prefix.  NOTE 2: Processing capability 2 is not supported in any CC if at least one CC is configured with two values of *coresetPoolIndex*.  NOTE 3: If UE reports value N1 for *maxNumberCORESET-r16*, that means UE supports up to min (N1+1, 5) CORESETs in total (including CORESET#0) if there is CORESET#0, and supports maximal N1 CORESETs if there is no CORESET#0.  NOTE 4: If UE reports value N2 for *maxNumberCORESETPerPoolIndex-r16*, that means UE supports up to min (N2+1, 3) CORESETs in total (including CORESET#0) for a TRP if there is CORESET#0, and supports maximal N2 CORESETs for another TRP if there is no CORESET#0.  NOTE 5: For the multi-DCI based multi-TRP PUSCH operation, the maximum number of unicast PUSCHs that UE can support per slot is based on *pusch-ProcessingType1-DifferentTB-PerSlot*, and it is counted across both *coresetPoolIndex* of TRPs. | FSPC | No | N/A | N/A |
| ***supportedBandwidthDL, supportedBandwidthDL-v1710***  Indicates maximum DL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of DAPS handover for the source or target cell), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2.  For FR1, all the bandwidths listed in TS38.101-1 Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3]. *supportedBandwidthDL-v1710* is included if the maximum DL channel bandwidth supported by the UE within a single CC is greater than 400MHz, otherwise it is absent.  The UE may report a *supportedBandwidthDL* wider than the *channelBWs-DL*; this *supportedBandwidthDL* may not be included in the Table 5.3.5-1 of TS 38.101-1[2]/TS 38.101-2[3] for the case that the UE is unable to report the actual supported bandwidth according to the Table 5.3.5-1 of TS 38.101-1[2]/TS 38.101-2[3]. For each band, RedCap UEs shall indicate its maximum channel bandwidth, which is the maximum of those channel bandwidths that are less than or equal to 20 MHz for FR1 and less than or equal to 100 Mhz for FR2, taking restrictions in TS 38.101-1 [2] and TS 38.101-2 [3] into consideration.  NOTE: To determine whether the UE supports a channel bandwidth of 90 MHz, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet* and the *supportedBandwidthCombinationSetIntraENDC*. For serving cell(s) with other channel bandwidths the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]), *supportedBandwidthDL/supportedBandwidthDL-v1710* and *supportedMinBandwidthDL*. | FSPC | CY | N/A | N/A |
| ***supportedMinBandwidthDL-r17***  Indicates minimum DL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of intra-frequency DAPS handover for the source and target cells), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2. This parameter is only applicable to the Bandwidth Combination Set 5. This field does not restrict the bandwidths configured for a single CC (i.e. non-CA case). | FSPC | CY | N/A | N/A |
| ***supportedModulationOrderDL***  Indicates the maximum supported modulation order to be applied for downlink in the carrier in the max data rate calculation as defined in 4.1.2. If included, the network may use a modulation order on this serving cell which is higher than the value indicated in this field as long as UE supports the modulation of higher value for downlink. If not included:  - for FR1, the network uses the modulation order signalled per band i.e. [pdsch-1024QAM-FR1] when [pdsch-1024QAM-FR1] is signalled for the band, otherwise the network uses the modulation order signalled in *pdsch-256QAM-FR1*.  - for FR2, the network uses the modulation order signalled per band i.e. *pdsch-256QAM-FR2* if signalled. If not signalled in a given band, the network shall use the modulation order 64QAM.  In all the cases, it shall be ensured that the data rate does not exceed the max data rate (*DataRate*) and max data rate per CC (*DataRateCC*) according to TS 38.214 [12]. | FSPC | No | N/A | N/A |
| ***supportedSubCarrierSpacingDL***  Defines the supported sub-carrier spacing for DL by the UE, as defined in clause 4.2-1 of TS 38.211 [6], indicating the UE supports simultaneous reception with same or different numerologies in CA. Support of simultaneous reception with same numerology for intra-band NR CA including both contiguous and non-contiguous is mandatory with capability in both FR1 and FR2. Support of simultaneous reception with two different numerologies between FR1 band(s) and FR2 band(s) in DL is mandatory with capability if UE supports inter-band NR CA including both FR1 band(s) and FR2 band(s). Optional for other cases. Support of simultaneous reception of with different numerologies in CA for other cases is optional. | FSPC | CY | N/A | N/A |
| ***supportFDM-SchemeB-r16***  Indicates whether UE supports single DCI based FDMSchemeB. | FSPC | No | N/A | N/A |

