**3GPP TSG RAN WG1 #106-e** ***R1-2107299***

**e-Meeting, August 16 – 27, 2021**

**Agenda item: 7.1**

**Source: Moderator (NEC)**

**Title: Summary on [106-e-NR-7.1CRs-11]**

**Document for: Discussion and Decision**

# Introduction

Based on Mr. Chairman’s guidance, editorial corrections (Issue#3 [1], Issue#8 [2][3], Issue#13 [4], Issue#22 [5][6]) are handled under the email thread [106-e-NR-7.1CRs-11]. The outcome of the email discussion will be captured in Chairman’s Notes as recommendations for the editors (no CRs).

[106-e-NR-7.1CRs-11] Discussion on editorial spec changes for recommendation to the editors (Issue#3, Issue#8, Issue#13, Issue#22) by August 20 – Sasaki (NEC)

[R1-2106517](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106517.zip) Correction on data and control multiplexing Huawei, HiSilicon

[R1-2106773](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106773.zip) Correction of physical-layer model of BCH transmission Ericsson

[R1-2106774](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106774.zip) Correction of physical-layer model of BCH transmission Ericsson

[R1-2107159](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107159.zip) TP for editor’s CR on Precoding information and number of layers, and Antenna port(s) configuration table NEC

[R1-2107626](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107626.zip) draftCR on PUCCH maxCodeRate in TS 38.213 (Rel-15) Ericsson

[R1-2107627](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107627.zip) draftCR on PUCCH maxCodeRate in TS 38.213 (Rel-16) Ericsson

This document is to collect companies’ inputs and draw potential TP(s) as recommendations for the editors (no CRs) for the issue being agreeable in RAN1 group.

# TP

## Issue#3: Correction on data and control multiplexing [1]

### 2.1.1 Background & Proposed TP for 38.212

|  |  |
| --- | --- |
| ***Reason for change:*** | In the section of Data and control multiplexing, there are two issues.  Issue 1: the condition “if the number of HARQ-ACK information bits is more than 2,” is at same level of other independent condition. However, it should be one sub-condition of “if HARQ-ACK, CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH”.  Issue 2: the condition “if CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH” is not mutual exclusive from the condition of “if HARQ-ACK, CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH,” |
|  |  |
| ***Summary of change:*** | To issue 1: Align the indent of “if the number of HARQ-ACK information bits is more than 2,” with other sub-bullets under “if HARQ-ACK, CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH”.  To issue 2: Add “only” before “CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH”. |
|  |  |
| ***Consequences if not approved:*** | Consequence of issue 1: UE will carry wrong data and control multiplexing procedure if UE has more than 2 HARQ-ACK information bits.  Consequence of issue 2: UE with HARQ-ACK+CSI-part-1+CSI-part-2 may confuse on the branches to dervie number of coded bit for CSI-part-1 and CSI-part-2. |

### 6.2.7 Data and control multiplexing

< Unchanged part is omitted >

If frequency hopping is configured for the PUSCH,

- denote  as the OFDM symbol index of the first OFDM symbol after the first set of consecutive OFDM symbol(s) carrying DMRS in the first hop;

- denote  as the OFDM symbol index of the first OFDM symbol after the first set of consecutive OFDM symbol(s) carrying DMRS in the second hop.

- denote  as the OFDM symbol index of the first OFDM symbol that does not carry DMRS in the first hop;

- denote  as the OFDM symbol index of the first OFDM symbol that does not carry DMRS in the second hop;

- if HARQ-ACK is present for transmission on the PUSCH with UL-SCH, let

-  and ;

- if CSI is present for transmission on the PUSCH with UL-SCH, let

- ;

- ;

- ; and

- ;

- if only HARQ-ACK and CSI part 1 are present for transmission on the PUSCH without UL-SCH, let

- ;

- ;

- ; and

- ;

- if HARQ-ACK, CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH, let

- ;

- ;

- if the number of HARQ-ACK information bits is more than 2, ; otherwise, 

- ;

-  if the number of HARQ-ACK information bits is no more than 2, and  otherwise; and

-  if the number of HARQ-ACK information bits is no more than 2, and  otherwise;

- if only CSI part 1 and CSI part 2 are present for transmission on the PUSCH without UL-SCH, let

- ;

- ;

- ; and

- ;

- let , and denote ,  as the number of OFDM symbols of the PUSCH in the first and second hop, respectively;

-  is the number of transmission layers of the PUSCH;

-  is the modulation order of the PUSCH;

- ;

- 

- .

