**3GPP TSG RAN WG1 Meeting #104-e R1-210xxxx**

**Jan 25th – Feb 5th, 2021**

**Agenda item: 7.2.2**

**Source: Moderator (Qualcomm Incorporated)**

**Title: Email discussion summary for [104-e-NR-NRU-04]**

**Document for: Discussion and Decision**

# Introduction

The paper summarizes the email discussion for the following

[104-e-NR-NRU-04] Email discussion/approval on editorial issues in initial access signal, UL signals and channels and configured grant until Jan-29 – Jing (Qualcomm)

High priority on

* Init-2: Clarification on usage of subCarrierSpacingCommon for unlicensed
* 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
* CG-TP2: RRC parameter name alignment in 38.213

Low priority on

* Init-1: Invalid SSB by SSB positions in burst for FBE
* CG-TP1: The intra-slot frequency hopping is supported while the inter-slot frequency hopping is not supported for NR-U configured grant PUSCH repetition
* CG-TP3: for K=1 and UE provided with higher layer parameters *cg-nrofSlots* and *cg-nrofPUSCH-InSlot*, the case of whether UE transmits in *repK* earliest transmission occasion candidate is missing in 38.214

# High priority issues

## 2.1 Issue Init-2. Clarification on usage of subCarrierSpacingCommon for unlicensed

In [2], it is proposed to clarify the usage of subCarrierSpacingCommon, to avoid using the term when it is not defined.

============================== Start of TP1 for TS 38.211 ==================================

4.4.4.2 Point A

Point A serves as a common reference point for resource block grids and is obtained from:

- *offsetToPointA* for a PCell downlink where *offsetToPointA* represents the frequency offset between point A and the lowest subcarrier of the lowest resource block, which overlaps with the SS/PBCH block used by the UE for initial cell selection, expressed in units of resource blocks assuming 15 kHz subcarrier spacing for FR1 and 60 kHz subcarrier spacing for FR2;

- for operation without shared spectrum channel access, the lowest resource block has the subcarrier spacing provided by the higher layer parameter *subCarrierSpacingCommon*;

- for operation with shared spectrum channel access, the lowest resource block has the subcarrier spacing same as the SS/PBCH block used by the UE for initial cell selection;

- *absoluteFrequencyPointA* for all other cases where *absoluteFrequencyPointA* represents the frequency-location of point A expressed as in ARFCN.

============================== End of TP1 for TS 38.211 ==================================

============================== Start of TP2 for TS 38.211 ==================================

7.4.3.1 Time-frequency structure of an SS/PBCH block

============================== Unchanged Text Omitted ==================================

For an SS/PBCH block, the UE shall assume

- antenna port  is used for transmission of PSS, SSS, PBCH and DM-RS for PBCH,

- the same cyclic prefix length and subcarrier spacing for the PSS, SSS, PBCH and DM-RS for PBCH,

- for SS/PBCH block type A,  and  with the quantities , and expressed in terms of 15 kHz subcarrier spacing, and

- for SS/PBCH block type B,  and  with the quantity  expressed in terms of the subcarrier spacing provided by the higher-layer parameter *subCarrierSpacingCommon* and expressed in terms of 60 kHz subcarrier spacing;

- the centre of subcarrier 0 of resource block coincides with the centre of subcarrier 0 of a common resource block with the subcarrier spacing provided by the higher-layer parameter *subCarrierSpacingCommon* for operation without shared spectrum channel access and same as the subcarrier spacing of the SS/PBCH block for operation with shared spectrum channel access. This common resource block overlaps with subcarrier 0 of the first resource block of the SS/PBCH block.

