**3GPP TSG RAN WG1 #105-e R1- 21xxxxx**

e-Meeting, May 12th – 20th, 2021

**Agenda item:** 7.2.5

**Source:** Moderator (vivo)

**Title:** Summary of the Remaining Issues on intra-UE prioritization/multiplexing

**Document for:** Discussion and Decision

# 1 Introduction

In this document, proposals and remaining issues related to intra-UE prioritization/multiplexing are summarized based on the contributions listed in the Reference. The recommendation for this meeting’s email thread is following:

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| **Topic** | **FL Comment** |
| **Issue #1:** Intra-UE prioritization and multiplexing   * Discuss whether to confirm RAN2’s working assumption on UL skipping vs. LCH-based prioritization. * Discuss PHY impacts/behavior on intra-UE prioritization and multiplexing. | Discuss in this meeting. |
| **Issue#2:** PHR for multiple CGs in one serving cell.   * Discuss which CG should be used for PH calculation if multiple CG PUSCHs with same starting symbol in one cell overlap with a PUSCH carrying the PHR in the other cell. | Deprioritize the discussion in this meeting. |

# 2 Issue #1

**Background:**

In RAN1#103-e and 104-e meeting, RAN1 received two LSs from RAN2 to confirm the intended UE behavior as below:

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| **RAN2 LS on Intra UE Prioritization Scenario (R1-2007523)**   |  | | --- | | RAN2 has agreed in RAN2#107 that  For the case when no PDU has been generated at all yet, and there are two grants where one will be de-prioritized (and there is data available for both grants), one PDU is generated by MAC.  This agreement means that in the collision scenario between CG and DG with same/different PHY-priority index, and only one transport block is delivered to PHY, PHY transmit on the grant for which a transport block is delivered and skip the transmission on the other grant.  It is not clear from the wording in the LS R1-2005078 if the PHY behavior described above is consistent with RAN1 understanding.  RAN2 respectfully asks RAN1 to clarify if the mentioned scenario is supported or not. |   **RAN2 LS on overlapped data and SR are of equal L1 priority (R1-2100026)**   |  | | --- | | RAN2 confirms the intended UE behavior: For the case of overlapping PUSCH and SR with equal L1 priority and MAC has not yet delivered MAC PDU for the PUSCH to PHY, if SR is prioritized in MAC, MAC shall not deliver the MAC PDU for the PUSCH and shall instruct PHY for SR transmission.  RAN2 respectfully asks RAN1 to confirm if the intended UE behavior mentioned above can be supported. | |

RAN1 provided the corresponding reply LSs as following:

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| **RAN1 Reply LS on Intra UE Prioritization Scenario (R1-2009680)**   |  | | --- | | RAN1 had a discussion and made following agreements:  **Agreement**   * For the collision scenario between CG and DG with same/different PHY-priority index, if there is no collision between PUCCH and the CG and there is no collision between PUCCH and the DG, the behaviour mentioned in the LS is consistent with RAN1’s understanding if taking into account the TP to Rel-16 TS 38.214, i.e., revision CR in R1-2008655. * When the MAC entity is configured with *lch-basedPrioritization*, for the collision scenario between CG and DG with same/different PHY-priority index, and when there is collision between PUCCH and the CG with the same priority and/or there is collision between PUCCH and the DG with the same priority, RAN1 is still discussing the related PHY layer behaviour. |   **RAN1 Reply LS on overlapped data and SR are of equal L1 priority (R1-2102244)**   |  | | --- | | Assumption: LCH based prioritization is configured. Rel-16 UL skipping is possible.  RAN1 respectfully asks RAN2 to provide their views on which understanding (understanding 1 or 2) is the intended MAC layer behavior or to provide an alternate understanding, for case 2-1, case 2-2, case 3 and case 4. | |

In RAN2#113-e and RAN2#113bis-e meeting, RAN2 discussed Rel-16 intra-UE prioritization with taking UL skipping agreement into account and achieved following agreements:

