**3GPP TSG RAN WG1 #104e-b R1-** **21xxxxx**

**April 12th – 20th, 2021**

**Agenda item:** 7.2.5

**Source:** Moderator (Qualcomm)

**Title:** Summary of [104b-e-NR-L1enh-URLLC-04] Email discussion/approval on remaining issues on Scheduling & HARQ enhancements

**Document for:** Discussion and Decision

# 1 Introduction

Based on the discussions during the preparation phase, it is agreed to discuss the following topics during the RAN1 #104e-b:

[104b-e-NR-L1enh-URLLC-04] Email discussion/approval on remaining issues on Scheduling & HARQ enhancements – Kianoush (Qualcomm):

* Issue#2: Clarification on cancellation of LP channels
* Issue #4: Timeline requirement for cancellation
* Issue #6: Correction for UE processing times for intra-UE prioritization
* Discussion/decision by April 15 and TP(s) by April 20

Please provide your comments by 12:00pm (PDT), Wednesday April 14th.

# 2 Issue #2

As shown in Figure 1, multiplexing HP PUCCH-1 and HP PUCCH-2 result in HP PUCCH-3, which overlaps with HP PUSCH and would multiplex with HP PUSCH. It is not clear whether the intermediate HP PUCCH-3 would cancel LP PUCCH according the specification.



Since UE may not know the HP PUCCH-3 would multiplex with HP PUSCH when UE begins to cancel the LP PUCCH, the LP PUCCH should be cancelled by intermediate high priority PUCCH resource(s). Hence, the following TP is proposed:

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| **9 UE procedure for reporting control information**  <Unchanged text omitted>  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes other than PUCCH transmissions with SL HARQ-ACK reports, including repetitions if any, the UE first resolves the overlapping for PUCCH and/or PUSCH transmissions of smaller priority index as described in Clauses 9.2.5 and 9.2.6. Then,  - if a transmission of a first PUCCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of a transmission of a second PUSCH or a second PUCCH of smaller priority index, the UE cancels the repetition of a transmission of the second PUSCH or the second PUCCH before the first symbol that would overlap with the first PUCCH transmission  - if a transmission of a first PUSCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of the transmission of a second PUCCH of smaller priority index, the UE cancels the repetition of the transmission of the second PUCCH before the first symbol that would overlap with the first PUSCH transmission  where  - the overlapping is applicable before or after resolving overlapping among channels of larger priority index, and during the multiplexing among channels of larger priority index, if any, as described in Clauses 9.2.5 and 9.2.6; and the overlapping is applicable during PUCCH resource overriding procedure, if any, as described in Clauses 9.2.3  - any remaining PUCCH and/or PUSCH transmission after overlapping resolution is subjected to the limitations for UE transmission as described in Clause 11.1  - the UE expects that the transmission of the first PUCCH or the first PUSCH, respectively, would not start before after a last symbol of the corresponding PDCCH reception  - is the PUSCH preparation time for a corresponding UE processing capability assuming [6, TS 38.214], based on and as subsequently defined in this Clause, and is determined by a reported UE capability  ----------------------------------------------------- End of text proposal ------------------------------------------------------ |