============================== End of TP2 for TS 38.211 ==================================

FL proposal:

Adopt TP1 and TP2 in Section 2.1

Please provide your view below:

|  |  |
| --- | --- |
| Company | comments |
| vivo | Fine with the above TP1 and TP2 |
| Samsung | Support. Editorial change to align TS 38.213 and TS 38.211. |
| ZTE | We are fine with the TPs |
| Qualcomm | Support the TPs |
| Ericsson | We support in principle. However, I the 38.211 spec editor prefers to avoid the wording "without shared spectrum access." It would be desirable to leave some freedom to the editor to use alternative wording. |
| Fujitsu | Fine with the TP1 and TP2.  As commented in the preparation phase, maybe the following TP can be discussed together for saving effort since it is a correction for the similar issue. But we are also fine to leave it to RAN2 since it is for TS 38.331. Hopefully, we can hear views from FL and other companies.   |  | | --- | | ***SubcarrierSpacing***  Subcarrier spacing to be used in this BWP for all channels and reference signals unless explicitly configured elsewhere. Corresponds to subcarrier spacing according to TS 38.211 [16], table 4.2-1. The value *kHz15* corresponds to µ=0, value *kHz30* corresponds to µ=1, and so on. Only the values 15 kHz, 30 kHz, or 60 kHz (FR1), and 60 kHz or 120 kHz (FR2) are applicable. For the initial DL BWP this field has the same value as the field *subCarrierSpacingCommon* in *MIB* of the same serving cell for operation without shared spectrum channel access and has the value corresponding to the subcarrier spacing of the corresponding SSB for initial access of the same serving cell for operation with shared spectrum channel access. | |
| Spreadtrum | Fine with the TP1 and TP2 |
| Huawei, HiSilicon | Agree with TP1 and TP2 |
| LG Electronics | Support the TPs |
| Nokia, NSB | We support the text proposals |
| Sharp | We support the text proposal.  To Fujitsu,  The restriction of the same subcarrier spacing for the initial DL BWP through SIB1 and CORESET 0 through MIB was specified in Rel-15. The change to the restriction has not been agreed in Rel-16 NR-U. |

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

In both [3] and [4], 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.

#### Text Proposals from [3]

|  |
| --- |
| * **Text proposal#1**   --------- beginning of text proposal for TS 38.212 7.3.1.1.1 Format 0\_0 DCI 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 onfigure, 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 where 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 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 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 |

|  |
| --- |
| * **Text proposal#2**   --------- beginning of text proposal for TS 38.212 7.3.1.1.2 Format 0\_1 DCI 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 where 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 [4]

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#3) 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 where 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#4) 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 where 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 -----------------------------------------------------------

The two set of TPs are essentially the same. We can either adopt TP1/2 or TP ¾.

FL proposal:

Adopt TP1 and TP2 in section 2.2

|  |  |
| --- | --- |
| Company | comments |
| vivo | Seems editorial changes, fine with TP1 and TP2. |
| Samsung | Support TP1 and TP2 |
| ZTE | We are fine with TP1 and TP2. |
| Qualcomm | Support TP1 and TP2 |
| Ericsson | Fine with either  However, TP#3 / #4 already have the CR rationale written down so it will save the feature lead some work ☺ |
| Lenovo, Motorola Mobility | We are fine with TP1 and TP2. |
| Fujitsu | Fine with either |
| Spreadtrum | Fine with either. |
| Huawei, HiSilicon | As well as the major changes on FDRA and BWP indicator mentioned in both [3] and [4], the minor editorial changes in [3] could also be captured. |
| LG Electronics | We are fine with TP1 and TP2. |
| Nokia, NSB | We support the TP 1 and TP2 |
| Sharp | We support FL proposal. |

## 2.3 Issue CG-TP2: RRC parameter name alignment in 38.213

============Start of TP for 38.213================

10.5 HARQ-ACK information for PUSCH transmissions

A UE can be configured a number of search space sets to monitor PDCCH for detecting a DCI format 0\_1 with a DFI flag field and CRC scrambled with a CS-RNTI provided by *cs-RNTI*. The UE determines that the DCI format provides HARQ-ACK information for PUSCH transmissions based on when a DFI flag field value is set to '1', if a PUSCH transmission is configured by *ConfiguredGrantConfig*.

The HARQ-ACK information corresponds to transport blocks in PUSCH transmissions for all HARQ processes for a serving cell of a PDCCH reception that provides DCI format 0\_1 or, if DCI format 0\_1 includes a carrier indicator field, for a serving cell indicated by a value of the carrier indicator field.

