**3GPP TSG-RAN2 Meeting #127 *R2-2407653***

**Maastricht, Netherlands, 19 - 23 August 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.306** | **CR** | **x** | **rev** | **-** | **Current version:** | **17.9.0** |  |
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| *For* [***HE******LP***](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:*** | Corrections to UE capabilities related to Rel-17 URLLC and RedCap | | | | | | | | | |
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| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IIOT\_URLLC\_enh-Core, NR\_redcap-Core | | | | |  | ***Date:*** | | | 2024-08-18 |
|  |  | | | |  | |  | | |  |
| ***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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | (i) ***cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17***  In TS 38.306, the FRx-diff is set to No as follow:   | ***Definitions for parameters*** | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF | | --- | --- | --- | --- | --- | | ***cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17***  Indicates whether the UE supports subband CQI reporting with 4 bits per subband for TN and non-shared spectrum channel access. | UE | No | No | No |   This is aligned with the latest R1 feature list as follow for Rel-17:   * R1-2304113 Updated RAN1 UE features list for Rel-17 NR after RAN1#112bis-e   However, in the ASN.1 in TS 38.331, this is implemented as per UE capability with FRx-diff in *Phy-ParametersFRX-Diff*:  **(ii) *multipleCORESET-RedCap-r17***  The *multipleCORESET-RedCap-r17* is implemented with FRx -diff in *Phy-ParametersFRX-Diff* and the reason is to align it with *multipleCORESET* which is also in *Phy-ParametersFRX-Diff*. Hence this is correctly implemented in the ASN.1. However, this is not correctly reflected in TS38.306 as follow where the FR1-FR2-DiFF column is set to ‘No’. This should be corrected.   | ***Definitions for parameters*** | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF | | --- | --- | --- | --- | --- | | ***multipleCORESET-RedCap-r17***  Indicates whether the RedCap UE supports configuration of up to three PDCCH CORESETs in the RedCap specific initial DL BWP when it does not contain CD-SSB and CORESET#0. If this is not supported, the field description of *multipleCORESET* applies to the RedCap-specific initial BWP. The RedCap UE reporting this capability shall also report *multipleCORESET.* | UE | No | No | No | | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | (i) ***cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17***  Update the field description that the same value is used for both frequency range FR1 and FR2 (i.e. Add the following: In this release, the same value shall be indicated for the frequency ranges) and change the FR1-FR2DIFF column to ‘Yes’.  **(ii) *multipleCORESET-RedCap-r17***  The FR1-FR2-diff column for *multipleCORESET-RedCap-r17* should be changed to ‘Yes’.  **Impact analysis**  Impacted functionality:  URLLC capability  RedCap capability  Inter-operability:  If the network is implemented according to the CR and the UE is not, or vice versa, there is no interoperability issue. For the *cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17*, if the indication for FR1 and FR2 are different, it is left to network implementation to decide whether to configure the feature for the specific FR. | | | | | | | | |
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| ***Consequences if not approved:*** | | For *cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17*, it is not implemented as it should which is not FRx differentiated.  For *multipleCORESET-RedCap-r17*, there will be misalignment between the ASN.1 and the TS38.306. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.7.10 | | | | | | | | |
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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 of Change>