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| **Working assumption: When lch-BasedPrioritization is not configured and Rel-16 CG/DG PUSCH skipping is enabled, DG always overrides CG. This working assumption is not agreed until confirmed by RAN1.**  **Confirm the WA that LCH based prio has higher priority than UL skipping still applies, and we expect that if there are issues, RAN1 will come-back.** |

In addition, for various SR/Data overlapping cases identified by RAN1, as captured in RAN2’s chairman notes in RAN2#113bis-e meeting, it seems both understandings 1) MAC does not have a knowledge of the UCI multiplexing and 2) MAC would have a knowledge of the UCI multiplexing are possible, and RAN2 postponed the discussions to the next meetings.

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| Chair: A TS can refer to a condition where the details are specified in another TS. This is usually done by fuzzy reference, so it seems that both interpretations are possible (without adding L1 specific details in MAC or vice versa).  Chair: Understanding 1: If we assume that MAC just generate SR and let L1 decide if/by what resource to transmit it, if the SR is not transmitted in the end then MAC may need to know this, in order to re-trigger the SR.  Chair: Understanding 2: If we assume that MAC (the UE) can first know whether SR can be transmitted or not, then the current TS works.  Chair propose to: Postpone this specific issue (MAC awareness of UCI for this case), invite for a more principal discussion on MAC L1 dependencies next meeting.  **Postpone this issue** |

Following contributions discussed the recent RAN2 working assumptions on UL skipping and LCH based prioritization. The observations and proposals are summarized below:

**Details**

* [R1-2104214]

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| Observation 1: If LCH based prioritization has higher priority than UL skipping, multiple possible multiplexing/prioritization outcomes exist in each slot. This significantly increases the processing burden for both UE and gNB.    Figure 1(A). If LCH based prioritization has higher priority than UL skipping, and MAC generates a PDU for DG PUSCH1, and does not generate a PDU for CG PUSCH 1.    Figure 1(B). If LCH based prioritization has higher priority than UL skipping, and MAC does not generate a PDU for DG PUSCH1, and but generate a PDU for CG PUSCH 1.  Observation 2: If UL skipping has higher priority than LCH based prioritization, multiplexing/prioritization outcome is deterministic in each slot. This is necessary to control processing burden for both UE and gNB.    Figure 2. If UL skipping has higher priority than LCH based prioritization, the behavior is deterministic.   1. If UL skipping and intra-UE prioritization need to be supported simultaneously in Rel-16, RAN1 notify RAN2 that it is necessary to specify: UL skipping has higher priority than LCH based prioritization. 2. RAN1 notify RAN2 that it is acceptable: Rel-16 does not support a simultaneous configuration of the Rel-16 UL skipping and intra-UE prioritization. 3. For a given PHY priority level, the PUSCH#0 (DG or CG) expected to have UCI multiplexing is determined. The UCI is either multiplexed with PUSCH#0 or transmitted via PUCCH, but not to be multiplexed with another PUSCH. 4. For any UL grant (i.e., DG-PUSCH or CG-PUSCH), if MAC does not generate a TB for a grant, then the PUSCH is discarded and does not participate in subsequent physical layer procedure. |

* [R1-2104313]

