3GPP TSG-RAN WG1 Meeting #100bis-e R1-20xxxxx

e-Meeting, 20th – 30th April, 2020

Agenda Item: 7.2.2.1.3

Source: Moderator (Ericsson)

Title: FL Summary for [100b-e-NR-unlic-NRU-ULSignalsChannels-02] Email discussion/approval

Document for: Discussion, Decision

# 1 Introduction

Based on the conclusion of the e-meeting preparation phase [21] and the vice-Chairman’s guidance, the following e-mail discussion has been kicked-off:

[100b-e-NR-unlic-NRU-ULSignalsChannels-02] Email discussion/approval on the following issues

by 4/24; if necessary, followed by endorsing the corresponding TPs by 4/30 – Steve (Ericsson)

* Capture UE procedure related to FDRA field in RAR UL grant
* Editorial correction on SRS

The following topics are included in this email discussion

|  |  |  |  |
| --- | --- | --- | --- |
| **Issue** | **Description** | **Tdoc References** | **Class** |
| 3 | FDRA field in RAR UL grant for operation with shared spectrum channel access   * Capture UE interpreation of FDRA field when interlacing configured * Truncation/expansion rule when interlacing not configured * Agree on rule for RB set allocation for PUSCH scheduled by RAR UL grant   TP needed to 38.213 §8.3 | R1-2002030: P3,P4  R1-2001875: P4  R1-2001533: P3  R1-2001934: P5  R1-2001758: P1  R1-2002382: P4-P5  R1-2001651: P3  R1-2002383: P2  R1-2001706: P8 | Critical |
| 4 | Align procedure text in 38.213 §6.2.1 with SRS resource configuration in 38.331 capturing that SRS resource can start at any OFDM symbol in a slot.  TP needed to 38.214 §6.2.1 | R1-2002075: P1  R1-2002030: P5  R1-2001986: §2.1  R1-2002365: TP1  R1-2002529: P4  R1-2001704: P4 | Editorial |

# 2 Discussion

## 2.1 Issue #3: FDRA Field in RAR UL Grant

**Description**:

In Section 8.3 in 38.213, either UL resource allocation Type 1 or Type 2 is used for PUSCH scheduled by a RAR UL grant depending on if interlacing is configured. However, the procedure on how the UE interprets the FDRA field of the RAR UL grant is only described for the case when interlacing is not configured. The procedure when interlacing is configured needs to be included. The procedure needs to account for truncation of the FDRA field since only X bits is indicated for the interlace allocation, where X = 6/5 for 15/30 kHz SCS. The procedure also needs to account for what RB set allocation the UE should assume for transmission of PUSCH scheduled by the RAR UL grant, since the FDRA field does not include Y bits as previously agreed.

Another issue is that since the number of bits in the FDRA field is reduced to 12 for operation with shared spectrum channel access, the threshold number of PRBs that the UE uses for processin the FDRA field needs to be reduced from 180 to 90 for the case when interlacing is not configured.

A text proposal (TP#1) to correct these issues is proposed below. There is one FFS point in the TP on the RB set allocation. This is analogous to the RB set allocation rule for DCI 0\_0 in a CSS discussed in Email Thread #1. Alt-1 is analogous to Alt-1 in Issues #1-1 in Email Thread #1.

1. The following is proposed for discussion this week to address the FFS item in TP#1 below, with down selection completed by 4/24.

* For PUSCH scheduled by an UL RAR grant when UL resource allocation Type 2 is configured, down-select to one alternative:
  + **Alt-1**: The UE assumes that PUSCH is allocated to the RB set of the active UL BWP that intersects the RB set of the active DL BWP in which the DCI 0\_1 that schedules the PDSCH with the RAR message is received
  + Other alternatives?

**Affected Specification(s)**:

* 38.213 Section 8.3
* 38.214 Section 6.1.2.2.3

|  |  |
| --- | --- |
| **Company** | **View/Position** |
| ZTE | Agree with the TPs |
| Huawei | Support Alt-1. Agree with the TPs. |
| Nokia, NSB | Support Alt-1 and the TP |
| Lenovo, Motorola Mobility | We support RB set 0 is assumed when scheduled by RAR |
| LG Electronics | Agree with the TPs other than RB set allocation part.  Regarding to the rule for RB set allocation, we could consider another alternative. Since the FDRA field in RAR grant is 12 bits for operation with shared spectrum channel access, there are 5 or 6 bits left that can be used for RB set indication. For this reason, we suggest the following alternative (i.e., Alt-2).  Alt-2 : FDRA field in RAR grant contains X + Y bits  - Y is given by size of active UL BWP |
| NTT DOCOMO | Support Alt-1 and agree with TPs #1 and #2 |
| Samsung | Agree with LGE. |
| Qualcomm | Agree with TP. For FFS, can reuse the same design for DCI 0\_0 in CSS |
| Intel | Support Alt-1 and the TP |
| OPPO | We don't agree with the RB set determination Alt-1. We propose to follow NR baseline, i.e.  Alt-3: UE assumes that PUSCH is in the RB set that intersects with initial UL BWP, if any, or RB set 0 of active UL BWP. |
| vivo | Agree with the TPs, other than Alt 1 to determine the RB set allocation part.  We share the same view with Qualcomm, can reuse the same design for DCI 0\_0 in CSS. |
| Spreadtrum | Agree with the TP. For FFS part, we prefer RB set 0 is assumed when scheduled by RAR. |

