**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*.* | |
| ZTE | No | The two tables (Table 6.1.2.1.1-1A/B) are actually to define which TDRA table to be used when multiple TDRA tables are available. So, it seems the current restriction in 38.331 is unnecessary.  Even if we follow the configuration restriction in 38.331, should we also need to delete the ‘Yes’ in the first column of the concerned row? |
| Spreadtrum |  | Agree with Nokia. |
| vivo | No | Similar view as Samsung and ZTE |
| Huawei, HiSilicon |  | The main issue here is that there is inconsistence between 38.331 and 38.214, thus either changing 331 or 38.214 is fine. From RAN1 specification perspective, as long as *pusch-TimeDomainAllocationList* with suffix is configured, then the one without suffix will not be used anyway, therefore it looks like that the restriction in 331 makes sense, so we slightly prefer to make the change for TS 38.214. |
| DOCOMO | No | Similar view with Samsung. |

# 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”**