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| **Proposal 1: RAN1 to indicate to RAN2 in an LS that RAN1 supports the confirmed RAN2 working assumption *“LCH based prio has higher priority than UL skipping”.***  **Proposal 2: RAN1 to indicate to RAN2 in an LS,**   * **that RAN1 supports the RAN2 working assumption “*When lch-BasedPrioritization is not configured and Rel-16 CG/DG PUSCH skipping is enabled, DG always overrides CG*”,** * **but when *lch-BasedPrioritization* is configured, the LCH based prioritization has higher priority than DG overriding CG PUSCH, i.e. MAC should select the overlapping DG or CG PUSCH grant of higher LCH priority having data available in the buffer.**   **Proposal 3: RAN1 to indicate to RAN2 in an LS that RAN1 supports the RAN2 working assumption *“The MAC entity does not generate a MAC PDU for a deprioritized uplink grant even when its associated PUSCH is overlapping with PUCCH”* and further clarify that this working assumption should be generically applicable including operation with and without LCH based prioritization as well as one & two UL PHY priorities.**  **Proposal 4: If the UE is configured with *lch-basedPrioritization* and/or two UL PHY priorities, the UE transmits a PUCCH which overlaps with a PUSCH on the same or different serving cell in case MAC did not deliver a PDU for the PUSCH.** |

* [R1-2104322]

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| ***Observation 1:*** *The agreement of PUSCH skipping cannot be applied to the collision scenario between CG PUSCH and DG PUSCH with different priorities where one of the PUSCH overlaps with a PUCCH with the same priority.*  ***Proposal 1:*** *If CG PUSCH and DG PUSCH overlap in the time domain with same/different priorities, and one of the collided PUSCH overlaps with a PUCCH, a UE expects a MAC PDU is generated only for the PUSCH with higher priority if there is available data.*  ***Proposal 2:*** *If the MAC entity does not generate MAC PDU for a PUSCH, the PUSCH should not participate in the subsequent UCI multiplexing.*  ***Proposal 3:*** *For the LP PUCCH overlapping with a LP PUSCH which is canceled by a HP PUSCH,*   * *If the time interval between LP PUCCH and the PDCCH scheduling HP PUSCH is not less than Tmuxproc,2, the LP PUCCH should be transmitted.* * *Otherwise, the LP PUCCH should be dropped.*   ***Proposal 4:*** *If the MAC entity does not generate MAC PDU for a HP PUSCH, the HP PUSCH should not cancel the overlapped LP PUSCH or LP PUCCH.*  ***Proposal 5:*** *When there is no available data for PUSCH transmission, the PUSCH can be skipped if the PUSCH overlaps with PUCCH and they are configured with different priorities.* |

* [R1-2104479]

