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

**E-meeting, May 10 – May 27, 2021**

**Agenda Item: 7.2.5**

**Source: Moderator (Huawei)**

**Title:** **Summary #1 of email discussion [105-e-NR-L1enh-URLLC-01] on remaining issues on PDCCH enhancements**

**Document for: Discussion and Decision**

# Introduction

The email discussion is to discuss the remaining issues on PDCCH enhancements.

[105-e-NR-L1enh-URLLC-01] Email discussion/approval on remaining issues on PDCCH enhancements – Chengyan (Huawei):

* Issue #2: Correction on relative SLIV reference for Type 1 HARQ codebook
* Issue #4: Remove DCI format 1\_1 indicating SCell dormancy in case of 1-bit C-DAI
* Issue #6: Correction on the number of SRS resource set configuration
* Issue #3 (editor CR): Correction on RRC parameter in DCI formats when two HARQ-ACK codebooks are configured
* Issue #5 (editor CR): Editorial correction on
* Discussion and decision by May 24, TPs by May 27

This document summarizes the above issue and provide some initial proposals for discussion. Companies are encouraged to provide the first round views by 05/20, 11:00am UTC, then we can adjust the proposals and/or prepare the TPs for the next step discussions.

# Issue #2: Correction on relative SLIV reference for Type 1 HARQ codebook

In RAN1#104b-e meeting, the issue (details as copied below) was discussed but was not concluded yet.

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| Based on the current specification text in 38.213, if the UE is configured with *referenceOfSLIVDCI-1-2*, then for each row index with *K0=*0and each PDCCH monitoring occasion with starting symbol , a new row index is added into the TDRA table.   |  | | --- | | *b) on a set of row indexes of a table that is associated with the active DL BWP and defining respective sets of slot offsets , start and length indicators SLIV, and PDSCH mapping types for PDSCH reception as described in [6, TS 38.214], where the row indexes of the table are provided by the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell*  *a) if the UE is provided referenceOfSLIVDCI-1-2, for each row index with slot offset and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for each PDCCH monitoring occasion in a set of PDCCH monitoring occasions with different starting symbols within a slot where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol , if for normal cyclic prefix and for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol of the row index by* |   Based on the discussion in RAN1#104b-e, two different interpretations as below of the above descriptions were discussed and it can be seen that most companies agree with interpretation 1.   * **Interpretation 1:** The extended SLIV applies in every slot (i.e. even for the slot(s) with no PDCCH monitoring occasion with starting symbol ). Interpretation 1 ensures the same number of the set of row indexes of the TDRA tables for type-1 codebook construction for every slot.   + *Note: With this interpretation, there is no problem related to the Type 1 codebook size and at most some conclusion can be provided for clarification.*   + **Support:**  *ZTE, Ericsson, LG, Sharp, Huawei, HiSilicon, Qualcomm, Intel, CATT, NTT DCM, Vivo, OPPO* * **Interpretation 2:** The extended SLIV is only applied to the slot(s) with PDCCH monitoring occasion with starting symbol . The candidate PDSCHs in a slot can be impacted by both PDCCH Mos and the number of PDSCH repetitions as discussed in Samsung paper.   + *Note: With this understanding, there is a problem with the Type-1 codebook size and further solutions need to be considered.*   + **Support:**  *LG, Samsung,*     It was proposed to put some restriction as below on top of interpretation 1, for simplicity of the specification and possible to address the concern of increasing the HARQ-ACK codebook size.  ===============  If the UE is provided *referenceOfSLIVDCI-1-2*, the gNB configures Type-1 HARQ-ACK codebook only if the starting symbols of PDCCH monitoring occasions are configured the same in all slots.  ===============  Therefore, the following proposal A-7 was proposed from the feature lead in RAN1#104-e. However, there was some concern raised that with this restriction, the feature is not that useful.  ***Proposal A-7****: It is recommended to conclude that,*   * *If a UE is provided referenceOfSLIVDCI-1-2, R defined in section 9.1.2.1 of 38.213 is applicable for all slots, including the slot(s) with no PDCCH monitoring occasion with starting symbol .* * *If a UE is provided referenceOfSLIVDCI-1-2, the gNB configures Type-1 HARQ-ACK codebook only if the starting symbols of PDCCH monitoring occasions are configured the same in all the slots with PDCCH monitoring occasion with starting symbol .* |

In this meeting, several companies (i.e. Ericsson, Nokia, CATT, Samsung, Vivo and Huawei) provide further views on this issue. The following three options was observed from the views:

* **Option 1**: **Go with interpretation 1 with restriction.** 
  + *If a UE is provided referenceOfSLIVDCI-1-2, R defined in section 9.1.2.1 of 38.213 is applicable for all slots, including the slot(s) with no PDCCH monitoring occasion with starting symbol .*
  + *If a UE is provided referenceOfSLIVDCI-1-2, the gNB configures Type-1 HARQ-ACK codebook only if the starting symbols of PDCCH monitoring occasions are configured the same in all the slots with PDCCH monitoring occasion with starting symbol .*

***Potential TP***:

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---------------------------------Start of Text Proposal to TS 38.213 v16.5.0-----------------------

**9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel**

a) if the UE is provided *referenceOfSLIVDCI-1-2*, for each row index with slot offset and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for each PDCCH monitoring occasion in a set of PDCCH monitoring occasions with different starting symbols within a slot where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol , if for normal cyclic prefix and for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol of the row index by . If the UE is provided with *referenceOfSLIVDCI-1-2*, the gNB configures Type-1 HARQ-ACK codebook only if the starting symbols of PDCCH monitoring occasions are configured the same in all slots.

--------------------------------- End of Text Proposal to TS 38.213 v16.5.0-----------------------

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* + ***Pros****: No increase of the HARQ-ACK codebook size compared to option 2.*
  + ***Cons****: Restriction applied which will limit the applicable scenario of the feature. Due to the configuration of search space sets may vary much, it may be difficult to always ensure same starting symbol for PDCCH monitoring occasions.*
* **Option 2**:  **Go with interpretation 1 without restriction.** 
  + *If a UE is provided referenceOfSLIVDCI-1-2, R defined in section 9.1.2.1 of 38.213 is applicable for all slots, including the slot(s) with no PDCCH monitoring occasion with starting symbol .*
  + *If the starting symbols of PDCCH monitoring occasions are configured different in different slots with PDCCH monitoring occasion with starting symbol , R is determined based on the union of PDCCH monitoring configurations in all the slots.*

***Potential TP***:

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------------------------------------ Start of TP 38.213 V16.5.0 section 9.1.2.1---------------------------------

<unchanged text omitted>

b) on a set of row indexes of a table that is associated with the active DL BWP and defining respective sets of slot offsets , start and length indicators *SLIV*, and PDSCH mapping types for PDSCH reception as described in [6, TS 38.214], where the row indexes of the table are provided by the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell

a) if the UE is provided *referenceOfSLIVDCI-1-2*, for each row index with slot offset and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for ~~each~~any PDCCH monitoring occasion in any slot~~in a set of PDCCH monitoring occasions with different starting symbols within a slot~~ where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol , if for normal cyclic prefix and for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol of the row index by

<unchanged text omitted>

------------------------------------ End of TP 38.213 V16.5.0 section 9.1.2.1---------------------------------

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* + ***Pros****: No restriction needed and meanwhile make the specification clearer, which will ensure more applicable scenarios for the new SLIV reference feature.*
  + ***Cons****: The HARQ-ACK codebook size may be larger compared to option 1.*
* **Option 3**: **Slot boundary should be used as the reference of PDSCH SLIV if UE is configured with Type-1 HARQ-ACK codebook. Adopt the following TP#1 and TP#2.**

*TP #1*

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| TS 38.214 5.1.2.1 Resource allocation in time domain When the UE is scheduled to receive PDSCH by a DCI, the *Time domain resource assignment* field value *m* of the DCI provides a row index *m* + 1 to an allocation table. The determination of the used resource allocation table is defined in Clause 5.1.2.1.1. The indexed row defines the slot offset *K0*, the start and length indicator *SLIV*, or directly the start symbol *S* and the allocation length *L*, and the PDSCH mapping type to be assumed in the PDSCH reception.  Given the parameter values of the indexed row:  - The slot allocated for the PDSCH is *Ks*, where , if UE is configured with ca-SlotOffset for at least one of the scheduled and scheduling cell, and *Ks* = , otherwise, and where *n* is the slot with the scheduling DCI, and *K0* is based on the numerology of PDSCH, and  and are the subcarrier spacing configurations for PDSCH and PDCCH, respectively, and  - and are the and the, respectively, which are determined by higher-layer configured ca-SlotOffset, for the cell receiving the PDCCH respectively, and are the and the, respectively, which are determined by higher-layer configured ca-SlotOffset for the cell receiving the PDSCH, as defined in clause 4.5 of [4, TS 38.211].  - The reference point *S0* for starting symbol *S* is defined as:  - if configured with *pdsch-HARQ-ACK-Codebook = dynamic* and configured with *referenceOfSLIVForDCI-Format1-2-r16*, and when receiving PDSCH scheduled by DCI format 1\_2 with CRC scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI with *K0=0*, and PDSCH mapping Type B, the starting symbol *S* is relative to the starting symbol *S0* of the PDCCH monitoring occasion where DCI format 1\_2 is detected;  - otherwise, the starting symbol *S* is relative to the start of the slot using *S0=0.*  … |