#### 4.2.7.10 *Phy-Parameters*

| Definitions for parameters | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
| --- | --- | --- | --- | --- |
| ***absoluteTPC-Command***  Indicates whether the UE supports absolute TPC command mode. | UE | No | No | Yes |
| ***additionalSR-Periodicities-r18***  Indicates whether the UE supports the following SR periodicities in the *periodicityAndOffset* parameter as specified in TS 38.331 [9]. The capability signalling comprises the following parameters:  - Value *scs-30kHz-r18* indicates the support of 5slots for 30 kHz SCS  - Value *scs-120kHz-r18* indicates the support of 5slots and 10slots for 120 kHz SCS | UE | No | No | No |
| ***advReceiver-MU-MIMO-r18***  Indicates whether the UE supports R-ML (reduced complexity ML) receivers with enhanced inter-user interference suppression, for MU-MIMO up to *maxNumberMIMO-LayersPDSCH* layers across target and co-scheduled UEs with 2RX and 4RX antennas, when co-scheduled UE(s)' modulation order is explicitly signalled by DCI index 1-5 in Table 7.3.1.2.2-12 of TS 38.212 [10].  NOTE: UE supports R-ML on MU-MIMO on single carrier operation. UE optionally supports R-ML on MU-MIMO on one or more carriers in CA, NE-DC, NR-DC and EN-DC operation.  A UE supporting this feature shall also support SU-MIMO Interference Mitigation advanced receiver in clause 5. | UE | No | No | FR1 only |
| ***aggregationFactorSPS-DL-r16***  Indicates whether the UE supports configurable PDSCH aggregation factor ({1, 2, 4, 8}) per DL SPS configuration. The UE can include this feature only if the UE indicates support of *downlinkSPS*. | UE | No | No | Yes |
| ***almostContiguousCP-OFDM-UL***  Indicates whether the UE supports almost contiguous UL CP-OFDM transmissions as defined in clause 6.2 of TS 38.101-1 [2]. | UE | No | No | Yes |
| ***bwp-SwitchingDelay***  Defines whether the UE supports DCI and timer based active BWP switching delay type1 or type2 specified in clause 8.6.2 of TS 38.133 [5]. It is mandatory to report type 1 or type 2 when *bwp-SameNumerology* or *bwp-DiffNumerology* is supported on at least one band. This capability is not applicable to IAB-MT. | UE | CY | No | No |
| ***bwp-SwitchingMultiCCs-r16***  Indicates whether the UE supports incremental delay for DCI and timer based active BWP switching on multiple CCs simultaneously as specified in TS 38.133 [5]. The capability signalling comprises of the following:  - *type1-r16* indicates the delay value for type 1 BWP switching delay and has values of {100us, 200us}  - *type2-r16* indicates the delay value for type 2 BWP switching delay and has values of {200us, 400us, 800us, 1000us}  The UE indicating support of this feature shall also support *bwp-SwitchingDelay*, *bwp-SameNumerology* and/or *bwp-DiffNumerology*. It is mandatory to report either *type1-r16* or *type2-r16* for a UE which supports CA. | UE | CY | No | No |
| ***bwp-SwitchingMultiDormancyCCs-r16***  Indicates whether the UE supports incremental delay for BWP switch processing on additional SCells in DCI based simultaneous dormant BWP switching on multiple SCells as specified in TS 38.133 [5]. The capability signalling comprises of the following:  - *type1-r16* indicates the delay value for type 1 BWP switching delay and has values of {100us, 200us}  - *type2-r16* indicates the delay value for type 2 BWP switching delay and has values of {200us, 400us, 800us, 1000us}  The UE indicating support of this feature shall also support *scellDormancyWithinActiveTime-r16* or *scellDormancyOutsideActiveTime-r16*. | UE | No | No | No |
| ***bwp-SwitchingMultiDormancyCC-DCI-0-3-And-1-3-r18***  Indicates whether the UE supports incremental delay for BWP switch processing on additional SCells in DCI based simultaneous dormant BWP switching on multiple Scells while DCI format 0\_3/1\_3 is used as specified in TS 38.133 [5]. The capability signalling comprises of the following:  - *type1-r18* indicates the delay value for type 1 BWP switching delay and has values of {100us, 200us}  - *type2-r18* indicates the delay value for type 2 BWP switching delay and has values of {200us, 400us, 800us, 1000us}  The UE indicating support of this feature shall also support *scellDormancyWithinActiveTime-DCI-0-3-And-1-3-r18*. | UE | No | No | No |