**In the table below, please provide your comments on the proposed TP above:**

|  |  |
| --- | --- |
| Company | Comments |
| HW/HiSi | The TP is not needed. The specification is already clear.  Also, it has been discussed before and we agree with Ericsson’s comment during the scope setting, that the conclusion made in RAN1#103 is sufficient:   |  | | --- | | **Conclusion (RAN1#103e)**  In the following clause from Section 9 of TS 38.213:  “where   * The overlapping is applicable before or after resolving overlapping among channels of larger priority index, if any, as described in Clause 9.2.5”   the meaning of “before or after” should be interpreted as follows: A UE checks the overlap between a HP channel and a low priority channel before multiplexing. If there is an overlap, the LP channel gets cancelled. If not, a UE performs multiplexing across the HP channels. If then there is an overlap with a LP channel, the LP channel gets cancelled. | |
| Samsung | For intermediate high priority PUCCH resource, it is understood that this case is already covered by “before or after” because “resolving overlapping procedures” itself includes inherently “intermediate” procedures.  Agree in principle for PUCCH overriding. Simple correction is preferred as follows.  the overlapping is applicable before or after resolving overlapping among channels of larger priority index if any, as described in Clauses 9.2.3 and 9.2.5 and 9.2.6 |
| Nokia/NSB | Agree with HW/HiSi on the argumentation why there is no need for change.   On referring to the overriding operation, we agree with Samsung that we would need to add 9.2.3. |
| ZTE | No need, we have discussed this issue for many meetings, the specification is clear. |
| CATT | The spec or the previous conclusion quoted by Huawei may not cover the intermediate HP PUCCH resource in our understanding. For the conclusion, it depends on how to interpret “then” in the last sentence. If it means the HP channel(s) after HP channel multiplexing, it does not include intermediate HP channels.  However, we think it should be common understanding that intermediate HP channel during PUCCH overriding and multiplexing would cancel LP channel. If all the companies think that it is clear from the current spec/conclusion, we are fine to keep the spec as it is.  We are fine with the addition proposed by Samsung. |
| vivo | Agree with HW/HiSi’s views. We also think current spec is clear. |
| Intel | Change does not seem necessary. The scenario mentioned is covered with the phrase “overlapping is applicable before or after resolving overlapping among channels of larger priority index” |
| OPPO | Current spec is clear and Clause 9.2.3 seems not be included either.  Clause 9.2.5 and Clause 9.2.6 is quoted to interpret how to resolve overlapping. Clause 9.2.3 describes HARQ-ACK reporting, including overriding procedure for PUCCH for HARQ-ACK. It is independent with overlapping issue. |
| DOCOMO | Agree with HW/HiSi and Samsung. Regarding overriding operation, we support the suggestion from Samsung. |
| Ericsson | As HW mentioned (thanks), in our view the outcome of 9.2.3 is used for multiplexing. Below is the our explanation that I found from last meeting. In that regard, the addition of “9.2.3” could clarify any potential ambiguity.   * + From our point of view, clause 9.2.5 uses outcome of 9.2.3, which means overriding takes place before multiplexing, and not during multiplexing. Therefore:     - Intermediate HP before multiplexing (or overlapping resolution), can cancel LP channels (this is aligned with applying two sub-bullets above before where, due to “before” )     - HP channel after multiplexing (or overlapping resolution) can cancel LP channels (this is aligned with applying two sub-bullets above before where, due to “after”).     - However, 9.2.5 and 9.26 use the outcome of 9.2.3. For us this should be clear from spec as we explained before. |
| LG | Agree with HW/HiSi and Samsung. We think current specification is clear. Inter-priority prioritization would perform before and after multiplexing, not during. |
| Apple | We still feel that it is not completely clear to us in terms of which HP channels are used for cancelling LP channel, even though I understand the intention is that all the HP channels before/after overriding/multiplexing are used to cancel LP.  I used the following example before, to check companies’ understanding on which HP channels are used to cancel LP. The answer from the moderator (Kianoush) in RAN1#103-e was that PUCCH1/3/4/5 are all used to cancel LP: “in my understanding, PUCCH1 can cancel a LP channel if they are overlapping. If not, HARQ-ACK and SR gets multiplexed, and PUCCH3 can cancel a LP channel if they are overlapping. Then, PUCCH4 can cancel a LP channel if overlapping. Finally, PUCCH5 can do the same.”  An immediate question is why PUCCH2 is not used to cancel LP. PUCCH2 is also one of the HP channel before resolving overlap, so shouldn’t it also be used to cancel LP?    Secondly, we would also like to confirm if the moderator’s understanding is shared by all the companies.  Another question is, the text we discuss here just covers dynamically scheduled HP UL transmission. What happens to the configured HP UL transmission? Using the HP channels before and after multiplexing should apply to both scheduled and configured HP UL transmission? |
| HW/HiSi[2] | We are fine with Kianoush’s suggestion:   * Issue #2: Only add a reference to Section 9.2.3 of TS 38.213 for clarity as suggested by Samsung. |
