**3GPP TSG-RAN2 Meeting #125R2-2401718**

**Athens, Greece 26th Feb – 1st Mar, 2024**

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| *CR-Form-v12.2* | | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | | |
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|  | **38.306** | **CR** | **1057** | **rev** | **-** | **Current version:** | **18.0.0** |  | |
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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:*** | Introduction of TxDiversity for 2Tx capability | | | | | | | | | | | | | |
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| ***Source to WG:*** | OPPO, Huawei, HiSilicon | | | | | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | | | | | |
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| ***Work item code:*** | 4Rx\_low\_NR\_band\_handheld\_3Tx\_NR\_CA\_ENDC-Core | | | | | | |  | ***Date:*** | | | | 2024-03-06 | |
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| ***Category:*** | **B** | |  | | | | | | | ***Release:*** | | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)*  *Rel-19 (Release 19)* | | |
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| ***Reason for change:*** | According to the RAN4 feature list R4-2403842 and RAN4 LS R4-2321983, RAN4 agreed to introduce a new UE capability in perFS level to indicate support of 2Tx TxDiversity for the band configured. This capability is applicable for both single band (non-CA) case and CA case. | | | | | | | | | | | | | |
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| ***Summary of change:*** | Introduce TxDiversity capability for 2Tx in perFS level to be early implementable in v18.1.0 from Rel-17.  *Implementation of this CR by a Release 17 UE will not cause compatibility issues.* | | | | | | | | | | | | | |
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| ***Consequences if not approved:*** | The UE is not allowed to indicate support of TxDiversity for 2Tx capability for the band configured and is not early implementable from Rel-17. | | | | | | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.7.7 | | | | | | | | | | | | |
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|  | | **Y** | | | **N** |  | | | | |  | | | |
| ***Other specs*** | | **x** | | |  | Other core specifications | | | | | TS 38.331 CR 4639 | | | |
| ***affected:*** | |  | | | **x** | Test specifications | | | | | TS/TR ... CR ... | | | |
| ***(show related CRs)*** | |  | | | **x** | O&M Specifications | | | | | TS/TR ... CR ... | | | |
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| ***Other comments:*** | |  | | | | | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | | | | | |
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<Start of modification>

#### 4.2.7.7 *FeatureSetUplink* parameters

| **Definitions for parameters** | **Per** | **M** | **FDD-TDD**  **DIFF** | **FR1-FR2**  **DIFF** |
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| ***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 |
| ***cbgPUSCH-ProcessingType1-DifferentTB-PerSlot-r16***  Defines whether the UE capable of processing time capability 1 supports CBG based transmission with one or with up to two or with up to four or with up to seven unicast PUSCHs per slot per CC. | FS | No | N/A | N/A |
| ***cbgPUSCH-ProcessingType2-DifferentTB-PerSlot-r16***  Defines whether the UE capable of processing time capability 2 supports CBG based transmission with one or with up to two or with up to four or with up to seven unicast PUSCHs per slot per CC. | FS | No | N/A | N/A |
| ***crossCarrierSchedulingProcessing-DiffSCS-r16***  Indicates the UE cross carrier scheduling processing capability for UL carrier aggregation processing up to X unicast DCI scheduling for UL 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 |
| ***dynamicSwitchSUL***  Indicates whether the UE supports supplemental uplink with dynamic switch (DCI based selection of PUSCH carrier). The UE supports this among a carrier on a band X and a band Y if it sets this capability parameter for both band X and band Y. | FS | No | N/A | N/A |
| ***extendedDC-LocationReport-r17***  Indicates whether the UE supports extended DC location reporting (based on indicated default DC location) for at least 2 UL CCs in one band. A UE that supports this feature also supports extended DC location reporting for 1 UL CC in one band. | FS | No | N/A | N/A |