*Next Change*

## 5.10 MBS features

| Definitions for feature |
| --- |
| **Broadcast reception**  It is optional for UE to support broadcast reception as specified in TS 38.331 [9]. A UE that supports the feature shall also support:  - Group-common PDCCH/PDSCH with CRC scrambled by MCCH-RNTI;  - Group-common PDCCH/PDSCH with CRC scrambled by G-RNTI;  - CFR configuration for broadcast;  - CORESET and common search space for broadcast;  - DCI format 4\_0 with CRC scrambled with G-RNTI/MCCH-RNTI for broadcast;  - Inter-slot TDM between unicast PDSCH and group-common PDSCH in different slots;  - MCCH change notification indication via DCI;  - RRC configured slot-level repetition up to 8 for MTCH;  - 4 broadcast MRBs as the minimum number;  - PDCP 12 bits SN;  - ROHC with profiles 0x0000, 0x0001 and 0x0002;  - 4 ROHC context sessions;  - RLC UM with 6 bits SN;  - RLC UM with 12 bits SN;  - DRX with long DRX cycle for MBS broadcast as specified in TS38.321 [8]. |

*Next Change*

# 8 UE Capability Constraints

The following table lists constraints indicating the UE capabilities that the UE shall support.

| Parameter | Description | Value |
| --- | --- | --- |
| #DRBs | The number of DRBs that a UE shall support. | 8 per UE, for RedCap UEs.  16 per UE, otherwise.  NOTE 1  NOTE 3  NOTE 4 |
| #minCellperMeasObjectNR | The minimum number of neighbour cells (excluding exclude-list cells) that a UE shall be able to store associated with a MeasObjectNR. | 32  NOTE 2 |
| #minExcludedCellRangesperMeasObjectNR | The minimum number of exclude-list cell PCI ranges that a UE shall be able to store associated with a MeasObjectNR. | 8 |
| #minExcludedCellperMeasObjectEUTRA | The minimum number of exclude-list cells that a UE shall be able to store associated with a MeasObjectEUTRA. | 32 |
| #minCellperMeasObjectEUTRA | The minimum number of neighbour cells that a UE shall be able to store associated with a MeasObjectEUTRA. | 32  NOTE 2 |
| #minCellTotal | The minimum number of neighbour cells (excluding exclude-list cells) that UE shall be able to store in total from all measurement objects configured. | 256 with counting CSI-RS and SSB as 2. |
| #maxDeprioritisationFreq | The UE shall be able to store a depriotisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request via *RRCRelease* before T325 expiry). | 8 |
| #minCellperMeasObjectUTRA-FDD | The minimum number of neighbour cells that a UE shall be able to store associated with a MeasObjectUTRA-FDD. | 32 |
| NOTE 1: For one MAC entity, the maximum number of DRBs configured with PDCP duplication and with RLC entity(ies) associated with this MAC entity is 8.  NOTE 2: In case of CGI reporting, the limit regarding the cells configured includes the cell for which the UE is requested to report CGI i.e. the amount of neighbour cells that can be included is at most (# minCellperMeasObjectRAT - 1), where RAT represents NR and EUTRA.  NOTE 3: This requirement is applicable in NR SA, NR-DC and NE-DC.  NOTE 4: The value of parameter #DRBs defines the total number of multicast MRBs and DRBs, and each split-MRB is counted as two RBs. | | |

*End of Change*