*TP #2*

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| TS 38.213 9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel For a serving cell , an active DL BWP, and an active UL BWP, as described in Clause 12, the UE determines a set of occasions for candidate PDSCH receptions for which the UE can transmit corresponding HARQ-ACK information in a PUCCH in slot . If serving cell is deactivated, the UE uses as the active DL BWP for determining the set of occasions for candidate PDSCH receptions a DL BWP provided by *firstActiveDownlinkBWP-Id*. The determination is based:  a) on a set of slot timing values associated with the active UL BWP  a) If the UE is configured to monitor PDCCH for DCI format 1\_0 and is not configured to monitor PDCCH for either DCI format 1\_1 or DCI format 1\_2 on serving cell , is provided by the slot timing values {1, 2, 3, 4, 5, 6, 7, 8}  b) If the UE is configured to monitor PDCCH for DCI format 1\_1 and is not configured to monitor PDCCH for DCI format 1\_2 for serving cell , is provided by *dl-DataToUL-ACK*  c) If the UE is configured to monitor PDCCH for DCI format 1\_2 and is not configured to monitor PDCCH for DCI format 1\_1 for serving cell ,  is provided by *dl-DataToUL-ACK-ForDCIFormat1\_2*  d) If the UE is configured to monitor PDCCH for DCI format 1\_1 and DCI format 1\_2 for serving cell ,  is provided by the union of *dl-DataToUL-ACK* and *dl-DataToUL-ACK-ForDCIFormat1\_2*  b) on a set of row indexes of a table that is associated with the active DL BWP and defining respective sets of slot offsets , start and length indicators *SLIV*, and PDSCH mapping types for PDSCH reception as described in [6, TS 38.214], where the row indexes of the table are provided by the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell  ~~a) if the UE is provided~~ *~~ReferenceofSLIV-ForDCIFormat1\_2~~*~~, for each row index with slot offset~~ ~~and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for each PDCCH monitoring occasion in a set of PDCCH monitoring occasions with different starting symbols within a slot where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol , if for normal cyclic prefix and for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol of the row index by~~  … |

**Feature lead**: Before making any proposal, companies views on the above three options are needed first.

***Question 2-1*: *Which option (i.e. option 1, option 2 and option 3 above) do you prefer? If you have any suggestion on the TP for any of the option, please share also.***

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| *Company* | *View* | |
| ZTE | Option 2 is slightly preferred, considering there is less restriction on PDCCH configuration and reducing HARQ-ACK codebook size is not the main pursuing target for Type1 HARQ-ACK codebook. | |
| CATT | | We prefer option 2. The current specification is clear enough and we don’t think any restriction is needed. Regarding to the codebook overhead issue, it can be up to gNB implementation.  Regarding the proposed TP for option 2, we don’t think it improves the current wording in the specification, it still from the perspective of an actual PDCCH monitoring occasion. From our understanding, interpretation#1 is the only reasonable understanding from the current specification. We think the note under interpretation#1 achieved in the last meeting should be respected, i.e. a conclusion provide the correct interpretation for clarification is sufficient.  >> Feature lead  Based on the discussions in RAN1#104-e and this meeting, “within a slot” in the current specification is the part that may cause misunderstanding, e.g. it may cause the misunderstanding that R is only applied to the slot with no PDCCH monitoring occasion with starting symbol , and it is not clear/obvious that R is determined based on the union of PDCCH monitoring configurations in all the slots. With the TP under option 2, it is clear that a row index will be added for any PDCCH monitoring occasion in any slot, which means R is determined based on the union of PDCCH monitoring configurations in all the slots. In addition, since “within a slot” is deleted, it can avoid the misunderstanding that R is only applied to the slot with no PDCCH monitoring occasion with starting symbol , and based on the following up pseudo in the same section, it is clear that R is applied to all slots, including the slot(s) with no PDCCH monitoring occasion with starting symbol .  Therefore, it seems the TP in option 2 is better than the current specification. |
| Nokia/NSB | Option 2  Overall, we think supporting the relative SLIV also for Type 1 CB is important as discussed earlier so we support Interpretation 1. From the two options on Interpretation 1, we would prefer no restriction on the gNB configurability on the monitoring occasion in different slots (i.e. Option2) even though this may increase the Type 1 CB size as pointed out by the moderator. But for compromise, we could also be fine with Option1. | |
| HW/HiSi | Option 2.  With Option1, the number of applicable use cases will become more limited which is not good for the usefulness of this feature.  As TP the one that the FL has suggested for Option 2 could be used. | |
| Ericsson | Option 1 (1st preference), Option 3 (2nd preference).  Option 2 requires that both UE and gNB to check PDCCH monitoring occasions across all slots and all search spaces to determine the HARQ-ACK codebook size. In Rel-16, there can be up to 40 search spaces, and each with periodicity up to 2560 slots, and different search space can use different offset. It is difficult for both UE and gNB to go through all the combinations before Type-1 CB can be constructed. Also, the CB size explodes if considering all search spaces, and all possible combinations of periodicity and offset. In reality, restrictions have to be imposed.  >> Feature lead  As commented by some companies, it is not really necessary for UE and gNB to check PDCCH monitoring occasions across all slots, UE and gNB just need to check *monitoringSymbolsWithinSlot* for all search space sets to get all potential different starting symbols S0 of PDCCH monitoring occasions, and then R can be determined based on the union of all different starting symbols S0, because it doesn’t matter which S0 is in which slot. | |
| OPPO | We share similar view with other companies that Interpretation 1 is the reasonable understanding for the SLIV set for Type-1 CB. For the two options to implement Interpretation 1, we slightly prefer option 2 for less restrictions for the applicability of the feature. | |
| Sharp | Option 2 is preferred.  For option 2, it seems to us that the UE and gNB just need to check *monitoringSymbolsWithinSlot*  in search spaces associated with DCI format 1\_2 monitoring for deciding whether to add new SLIV. Then all SLIVs apply in every slot regardless of whether MO is present or absent.  Regarding Type 1 CB size overhead issue, we agree with ZTE and CATT.  >> Feature lead  Thanks. I agree with you here. | |
| Intel | Option 2 is preferred.  On the TP for Option 2, we share the views from CATT that it’s not clear whether an update to the specs is really necessary.  >> Feature lead  Please see my comments to CATT. | |
| DOCOMO | Option 2 is preferred considering it is less restrictive. | |
| Vivo | Firstly, we support Interpretation 1. If the issue as Ericsson mentioned doesn’t bring the additional burden on both UE and gNB side, we can accept option 2. | |
| Samsung | Option 3, also OK with Option 2 – Option 1 is not necessary as PDCCH MO configuration is up to the gNB. | |
| Qualcomm | We prefer Option 1.  We acknowledge that Option 1 limits the flexibility on the gNB side. However, in our view, such limitation is not rather minor. As pointed out by Sharp, the limitation imposed by Option 1 only applies to the search spaces configured with DCI format 1\_2. In the most typical use case, gNB may only need to configure 1 search space with DCI format 1\_2, in which case Option 1 and Option 2 becomes equivalent. There is no need for the gNB to align the MOs of other search spaces that is not configured with DCI format 1\_2.  On the other hand, without the limitation in Option 1, there is no limit on how many search spaces can be configured with DCI format 1\_2. As such, UE has to dimension for the worst case configuration (40 SSs each configured with DCI format 1\_2) as pointed out by Ericsson, although there is clearly no use case for such a configuration.  We could accept Option 2 if there’re additional limitations imposed on the number of search spaces that can be configured with DCI format 1\_2. | |

#### Summary of the status for question 2-1 based on first round email discussion

* **Option 1**:
  + **Support:**  *Ericsson, Qualcomm*
* **Option 2**:
  + **Support:**  *ZTE, CATT, Nokia, NSB, Huawei, HiSilicon, OPPO, Sharp, Intel, NTT DOCOMO, Vivo, Samsung*
* **Option 3**:
  + **Support:**  *Ericsson, Samsung*
* **Feature lead recommendation:** Recommend to go with option 2. Please Ericsson check the reply from feature lead to the comments on option 2.