| ***featureSetListPerUplinkCC***  Indicates which features the UE supports on the individual UL carriers of the feature set (and hence of a band entry that refer to the feature set) by *FeatureSetUplinkPerCC-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 *FeatureSetUplinkPerCC-Id* in this list. A fallback per CC feature set resulting from the reported feature set per UL CC is not signalled but the UE shall support it. | FS | N/A | N/A | N/A |
| ***interSubslotFreqHopping-PUCCH-r17***  Indicates whether the UE supports inter-subslot frequency hopping for PUCCH repetitions comprised of the following functional components:  - Inter-subslot frequency hopping for PUCCH repetition operation of PUCCH Formats 0, 1, 2, 3 and 4 for 7OS slot-based PUCCH configurations;  - Inter-subslot frequency hopping for PUCCH repetition operation of PUCCH Format 0 and Format 2 for 2OS slot-based PUCCH configurations.  The UE indicating support of this feature shall also indicate the support of *pucch-Repetition-F0-1-2-3-4-RRC-Config-r17*. | FS | No | N/A | N/A |
| ***intraBandFreqSeparationUL, intraBandFreqSeparationUL-v1620***  Indicates UL 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 FeatureSetUplink of each band entry within a band. The values mhzX corresponds to the values XMHz defined in TS 38.101-2 [3]. It is mandatory to report for UE which supports UL non-contiguous CA in FR2.  If the UE sets the field *intraBandFreqSeparationUL-v1620* it shall set *intraBandFreqSeparationUL* (without suffix) to the nearest smaller value. | FS | CY | N/A | FR2 only |
| ***intraFreqDAPS-UL-r16***  Indicates whether UE supports enhanced uplink capabilities for intra-frequency DAPS handover. The UE only includes this capability signalling if *intraFreqDAPS-r16* is included in the *FeatureSetDownlink* for the same *FeatureSet*. The capability signalling comprises of the following parameter:  - *intraFreqTwoTAGs-DAPS-r16* indicates whether the UE supports different timing advance groups in source PCell and intra-frequency target PCell. It is mandatory with capability signalling. | FS | No | N/A | N/A |
| ***max2SP1SRS8T8R-AntennaSwitch-r18***  Indicates whether the UE supports maximum 2 SP SRS resource sets and maximum 1 periodic SRS resource set for 8T8R antenna switching.  A UE supports this feature shall also indicate support of FG40-5-4.  NOTE 1: If UE does NOT support this feature, support maximum one SRS resource set for periodic SRS and maximum one SRS resource set for semi-persistent SRS  NOTE 2: The two SP-SRS resource sets are not activated at the same time. | FS | No | N/A | N/A |
| ***mTRP-PUCCH-IntraSlot-r17***  Indicates whether the UE supports PUCCH repetition scheme 3 (intra-slot repetition) with sequential mapping for repetitions larger than 2 and cyclic mapping for 2 repetitions by indicating the supported PUCCH formats for this scheme. The UE indicating this feature shall also support up to two PUCCH power control parameter sets/spatial relation info per PUCCH resource.  Power control parameter sets feature is applicable to FR1 only (without spatial relation info) and spatial relation info is applicable to FR2 only. | FS | No | N/A | N/A |
| ***mTRP-PUSCH-TypeA-CB-r17***  Indicates the support of multi-TRP PUSCH repetition based on codebook with PUSCH repetition type A. The value indicates the supported number of SRS resources in one SRS resource set.  This feature includes the following features:  - sequential mapping for repetitions larger than 2.  - cyclic mapping for 2 repetitions.  - two SRS resource sets with usage set to 'codebook'.  The UE indicating support of this feature shall also indicate the support of *mimo-CB-PUSCH.* If the value of supported number of SRS resources is 4 then the UE shall also indicate support of *ul-FullPwrMode2-MaxSRS-ResInSet* set to n4*.* | FS | No | N/A | N/A |
| ***mTRP-PUSCH-RepetitionTypeA-r17***  Indicates whether the UE supports multi-TRP PUSCH repetition for non-codebook based PUSCH repetition type A with sequential mapping for repetitions larger than 2 and cyclic mapping for 2 repetitions by indicating the supported number of SRS resources in one SRS resource set. The UE indicating this feature shall also support two SRS resource sets with usage set to 'nonCodebook'.  The UE indicating this feature shall indicate support of *maxNumberMIMO-LayersNonCB-PUSCH* and *mimo-NonCB-PUSCH.* | FS | No | N/A | N/A |