| ***cbg-FlushIndication-DL***  Indicates whether the UE supports CBG-based (re)transmission for DL using CBG flushing out information (CBGFI) as specified in TS 38.214 [12]. | UE | No | No | No |
| ***cbg-TransIndication-DL***  Indicates whether the UE supports CBG-based (re)transmission for DL using CBG transmission information (CBGTI) as specified in TS 38.214 [12]. | UE | No | No | No |
| ***cbg-TransIndication-UL***  Indicates whether the UE supports both in-order and out-of-order CBG-based (re)transmission for UL using CBG transmission information (CBGTI) as specified in TS 38.214 [12]. | UE | No | No | No |
| ***cbg-TransInOrderPUSCH-UL-r16***  Indicates whether the UE supports CBG-based re-transmission(s) of a TB using CBG transmission information (CBGTI) as specified in TS 38.214 [12] in the following two cases (both are considered as in-order CBG-based retransmission(s)):  1. if the initial PUSCH transmission was not cancelled due to gNB scheduling/indication/configuration; and  2. if the initial PUSCH transmission was cancelled due to gNB scheduling/indication/configuration and the following condition is satisfied: the UE is scheduled for a re-transmission of a CBG #N in a given TB when CBG #N-1 has been transmitted before or is scheduled in the same UL grant that includes CBG#N. | UE | No | No | No |
| ***cg-TimeDomainAllocationExtension-r17***  Indicates whether UE supports the *timeDomainAllocation-v1710* configured in *rrc-ConfiguredUplinkGrant* to indicate 16 or more entries in PUSCH TDRA table. This field is only applicable if the UE supports both *pusch-RepetitionTypeB-r16* and either *configuredUL-GrantType1* or *configuredUL-GrantType1-v1650.* | UE | No | No | No |
| ***cli-RSSI-FDM-DL-r16***  Indicates whether serving cell DL signal/channel (e.g. PDSCH/PDCCH) and CLI-RSSI FDMed reception is supported as specified in TS 38.215 [13]. | UE | No | TDD only | Yes |
| ***cli-SRS-RSRP-FDM-DL-r16***  Indicates whether serving cell DL signal/channel (e.g. PDSCH/PDCCH) and SRS-RSRP FDMed reception is supported as specified in TS 38.215 [13]. | UE | No | TDD only | Yes |
| ***codebookVariantsList-r16***  Indicates the list of *SupportedCSI-RS-Resource* applicable to the codebook types supported by the UE. | UE | No | No | No |
| ***configurableType-1A-FieldsForDCI-0-3-And-1-3-r18***  Indicates support of Type-1A for 'Antenna port(s)' field for DCI format 1\_3 and Type-1A for 'Antenna port(s)', 'Precoding information and number of layers' and 'SRS resource indicator' fields for DCI format 0\_3.  The UE indicating support for this feature also indicates support at least one of *multiCell-PDSCH-DCI-1-3-SameSCS-r18*, *multiCell-PDSCH-DCI-1-3-DiffSCS-r18,* 49-2 or 49-2b | UE | No | No | No |
| ***configuredUL-GrantType1***  Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *configuredUL-GrantType1-r16* applies. | UE | No | No | No |
| ***configuredUL-GrantType2***  Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *configuredUL-GrantType2-r16* applies. | UE | No | No | No |
| ***cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17***  Indicates whether the UE supports subband CQI reporting with 4 bits per subband for TN and non-shared spectrum channel access. In this release, the same value shall be indicated for the frequency ranges. | UE | No | No | Yes |
| ***cqi-TableAlt***  Indicates whether UE supports the CQI table with target BLER of 10^-5. | UE | No | No | Yes |
| ***cri-RI-CQI-WithoutNon-PMI-PortInd-r16***  Indicates whether UE supports *CSI-ReportConfig* with the *reportQuantity* set to '*cri-RI-CQI*' and the *non-PMI-PortIndication* is not configured.  UE indicating support of this feature shall also indicate support of *csi-ReportFramework*. | UE | No | No | Yes |
| ***crossSlotScheduling-r16***  Indicates whether UE supports dynamic indication of applicable minimum scheduling restriction by DCI format 0\_1 and 1\_1, and the minimum scheduling offset for PDSCH and aperiodic CSI-RS triggering offset (K0), and PUSCH (K2), and the extended value range for aperiodic CSI-RS triggering offset. Support of this feature is reported for licensed and unlicensed bands, respectively. When this field is reported, either of *non-SharedSpectrumChAccess-r16* or *sharedSpectrumChAccess-r16* shall be reported, at least. | UE | No | No | No |

