**3GPP TSG RAN WG1 #104b-e R1-210xxxx**

**e-Meeting, April 12th – 20th, 2021**

**Agenda item:** 8.8

**Source:** Moderator (Qualcomm)

**Title:** FL summary for Reply LS to [R1-2102298](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2102298.zip)

**Document for:** Discussion/Decision

# Introduction

This document summarizes companies’ view for reply LS to [R1-2102298](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_104b\Docs\R1-2102298.zip).

# Response to RAN4 Question

**Question from RAN4 to RAN1: For analysis for the amount of tolerable phase change between repetitions, RAN4 respectably asks RAN1 if RAN1 has specific scenario what RAN4 should focus in their study? (e.g contiguous/non-contiguous transmission, within one time slot or multiple time slots, TDD band or FDD band etc)**

**The following table summarizes companies’ answers to this question in submitted contributions.**

|  |  |
| --- | --- |
| **Company name** | **Answer to RAN4 question in contributions** |
| **ZTE** | * Use case 1: back-to-back PUSCH transmissions within one slot. * Use case 2: non-back-to-back PUSCH transmissions within one slot. * Use case 3: back-to-back PUSCH transmissions across consecutive slots. * Use case 4: non-back-to-back PUSCH transmissions across consecutive slots. * Use case 5: PUSCH transmissions across non-consecutive slots.   Note: RAN1 assumes “back-to-back PUSCH transmission” has zero gap in-between adjacent PUSCH transmissions. |
| **OPPO** | * Use case 1: back-to-back PUSCH transmissions within one slot. * Use case 2: non-back-to-back PUSCH transmissions within one slot. * Use case 3: back-to-back PUSCH transmissions across consecutive slots. * Use case 4: non-back-to-back PUSCH transmissions across consecutive slots. * Use case 5: PUSCH transmissions across non-consecutive slots.   Note: RAN1 assumes “back-to-back PUSCH transmission” has zero gap in-between adjacent PUSCH transmissions. |
| **VIVO** | * Use case 1: back-to-back PUSCH transmissions within one slot. * Use case 2: non-back-to-back PUSCH transmissions within one slot. * Use case 3: back-to-back PUSCH transmissions across consecutive slots. * Use case 4: non-back-to-back PUSCH transmissions across consecutive slots. * Use case 5: PUSCH transmissions across non-consecutive slots.   Note: RAN1 assumes “back-to-back PUSCH transmission” has zero gap in-between adjacent PUSCH transmissions. |
| **LG** | * Use case 1: back-to-back PUSCH transmissions within one slot. * Use case 2: non-back-to-back PUSCH transmissions within one slot. * Use case 3: back-to-back PUSCH transmissions across consecutive slots. * Use case 4: non-back-to-back PUSCH transmissions across consecutive slots. * Use case 5: PUSCH transmissions across non-consecutive slots.   Note: RAN1 assumes “back-to-back PUSCH transmission” has zero gap in-between adjacent PUSCH transmissions. |
| **Ericsson** | * Both contiguous and non-contiguous repetition of PUSCH in a set of symbols across slots * Both contiguous and non-contiguous repetition of PUCCH in a set of symbols across slots or within a slot |
| **Huawei** | SuggestRAN4 to focus on the scenario of non-back-to-back PUSCH transmissions in phase change tolerance study   * + E.g. there are un-scheduled symbols or slots between PUSCH transmissions   + E.g. there are other signals transmitted between PUSCH transmissions |

Based on the above table, for PUSCH transmission, the situation seems quite stable. Therefore, FL has the following proposal.

**FL Proposal 1: For PUSCH transmission, Inform RAN4 the following 5 use cases which are considered in RAN1.**

* Use case 1: back-to-back PUSCH transmissions within one slot.
* Use case 2: non-back-to-back PUSCH transmissions within one slot.
* Use case 3: back-to-back PUSCH transmissions across consecutive slots.
* Use case 4: non-back-to-back PUSCH transmissions across consecutive slots.
* Use case 5: PUSCH transmissions across non-consecutive slots.

Note: RAN1 assumes “back-to-back PUSCH transmission” has zero gap in-between adjacent PUSCH transmissions.

For PUCCH transmission, more discussion is needed. Therefore, companies are encouraged to provide input on how to answer RAN4’s question for PUCCH in the following table.

|  |  |
| --- | --- |
| **Company name** | **Answer to RAN4 question for PUCCH transmission** |
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|  |  |

# Other related issues

This section summarizes a few other related issues which are mentioned in companies’ contributions.

VIVO has following proposals.

**Proposal 1: To confirm with RAN4 the understanding that, it is not feasible to perform DMRS bundling at gNB if the TPMI precoder changes between PUSCH transmissions.**

Comments to VIVO proposal 1 can be added in the following table.

|  |  |
| --- | --- |
| **Company name** | **Comments to VIVO proposal 1** |
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|  |  |

**Proposal 2: To confirm with RAN4 that, whether other UL transmissions, e.g. SRS or UL transmissions with different waveform, in between the PUCCH/PUSCH repetitions have impact on DMRS bundling, and whether any additional conditions are required.**

Comments to VIVO proposal 2 can be added in the following table.

|  |  |
| --- | --- |
| **Company name** | **Comments to VIVO proposal 2** |
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|  |  |

LG has the following proposal.

“In addition to that, it needs to be clarified that whether requirements for the cases between “uplink transmission in-between the PUSCH or PUCCH repetition in the same band for TDD case” and “no downlink reception and no uplink transmission in-between the PUSCH or PUCCH repetition in the same band for TDD case” needs to be classified or not. If needed, different requirements according to cases should be specified.”

Comments to LG proposal can be added in the following table.

|  |  |
| --- | --- |
| **Company name** | **Comments to LG proposal** |
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|  |  |

Ericsson has following proposal.

“RAN1 would like to further inform RAN4 that the TB processing over multi-slot PUSCH (‘TBoMS’) feature will also support joint channel estimation. While RAN1 is still discussing whether the numbers of PUSCH symbols can be different between slots of a TBoMS transmission, the scenarios for PUSCH repetition above can be a starting point for RAN4 TBoMS studies. RAN1 will provide further guidance if additional scenarios should be focussed upon.”

Comments to Ericsson proposal can be added in the following table.

|  |  |
| --- | --- |
| **Company name** | **Comments to Ericsson proposal** |
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