For a PUSCH transmission configured by *ConfiguredGrantConfig*, HARQ-ACK information for a transport block of a corresponding HARQ process number is valid if a first symbol of the PDCCH reception is after a last symbol of the PUSCH transmission, or of any repetition of the PUSCH transmission, by a number of symbols provided by *cg-minDFI-Delay*.

For an initial transmission by a UE of a transport block in a PUSCH configured by *ConfiguredGrantConfig*, if the UE receives a CG-DFI that provides HARQ-ACK information for the transport block, the UE assumes that the transport block was correctly decoded if the HARQ-ACK information value is ACK; otherwise, the UE assumes that the transport block was not correctly decoded.

For a PUSCH transmission scheduled by a DCI format, if the UE receives a CG-DFI that provides HARQ-ACK information for the transport block, the UE assumes that the transport block was correctly decoded if the HARQ-ACK information value is ACK; otherwise, the UE assumes that the transport block was not correctly decoded.

For a PUSCH transmission scheduled by a DCI format, HARQ-ACK information for a transport block of a corresponding HARQ process number is valid if a first symbol of the PDCCH reception is after a last symbol of the PUSCH transmission by a number of symbols provided by *cg-minDFI-Delay* or, if the PUSCH transmission is over multiple slots,

- after a last symbol of the PUSCH transmission in a first slot from the multiple slots by a number of symbols provided by *cg-minDFI-Delay*, if a value of the HARQ-ACK information is ACK.

- after a last symbol of the PUSCH transmission in a last slot from the multiple slots by a number of symbols provided by *cg-minDFI-Delay*, if a value of the HARQ-ACK information is NACK.

UE does not expect to be configured with different *cg-minDFI-Delay* among multiple *ConfiguredGrantConfig* in one BWP.

==========End of tP for 38.213===================

FL proposal

Adopt TP in Section 2.3

Please provide your view below:

|  |  |
| --- | --- |
| Company | comments |
| vivo | Support the TP. |
| Samsung | Support the TP |
| ZTE | We are fine with the proposal |
| Qualcomm | Support the TPs |
| Lenovo, Motorola Mobility | We are fine with the TP. |
| Fujitsu | Support the TP |
| Spreadtrum | Fine with the TP. |
| LG Electronics | Support the TP. |
| Nokia, NSB | We support the proposal |
| Sharp | Support the FL proposal. |

# Low priority issues

## 3.1 Issue Init-1. Invalid SSB by SSB positions in burst for FBE

In [1], it is proposed to add clarification to capture earlier conclusion on invalid SSB for FBE.

Conclusion:

For semi-static channel access, SSBs that (partially) fall in the idle region of a fixed frame period should be considered as invalid. No PDSCH rate matching and no RLM/RRM measurement will be done for those candidate SSB positions.

The proposed solution is to add in 37.213 that the SSBs partially overlap with idle periods are not expected to be included in *ssb-PositionInBurst*.

TP for TS 37.213

==============Start of TP 1=====================

4.3 Channel access procedures for semi-static channel occupancy

Channel assess procedures based on semi-static channel occupancy as described in this Clause, are intended for environments where the absence of other technologies is guaranteed e.g., by level of regulations, private premises policies, etc. If a gNB provides UE(s) with higher layer parameters *ChannelAccessMode-r16 ='semistatic'* by SIB1 or dedicated configuration, a periodic channel occupancy can be initiated by the gNB every within every two consecutive radio frames, starting from the even indexed radio frame at with a maximum channel occupancy time , where *period* in , is a higher layer parameter provided in *SemiStaticChannelAccessConfig* and *.*

In the following procedures in this clause, when a gNB or UE performs sensing for evaluating a channel availability, the sensing is performed at least during a sensing slot duration . The corresponding adjustment for performing sensing by a gNB or a UE is described in clauses 4.1.5 and 4.2.3, respectively.

A channel occupancy initiated by a gNB and shared with UE(s) shall satisfy thefollowing:

- The gNB shall transmit a DL transmission burst starting at the beginning of the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration . If the channel is sensed to be busy, the gNB shall not perform any transmission during the current period.

- The gNB may transmit a DL transmission burst(s) within the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration if the gap between the DL transmission burst(s) and any previous transmission burst is more than .

