**3GPP TSG RAN WG1 Meeting #108-e R1-22xxxxx**

**e-Meeting, February 21st – March 3rd, 2022**

**Agenda item:** 7.2.4

**Source:** Moderator (Sharp)

**Title:** Summary of [108-e-R16-V2X-06]

**Document for:** Discussion and Decision

# Introduction

This document is a summary of the following email discussion,

[108-e-R16-V2X-06] DCI size alignment for sidelink; considering R1-2202185 by February 25 – Luochao (Sharp)

# Summary of inputs up to the preparation phase

In R1-2202185 [1] the following points were identified (copied from “Reason for change” in R1-2202185),

|  |
| --- |
| 1. DCI formats for scheduling of sidelink should not be included in the DCI size alignment procedure in clause 7.3.1.0. However, this is not made clear in the current spec (it is mentioned in clause 7.3.1.0.1 that “*DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0*”, but this sentence does not preclude DCI formats 3\_0 and 3\_1 being also included in the DCI size alignment procedure in clause 7.3.1.0). 2. It is ambiguous what the actual difference is between a DCI format “monitored on a cell” and a DCI format “monitored for a cell” as described in clause 7.3.1.0.1.  * On one hand, the spec text of that clause (except the last sentence) implies that  1. A DCI format “monitored on a cell” is a DCI format for scheduling of sidelink (i.e. DCI format 3\_0 or 3\_1), and; 2. A DCI format “monitored for a cell” is a DCI format not for scheduling of sidelink (i.e. a DCI format other than 3\_0 and 3\_1).  * On the other hand, the last sentence of the same clause (“*the payload size of DCI format 3\_0 or DCI format 3\_1 is larger than the payload size of all other DCI formats configured to monitor for the cell*”), with the word “*other*”, implies that DCI formats 3\_0 and 3\_1 are also part of those “*confgiured to monitor for the cell*”, i.e. a direct contradiction to 1) and 2) above. |

The changes proposed in R1-2202185 for TS 38.212 can also be found in the Appendix of this document. The changes were summarized in R1-2202185 as follows (copied from “Summary of change” in R1-2202185),

|  |
| --- |
| 1. In clause 7.3.1.0, clarify that DCI formats for scheduling of sidelink are not included in the DCI size alignment procedure in that clause. 2. In clause 7.3.1.0.1, remove “*other*” in the last sentence, and replace all occurrences of “*DCI formats configured to monitor for a cell*” with “*DCI formats not for scheduling of sidelink*". |

Below is a brief summary of the comments provided in the preparation phase (see email discussion [108-e-Prep-AI7.2.4]).

Two companies commented that the current spec is clear and no change proposed in R1-2202185 is necessary. No detail was provided.

Regarding the first point identified by R1-2202185, i.e. whether the current spec has been clear on SL DCL not involved in the procedure described in clause 7.3.1.0 of TS 38.212,

* One company expressed a view that they were fine with the proposed change (with no details).
* One company believed that “*The current spec text ‘DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0.’ already implies that DCI size alignment described in Clause 7.3.1.0 does not involve SL DCI*”. And the proponent of R1-2202185 argued that “*3\_0 and 3\_1 is first aligned to each other before performing 7.3.1.0.1, so a DCI format being involved in size alignment in one place does not automatically preclude it being involved in another place*”.
* One company commented that the change was “*not needed, current spec is clear*”, and “*the section 7.3.1.0 on DCI size alignment does not deal with SCI format 3\_0 and/or format 3\_1, i.e. thus it is redundant to add DCI formats not scheduling SL*”.

Regarding the second point identified by R1-2202185 about DCI formats “*monitored for a cell*” and DCI formats “*monitored on a cell*”,

* One company thought they are not necessary (with no details).
* One company commented that “*cross-carrier scheduling was discussed at length during the editor CR phase, and the current wording was chosen to cover all the cases. It should preferably not be re-discussed*”.
* The proponent of R1-2202185 argued that the word “*other*” in the last sentence of clause 7.3.1.0.1 resulted in a contradiction among text in that clause.