< Unchanged part is omitted >

### 2.1.2 Companies’ input

Please provide your views about the proposed TP of Issue#3 in the table below.

**Question 2.1: Do you agree the proposed TP of Issue#3 for Rel-15 and mirroring for Rel-16?**

* **If no, please provide the reasons and your suggestions, if any.**

|  |  |
| --- | --- |
| Company | Comment |
| vivo | OK |
| OPPO | Yes |
| Intel | We are fine with the proposed TP. |
| QC | We are fine with the TP for Rel-15 and Rel-16 |
|  |  |

## Issue#8: Correction of physical-layer model of BCH transmission [2][3]

### 2.2.1 Background & Proposed TP for TS 38.202

|  |  |
| --- | --- |
| ***Reason for change:*** | * “Data modulation” is used for BCH reception on UE side in figure 5.2.2-1, and it should be “Data demodulation” instead. |
|  |  |
| ***Summary of change:*** | * Change “Data modulation” block to “Data demodulation” block on UE side in figure 5.2.2-1 |
|  |  |
| ***Consequences if not approved:*** | * the demodulation block in figure 5.2.2-1 for BCH reception on UE side is wrong |

### 5.2.2 Broadcast channel

The physical-layer model for BCH transmission is characterized by a fixed pre-defined transport format. There is one transport block for the BCH every 80ms. The BCH physical-layer model is described based on the corresponding PBCH physical-layer-processing chain, see Figure 5.2.2-1:

- Higher-layer data passed to/from the physical layer;

- CRC and transport-block-error indication;

- FEC and rate matching;

- Data modulation;

- Mapping to physical resource;

- Multi-antenna processing.



Figure 5.2.2-1: Physical-layer model for BCH transmission

### 2.2.2 Companies’ input

Please provide your views about the proposed TP of Issue#8 in the table below.

**Question 2.2: Do you agree the proposed TP [2] for Rel-15 and TP [3] for Rel-16 of Issue#8?**

* **If no, please provide the reasons and your suggestions, if any.**

|  |  |
| --- | --- |
| Company | Comment |
| vivo | Ok. Another issue is, shouldn’t “encoding” block also need to be replaced by “decoding”? |
| OPPO | Yes |
| Intel | Ok, as for vivo’s comment on coding. “coding” might be ok since encoding/decoding description isn’t used. Alternatively, we can use encoding + RM, and decoding + de-RM. |
| QC | We are fine with the CR. Also agree with Intel’s comment on decoding and de-RM. |
|  |  |

## Issue#13: TP for editor’s CR on Precoding information and number of layers, and Antenna port(s) configuration table [4]

### 2.3.1 Background & Proposed TP for TS 38.212

In RAN1 specifications TS 38.212 [TS 38.212 v15.11.0][ TS 38.212 v16.6.0], some precoding information and number of layers configuration tables (Table 7.3.1.1.2-2 and Table 7.3.1.1.2-4) are only available when transform precoder is disabled, while current specifications involve the case when transform precoder is enabled.

And some antenna port configuration tables (Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11) missing value 1.