- The gNB may transmit DL transmission burst(s) after UL transmission burst(s) within the channel occupancy time without sensing the channel if the gap between the DL and UL transmission bursts is at most

- A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time as follows:

- If the gap between the UL and DL transmission bursts is at most , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.

- If the gap between the UL and DL transmission bursts is more than , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.

- The gNB and UEs shall not transmit any transmissions in a set of consecutive symbols for a duration of at least before the start of the next period. A UE does not expect *ssb-PositionInBurst* indicates a candidate SS/PBCH block may be transmitted if the candidate SS/PBCH block partially overlap with the duration of at least before the start of the next period.

If a UE fails to access the channel(s) prior to an intended UL transmission to a gNB, Layer 1 notifies higher layers about the channel access failure.

===============End of TP 1======================

FL proposal:

Adopt TP1 in section 3.1.

Please provide your view below:

|  |  |
| --- | --- |
| Company | comments |
| vivo | Understand the intention but the additional text is not be necessary. Any transmission should include SSB if it is partially overlapping with the idle period. If this is clarified, it seems that other transmissions such as PDSCH, PUSCH or reference signal partially overlapping with idle period may also need further clarification. |
| Samsung | The TP is not needed since the previous sentence in TS 37.213 already explicitly mention “The gNB and UEs shall not transmit any transmissions”, which certainly include SSB transmission. We believe this is the motivation to make it a conclusion in the previous meeting, and an explicit conclusion in the meetings means no spec impact. |
| ZTE | We understand the intention of the TP and could be fine with it. |
| Qualcomm | Support the TP. Undertand any transmission mentioned in the previous paragraph include SSB. But the issue is, say an SSB is partially in idle period and there is a PDSCH ends before the idle period but after SSB starts. If we allow ssb-PositionInBurst to indicate 1 for the SSB, we will have PDSCH rate matching around the SSB |
| Ericsson | Agree with the view from Samsung |
| Spreadtrum | Fine with the TP. |
| Huawei, HiSilicon | Agree with Samsung. The specification text already restrict the transmission not in the idle period. |
| LG Electronics | We are fine with the clarification, but it seems that whether that clarification has an impact on specification needs further discussion. |
| Sharp | We are fine with clarification. Need to discuss whether spec update is necessary or not. |

## 3.2 Issue CG-TP1: Freq hopping of NR-U CG-PUSCH

In [5], it is proposed to consider supporting intra-slot frequency hopping is supported while the inter-slot frequency hopping is not supported for NR-U configured grant PUSCH repetition. The corresponding TP is below:

------------------------------------------ TP for 38.214 6.3.1-------------------------------------------------------------

For PUSCH repetition Type A (as determined according to procedures defined in Clause 6.1.2.1 for scheduled PUSCH, or Clause 6.1.2.3 for configured PUSCH), a UE is configured for frequency hopping by the higher layer parameter *frequencyHoppingDCI-0-2* in *pusch-Config* for PUSCH transmission scheduled by DCI format 0\_2, and by *frequencyHopping* provided in *pusch-Config* for PUSCH transmission scheduled by a DCI format other than 0\_2*,* and by *frequencyHopping* provided in *configuredGrantConfig* for configured PUSCH transmission. One of two frequency hopping modes can be configured:

- Intra-slot frequency hopping, applicable to single slot and multi-slot PUSCH transmission.

- Inter-slot frequency hopping, applicable to multi-slot PUSCH transmission.

In case that *cg-RetransmissionTimer* is provided, only intra-slot frequency hopping can be configured for configured PUSCH transmission.

In case of resource allocation type 2, the UE transmits PUSCH without frequency hopping.

In case of resource allocation type 1, whether or not transform precoding is enabled for PUSCH transmission, the UE may perform PUSCH frequency hopping, if the frequency hopping field in a corresponding detected DCI format or in a random access response UL grant is set to 1, or if for a Type 1 PUSCH transmission with a configured grant the higher layer parameter *frequencyHoppingOffset* is provided, otherwise no PUSCH frequency hopping is performed. When frequency hopping is enabled for PUSCH, the RE mapping is defined in clause 6.3.1.6 of [4, TS 38.211].