# Discussion

## Round 1

### Issue 1: DCI formats involved in the procedure described in clause 7.3.1.0 of TS 38.212

Regarding the comment from one company in the preparation phase: “*the section 7.3.1.0 on DCI size alignment does not deal with SCI format 3\_0 and/or format 3\_1*”, Moderator’s understanding is that, in clause 7.3.1.0, besides those explicitly mentioned DCI formats (e.g. 0\_0, 1\_0, etc.), other (Uu) DCI formats are also implicitly involved, e.g. in Step 3 where the UE checks if “*the total number of different DCI sizes configured to monitor is no more than 4 for the cell*”.

Regarding whether the sentence in clause 7.3.1.0.1, “*DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0*”, already implies that DCI format 3\_0 and DCI format 3\_1 are not involved in the procedure described in clause 7.3.1.0, or not, different views exist. Companies are encouraged to include comments on this aspect when providing input to Q1.

**Q1: Is it already clear in current spec that DCI format 3\_0 and DCI format 3\_1 are not involved in the procedure described in clause 7.3.1.0 of TS 38.212?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Answer (Y/N)** | **Comment** |
| Intel | No | After careful reading of 7.3.1.0, it seems there could be another interpretation related to the sentences “*If the total number of different DCI sizes configured to monitor is [no] more than 4*” which does not distinguish DL / UL / SL scheduling formats. It is safer to introduce the proposed change to limit interpretation of these sentences to DL and UL formats only. |
| vivo | YES | 1.As commented in the preparation phase, we think “*DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0*” **already implies that DCI format 3\_0 and DCI format 3\_1 are not involved in the procedure described in clause 7.3.1.0 and thus the DCI format considered in 7.3.1.0 includes Uu DCI only**, thus 7.3.1.0 is only for Uu DCI format.  2.Regarding moderator and intel’s comments on step3, the whole clause 7.3.1.0 **is described from the perspective of a cell, thus it must be for Uu scheduling operation,** this aspect is especially clarified in step3 by the text “the total number of different DCI sizes configured to **monitor** is no more than 4 **for the cell**” quoted by moderator. ‘DCI monitored **for the cell**’ refers to **‘DCI format scheduling the cell’,** SL DCI is not a ‘DCI formats monitored **for** a cell’ because there is no SL cell defined in R16 V2X. |
| Nokia, NSB | No | Clause 7.3.1 presents a table of all DCI formats, including those for SL, and then states a few lines below the table that “The size of each DCI format … shall be adjusted as described in clause 7.3.1.0 if necessary”  On a straightforward reading, this seems to **explicitly** state that clause 7.3.1.0 applies to all DCI formats, including those for SL. We don’t think that the **implied** scope of the text in clause 7.3.1.0.1 is sufficient to outweigh this. |
| Qualcomm | Yes |  |
| OPPO | No | The current spec doesn’t preclude the interpretation that DCI 3\_0 or DCI 3\_1 is involved in Clause 7.3.1.0. It is better to make a clarification. |
| Samsung |  | When reading the spec in its entirety, it is implied based on the sentence in section 7.3.1.0.1:  “DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing DCI size alignment described in Clause 7.3.1.0”  that DCI size alignment in clause 7.3.1.0 doesn’t include DCI format 3\_0 or DCI format 3\_1.  However, we are fine to clarify that explicitly in clause 7.3.1.0. |
| Apple | Yes | Section 7.3.1.0.1 of TS 38.212 indicates the DCI format 3\_0 and 3\_1 are not involved in DCI size alignment in Section 7.3.1.0. |
| LG Electronics | Yes | We think that the yellow-marked parts in Section 7.3.1.0.1 already clarify/imply that DCI format 3\_0/3\_1 are not involved in the procedure described in Clause 7.3.1.0. 7.3.1.0.1 DCI size alignment for DCI formats for scheduling of sidelink If DCI format 3\_0 or DCI format 3\_1 is monitored on a cell, DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0. The size(s) of the DCI formats configured to monitor for a cell in this clause refers to that after performing the DCI size alignment described in Clause 7.3.1.0.  If DCI format 3\_0 or DCI format 3\_1 is monitored on a cell and the total number of DCI sizes of the DCI formats configured to monitor for the cell and DCI format 3\_0 or DCI format 3\_1 is more than 4, zeros shall be appended to DCI format 3\_0 if configured and DCI format 3\_1 if configured, until the payload size of DCI format 3\_0 or DCI format 3\_1 equals that of the smallest DCI format configured to monitor for the cell that is larger than DCI format 3\_0 or DCI format 3\_1.  The UE is not expected to handle a configuration that results in:  - the total number of different DCI sizes configured to monitor for the cell and DCI format 3\_0 or DCI format 3\_1 is more than 4; and  - the payload size of DCI format 3\_0 or DCI format 3\_1 is larger than the payload size of all other DCI formats configured to monitor for the cell. |
| NTT DOCOMO | No | Although the text in 7.3.1.0.1 implies the intention, it would be better to clearly mention the intention in 7.3.1.0 to avoid misunderstanding. |
| Sharp | No | As we commented in the preparation phase discussion, the sizes of DCI formats 3\_0/3\_1 may be adjusted multiple times and the one in 7.3.1.0.1 is just one of them, and so DCI formats 3\_0/3\_1 being size aligned in 7.3.1.0.1 does not imply in any manner that they have been precluded from size alignment elsewhere. (For example, 3\_0 and 3\_1 are size aligned to each other before going to 7.3.1.0.1).  In fact, the above point was made clear in the sentence “*DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0*” quoted by some companies answering “Yes”, by the yellow highlight. |

