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

e-Meeting, 25th January – 5th February, 2021

Agenda Item: 7.2.2

Source: Moderator (Ericsson)

Title: Feature lead summary for Maintenance of UL Signals and Channels

Document for: Discussion, Decision

# 1 Introduction

This document contains a summary of proposals related to UL Signals and Channels made under the agenda item 7.2.2 "Maintenance of NR-based Access to Unlicensed Spectrum." Only one issue is identified, and two companies make the same proposal to correct it.

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| # | Issue | Contributions |
| UL-01 | Correction to description of FDRA field description in DCI 0\_0 and 0\_1 to ensure that it is defined both for the case when interlacing is configured and the case when interlacing is not configured. | [1]: R1-2101530[2]: R1-2101304 |

# 2 Issue UL-01: Correction to description of FDRA field size in DCI 0\_0 and 0\_1

In both [1] and [2], the following two sub-issue are identified, and similar TPs are proposed by both companies to correct the issues.

## Sub-issue #1

The number of bits in the frequency domain resource assignment (FDRA) field for DCI 0\_0 and DCI 0\_1 depends on whether or not interlaced PUSCH/PUCCH is configured, controlled by the RRC parameter *useInterlacePUCCH-PUSCH*. In the current version of 38.212 Section 7.3.1.1.1 for DCI 0\_0, the indenting of the text related to the size of the FDRA field is such that if *useInterlacePUCCH-PUSCH* is configured, the procedure text that specifies the FDRA field size is never "executed." This can be fixed easily by adjusting the indenting levels.

## Sub-issue #2

For DCI 0\_1, there is a procedure defined in 38.212 for how the UE should interpret the FDRA field if the "Bandwidth part indicator field" of DCI 0\_1 indicates a bandwidth part other than the active bandwidth part for the case when the higher layer parameter *resourceAllocation* is configured as '*dynamicSwitch*'. In the current version of 38.212 Section 7.3.1.1.2, the indenting of the text related to this procedure is such that it is "executed" if interlaced PUSCH/PUCCH is configured. However, the setting '*dynamicSwitch*' is only relevant with interlacing is NOT configured. This can be fixed easily by moving the paragraph related to the "Bandwidth part indicator field" such that it applies only when interlacing is NOT configured.

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| **Company** | **Summary of Proposals** |
| SharpR1-2101530 | **Proposal 1: Adopt Text Proposal #1****Proposal 2: Adopt Text Proposal #2**(Please see appendix for TPs) |
| EricssonR1-2101304 | **Proposal 2: Adopt Text Proposal TP#2 for TS 38.212 for Section 7.3.1.1.1.****Proposal 3: Adopt Text Proposal TP#3 for TS 38.212 for Section 7.3.1.1.2.**(Please see appendix for TPs) |
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**FL Proposal**: This issue should be corrected. The correction involves mainly formatting changes, so it should be fairly easy to agree without extensive discussion.

Companies are invited to provide their view in the following table:

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| **Company** | **View** |
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# References

1. R1-2101530, "Correction to FDRA field description," Sharp, RAN1#104-e, January 2021.
2. R1-2101304, "Corrections related to DL, UL, and channel access," Ericsson, RAN1#104-e, January 2021.