| Ericsson | We are fine with Kianoush’s suggestion:   * Issue #2: Only add a reference to Section 9.2.3 of TS 38.213 for clarity as suggested by Samsung.   To comments by Apple:  First question:   * HP PUCCH4 cancels LP PUCCH. * HP PUCCH4 is mux with HP SR PUCCH2. * Outcome. HP PUCCH5   Second question:   * For before, it should be only HP scheduled by DCI that can cancels. That was the reason from UE vendors concerning about timeline (please see additional view on the email on reflector). * For after, configured HP PUCCH also cancels. But that is covered in text after. In other words, this is not the end of procedure. It is the way the spec is constructed, but for implementation can be simplified.   If a UE would transmit the following channels that would overlap in time  - a first PUCCH of larger priority index with SR and a second PUCCH or PUSCH of smaller priority index, or  - a configured grant PUSCH of larger priority index and a PUCCH of smaller priority index, or  - a first PUCCH of larger priority index with HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH and a second PUCCH of smaller priority index with SR and/or CSI, or a configured grant PUSCH with smaller priority index, or a PUSCH of smaller priority index with SP-CSI report(s) without a corresponding PDCCH, or  - a PUSCH of larger priority index with SP-CSI reports(s) without a corresponding PDCCH and a PUCCH of smaller priority index with SR, or CSI, or HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH, or  - a configured grant PUSCH of larger priority index and a configured PUSCH of lower priority index on a same serving cell  the UE is expected to cancel the PUCCH/PUSCH transmissions of smaller priority index before the first symbol overlapping with the PUCCH/PUSCH transmission of larger priority index. |
| Ericsson | Here, I included the follow-up discussion based on email sent by Jing(OPPO).  Dear Jing, Kianoush, Yanping, Sigen and all  Thanks for the follow-up.  I totally agree with you that we have to fix issue#2. It seems we have created a procedure that even among us, it does not work consistently. We are responsible for our deliverable to industry.  Analysis of the outcome in example figure:  I can explain my reasoning how the procedure should work:   * The outcome of 9.2.3 is used for cancellation/prioritization in “before” step. Hence, PUCCH 4 before multiplexing by PUCCH 5, cancels LP PUCCH. Then due to “after” step, PUCCH2 and PUCCH 4 are multiplexed and hence outcome is PUCCH 5.   Overriding outcome used for multiplexing:  That aside, I see there is another issue in the figure and that is for multiplexing (procedures in 9.2.5), the HP codebook under construction is considered (by showing as a candidate in PUCCH 3). In my view, this is wrong. I explained before as well, it means that the UE has to run the procedure in 9.2.5 for each overriding DCI for ever growing number of HARQ-ACK bits. This is crazy 😊 The outcome of 9.2.3 should be used for 9.2.5 as in Rel-15 ad there is no reason to change it  in Rel-16 due to HP.  I have realized this issue during the discussion and at least to me, the **TP for issue#2** tries to fix this issue that the outcome of 9.2.3 should be used in this procedure, both for multiplexing in 9.2.5 and cancellation (before) or prioritization (after).  ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^  Back to underlying main issue:  **Major point: I agree the procedure is unnecessarily too complicated and there is not even common understanding by us. It is our responsibility to take action.**  Sigen opened up the discussion that I fully support. Kianoush laid out conditions for a constructive solution. You rightly pointed out that let’s face the fact what we are not on common page. To me, we have to fix it. There is no other way and the 3gpp procedural routines should not stop us for our responsibility to industry. This, I firmly believe.  **Now, to solutions:** To the suggestion that I earlier sent, in order to give UEs assurance that the gNB does not do crazy stuff, that is to cancel a LP and then ask UE to override cancellation and transmit the LP (this was the trigger of all these discussion), my suggestion would be to simplify the procedure and put crazy behavior as an error case. At least as a NW vendor I think it is fair and reasonable as well. It meets all the requirements Kianoush laid out. It also provides a better ground for Rel-17. And for implementation for Rel-16, I am not sure any vendor has implemented this procedure  since it is still under maintenance and updated is needed, anyhow.  **Proposal to update Rel-16 as follows:**   * + Rel-15:     - Overlapping resolution of (low priority) PUCCH/PUSCH   + Rel-16:     - Overlapping resolution by multiplexing low priority PUCCH/PUSCH     - ~~Intermediate cancellation of LP by HP scheduled by DCI~~     - Overlapping resolution by multiplexing high priority PUCCH/PUSCH     - Prioritization/cancellation HP over LP     - Add error case: UE is not expected that a first HP DCI results in cancellation of a LP PUCCH/PUSCH channel and a second HP DCI results in   I know it reverts some previous agreements, etc. But to me the fact is that we have to admit to ourselves that we DON’T HAVE A COMMON UDERSTANDING. We have failed last few months to reach a common understanding. Then, really doesn’t matter who is right or wrong. How are we going to answer our respective PDUs and the huge problems that it will cause later both for IODT and in the field, for the sake of “respecting” previous agreements?  