For a PUSCH scheduled by RAR UL grant, fallbackRAR UL grant, or by DCI format 0\_0 with CRC scrambled by TC-RNTI, frequency offsets are obtained as described in clause 8.3 of [6, TS 38.213]. For a PUSCH scheduled by DCI format 0\_0/0\_1 or a PUSCH based on a Type2 configured UL grant activated by DCI format 0\_0/0\_1 and for resource allocation type 1, frequency offsets are configured by higher layer parameter *frequencyHoppingOffsetLists* in *pusch-Config*. For a PUSCH scheduled by DCI format 0\_2 or a PUSCH based on a Type2 configured UL grant activated by DCI format 0\_2 and for resource allocation type 1, frequency offsets are configured by higher layer parameter *frequencyHoppingOffsetListsDCI-0-2* in *pusch-Config*.

- When the size of the active BWP is less than 50 PRBs, one of two higher layer configured offsets is indicated in the UL grant.

- When the size of the active BWP is equal to or greater than 50 PRBs, one of four higher layer configured offsets is indicated in the UL grant.

For PUSCH based on a Type1 configured UL grant the frequency offset is provided by the higher layer parameter *frequencyHoppingOffset* in *rrc-ConfiguredUplinkGrant*.

For a MsgA PUSCH the frequency offset is provided by the higher layer parameter as described in [6, TS 38.213.

In case of intra-slot frequency hopping, the starting RB in each hop is given by:

,

where *i*=0 and *i*=1 are the first hop and the second hop within every PUSCH respectively, and  is the starting RB within the UL BWP, as calculated from the resource block assignment information of resource allocation type 1 (described in Clause 6.1.2.2.2) or as calculated from the resource assignment for MsgA PUSCH (described in [6, TS 38.213]) and is the frequency offset in RBs between the two frequency hops. The number of symbols in the first hop is given by , the number of symbols in the second hop is given by , where is the length of the PUSCH transmission in OFDM symbols ~~in one slot~~.

In case of inter-slot frequency hopping, the starting RB during slot  is given by:

,

where  is the current slot number within a radio frame, where a multi-slot PUSCH transmission can take place,  is the starting RB within the UL BWP, as calculated from the resource block assignment information of resource allocation type 1 (described in Clause 6.1.2.2.2) and is the frequency offset in RBs between the two frequency hops.

<unchanged part omitted>

-------------------------------------------------END OF TP-----------------------------------------------------------------

Discussion:

We do have the agreement that we don’t support frequency hopping when interlaced waveform is not configured. Need the proponent to clarify if the proposed text is for legacy waveform only. The remaining discussion assumes the proposal is for legacy PUSCH (type 1 or type 2 allocation).

Please provide your view for the following:

* Alt 1. Frequency hopping not supported for PUSCH (include CG-PUSCH) for unlicensed band
  + May still have spec impact to add a clarification
* Alt 2. Frequency hopping supported for PUSCH (including CG-PUSCH) for unlicensed band when non-interlaced PUSCH is used
  + Alt 2.1: Intra-slot only, and no inter-slot frequency hopping
  + Alt 2.2: Bot intra-slot and inter-slot frequency hopping supported

|  |  |
| --- | --- |
| Company | comments |
| Samsung | Alt 1 is preferred. |
| ZTE | Alt 1 is preferred as this has not been discussed in Rel-16 and we are not sure about the benefit to support FH. |
| vivo | The proposed text is for legacy waveform only.  For both Alt 1 and Alt 2.1, clarification in spec is needed. As discussed in our contribution R1-2100409, we support Alt 2.1. |
| Qualcomm | Alt 1 preferred. |
| Lenovo,  Motorola Mobility | We are fine with Alt 1. |
| Spreadtrum | Fine with Alt 1. |
| Huawei, HiSilicon | First, just a clarification on the FL’s preamble  “We do have the agreement that we don’t support frequency hopping when interlaced waveform is ~~not~~ configured. Need the proponent to clarify if the proposed text is for legacy waveform only. The remaining discussion assumes the proposal is for legacy PUSCH (type 1 or type 2 allocation).”  If “legacy PUSCH (type 1 or type 2 allocation)” refers to legacy CG PUSCH Type 1 or Type 2, then the proposed alternatives should not recite “PUSCH (include CG-PUSCH)”. If “(type 1 or type 2 allocation)” refers to FDRA type 1 or type 2, then “legacy PUSCH” is not applicable for latter FDRA ☺  Our understanding is that when FDRA type 2 (interlaced waveform) is configured, frequency hopping is not supported. Otherwise, the legacy NR behaviour should be applied regardless of whether the operation is in licensed or unlicensed spectrum.  Therefore, Alt 2.2 seems to capture this understanding. |
| LG Electronics | Alt 1 is preferred. |
| Nokia, NSB | We prefer Alt 1 |
| Sharp | We prefer Alt2.2, which doesn’t require any Spec change. We can live with Alt 1, if the majority supports it. |