# Appendix: Text Proposals from [1] and [2]

## Text Proposals from [1]

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| **Text proposal#1**--------- beginning of text proposal for TS 38.2127.3.1.1.1 Format 0\_0DCI format 0\_0 is used for the scheduling of PUSCH in one cell. The following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:- Identifier for DCI formats – 1 bit- The value of this bit field is always set to 0, indicating an UL DCI format- Frequency domain resource assignment – number of bits determined by the following:-  bits if neither of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured, where  is defined in clause 7.3.1.0- For PUSCH hopping with resource allocation type 1:-  MSB bits are used to indicate the frequency offset according to Clause 6.3 of [6, TS 38.214], where  if the higher layer parameter *frequencyHoppingOffsetLists* contains two offset values and  if the higher layer parameter *frequencyHoppingOffsetLists* contains four offset values-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]- For non-PUSCH hopping with resource allocation type 1:-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214] - If any of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured - 5+Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz.- 6+Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz.  If the DCI format 0\_0 is monitored in a UE-specific search space, the value of Y is determined by $\left⌈log\_{2}\left(\frac{N\_{RB-set,UL}^{BWP}\left(N\_{RB-set,UL}^{BWP}+1\right)}{2}\right)\right⌉$ where $N\_{RB-set,UL}^{BWP}$ is the number of RB sets contained in the active UL BWP as defined in clause 7 of [6, TS38.214]. If the DCI 0\_0 is monitored in a common search space Y = 0.- Time domain resource assignment – 4 bits as defined in Clause 6.1.2.1 of [6, TS 38.214]-------- Unchanged contents are omittedThe following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by TC-RNTI:- Identifier for DCI formats – 1 bit- The value of this bit field is always set to 0, indicating an UL DCI format- Frequency domain resource assignment – number of bits determined by the following:- bits if the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* is not configured, where-  is the size of the initial UL bandwidth part.- For PUSCH hopping with resource allocation type 1:-  MSB bits are used to indicate the frequency offset according to Table 8.3-1 in Clause 8.3 of [5, TS 38.213], where  if  and  otherwise-  bits provide the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]- For non-PUSCH hopping with resource allocation type 1:-  bits provide the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214] - If the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* is configured - 5 bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz- 6 bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz- Time domain resource assignment – 4 bits as defined in Clause 6.1.2.1 of [6, TS 38.214]-------- Unchanged contents are omitted--------- end of text proposal  |

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| **Text proposal#2**--------- beginning of text proposal for TS 38.2127.3.1.1.2 Format 0\_1DCI format 0\_1 is used for the scheduling of one or multiple PUSCH in one cell, or indicating CG downlink feedback information (CG-DFI) to a UE. The following information is transmitted by means of the DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:- Identifier for DCI formats – 1 bit- The value of this bit field is always set to 0, indicating an UL DCI format- Carrier indicator – 0 or 3 bits, as defined in Clause 10.1 of [5, TS38.213].- DFI flag – 0 or 1 bit- 1 bit if the UE is configured to monitor DCI format 0\_1 with CRC scrambled by CS-RNTI and for operation in a cell with shared spectrum channel access. For a DCI format 0\_1 with CRC scrambled by CS-RNTI, the bit value of 0 indicates activating type 2 CG transmission and the bit value of 1 indicates CG-DFI. For a DCI format 0\_1 with CRC scrambled by C-RNTI/SP-CSI-RNTI/MCS-C-RNTI and for operation in a cell with shared spectrum channel access, the bit is reserved.- 0 bit otherwise; If DCI format 0\_1 is used for indicating CG-DFI, all the remaining fields are set as follows: - HARQ-ACK bitmap – 16 bits, where the order of the bitmap to HARQ process index mapping is such that HARQ process indices are mapped in ascending order from MSB to LSB of the bitmap. For each bit of the bitmap, value 1 indicates ACK, and value 0 indicates NACK. - TPC command for scheduled PUSCH – 2 bits as defined in Clause 7.1.1 of [5, TS38.213]- All the remaining bits in format 0\_1 are set to zero.Otherwise, all the remaining fields are set as follows:- UL/SUL indicator – 0 bit for UEs not configured with *supplementaryUplink* in *ServingCellConfig* in the cell or UEs configured with *supplementaryUplink* in *ServingCellConfig* in the cell but only one carrier in the cell is configured for PUSCH transmission; otherwise, 1 bit as defined in Table 7.3.1.1.1-1.- Bandwidth part indicator – 0, 1 or 2 bits as determined by the number of UL BWPs  configured by higher layers, excluding the initial UL bandwidth part. The bitwidth for this field is determined as bits, where -  if , in which case the bandwidth part indicator is equivalent to the ascending order of the higher layer parameter *BWP-Id*;- otherwise , in which case the bandwidth part indicator is defined in Table 7.3.1.1.2-1;If a UE does not support active BWP change via DCI, the UE ignores this bit field.- Frequency domain resource assignment – number of bits determined by the following, where  is the size of the active UL bandwidth part: - If higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is not configured-  bits if only resource allocation type 0 is configured, where  is defined in Clause 6.1.2.2.1 of [6, TS 38.214], - bits if only resource allocation type 1 is configured, or  bits if *resourceAllocation* is configured as '*dynamicSwitch'*.- If *resourceAllocation* is configured as '*dynamicSwitch'*, the MSB bit is used to indicate resource allocation type 0 or resource allocation type 1, where the bit value of 0 indicates resource allocation type 0 and the bit value of 1 indicates resource allocation type 1. - For resource allocation type 0, the  LSBs provide the resource allocation as defined in Clause 6.1.2.2.1 of [6, TS 38.214].- For resource allocation type 1, the  LSBs provide the resource allocation as follows:- For PUSCH hopping with resource allocation type 1:-  MSB bits are used to indicate the frequency offset according to Clause 6.3 of [6, TS 38.214], where  if the higher layer parameter *frequencyHoppingOffsetLists* contains two offset values and  if the higher layer parameter *frequencyHoppingOffsetLists* contains four offset values-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]- For non-PUSCH hopping with resource allocation type 1:-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and if *resourceAllocation* is configured as '*dynamicSwitch'* for the indicated bandwidth part, the UE assumes resource allocation type 0 for the indicated bandwidth part if the bitwidth of the "Frequency domain resource assignment" field of the active bandwidth part is smaller than the bitwidth of the "Frequency domain resource assignment" field of the indicated bandwidth part.- If the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured - 5 + Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz. The 5 MSBs provide the interlace allocation and the Y LSBs provide the RB set allocation.- 6 + Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz. The 6 MSBs provide the interlace allocation and the Y LSBs provide the RB set allocation.The value of Y is determined by $\left⌈log\_{2}\left(\frac{N\_{RB-set,UL}^{BWP}\left(N\_{RB-set,UL}^{BWP}+1\right)}{2}\right)\right⌉ $ where $N\_{RB-set,UL}^{BWP}$ is the number of RB sets contained in the active UL BWP as defined in clause 7 of [6, TS38.214].- Time domain resource assignment – 0, 1, 2, 3, 4, 5, or 6 bits-------- Unchanged contents are omitted--------- end of text proposal |