### Issue 2: DCI formats “configured to monitor for a cell”

R1-2202185 outlines a potential contradiction in interpreting “*DCI formats configured to monitor for a cell*” in clause 7.3.1.0.1:

* On one hand, the following seems to support an interpretation that DCI format 3\_0 and DCI format 3\_1 are **not** part of “*DCI formats configured to monitor for a cell*”:

|  |  |
| --- | --- |
| **Spec text** | **Interpretation** |
| *The size(s) of the DCI formats configured to monitor for a cell in this clause refers to that after performing the DCI size alignment described in Clause 7.3.1.0.* | Since “*DCI formats configured to monitor for a cell*” are defined as those involved in clause 7.3.1.0, and DCI format 3\_0 and DCI format 3\_1 are not supposed to be involved in clause 7.3.1.0, it seems straightforward that DCI format 3\_0 and DCI format 3\_1 are not part of “*DCI formats configured to monitor for a cell*”. |
| *If … the total number of DCI sizes of the DCI formats configured to monitor for the cell and DCI format 3\_0 or DCI format 3\_1 is more than 4.* | A list of items like “*A and b or c*”, where *A* is a set of items and *b* or *c* is one item, implies that neither *b* nor *c* is part of *A* (or else there is no need for “*and b or c*”). |

* On the other hand, the following seems to support an interpretation that DCI format 3\_0 and DCI format 3\_1 are part of “*DCI formats configured to monitor for a cell*”:

|  |  |
| --- | --- |
| **Spec text** | **Interpretation** |
| *The payload size of DCI format 3\_0 or DCI format 3\_1 is larger than the payload size of all other DCI formats configured to monitor for the cell.* | A sentence like “*b or c is larger than all other items in the set A*” implies that *b* or *c* is in the set *A*. |

And R1-2202185 proposes to remove the word “other” in the last sentence of clause 7.3.1.0.1 of TS 38.212 in order to resolve the potential contradiction.