##### 7.3.1.1.2 Format 0\_1

<Unchanged part omitted>

- Precoding information and number of layers – number of bits determined by the following:

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 4, 5, or 6 bits according to Table 7.3.1.1.2-2 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and the values of higher layer parameters *maxRank*, and *codebookSubset*;

- 4 or 5 bits according to Table 7.3.1.1.2-2A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1, maxRank=2,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 4 or 6 bits according to Table 7.3.1.1.2-2B for 4 antenna ports, if *txConfig = codebook, ul-FullPowerTransmission = fullpowerMode1,* *maxRank=3 or 4,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank*, and *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRank=1*, and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and the values of higher layer parameters *maxRank* and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-4A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, transform precoder is disabled, *maxRank=2*, and *codebookSubset=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank* and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-5A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRank=1*, and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

<Unchanged part omitted>

Table 7.3.1.1.2-2: Precoding information and number of layers, for 4 antenna ports, if transform precoder is disabled, *maxRank* = 2 or 3 or 4, and *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset* = *fullyAndPartialAndNonCoherent* | Bit field mapped to index | *codebookSubset* = *partialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| … | … | … | … | … | … |
| 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 |
| 4 | 2 layers: TPMI=0 | 4 | 2 layers: TPMI=0 | 4 | 2 layers: TPMI=0 |
| … | … | … | … | … | … |
| 9 | 2 layers: TPMI=5 | 9 | 2 layers: TPMI=5 | 9 | 2 layers: TPMI=5 |
| 10 | 3 layers: TPMI=0 | 10 | 3 layers: TPMI=0 | 10 | 3 layers: TPMI=0 |
| 11 | 4 layers: TPMI=0 | 11 | 4 layers: TPMI=0 | 11 | 4 layers: TPMI=0 |
| 12 | 1 layer: TPMI=4 | 12 | 1 layer: TPMI=4 | 12-15 | reserved |
| … | … | … | … |  |  |
| 19 | 1 layer: TPMI=11 | 19 | 1 layer: TPMI=11 |  |  |
| 20 | 2 layers: TPMI=6 | 20 | 2 layers: TPMI=6 |  |  |
| … | … | … | … |  |  |
| 27 | 2 layers: TPMI=13 | 27 | 2 layers: TPMI=13 |  |  |
| 28 | 3 layers: TPMI=1 | 28 | 3 layers: TPMI=1 |  |  |
| 29 | 3 layers: TPMI=2 | 29 | 3 layers: TPMI=2 |  |  |
| 30 | 4 layers: TPMI=1 | 30 | 4 layers: TPMI=1 |  |  |
| 31 | 4 layers: TPMI=2 | 31 | 4 layers: TPMI=2 |  |  |
| 32 | 1 layers: TPMI=12 |  |  |  |  |
| … | … |  |  |  |  |
| 47 | 1 layers: TPMI=27 |  |  |  |  |
| 48 | 2 layers: TPMI=14 |  |  |  |  |
| … | … |  |  |  |  |
| 55 | 2 layers: TPMI=21 |  |  |  |  |
| 56 | 3 layers: TPMI=3 |  |  |  |  |
| … | … |  |  |  |  |
| 59 | 3 layers: TPMI=6 |  |  |  |  |
| 60 | 4 layers: TPMI=3 |  |  |  |  |
| 61 | 4 layers: TPMI=4 |  |  |  |  |
| 62-63 | reserved |  |  |  |  |

Table 7.3.1.1.2-2A: Precoding information and number of layers for 4 antenna ports, if transform precoder is disabled, *maxRank* = 2, and *ul-FullPowerTransmission = fullpowerMode1*

|  |  |  |  |
| --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset* = *partialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| … | … | … | … |
| 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 |
| 4 | 2 layers: TPMI=0 | 4 | 2 layers: TPMI=0 |
| … | … | … | … |
| 9 | 2 layers: TPMI=5 | 9 | 2 layers: TPMI=5 |
| 10 | 1 layer: TPMI=13 | 10 | 1 layer: TPMI=13 |
| 11 | 2 layer: TPMI=6 | 11 | 2 layer: TPMI=6 |
| 12 | 1 layer: TPMI=4 | 12-15 | Reserved |
| … | … |  |  |
| 20 | 1 layer: TPMI=12 |  |  |
| 21 | 1 layer: TPMI=14 |  |  |
| 22 | 1 layer: TPMI=15 |  |  |
| 23 | 2 layers: TPMI=7 |  |  |
| … | … |  |  |
| 29 | 2 layers: TPMI=13 |  |  |
| 30-31 | Reserved |  |  |