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| **Proposal 1**: In case LCH prioritization is configured and there is resource overlapping between PUCCH and PUSCH(s) with a single PHY priority, MAC layer shall decide which MAC PDU should be delivered based on LCH prioritization and the UCI multiplexing requirements for a single PHY priority.  **Proposal 2:** In case LCH prioritization is configured and there is a single PHY priority for UL transmissions, when DG PUSCH, CG PUSCH and PUCCH overlap with each other, MAC generates PDU for the PUSCH selected to carry UCI and the UCI is multiplexed on the selected PUSCH.  **Proposal 3:** In case LCH prioritization is configured and there is a single PHY priority for overlapped UL transmissions, when DG PUSCH overlaps with CG PUSCH on the same serving cell and the DG PUSCH overlaps with PUCCH and the CG PUCCH does not overlaps with the PUCCH:   * If the PUCCH is earlier than the CG PUSCH, MAC always delivers PDU to the DG PUSCH and UCI is multiplexed on the DG PUSCH; * Otherwise, it is MAC behavior to deliver PDU for either the CG PUSCH or the DG PUSCH based on the Rel-16 LCH prioritization, and UCI is transmitted on the DG PUSCH when there is PDU for the DG PUSCH or transmitted on the PUCCH when there is no PDU for the DG PUSCH.     Case 2 of signle PHY priority for proposal 3  **Proposal 4:** In case LCH prioritization is configured and there is a single PHY priority for overlapped UL transmissions, when DG PUSCH overlaps with CG PUSCH on the same serving cell and the CG PUSCH overlaps with PUCCH and the DG PUSCH does not overlap with the PUCCH:   * If the PUCCH is earlier than the DG PUSCH, the same solution as for no Rel-16 LCH based prioritization could be reused; * Otherwise, it is MAC behavior to deliver PDU for either the CG PUSCH or the DG PUSCH based on Rel-16 LCH based prioritization, and UCI is transmitted on the CG PUSCH when there is PDU for the CG PUSCH or transmitted on the PUCCH when there is no PDU for the CG PUSCH.     Case 3 of signle PHY priority for proposal 4    Case 3 of signle PHY priority for proposal 4  **Proposal 5:** In case LCH prioritization is configured and there are two PHY priorities for UL transmissions, the MAC PDU generation and delivery can be handled by gNB scheduling or MAC layer.  **Proposal 6:** In case LCH prioritization is configured and there are two PHY priorities for overlapped UL transmissions which refer to LP DG PUSCH and HP CG PUSCH and the same priority between DG PUSCH and PUCCH, when LP DG PUSCH would overlap with HP CG PUSCH on the same serving cell and the LP DG PUSCH would overlap with LP PUCCH and the HP CG PUCCH does not overlaps with the LP PUCCH:   * If the LP PUCCH is earlier than the HP CG PUSCH, gNB should avoid scheduling such LP DG PUSCH overlapping with both the LP PUCCH and the HP CG PUSCH; * Otherwise, it is MAC behavior to deliver PDU for either the HP CG PUSCH or the LP DG PUSCH based on the Rel-16 LCH prioritization, and UCI is transmitted on the LP DG PUSCH when there is PDU for the LP DG PUSCH or transmitted on the LP PUCCH when there is no PDU for the LP DG PUSCH.     Case 1 of two PHY priorities for proposal 6    Case 2 of two PHY priorities for proposal 6  **Proposal 7:** In case LCH prioritization is configured and there are two PHY priorities for overlapped UL transmissions which refer to HP DG PUSCH overlaps with LP CG PUSCH on the same serving cell and the HP DG PUSCH overlaps with HP PUCCH and the LP CG PUCCH does not overlaps with the HP PUCCH:   * If the HP PUCCH is earlier than the LP CG PUSCH, MAC always delivers PDU to the HP DG PUSCH and UCI is multiplexed on the HP DG PUSCH; * Otherwise, it is MAC behavior to deliver PDU for either the LP CG PUSCH or the HP DG PUSCH based on the Rel-16 LCH prioritization, and UCI is transmitted on the HP DG PUSCH when there is PDU for the HP DG PUSCH or transmitted on the PUCCH when there is no PDU for the DG PUSCH.     Case 3 of two PHY priorities for proposal 7  **Proposal 8:** For overlapping between DG PUSCH and CG PUSCH with different priorities, the first symbol of LP PUSCH should be no earlier than the first symbol of HP PUSCH. |

* [R1-2104650]

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| **Proposal:** To handle CGDG collisions with PUCCH overlap, a UE follows the following steps:   * Step #1: Assume no uplink skipping. For each priority, a UE determines whether UCI will be multiplexed on a PUSCH or not. * Step#2: A UE selects one PUSCH that cannot be skipped by comparing the L1 priorities of the PUSCHs in case a 2-level priority is configured for a UE. * Step#3: The MAC layer can skip other PUSCHs except the one indicated by the PHY layer. * Step #4: The PHY layer performs prioritization/multiplexing as needed.   + In case the PHY has indicated one PUSCH as non-droppable, and if there is another PUSCH overlapping with it on the same carrier, that PUSCH, including UCI that is expected to be multiplexed on it as part of step #1, are dropped. |

* [R1-2105083]