## Text Proposals from [2]

Reason for changes

Due to misalignment of indenting, the FDRA field of DCI 0\_0 is undefined for the case that interlaced PUSCH/PUCCH is configured.

Summary of changes

* For DCI 0\_0 with CRC scrambled by C-RNTI/CS-RNTI/MCS-C-RNTI, demote the description of the size of the FDRA field by one level of indenting for the case that interlacing is not configured, i.e., when neither of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured
* For DCI 0\_0 with CRC scrambled by TC-RNTI, promote the description of the size of the FDRA field by one level of indenting for the case that interlacing is configured, i.e., when any of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured

Specs/Sections impacted

38.212 Section 7.3.1.1.1

Consequences if not approved

FDRA field size for DCI 0\_0 is undefined for the case that interlaced PUSCH/PUCCH is configured.

--------------------------------------- Text Proposal (TP#2) for 38.212, Section 7.3.1.1.1 -------------------------------------

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

The following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:

- Identifier for DCI formats – 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

- Frequency domain resource assignment – number of bits determined by the following:

-  bits if neither of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured, where  is defined in clause 7.3.1.0

- For PUSCH hopping with resource allocation type 1:

-  MSB bits are used to indicate the frequency offset according to Clause 6.3 of [6, TS 38.214], where  if the higher layer parameter *frequencyHoppingOffsetLists* contains two offset values and  if the higher layer parameter *frequencyHoppingOffsetLists* contains four offset values

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- For non-PUSCH hopping with resource allocation type 1:

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- if any of the higher layer parameters *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* and *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured

- 5+Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz.

- 6+Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz.

 If the DCI format 0\_0 is monitored in a UE-specific search space, the value of Y is determined by $\left⌈log\_{2}\left(\frac{N\_{RB-set,UL}^{BWP}\left(N\_{RB-set,UL}^{BWP}+1\right)}{2}\right)\right⌉$ where $N\_{RB-set,UL}^{BWP}$ is the number of RB sets contained in the active UL BWP as defined in clause 7 of [6, TS38.214]. If the DCI 0\_0 is monitored in a common search space Y = 0.

- Time domain resource assignment – 4 bits as defined in Clause 6.1.2.1 of [6, TS 38.214]

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

The following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by TC-RNTI:

- Identifier for DCI formats – 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

- Frequency domain resource assignment – number of bits determined by the following:

- bits if the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* is not configured, where

-  is the size of the initial UL bandwidth part.

