**3GPP TSG-RAN WG1 Meeting #117 R1-2405478**

**Fukuoka City, Fukuoka, Japan, May 20th-24th, 2024**

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| --- |
| *CR-Form-v12.3* |
| **DRAFT CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| --- |
|  |
| ***Title:***  | Draft CR Corrections for Transmission with more than 4 Layers for 8TX UE |
|  |  |
| ***Source to WG:*** | Moderator (InterDigital), NTT DOCOMO, , ASUSTek, Samsung |
| ***Source to TSG:*** | --- |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | * In the current version of 38.212, some functionality that should support >4 layer transmission does not function because either or both of maxRank-n8 and/or maxMIMO-Layers-n8 are not used, including:
	+ The maximum number of layers in for one TB in UL-SCH is undefined when the maximum rank or number of layers is 5-8.
	+ UE cannot determine when to zero pad DCI fields for TB2 with bandwidth part switching since maxMIMO-Layers never meets the conditions for the zero padding.
* According to the latest agreed version of 38.331, maxRank-v1810 and maxMIMO-Layers-v1810, are used to configure 5-8 layers, while maxRank and maxMIMO-Layers are used for 1-4 layers. Therefore, maxRank-n8 and maxMIMO-Layers-n8, which are used for 5-8 layers in 38.212, need to be replaced. According to RAN2 guidance (e.g. R1-2009669), an RRC parameter that is an extension of a parameter in an earlier release with suffix -vX.Y.Z (-v1810 in this case) can be referred to without the suffix. Therefore, maxRank-n8 and maxMIMO-Layers-n8 are replaced by maxRank and maxMIMO-Layers, respectively, while maxRank-v1810 and maxMIMO-Layers-v1810 are implicitly referred to.
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| ***Summary of change:*** | * Delete any reference to maxRank-n8 and maxMIMO-Layers-n8
* Also, addition of two instances of “is larger than 4” in the clause related to the transport block 2 and bandwidth part indication.
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| ***Consequences if not approved:*** | * Inconsistency between specifications on parameter name and usage.
* The UE may not be able to be operate properly for more than 4 layers with respect to determining the number of layers in one TB or for zero pading of DCI field sizes for TB2 when using bandwith part switching.
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| ***Clauses affected:*** | 7.3.1.1.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **N** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **N** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **N** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