Table 7.3.1.1.2-2B: Precoding information and number of layers for 4 antenna ports, if transform precoder is disabled, *maxRank* = 3 or 4, and *ul-FullPowerTransmission = fullpowerMode1*

|  |  |  |  |
| --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset* = *partialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| … | … | … | … |
| 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 |
| 4 | 2 layers: TPMI=0 | 4 | 2 layers: TPMI=0 |
| … | … | … | … |
| 9 | 2 layers: TPMI=5 | 9 | 2 layers: TPMI=5 |
| 10 | 3 layers: TPMI=0 | 10 | 3 layers: TPMI=0 |
| 11 | 4 layers: TPMI=0 | 11 | 4 layers: TPMI=0 |
| 12 | 1 layer: TPMI=13 | 12 | 1 layer: TPMI=13 |
| 13 | 2 layer: TPMI=6 | 13 | 2 layer: TPMI=6 |
| 14 | 3 layer: TPMI=1 | 14 | 3 layer: TPMI=1 |
| 15 | 1 layer: TPMI=4 | 15 | Reserved |
| … | … |  |  |
| 23 | 1 layer: TPMI=12 |  |  |
| 24 | 1 layer: TPMI=14 |  |  |
| 25 | 1 layer: TPMI=15 |  |  |
| 26 | 2 layers: TPMI=7 |  |  |
| … | … |  |  |
| 32 | 2 layers: TPMI=13 |  |  |
| 33 | 3 layers: TPMI=2 |  |  |
| 34 | 4 layers: TPMI=1 |  |  |
| 35 | 4 layers: TPMI=2 |  |  |
| 36-63 | Reserved |  |  |

Table 7.3.1.1.2-3: Precoding information and number of layers for 4 antenna ports, if transform precoder is enabled and *ul-FullPowerTransmission* is either not configured or configured to *fullpowerMode2*, or if transform precoder is disabled, *maxRank* = 1, and *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset* = *fullyAndPartialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *partialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| … | … | … | … | … | … |
| 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 |
| 4 | 1 layer: TPMI=4 | 4 | 1 layer: TPMI=4 |  |  |
| … | … | … | … |  |  |
| 11 | 1 layer: TPMI=11 | 11 | 1 layer: TPMI=11 |  |  |
| 12 | 1 layers: TPMI=12 | 12-15 | reserved |  |  |
| … | … |  |  |  |  |
| 27 | 1 layers: TPMI=27 |  |  |  |  |
| 28-31 | reserved |  |  |  |  |

Table 7.3.1.1.2-3A: Precoding information and number of layers for 4 antenna ports, if transform precoder is enabled and *ul-FullPowerTransmission = fullpowerMode1*, or if transform precoder is disabled, *maxRank* = 1, and *ul-FullPowerTransmission = fullpowerMode1*

|  |  |  |  |
| --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset*= *partialAndNonCoherent* | Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| … | … | … | … |
| 3 | 1 layer: TPMI=3 | 3 | 1 layer: TPMI=3 |
| 4 | 1 layer: TPMI=13 | 4 | 1 layer: TPMI=13 |
| 5 | 1 layer: TPMI=4 | 5-7 | Reserved |
| … | … |  |  |
| 13 | 1 layer: TPMI=12 |  |  |
| 14 | 1 layer: TPMI=14 |  |  |
| 15 | 1 layer: TPMI=15 |  |  |

