**3GPP TSG RAN WG1 #110 R1-** **210xxxx**

**August 22nd – 26th, 2022**

**Agenda item:** 7.2.5

**Source:** Moderator (Qualcomm)

**Title:** Summary of Corrections for PUSCH TDRA

**Document for:** Discussion and Decision

# 1 Introduction

This document summarizes companies views on the corrections proposed in [1] regarding the selection of the PUSCH TDRA table.

According to [2], *pusch-TimeDomainAllocationList* is not configured simultaneously with *pusch-TimeDomainAllocationListDCI-0-2-r16* or *pusch-TimeDomainAllocationListDCI-0-1-r16:*

|  |
| --- |
| ***pusch-TimeDomainAllocationList***  List of time domain allocations for timing of UL assignment to UL data (see TS 38.214 [19], table 6.1.2.1.1-1). The field *pusch-TimeDomainAllocationList* applies to DCI formats 0\_0 or DCI format 0\_1 when the field *pusch-TimeDomainAllocationListDCI-0-1* is not configured (see TS 38.214 [19], table 6.1.2.1.1-1 and table 6.1.2.1.1-1A). The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with the *pusch-TimeDomainAllocationListDCI-0-2-r16* or*pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*. |

However, in the TDRA tables provided in Section 6.1.2.1 of [3], as copied below, these constraints are not reflected:

**Table 6.1.2.1.1-1A: Applicable PUSCH time domain resource allocation for DCI format 0\_1 in UE specific search space scrambled with C-RNTI, MCS-C-RNTI, CS-RNTI or SP-CSI-RNTI**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***pusch-ConfigCommon* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationListDCI-0-1*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH or pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH-17*** | **PUSCH time domain resource allocation to apply** |
| No | No | No | No | Default A |
| Yes | No | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-ConfigCommon* |
| No/Yes | Yes | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-Config* |
| No/Yes | No/Yes | Yes | - | *pusch-TimeDomainAllocationListDCI-0-1*provided in *pusch-Config* |
| No/Yes | No/Yes | - | Yes | *pusch-TimeDomainAllocationList-ForMultiPUSCH*or *pusch-TimeDomainAllocationList-ForMultiPUSCH* -17 provided in *pusch-Config* |

**Table 6.1.2.1.1-1B: Applicable PUSCH time domain resource allocation for DCI format 0\_2 in UE specific search space scrambled with C-RNTI, MCS-C-RNTI, CS-RNTI or SP-CSI-RNTI**

|  |  |  |  |
| --- | --- | --- | --- |
| ***pusch-ConfigCommon* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationListDCI-0-2*** | **PUSCH time domain resource allocation to apply** |
| No | No | No | Default A |
| Yes | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-ConfigCommon* |
| No/Yes | Yes | No | *pusch-TimeDomainAllocationList*provided in *pusch-Config* |
| No/Yes | No/Yes | Yes | *pusch-TimeDomainAllocationListDCI-0-2*provided in *pusch-Config* |

# 2 Proposals and Summary of Views

**Question #1:** To align the RAN1 specification with the constraint set in [2], do you agree with the following modifications:

**TP to TS38.214, Section 6.1.2.1 (Rel-16):**

**Reasons for change:** Disparity between the TDRA configuration constraints between TS 38.331 and TS 38.214.

**Summary of change:** Apply the configuration limitation of TS 38.331.

**Consequence if not adopted:** UE behavior is unclear

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 6.1.2.1.1-1A: Applicable PUSCH time domain resource allocation for DCI format 0\_1 in UE specific search space scrambled with C-RNTI, MCS-C-RNTI, CS-RNTI or SP-CSI-RNTI**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | ***pusch-ConfigCommon* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationListDCI-0-1*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH or pusch-Config* includes *pusch-TimeDomainAllocationList-ForMultiPUSCH-17*** | **PUSCH time domain resource allocation to apply** | | No | No | No | No | Default A | | Yes | No | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-ConfigCommon* | | No/Yes | Yes | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-Config* | | No/Yes | No~~/Yes~~ | Yes | - | *pusch-TimeDomainAllocationListDCI-0-1*provided in *pusch-Config* | | No/Yes | No/Yes | - | Yes | *pusch-TimeDomainAllocationList-ForMultiPUSCH*or *pusch-TimeDomainAllocationList-ForMultiPUSCH* -17 provided in *pusch-Config* |     **Table 6.1.2.1.1-1B: Applicable PUSCH time domain resource allocation for DCI format 0\_2 in UE specific search space scrambled with C-RNTI, MCS-C-RNTI, CS-RNTI or SP-CSI-RNTI**   |  |  |  |  | | --- | --- | --- | --- | | ***pusch-ConfigCommon* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationList*** | ***pusch-Config* includes *pusch-TimeDomainAllocationListDCI-0-2*** | **PUSCH time domain resource allocation to apply** | | No | No | No | Default A | | Yes | No | No | *pusch-TimeDomainAllocationList*provided in *pusch-ConfigCommon* | | No/Yes | Yes | No | *pusch-TimeDomainAllocationList*provided in *pusch-Config* | | No/Yes | No~~/Yes~~ | Yes | *pusch-TimeDomainAllocationListDCI-0-2*provided in *pusch-Config* | |