## Second round discussion

***Proposal 2-1****: It is recommended to conclude that,*

* *If a UE is provided referenceOfSLIVDCI-1-2, R defined in section 9.1.2.1 of 38.213 is applicable for all slots, including the slot(s) with no PDCCH monitoring occasion with starting symbol .*
* *If the starting symbols of PDCCH monitoring occasions are configured different in different slots with PDCCH monitoring occasion with starting symbol , R is determined based on the union of PDCCH monitoring configurations in all the slots.*

**Please comment if you have strong concern on the above proposal 2-1.**

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| *Company* | *View* |
| Feature lead | *@ Ericsson*  Please check my reply to your comments on option 2 in the table capturing the inputs from first round email discussion. |
| Qualcomm | Sorry for joining the discussion late. We think Ericsson’s concern on Option 2 is valid (as indicated in the table above). Our comments were copied below for reference:  We acknowledge that Option 1 limits the flexibility on the gNB side. However, in our view, such limitation is not rather minor. As pointed out by Sharp, the limitation imposed by Option 1 only applies to the search spaces configured with DCI format 1\_2. In the most typical use case, gNB may only need to configure 1 search space with DCI format 1\_2, in which case Option 1 and Option 2 becomes equivalent. There is no need for the gNB to align the Mos of other search spaces that is not configured with DCI format 1\_2.  On the other hand, without the limitation in Option 1, there is no limit on how many search spaces can be configured with DCI format 1\_2. As such, UE has to dimension for the worst case configuration (40 SSs each configured with DCI format 1\_2) as pointed out by Ericsson, although there is clearly no use case for such a configuration.  We could accept Option 2 if there’re additional limitations imposed on the number of search spaces that can be configured with DCI format 1\_2. |
| LG | Sorry for not commenting earlier. Though we slightly prefer Option 1, we can compromise with option 2. |
| OPPO | Support. |
| Nokia/NSB | Support. |
| Ericsson | Our preference is still the same: Option 1 (1st preference), Option 3 (2nd preference)  Regarding *monitoringSymbolsWithinSlot* and explanation, thanks for pointing this out! I agree with the point that the TDRA entries attributable to relative SLIV only need to consider all *monitoringSymbolsWithinSlot* across all search spaces for DCI format 1\_2, across all CA carriers. That is, no need to consider *monitoringSlotPeriodicityAndOffset*. Still, both UE and gNB have to figure out the union of the TDRA entries considering all the dimensions above. The HARQ-ACK CB size can be massive and carry lots of filler bits. |

***Proposal 2-2****: Endorse the text proposal in R1-2xxxxxx for TS 38.213 Section 9.1.2.1.*

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| ------------------------------------ Start of TP 38.213 V16.5.0 section 9.1.2.1---------------------------------  <unchanged text omitted>  b) on a set of row indexes of a table that is associated with the active DL BWP and defining respective sets of slot offsets , start and length indicators *SLIV*, and PDSCH mapping types for PDSCH reception as described in [6, TS 38.214], where the row indexes of the table are provided by the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell  a) if the UE is provided *referenceOfSLIVDCI-1-2*, for each row index with slot offset and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for ~~each~~any PDCCH monitoring occasion in any slot~~in a set of PDCCH monitoring occasions with different starting symbols within a slot~~ where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol , if for normal cyclic prefix and for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol of the row index by  <unchanged text omitted>  ------------------------------------ End of TP 38.213 V16.5.0 section 9.1.2.1--------------------------------- |

**Please provide your view on the above proposal 2-2.**

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| *Company* | *View* |
| Feature lead | *@ CATT @ Intel*  Please check my reply to your comments on the TP in the table capturing the inputs from first round email discussion. |
| OPPO | Support the TP. |
| Nokia, NSB | Support the TP. |

# Issue #3: Correction on RRC parameter in DCI formats when two HARQ-ACK codebooks are configured

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| CATT R1-2104481  The RRC parameter *pdsch-HARQ-ACK-CodebookList-r16* was introduced in Rel-16 for URLLC to generate two HARQ-ACK codebooks. The descriptions for this parameter in TS38.331 is as follows   |  | | --- | | ***pdsch-HARQ-ACK-CodebookList***  A list of configuration for at least two simultaneously constructed HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored for the case at least two HARQ-ACK codebooks are simultaneously constructed. |   According to the description, the HARQ-ACK codebook type is determined by *pdsch-HARQ-ACK-CodebookList* if configured, otherwise by field *pdsch-HARQ-ACK-Codebook*. However, only *pdsch-HARQ-ACK-Codebook* is considered for DCI formats in TS38.212 section 7.3.1. For example, for DCI format 1\_1, the number of bits of DAI field is determined by the RRC parameter *pdsch-HARQ-ACK-Codebook* as shown below, but if *pdsch-HARQ-ACK-CodebookList* is configured, the bit of DAI field should be determined by the RRC parameter *pdsch-HARQ-ACK-CodebookList.*  To resolve the issue, it should be clarified that *pdsch-HARQ-ACK-Codebook* is replaced by *pdsch-HARQ-ACK-CodebookList-r16* when *pdsch-HARQ-ACK-CodebookList-r16* is configured in TS38.212.   |  | | --- | | 7.3.1.2.2 Format 1\_1 ……  - Downlink assignment index – number of bits as defined in the following  - 6 bits if more than one serving cell are configured in the DL and the higher layer parameter *nfi-TotalDAI-Included=true = enable*. The 4 MSB bits are the counter DAI and the total DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group.  - 4 bits if only one serving cell are configured in the DL and the higher layer parameter *nfi-TotalDAI-Included=true = enable.* The 2 MSB bits are the counter DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group;  - 4 bits if more than one serving cell are configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16= enhancedDynamic*, and *nfi-TotalDAI-Included=true* is not configured, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;  - 4 bits if one serving cell is configured in the DL, and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, and the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for one or more first CORESETs and is provided *coresetPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode = joint*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;  - 2 bits if only one serving cell is configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16=enhancedDynamic*, and *nfi-TotalDAI-Included=true* is not configured, when the UE is not configured with *coresetPoolIndex* or the value of *coresetPoolIndex* is the same for all CORESETs if *coresetPoolIndex* is provided or the UE is not configured with *ackNackFeedbackMode = joint*, where the 2 bits are the counter DAI;  - 0 bits otherwise. |   **Proposal 2: Adopt the following TP for TS38.212 section 7.3.1.**  -------------------------------------------------- Start of text proposal ------------------------------------------------------ 7.3.1 DCI formats The DCI formats defined in table 7.3.1-1 are supported.  Table 7.3.1-1: DCI formats   |  |  | | --- | --- | | **DCI format** | **Usage** | | 0\_0 | Scheduling of PUSCH in one cell | | 0\_1 | Scheduling of one or multiple PUSCH in one cell, or indicating downlink feedback information for configured grant PUSCH (CG-DFI) | | 0\_2 | Scheduling of PUSCH in one cell | | 1\_0 | Scheduling of PDSCH in one cell | | 1\_1 | Scheduling of PDSCH in one cell, and/or triggering one shot HARQ-ACK codebook feedback | | 1\_2 | Scheduling of PDSCH in one cell | | 2\_0 | Notifying a group of Ues of the slot format, available RB sets, COT duration and search space set group switching | | 2\_1 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | | 2\_2 | Transmission of TPC commands for PUCCH and PUSCH | | 2\_3 | Transmission of a group of TPC commands for SRS transmissions by one or more Ues | | 2\_4 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE | | 2\_5 | Notifying the availability of soft resources as defined in Clause 9.3.1 of [10, TS 38.473] | | 2\_6 | Notifying the power saving information outside DRX Active Time for one or more Ues | | 3\_0 | Scheduling of NR sidelink in one cell | | 3\_1 | Scheduling of LTE sidelink in one cell |   The fields defined in the DCI formats below are mapped to the information bits  to  as follows.  Each field is mapped in the order in which it appears in the description, including the zero-padding bit(s), if any, with the first field mapped to the lowest order information bit  and each successive field mapped to higher order information bits. The most significant bit of each field is mapped to the lowest order information bit for that field, e.g. the most significant bit of the first field is mapped to .  If the number of information bits in a DCI format is less than 12 bits, zeros shall be appended to the DCI format until the payload size equals 12.  The size of each DCI format is determined by the configuration of the corresponding active bandwidth part of the scheduled cell and shall be adjusted as described in clause 7.3.1.0 if necessary.  If a UE is configured with *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by *pdsch-HARQ-ACK-CodebookList-r16* in this clause.  -------------------------------------------------------- End of text proposal ------------------------------------------------------ |

**Feature lead view**: The issues is valid. The TP from R1-2104481 can be taken as the starting point. Based on the rule in previous meetings, it is recommended to provide to editor directly.