| ***multiPUCCH-r16***  Indicates whether the UE supports more than one PUCCH for HARQ-ACK transmission within a slot. This field includes the following parameters:  - *sub-SlotConfig-NCP-r16* indicates the sub-slot configuration for NCP;  - *sub-SlotConfig-ECP-r16* indicates the sub-slot configuration for ECP.  For NCP, the value *set1* denotes 7-symbol\*2, and *set2* denotes 2-symbol\*7 and 7-symbol\*2.  For ECP, the value *set1* denotes 6-symbol\*2, and *set2* denotes 2-symbol\*6 and 6-symbol\*2. | FS | No | N/A | N/A |
| ***mux-SR-HARQ-ACK-r16***  Indicates whether the UE supports SR/HARQ-ACK multiplexing once per subslot using a PUCCH (or HARQ-ACK piggybacked on a PUSCH) when SR/HARQ-ACK are supposed to be sent with different starting symbols in a subslot. | FS | No | N/A | N/A |
| ***offsetSRS-CB-PUSCH-Ant-Switch-fr1-r16***  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for SRS for codebook based PUSCH and antenna switching.  UE indicating support of this shall indicate support of *supportedSRS-Resources.* | FS | No | N/A | FR1 only |
| ***offsetSRS-CB-PUSCH-PDCCH-MonitorSingleOcc-fr1-r16***  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for SRS for codebook based PUSCH and antenna switching for the case of PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot.  UE indicating support of this shall indicate support of *supportedSRS-Resources.* | FS | No | N/A | FR1 only |
| ***offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithoutGap-fr1-r16***  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for the case of 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.  UE indicating support of this shall indicate support of *supportedSRS-Resources.* | FS | No | N/A | FR1 only |
| ***offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithGap-fr1-r16***  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for SRS for codebook based PUSCH and antenna switching for the case of 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.  UE indicating support of this shall indicate support of *pdcch-MonitoringAnyOccasions* with value *withDCI-Gap* and *supportedSRS-Resources.* | FS | No | N/A | FR1 only |
| ***offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithSpanGap-fr1-r16***  Indicates whether UE requires minimum of 19 symbols offset between aperiodic SRS triggering and transmission for the case of 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).  UE indicating support of this shall indicate support of *supportedSRS-Resources*. | FS | No | N/A | FR1 only |
| ***pa-PhaseDiscontinuityImpacts***  Indicates incapability motivated by impacts of PA phase discontinuity with overlapping transmissions with non-aligned starting or ending times or hop boundaries across carriers for intra-band (NG)EN-DC/NE-DC, intra-band CA and FDM based ULSUP.  This capability applies to:  - Intra-band (NG)EN-DC/NE-DC combination without additional inter-band NR and LTE CA component;  - Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component;  - Inter-band (NG)EN-DC/NE-DC combination, where the frequency range of the E-UTRA band is a subset of the frequency range of the NR band (as specified in Table 5.5B.4.1-1 of TS 38.101-3 [4]).  If this capability is included in an "Intra-band (NG)EN-DC/NE-DC combination supporting both UL and DL intra-band (NG)EN-DC/NE-DC parts with additional inter-band NR/LTE CA component", this capability applies to the intra-band (NG)EN-DC/NE-DC BC part. | FS | No | N/A | N/A |
| ***partialCancellationPUCCH-PUSCH-PRACH-TX-r16***  Indicates whether UE supports the partial cancellation of the configured PUCCH or PUSCH or PRACH transmission in set of symbols of a slot due to:  - Detection of a DCI format 2\_0 with a slot format value other than 255 that indicates a slot format with a subset of symbols from the set of symbols as downlink or flexible;  - DCI format 2\_0 being configured but not detected, when either a subset of symbols from the set of symbols are indicated as flexible by *tdd-UL-DL-ConfigurationCommon*, and *tdd-UL-DL-ConfigurationDedicated* if provided, or *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated* are not provided to the UE;  - Detection of a DCI format 1\_0, DCI format 1\_1, DCI format 1\_2 or DCI format 0\_1 and DCI format 0\_2 indicating to the UE to receive CSI-RS or PDSCH in a subset of symbols from the set of symbols. | FS | No | N/A | N/A |
| ***phaseReportMoreThanOne-r18***  Indicates whether the UE supports phase report for Y>=1.  A UE supporting this feature shall also indicate support of FG40-3-3-1. | FS | No | N/A | N/A |