I think instead of us spending time to convince each other if my understanding or correct or yours, we better just admit, whatever it is , it doesn’t work. And since we know it as you Jing clearly showed, we are responsible to fix it. If it is at the cost of reverting previous agreements,  let be it, for the purpose that we are here. Better early than late.  To summarize:  I support and call for action to fix the procedures.  Anybody with me?  A suggestion below  to think about perhaps during weekend. Maybe better suggestion for highlighted.  Thanks BR  Sorour  Ps. Uploaded this email as v15 from Ericsson.  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes other than PUCCH transmissions with SL HARQ-ACK reports, including repetitions if any, the UE first resolves the overlapping for PUCCH and/or PUSCH transmissions of ~~smaller~~ same priority index as described in Clauses 9.2.5 and 9.2.6. Then,  -     if a transmission of a first PUCCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of a transmission of a second PUSCH or a second PUCCH of smaller priority index, the UE cancels the repetition of a transmission of the second PUSCH or the second PUCCH before the first symbol that would overlap with the first PUCCH transmission  -     if a transmission of a first PUSCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of the transmission of a second PUCCH of smaller priority index, the UE cancels the repetition of the transmission of the second PUCCH before the first symbol that would overlap with the first PUSCH transmission  where  -     the overlapping is applicable ~~before or~~ after resolving overlapping among channels of larger priority index, if any, as described in Clauses 9.2.3,  9.2.5 and 9.2.6  -     any remaining PUCCH and/or PUSCH transmission after overlapping resolution is subjected to the limitations for UE transmission as described in Clause 11.1  -    the UE is not expected a later DCI in a PDCCH reception overrides cancellation of a repetition of a PUCCH/PUSCH transmissions of smaller priority index due to overlapping with a PUCCH/PUSCH transmission of larger priority index scheduled by an earlier DCI format in a PDCCH reception  -     the UE expects that the transmission of the first PUCCH or the first PUSCH, respectively, would not start before after a last symbol of the corresponding PDCCH reception  -     is the PUSCH preparation time for a corresponding UE processing capability assuming [6, TS 38.214], based on and as subsequently defined in this Clause, and is determined by a reported UE capability  If a UE is scheduled by a DCI format in a first PDCCH reception to transmit a first PUCCH or a first PUSCH of larger priority index that overlaps with a second PUCCH or a second PUSCH transmission of smaller priority index that, if any, is scheduled by a DCI format in a second PDCCH  -     is based on a value of corresponding to the smallest SCS configuration of the first PDCCH, the second PDCCHs, the first PUCCH or the first PUSCH, and the second PUCCHs or the second PUSCHs  -     if the overlapping group includes the first PUCCH  -     if *processingType2Enabled* of *PDSCH-ServingCellConfig* is set to *enable* for the serving cell where the UE receives the first PDCCH and for all serving cells where the UE receives the PDSCHs corresponding to the second PUCCHs, and if *processingType2Enabled* of *PUSCH-ServingCellConfig* is set to *enable* for the serving cells with the second PUSCHs, is 5 for , 5.5 for  and 11 for  -     else, is 10 for =0*,* 12 for , 23 for , and 36 for ;  -     if the overlapping group includes the first PUSCH  -     if *processingType2Enabled* of *PUSCH-ServingCellConfig* is set to *enable* for the serving cells with the first PUSCH and the second PUSCHs and if *processingType2Enabled* of *PDSCH-ServingCellConfig* is set to *enable* for all serving cells where the UE receives the PDSCHs corresponding to the second PUCCHs, is 5 for , 5.5 for  and 11 for  -     else, is 10 for =0*,* 12 for , 23 for , and 36 for ;  If a UE would transmit the following channels, including repetitions if any, that would overlap in time  -     a first PUCCH of larger priority index with SR and a second PUCCH or PUSCH of smaller priority index, or  -     a configured grant PUSCH of larger priority index and a PUCCH of smaller priority index, or  -     a first PUCCH of larger priority index with HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH and a second PUCCH of smaller priority index with SR and/or CSI, or a configured grant PUSCH with smaller priority index, or a PUSCH of smaller priority index with SP-CSI report(s) without a corresponding PDCCH, or  -    a PUSCH of larger priority index with SP-CSI reports(s) without a corresponding PDCCH and a PUCCH of smaller priority index with SR, or CSI, or HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH, or  -     a configured grant PUSCH of larger priority index and a configured PUSCH of lower priority index on a same serving cell  the UE is expected to cancel a repetition of the PUCCH/PUSCH transmissions of smaller priority index before the first symbol overlapping with the PUCCH/PUSCH transmission of larger priority index if the repetition of the PUCCH/PUSCH transmissions of smaller priority index overlaps in time with the PUCCH/PUSCH transmissions of larger priority index.  A UE does not expect to be scheduled to transmit a PUCCH or a PUSCH with smaller priority index that would overlap in time with a PUCCH of larger priority index with HARQ-ACK information only in response to a PDSCH reception without a corresponding PDCCH. A UE does not expect to be scheduled to transmit a PUCCH of smaller priority index that would overlap in time with a PUSCH of larger priority index with SP-CSI report(s) without a corresponding PDCCH. |