***Proposal 3-1****: Provide the text proposal below to TS 38.212 editor.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ---------------------------------Start of Text Proposal to TS 38.212 v16.5.0----------------------- 7.3.1 DCI formats The DCI formats defined in table 7.3.1-1 are supported.  Table 7.3.1-1: DCI formats   |  |  | | --- | --- | | **DCI format** | **Usage** | | 0\_0 | Scheduling of PUSCH in one cell | | 0\_1 | Scheduling of one or multiple PUSCH in one cell, or indicating downlink feedback information for configured grant PUSCH (CG-DFI) | | 0\_2 | Scheduling of PUSCH in one cell | | 1\_0 | Scheduling of PDSCH in one cell | | 1\_1 | Scheduling of PDSCH in one cell, and/or triggering one shot HARQ-ACK codebook feedback | | 1\_2 | Scheduling of PDSCH in one cell | | 2\_0 | Notifying a group of Ues of the slot format, available RB sets, COT duration and search space set group switching | | 2\_1 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | | 2\_2 | Transmission of TPC commands for PUCCH and PUSCH | | 2\_3 | Transmission of a group of TPC commands for SRS transmissions by one or more Ues | | 2\_4 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE | | 2\_5 | Notifying the availability of soft resources as defined in Clause 9.3.1 of [10, TS 38.473] | | 2\_6 | Notifying the power saving information outside DRX Active Time for one or more Ues | | 3\_0 | Scheduling of NR sidelink in one cell | | 3\_1 | Scheduling of LTE sidelink in one cell |   The fields defined in the DCI formats below are mapped to the information bits  to  as follows.  Each field is mapped in the order in which it appears in the description, including the zero-padding bit(s), if any, with the first field mapped to the lowest order information bit  and each successive field mapped to higher order information bits. The most significant bit of each field is mapped to the lowest order information bit for that field, e.g. the most significant bit of the first field is mapped to .  If the number of information bits in a DCI format is less than 12 bits, zeros shall be appended to the DCI format until the payload size equals 12.  The size of each DCI format is determined by the configuration of the corresponding active bandwidth part of the scheduled cell and shall be adjusted as described in clause 7.3.1.0 if necessary.  If a UE is configured with *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by *pdsch-HARQ-ACK-CodebookList-r16* in this clause.  …  < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.212 v16.5.0----------------------- |

|  |  |
| --- | --- |
| *Company* | *View* |
| ZTE | Support the proposal. |
| CATT | Support the proposal |
| Nokia, NSB | Support the proposal & TP (incl. to capture in the 38.212 editor CR) |
| HW/HiSi | Support the proposal and provide it directly to the editor. |
| Qualcomm | Support the proposal. |
| Ericsson | Support the intention of the proposal.  The TP is not accurate, since *pdsch-HARQ-ACK-CodebookList-r16* may contain one or two entries. Suggest changing the TP to: “If a UE is configured with *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by the relevant entry in *pdsch-HARQ-ACK-CodebookList-r16* in this clause.”  >> Feature lead  I think there is no misunderstanding that only the corresponding entry will be applied even without any further change. However, it seems good to make it clearer also. Let me update accordingly and check if companies are ok with it. |
| OPPO | Support the proposal. |
| Sharp | Support the proposal. |
| Intel | Support the proposal. |
| DOCOMO | Support the proposal. |
| Vivo | Support the proposal. |
| Samsung | OK with the proposal |

#### Summary of the status for proposal 3-1 based on first round email discussion

* **Support:**  *ZTE, CATT, Nokia, NSB, Huawei, HiSilicon, Qualcomm, OPPO, Sharp, Intel, NTT DOCOMO, Vivo, Ericsson (with modification), Samsung* 
  + **Ericsson:**  The TP is not accurate, since *pdsch-HARQ-ACK-CodebookList-r16* may contain one or two entries.

**Feature lead recommendation:** Companies are encouraged to check if you are ok with the modification from Ericsson. It looks to me no harm to make it clearer.

## Second round discussion

***Revised proposal 3-1****: Provide the text proposal below to TS 38.212 editor.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ---------------------------------Start of Text Proposal to TS 38.212 v16.5.0----------------------- 7.3.1 DCI formats The DCI formats defined in table 7.3.1-1 are supported.  Table 7.3.1-1: DCI formats   |  |  | | --- | --- | | **DCI format** | **Usage** | | 0\_0 | Scheduling of PUSCH in one cell | | 0\_1 | Scheduling of one or multiple PUSCH in one cell, or indicating downlink feedback information for configured grant PUSCH (CG-DFI) | | 0\_2 | Scheduling of PUSCH in one cell | | 1\_0 | Scheduling of PDSCH in one cell | | 1\_1 | Scheduling of PDSCH in one cell, and/or triggering one shot HARQ-ACK codebook feedback | | 1\_2 | Scheduling of PDSCH in one cell | | 2\_0 | Notifying a group of Ues of the slot format, available RB sets, COT duration and search space set group switching | | 2\_1 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | | 2\_2 | Transmission of TPC commands for PUCCH and PUSCH | | 2\_3 | Transmission of a group of TPC commands for SRS transmissions by one or more Ues | | 2\_4 | Notifying a group of Ues of the PRB(s) and OFDM symbol(s) where UE cancels the corresponding UL transmission from the UE | | 2\_5 | Notifying the availability of soft resources as defined in Clause 9.3.1 of [10, TS 38.473] | | 2\_6 | Notifying the power saving information outside DRX Active Time for one or more Ues | | 3\_0 | Scheduling of NR sidelink in one cell | | 3\_1 | Scheduling of LTE sidelink in one cell |   The fields defined in the DCI formats below are mapped to the information bits  to  as follows.  Each field is mapped in the order in which it appears in the description, including the zero-padding bit(s), if any, with the first field mapped to the lowest order information bit  and each successive field mapped to higher order information bits. The most significant bit of each field is mapped to the lowest order information bit for that field, e.g. the most significant bit of the first field is mapped to .  If the number of information bits in a DCI format is less than 12 bits, zeros shall be appended to the DCI format until the payload size equals 12.  The size of each DCI format is determined by the configuration of the corresponding active bandwidth part of the scheduled cell and shall be adjusted as described in clause 7.3.1.0 if necessary.  If a UE is configured with *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by the relevant entry in *pdsch-HARQ-ACK-CodebookList-r16* in this clause.  …  < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.212 v16.5.0----------------------- |

**Please comment if you have strong concern on the above proposal 3-1.**

|  |  |
| --- | --- |
| *Company* | *View* |
| Feature lead | @all  Please check if you are ok with the modification highlight in blue based on comments from Ericsson. |
| WILUS | We prefer the original TP, which seems already clear and aligned with TS38.213 wording.  If the wording “the relevant entry in” suggested by Ericsson is deemed necessary, we need to change the following texts in TS38.213 as well.  TS38.213 Clause 9:  “If a UE is provided *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by the relevant entry in *pdsch-HARQ-ACK-CodebookList-r16*.” |
| OPPO | Fine with both the original TP or the modified TP. |
| vivo | We are fine with both the original TP or the modified TP. |
| Nokia, NSB | Fine with the original TP (or the addition by Ericsson) |
| Ericsson | The TP is purely editorial and we are fine with any text that flows. We agree with WILUS that TS 38.213 Clause 9 has the same issue.  The reason we suggested the change is follows. If *pdsch-HARQ-ACK-CodebookList-r16* = { semiStatic, dynamic}, i.e., has two entries, then it is not correct if simply replace the parameter name in 38.212 below: “- 1 bit if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *semi-static* and,..  - 2 bits if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *dynamic* and, …” |
| Apple | Fine with the changes suggested by Ericsson/WILUS |

