**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 |
| Huawei, HiSilicon | Yes |
| DOCOMO | The 1st correction is OK. The 2nd correction would be unnecessary since e.g. ‘if HARQ-ACK is present for transmission on the PUSCH with UL-SCH, let’ in the same clause does not have ‘only’. Why only the part needs ‘only’ is unclear for us. |
| NEC | Yes |
| Samsung | We are fine with the proposed TP. |
| Huawei, HiSilicon 2 | Reply to DOCOMO: For the first two cases, how HARQ-ACK is multiplexed on PUSCH with UL-SCH does not have an impact on whether/how CSI is multiplexed on the PUSCH with UL-SCH, i.e. same procedure applies for the HARQ-ACK multiplexing with and without CSI and vice versa for the CSI. This is why “only” is not needed in the first two conditions. For the last three cases, how HARQ-ACK is multiplexed on PUSCH with UL-SCH will have an impact on whether/how CSI is multiplexed on the PUSCH with UL-SCH. That is why the conditions needs to be exclusive. However, according to the current specification, 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,”. That is why the change is needed. |
| Lenovo, Motorola Mobility | We are OK with the TP. |
| ZTE | We are fine with this proposed TP. |
| Ericsson | OK |

### 2.1.3 Summary

Based on the comments provided so far, companies’ view on issue#3 are summarized as follows. The first part of the corrections are agreeable for all companies. Moderator proposes further check if addition of “only” is also agreeable according to the background provided above.

|  |  |
| --- | --- |
| Support | vivo, OPPO, Intel, QC, Huawei, HiSilicon, NEC, Samsung, Lenovo, Motorola Mobility, ZTE, Ericsson |
| Support the first correction only | DOCOMO |
| Not support | None |

## 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.  |
| Huawei, HiSilicon | Yes |
| DOCOMO | We are fine with recommending the TPs for the editor, and we also think the “coding” block can be replaced by “decoding” block. |
| ASUSTeK | The change is not necessary as there is no ambiguity. Otherwise, we would turn out to discuss how many “de-” is required as happened above. Simply leave no “de-” there should be clear enough. |
| NEC | We are fine with the TP. Regarding coding + RM block, we agree with Intel’s comment. |
| Samsung | We are fine with the CR. Also we think it is not necessary to change "coding+RM" block. "encoding" is not used. |
| Lenovo, Motorola Mobility | We are OK with the TP. We agree no need to change “coding+RM”. |
| ZTE | We are fine with the proposed TP and also the proposal of changing from “coding” to “decoding”. |
| Ericsson | OK |

### 2.2.3 Summary

Based on the comments provided so far, companies’ view on issue#8 are summarized as follows. Majority of companies supports the TP.

|  |  |
| --- | --- |
| Support | vivo, OPPO, Intel, QC, Huawei, HiSilicon, DOCOMO, NEC, Samsung, Lenovo, Motorola Mobility, ZTE, Ericsson |
| Not support | ASUSTeK |

Regarding additional correction to “Coding+RM” block, companies’ view are summarized as follows.

|  |  |
| --- | --- |
| Support | vivo, DOCOMO, ZTE |
| Not necessary but OK with correction | Intel, QC, NEC,  |
| Not necessary | ASUSTeK, Samsung, Lenovo, Motorola Mobility,  |