# 3 Issue #4

In [2], it is proposed that:

***Proposal: The SCS configuration of the PDSCH corresponding to the overlapping PUCCH should be considered in cancellation time.***

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| -------------------------------------------------- Start of text proposal ------------------------------------------------------  If a UE is scheduled by a DCI format in a first PDCCH reception to transmit a first PUCCH or a first PUSCH of larger priority index that overlaps with a second PUCCH or a second PUSCH transmission of smaller priority index that, if any, is scheduled by a DCI format in a second PDCCH  - is based on a value of corresponding to the smallest SCS configuration of the first PDCCH, the second PDCCHs, the PDSCHs corresponding to the first PUCCH, the PDSCHs corresponding to the second PUCCHs, the first PUCCH or the first PUSCH, and the second PUCCHs or the second PUSCHs  - if the overlapping group includes the first PUCCH  - if *processingType2Enabled* of *PDSCH-ServingCellConfig* is set to *enable* for the serving cell where the UE receives the first PDCCH and for all serving cells where the UE receives the PDSCHs corresponding to the second PUCCHs, and if *processingType2Enabled* of *PUSCH-ServingCellConfig* is set to *enable* for the serving cells with the second PUSCHs, is 5 for , 5.5 for  and 11 for  - else, is 10 for =0*,* 12 for , 23 for , and 36 for ;  - if the overlapping group includes the first PUSCH  - if *processingType2Enabled* of *PUSCH-ServingCellConfig* is set to *enable* for the serving cells with the first PUSCH and the second PUSCHs and if *processingType2Enabled* of *PDSCH-ServingCellConfig* is set to *enable* for all serving cells where the UE receives the PDSCHs corresponding to the second PUCCHs, is 5 for , 5.5 for  and 11 for  - else, is 10 for =0*,* 12 for , 23 for , and 36 for ;  ----------------------------------------------------- End of text proposal ------------------------------------------------------ |

