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

**e-Meeting, Jan 25th – Feb 5th, 2021**

**Agenda Item: 7.2.1**

**Source: Moderator (ZTE)**

**Title: Summary of email discussion for [104-e-NR-2step-RACH-01]**

**Document for: Discussion**

# Introduction

This document is intended to address the following corrections for 2-step RACH by email discussion.

[104-e-NR-2step-RACH-01] Corrections of 2-step RACH related issues till 1/28 – Li (ZTE)

* CR in R1-2008785, CR in R1-2101526, and TP in R1-2101573

# Correction on DMRS configuration for MsgA in 38.214

In R1-2100243, it is proposed to clarify that for MsgA PUSCH transmission, if a UE is not configured with *msgA-PUSCH-NrofPort*, the UE shall assume that it is only for the case of double-symbol DM-RS that 4 ports are configured per DM-RS CDM groups, because it should be clear that for single-symbol DM-RS case, there can be at most 2 ports configured per DM-RS CDM group.

And for MsgA PUSCH transmission, only PUSCH DM-RS configuration type 1 is supported, and there is no higher layer parameter “*dmrs-Type*”. It is proposed to make the correction in 38.214, similar to what has been provided in 38.211.

***Proposal 1:***

* Adopt the following TP#1 in 38.214, to clarify that it is “for double-symbol DM-RS” for MsgA PUSCH transmission when the UE is not configured with *msgA-PUSCH-NrofPort*, and remove the higher layer parameter “*dmrs-Type*” for MsgA PUSCH transmission.

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| **Reasons for change**  1. It is clear that there can be at most 2 ports configured per DM-RS CDM group for single-symbol DM-RS case. Then for MsgA PUSCH transmission, if a UE is not configured with *msgA-PUSCH-NrofPort*, the UE shall assume that it is only for the case of double-symbol DM-RS that 4 ports are configured per DM-RS CDM groups. This is also aligned with the possible DMRS configuration defined in TS 38.211 and TS 38.212.  2. For MsgA PUSCH transmission, only PUSCH DM-RS configuration type 1 is supported, and there is no higher layer parameter “*dmrs-Type*”. The corresponding correct description is already provided in TS 38.211.  **Summary of changes**  1. Clarify that it is “for double-symbol DM-RS” for MsgA PUSCH transmission, when the UE is not configured with *msgA-PUSCH-NrofPort*.  2. Delete “For MsgA PUSCH transmissions, *dmrs-Type* is type 1.”  **Consequences if not approved:**  Incorrect number of ports is specified for single-symbol DM-RS case. Incorrect use of a non-applicable higher-layer parameter for PUSCH DM-RS configuration type.  **Specs/Sections impacted**  TS 38.214, Section 6.2.2  ------------------------- **Start of Text Proposal #1 for TS 38.214** ----------------------------  6.2.2 UE DM-RS transmission procedure  <Unchanged Text Omitted>  When transmitted PUSCH is scheduled by DCI format 0\_1 with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, or corresponding to a configured grant, or being a PUSCH for Type-2 random access procedure,  - the UE may be configured with higher layer parameter *dmrs-Type* in *DMRS-UplinkConfig*, and the configured DM-RS configuration type is used for transmitting PUSCH in as defined in Clause 6.4.1.1 of [4, TS 38.211].  <Unchanged Text Omitted>  For MsgA PUSCH transmission, if the UE is not configured with *msgA-PUSCH-DMRS-CDM-group,* the UEshall assume that 2 DM-RS CDM groups are configured. Otherwise, *msgA-PUSCH-DMRS-CDM-group* indicates which DM-RS CDM group to use from the set of {0,1}.  For MsgA PUSCH transmission, if the UE is not configured with *msgA-PUSCH-NrofPort,* the UEshall assume that 4 ports are configured per DM-RS CDM groups for double-symbol DM-RS. Otherwise, *msgA-PUSCH-NrofPort* with value of 0 indicates the first port per DM-RS CDM group, while a value of 1 indicates the first two ports per DM-RS CDM group.  <Unchanged Text Omitted>  ------------------------- **End of Text Proposal #1**------------------------------- |

Any comments?

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# Correction on the transmission timing adjustment procedure in 38.213

R1-2101526 pointed out that a 12-bit absolute TA can be in a DL-SCH with Absolute Timing Advance Command MAC CE which is already specified in 38.321 from 2-step RACH work item in NR R16. But in 38.213, the 12 bits absolute TA is only assumed to be in RAR, and only 6-bit TA is assumed for all other cases. So it should be clarify that in the description of the transmission timing adjustment procedure, the 12-bit absolute TA can be also in a DL-SCH with Absolute Timing Advance Command.

***Proposal 2:***

* Adopt the following TP#2 in 38.213, to clarify that the 12-bit absolute TA can be also in a DL-SCH with Absolute Timing Advance Command.

**Reasons for change**

A 12-bit absolute TA can be in a DL-SCH with Absolute Timing Advance Command MAC CE which is already specified in 38.321 from 2-step RACH work item in NR R16.

But in 38.213, the 12 bits absolute TA is only assumed to be in RAR, and only 6-bit TA is assumed for all other cases.

**Summary of changes**

Clarify in the description of the transmission timing adjustment procedure that the 12-bit absolute TA can be also in a DL-SCH with Absolute Timing Advance Command.

