**3GPP TSG- Meeting #121bis-eR2-23xxxxx**

**Online, 17th – 26th April 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **4016** | **rev** | - | **Current version:** |  |  |
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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:***  | Correction to RRC for 71 GHz on multi-PUSCH |
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| ***Source to WG:*** | Ericsson, LG Electronics Inc., ASUSTeK, Huawei, HiSilicon |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_ext\_to\_71GHz-Core |  | ***Date:*** | 2023-04-20 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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 canbe 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:*** | 1. changes indicated in RAN1 LS R1-2302144 with some update
2. changes indicated in RAN1 LS R1-2302144 is not complete, the 1st change in R2-2303557 is adopted as the baseline.
3. Incorporation of correction from R2-2303942 regarding field description of *pusch-AllocationList, i.e.,* The *pusch-AllocationList-r17* is mentioned in the field description of *puschAllocationList*, but this does not exist in RRC specification. Thus, this should be removed and the related description needs to be updated
4. 4. Incorporation of correction from R2-2303917, i.e., according to text from TS 38.214, when *extendedK2* is not configured, *K2* is given by *k2-r16*. However, according to TS 38.331, when *extendedK2* is absent, the UE applies default value according to PUSCH SCS which makes inconsistence between TS 38.331 and TS 38.214.

According to previous RAN1 agreement, motivation of applying default value for K2 is when RRC parameter is absent. In this sense, default value should be corrected to be applied when both extendedK2 and k2-r16 are not configured |
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| ***Summary of change:*** | 1. Adopt the modified RAN1 wording “for all n if any two consecutive PUSCHs are non-contiguous”,
2. 1st change in R2-2303557 is further updated as “multiple contiguous PUSCH are configured per PDCCH, when the field *extendedK2(n)* corresponding to k2 of the PUSCHs in the n-th slot, n>1 is absent, the UE applies k2 of the first PUSCH plus n-1”.
3. Incorporation of correction from R2-2303942 regarding field description of *pusch-AllocationList,* i.e.,Remove *pusch-AllocationList-r17*.
4. Incorporation of correction from R2-2303917, i.e., specify the UE applies the default value for K2 when both extendedK2 and k2-r16 are not configured.

**Impact Analysis**Impacted 5G architecture options: NR SA, (NG)EN-DC, NE-DC,NR-DC Impacted functionality:multi-PUSCH configured by a single DCIInter-operability:if the network implements the change according to the CR and the UE does not, there are no inter-operability issues since the network will not configure *extendedK2-r17* for Type 1 multi-PUSCH.If the UE implements the change according to the CR and the network does not, there are inter-operability issues since the network may only configure *extendedK2-r17* without configuring *k2-r16* even for Type 1 multi-PUSCH while the UE only expects to receive *k2-r16*.  |
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| ***Consequences if not approved:*** | If changes are not approved, the UE cannot apply Type 1 multi-PUSCH properly due to an invalid K2 value configured by the network. |
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| ***Clauses affected:*** | 6.3.2 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*First change*

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# 6 Protocol data units, formats and parameters (ASN.1)

## 6.3 RRC information elements

### 6.3.2 Radio resource control information elements

**<<<<Skipped>>>>**

#### – *PUSCH-TimeDomainResourceAllocationList*

The IE *PUSCH-TimeDomainResourceAllocation* is used to configure a time domain relation between PDCCH and PUSCH. *PUSCH-TimeDomainResourceAllocationList* contains one or more of such *PUSCH-TimeDomainResourceAllocations*. The network indicates in the UL grant which of the configured time domain allocations the UE shall apply for that UL grant. The UE determines the bit width of the DCI field based on the number of entries in the *PUSCH-TimeDomainResourceAllocationList*. Value 0 in the DCI field refers to the first element in this list, value 1 in the DCI field refers to the second element in this list, and so on.

*PUSCH-TimeDomainResourceAllocation* information element

-- ASN1START

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-START

PUSCH-TimeDomainResourceAllocationList ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations)) OF PUSCH-TimeDomainResourceAllocation

PUSCH-TimeDomainResourceAllocation ::= SEQUENCE {

 k2 INTEGER(0..32) OPTIONAL, -- Need S

 mappingType ENUMERATED {typeA, typeB},

 startSymbolAndLength INTEGER (0..127)

}

PUSCH-TimeDomainResourceAllocationList-r16 ::= SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocation-r16

PUSCH-TimeDomainResourceAllocation-r16 ::= SEQUENCE {

 k2-r16 INTEGER(0..32) OPTIONAL, -- Need S

 puschAllocationList-r16 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF PUSCH-Allocation-r16,

...

}

PUSCH-Allocation-r16 ::= SEQUENCE {

 mappingType-r16 ENUMERATED {typeA, typeB} OPTIONAL, -- Cond NotFormat01-02-Or-TypeA

 startSymbolAndLength-r16 INTEGER (0..127) OPTIONAL, -- Cond NotFormat01-02-Or-TypeA

 startSymbol-r16 INTEGER (0..13) OPTIONAL, -- Cond RepTypeB

 length-r16 INTEGER (1..14) OPTIONAL, -- Cond RepTypeB

 numberOfRepetitions-r16 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16} OPTIONAL, -- Cond Format01-02