| ***phy-PrioritizationHighPriorityDG-LowPriorityCG-r17***  Indicates whether the UE supports PHY prioritization of overlapping high-priority DG-PUSCH and low-priority CG-PUSCH comprised of the following functional components:  - PHY prioritization of overlapping high-priority dynamic grant PUSCH and low-priority configured grant PUSCH on a BWP of a serving cell;  - Configuration of PHY priority level for CG PUSCH, and dynamic indication of priority level for dynamic PUSCH with a single DCI format.  The capability signalling comprises the following parameters:  - *pusch-PreparationLowPriority-r17* indicates additional number of symbols (d1) needed beyond the PUSCH preparation time for cancelling a low priority UL transmission;  - *additionalCancellationTime-r17* indicates additional number of symbols (d3) needed on top of Rel-16 cancellation time (which results N2+d1+d3 in total cancellation time);  - *maxNumberCarriers-r17* indicates maximum number of supported carriers on the band across a set of contiguous carriers for the reported FS of that band.  The value sym0 denotes 0 symbol, sym1 denotes one symbol, and so on. | FS | No | N/A | N/A |
| ***phy-PrioritizationLowPriorityDG-HighPriorityCG-r17***  Indicates whether the UE supports PHY prioritization of overlapping low-priority DG-PUSCH and high-priority CG-PUSCH comprised of the following functional components:  - PHY prioritization for the case where low-priority DG-PUSCH collides with high-priority CG-PUSCH;  - Configuration of PHY priority level for CG PUSCH, and dynamic indication of priority level for dynamic PUSCH with a single DCI format.  The value indicates maximum number of supported carriers on the band across a set of contiguous carriers for the reported FS of that band. | FS | No | N/A | N/A |
| ***pucch-Repetition-F0-1-2-3-4-DynamicIndication-r17***  Indicates whether the UE supports repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots based on dynamic repetition indication*.*  The UE indicating support of this feature shall also indicate the support of *pucch-Repetition-F0-1-2-3-4-RRC-Config-r17.*  NOTE: Dynamic PUCCH repetition factor indication is only supported for HARQ-ACK. | FS | No | N/A | N/A |
| ***pucch-Repetition-F0-1-2-3-4-RRC-Config-r17***  Indicates whether the UE supports repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with RRC configured repetition factor K = 2, 4, 8.  A UE supporting this feature shall also indicate support of *pucch-Repetition-F1-3-4* and *multiPUCCH-r16.*  NOTE: The support of this feature doesn't imply an increase of the maximum number of PUCCHs per slot that supported by the UE. | FS | No | N/A | N/A |
| ***pucch-SingleDCI-STx2P-SFN-r18***  Indicates whether the UE supports single-DCI based STx2P SFN scheme for PUCCH and the supported PUCCH formats for STxMP SFN scheme. | FS | No | N/A | FR2 only |
| ***pusch-1SymbolFL-DMRS-Addition3Symbol-r18***  Indicates whether the UE supports 1 symbol FL DMRS and 3 additional DMRS symbols for enhanced DMRS ports for PUSCH.  A UE supporting this feature shall also indicate support of FG40-4-6. | FS | No | N/A | N/A |
| ***pusch-2SymbolFL-DMRS-r18***  Indicates whether the UE supports 2 symbols FL-DMRS for enhanced DMRS ports for PUSCH.  A UE supporting this feature shall also indicate support of FG40-4-6. | FS | No | N/A | N/A |
| ***pusch-2SymbolFL-DMRS-Addition2Symbol-r18***  Indicates whether the UE supports 2-symbol FL DMRS + one additional 2-symbols DMRS for enhanced DMRS ports for PUSCH.  A UE supporting this feature shall also indicate support of FG40-4-6. | FS | No | N/A | N/A |
| ***pusch-ProcessingType1-DifferentTB-PerSlot***  Indicates whether the UE capable of processing time capability 1 supports transmission of up to two, four or seven unicast PUSCHs for several transport blocks in one serving cell within the same slot per CC that are multiplexed in time domain only. | FS | No | N/A | N/A |
| ***pusch-ProcessingType2***  Indicates whether the UE supports PUSCH 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 PUSCH 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 PUSCHs 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 PUSCHs 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 *pusch-ProcessingType2* is indicated. | FS | No | N/A | FR1 only |