# Issue #4: Remove DCI format 1\_1 indicating Scell dormancy in case of 1-bit C-DAI

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| WILUS R1-2105867  Rel-16 URLLC supports the configuration of 1-bit or 2-bit counter DAI for DCI format 1\_2 if one serving cell is configured in the DL. However, there is no such a configuration for DCI format 1\_1 so that the DCI format 1\_1 always includes 2-bit counter DAI. As a reference, we copy the relevant texts from TS38.212 v16.5.0 below.   |  | | --- | | **TS38.212 v16.5.0 [1]**  7.3.1.2.2 Format 1\_1  <…>  - Downlink assignment index – number of bits as defined in the following  - 6 bits if more than one serving cell are configured in the DL and the higher layer parameter *nfi-TotalDAI-Included=true = enable*. The 4 MSB bits are the counter DAI and the total DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group.  - 4 bits if only one serving cell are configured in the DL and the higher layer parameter *nfi-TotalDAI-Included=true = enable.* The 2 MSB bits are the counter DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group;  - 4 bits if more than one serving cell are configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16= enhancedDynamic*, and *nfi-TotalDAI-Included=true* is not configured, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;  - 4 bits if one serving cell is configured in the DL, and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, and the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for one or more first CORESETs and is provided *coresetPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode = joint*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;  - 2 bits if only one serving cell is configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16=enhancedDynamic*, and *nfi-TotalDAI-Included=true* is not configured, when the UE is not configured with *coresetPoolIndex* or the value of *coresetPoolIndex* is the same for all CORESETs if *coresetPoolIndex* is provided or the UE is not configured with *ackNackFeedbackMode = joint*, where the 2 bits are the counter DAI;  - 0 bits otherwise.  <…>  7.3.1.2.3 Format 1\_2  <…>  - Downlink assignment index – 0, 1, 2 or 4 bits  - 0 bit if the higher layer parameter *downlinkAssignmentIndexDCI-1-2* is not configured;  - 1, 2 or 4 bits determined by higher layer parameter *downlinkAssignmentIndexDCI-1-2* otherwise,  - 4 bits if more than one serving cell are configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI  - 4 bits if one serving cell are configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, and the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for one or more first CORESETs and is provided *coresetPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode = joint*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI.  - 1 or 2 bits if only one serving cell is configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, when the UE is not configured with *coresetPoolIndex* or the value of *coresetPoolIndex* is the same for all CORESETs if *coresetPoolIndex* is provided or the UE is not configured with *ackNackFeedbackMode = joint,* where the 1 bit or 2 bits are the counter DAI.  <…> |   Also, a UE does not multiplex with HARQ-ACK information of two DCI formats, where one DCI format has 2-bit counter DAI and another DCI format has 1-bit counter DAI based on the following highlighted text as yellow in TS38.213 v16.5.0 [2].   |  | | --- | | 9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  …  Denote by the number of bits for the counter DAI and set . Denote by the value of the counter DAI in a DCI format scheduling PDSCH reception, SPS PDSCH release or Scell dormancy indication on serving cell in PDCCH monitoring occasion according to Table 9.1.3-1 or Table 9.1.3-1A. Denote by the value of the total DAI in a DCI format in PDCCH monitoring occasion according to Table 9.1.3-1. The UE assumes a same value of total DAI in all DCI formats that include a total DAI field in PDCCH monitoring occasion . A UE does not expect to multiplex, in a same Type-2 HARQ-ACK codebook, HARQ-ACK information that is in response to detection of DCI formats with different number of bits for the counter DAI field.  … |   Therefore, the UE generates one Type-2 HARQ-ACK CB based on 2-bit counter DAI in DCI format 1\_0 and 1\_1 and another Type-2 HARQ-ACK CB based on 1-bit counter DAI in DCI format 1\_2 (if 1-bit counter DAI is configured). Also, the N-bit counter DAI only counts the number of {serving cell, PDCCH monitoring occasion}-pairs in DCI formats with the N-bit counter DAI. However, Table 9.1.3-1A, shown in below, says that the number of {serving cell, PDCCH monitoring occasion}-pair(s) in which ***DCI format 1\_1*** indicating Scell dormancy is also counted for the 1-bit counter DAI.  Table 9.1.3-1A: Value of counter DAI for   |  |  |  | | --- | --- | --- | | **DAI** |  | **Number of {serving cell, PDCCH monitoring occasion}-pair(s) in which PDSCH transmission(s) associated with PDCCH or PDCCH indicating SPS PDSCH release or DCI format 1\_1 indicating Scell dormancy is present, denoted as and** | | 0 | 1 |  | | 1 | 2 |  |   This is not aligned with the UE behavior “A UE does not expect to multiplex, in a same Type-2 HARQ-ACK codebook, HARQ-ACK information that is in response to detection of DCI formats with different number of bits for the counter DAI field.” So, we propose to adopt the following TP on the Clause 9.1.3.1 in TS38.213.   * ***Proposal 1. Adopt the following TP for Clause 9.1.3.1 in TS38.213.***  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  < Unchanged parts are omitted >  Table 9.1.3-1A: Value of counter DAI for   |  |  |  | | --- | --- | --- | | **DAI** |  | **Number of {serving cell, PDCCH monitoring occasion}-pair(s) in which PDSCH transmission(s) associated with PDCCH or PDCCH indicating SPS PDSCH release ~~or DCI format 1\_1 indicating Scell dormancy~~ is present, denoted as and** | | 0 | 1 |  | | 1 | 2 |  |   < Unchanged parts are omitted > | |

**Feature lead view**: The issues is valid. The TP from R1-2105867 can be taken as the starting point.

***Proposal 4-1****: Endorse the text proposal in R1-2xxxxxx for TS 38.213 Section 9.1.3.1.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ---------------------------------Start of Text Proposal to TS 38.213 v16.5.0-----------------------  9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  < Unchanged parts are omitted >  Table 9.1.3-1A: Value of counter DAI for   |  |  |  | | --- | --- | --- | | **DAI** |  | **Number of {serving cell, PDCCH monitoring occasion}-pair(s) in which PDSCH transmission(s) associated with PDCCH or PDCCH indicating SPS PDSCH release ~~or DCI format 1\_1 indicating Scell dormancy~~ is present, denoted as and** | | 0 | 1 |  | | 1 | 2 |  |   < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.213 v16.5.0----------------------- |

|  |  |
| --- | --- |
| *Company* | *View* |
| ZTE | Support the proposal. |
| CATT | Support. |
| Nokia, NSB | Support the proposal in principle  But we think the reason for the change has nothing to do with the multiplexing restriction pointed out, but just with the fact that actually DCI format 1\_1 can never lead to a 1bit DAI. **So this is actually not URLLC related at all** (and not relation to the Type 2 CB multiplexing of 1bit and 2bit DAI, **but should actually have the WI code of the Scell activation or put to the editor CR**).  >> Feature lead  The table 9.1.3-1A is actually introduced under URLLC, and DCI format 1\_1 doesn’t support 1 bit DAI is also based on agreements from URLLC. Therefore, I think the decision should be made under URLLC work item, since CA colleagues cannot judge this I think. But I agree with you that it is also related to CA WI, let’s add the WI code LTE\_NR\_DC\_CA\_enh-Core for CA as well in addition to URLLC WI code. |
| HW/HiSi | Support the proposal.  As Nokia pointed out, DCI format 1\_1 can never lead to a 1bit DAI, it could also be provided directly to the editor CR. We are open either way.  >> Feature lead  Check my reply to Nokia above. |
| WILUS | Support the proposal.  Regarding Nokia’s comments, we still think that this correction is relevant to URLLC because Table 9.1.3-1A is introduced in URLLC WI to support 1-bit C-DAI and type-2 CB multiplexing rules for 1-bit and 2-bit DAI is also agreed in this WI. So, we could handle this correction in URLLC WI.  >> Feature lead  I agree with you. And please check my reply to Nokia. |
| Qualcomm | Support the TP. |
| Ericsson | Support the TP |
| OPPO | Support the proposal. |
| Sharp | Support the TP. |
| Intel | Support the proposal. |
| DOCOMO | Support the TP. |
| Vivo | Support the TP. |
| Samsung | OK with the TP |

#### Summary of the status for proposal 4-1 based on first round email discussion

* **Support:**  *ZTE, CATT, Huawei, HiSilicon, WILUS, Qualcomm, Ericsson, OPPO, Sharp, Intel, DOCOMO, Vivo, Samsung*
  + **Nokia:**  Seems not related to URLLC WI.
  + **Feature lead:** Please check my reply to your comment in the table above.

**Feature lead recommendation:** *Recommend to agree with the TP since it is agreeable to all companies on the TP itself*. Note that for the WI code for the agreed CR corresponding to this TP, both URLLC code and CA WI code will be provided.

|  |  |
| --- | --- |
| *Company* | *View* |
| WILUS | We are fine to add both WI codes. |
| Apple | Fine with the proposal |

# Issue #5: Editorial corrections on

|  |  |  |
| --- | --- | --- |
| WILUS R1-2105867  Note that the following correction is not relevant to Rel-16 URLLC WI, but it is included in this contribution to facilitate the discussion.  At the RAN1#103-e meeting, RAN1 endorsed the following alignment CR for TS38.213 (R1-2009742, CR0176) [3]. The alignment CR included editorial changes to improve readability and compatibility of equations. Among the editorial changes, the equation (highlighted as ‘yellow’) was changed from to . Due to this change, even though the UE does not detect any DCI format scheduling CBG-based transmission, *n*HARQ-ACK,CBG is not 0, which makes wrong UE ehavior for obtaining a PUCCH transmission power.   |  | | --- | | **R1-2009742, CR0176 [3]**  9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  <…>    <…> |   Therefore, we propose to adopt the following TP on the Clause 9.1.3.1 in TS38.213.   * ***Proposal 2. Adopt the following TP for Clause 9.1.3.1 in TS38.213.***  |  | | --- | | 9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  < Unchanged parts are omitted >  If , the UE also determines for obtaining a PUCCH transmission power, as described in Clause 7.2.1, with    where  - if , is the value of the counter DAI in the last DCI format scheduling CBG-based PDSCH reception for any serving cell that the UE detects within the PDCCH monitoring occasions  - if ,, is the value of the total DAI in the last DCI format scheduling CBG-based PDSCH reception for any serving cell that the UE detects within the PDCCH monitoring occasions  - , if the UE does not detect any DCI format scheduling CBG-based PDSCH reception for any serving cell in any of the PDCCH monitoring occasions  - is the total number of DCI formats scheduling CBG-based PDSCH receptions that the UE detects within the PDCCH monitoring occasions for serving cell . if the UE does not detect any DCI format scheduling CBG-based PDSCH reception for serving cell in any of the PDCCH monitoring occasions  - is the number of CBGs the UE receives in a PDSCH scheduled by a DCI format that supports CBG-based PDSCH reception that the UE detects in PDCCH monitoring occasion for serving cell and the UE reports corresponding HARQ-ACK information in the PUCCH  < Unchanged parts are omitted > | |

**Feature lead view**: The issues is valid. The TP from R1-2105867 can be taken as the starting point. It seems the issue can be provided to editor directly.

