3GPP TSG-RAN WG1 Meeting #104bis-e Tdoc R1-20xxxxx

e-Meeting, April 12th – 20th, 2021

Agenda Item: 7.2.4

Source: Moderator (Ericsson)

Title: Feature lead summary#2 on Resource allocation for NR sidelink Mode 1

Document for: Discussion, Decision

# Summary of issues listed in the contributions

The FL has grouped the corrections discussed in the contributions in the following way.

**Group 1 – DCI-related aspects**

1. *dci-FormatsExt* vs *dci-FormatsSL* (see Nokia+NSB (P2, P3), vivo (P2, P3), LGE (P1))
   * FL assessment: discussion is necessary. Nokia+NSB claim it is editorial but vivo and LGE have longer discussions.
2. Value of n\_CI (see vivo (TP1))
   * FL assessment: views from other companies required.
3. For size alignment, include DCI formats for other purposes (see vivo (TP2))
   * FL assessment: almost editorial

**Group 2 – Codebook construction**

1. For Type 1, the number of PSSCH slots associated with the same PSFCH slot could be smaller than the PSFCH resource period (see LGE (P1), vivo (TP4), ZTE+Sanechips (P1))
   * FL assessment: needs correction
2. How to operate with multiple resource pools with different PSFCH periods (see ASUSTeK (TP1), ZTE+Sanechips (P2))
   * FL assessment: views from other companies required.
3. TX power – vivo (TP7)
   * FL assessment: views from other companies required.

**Group 3 – SL HARQ-ACK reports to gNB**

1. Change RRC parameter values (see OPPO (P1))
   * FL assessment: ASN.1 impact, not necessary, can be addressed by RAN2 if necessary.
2. SL HARQ-ACK reporting in UL when the SL transmission (scheduled by DG/CG) does not use SL HARQ feedback (see OPPO (P2, P3))
   * FL assessment: RAN1 has already made agreements already captured in the agreements on the topic. This change has been discussed in the past without reaching consensus.
3. Report ACK when DG is not used (see Fujitsu (P1), DCM (TP1))
   * FL assessment: This change has been discussed in the past without reaching consensus.
4. Slot offset between PSFCH and HARQ-ACK reporting (i.e., k>0 always) (see Sharp (TP5))
   * FL assessment: Not a critical correction.
5. Some companies discuss actions for a potential reply by RAN2 to LS R1-2102176. In all cases, they suggest waiting for a reply LS (See Nokia+NSB, DCM)
   * FL assessment: Wait until a reply LS is received

A few contributions discuss issues related to priorities (see vivo (TP5), Sharp (TP3), Fujitsu (P1)). The FL suggestion is that, as done earlier, they are treated by the FL of PHY procedures, if necessary.

In addition, the FL has identified proposals to make the following editorial corrections.

**Group 4 – Editorial**

* TS 38.211
  + 8.4.1.2.2: See OPPO
* TS 38.212
  + 7.3.1.4.1: DCI format 3\_0 clarification that the configuration index is reserved for DG scheduling a retransmission for CG (see ASUSTeK (TP5), Sharp (TP2))
    - FL assessment: reasonable correction
* TS 38.213
  + 10.1:
    - Remove ‘a SL-RNTI, a SL-CS-RNTI, or a SL-L-CS-RNTI’ (see Sharp (TP4-1 and TP4-2))
      * FL assessment: reasonable correction. Take the simpler proposal, which requires no new agreement.
    - Other editorial (see Sharp (TP1-1))
  + 16.5:
    - Clarify that the UE does not expect to multiplex SL HARQ and Uu UCI on PUCCH or PUSCH (see vivo (P9))
      * FL assessment: reasonable clarification
    - “One bit” (see Sharp (TP6))
      * FL assessment: this was brought up last meeting but there was no consensus.
    - Other editorial (see Sharp (TP1-1))
* TS 38.214
  + 8.1.2:
    - Clause number (see ASUSTeK (TP3), Sharp (TP1-2))
  + 8.1.2.1:
    - 2xTypo (see vivo (P5))
    - RRC parameter name (see ASUSTeK (TP3))
  + 8.1.4: ASUSTeK (TP3)
    - FL Assessment: the misalignment of priority values (0-7 vs 1-8) was also an issue in LTE. It would be good to discuss whether this is the case here too.
  + 8.2.1: See OPPO