| ***pusch-RepetitionTypeB-r16, pusch-RepetitionTypeB-v16d0***  Indicates whether the UE supports PUSCH repetition type B, as specified in 6.1.2 of TS 38.214 [12].  The *maxNumberPUSCH-Tx-r16* in *pusch-RepetitionTypeB-r16* indicates the supported maximum number of PUSCH transmissions within a slot for all TB(s) for processing capability 1 if *pusch-ProcessingType2* is not included, or for both processing capability 1 and processing capability 2 if *pusch-ProcessingType2* is included. The *maxNumberPUSCH-Tx-Cap1-r16* and *maxNumberPUSCH-Tx-Cap2-r16* in *pusch-RepetitionTypeB-v16d0* are for processing capability 1 and processing capability 2 separately, which are only included when different values are supported for the processing capabilities. The *maxNumberPUSCH-Tx-r16* will be ignored by the network if the *pusch-RepetitionTypeB-v16d0* is included. | FS | No | N/A | N/A |
| ***pusch-SeparationWithGap***  Indicates whether the UE supports separation of two unicast PUSCHs with a gap, applicable to Sub-carrier spacings of 15 kHz, 30 kHz and 60 kHz only. For any two consecutive slots n and n+1, if there are more than 1 unicast PUSCH in either slot, the minimum time separation between starting time of any two unicast PUSCHs within the duration of these slots is 2 OFDM symbols for 15kHz, 4 OFDM symbols for 30kHz and 7 OFDM symbols for 60kHz. | FS | No | N/A | N/A |
| ***searchSpaceSharingCA-UL***  Defines whether the UE supports UL PDCCH search space sharing for carrier aggregation operation. | FS | No | N/A | N/A |
| ***semiStaticHARQ-ACK-CodebookSub-SlotPUCCH-r17***  Indicates whether the UE supports Semi-static (Type 1) HARQ-ACK codebook for sub-slot based PUCCH configuration*.*  A UE supporting this feature shall also indicate support of *semiStaticHARQ-ACK-Codebook* and *multiPUCCH-r16*. | FS | No | N/A | N/A |
| ***simultaneousTxSUL-NonSUL***  Indicates whether the UE supports simultaneous transmission of SRS on an SUL/non-SUL carrier and PUSCH/PUCCH/SRS on the other UL carrier in the same cell. The UE supports simultaneous transmission on an SUL band X and a Non-SUL band Y if it sets this capability parameter for both band X and band Y. | FS | No | N/A | N/A |
| ***srs-AntennaSwitching2SP-1Periodic-r17***  Indicates whether the UE supports maximum 2 SP SRS resource sets and maximum 1 periodic SRS resource set for antenna switching.  The UE indicating support of this shall indicate support of *supportedSRS-Resources.*  NOTE:  - Applies for all supported xTyR where y<=8  - For xTyR where y>4, if UE does not support this feature, UE supports maximum one SRS resource set for periodic SRS and maximum one SRS resource set for semi-persistent SRS  - For xTyR where y<=4, if UE does not support this feature, UE follows Rel-15 on the number of resource sets for periodic and semi-persistent SRS  The two SP-SRS resource sets are not activated at the same time. | FS | No | N/A | N/A |
| ***srs-ExtensionAperiodicSRS-r17***  Indicates whether the UE supports 4 aperiodic SRS resource sets for 1T4R and 2 aperiodic resource sets for 1T2R/2T4R.  The UE indicating support of this shall indicate support of *srs-TxSwitch* and *supportedSRS-Resources.* | FS | No | N/A | N/A |
| ***srs-OneAP-SRS-r17***  Indicates the support of 1 aperiodic SRS resource sets for 1T4R.  The UE indicating support of this feature shall also indicate the support of *srs-StartAnyOFDM-Symbol-r16* and *srs-TxSwitch.* | FS | No | N/A | N/A |
| ***srs-PosResources-r16***  Indicates support of SRS for positioning. UE supporting this feature should also support open loop power control for positioning SRS based on SSB from the serving cell. The capability signalling comprises the following parameters:  - *maxNumberSRS-PosResourceSetPerBWP-r16* Indicates the max number of SRS Resource Sets for positioning supported by UE per BWP*;*  - *maxNumberSRS-PosResourcesPerBWP-r16* indicates the max number of SRS resources for positioning supported by UE per BWP, including periodic, semi-persistent, and aperiodic SRS;  - *maxNumberSRS-ResourcesPerBWP-PerSlot-r16* indicates the max number of SRS resources configured by *SRS-Resource* and *SRS-PosResource-r16* supported by UE per BWP, including periodic, semi-persistent, and aperiodic SRS;  - *maxNumberPeriodicSRS-PosResourcesPerBWP-r16* indicates the max number of periodic SRS resources for positioning supported by UE per BWP;  - *maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r16* indicates the max number of periodic SRS resources for positioning supported by UE per BWP per slot. | FS | No | N/A | N/A |
| ***srs-PosResourceAP-r16***  Indicates support of aperiodic SRS for positioning. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - *maxNumberAP-SRS-PosResourcesPerBWP-r16* indicates the max number of aperiodic SRS resources for positioning supported by UE per BWP;  - *maxNumberAP-SRS-PosResourcesPerBWP-PerSlot-r16* indicates the max number of aperiodic SRS resources for positioning supported by UE per BWP per slot. | FS | No | N/A | N/A |