***Proposal 3-1****: Provide the text proposal below to TS 38.213 editor.*

|  |
| --- |
| ---------------------------------Start of Text Proposal to TS 38.213 v16.5.0-----------------------  9.1.3.1 Type-2 HARQ-ACK codebook in physical uplink control channel  < Unchanged parts are omitted >  If , the UE also determines for obtaining a PUCCH transmission power, as described in Clause 7.2.1, with    where  - if , is the value of the counter DAI in the last DCI format scheduling CBG-based PDSCH reception for any serving cell that the UE detects within the PDCCH monitoring occasions  - if ,, is the value of the total DAI in the last DCI format scheduling CBG-based PDSCH reception for any serving cell that the UE detects within the PDCCH monitoring occasions  - , if the UE does not detect any DCI format scheduling CBG-based PDSCH reception for any serving cell in any of the PDCCH monitoring occasions  - is the total number of DCI formats scheduling CBG-based PDSCH receptions that the UE detects within the PDCCH monitoring occasions for serving cell . if the UE does not detect any DCI format scheduling CBG-based PDSCH reception for serving cell in any of the PDCCH monitoring occasions  - is the number of CBGs the UE receives in a PDSCH scheduled by a DCI format that supports CBG-based PDSCH reception that the UE detects in PDCCH monitoring occasion for serving cell and the UE reports corresponding HARQ-ACK information in the PUCCH  < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.213 v16.5.0----------------------- |

|  |  |
| --- | --- |
| *Company* | *View* |
| ZTE | This is out of Rel-16 URLLC scope, while we are fine to leave this to editor. |
| CATT | Agree with FL’s assessment. |
| Nokia, NSB | Agree with the TP, but this should be left to editor CR (not URLLC related as ZTE pointed out). |
| HW/HiSi | Agree to give it to the editor. |
| WILUS | Support FL proposal to leave this to editor. |
| Qualcomm | Agree with ZTE/Nokia, this is not URLLC related, and should be left to editor CR. |
| Ericsson | Support Proposal 3-1 |
| OPPO | Agree to leave it to the editor. |
| Sharp | Support FL’s proposal. |
| DOCOMO | Agree to leave it to the editor. |
| Vivo | Fine to leave it to the editor. |
| Samsung | OK – editorial |

#### Summary of the status for proposal 3-1 based on first round email discussion

* **Support:**  *ZTE, CATT, Nokia, NSB, Huawei, HiSilicon, WILUS, Qualcomm, Ericsson, OPPO, Sharp, DOCOMO, Vivo, Samsung*

**Feature lead recommendation:** The proposal is agreeable.

# Issue #6: Correction on the number of SRS resource set configuration

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| --- |
| Vivo R1-2105468  In Rel-15, only one SRS resource set can be configured with higher layer parameter usage in SRS-ResourceSet set to ‘codebook’ for codebook based transmission and only one SRS resource set to ‘nonCodebook’ for non-codebook based transmission.  In Rel-16, two SRS resource sets can be configured, with each one of the sets used for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 respectively. However, the text in spec current version of spec seems to restrict only one SRS resource set for both usage ‘codebook’ and ‘non-codebook’, which is ambiguous.  Draft CR as below: Codebook based UL transmission For codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE determines its PUSCH transmission precoder based on SRI, TPMI and the transmission rank, where the SRI, TPMI and the transmission rank are given by DCI fields of SRS resource indicator and Precoding information and number of layers in clause 7.3.1.1.2 and 7.3.1.1.3 of [5, TS 38.212] for DCI format 0\_1 and 0\_2 or given by *srs-ResourceIndicator* and *precodingAndNumberOfLayers* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’. The TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource selected by the SRI when multiple SRS resources are configured, or if a single SRS resource is configured TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource. The transmission precoder is selected from the uplink codebook that has a number of antenna ports equal to higher layer parameter *nrofSRS-Ports* in SRS-Config, as defined in Clause 6.3.1.5 of [4, TS 38.211]. When the UE is configured with the higher layer parameter *txConfig* set to ‘codebook’, the UE is configured with at least one SRS resource. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource identified by the SRI, where the SRS resource is prior to the PDCCH carrying the SRI.  For codebook based transmission, the UE determines its codebook subsets based on TPMI and upon the reception of higher layer parameter *codebookSubset* in *pusch-Config* for PUSCH associated with DCI format 0\_1 and *codebookSubsetDCI-0-2* in *pusch-Config* for PUSCH associated with DCI format 0\_2 which may be configured with *‘*fullyAndPartialAndNonCoherent*’*, or *‘*partialAndNonCoherent*’*, or ‘nonCoherent’ depending on the UE capability. When higher layer parameter ul-FullPowerTransmission is set to ‘fullpowerMode2’and the higher layer parameter codebookSubset or the higher layer parameter codebookSubsetForDCI-Format0-2 is set to ‘partialAndNonCoherent’, and when the SRS-resourceSet with usage set to “codebook” includes at least one SRS resource with 4 ports and one SRS resource with 2 ports, the codebookSubset associated with the 2-port SRS resource is ‘nonCoherent’. The maximum transmission rank may be configured by the higher layer parameter *maxRank* in *pusch-Config* for PUSCH scheduled with DCI format 0\_1 and *maxRank-ForDCIFormat0\_2* for PUSCH scheduled with DCI format 0\_2*.*  A UE reporting its UE capability of ‘partialAndNonCoherent’ transmission shall not expect to be configured by either *codebookSubset* or *codebookSubsetForDCI-Format0-2* with ‘fullyAndPartialAndNonCoherent*’*.  A UE reporting its UE capability of ‘nonCoherent’ transmission shall not expect to be configured by either *codebookSubset* or *codebookSubsetForDCI-Format0-2* with *‘*fullyAndPartialAndNonCoherent*’* or with *‘*partialAndNonCoherent’.  A UE shall not expect to be configured with the higher layer parameter *codebookSubset* or the higher layer parameter *codebookSubsetForDCI-Format0-2* set to *‘*partialAndNonCoherent’ when higher layer parameter *nrofSRS-Ports* in an *SRS-ResourceSet* with *usage* set to ‘codebook’ indicates that the maximum number of the configured SRS antenna ports in the *SRS-ResourceSet* is two.  For codebook based transmission, ~~the UE may be configured with a single~~ *~~SRS-ResourceSet~~* ~~with~~ *~~usage~~* ~~set to ‘codebook’ and~~ only one SRS resource can be indicated based on the SRI from within the SRS resource set. Except when higher layer parameter *ul-FullPowerTransmission* is set to ‘fullpowerMode2’, the maximum number of configured SRS resources for codebook based transmission is 2. If aperiodic SRS is configured for a UE, the SRS request field in DCI triggers the transmission of aperiodic SRS resources.  A UE shall not expect to be configured with higher layer parameter *ul-FullPowerTransmission* set to ‘fullpowerMode1*’* and *codebookSubset* or *codebookSubsetDCI-0-2* set to *‘*fullAndPartialAndNonCoherent*’* simultaneously.  The UE shall transmit PUSCH using the same antenna port(s) as the SRS port(s) in the SRS resource indicated by the DCI format 0\_1 or 0\_2 or by *configuredGrantConfig* according to clause 6.1.2.3.  The DM-RS antenna ports  in Clause 6.4.1.1.3 of [4, TS38.211] are determined according to the ordering of DM-RS port(s) given by Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 in Clause 7.3.1.1.2 of [5, TS 38.212].  Except when higher layer parameter *ul-FullPowerTransmission* is set to ‘fullpowerMode2’, when multiple SRS resources are configured by *SRS-ResourceSet* with *usage* set to ‘codebook’, the UE shall expect that higher layer parameters *nrofSRS-Ports* in *SRS-Resource* in *SRS-ResourceSet* shall be configured with the same value for all these SRS resources.  When higher layer parameter *ul-FullPowerTransmission* is set to ‘fullpowerMode2’,  - the UE can be configured with one SRS resource or multiple SRS resources with same or different number of SRS ports within an SRS resource set with *usage* set to ‘codebook’.  - up to 2 different spatial relations can be configured for all SRS resources in the SRS resource set with *usage* set to ‘codebook’ when multiple SRS resources are configured in the SRS resource set.  - subject to UE capability, a maximum of 2 or 4 SRS resources are supported in an SRS resource set with *usage* set to ‘codebook’. 6.1.1.2 Non-Codebook based UL transmission For non-codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE can determine its PUSCH precoder and transmission rank based on the SRI when multiple SRS resources are configured, where the SRI is given by the SRS resource indicator in DCI according to clause 7.3.1.1.2 and 7.3.1.1.3 of [5, 38.212] for DCI format 0\_1 and DCI format 0\_2, or the SRI is given by *srs-ResourceIndicator* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. The UE shall use one or multiple SRS resources for SRS transmission, where, in a SRS resource set, the maximum number of SRS resources which can be configured to the UE for simultaneous transmission in the same symbol and the maximum number of SRS resources are UE capabilities. The SRS resources transmitted simultaneously occupy the same RBs. Only one SRS port for each SRS resource is configured. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘nonCodebook’. The maximum number of SRS resources that can be configured for non-codebook based uplink transmission is 4. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource(s) identified by the SRI, where the SRS transmission is prior to the PDCCH carrying the SRI.  For non-codebook based transmission, the UE can calculate the precoder used for the transmission of SRS based on measurement of an associated NZP CSI-RS resource. A UE can be configured with only one NZP CSI-RS resource for the SRS resource set with higher layer parameter usage in *SRS-ResourceSet* set to ‘nonCodebook’ if configured.  - If aperiodic SRS resource set is configured, the associated NZP-CSI-RS is indicated via SRS request field in DCI format 0\_1 and 1\_1, as well as DCI format 0\_2 (if SRS request field is present) and DCI format 1\_2 (if SRS request field is present), where *AperiodicSRS-ResourceTrigger* and *AperiodicSRS-ResourceTriggerList* (indicating the association between aperiodic SRS triggering state(s) and SRS resource sets), triggered SRS resource(s) *srs-ResourceSetId*, *csi-RS* (indicating the associated *NZP-CSI-RS-ResourceId*) are higher layer configured in *SRS-ResourceSet*. The *SRS-ResourceSet(s)* associated with the SRS request by DCI format 0\_1 and 1\_1 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and the *SRS-ResourceSet(s)* associated with the SRS request by DCI format 0\_2 and 1\_2 are defined by the entries of the higher layer parameter. A UE is not expected to update the SRS precoding information if the gap from the last symbol of the reception of the aperiodic NZP-CSI-RS resource and the first symbol of the aperiodic SRS transmission is less than 42 OFDM symbols.  - If the UE configured with aperiodic SRS associated with aperiodic NZP CSI-RS resource, the presence of the associated CSI-RS is indicated by the SRS request field if the value of the SRS request field is not ‘00’ as in Table 7.3.1.1.2-24 of [5, TS 38.212] and if the scheduling DCI is not used for cross carrier or cross bandwidth part scheduling. The CSI-RS is located in the same slot as the SRS request field. If the UE configured with aperiodic SRS associated with aperiodic NZP CSI-RS resource, any of the TCI states configured in the scheduled CC shall not be configured with *qcl-Type* set to ‘typeD’.  - If periodic or semi-persistent SRS resource set is configured, the *NZP-CSI-RS-ResourceId* for measurement is indicated via higher layer parameter *associatedCSI-RS* in *SRS-ResourceSet*.  The UE shall perform one-to-one mapping from the indicated SRI(s) to the indicated DM-RS ports(s) and their corresponding PUSCH layers {0 … ν-1} given by DCI format 0\_1 or by *configuredGrantConfig* according to clause 6.1.2.3 in increasing order.  The UE shall transmit PUSCH using the same antenna ports as the SRS port(s) in the SRS resource(s) indicated by SRI(s) given by DCI format 0\_1 or by *configuredGrantConfig* according to clause 6.1.2.3, where the SRS port in (*i*+1)-th SRS resource in the SRS resource set is indexed as .  The DM-RS antenna ports  in Clause 6.4.1.1.3 of [4, TS 38.211] are determined according to the ordering of DM-RS port(s) given by Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 in Clause 7.3.1.1.2 of [5, TS 38.212].  For non-codebook based transmission, the UE does not expect to be configured with both *spatialRelationInfo* for SRS resource and *associatedCSI-RS* in *SRS-ResourceSet* for SRS resource set.  For non-codebook based transmission, the UE can be scheduled with DCI format 0\_1 when at least one SRS resource is configured in *SRS-ResourceSet* with *usage* set to ‘nonCodebook’. |