---------------------------------------- Text Proposal (TP#1) for 38.213, Section 8.3 ----------------------------------

\*\*\* Unchanged text omitted \*\*\*

8.3 PUSCH scheduled by RAR UL grant

An active UL BWP, as described in Clause 12 and in [4, TS 38.211], for a PUSCH transmission scheduled by a RAR UL grant is indicated by higher layers.

If *useInterlace-PUCCH-PUSCH* is neither provided in *BWP-UplinkCommon* nor *BWP-UplinkDedicated,* ~~F~~for determining the frequency domain resource allocation for the PUSCH transmission within the active UL BWP

- if the active UL BWP and the initial UL BWP have same SCS and same CP length and the active UL BWP includes all RBs of the initial UL BWP, or the active UL BWP is the initial UL BWP, the initial UL BWP is used

- else, the RB numbering starts from the first RB of the active UL BWP and the maximum number of RBs for frequency domain resource allocation equals the number of RBs in the initial UL BWP

The frequency domain resource allocation is by uplink resource allocation type 1 ~~if~~ *~~useInterlacePUSCH-Common~~* ~~is not provided and by uplink resource allocation type 2 if~~ *~~useInterlacePUSCH-Common~~* ~~is provided~~ [6, TS 38.214]. For an initial UL BWP size of  RBs, ~~if~~ *~~useInterlacePUSCH-Common~~* ~~is not provided,~~ a UE processes the frequency domain resource assignment field as follows

- if , or for operation with shared spectrum channel access if ,

- truncate the frequency domain resource assignment field to its  least significant bits and interpret the truncated frequency resource assignment field as for the frequency resource assignment field in DCI format 0\_0 as described in [5, TS 38.212]

- else

- insert  most significant bits, or for operation with shared spectrum channel access insert most significant bits, with value set to '0' after the  bits to the frequency domain resource assignment field, where  if the frequency hopping flag is set to '0' and  is provided in Table 8.3-1 if the hopping flag bit is set to '1', and interpret the expanded frequency resource assignment field as for the frequency resource assignment field in DCI format 0\_0 as described in [5, TS 38.212]

- end if

If *useInterlace-PUCCH-PUSCH* is provided in any of *BWP-UplinkCommon* and *BWP-UplinkDedicated*, the frequency domain resource allocation is by uplink resource allocation type 2 [6, TS 38.214]. A UE processes the frequency domain resource assignment field as follows:

* truncate the frequency domain resource assignment field to its X LSBs
* interpret the truncated frequency domain resource assignment field for the active UL BWP as for the X MSBs of the frequency domain resource assignment field in DCI format 0\_0 as described in [6, TS 38.214]
* The UE assumes the RB set allocation in the active UL BWP for a PUSCH scheduled by the RAR UL grant is given by [FFS: rule for for RB set allocation]
* \*\*\* Unchanged text omitted \*\*\*

------------------------------------------------------ End Text Proposal -------------------------------------------------------

------------------------------------ Text Proposal (TP#2) for 38.214, Section 6.1.2.2.3 ------------------------------

\*\*\* Unchanged text omitted \*\*\*

6.1.2.2.3 Uplink resource allocation type 2

In uplink resource allocation of type 2, the resource block assignment information defined in [5, TS 38.212] indicates to a UE a set of up to *M* interlace indices, and for DCI 0\_1 a set of up to contiguous RB sets, where *M* and interlace indexing are defined in Clause 4.4.4.6 in [4, TS 38.211]. The UE shall determine the resource allocation in frequency domain as an intersection of the resource blocks of the indicated interlaces and the indicated set of RB sets and intra-cell guard bands defined in Clause 7 between the indicated RB sets, if any.

For µ=0, the X = 6 MSBs of the resource block assignment information indicates to a UE a set of allocated interlace indices , where the indication consists of a resource indication value (*RIV*). For , the resource indication value corresponds to the starting interlace index *m0* and the number of contiguous interlace indices (). The resource indication value is defined by:

if then

else

For , the resource indication value corresponds to the starting interlace index *m0* and the set of values  according to Table 6.1.2.2.3-1.