| ***srs-PosResourceSP-r16***  Indicates support of semi-persistent SRS for positioning. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - *maxNumberSP-SRS-PosResourcesPerBWP-r16* indicates the max number of semi-persistent SRS resources for positioning supported by UE per BWP;  - *maxNumberSP-SRS-PosResourcesPerBWP-PerSlot-r16* indicates the max number of semi-persistent SRS resources for positioning supported by UE per BWP per slot | FS | No | N/A | N/A |
| ***supportedSRS-Resources***  Defines support of SRS resources. 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 this field is not included, the UE supports one periodic, one aperiodic, no semi-persistent SRS resources per BWP and 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 |
| ***tdcpNumberDelayValue-r18***  Indicates whether the UE supports number Y>1 of delay values for which TDCP is reported.  A UE supporting this feature shall also indicate support of FG40-3-3-1. | FS | No | N/A | N/A |
| ***twoHARQ-ACK-Codebook-type1-r16***  Indicates whether the UE supports two HARQ-ACK codebooks with up to one subslot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based + subslot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE. The capability signalling comprises the following parameters:  - *sub-SlotConfig-NCP-r16* indicates the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot for NCP with 2-symbol\*7 sub-slot configuration;  - *sub-SlotConfig-ECP-r16* indicates the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot for ECP with 2-symbol\*6 sub-slot configuration;  For the 7-symbol\*2 sub-slot configuration of NCP or the 6-symbol\*2 sub-slot configuration of ECP, the value of the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot is {2}.  NOTE 1: If the UE indicates support of this feature and is simultaneously configured with two slot-based HARQ-ACK codebooks:  - whether the UE supports two PUCCH of format 0 or 2 in consecutive symbols in the same slot for each HARQ-ACK codebook is subject to the capability reported by *twoPUCCH-F0-2-ConsecSymbols*.  - whether the UE supports one PUCCH format 0 or 2 and one PUCCH format 1, 3 or 4 in the same slot for each HARQ-ACK codebook is subject to the capability reported by *onePUCCH-LongAndShortFormat*.  - whether the UE supports two PUCCH transmissions in the same slot for each HARQ-ACK codebook not covered by *twoPUCCH-F0-2-ConsecSymbols* and *onePUCCH-LongAndShortFormat* is subject to the capability reported by *twoPUCCH-AnyOthersInSlot*.  NOTE 2: If a UE reports both *multiPUCCH-r16* and *twoHARQ-ACK-Codebook-type1-r16*, it can support two slot-based HARQ-ACK codebooks, and one slot-based and one-sub-slot-based HARQ-ACK codebooks. If a UE reports *twoHARQ-ACK-Codebook-type1-r16* but does not report *multiPUCCH-r16*, it can only support two slot-based HARQ-ACK codebooks. | FS | No | N/A | N/A |
| ***twoHARQ-ACK-Codebook-type2-r16***  Indicates whether the UE supports two subslot based HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE. The capability signalling comprises the following parameters:  - *sub-SlotConfig-NCP-r16* indicates the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot for NCP with 2-symbol\*7 sub-slot configuration;  - *sub-SlotConfig-ECP-r16* indicates the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot for ECP with 2-symbol\*6 sub-slot configuration;  For the 7-symbol\*2 sub-slot configuration of NCP or the 6-symbol\*2 sub-slot configuration of ECP, the value of the maximum number of actual PUCCH transmissions for HARQ-ACK within a slot is {2}. | FS | No | N/A | N/A |
| ***twoPUCCH-Group***  Indicates whether two PUCCH group in CA with a same numerology across CCs for data and control channel [at a given time] is supported by the UE. For NR CA, two PUCCH group is supported with the same numerology across NR carriers for data and control channel at a given time. For (NG)EN-DC/NE-DC, two PUCCH group is supported with the same numerology across NR carriers for data and control channel at a given time, wherein an NR PUCCH group is configured in FR1 and another NR PUCCH group is configured in FR2. The UE supports two PUCCH groups with PUCCH on a band X and a band Y if it sets this capability parameter for both band X and band Y. | FS | No | N/A | N/A |
