**3GPP T****SG-RAN WG2 Meeting #119bis-e R2-220nnnn**

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

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.306** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **17.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
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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 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MBS-Core | | | | |  | ***Date:*** | | | 2022-10-13 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
|  |  | | | | | | | | | |
| ***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  =>Split MRB is counted as two RBs (being discussed at email [602]).  =>Capture RAN1 agreement on broadcast capability (being discussed at email [602]). | | | | | | | | |
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| ***Summary of change:*** | | 1. Add one UE capability for FG33-1-1 in the table hosting phy parameters in section 4.2.7.6 2. Capture RAN1 agreement on broadcast capability in section 5.10 3. 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:*** | | 4.2.7.6, 5.10, 8 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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*

#### 4.2.7.6 *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-BroadcastWith16SLRepitition-r17***  Indicates whether the UE supports up to 16 times dynamic slot-level repetition for broadcast MTCH during its MBS reception. | 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 |
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| **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;  - Higher layer 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. |

*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*