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| **Observation 2-1: Channel selection with PUCCH Format 1 brings much complication to UCI multiplexing.**  **Observation 2-2: In Rel-15, PUSCH selection procedure clarified by Step 2 in the RAN1 #97 clarification applies to actual PUSCH transmissions.**  **Observation 2-3: DG PUSCHs, CG PUSCHs, and PUSCHs configured by semiPersistentOnPUSCH are candidates for UCI multiplexing. And a PUSCH without MAC PDU can be selected for UCI multiplexing.**  **Observation 2-4: Using a few examples with overlapping channels in discussion is helpful to understand the complex nature of the underlying design issue, but the complex nature of UCI multiplexing cannot be adequately covered by them.**  **Observation 2-5: There is an unremovable uncertainty in PUSCH selection for UCI multiplexing once CG configuration is activated.**  **Observation 3-1: when discussing the interaction between PHY and MAC, the demarcation between hypothetical PUSCH transmissions and actual PUSCH transmissions is key.**  **Proposal 2-1: in Rel-17, when HARQ-ACK PUCCH resource and SR PUCCH resource both configured with PUCCH format 1 collide, then a PUCCH resource for HARQ-ACK with payload more than 2 bits is used, zero padding can be considered to minimize specification change & implementation change:**  **In this case the payload is given by [HARQ bit(s)] + SR bit + zero or more padding bit.**   * **If there are 2 HARQ-ACK bits, then the 1 SR bit is included in the payload, so there are 3 bits in the payload (2 HARQ-ACK bits + 1 SR bit).** * **If there are 1 HARQ-ACK bit, then 1 SR bit and 1 padding bit are included, so there are 3 bits in the payload (1 HARQ-ACK bit + 1 SR bit + 1 padding bit).**   **Proposal 3-1: To mitigate the uncertainty in UCI multiplexing, the occurrence of HARQ-ACK PUCCH resource at PUCCH format 1 and SR PUCCH resource at PUCCH format 1 should be avoided. One of the following alternatives is selected:**   * **Alt. 1: HARQ-ACK PUCCH resource and SR PUCCH resource cannot be both configured with PUCCH format 1** * **Alt. 2: If HARQ-ACK PUCCH resource and SR PUCCH resource overlap, then they won’t be both at PUCCH format 1.** * **Alt. 3: SR is assumed to be negative in Stage 1.** * **Alt. 4: SR is assumed to be positive in Stage 1.**   **Proposal 3-2: For PUSCH selection with hypothetical PUSCH transmissions, the following priority order is used:**   * + **First priority: PUSCH with A-CSI as long as it overlaps with Z**   + **Second priority: earliest PUSCH slot(s) based on the start of the slot(s)**   + **If there are still multiple PUSCHs overlap with Z in the earliest PUSCH slot(s), follow the following priorities (sequentially from high to low)**     - **Third priority: Dynamic grant PUSCHs > PUSCHs configured by respective ConfiguredGrantConfig > semiPersistentOnPUSCH**     - **Fourth priority: PUSCHs on serving cell with smaller serving cell index > PUSCHs on serving cell with larger serving cell index**     - **Fifth priority: Earlier PUSCH transmission > later PUSCH transmission**   **Proposal 3-3: UE PHY provides the following to UE MAC:**   * **the PUSCH selected for UCI multiplexing** * **PUCCH resource Z**   + **For a PUCCH resource Z, the following are indicated to MAC:**     - **the starting symbol and duration (the number of OFDM symbols in the PUCCH)**     - **the UCI payload: information about SR (e.g. SR resource IDs) conveyed in resource Z, and optionally whether HARQ-ACK and/or CSI is included.**   **Proposal 3-4: if some form of the RAN1 102-e agreement is to be extended to the cases with configured physical layer priority and/or *lch-basedPrioritization,* there can be 3 outcomes:**   * + **Outcome 1:**      - **1> if  the PUSCH selected for UCI multiplexing is with UL-SCH,  and MAC generates MAC PDU for the PUSCH selected for UCI multiplexing  or**     - **1> if the PUSCH selected for UCI multiplexing is without UL-SCH, and MAC does not generate MAC PDU for another PUSCH to overlap with the PUSCH selected for UCI multiplexing**     - **2> PHY transmits the PUSCH selected for UCI multiplexing (dropping SR if SR is present in resource Z)**     - **Outcome 2-1:**   **1> if  the PUSCH selected for UCI multiplexing is with UL-SCH,  and MAC does not generate MAC PDU for the PUSCH selected for UCI multiplexing  or**  **1> if  the PUSCH selected for UCI multiplexing is without UL-SCH, and MAC generates ~~SR or~~MAC PDU for another PUSCH to overlap with the PUSCH selected for UCI multiplexing**   * + - 1. **2> PHY checks there is no PUSCH overlapping with resource Z on the PUCCH CC or another CC**       2. **3> PHY transmits resource Z including SR**     - **Outcome 2-2:**   **If neither the PUSCH selected for UCI multiplexing nor resource Z can be used by PHY (e.g. MAC does not generate MAC PDU for the PUSCH selected for UCI multiplexing, but MAC generates MAC PDU for a PUSCH overlapping with resource Z), then PHY drops UCI.**  **Proposal 5-1: To avoid the necessity for PHY to assume SR status for UCI multiplexing, RAN2 should split the LCH based prioritization between data and data from LCH based prioritization between data and SR so separate UE capabilities and RRC configurations from gNB are supported for SR/data LCH based prioritization and data/data LCH based prioritization when UL skipping is configured.** |