**Q2: Is there any problem in the current spec in terms of consistency in different occurrences of “*DCI formats configured to monitor for a cell*” in clause 7.3.1.0.1 of TS 38.212?**

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| --- | --- | --- |
| **Company** | **Answer (Y/N)** | **Comment** |
| Intel |  | We are open to continue discussion on that and slightly support the arguments from the moderator |
| vivo |  | Although the intention is understood (i.e., for wording consistency), we are wondering if this is a necessary change since other parts in the spec are clear to us and the text ‘The payload size of DCI format 3\_0 or DCI format 3\_1 is larger than the payload size of all other DCI formats configured to monitor for the cell’ should not be ambiguous with the context, but if the majority think the removal of ‘other’ is needed, we can live with it. |
| Nokia, NSB |  | If we decide to make any TS changes as a result of this email discussion, then we support to also remove “other” here. |
| Qualcomm |  | We think the alignment procedure is clear from context. |
| OPPO |  | Although we don’t think the “other” may lead to the interpretation that DCI 3\_0 or DCI 3\_1 is a part of DCI formats configured to monitor for a cell, we are ok to remove it. |
| Samsung |  | There is some inconsistency in the spec’s wording. It is better to assume that DCI formats configured to monitor for a cell include Format 3\_0 and 3\_1. In this case, the following change is more appropriate:  “the total number of DCI sizes of the DCI formats configured to monitor for the cell ~~and~~ including DCI format 3\_0 or DCI format 3\_1 is more than 4” |
| Apple |  | We are open to remove “other”, if majority companies support it. |
| LG Electronics |  | We think that even the current wording of “other” doesn’t make a critical problem on correctly interpreting the intended procedure. |
| NTT DOCOMO |  | Same view with Apple. |
| Sharp |  | We are open to discuss different interpretations from companies, but we cannot understand the view that there is no problem with the word “other” (but without any detailed explanation). For the purpose of moving the discussion forward, we would really like to encourage proponents of the such a view to provide some explanations, e.g.   * “*all ~~other~~ DCI formats configured to monitor for the cell*” and “*all other DCI formats configured to monitor for the cell*” are the same thing? Or * The word “other” may cause a little ambiguity, but the intended procedure is clarified clearly in other places, so it does not matter? |

It was also argued in R1-2202185 that there is ambiguity in using “*DCI formats configured to monitor on a cell*” for some DCI formats and “*DCI formats configured to monitor for a cell*” for other DCI formats, and proposed to replace the latter with “*DCI formats not for scheduling of sidelink*".

**Q3: Is there any problem in current spec in terms of using “*DCI formats configured to monitor on a cell*” for some DCI formats and “*DCI formats configured to monitor for a cell*” for other DCI formats?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Answer (Y/N)** | **Comment** |
| Intel |  | We are open to continue discussion on that and slightly support the arguments from the moderator |
| vivo | No | “DCI formats configured to monitor on a cell” refers to DCI transmitted on a cell, which includes Uu DCI and SL DCI  “DCI formats configured to monitor for a cell” is usually for DCI scheduling operation for a cell, as we explained in Q1, there is no SL cell and SL DCI is not ‘for a cell’, thus there is no ambiguity. |
| Nokia, NSB |  | Prefer to keep “on a cell” and “for a cell” terminology – let us doublecheck that it is used consistently. |
| Qualcomm | No |  |
| OPPO |  | We prefer to keep “DCI formats configured to monitor on a cell” and “DCI formats configured to monitor for a cell” |
| Samsung | N | The spec is fine:  “*DCI formats monitor on a cell*”. The monitoring is on a cell.  “*DCI formats configured to monitor for a cell*”. Configuration to monitor is for a cell. |
| Apple | No |  |
| LG Electronics | No | We think that no additional change is needed for this issue. |
| NTT DOCOMO | No |  |

Regarding the following comment from one company in the preparation phase, “*cross-carrier scheduling was discussed at length during the editor CR phase, and the current wording was chosen to cover all the cases. It should preferably not be re-discussed*”, Moderator’s understanding is that R1-2202185 did not propose any change related to cross-carrier scheduling. Follow-up comments on this aspect, as well as other comments/suggestions which cannot be covered by Q1, Q2 and Q3, can be provided in the table below Q4.