<<Omitted>>

| ***maxTotalResourcesForOneFreqRange-r16***  Indicates the maximum total number of SSB/CSI-RS/CSI-IM resources for beam management, pathloss measurement, BFD, RLM and new beam identification for one frequency range that the UE supports.  The capability signalling includes the following:  *- maxNumberResWithinSlotAcrossCC-OneFR-r16* indicates maximum total number of SSB/CSI-RS/CSI-IM resources configured to measure within a slot across all CCs in one frequency range for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification  *- maxNumberResAcrossCC-OneFR-r16* indicates maximum total number of SSB/CSI-RS/CSI-IM resources configured across all CCs in one frequency range for any of L1-RSRP measurement, L1-SINR measurement, pathloss measurement, BFD, RLM and new beam identification.  gNB takes into conjunction of this feature and the features *beamManagementSSB-CSI-RS, maxNumberCSI-RS-BFD, maxNumberSSB-BFD* and *maxNumberCSI-RS-SSB-CBD* when configuring SSB/CSI-RS/CSI-IM resources for beam management, pathloss measurement, BFD, RLM and new beam identification across one frequency range.  NOTE 1: The reference slot duration is the shortest slot duration defined for the reported FR supported by the UE.  NOTE 2: For RS configured for new beam identification, they are always counted regardless of beam failure event.  NOTE 3: The *maxNumberResWithinSlotAcrossCC-AcrossFR-r16* only counts those in active BWP but the *maxNumberResAcrossCC-AcrossFR-r16* counts all configured including both active and inactive BWP.  NOTE 4: The "configured to measure" RS is counted within the duration of a reference slot in which the corresponding reference signals are transmitted.  NOTE 5: Regarding the "configured to measure" RS counting  - (basic usage 1): If one resource is used for one or multiple of BFD/RLM, it is counted as one.  - (basic usage 2): If one resource is used for one or multiple of New Beam Identification/PL-RS/L1-RSRP, add 1.  - L1-RSRP measurement includes cases associated with reports with *reportQuantity* set to '*ssb-Index-RSRP*', '*cri-RSRP*' or with *reportQuantity* set to '*none*' and *CSI-RS-ResourceSet* with *trs-Info* not configured.  - If one resource is used for L1-SINR in addition to basic usage 1 & 2, add N if referred N times by one or more CSI Reporting settings with *reportQuantity-r16* = '*ssb-Index-SINR-r16*' or '*cri-SINR-r16*'. | UE | No | No | Yes |
| --- | --- | --- | --- | --- |
| ***monitoringDCI-SameSearchSpace-r16***  Indicates whether the UE supports monitoring both DCI format 0\_1/1\_1 and DCI format 0\_2/1\_2 in the same search space. If the UE supports this feature, the UE needs to report *dci-Format1-2And0-2-r16*. | UE | No | No | No |
| ***mTRP-PDCCH-singleSpan-r17***  Indicates the support of PDCCH repetition for PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot. It is applicable to 15kHz SCS only.  The UE indicating support of this feature shall also indicate support of *pdcch-MonitoringSingleSpanFirst4Sym-r16* and *mTRP-PDCCH-Repetition-r17*. | UE | No | No | FR1 only |
| ***multiPDSCH-PerSlotType1-CB-Support-r17***  Indicates whether the UE supports RRC configuration *multiPDSCH-PerSlotType1-CB-r17* as specified in TS 38.331 [9]. | UE | No | No | No |
| ***multipleCORESET***  Indicates whether the UE supports configuration of up to two PDCCH CORESETs per BWP in addition to the CORESET with CORESET-ID 0 in the BWP. If this is not supported, the UE supports one PDCCH CORESET per BWP in addition to the CORESET with CORESET-ID 0 in the BWP. It is mandatory with capability signalling for FR2 and optional for FR1. | UE | CY | No | Yes |
| ***multipleCORESET-RedCap-r17***  Indicates whether the RedCap UE supports configuration of up to three PDCCH CORESETs in the RedCap specific initial DL BWP when it does not contain CD-SSB and CORESET#0. If this is not supported, the field description of *multipleCORESET* applies to the RedCap-specific initial BWP. The RedCap UE reporting this capability shall also report *multipleCORESET.* | UE | No | No | Yes |
| ***mux-HARQ-ACK-PUSCH-DiffSymbol***  Indicates whether the UE supports HARQ-ACK piggyback on a PUSCH with/without aperiodic CSI once per slot when the starting OFDM symbol of the PUSCH is different from the starting OFDM symbols of the PUCCH resource that HARQ-ACK would have been transmitted on. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *mux-HARQ-ACK-PUSCH-DiffSymbol-r16* applies. | UE | Yes | No | Yes |

<<Omitted>>

<End of Change>