* [R1- 2105285] made some observations for the SR vs. data cases:

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| * Observation 1: Case 2-1(b) has the same PHY behavior regardless of understanding, while case 2-1(a) has different PHY behaviors according to understanding. * Observation 2: It is not clear whether a UE would multiplex AN/CSI on PUSCH or not due to negative SR on case 2-2(b) although MAC generates MAC PDU assuming PUSCH overlapping with final PUCCH resources. * Observation 3: It is not clear whether AN/CSI would be multiplexed with PUSCH or not due to negative SR although MAC generate MAC PDU assuming PUSCH overlapping with final PUCCH resources. |

* [R1- 2105467]:

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| **For collision between data and data**  **Proposal 1: When lch-BasedPrioritization is not configured and PHY is configured with two L1 prioritizes, RAN1 confirms RAN2’s working assumption** **that is DG always overrides CG.**  **Proposal 2: When the MAC entity is configured with *lch-basedPrioritization*, for the collision scenarios between CG and DG, CG and CG with different L1 priorities and when there is collision between L1 LP PUCCH and L1 LP PUSCH and there is no collision between L1 HP PUCCH and L1 HP PUSCH, confirm RAN2’s working assumption that LCH based prio has higher priority than UL skipping.**   * **If LP PUSCH is delivered, the LP PUCCH is multiplexed on the LP PUSCH;** * **Otherwise, the handling of LP PUCCH is down-selected from following options:**   + **Opt.1: LP PUCCH is dropped together with the LP PUSCH.**   + **Opt.2: define condition X, if X is satisfied, LP UCI is transmitted on LP PUCCH; otherwise, the LP PUCCH is dropped together with the LP PUSCH.**     - **FFS X**   **Proposal 3: When the MAC entity is configured with lch-basedPrioritization, for the collision scenarios between CG and DG, CG and CG with different L1 priorities and when there is collision between L1 HP PUCCH and L1 HP PUSCH and there is no collision between L1 LP PUCCH and L1 LP PUSCH, it is preferred from RAN1 perspective that MAC shall deliver the HP PUSCH when there is HP PUCCH overlapping with the HP PUSCH regardless whether there is available data for HP PUSCH.**  **Proposal 4: When the MAC entity is configured with lch-basedPrioritization, for the collision scenarios between CG and DG, CG and CG with different L1 priorities and when there is collision between L1 HP PUCCH and L1 HP PUSCH and there is also collision between L1 LP PUCCH and L1 LP PUSCH, it is preferred from RAN1 perspective that MAC shall deliver the HP PUSCH when there is HP PUCCH overlapping with the HP PUSCH regardless whether there is available data for HP PUSCH.**   * **PHY drops the LP PUSCH and transmits the LP UCI on LP PUCCH.**   **For collision between data and SR are of equal L1 priority**  **Observation 1: No RAN1 impacts is identified for case 2-1 regardless which understanding is the current MAC layer behaviour.**  **Observation 2: for case 2-2, regardless of which understanding is correct MAC behavior, if MAC delivers SR, there are potential RAN1 impacts in terms of processing timeline at the UE side and blind detection at the gNB side.**  **Observation 3: for case 3, regardless of which understanding is correct MAC behavior, if SR is delivered by MAC, the handling of the AN/CSI that overlaps with the PUSCH can adopt the similar way as for the collision between data and data.**  **Observation 4: for case 4, if understanding 1 is correct MAC behaviour, there is no RAN1 impacts; if understanding 2 is correct MAC behaviour and SR is delivered by MAC, there are potential RAN1 impacts in terms of processing timeline at the UE side and blind detection at the gNB side.**  **Proposal 5: if RAN1 can have common understanding on above observations, discuss from RAN1 perspective, which understanding of MAC layer behavior is preferred and send LS to RAN2 about RAN1’s preference.** |