**Q4: Please provide comments and suggestions, if any, on any aspect that cannot be covered by Q1, Q2 and Q3.**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| vivo | In our understanding, the proposed change in R1-2202185 does involve the DCI format for cross-carrier scheduling, which is not correct.  RAN1 agreed that the Uu DCI size budget of the scheduling cell (e.g., cell A) on which SL DCI is received should be used to determine the size of SL DCI as well as to specify the conditions of invalid configuration. The original text ‘DCI format configured to monitor for the cell’ was suggested by editor, ‘the cell’ refers to the scheduling cell (i.e., cell A) according to the context so that ‘DCI format configured to monitor for the cell’ includes Uu DCI for cell A self-scheduling purposes only, thus DCI size budget of the scheduling cell would be used. But the proposed change ‘DCI formats not for scheduling of sidelink’ includes not only the Uu DCI for self-scheduling but also the Uu DCI received on cell A for cross-carrier scheduling other Scell.  Agreements:   * If the DCI size budget is not exceeded, no alignment of DCI format 3\_0 / 3\_1 with other NR DCI formats is performed. * If the DCI size budget is exceeded, DCI format 3\_0 / 3\_1 is zero-padded until the size is equal to that of the next large Uu DCI format (in size). * The UE does not expect that the following two conditions happen simultaneously:   + The DCI size budget is exhausted   + DCI format 3\_0 / 3\_1 is larger than all other configured DCI formats. * Note: the DCI size budget is performed for Uu DCI formats first, before the considerations for DCI format 3\_0/3\_1 as listed in the above bullets   Agreements:  In the preceding agreement, the DCI size budget refers to the budget of the cell on which the DCI format 3\_0 or DCI format 3\_1 is received. |
| Sharp | Regarding vivo’s comment, it seems to be mainly on whether the wording of the proposed change “DCI formats not for scheduling of sidelink” is appropriate or not. The wording can certainly be tuned if there is consensus on the issue raised in the contribution. |
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## Round 2

TBD

# Summary and Conclusion

TBD.

# Reference

[1] R1-2202185, “Correction on DCI size alignment for sidelink”, Sharp, RAN1#108-e.

# Appendix: Proposed changes to TS 38.212 in R1-2202185

**<Unchanged parts are omitted>**

7.3.1.0 DCI size alignment

If necessary, padding or truncation shall be applied to the DCI formats not for scheduling of sidelink according to the following steps executed in the order below:

**<Unchanged parts are omitted>**

7.3.1.0.1 DCI size alignment for DCI formats for scheduling of sidelink

If DCI format 3\_0 or DCI format 3\_1 is monitored on a cell, DCI size alignment for DCI format 3\_0 and DCI format 3\_1 is performed as described in this clause after performing the DCI size alignment described in Clause 7.3.1.0. The size(s) of the DCI formats not for scheduling of sidelink in this clause refers to that after performing the DCI size alignment described in Clause 7.3.1.0.

If DCI format 3\_0 or DCI format 3\_1 is monitored on a cell and the total number of DCI sizes of the DCI formats not for scheduling of sidelink and DCI format 3\_0 or DCI format 3\_1 is more than 4, zeros shall be appended to DCI format 3\_0 if configured and DCI format 3\_1 if configured, until the payload size of DCI format 3\_0 or DCI format 3\_1 equals that of the smallest DCI format not for scheduling of sidelink that is larger than DCI format 3\_0 or DCI format 3\_1.

The UE is not expected to handle a configuration that results in:

- the total number of different DCI sizes of the DCI formats not for scheduling of sidelink and DCI format 3\_0 or DCI format 3\_1 is more than 4; and

- the payload size of DCI format 3\_0 or DCI format 3\_1 is larger than the payload size of all DCI formats not for scheduling of sidelink.

**<Unchanged parts are omitted>**