Table 7.3.1.1.2-4: Precoding information and number of layers, for 2 antenna ports, if transform precoder is disabled, *maxRank* = 2, and *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*

|  |  |  |  |
| --- | --- | --- | --- |
| Bit field mapped to index | *codebookSubset* = *fullyAndPartialAndNonCoherent* | Bit field mapped to index | *codebookSubset* = *nonCoherent* |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 1 layer: TPMI=1 |
| 2 | 2 layers: TPMI=0 | 2 | 2 layers: TPMI=0 |
| 3 | 1 layer: TPMI=2 | 3 | reserved |
| 4 | 1 layer: TPMI=3 |  |  |
| 5 | 1 layer: TPMI=4 |  |  |
| 6 | 1 layer: TPMI=5 |  |  |
| 7 | 2 layers: TPMI=1 |  |  |
| 8 | 2 layers: TPMI=2 |  |  |
| 9-15 | reserved |  |  |

Table 7.3.1.1.2-4A: Precoding information and number of layers, for 2 antenna ports, if transform precoder is disabled*, maxRank* = 2, and *ul-FullPowerTransmission = fullpowerMode1*

|  |  |
| --- | --- |
| Bit field mapped to index | *codebookSubset*= *nonCoherent* |
| 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 |
| 2 | 2 layers: TPMI=0 |
| 3 | 1 layer: TPMI=2 |

<Unchanged part omitted>

Table 7.3.1.1.2-10: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *maxLength*=1, rank = 3

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1-7 | Reserved | Reserved |

Table 7.3.1.1.2-11: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *maxLength*=1, rank = 4

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-3 |
| 1-7 | Reserved | Reserved |

<Unchanged part omitted>

##### 7.3.1.1.3 Format 0\_2

<Unchanged part omitted>

- Precoding information and number of layers – number of bits determined by the following:

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 4, 5, or 6 bits according to Table 7.3.1.1.2-2 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and the values of higher layer parameters *maxRankDCI-0-2*, and *codebookSubsetDCI-0-2*;

- 4 or 5 bits according to Table 7.3.1.1.2-2A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1,* the values of higher layer parameters *maxRankDCI-0-2=2,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 4 or 6 bits according to Table 7.3.1.1.2-2B for 4 antenna ports, if *txConfig = codebook, ul-FullPowerTransmission =fullpowerMode1,* the values of higher layer parameters *maxRankDCI-0-2=3 or 4,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRankDCI-0-2* and *codebookSubsetDCI-0-2*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, *maxRankDCI-0-2=1*, and according to whether transform precoder is enabled or disabled, and the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and the values of higher layer parameters *maxRankDCI-0-2* and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-4A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, transform precoder is disabled, the *maxRankDCI-0-2=2*, and *codebookSubsetDCI-0-2=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRankDCI-0-2* and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-5A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, *maxRankDCI-0-2=1*, and according to whether transform precoder is enabled or disabled, and the value of higher layer parameter *codebookSubsetDCI-0-2*.

<Unchanged part omitted>

### 2.3.2 Companies’ input

Please provide your views about the proposed TP of Issue#13 in the table below.

**Question 2.3: Do you agree the proposed TP of Issue#13 for Rel-15 and mirroring for Rel-16?**

* **If no, please provide the reasons and your suggestions, if any.**

|  |  |
| --- | --- |
| Company | Comment |
| vivo | Ok. |
| OPPO | We don’t think this change “transform precoder is disabled, ” is necessary since there is no ambiguity. Having said that, we can accept it if majority companies support it |
| Intel | We are fine with CR |
| QC | For the typo fix “2” -> “1”, we are fine with it for both Rel-15 and 16.  For the other changes in the TP, we don’t see they are necessary. But if majority companies want them, we are fine to take them in Rel-16. But for Rel-15, we don’t accept them as we don’t see them meet the high bar of a Rel-15 CR. |
|  |  |