* [R1- 2105532]:

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| ***Observation 1: For understanding 2, PHY needs to inform MAC about the final PUCCH resources assuming a positive SR, then MAC decides to deliver SR or PDU. If it delivers the PDU, the UE may need to perform UCI multiplexing again based on a negative SR which would complicate the UE implementation in the physical layer.***  ***Proposal 1: When LCH based prioritization is configured, the timeline in the following cases needs to be relaxed e.g. by adding delta symbols to the existing values***   * ***Case 1: UCI multiplexing timeline for the overlap between SR and PUSCH*** * ***Case 2: the timeline for the overlap between DG PUSCH and CG PUSCH***   ***Observation 2: In CA case, if logical channel prioritization is enabled, it is up the UE’s MAC to decide if a PDU for a PUSCH is delivered to PHY or not. The gNB might not know which PUSCH contains the UCI and has to perform blind decoding to find out.*** |

# 3 Issue #2

[R1-2105417]: Multiple CG configurations are configured in cell#1. If a PUSCH in cell#2 carries PHR for cell#1, and if there are overlapped multiple CG PUSCHs with same starting symbol in cell#1, it is necessary to specify which CG PUSCH would be involved in PHR calculation.

Proposal: Use the CG PUSCH having lowest *configuredgrantindex* if there are multiple CG PUSCHs are configured with same starting symbol.

# 4 Summary

TBD

# References

1. [R1-2104214](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104214.zip) Intra-UE Multiplexing and Prioritization for Rel-16 URLLC Ericsson
2. [R1-2104313](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104313.zip) Rel-16 URLLC/IIoT PUSCH skipping (with LCH and/or PHY prioritization configured) Nokia, Nokia Shanghai Bell
3. [R1-2104322](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104322.zip) Remaining issues on intra-UE multiplexing in Rel-16 URLLC ZTE
4. [R1-2104479](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104479.zip) Discussion on overlapping between CG PUSCH and DG PUSCH CATT
5. [R1-2104650](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2104650.zip) Remaining issues on eCG enhancements for URLLC Qualcomm Incorporated
6. [R1-2105083](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105083.zip) UCI multiplexing and PUSCH skipping design in URLLC Apple
7. [R1-2105084](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105084.zip) Remaining issues on intra-UE multiplexing/prioritization for eURLLC Apple
8. [R1-2105285](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105285.zip) Discussion on PUSCH skipping for URLLC Samsung
9. [R1-2105417](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105417.zip) PHR issues related to URLLC/IIOT WI LG Electronics
10. [R1-2105467](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105467.zip) Maintenance on eCG enhancement and intra-UE prioritization vivo
11. [R1-2105532](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_105\Docs\R1-2105532.zip) On LCH prioritization and UL skipping Huawei, HiSilicon