| ***twoPUCCH-Type1-r16***  Indicates whether the UE supports two PUCCH of format 0 or 2 in the same subslot for a single 7\*2-symbol subslot based HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type2-r16***  Indicates whether the UE supports two PUCCH of format 0 or 2 in consecutive symbols in the same subslot for a single 2\*7-symbol subslot based HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type3-r16***  Indicates whether the UE supports one PUCCH format 0 or 2 and one PUCCH format 1, 3 or 4 in the same subslot for a single 2\*7-symbol HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type4-r16***  Indicates whether the UE supports two PUCCH transmissions in the same subslot for a single 2\*7-symbol HARQ-ACK codebook which are not covered by *twoPUCCH-Type2-r16* and *twoPUCCH-Type3-r16*. | FS | No | N/A | N/A |
| ***twoPUCCH-Type5-r16***  Indicates whether the UE supports two PUCCH of format 0 or 2 for two HARQ-ACK codebooks with one 7\*2-symbol subslot based HARQ-ACK codebook and one slot based HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type6-r16***  Indicates whether the UE supports two PUCCH of format 0 or 2 in consecutive symbols in the same subslot for two HARQ-ACK codebooks with one 2\*7-symbol subslot based HARQ-ACK codebook and one slot based HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type7-r16***  Indicates whether the UE supports two PUCCH of format 0 or 2 in consecutive symbols in the same subslot for two subslot based HARQ-ACK codebooks. | FS | No | N/A | N/A |
| ***twoPUCCH-Type8-r16***  Indicates whether the UE supports one PUCCH format 0 or 2 and one PUCCH format 1, 3 or 4 in the same subslot for two HARQ-ACK codebooks with one 2\*7-symbol subslot based HARQ-ACK codebook and one slot based HARQ-ACK codebook. | FS | No | N/A | N/A |
| ***twoPUCCH-Type9-r16***  Indicates whether the UE supports one PUCCH format 0 or 2 and one PUCCH format 1, 3 or 4 in the same subslot for two subslot based HARQ-ACK codebooks. | FS | No | N/A | N/A |
| ***twoPUCCH-Type10-r16***  Indicates whether the UE supports two PUCCH transmissions in the same subslot for two HARQ-ACK codebooks with one 2\*7-symbol subslot and one slot based HARQ-ACK codebook which are not covered by *twoPUCCH-Type6-r16* and *twoPUCCH-Type8-r16*. | FS | No | N/A | N/A |
| ***twoPUCCH-Type11-r16***  Indicates whether the UE supports two PUCCH transmissions in the same subslot for two subslot based HARQ-ACK codebooks which are not covered by *twoPUCCH-Type7-r16* and *twoPUCCH-Type9-r16*. | FS | No | N/A | N/A |
| ***txDiversity2Tx-r18***  Indicates whether the UE supports 2Tx Tx diversity for the band configured.  This capability is applicable for both single band (non-CA) case and CA case. | FS | No | N/A | FR1 only |
| ***txDiversity4Tx-r18***  Indicates whether the UE supports Tx diversity for 4Tx for the band configured.  This capability is applicable for both single band (non-CA) case and CA case. | FS | No | N/A | FR1 only |
| ***tx-Support-UL-GapFR2-r17***  Indicates whether the UE supports UL transmission in FR2 bands within an FR2 UL gap when the FR2 UL gap is activated in inter-band UL CA. The UE which indicates support for *tx-Support-UL-GapFR2-r17*shall also indicate support for *ul-GapFR2-r17* in an FR2 band. | FS | No | No | FR2 only |
| ***ue-PowerClassPerBandPerBC-r17***  Indicates the UE power class per band per band combination.  NOTE: Void. | FS | No | N/A | FR1 only |
| ***ul-CancellationCrossCarrier-r16***  Indicates whether the UE supports UL cancellation scheme for cross-carrier comprised of the following functional components:  - Supports group common DCI (i.e. DCI format 2\_4) for cancellation indication on a different DL CC than that scheduling PUSCH or SRS;  - UL cancellation for PUSCH. Cancellation is applied to each PUSCH repetition individually in case of PUSCH repetitions;  - UL cancellation for SRS symbols that overlap with the cancelled symbols. | FS | No | N/A | N/A |
| ***ul-CancellationSelfCarrier-r16***  Indicates whether the UE supports UL cancellation scheme for self-carrier comprised of the following functional components:  - Supports group common DCI (i.e. DCI format 2\_4) for cancellation indication on the same DL CC as that scheduling PUSCH or SRS;  - UL cancellation for PUSCH. Cancellation is applied to each PUSCH repetition individually in case of PUSCH repetitions;  - UL cancellation for SRS symbols that overlap with the cancelled symbols. | FS | No | N/A | N/A |
| ***ul-DMRS-SingleDCI-M-TRP-r18***  Indicates whether the UE supports UL DMRS with Single-DCI based M-TRP. | FS | No | N/A | N/A |
| ***ul-DMRS-M-DCI-M-TRP-r18***  Indicates whether the UE supports UL DMRS with M-DCI based M-TRP. | FS | No | N/A | N/A |