 ...,

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 numberOfRepetitionsExt-r17 ENUMERATED {n1, n2, n3, n4, n7, n8, n12, n16, n20, n24, n28, n32, spare4, spare3, spare2,

 spare1} OPTIONAL, -- Cond Format01-02-For-TypeA

 numberOfSlotsTBoMS-r17 ENUMERATED {n1, n2, n4, n8, spare4, spare3, spare2, spare1} OPTIONAL, -- Need R

 extendedK2-r17 INTEGER (0..128) OPTIONAL -- Cond MultiPUSCH

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}

-- TAG-PUSCH-TIMEDOMAINRESOURCEALLOCATIONLIST-STOP

-- ASN1STOP

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| *PUSCH-TimeDomainResourceAllocationList* field descriptions |
| ***extendedK2***Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1) configurable per PUSCH allocation. Only values {0..32} are applicable for PUSCH SCS of 120 kHz.When the field is absent for the first PUSCH if multiple PUSCH are configured per PDCCH and *k2-r16* is absent, or when the field is absent and only one PUSCH is configured per PDCCH and *k2-r16* is absent, the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, the value 3 when PUSCH SCS is 120 kHz, the value 11 when PUSCH SCS is 480 kHz, and the value 21 when PUSCH SCS is 960 kHz. If multiple contiguous PUSCHs are configured per PDCCH and *k2-r16* is absent, when the field *extendedK2(n)* corresponding to k2 of the PUSCHs in the n-th ~~PUSCH~~ slot, n>1 is absent, the UE applies k2 of the first PUSCH plus n-1. |
| ***k2***Corresponds to L1 parameter 'K2' (see TS 38.214 [19], clause 6.1.2.1). When the field is absent the UE applies the value 1 when PUSCH SCS is 15/30 kHz; the value 2 when PUSCH SCS is 60 kHz, and the value 3 when PUSCH SCS is 120 kHz. k2 is absent/ignored if *extendedK2* is present. |
| ***length***Indicates the length allocated for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***mappingType***Mapping type (see TS 38.214 [19], clause 6.1.2.1). |
| ***numberOfRepetitions***Number of repetitions for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). When *numberOfSlotsTBoMS-r17* is set to 2, 4 or 8 (i.e. TB processing over multi-slot (TBoMS) PUSCH is enabled), it indicates the number of repetitions of a single TBoMS. |
| ***numberOfRepetitionsExt***Number of repetitions for DCI format 0\_1/0\_2 if *pusch-RepTypeIndicatorDCI-0-1*/*pusch-RepTypeIndicatorDCI-0-2* is not set to *pusch-RepTypeB* (see TS 38.214 [19], clause 6.1.2.1). If this field is present, the field *numberOfRepeitions-r16* is ignored for PUSCH repetition Type A. |
| ***numberOfSlotsTBoMS***Number of slots allocated for TB processing over multi-slot PUSCH for DCI format 0\_1/0\_2. If a number of repetitions K is configured by *numberOfRepetitions* or *numberOfRepetitionsExt*, the network configures *numberOfSlotsTBoMS* (N) and K such that N\*K ≤ 32 (see TS 38.214 [19], clause 6.1.2.1). |
| ***puschAllocationList***The field *puschAllocationList-r16* indicates one or multiple PUSCH continuous in time domain which share a common k2 (see TS 38.214 [19], clause 6.1.2.1). In this release, this field configures one or multiple PUSCH that may be in consecutive or non-consecutive slots (see TS 38.214 [19], clause 6.1.2.1). The *puschAllocationList-r16* only has one element in *pusch-TimeDomainAllocationListDCI-0-1-r16* and in *pusch-TimeDomainAllocationListDCI-0-2-r16*. |
| ***startSymbol***Indicates the index of start symbol for PUSCH for DCI format 0\_1/0\_2 (see TS 38.214 [19], clause 6.1.2.1). |
| ***startSymbolAndLength***An index giving valid combinations of start symbol and length (jointly encoded) as start and length indicator (SLIV). The network configures the field so that the allocation does not cross the slot boundary. (see TS 38.214 [19], clause 6.1.2.1). |

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| Conditional Presence | Explanation |
| *Format01-02* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent.In *pusch-TimeDomainAllocationListDCI-0-1* and in *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present. |
| *Format01-02-For-TypeA* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent.In *pusch-TimeDomainAllocationListDCI-0-1*, the field is optionally present if *pusch-RepTypeIndicatorDCI-0-1* is not set to pusch-RepTypeB, Need R. It is absent otherwise, Need R.In *pusch-TimeDomainAllocationListDCI-0-2*, the field is optionally present if *pusch-RepTypeIndicatorDCI-0-2* is not set to pusch-RepTypeB, Need R. It is absent otherwise, Need R. |
| *NotFormat01-02-Or-TypeA* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is mandatory present.In *pusch-TimeDomainAllocationListDCI-0-1*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-1* is not set to pusch-RepTypeB. It is absent otherwise, Need R.In *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-2* is not set to pusch-RepTypeB. It is absent otherwise, Need R. |
| *RepTypeB* | In *pusch-TimeDomainAllocationListForMultiPUSCH-r16*, the field is absent.In *pusch-TimeDomainAllocationListDCI-0-1*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-1* is set to pusch-RepTypeB. It is absent otherwise, Need R.In *pusch-TimeDomainAllocationListDCI-0-2*, the field is mandatory present if *pusch-RepTypeIndicatorDCI-0-2* is set to pusch-RepTypeB. It is absent otherwise, Need R. |
| *MultiPUSCH* | In case size of *puschAllocationList* is higher than 1, the field *extendedK2(n)* corresponding to k2 of the n-th PUSCH, n>1, is mandatory present for all n if any two consecutive PUSCHs are non-contiguous. Otherwise, it is optionally present, Need S. |