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Nokia | Yes for 0\_1 No for 0\_2 | It is unclear to us, why we actually are not able to operate DCI format 0\_2 with a smaller set of TDRA entries (configured specifically for 0\_2) and not operate 0\_1 with the TDRA table from Rel-15 in pusch-config  i.e. we don’t see why the 38.331 does not allow configuring *pusch-TimeDomainAllocationList* if configuring *pusch-TimeDomainAllocationListDCI-0-2*  So we are questioning if this unnecessary restriction should not be removed from 38.331 – i.e.  The network does not configure the *pusch-TimeDomainAllocationList* (without suffix) simultaneously with ~~the~~*~~pusch-TimeDomainAllocationListDCI-0-2-r16~~*~~or~~*pusch-TimeDomainAllocationListDCI-0-1-r16* or *pusch-TimeDomainAllocationListForMultiPUSCH-r16*. |
| Samsung | No | In 38.212, there are rules to determine TDRA field size based on RRC configuration as follows. So, there is no issue even if both RRC parameters are configured for 0\_1/0\_2 according to 214 specification. Therefore, current restriction specified in 38.331 is not necessary.   |  | | --- | | **1) DCI format 0\_1**  - Time domain resource assignment – 0, 1, 2, 3, 4, 5, or 6 bits  - If the higher layer parameter *pusch-TimeDomainAllocationListDCI-0-1* is not configured and if the higher layer parameter *pusch-TimeDomainAllocationListForMultiPUSCH* is not configured and if the higher layer parameter *pusch-TimeDomainAllocationList* is configured, 0, 1, 2, 3, or 4 bits as defined in Clause 6.1.2.1 of [6, TS38.214]. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *pusch-TimeDomainAllocationList*;  - If the higher layer parameter *pusch-TimeDomainAllocationListDCI-0-1* is configured or if the higher layer parameter *pusch-TimeDomainAllocationListForMultiPUSCH is configured*, 0, 1, 2, 3, 4, 5 or 6 bits as defined in Clause 6.1.2.1 of [6, TS38.214]. The bitwidth for this field is determined as ⌈log2(𝐼)⌉ bits, where *I* is the number of entries in the higher layer parameter *pusch-TimeDomainAllocationListDCI-0-1* or *pusch- TimeDomainAllocationListForMultiPUSCH*;  - otherwise the bitwidth for this field is determined as ⌈log2(𝐼)⌉ bits, where *I* is the number of entries in the default table*.*  **2) DCI format 0\_2**  - Time domain resource assignment – 0, 1, 2, 3, 4, 5 or 6 bits as defined in Clause 6.1.2.1 of [6, TS38.214]. The bitwidth for this field is determined as ⌈log2(𝐼)⌉ bits, where *I* is the number of entries in the higher layer parameter *pusch-TimeDomainAllocationListDCI-0-2* if the higher layer parameter is configured, or *I* is the number of entries in the higher layer parameter *PUSCH-TimeDomainResourceAllocationList* if the higher layer parameter *PUSCH-TimeDomainResourceAllocationList* is configured and the higher layer parameter *pusch-TimeDomainAllocationListDCI-0-2* is not configured; otherwise *I* is the number of entries in the default table*.* | |

# 3 Summary

TBD

# 4 References

**[1] R1-2207172, “*Maintenance for R16 eURLLC*,” Qualcomm**

**[2] TS 38.331, “Radio Resource Control (RRC) protocol specification”**

**[3] TS 38.214, “Physical layer procedures for data”**