After a round of discussion, it was agreed to have the following discussion:

[104b-e-NR-5G\_V2X-02] Email discussion/approval on issue M1-1-1: dci-FormatsExt vs dci-FormatsSL till 4/15, with potential CRs till 4/19 – Ricardo (Ericson)

# Issue M1-1-1: dci-FormatsExt vs dci-FormatsSL

[104b-e-NR-5G\_V2X-02] Email discussion/approval on issue M1-1-1: dci-FormatsExt vs dci-FormatsSL till 4/15, with potential CRs till 4/19 – Ricardo (Ericson)

At least three contributions (Nokia+NSB (P2, P3), vivo (P2, P3), LGE (P1)) have identified issues with the configuration of the search space.

Currently TS 38.331 defines (excerpt):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| – *SearchSpace*  The IE *SearchSpace* defines how/where to search for PDCCH candidates. Each search space is associated with one *ControlResourceSet*. For a scheduled cell in the case of cross carrier scheduling, except for *nrofCandidates*, all the optional fields are absent (regardless of their presence conditions).  ***SearchSpace* information element**  -- ASN1START  -- TAG-SEARCHSPACE-START  SearchSpace ::= SEQUENCE {  searchSpaceId SearchSpaceId,  controlResourceSetId ControlResourceSetId OPTIONAL, -- Cond SetupOnly  PARTS OMMITTED  ue-Specific SEQUENCE {  dci-Formats ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1},  ...,  [[  dci-Formats-MT-r16 ENUMERATED {formats2-5} OPTIONAL, -- Need R  dci-FormatsSL-r16 ENUMERATED {formats0-0-And-1-0, formats0-1-And-1-1, formats3-0, formats3-1,  formats3-0-And-3-1} OPTIONAL, -- Need R  dci-FormatsExt-r16 ENUMERATED {formats0-2-And-1-2, formats0-1-And-1-1And-0-2-And-1-2}  OPTIONAL -- Need R  ]]  }  } OPTIONAL -- Cond Setup2  }  PARTS OMMITTED   |  | | --- | | ***SearchSpace* field descriptions (excerpt)** | | ***dci-Formats***  Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1. | | ***dci-FormatsExt***  If this field is present, the field *dci-Formats* is ignored and *dci-FormatsExt* is used instead to indicate whether the UE monitors in this USS for DCI format 0\_2 and 1\_2 or formats 0\_1 and 1\_1 and 0\_2 and 1\_2 (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13], clause 10.1). | | ***dci-FormatsSL***  Indicates whether the UE monitors in this USS for DCI formats 0-0 and 1-0 or for formats 0-1 and 1-1 or for format 3-0 or for format 3-1 or for formats 3-0 and 3-1. | | ***ue-Specific***  Configures this search space as UE specific search space (USS). The UE monitors the DCI format with CRC scrambled by C-RNTI, CS-RNTI (if configured), and SP-CSI-RNTI (if configured) | |

While TS 38.213 states:

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| --- |
| For each DL BWP configured to a UE in a serving cell, the UE is provided by higher layers with search space sets where, for each search space set from the search space sets, the UE is provided the following by *SearchSpace*:  PARTS OMMITTED  - if search space set is a USS set, an indication by *dci-Formats* to monitor PDCCH candidates either for DCI format 0\_0 and DCI format 1\_0, or for DCI format 0\_1 and DCI format 1\_1, or an indication by *dci-FormatsExt* to monitor PDCCH candidates for DCI format 0\_2 and DCI format 1\_2, or for DCI format 0\_1, DCI format 1\_1, DCI format 0\_2, and DCI format 1\_2, or for DCI format 3\_0, or for DCI format 3\_1, or for DCI format 3\_0 and DCI format 3\_1  PARTS OMMITTED |

The following problems about the current specification have been described:

* TS 38.213 does not mention *dci-FormatsSL*.
* It is not clear how to handle the potential cases that:
  + Both *dci-Format* and *dci-FormatsSL* are configured.
  + Both *dci-FormatsSL* and *dci-FormatsExt* are configured.