**Table 6.1.2.2.3-1: *m0* and  for .**

|  |  |  |
| --- | --- | --- |
|  | ***m0*** |  |
| 0 | 0 | {0, 5} |
| 1 | 0 | {0, 1, 5, 6} |
| 2 | 1 | {0, 5} |
| 3 | 1 | {0, 1, 2, 3, 5, 6, 7, 8} |
| 4 | 2 | {0, 5} |
| 5 | 2 | {0, 1, 2, 5, 6, 7} |
| 6 | 3 | {0, 5} |
| 7 | 4 | {0, 5} |

For µ=1, the X = 5 MSBs of the resource block assignment information comprise a bitmap indicating the interlaces that are allocated to the scheduled UE. The bitmap is of size *M* bits with one bitmap bit per interlace such that each interlace is addressable, where *M* and interlace indexing is defined in Clause 4.4.4.6 in [4, TS 38.211]. The order of interlace bitmap is such that interlace 0 to interlace are mapped from MSB to LSB of the bitmap. An interlace is allocated to the UE if the corresponding bit value in the bitmap is 1; otherwise the interlace is not allocated to the UE.

\*\*\* Unchanged text omitted \*\*\*

------------------------------------------------------ End Text Proposal -------------------------------------------------------

## 2.2 Issue #4: Procedure Text Related to Configuration of SRS

**Description**:

It was agreed in RAN1#96bis to allow the starting OFDM symbol of an SRS resource to occur at any OFDM symbol of a slot rather than be limited to start only within the last 6 symbols of a slot:

Agreement:

Support RRC configuration of an SRS resource to start at any OFDM symbol within a slot by extending the RRC parameter *startPosition* of *resourceMapping* of *SRS-Config* for Rel-16 to have a value range 0..13.

While 38.331 has been updated to capture this agreement, 38.214 has not.

**Affected Specification(s)**:

* 38.214 Section 6.2.1

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| **Company** | **View/Position** |
| ZTE | Agree with the TP |
| Huawei | Agree with the TP |
| Nokia, NSB | Agree with the TP |
| Lenovo, Motorola Mobility | Agree with the TP |
| LG Electronics | Agree with the TP#3 |
| NTT DOCOMO | Agree with TP#3 |
| Samsung | Agree with the TP |
| Qualcomm | Agree with the TP |
| Intel | Agree with the TP |
| OPPO | OK |
| vivo | Agree with the TP |
| Spreadtrum | Agree with the TP |

----------------------------------- Text Proposal (TP#3) for 38.214, Section 6.2.1 -------------------------------------

\*\*\* Unchanged text omitted \*\*\*

The UE may be configured by the higher layer parameter *resourceMapping* in *SRS-Resource* with an SRS resource occupying  adjacent OFDM symbols at any symbol location within ~~the last 6 symbols of~~ the slot, where all antenna ports of the SRS resources are mapped to each symbol of the resource. When the SRS is configured with the higher layer parameter [SRS-for-positioning] the higher layer parameter *resourceMapping* in *SRS-Resource* with an SRS resource occupying adjacent symbols anywhere within the slot.

\*\*\* Unchanged text omitted \*\*\*

------------------------------------------------------ End Text Proposal -------------------------------------------------------

# References

1. R1-2001533 Maintainance on uplink signals and channels Huawei, HiSilicon
2. R1-2001651 Remaining issues on physical UL channel design in unlicensed spectrum vivo
3. R1-2001704 Remaining issues on the UL channels for NR-U ZTE, Sanechips
4. R1-2001758 Discussion on the remaining issues of UL signals and channels OPPO
5. R1-2001875 Remaining issues on UL signals and channels for NR-U Fujitsu
6. R1-2001903 Remaining issues on UL signals and channels for NR-U MediaTek Inc.
7. R1-2001934 Remaining issues of UL signals and channels for NR-U LG Electronics
8. R1-2001973 Remaining issues for UL signals and channels for NR-U Lenovo, Motorola Mobility
9. R1-2001986 UL signals and channels for NR-unlicensed Intel Corporation
10. R1-2002030 UL signals and channels Ericsson
11. R1-2002075 TP for SRS configuration CATT
12. R1-2002116 UL signals and channels for NR-U Samsung
13. R1-2002192 Remaining Issues on UL Signals and Channels for NR-U Nokia, Nokia Shanghai Bell
14. R1-2002246 UL signals and channels ETRI
15. R1-2002276 Remaining issues in UL signals and channels Spreadtrum Communications
16. R1-2002321 Remaining issues of UL signals and channels Apple
17. R1-2002365 TPs on uplink signals in NRU NEC
18. R1-2002382 Remaining issues on UL signals/channels for NR-U Sharp
19. R1-2002433 Remaining issues on UL signals and channels for NR-U NTT DOCOMO, INC.
20. R1-2002529 TP for UL signals and channels for NR-U Qualcomm Incorporated
21. R1-2002036, “Feature lead summary for Maintenance of UL Signals and Channels,” Moderator (Ericsson), RAN1#100bis-e, April, 2020.