| ***ul-FullPwrMode-r16***  Indicates the UE support of UL full power transmission mode of *fullpower* as specified in clause 7.1 of TS 38.213 [11]. If the UE indicates this capability the UE also indicates the support of codebook based PUSCH MIMO transmission using *mimo-CB-PUSCH* and the support of PUSCH codebook coherency subset using *pusch-TransCoherence.* | FS | No | N/A | N/A |
| ***ul-FullPwrMode1-r16***  Indicates the UE support of UL full power transmission mode of *fullpowerMode1*. If the UE indicates this capability the UE also indicates the support of codebook based PUSCH MIMO transmission using *mimo-CB-PUSCH* and the support of PUSCH codebook coherency subset using *pusch-TransCoherence.* | FS | No | N/A | N/A |
| ***ul-FullPwrMode2-MaxSRS-ResInSet-r16***  Indicates the UE support of the maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for uplink full power Mode 2 operation. If the UE indicates this capability the UE also indicates the support of codebook based PUSCH MIMO transmission using *mimo-CB-PUSCH* and the support of PUSCH codebook coherency subset using *pusch-TransCoherence.* A UE supports this feature shall support at least full power operation with single port. | FS | No | N/A | N/A |
| ***ul-FullPwrMode2-SRSConfig-diffNumSRSPorts-r16***  Indicates the UE supported SRS configuration with different number of antenna ports per SRS resource for uplink full power Mode 2 operation. The possible different number of antenna ports that can be configured for a SRS resource are as follow:  - value *p1-2* means that each SRS resource can be configured with 1 port or 2 ports  - value *p1-4* means that each SRS resource can be configured with 1 port or 4 ports  - value *p1-2-4* means that each SRS resource can be configured with 1 port or 2 ports or 4 ports  UE indicates support of this feature shall also indicate support of *ul-FullPwrMode2-MaxSRS-ResInSet.*  NOTE: The values *p1-2*, *p1-4* or *p1-2-4* can be used if *ul-FullPwrMode2-MaxSRS-ResInSet* is reported as *n2* or *n4*. | FS | No | N/A | N/A |
| ***ul-FullPwrMode2-TPMIGroup-r16***  Indicates the UE supported TPMI group(s) which delivers full power. The capability signalling comprises the following values:  - *twoPorts-r16* indicates a 2-bit bitmap, where the leading / leftmost bit (bit 0) corresponds to {TPMI index = 0}. The next bit (bit 1) corresponds to {TPMI index = 1} and the TPMI index is as specified in Table 6.3.1.5-1 of TS 38.211 [6]  - *fourPortsNonCoherent-r16* indicates the TPMI groups {G0-3}  - *fourPortsPartialCoherent-r16* indicates the TPMI groups {G0-6}  UE indicates support of this feature shall also indicate support of *ul-FullPwrMode2-MaxSRS-ResInSet.*  Definition of G0~G6 can be found in the table below:   |  |  | | --- | --- | | ID | TPMI groups | | G0 | , | | G1 | , , , | | G2 | , , , , | | G3 | , ,, | | G4 | , , | | G5 | , ,, ,, | | G6 | , ,,, ,  , , ,, |   NOTE 1: When a full coherent UE operates in mode 2, it reports TPMIs the same as a partial-coherent UE.  NOTE 2: For 4 port partial-coherent or full-coherent UE, UE can report: 2-port {2-bit bitmap} and one of 4-port non-coherent {G0~G3} and one of 4-port partial-coherent {G0~G6}  For 4 port non-coherent UE, UE can report: 2-port {2-bit bitmap} and one of 4-port non-coherent {G0~G3}  For 2 port UE, UE can report: 2-port {2-bit bitmap}  NOTE 3: A UE that supports this feature must report at least one of the values. | FS | No | N/A | N/A |
| ***ul-IntraUE-Mux-r16***  Indicates whether the UE supports intra-UE multiplexing/prioritization of overlapping PUCCH/PUCCH and PUCCH/PUSCH with two priority levels in the physical layer. This field includes the following parameters:  - *pusch-PreparationLowPriority-r16* indicates the additional number of symbols needed beyond the PUSCH preparation time for cancelling a low priority UL transmission;  - *pusch-PreparationHighPriority-r16* indicates the additional number of the preparation time needed for the high priority UL transmission that cancels a low priority UL transmission.  The value *sym0* denotes 0 symbol, *sym1* denotes one symbol, and so on. | FS | No | N/A | N/A |
| ***ul-MCS-TableAlt-DynamicIndication***  Indicates whether the UE supports dynamic indication of MCS table using MCS-C-RNTI for PUSCH. | FS | No | N/A | N/A |
| ***zeroSlotOffsetAperiodicSRS***  Indicates whether the UE supports 0 slot offset between aperiodic SRS triggering and transmission, for SRS for CB PUSCH and antenna switching on FR1. | FS | No | N/A | N/A |

<End of modification>