To solve these issues:

* Proposal 3 in R1-2103764 addresses the first bullet and consists of modifying TS 38.213 so that it states that *dci-FormatsSL* is used to monitor PDCCH candidates for DCI format 0\_0 and DCI format 1\_0, or for DCI format 0\_1 and DCI format 1\_1, or for DCI format 3\_0, or for DCI format 3\_1, or for DCI format 3\_0 and DCI format 3\_1.
* Proposals 2 and 3 in R1-2102940 consists of specifying the following behavior:
  + If *dci-FormatsSL* is configured in a USS with *dci-Format*, it overrides *dci-Format*.
  + It is not expected to configure *dci-FormatsSL* and *dci-FormatsExt* in a same USS.
* Proposal 1 R1-2103376 discusses the interaction *dci-Format* and *dci-FormatsSL* for dedicated ITS-dedicated carriers. The proposed change is:
  + When Mode 1 SL TX is cross-carrier scheduled on ITS-dedicated carrier, the UE ignores dci-Formats and monitors only dci-FormatsSL-r16 in the relevant search space configuration on the scheduling licensed carrier.

This proposal is like Proposal 2 in R1-2102940 but restricted to ITS-dedicated carriers.

Based on this, the FL makes the following proposal.

**Proposal**:

* *dci-FormatsSL* is used to monitor PDCCH candidates for DCI format 0\_0 and DCI format 1\_0, or for DCI format 0\_1 and DCI format 1\_1, or for DCI format 3\_0, or for DCI format 3\_1, or for DCI format 3\_0 and DCI format 3\_1.
* If *dci-FormatsSL* is configured in a USS with *dci-Format*, it overrides *dci-Format*.
* The UE does not expect to be configured with *dci-FormatsSL* and *dci-FormatsExt* in a same USS.

FL comments after round 1 (13/4/2021):

* The proposal is in general acceptable to everyone, with only some relatively small comments about it.
* In some of the comments, there was a discussion on whether the agreements would be reflected in RAN1 and/or RAN2 specifications. This will be discussed during the CR phase. My understanding is that we will draft CR(s) for the RAN1 specification(s) and send an LS to RAN2 for their specifications, if applicable.
* There is one request to clarify that the above proposal does not change the blind decoding budget

Taking all this into account, I have kept the proposal as it was and added one note about the blind decoding budget.

**Proposal**:

* *dci-FormatsSL* is used to monitor PDCCH candidates for DCI format 0\_0 and DCI format 1\_0, or for DCI format 0\_1 and DCI format 1\_1, or for DCI format 3\_0, or for DCI format 3\_1, or for DCI format 3\_0 and DCI format 3\_1.
* If *dci-FormatsSL* is configured in a USS with *dci-Format*, it overrides *dci-Format*.
* The UE does not expect to be configured with *dci-FormatsSL* and *dci-FormatsExt* in a same USS.

NOTE: no changes to the blind decoding budget are introduced

Please use the following table to express your views:

**Company views**

|  |  |
| --- | --- |
| **Company** | **View** |
| Vivo | **We support the proposal.** And we think the first bullet can be supported only when the second bullet is approved.  If the second bullet is not approved, there will be the following issues:   * According to the searchspace IE shown above, gNB can set dci-Formats set to fallback Uu DCI (format 0-0-And-1-0) and set dci-FormatsSL to non-fallback Uu DCI (format 0-1-And-1-1), or vice versa. **In this case, UE needs to monitor both fallback Uu DCI and non-fallback Uu DCI on the same USS.** **Such behavior violates the R15 IE design principle** that a USS can be configured with either fallback DCI or non-fallback DCI but cannot be configured with both at the same time. It should be noted that R16 URLLC also follows this design principle, **specifically by overriding dci-Formats with dci-FormatsExt if dci-FormatsExt is configured**. On the other hand, allowing monitoring both fallback Uu DCI and non-fallback Uu DCI in the same searchspace does bring benefits either, but rather increases complexity of blind detection. * In some cases, e.g., when SL is configured on ITS band, **there is no need to monitor any Uu DCI**. In some other cases where SL is configured on an SRS-only cell without PUSCH TX, **there is no need to monitor Uu DCI format 0-X scheduling PUSCH**. However, if the second bullet is not approved, according to the cross-carrier scheduling framework and above IEs, the searchspace used to schedule the SL resources **must be associated with SL DCI format(s), a Uu DCI format 0-X and a Uu DCI format 1-X, thus** **UE must monitor all these associated DCI formats for the scheduled cell although the monitoring of some of them is not needed for the scheduled cell.** * Coupling SL DCI and Uu DCI in the same searchspace imposes great limitations on Uu scheduling.   The second bullet is a simple way to address the above issues and should be supported. With regard to the configuration of dci-FormatsExt, the 3rd bullet is supported to avoid impacts on the new formats 2-X introduced in other AI, |
| NTT DOCOMO | Support the proposal. |
| Intel | We think the direction is correct. To support the second bullet, it seems interaction with RAN2 is needed to mention the overriding in RRC spec similar to how dci-FormatsExt replaces dci-Formats.  FL reply 13/4/21:  We will discuss that during the CR phase. |
| Qualcomm | We agree with the proposal. |
| Apple | Support the proposal. |
| OPPO | Support the proposal, while the 1st bullet is not necessary which have been captured in 38.331.  FL reply 13/4/21:  My impression is that the change to TS 38.213 is necessary too. From the replies by the different companies, it seems that they agree with that. |
| Sharp | Support the proposal. |
| CATT | OK with the proposal. |
| Huawei, HiSilicon | We support the proposal in principle, but it should be clarified that the proposal does not increase the blind decoding budget which already agreed in RAN1 #99.  FL reply 13/4/21:  I captured a clarification. |
| ZTE, Sanechips | We understand the motivation of the second bullet - to support the case when only 3-0/3-1 and/or the combination is needed while 0-1/0-0 is not. Yet this rule shall eliminate the case when the UE is supposed to monitor (DCI format 0\_0 and DCI format 1\_0) and (DCI format 3\_0, and/or for DCI format 3\_1). Thus a change of the 331 spec of the signalling of dci-FormatsSL-r16 is needed together with this rule to ensure no new issue arises. A triggering LS may also be needed.  FL reply 13/4/21:  I am not sure I understood your concern. In any case, any clarification can be addressed during the CR phase, when we would write such an LS to RAN2. |
| Nokia, NSB | We support the proposal. |
| LG Electronics | We are fine with FL’s proposal |
| Samsung | Support the proposal. |
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# List of identified contributions

R1-2102368 Remaining open issues and corrections for mode 1 RA OPPO

R1-2102710 A remaining issue on Mode-1 resource allocation for NR sidelink Fujitsu

R1-2102940 Maintenance on NR sidelink mode-1 resource allocation mechanism vivo

R1-2103376 Discussion on essential corrections in resource allocation procedure LG Electronics

R1-2103467 Remaining issues on resource allocation for NR sidelink Sharp

R1-2103499 Remaining issues on mode1 ZTE, Sanechips

R1-2103555 Maintenance for resource allocation mechanism mode 1 NTT DOCOMO, INC.

R1-2103672 Remaining issues on resource allocation mode-1 and sidelink procedure ASUSTeK

R1-2103764 Maintenance for Resource allocation for sidelink - Mode 1 Nokia, Nokia Shanghai Bell