## Issue#22: draftCR on PUCCH maxCodeRate in TS 38.213 [5][6]

### 2.4.1 Background & Proposed TP for TS 38.213

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Reason for change:*** | The *maxCodeRate* used for handling HARQ-ACK, CSI and potentially SR multiplexing on PUCCH has mismatch between 38.213 and 38.311.  In 38.331 it is defined as follows: – *PUCCH-Config* The IE *PUCCH-Config* is used to configure UE specific PUCCH parameters (per BWP).  *PUCCH-Config* information element  -- ASN1START  -- TAG-PUCCH-CONFIG-START  […]  PUCCH-FormatConfig ::= SEQUENCE {  […]  maxCodeRate PUCCH-MaxCodeRate OPTIONAL, -- Need R  […]  }  PUCCH-MaxCodeRate ::= ENUMERATED {zeroDot08, zeroDot15, zeroDot25, zeroDot35, zeroDot45, zeroDot60, zeroDot80}  […]  -- TAG-PUCCH-CONFIG-STOP  -- ASN1STOP  […]   |  | | --- | | *PUCCH-FormatConfig* field descriptions | | […] | | ***maxCodeRate***  Max coding rate to determine how to feedback UCI on PUCCH for format 2, 3 or 4. The field is not applicable for format 1. See TS 38.213 [13], clause 9.2.5. | | […] |   Then in 38.213 9.2.5.2, it seems to assume that the field maxCodeRate in 38.331 is using value 0,1, …, 7 as it does a conversion to different coderates which then are the same as enumberated values in 38.331.  38.213 9.2.5.2 UE procedure for multiplexing HARQ-ACK/SR/CSI in a PUCCH […]  In the following  -  is a code rate given by *maxCodeRate* as in Table 9.2.5.2-1.  […]  Table 9.2.5.2-1: Code rate  corresponding to value of *maxCodeRate*   |  |  | | --- | --- | | *maxCodeRate* | **Code rate** | | | 0 | 0.08 | | 1 | 0.15 | | 2 | 0.25 | | 3 | 0.35 | | 4 | 0.45 | | 5 | 0.60 | | 6 | 0.80 | | 7 | Reserved |   Based on this a correction is needed in 38.213 by removing the table 9.2.3.2-1 and updating the following sentence under 9.2.5.2:  -  is a code rate given by *maxCodeRate*. |
|  |  |
| ***Summary of change:*** | Correct the description of maxCodeRate in 38.213.The value used for maxCodeRate is configured in RRC in 38.331 as enumerated value {zeroDot08, zeroDot15, zeroDot25, zeroDot35, zeroDot45, zeroDot60, zeroDot80}, not the 0,1,…,7 listed in the table 9.2.3.2-1. Remove the table 9.2.3.2-1 and the reference to the table as it is obsolete and wrong. |
|  |  |
| ***Consequences if not approved:*** | The current discription of maxCodeRate is wrong and inconsistent with 38.331. It can cause confusion and lead to incorrect implementation. |

#### 9.2.5.2 UE procedure for multiplexing HARQ-ACK/SR/CSI in a PUCCH

For a transmission occasion of a single CSI report, a PUCCH resource is provided by *pucch-CSI-ResourceList*. For a transmission occasion of multiple CSI reports, corresponding PUCCH resources can be provided by *multi-CSI-PUCCH-ResourceList*.

If a UE is provided only one PUCCH resource set for transmission of HARQ-ACK information in response to PDSCH reception scheduled by a DCI format or in response to a SPS PDSCH release, the UE does not expect to be provided *simultaneousHARQ-ACK-CSI*.

A UE is configured by *maxCodeRate* a code rate for multiplexing HARQ-ACK, SR, and CSI report(s) in a PUCCH transmission using PUCCH format 2, PUCCH format 3, or PUCCH format 4.

If a UE transmits CSI reports using PUCCH format 2, the UE transmits only wideband CSI for each CSI report [6, TS 38.214]. In the following, a Part 1 CSI report refers either to a CSI report with only wideband CSI or to a Part 1 CSI report with wideband CSI and sub-band CSI.