**Consequences if not approved:**

The 12 bits Timing Advance Command carried in Absolute Timing Advance Command MAC CE in a DL-SCH will be treated as a 6-bit TA in “other cases” in 38.213.

**Specs/Sections impacted**

TS 38.213, Section 4.2

-----------------------**Start of Text Proposal #2 for TS 38.213** ----------------------------

4.2 Transmission timing adjustments

<Unchanged Text Omitted>

In case of random access response or Absolute Timing Advance Command MAC CE, a timing advance command [11, TS 38.321], , for a TAG indicates values by index values of  = 0, 1, 2, ..., 3846, where an amount of the time alignment for the TAG with SCS of  kHz is . is defined in [4, TS 38.211] and is relative to the SCS of the first uplink transmission from the UE after the reception of the random access response.

In other cases, a timing advance command [11, TS 38.321], , for a TAG indicates adjustment of a current value, , to the new value, , by index values of  = 0, 1, 2,..., 63, where for a SCS of  kHz, .

<Unchanged Text Omitted>

-------------------------**End of Text proposal #2** ----------------------------

Any comments?

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# Multiplexing between MsgB and unicast PDSCH

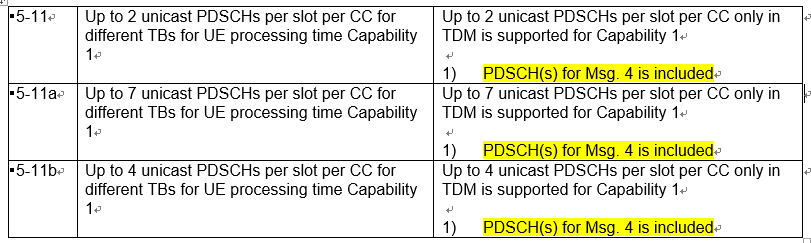
In R1-2101573, it was proposed to add some restriction on the multiplexing between MsgB and other unicast PDSCH, i.e. the UE is not expected to be scheduled a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI, and another PDSCH in the same cell scheduled with MSGB-RNTI in a slot.

The motivation was questioned by several companies during the preparation phase, and the proponent company provided some further clarifications.

[Spreadtrum]

For TP in R1-2101573, we want to provide further elaborations on why we should consider the restriction on MsgB.

* The payload size of MsgB could be much larger than Msg2 and/or Msg4 when including RRC payload for multiple UEs. It poses more challenge and difficulty for UE processing for the case when MsgB and unicast PDSCH TDMed multiplexing in a slot than the case for Msg2 and unicast PDSCH TDMed multiplexing in a slot.
* In our understanding, the processing capability requirement for MsgB could be equivalent to one unicast PDSCH. In Rel-15, for msg4, actually there are some restrictions in UE feature session, i.e., when UE not support more than 1 unicast PDSCHs in a slot per CC, UE is not expected to be scheduled with msg4 and unicast PDSCH in a slot per CC.



In our opinion, similar to msg4, UE should be not expected to be scheduled with MsgB and unicast PDSCH in a slot per CC when UE not supporting FG5-11/5-11a/5-11b. Otherwise, it is possibly that the UE could not process MsgB when one MsgB and one unicast PDSCH TDMed multiplexing in a slot. Then, the latency would be increased (always fallback to 4-step RACH) and the benefit of 2-step RACH would loss.

Thus, we have the following proposal:

**The UE is not expected to be scheduled a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI, and another PDSCH in the same cell scheduled with MSGB-RNTI in a slot.**

***Proposal 3:***

* Adopt the following TP#3 in 38.214, to restrict that MsgB and unicast PDSCH TDMed in a slot should not be supported.

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| Reason for change:  The payload size of MsgB is much larger than Msg2 and/or Msg4. The processing capability requirement for MsgB could be equivalent to unicast PDSCH. For UEs not supporting two unicast PDSCHs TDMed in a slot per CC, MsgB could not be treated. The accessing latency would be increased and the benefit of 2-step RACH would loss.  Summary of change:  Not support MsgB and unicast PDSCH TDMed multiplexing in a slot.  Consequences if not approved:  The benefit of 2-step RACH would loss, and even 2-step RACH could not be supported for UEs not supporting 2 unicast PDSCHs TDMed in a slot per CC.  Clauses affected:  TS38.214, Section 5.1  -----------------------**Start of Text Proposal #3 for TS 38.214** ---------------------------- 5.1 UE procedure for receiving the physical downlink shared channel <Unchanged Text Omitted>  The UE is not expected to decode a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI if another PDSCH in the same cell scheduled with RA-RNTI or MSGB-RNTI partially or fully overlap in time.  The UE is not expected to be scheduled a PDSCH scheduled with C-RNTI, MCS-C-RNTI, or CS-RNTI, and another PDSCH in the same cell scheduled with MSGB-RNTI in a slot.  <Unchanged Text Omitted>  -----------------------**End of Text Proposal #3** ---------------------------- |

Please companies double-check if the above clarifications make sense, and if the TP is agreeable.

Any comments?

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# Summary

The final proposals and the potential CRs are to be updated…

# References

1. R1-2100243 Correction on DMRS configuration for MsgA in 38.214 Huawei, HiSilicon
2. R1-2101526 Draft CR to 38.213 on corrections for 2-step RACH Ericsson
3. R1-2101573 Discussion on remaining issues on 2-step RACH Spreadtrum Communications