**Feature lead view**: The issues is valid. The TP from R1-2105468 can be taken as the starting point. Note that the paper was submitted to MIMO, and chairman brought it us since the issue originates from the introduction of DCI format 0\_2.

***Proposal 6-1****: Endorse the text proposal in R1-2xxxxxx for TS 38.214 Section 6.1.1.1 & 6.1.1.2.*

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| --- |
| ---------------------------------Start of Text Proposal to TS 38.214 v16.5.0-----------------------   * + - 1. Codebook based UL transmission   For codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE determines its PUSCH transmission precoder based on SRI, TPMI and the transmission rank, where the SRI, TPMI and the transmission rank are given by DCI fields of SRS resource indicator and Precoding information and number of layers in clause 7.3.1.1.2 and 7.3.1.1.3 of [5, TS 38.212] for DCI format 0\_1 and 0\_2 or given by *srs-ResourceIndicator* and *precodingAndNumberOfLayers* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’. The TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource selected by the SRI when multiple SRS resources are configured, or if a single SRS resource is configured TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource. The transmission precoder is selected from the uplink codebook that has a number of antenna ports equal to higher layer parameter *nrofSRS-Ports* in SRS-Config, as defined in Clause 6.3.1.5 of [4, TS 38.211]. When the UE is configured with the higher layer parameter *txConfig* set to ‘codebook’, the UE is configured with at least one SRS resource. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource identified by the SRI, where the SRS resource is prior to the PDCCH carrying the SRI.  < Unchanged parts are omitted >  For codebook based transmission, ~~the UE may be configured with a single~~ *~~SRS-ResourceSet~~* ~~with~~ *~~usage~~* ~~set to ‘codebook’ and~~ only one SRS resource can be indicated based on the SRI from within the SRS resource set. Except when higher layer parameter *ul-FullPowerTransmission* is set to ‘fullpowerMode2’, the maximum number of configured SRS resources for codebook based transmission is 2. If aperiodic SRS is configured for a UE, the SRS request field in DCI triggers the transmission of aperiodic SRS resources.  < Unchanged parts are omitted >  6.1.1.2 Non-Codebook based UL transmission  For non-codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE can determine its PUSCH precoder and transmission rank based on the SRI when multiple SRS resources are configured, where the SRI is given by the SRS resource indicator in DCI according to clause 7.3.1.1.2 and 7.3.1.1.3 of [5, 38.212] for DCI format 0\_1 and DCI format 0\_2, or the SRI is given by *srs-ResourceIndicator* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. The UE shall use one or multiple SRS resources for SRS transmission, where, in a SRS resource set, the maximum number of SRS resources which can be configured to the UE for simultaneous transmission in the same symbol and the maximum number of SRS resources are UE capabilities. The SRS resources transmitted simultaneously occupy the same RBs. Only one SRS port for each SRS resource is configured. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘nonCodebook’. The maximum number of SRS resources that can be configured for non-codebook based uplink transmission is 4. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource(s) identified by the SRI, where the SRS transmission is prior to the PDCCH carrying the SRI.  < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.213 v16.5.0----------------------- |

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| --- | --- |
| *Company* | *View* |
| ZTE | Fine with the proposal. |
| CATT | Fine with the TP |
| Nokia, NSB | Fine with the intention of the proposal, but we are not sure if this covers what would actually be needed.  The fact is, that not only a single SRS resource set can be indicated with ‘codebook’ or ‘non-codebook’ within *srs-ResourceSetToAddModList* and/or *srs-ResourceSetToAddModListDCI-0-2*, but actually the **same SRS resource set needs to be indicated for both.**  We think the current proposal (if we want to clarify this), seems to be not fully clear as this could still leave ambiguity on which set can be configured for DCI format 1\_1 and 1\_2. But we are not fully sure how to formulate this perfectly here… |
| Qualcomm | Fine with the intention of the proposal, but the current TP is still a bit ambiguous to us: it could be interpreted as there can be only one SRS resource set with use case =”codebook” (or “non-codebook”) configured by the higher layer parameters *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2*.  If no better wording, maybe we can split them and explain, for example, :  Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’, and only one SRS resource set can be configured in *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’.  For Nokia’s comment, we are not sure whether this is the common understanding or not. Would like to hear more views. |
| Ericsson | We agree with the intention of the TP. We also share the same view as Nokia that same SRS resource set needs to be indicated by both lists, since only one SRS resource set is ‘codebook’ (or ‘non-codebook’) irrespective of which DCI indicates.  Exact TP wording can be worked on further, e.g., extending the wording by QC:  Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’, and only one SRS resource set can be configured in *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’, with the same *srs-ResourceSetId* for both. |
| OPPO | Fine with the proposal and the modification from QC. |
| Sharp | Fine with the proposal. |
| Intel | Support the updated TP from Qualcomm and Ericsson to address the issue raised by Nokia. |
| DOCOMO | Support the intention of the proposal and prefer the updates from QC and Ericsson. |
| Vivo | In our view, a single SRS resource set A can be indicated within *srs-ResourceSetToAddModList,* and a single SRS resource set B can be indicated within *srs-ResourceSetToAddModListDCI-0-2.* SRS resource set A and SRS resource set B can be the same or different. It is unnecessary to mandate the same SRS resource set for both configurations in *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2.*  We are fine with the modification from QC. |
| Samsung | OK with the update from QC. |

#### Summary of the status for proposal 6-1 based on first round email discussion

* All companies agree in principle, though there are some questions for clarification in order to make the specification clearer.
* 1 Controversial point:
  + **Nokia, Ericsson:**  Same SRS resource set needs to be indicated for both *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2.*
  + **Vivo:** Different SRS resource sets can be indicated for *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2.*
  + **Feature lead recommendation:** My understanding is that different SRS resource sets can be indicated by *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2*, otherwise seems no point to introduce separate RRC parameters for different DCI format. However, it would be good to hear more views from companies whether any problem if different resource sets are configured.