## 3.3 Issue CG-TP3: Repetition in CG-PUSCH

**Motivation:** for K=1 and UE provided with higher layer parameters *cg-nrofSlots* and *cg-nrofPUSCH-InSlot*, the case of whether UE transmits in *repK* earliest transmission occasion candidate is missing in 38.214

TP Option1:

6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant

<omitted>

For both Type 1 and Type 2 PUSCH transmissions with a configured grant, when *K >* 1*,* the UE shall repeat the TB across the *K* consecutive slots applying the same symbol allocation in each slot, except if the UE is provided with higher layer parameters *cg-nrofSlots* and *cg-nrofPUSCH-InSlot*, in which case the UE repeats the TB in the *repK* earliest consecutive transmission occasion candidates within the same configuration. For both Type 1 and Type 2 PUSCH transmissions with a configured grant, when K = 1 and the UE is provided with higher layer parameters *cg-nrofSlots* and *cg-nrofPUSCH-InSlot*, the UE transmits the TB in the *repK* earliest transmission occasion candidate within the same configuration. A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1 and Clause 11.2A of [6, TS38.213].

TP Option2:

6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant

<omitted>

For both Type 1 and Type 2 PUSCH transmissions with a configured grant, when *K* 1*,* the UE shall repeat the TB across the *K* consecutive slot(s) applying the same symbol allocation in each slot, except if the UE is provided with higher layer parameters *cg-nrofSlots* and *cg-nrofPUSCH-InSlot*, in which case the UE repeats the TB in the *repK* earliest consecutive transmission occasion candidates within the same configuration. A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1 and Clause 11.2A of [6, TS38.213].

TP Option3:

6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant

<omitted>

For both Type 1 and Type 2 PUSCH transmissions with a configured grant, when *K* 1*,* the UE shall repeat the TB across the *K* earliest consecutive slot(s) applying the same symbol allocation in each slot. A Type 1 or Type 2 PUSCH transmission with a configured grant in a slot is omitted according to the conditions in Clause 9, Clause 11.1 and Clause 11.2A of [6, TS38.213].

Discussion:

Please provide your view below

* No change needed (K=1 is no repetition, so the paragraph does not apply)
* Option 1
* Option 2
* Option 3

|  |  |
| --- | --- |
| Company | comments |
| vivo | No change needed. The repetition issue for CG-PUSCH in NRU was discussed before with no consensus, no need to go back to discuss it. |
| Samsung | No change needed |
| ZTE | We do not see the necessity to make the change |
| Qualcomm | No change needed |
| Lenovo, Motorola Mobility | Not necessary for this change |
| Spreadtrum | No change needed. |
| Huawei, HiSilicon | No change is needed |
| LG Electronics | No change needed. |
| Nokia, NSB | We see no need for a change |
| Sharp | No change needed. |

# Reference

[1]. R1-2101435, Invalid SSB in FBE for PDSCH rate matching, Qualcomm Incorporated

[2]. R1-2101173, Correction on the use of subCarrierSpacingCommon in NR-U, Samsung

[3]. R1-2101530, "Correction to FDRA field description," Sharp, RAN1#104-e, January 2021.

[4]. R1-2101304, "Corrections related to DL, UL, and channel access," Ericsson, RAN1#104-e, January 2021.

[5]. R1-2100409, TP on frequency hopping for NR-U configured grant, vivo

[6]. R1-2101652, Remaining issues for CG PUSCH in NR-U, ASUSTeK