## 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.  |
| Huawei, HiSilicon | We think it is incorrect to remove “according to” since the size of the DCI field is also according to “the values of higher layer parameters *maxRank*, and *codebookSubset*” for DCI format 0\_1 and “the values of higher layer parameters *maxRankDCI-0-2*, and *codebookSubsetDCI-0-2*” for DCI format 0\_2. We suggest to add “according to” before “the values of higher layer parameters *maxRank*, and *codebookSubset*” and “the values of higher layer parameters *maxRankDCI-0-2*, and *codebookSubsetDCI-0-2*”.  |
| DOCOMO | We think TP for Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11 are for Rel-15 and mirroring for Rel-16.All other TPs are only for Rel-16, because the original texts include RRC parameter of “fullpower”, which only exists in Rel-16 |
| ASUSTeK | About the change “transform precoder is disabled,” we don’t think it is a necessary change since the applicability of transform precoder disabled is clearly specified in the corresponding table title (i.e. title of Table 7.3.1.1.2-2/Table7.3.1.1.2-4), so there is nothing wrong/unclear in the existing spec. |
| NEC | We are fine with the comments from Huawei “according to” should be reserved and DoCoMo “TP for Rel-15 and mirroring for Rel-16”, and regarding the issue for “according to whether transform precoder is enabled or disabled”, we think it should be changed to make spec clear, as if transform precoder can only be disabled, then there is no need to according to. We are fine to have TPs for Rel-15 and Rel-16 separately:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TP for Rel-15**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,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank*, and *codebookSubset*;- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports, if *txConfig = codebook,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank*, and *codebookSubset*;- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports, if *txConfig = codebook,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank* and *codebookSubset*;- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports, if *txConfig = codebook,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank* and *codebookSubset*.<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> |
| **TP for Rel-16**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 according to 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 according to 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 7.3.1.1.2-10: 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 according to 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 according to 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> |

 |
| Samsung | We are fine with CR |
| ZTE | We are fine with this proposed TP. |
| Ericsson | We have the same view as Qualcomm. The 2 to 1 issue needs fix. The other are not strictly necessary.  |

### 2.3.3 Summary

Based on the comments provided so far, companies’ view on issue#13 are summarized as follows. Majority of companies supports the TP (with potential revision) while multiple companies support corrections to Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11 only. Corrections to Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11 only would be agreeable to the group.

|  |  |
| --- | --- |
| Support | vivo, Intel, Huawei,/HiSilicon (with revision to add “according to”), DOCOMO (corrections other than Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11 should be for Rel-16 only), NEC (fine with comments from Huawei, HiSilicon and DOCOMO), Samsung, ZTE, |
| Support corrections to Table 7.3.1.1.2-10 and Table 7.3.1.1.2-11 only | OPPO, QC, ASUS, Ericsson |
| Not support | None |

## 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 38.331.38.2139.2.5.2 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.

|  |  |
| --- | --- |
|  |  |
|
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|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### 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.  |
| Huawei, HiSilicon | Yes |
| DOCOMO | We are OK with either way. |
| NEC | OK. We are also OK with OPPO’s version. |
| Samsung | The configured 38.331 enumerated value (e.g., zeroDot08, ...) is indicated to 0, .. 6 actually, and these values are aligned to values in 38.213 table 9.2.5.2-1. So, interpretation of the table is clear in current specification. |
| Lenovo, Motorola Mobility | The current spec is clear but the TP is also fine. |
| ZTE | We believe there is no any mismatch and misunderstanding for the current specification. But we are OK with the TP if most companies support it.  |
| Ericsson | TP should be agreed for specification alignement |

### 2.4.3 Summary

Based on the comments provided so far, companies’ view on issue#22 are summarized as follows.

|  |  |
| --- | --- |
| Support | vivo, Intel, Huawei, HiSilicon, DOCOMO, NEC,  |
| Not necessary but OK with the TP | Lenovo, Motorola Mobility, ZTE |
| Not support | OPPO, QC, Samsung |

Regarding alternative correction proposed by OPPO

|  |  |
| --- | --- |
| Support | OPPO, DOCOMO, NEC |

# Summary

RAN1 has concluded as follows over RAN1 email reflector.

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

TP to TS 38.212 in [1] is agreeable to the group for both Rel-15 and Rel-16.

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

TPs to TS 38.202 in [2] and TP in [3] are agreeable to the group for Rel-15 and Rel-16, respectively.

Just for information to the editor (not recommendation from the group), there were comments on potential correction of “Coding + RM” blocks of receiver side in TS38.202, e.g. to “Decoding+de-RM”. Whether/how to correct is left for spec editor.

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

The following revised version of TPs for Rel-15 and Rel-16 to TS 38.212 are agreeable to the group

For Rel-15:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TP for Rel-15**7.3.1.1.2 Format 0\_1<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> |

For Rel-16:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TP for Rel-16**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 according to 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 according to 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 7.3.1.1.2-10: 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 according to 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 according to 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> |

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

There was no consensus on the TP to TS 38.213 in [5][6].

# 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