- For PUSCH hopping with resource allocation type 1:

-  MSB bits are used to indicate the frequency offset according to Table 8.3-1 in Clause 8.3 of [5, TS 38.213], where  if  and  otherwise

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- For non-PUSCH hopping with resource allocation type 1:

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- if the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkCommon* is configured

- 5 bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz

- 6 bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz

- Time domain resource assignment – 4 bits as defined in Clause 6.1.2.1 of [6, TS 38.214]

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

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

Reason for changes

Due to misalignment of indenting, the procedure related to the UE interpretation of the FDRA field if the "Bandwidth part indicator field" of DCI 0\_1 indicates a bandwidth part other than the active bandwidth when the higher layer parameter *resourceAllocation* is configured as '*dynamicSwitch*' is executed if interlaced PUSCH/PUCCH is configured. However, this procedure should be executed only if interlaced PUSCH/PUCCH is NOT configured, since '*dynamicSwitch*' is not relevant when interlaced PUSCH/PUCCH is configured.

Summary of changes

* Move the paragraph related to the interpretation of the FDRA field of DCI 0\_1 when *resourceAllocation* is configured as '*dynamicSwitch*' such that it is underneath the description of the FDRA field for the case when *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is not configured

Specs/Sections impacted

38.212 Section 7.3.1.1.2

Consequences if not approved

FDRA field size for DCI 0\_1 is undefined for the case that interlaced PUSCH/PUCCH is NOT configured and *resourceAllocation* is configured as '*dynamicSwitch*'.

--------------------------------------- Text Proposal (TP#3) for 38.212, Section 7.3.1.1.2 -------------------------------------

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

The following information is transmitted by means of the DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:

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

- Bandwidth part indicator – 0, 1 or 2 bits as determined by the number of UL BWPs  configured by higher layers, excluding the initial UL bandwidth part. The bitwidth for this field is determined as bits, where

-  if , in which case the bandwidth part indicator is equivalent to the ascending order of the higher layer parameter *BWP-Id*;

- otherwise , in which case the bandwidth part indicator is defined in Table 7.3.1.1.2-1;

If a UE does not support active BWP change via DCI, the UE ignores this bit field.

- Frequency domain resource assignment – number of bits determined by the following, where  is the size of the active UL bandwidth part:

- If higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is not configured

-  bits if only resource allocation type 0 is configured, where  is defined in Clause 6.1.2.2.1 of [6, TS 38.214],

- bits if only resource allocation type 1 is configured, or  bits if *resourceAllocation* is configured as '*dynamicSwitch'*.

- If *resourceAllocation* is configured as '*dynamicSwitch'*, the MSB bit is used to indicate resource allocation type 0 or resource allocation type 1, where the bit value of 0 indicates resource allocation type 0 and the bit value of 1 indicates resource allocation type 1.

- For resource allocation type 0, the  LSBs provide the resource allocation as defined in Clause 6.1.2.2.1 of [6, TS 38.214].

- For resource allocation type 1, the  LSBs provide the resource allocation as follows:

- For PUSCH hopping with resource allocation type 1:

-  MSB bits are used to indicate the frequency offset according to Clause 6.3 of [6, TS 38.214], where  if the higher layer parameter *frequencyHoppingOffsetLists* contains two offset values and  if the higher layer parameter *frequencyHoppingOffsetLists* contains four offset values

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- For non-PUSCH hopping with resource allocation type 1:

-  bits provides the frequency domain resource allocation according to Clause 6.1.2.2.2 of [6, TS 38.214]

- If the higher layer parameter *useInterlacePUCCH-PUSCH* in *BWP-UplinkDedicated* is configured

- 5 + Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 30 kHz. The 5 MSBs provide the interlace allocation and the Y LSBs provide the RB set allocation.

- 6 + Y bits provide the frequency domain resource allocation according to Clause 6.1.2.2.3 of [6, TS 38.214] if the subcarrier spacing for the active UL bandwidth part is 15 kHz. The 6 MSBs provide the interlace allocation and the Y LSBs provide the RB set allocation.

The value of Y is determined by $\left⌈log\_{2}\left(\frac{N\_{RB-set,UL}^{BWP}\left(N\_{RB-set,UL}^{BWP}+1\right)}{2}\right)\right⌉ $ where $N\_{RB-set,UL}^{BWP}$ is the number of RB sets contained in the active UL BWP as defined in clause 7 of [6, TS38.214].

- Time domain resource assignment – 0, 1, 2, 3, 4, 5, or 6 bits\*\*\* Unchanged text omitted \*\*\*

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