**3GPP TSG RAN WG1 #117 R1-240xxxx**

**Fukuoka City, Fukuoka, Japan, May 20th – 24th, 2024**

**Agenda item:** 7

**Source:** Moderator (Samsung)

**Title:** Summary of discussion on intra-UE multiplexing and prioritization

**Document for:** Discussion and Decision

# Introduction

This contribution aims to collect and summarize company views on the remaining issue of intra-UE multiplexing and prioritization as discussed in [1] ~ [3]. The following two issues were also discussed in RAN1#116bis without consensus.

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| Whether MAC generates a MAC PDU for a CG PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority?  If MAC does not generate a MAC PDU for a CG PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority, whether the CG PUSCH is included in the “candidate PUSCHs” for UCI multiplexing? |

Please consider entering the contact information below for better coordination for this discussion.

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| **Company** | **Contact(s)** | **Email address(es)** |
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| MTK | James Hsieh | CH.Hsieh@mediatek.com |
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# Background

Regarding whether MAC generates a MAC PDU for a CG PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority, or whether a UE transmits a CU PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority, it seems the current spec is not clear. A follow up question is if MAC does not generate a MAC PDU for a CG PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority, whether the CG PUSCH is included in the “candidate PUSCHs” for UCI multiplexing? Companies are encouraged to provide views on these issues and potential spec impact.

# Discussion

## 1st round discussion

**Q1: Do you think the spec is clear on “Whether MAC generates a MAC PDU for a CG PUSCH overlapping with a PUSCH with SP-CSI reports without UL-SCH on a same serving cell?” or “whether a UE transmits a CG PUSCH overlapping with a PUSCH with SP-CSI reports on a same serving cell for a same priority” ? If YES, please clarify the details.**

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| **Company** | **View** |
| MTK | We are open to clarify this issue if companies think current spec is not clear.  For “PUSCH with semi-persistent CSI report overlapping with CG PUSCH”, 38.214 captures this prioritization requirement stating that the PUSCH with semi-persistent CSI report would be cancelled depending on whether a TB has been generated for the CG PUSCH.    In our view when UE does the DG vs CG PUSCH prioritization step, it would also perform CG PUSCH vs PUSCH semi-persistent CSI and would select PUSCH semi-persistent CSI regardless of whether there is data in the LCH queues. In other words, CG PUSCH is excluded from candidate PUSCH for UCI multiplexing if it overlaps with PUSCH with SP-CSI.  Note that the case of PUSCH with A-CSI is already handled as part of the DG vs CG PUSCH prioritization step.  For the proposal from the proponent, it seems generally fine to us, but it needs to delete the line regarding DG PUSCH:    But actually, it is more clear if we just say that the resolution of PUSCH overlap within the same CC whether this is DG vs CG, or as above PUSCH SP-CSI vs CG  PUSCH is done before selecting the PUSCH candidates. Please note that the above line cross out in red is important because DG is no always higher priority than CG for example in case of Release 17 URLLC FGI25-14 (priLowDG-HighCG). |
|  | Do NOT support. Spec is already clear that within a serving cell, when SP-CSI on PSUCH overlaps with a PUSCH with UL-SCH, SP-CSI PUSCH is dropped. And that PUSCH with UL-SCH can be CG-PUSCH or DG-PUSCH. Now regardless CG is associated with TB or not, it does not matter to the NW. NW shall assume SP-CSI PUSCH is dropped since NW does not know if overlapping CG is with or without UL-SCH. We can take a conclusion that SP-CSI is dropped when overlapping with a CG PUSCH. |
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**Q2: What is your view on the intended UE behaviour for the questions in Q1?**

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| **Company** | **View** |
| MTK | See our reply in Q1. |
| Apple | UE will drop SP-CSI on PUSCH, given that NW shall not expect SP-CSI anyway. Whether UE transmits or drops a CG without UL-SCH is up to UE implementation. |
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**Q3: Do you think the spec is clear on “whether a CG PUSCH is included in the “candidate PUSCHs” when the CG PUSCH overlaps with a PUSCH with SP-CSI reports without UL-SCH on a same serving cell” If YES, please clarify the details.**

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| **Company** | **View** |
| MTK | See our reply in Q1. |
| Apple | Yes, see comments above. |
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**Q4: What is your view on “whether a CG PUSCH is included in the “candidate PUSCHs” when the CG PUSCH overlaps with a PUSCH with SP-CSI reports without UL-SCH on a same serving cell”?**

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| **Company** | **View** |
| MTK | See our reply in Q1. |
| Apple | See comments above. |
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# Conclusion

# Reference

1. R1-2404065 Discussion on intra-UE multiplexing and prioritization Samsung
2. R1-2404066 Correction on UCI multiplexing in a PUSCH transmission Samsung
3. R1-2404227 Discussion on the multiplexing prioritization for a PUSCH without a TB ZTE