Denote as

-  a total number of HARQ-ACK information bits, if any

-  a total number of SR bits.  if there is no scheduling request bit; otherwise,  as described in Clause 9.2.5.1

- , where  is a number of Part 1 CSI report bits for CSI report with priority value ,  is a number of Part 2 CSI report bits, if any, for CSI report with priority value  [6, TS 38.214], and  is a number of CSI reports that include overlapping CSI reports

- , where  is a number of CRC bits, if any, for encoding HARQ-ACK, SR and Part 1 CSI report bits and  is a number of CRC bits, if any, for encoding Part 2 CSI report bits

In the following

-  is a code rate given by *maxCodeRate*.

-  is a number of PRBs for PUCCH format 2, or PUCCH format 3, or PUCCH format 4, respectively, where  is provided by *nrofPRBs* in *PUCCH-format2* for PUCCH format 2 or by *nrofPRBs* in *PUCCH-format3* for PUCCH format 3, and  for PUCCH format 4

-  for PUCCH format 2,  for PUCCH format 3, and  for PUCCH format 4, where  is a number of subcarriers per resource block [4, TS 38.211]

-  is equal to a number of PUCCH symbols  for PUCCH format 2 provided by *nrofSymbols* in *PUCCH-format2*. For PUCCH format 3 or for PUCCH format 4,  is equal to a number of PUCCH symbols  for PUCCH format 3 or equal to a number of PUCCH symbols  for PUCCH format 4 provided by *nrofSymbols* in *PUCCH-format3* or *nrofSymbols* in *PUCCH-format4*, respectively, after excluding a number of symbols used for DM-RS transmission for PUCCH format 3 or for PUCCH format 4, respectively [4, TS 38.211]

-  if pi/2-BPSK is the modulation scheme and  if QPSK is the modulation scheme as indicated by *pi2BPSK* for PUCCH format 3 or PUCCH format 4. For PUCCH format 2, 

If a UE has one or more CSI reports and zero or more HARQ-ACK/SR information bits to transmit in a PUCCH where the HARQ-ACK, if any, is in response to a PDSCH reception without a corresponding PDCCH

- if any of the CSI reports are overlapping and the UE is provided by *multi-CSI-PUCCH-ResourceList* with  PUCCH resources in a slot, for PUCCH format 2 and/or PUCCH format 3 and/or PUCCH format 4, as described in Clause 9.2.1, where the resources are indexed according to an ascending order for the product of a number of corresponding REs, modulation order , and configured code rate ;

- if , the UE uses PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource 

- else if  and , , the UE transmits a PUCCH conveying HARQ-ACK information, SR and CSI report(s) in a respective PUCCH where the UE uses the PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource 

- else the UE uses the PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource  and the UE selects  CSI report(s) for transmission together with HARQ-ACK information and SR, when any, in ascending priority value as described in [6, TS 38.214]

- else, the UE transmits the  bits in a PUCCH resource provided by *pucch-CSI-ResourceList* and determined as described in Clause 9.2.5

If a UE has HARQ-ACK, SR and wideband or sub-band CSI reports to transmit and the UE determines a PUCCH resource with PUCCH format 2, or the UE has HARQ-ACK, SR and wideband CSI reports [6, TS 38.214] to transmit and the UE determines a PUCCH resource with PUCCH format 3 or PUCCH format 4, where

- the UE determines the PUCCH resource using the PUCCH resource indicator field [5, TS 38.212] in a last DCI format 1\_0 or DCI format 1\_1, from DCI formats 1\_0 or DCI formats 1\_1 that have a value of a PDSCH-to-HARQ\_feedback timing indicator field indicating a same slot for the PUCCH transmission, from a PUCCH resource set provided to the UE for HARQ-ACK transmission, and

- the UE determines the PUCCH resource set as described in Clause 9.2.1 and Clause 9.2.3 for  UCI bits

and

- if , the UE transmits the HARQ-ACK, SR, and CSI reports bits by selecting the minimum number  of the  PRBs satisfying  as described in Clauses 9.2.3 and 9.2.5.1;

- else, the UE selects  CSI report(s), from the  CSI reports, for transmission together with HARQ-ACK and SR in ascending priority value [6, TS 38.214], where the value of  satisfies  and , where  is a number of CRC bits corresponding to  UCI bits, and  is a number of CRC bits corresponding to  UCI bits.