**In the table below, please provide your comments on the proposed TP above:**

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| Company | Comments |
| HW/HiSi | We do not think that this TP is needed.  The cancellation timeline is applied for cancelling the low LP channel. When the UE detects the HP DCI, it gets aware of the overlap and starts to cancel the LP. This does not seem to have a relationship with the HP PDSCH. |
| Samsung | Agree in principle.  We would like to suggest modified version as follows to be more accurate.  is based on a value of corresponding to the smallest SCS configuration of the first PDCCH, the second PDCCH~~s~~, the PDSCH~~s~~ corresponding to the first PUCCH, if any, the PDSCH~~s~~ corresponding to the second PUCCH~~s~~, if any, the first PUCCH or the first PUSCH, and the second PUCCHs or the second PUSCHs |
| Nokia/NSB | We have a similar view as HW/HiSi, i.e. we don’t really see why PDSCH’s SCS should be considered. |
| ZTE | Fine with the intention of the TP, considering the PDSCH may not always exists, the revision from Samsung is fine |
| CATT | In cancellation timeline, the processing time of all channels corresponding to the high and low priority channels should be considered. For PUCCH transmission, the SCS configuration of corresponding PDCCH and PDSCH should be considered in processing time since different SCS may be used for PDCCH and PDSCH for cross-carrier scheduling. That is why it is proposed to consider SCS of PDSCH.  We are fine with the modification from Samsung. |
| vivo | Agree with the intention of the TP. We are fine with revision from Samsung. |
| Intel | We do not think the TP is necessary. For DL, only the channel providing the trigger need to be considered. Since timing is calculated from the end of PDCCH, we do not see the need to take PDSCH into account. |
| OPPO | TP is not necessary.  For prioritization, timeline requirement is defined between PUCCH/PUSCH and corresponding PDCCH reception only, so it is not clear to take numerology of corresponding PDSCH into account. |
| DOCOMO | We don’t think the TP is needed. In our understanding, we don’t need to take PDSCH into account for the cancellation. |
| Ericsson | We share similar view as HW, Nokia and Intel.  To CATT, in our view the SCS of involved channels are used. |
| LG | We don’t think the TP is essential. In our view, only channels determining UL processing time needs to be considered for uplink prioritization. PDSCH seems not need to be considered. |
| Apple | It is also not clear to us why the SCS of PDSCH needs to be considered. |

# 4 Issue #6

The following TP is proposed in [3]:

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| 9 UE procedure for reporting control information **<Unchanged parts are omitted>**  When a UE determines overlapping for PUCCH and/or PUSCH transmissions of different priority indexes, including repetitions if any, the UE first resolves the overlapping for PUCCH and/or PUSCH transmissions of smaller priority index as described in Clauses 9.2.5 and 9.2.6. Then,  - if a transmission of a first PUCCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of a transmission of a second PUSCH or a second PUCCH of smaller priority index, the UE cancels the repetition of a transmission of the second PUSCH or the second PUCCH before the first symbol that would overlap with the first PUCCH transmission  - if a transmission of a first PUSCH of larger priority index scheduled by a DCI format in a PDCCH reception would overlap in time with a repetition of the transmission of a second PUCCH of smaller priority index, the UE cancels the repetition of the transmission of the second PUCCH before the first symbol that would overlap with the first PUSCH transmission  where  - the overlapping is applicable before or after resolving overlapping among channels of larger priority index, if any, as described in Clauses 9.2.5 and 9.2.6  - the UE expects that the transmission of the first PUCCH or the first PUSCH, respectively, would not start before after a last symbol of the corresponding PDCCH reception  - is the PUSCH preparation time for a corresponding UE processing capability assuming [6, TS 38.214], based on and as subsequently defined in this Clause, and is determined by a reported UE capability.  **<Unchanged parts are omitted>** |

