**3GPP TSG-RAN WG Meeting #96 *RP-22xxxx***

**Budapest, Hungary, 06 – 09 June 2022 *RP-221476***

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.306** | **CR** |  | **rev** | **2** | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *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:*** | HARQ-ACK multiplexing on PUSCH in the absence of PUCCH | | | | | | | | | |
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| ***Source to WG:*** | - | | | | | | | | | |
| ***Source to TSG:*** | Nokia, Nokia Shanghai Bell, Ericsson | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16, NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2022-05-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **A** |  | | | | | ***Release:*** | | | 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-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:*** | | Release 15 TS 38.213 was missing a behaviour for multiplexing HARQ-ACK bits in a PUSCH in a PUCCH slot when the UE has no HARQ-ACK to transmit in any PUCCH but it receives UL grant(s) with UL-TDAI field to transmit multiple PUSCHs in the PUCCH slot.  RAN1#109 agreed to introduce the missing behaviour to TS38.213 as part of the CRs 0316/0317 to TS38.213 in R1-2205628/5629 starting from Rel-16, and in addition introduce a new UE capability indicating that the UE behaviour is according to the CR.  LS on the UE capability in R1-2205634 | | | | | | | | |
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| ***Summary of change:*** | | Introduce new per-UE capability mux-HARQ-ACK-withoutPUCCH-onPUSCH-r16 for the RAN1-specified UCI on PUSCH multiplexing case  **Impact analysis**  Impacted functionality: HARQ-ACK multiplexing on a PUSCH triggered by a DAI-field on the PUSCH-scheduling DCI twhen the UE ransmits multiple PUSCHs in the PUCCH slot.  Inter-operability: Since this is a new UE capability, no inter-operability issues are foreseen | | | | | | | | |
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| ***Consequences if not approved:*** | | It is not possible for the network to know if the UE has implemented the behaviour introduced by the 38.213 CR | | | | | | | | |
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| ***Clauses affected:*** | | 4.2.7.11 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS38.213 CR0317, TS38.331 CR3204 | | |
| ***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:*** | | Rev1: This is the first version of the CR, Rev1 due to double Tdoc# booking  Rev2: Clarifications based on RAN2 reflector comments. | | | | | | | | |

*First Modified Subclause*

#### 4.2.7.11 Other PHY parameters

| Definitions for parameters | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
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| ***appliedFreqBandListFilter***  Mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. | UE | No | No | No |
| ***downlinkSetEUTRA***  Indicates the features that the UE supports on the DL carriers corresponding to one EUTRA band entry in a band combination by FeatureSetEUTRA-DownlinkId. The FeatureSetEUTRA-DownlinkId = 0 means that the UE does not support a EUTRA DL carrier in this band of a band combination. | Band | N/A | N/A | N/A |
| ***downlinkSetNR***  Indicates the features that the UE supports on the DL carriers corresponding to one NR band entry in a band combination by FeatureSetDownlinkId. The FeatureSetDownlinkId = 0 means that the UE does not support a DL carrier in this band of a band combination. A fallback per band feature set resulting from the reported DL feature set that has fallback per CC feature set is not signalled but the UE shall support it. | Band | N/A | N/A | N/A |
| ***extendedBand-n77-r16***  This field is only applicable for UEs that indicate support for band n77. If present, the UE supports the restriction to 3450 - 3550 MHz and 3700 - 3980 MHz ranges of band n77 in the USA as specified in Note 12 of Table 5.2-1 in TS 38.101-1 [2]. If absent, the UE supports only restriction to the 3700 - 3980 MHz range of band n77 in the USA. A UE that indicates this field shall also support NS value 55 as specified in TS 38.101-1 [2]. | UE | No | No | No |
| ***featureSetCombinations***  Pools of feature sets that the UE supports on the NR or MR-DC band combinations. | UE | N/A | No | No |
| ***featureSets***  Pools of downlink and uplink features sets as well as a pool of FeatureSetCombination elements. A FeatureSetCombination refers to the IDs of the feature set(s) that the UE supports in that FeatureSetCombination. The BandCombination entries in the BandCombinationList then indicate the ID of the FeatureSetCombination that the UE supports for that band combination. | UE | N/A | No | No |
| ***mux-HARQ-ACK-withoutPUCCH-onPUSCH-r16***  Indicates that the UE is implemented according to the definition in TS 38.213 [11] for multiplexing HARQ-ACK in a PUSCH in a PUCCH slot when the UE has no HARQ-ACK for any DL activity to transmit, but it receives UL grant(s) with UL-TDAI field indicating HARQ-ACK multiplexing on a PUSCH, and it transmits multiple PUSCHs in the PUCCH slot. | UE | No | No | No |
| ***naics-Capability-List***  Indicates that UE in MR-DC supports NAICS as defined in TS 36.331 [17]. | UE | No | No | No |
| ***receivedFilters***  Contains all filters requested with UE-CapabilityRequestFilterNR from version 15.6.0 onwards. | UE | No | No | No |
| ***supportedBandCombinationList***  Defines the supported NR and/or MR-DC band combinations by the UE. For each band combination the UE identifies the associated feature set combination by featureSetCombinations index referring to featureSetCombination. A fallback band combination resulting from the reported CA and MR-DC band combination is not signalled but the UE shall support it. For intra-band non-contiguous CA band combinations, the UE only includes one band combination, and exclude the others for which the presence of uplink CA bandwidth class in the band combination entry is different. One band combination entry can also indicate support of any other possible permutations in the presence of uplink CA bandwidth class where a paired downlink CA bandwidth class is the same or where the number of UL CCs is smaller than the one of paired DL CCs expressed by the CA bandwidth class, as specified in TS 36.306 [15]. For these band combinations not included in the capability, the supported feature set is the same as the ones for the band combination included in the UE capability. | UE | Yes | No | No |
| ***supportedBandCombinationListNEDC-Only***  Defines the supported NE-DC only type of band combinations by the UE. | UE | No | No | No |
| ***supportedBandCombinationList-UplinkTxSwitch-r16***  Defines the NR inter-band UL CA, SUL and/or EN-DC band combinations where UE supports dynamic UL Tx switching. UE only includes this field if requested by the network. All fallback band combinations resulting from the reported band combination, which include at least one band pair supporting dynamic UL Tx switching as indicated in *ULTxSwitchingBandPair*, shall be supported by the UE. | UE | No | No | No |
| ***supportedBandListNR***  Includes the supported NR bands as defined in TS 38.101-1 [2] and TS 38.101-2 [3]. | UE | Yes | No | No |
| ***uplinkSetEUTRA***  Indicates the features that the UE supports on the UL carriers corresponding to one EUTRA band entry in a band combination by FeatureSetEUTRA-UplinkId. The FeatureSetUplinkId = 0 means that the UE does not support a UL carrier in this band of a band combination. | Band | N/A | N/A | N/A |
| ***uplinkSetNR***  Indicates the features that the UE supports on the UL carriers corresponding to one NR band entry in a band combination by FeatureSetUplinkId. The FeatureSetUplinkId = 0 means that the UE does not support a UL carrier in this band of a band combination. A fallback per band feature set resulting from the reported UL feature set that has fallback per CC feature set is not signalled but the UE shall support it. | Band | N/A | N/A | N/A |

*End of Changes*