## Second round discussion

***Revised proposal 6-1****: Endorse the text proposal in R1-2xxxxxx for TS 38.214 Section 6.1.1.1 & 6.1.1.2.*

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| ---------------------------------Start of Text Proposal to TS 38.214 v16.5.0-----------------------   * + - 1. Codebook based UL transmission   For codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE determines its PUSCH transmission precoder based on SRI, TPMI and the transmission rank, where the SRI, TPMI and the transmission rank are given by DCI fields of SRS resource indicator and Precoding information and number of layers in clause 7.3.1.1.2 and 7.3.1.1.3 of [5, TS 38.212] for DCI format 0\_1 and 0\_2 or given by *srs-ResourceIndicator* and *precodingAndNumberOfLayers* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’, and only one SRS resource set can be configured in *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’. The TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource selected by the SRI when multiple SRS resources are configured, or if a single SRS resource is configured TPMI is used to indicate the precoder to be applied over the layers {0…*ν*-1} and that corresponds to the SRS resource. The transmission precoder is selected from the uplink codebook that has a number of antenna ports equal to higher layer parameter *nrofSRS-Ports* in SRS-Config, as defined in Clause 6.3.1.5 of [4, TS 38.211]. When the UE is configured with the higher layer parameter *txConfig* set to ‘codebook’, the UE is configured with at least one SRS resource. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource identified by the SRI, where the SRS resource is prior to the PDCCH carrying the SRI.  < Unchanged parts are omitted >  For codebook based transmission, ~~the UE may be configured with a single~~ *~~SRS-ResourceSet~~* ~~with~~ *~~usage~~* ~~set to ‘codebook’ and~~ only one SRS resource can be indicated based on the SRI from within the SRS resource set. Except when higher layer parameter *ul-FullPowerTransmission* is set to ‘fullpowerMode2’, the maximum number of configured SRS resources for codebook based transmission is 2. If aperiodic SRS is configured for a UE, the SRS request field in DCI triggers the transmission of aperiodic SRS resources.  < Unchanged parts are omitted >  6.1.1.2 Non-Codebook based UL transmission  For non-codebook based transmission, PUSCH can be scheduled by DCI format 0\_0, DCI format 0\_1, DCI format 0\_2 or semi-statically configured to operate according to Clause 6.1.2.3. If this PUSCH is scheduled by DCI format 0\_1, DCI format 0\_2, or semi-statically configured to operate according to Clause 6.1.2.3, the UE can determine its PUSCH precoder and transmission rank based on the SRI when multiple SRS resources are configured, where the SRI is given by the SRS resource indicator in DCI according to clause 7.3.1.1.2 and 7.3.1.1.3 of [5, 38.212] for DCI format 0\_1 and DCI format 0\_2, or the SRI is given by *srs-ResourceIndicator* according to clause 6.1.2.3. The *SRS-ResourceSet(s)* applicable for PUSCH scheduled by DCI format 0\_1 and DCI format 0\_2 are defined by the entries of the higher layer parameter *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2* in *SRS-config*, respectively. The UE shall use one or multiple SRS resources for SRS transmission, where, in a SRS resource set, the maximum number of SRS resources which can be configured to the UE for simultaneous transmission in the same symbol and the maximum number of SRS resources are UE capabilities. The SRS resources transmitted simultaneously occupy the same RBs. Only one SRS port for each SRS resource is configured. Only one SRS resource set can be configured in *srs-ResourceSetToAddModList* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘nonCodebook’, and only one SRS resource set can be configured in *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to ‘codebook’. The maximum number of SRS resources that can be configured for non-codebook based uplink transmission is 4. The indicated SRI in slot *n* is associated with the most recent transmission of SRS resource(s) identified by the SRI, where the SRS transmission is prior to the PDCCH carrying the SRI.  < Unchanged parts are omitted >  --------------------------------- End of Text Proposal to TS 38.213 v16.5.0----------------------- |

**Please provide your views on the above proposal.**

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| *Company* | *View* |
| Feature lead | @ all  The proposal above is given assuming different SRS resource sets can be given by *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2*, as I explained in the previous section. **However, if you don’t agree with this, it is appreciated to hear views on why same SRS resource set needs to be indicated for both *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2*, or what kind of problem we would meet if different SRS resource sets are configured by *srs-ResourceSetToAddModList* and *srs-ResourceSetToAddModListDCI-0-2.*** |
| Samsung | OK with the update |
| Qualcomm | OK with the update. |
| LG | OK with the update. |
| DOCOMO | OK with the update. |
| OPPO | OK with the update. |
| vivo | OK with the update. |
| Sharp | OK with the update. |
| Nokia, NSB | We had the understanding that the same needs to be configured (as this may increase the UE complexity).  But if the group thinks this is fine, we would not be blocking / would be OK with it, and the corresponding TP seems to be technically correct. |
| Ericsson | We’d like to double check with MIMO folks if it is OK that this indirectly introduces two SRS resource sets of ‘codeBook’ (and the same situation for ‘nonCodeBook’). My previous checking with MIMO folks was, only one is supported in Rel-16, then two are supported in Rel-17. If DCI 0\_2 is allowed to use different sets than 0\_1, then Rel-16 UE actually supports two, and Rel-17 UE supports four, if the UE supports DCI 0\_2. Not sure if this was the common understanding.  Also, there seems to be a typo in TP for 6.1.1.2, ‘codeBook’ should be changed to ‘nonCodeBook’. |
| Apple | We have the understanding the same should be configured for 0\_1 and 0\_2:  1). DCI format 0\_2 has been introduced for its compact size compared with DCI format 0\_1, it does not involve enhancing MIMO capability of a UE.  2) SRS can be used (with “setUse”) for “codebook”, non-codebook”, “antenna switching”, “beam management”. Note for SRS request, we don’t have any enhancement for 0\_2 over 0\_1:  Agreements:  Support new RRC configuration for “SRS request” in DCI format 0\_2   * + Introduce new RRC parameters SRSRequest-ForDCIFormat0\_2 with the candidate value {1, 2}.   + If the RRC parameter SRSRequest-ForDCIFormat0\_2 is not configured, then 0 bit for “SRS request” in DCI format 0\_2.   + If the parameter SRSRequest-ForDCIFormat0\_2 is configured to value 1, 1 bit is used to indicate one of the first two rows of Table 7.3.1.1.2-24 in TS 38.212 for triggered aperiodic SRS resource set.   + If the value 2 is configured, 2 bits are used to indicate one of the rows of Table 7.3.1.1.2-24 in TS 38.212 as in Rel-15.   It would be strange to refer different SRS resource sets for PUSCH transmission between 0\_1 and 0\_2 while the probing/sounding through SRS transmissions for 0\_2 remains no a subset of 0\_1. |

# References

1. R1-2104215 Maintenance of PDCCH and SPS for Rel-16 NR URLLC (Ericcson)
2. [R1-2104312](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2104312.zip) Rel-16 URLLC/IIoT maintenance of PDCCH, Scheduling/HARQ and SPS enhancements (Nokia, Nokia Shanghai Bell)
3. [R1-2104323](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2104323.zip) Discussion on PDSCH processing timeline for DCI format 1\_2 (ZTE)
4. [R1-2104410](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2104410.zip) Maintenance on PDCCH enhancements for Rel-16 NR URLLC (Spreadtrum Communications)
5. [R1-2104481](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2104481.zip) Remaining issues on HARQ codebook (CATT)
6. [R1-2104799](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2104799.zip) Maintenance on PDCCH for UE PDSCH processing time for DCI format 1\_2 (OPPO)
7. [R1-2105286](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105286.zip) Maintanence on PDCCH as PDSCH SLIV reference (Samsung)
8. [R1-2105465](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105465.zip) Maintenance on PDCCH enhancement (vivo)
9. [R1-2105867](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105867.zip) Maintenance of PDCCH enhancements for Rel-16 URLLC (WILUS Inc.)
10. [R1-2105928](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105928.zip) Remaining issues on PDCCH enhancements (Huawei, HiSilicon)
11. R1-2105468    [Draft] CR on the number of SRS resource set configuration           vivo