**In the table below, please provide your comments on the proposed TP above:**

|  |  |
| --- | --- |
| Company | Comments |
| HW/HiSi | We agree that the issue is valid.  For the TP, we are not sure if d2,1=d1 can be used since d2,1 also already is defined in 38.214, section 6.4: “If the first symbol of the PUSCH allocation consists of DM-RS only, then *d2,1* = 0*,* otherwise *d2,1* = 1”. That means in 38.214, d2,1 can be 1. The intention of d1 is to relax the Tproc,2 on top of d2,1. However based on this TP, it seems d2,1 is replaced by d1 irrespective of d2,1 in 38.214 as 0 or 1. We think this could be a contradiction. What is your view? |
| Samsung | Agree |
| Nokia/NSB | Agree: The issue is valid and we agree with the TP.  On the comment by / reply to HW/HiSi:  Setting d2,1 to be d1 seems OK, as d2,1 is set in the current specs to 0 (independently of any DMRS operation in Sec. 6.4 of 38.214). So, for what we are discussing there, the d2,1 dependent on Sec. 6.4 of 38.214 would not apply. |
| ZTE | The intention is valid. I have a question to be clarified. As the d2,1 is replaced by d1, regarding the max selection of the equation , the d2,1 part will always be selected regardless the d2,2? |
| CATT | Agree with the intention of the TP. We have similar question as Huawei. According to 38.213 section 6.4, *d2,1* can be 0 or 1. |
| Vivo | Agree with the intention of the TP. We share the similar views with Huawei. *d2,1* can be 0 or 1 in current spec. |
| Intel | This issue needs to be addressed because the minimum UE processing time for transmission of a high priority channel as part of intra-UE prioritization is not captured accurately as it involves summation of quantities with different units, (absolute time in seconds and a number of symbols).  If we closely follow the current version of text (copied in blue font below for reference) and how was defined, we observe that *d2,1* = 0 is assumed, i.e., *d2,1* = 1 consideration as mentioned in 38.614 does not apply here, since this is related to the intra-UE transmission prioritization timeline, not PUSCH preparation timeline. Hope this addresses Huawei’s concern.  \*\*\*\*\*  the UE expects that the transmission of the first PUCCH or the first PUSCH, respectively, would not start before after a last symbol of the corresponding PDCCH reception  - is the PUSCH preparation time for a corresponding UE processing capability assuming [6, TS 38.214], based on and as subsequently defined in this Clause, and is determined by a reported UE capability  \*\*\*\*\*  Since the units are different in , simplest fix seems to be just replacing *d2,1* with , which achieves the intended outcome of the original specification text and issue with units is now fixed. A similar example can be found in Section 11.2A in 38.213 as well for companies to check.  Lastly, to respond to ZTE’s question, in our understanding, *d2,2*, which is related to BWP switching in the scheduling “HP DCI”, may not be very relevant in the context of intra-UE PUSCH/PUCCH prioritization. Nevertheless, if BWP switching may apply, the timeline would still follow current specifications and the outcome of the max () function could go either way. |
| OPPO | We share the same view as Intel.  Regarding HW’s comments, we reached the agreement below in RAN1 #99 meeting that there is a note to clarify *d2,1* = 0 in cancelation (Please correct me if I miss something). So, we support the TP.  Agreement  When a high-priority UL transmission overlaps with a low-priority UL transmission in a slot,   * The UE is expected to cancel the low-priority UL transmission starting from *Tproc,2 +d1* after the end of PDCCH scheduling the high-priority transmission, where   + *Tproc,2* is correponding to UE processing time capability for the carrier.   + *Value d1 is the time duration corresponding to 0,1,2 symbols reported by UE capability*   + Note: *d\_2,1*=0 is for cancellation * The minimum processing time of the high priority channel is extended by *d2* symbols   + Value *d2* is the time duration corresponding to 0,1,2 symbols reported by UE capability   The overlapping condition is per repetition of the uplink transmission |
| DOCOMO | Agree |
| Ericsson | Similarly to others, we find the issue valid. |
| LG | We agree that the issue is valid. For TP, proposed TP could solve the problem but it seems not best way to replace value without consideration on meaning of each variable. Though it would change two specs, could we add d\_1 directly to the equation which ZTE brought? |
| Apple | We support the TP. |
| HW/HiSi[2] | Thanks to all for the explanation on d2,1. We support the TP. |

# 5 Summary of the Discussions

TBD

# 6 References

**[1] R1-2102371, “Remaining issues on scheduling and HARQ,” OPPO**

**[2] R1-2102593, “Remaining issues on scheduling and HARQ enhancements,” CATT**

**[3] R1-2103428, “Correction to UE processing times for intra-UE prioritization,” Intel Corp.**