If a UE has HARQ-ACK, SR and sub-band CSI reports to transmit and the UE determines a PUCCH resource with PUCCH format 3 or PUCCH format 4, where

- the UE determines the PUCCH resource using the PUCCH resource indicator field [5, TS 38.212] in a last DCI format 1\_0 or DCI format 1\_1, from DCI formats 1\_0 or DCI formats 1\_1 that have a value of a PDSCH-to-HARQ\_feedback timing indicator field indicating a same slot for the PUCCH transmission, from a PUCCH resource set provided to the UE for HARQ-ACK transmission, and

- the UE determines the PUCCH resource set as described in Clause 9.2.1 and Clause 9.2.3 for  UCI bits

and

- if , the UE transmits the HARQ-ACK, SR and the  CSI report bits by selecting the minimum number  of PRBs from the  PRBs satisfying  as described in Clauses 9.2.3 and 9.2.5.1

- else,

- if for  Part 2 CSI report priority value(s), it is

 and

,

the UE selects the first  Part 2 CSI reports, according to respective priority value(s) [6, TS 38.214], for transmission together with the HARQ-ACK, SR and  Part 1 CSI reports , where  is the number of Part 1 CSI report bits for the  CSI report and  is the number of Part 2 CSI report bits for the  CSI report priority value,  is a number of CRC bits corresponding to , and  is a number of CRC bits corresponding to 

- else, the UE drops all Part 2 CSI reports and selects  Part 1 CSI report(s), from the  CSI reports in ascending priority value [6, TS 38.214], for transmission together with the HARQ-ACK and SR information bits where the value of  satisfies  and , where is a number of CRC bits corresponding to  UCI bits, and  is a number of CRC bits corresponding to  UCI bits.



### 2.4.2 Companies’ input

Please provide your views about the proposed TP of Issue#22 in the table below.

**Question 2.4: Do you agree the proposed TP for Rel-15 [5] and Rel-16 [6] of Issue#22?**

* **If no, please provide the reasons and your suggestions, if any.**

|  |  |
| --- | --- |
| Company | Comment |
| vivo | Ok |
| OPPO | We prefer to keep Table 9.2.5.2-1 by modifications for better readability since TS 38.331 has no description on the candidate values   |  |  | | --- | --- | | *maxCodeRate* | **Code rate** | | | ~~0~~ zeroDot08 | 0.08 | | ~~1~~ zeroDot15 | 0.15 | | ~~2~~ zeroDot25 | 0.25 | | ~~3~~ zeroDot35 | 0.35 | | ~~4~~ zeroDot45 | 0.45 | | ~~5~~ zeroDot60 | 0.60 | | ~~6~~ zeroDot80 | 0.80 | | ~~7~~ | ~~Reserved~~ | |
| Intel | We are fine with the proposed TP. |
| QC | We don’t think the TP is needed. The spec does not create any ambiguity, because there is no other interpretation of the table. |
|  |  |

# Summary

TBD

# Reference

[1] [R1-2106517](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106517.zip) Correction on data and control multiplexing Huawei, HiSilicon

[2] [R1-2106773](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106773.zip) Correction of physical-layer model of BCH transmission Ericsson

[3] [R1-2106774](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2106774.zip) Correction of physical-layer model of BCH transmission Ericsson

[4] [R1-2107159](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107159.zip) TP for editor’s CR on Precoding information and number of layers, and Antenna port(s) configuration table NEC

[5] [R1-2107626](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107626.zip) draftCR on PUCCH maxCodeRate in TS 38.213 (Rel-15) Ericsson

[6] [R1-2107627](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_106-e/Docs/R1-2107627.zip) draftCR on PUCCH maxCodeRate in TS 38.213 (Rel-16) Ericsson