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| 7.3.1.1.2 Format 0\_1-------------------------------------------Unchanged parts are omitted-------------------------------------------For transport block 2 (only present if *maxRank* or *maxMIMO-Layers* is larger than 4):- Modulation and coding scheme - 5 bits as defined in Clause 6.1.4.1 of [6, TS 38.214]- New data indicator - 1 bit- Redundancy version - 2 bits as defined in Table 7.3.1.1.1-2If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part, *maxRank* is larger than 4 or the value of *maxMIMO-Layers* for the indicated bandwidth part is larger than 4 and the value of *maxRank* or *maxMIMO-Layers* for the active bandwidth part is no more than 4, the UE assumes zeros are padded when interpreting the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields for transport block 2 according to Clause 12 of [5, TS38.213], and the UE ignores the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields of transport block 2 for the indicated bandwidth part.-------------------------------------------Unchanged parts are omitted-------------------------------------------- 7 bits according to Table 7.3.1.1.2-5B for 8 antenna ports, if *CodebookTypeUL=Codebook1*, transform precoder is disabled, *maxRank* = 8, and according to *ULcodebookFC-N1N2*;- 7 bits according to Table 7.3.1.1.2-5C for 8 antenna ports, if *CodebookTypeUL=Codebook1*, transform precoder is disabled, *maxRank* =7, and according to *ULcodebookFC-N1N2*;- 7 bits according to Table 7.3.1.1.2-5D for 8 antenna ports, if *CodebookTypeUL=Codebook1*, transform precoder is disabled, *maxRank* =4, 5 or 6, and according to *maxRank* ;- 4, 6 or 7 bits according to Table 7.3.1.1.2-5E for 8 antenna ports, if *CodebookTypeUL=Codebook1*, transform precoder is enabled or *maxRank* =1, 2 or 3 if transform precoder is disabled, and according to transform precoder and *maxRank*;- 8 bits according to Table 7.3.1.1.2-5F for 8 antenna ports, if *CodebookTypeUL=Codebook4*, transform precoder is disabled, *maxRank* =5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to *maxRank* ;- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5G for 8 antenna ports, if *CodebookTypeUL=Codebook4*, transform precoder is disabled, *maxRank*=2, 3 or 4, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to *maxRank*;- 3 bits according to Table 7.3.1.1.2-5H for 8 antenna ports, if *CodebookTypeUL=Codebook4*, transform precoder is enabled or *maxRank*=1 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*.- 10 bits according to Table 7.3.1.1.2-5I for 8 antenna ports, if *CodebookTypeUL=Codebook2*, transform precoder is disabled, *maxRank* =5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to *maxRank* ;- 5, 9 or 10 bits according to Table 7.3.1.1.2-5J for 8 antenna ports, if *CodebookTypeUL=Codebook2*, transform precoder is enabled or *maxRank* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRank*;- 10 bits according to Table 7.3.1.1.2-5K for 8 antenna ports, if *CodebookTypeUL=Codebook3*, transform precoder is disabled, *maxRank* =5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to *maxRank* ;- 4, 7, 9 or 10 bits according to Table 7.3.1.1.2-5L for 8 antenna ports, if *CodebookTypeUL=Codebook3*, transform precoder is enabled or *maxRank* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRank*;- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5M for 8 antenna ports, if *CodebookTypeUL=Codebook4*, transform precoder is disabled, *maxRank*=2, 3 or 4, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;- 4 bits according to Table 7.3.1.1.2-5N for 8 antenna ports, if *CodebookTypeUL=Codebook4*, transform precoder is enabled or *maxRank*=1 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*.- 6, 9 or 10 bits according to Table 7.3.1.1.2-5O for 8 antenna ports, if *CodebookTypeUL=Codebook2*, transform precoder is enabled or *maxRank* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRank*;- 5, 7, 9 or 10 bits according to Table 7.3.1.1.2-5P for 8 antenna ports, if *CodebookTypeUL=Codebook3*, transform precoder is enabled or *maxRank* =1, 2, 3, or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRank*;- 8 or 9 bits according to Table 7.3.1.1.2-5Q for 8 antenna ports, if *CodebookTypeUL*=*Codebook4*, transform precoder is disabled, *maxRank* =5, 6, 7 or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;- 10 bits according to Table 7.3.1.1.2-5R for 8 antenna ports, if *CodebookTypeUL*=*Codebook2*, transform precoder is disabled, *maxRank* =5, 6, 7 or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank* ;- 10 bits according to Table 7.3.1.1.2-5S for 8 antenna ports, if *CodebookTypeUL*=*Codebook3*, transform precoder is disabled, *maxRank* =5, 6, 7, or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank* ;-------------------------------------------Unchanged parts are omitted-------------------------------------------- -------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5B: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 8, and *CodebookTypeUL*=*Codebook1***-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5C: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 7, and *CodebookTypeUL=Codebook1***-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5D: Precoding information and number of layers, for 8 antenna ports,if transform precoder is disabled, *maxRank*  = 4, 5 or 6, *CodebookTypeUL=Codebook1,ULcodebookFC-N1N2 = (4,1) or (2,2)***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  =4** | **Bit field mapped to index** | ***maxRank*  =5** | **Bit field mapped to index** | ***maxRank*  *=6*** |
| 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 |
| … | … | … | … | … | … |
| 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 |
| 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 | 16 | 2 layer2: TPMI=0 |
| 17 | 2 layers: TPMI=1 | 17 | 2 layers: TPMI=1 | 17 | 2 layer2: TPMI=1 |
| … | … | … | … | … | … |
| 47 | 2 layers: TPMI=31 | 47 | 2 layers: TPMI=31 | 47 | 2 layers: TPMI=31 |
| 48 | 3 layers: TPMI=0 | 48 | 3 layers: TPMI=0 | 48 | 3 layers: TPMI=0 |
| 49 | 3 layers: TPMI=1 | 49 | 3 layers: TPMI=1 | 49 | 3 layers: TPMI=1 |
| … | … | … | … | … | … |
| 71 | 3 layers: TPMI=23 | 71 | 3 layers: TPMI=23 | 71 | 3 layers: TPMI=23 |
| 72 | 4 layers: TPMI=0 | 72 | 4 layers: TPMI=0 | 72 | 4 layers: TPMI=0 |
| 73 | 4 layers: TPMI=1 | 73 | 4 layers: TPMI=1 | 73 | 4 layers: TPMI=1 |
| … | … | … | … | … | … |
| 95 | 4 layers: TPMI=23 | 95 | 4 layers: TPMI=23 | 95 | 4 layers: TPMI=23 |
| 96-127 | reserved | 96 | 5 layers: TPMI=0 | 96 | 5 layers: TPMI=0 |
|  |  | 97 | 5 layers: TPMI=1 | 97 | 5 layers: TPMI=1 |
|  |  | … | … | … | … |
|  |  | 103 | 5 layers: TPMI=7 | 103 | 5 layers: TPMI=7 |
|  |  | 104-127 | reserved | 104 | 6 layers: TPMI=0 |
|  |  |  |  | 105 | 6 layers: TPMI=1 |
|  |  |  |  | … | … |
|  |  |  |  | 111 | 6 layers: TPMI=7 |
|  |  |  |  | 112-127 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5F: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7 or 8, and *CodebookTypeUL=Codebook4***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  *= 5*** | **Bit field mapped to index** | ***maxRank*  *= 6*** | **Bit field mapped to index** | ***maxRank = 7*** | **Bit field mapped to index** | ***maxRank*  *= 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 |
| 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 |
| … | … | … | … | … | … | … | … |
| 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 |
| 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 |
| … | … | … | … | … | … | … | … |
| 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 |
| 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 |
| … | … | … | … | … | … | … | … |
| 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 |
| 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 |
| … | … | … | … | … | … | … | … |
| 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 |
| 218-255 | reserved | 218 | 6 layers: TPMI=218 | 218 | 6 layers: TPMI=218 | 218 | 6 layers: TPMI=218 |
|  |  | … | … | … | … | … | … |
|  |  | 245 | 6 layers: TPMI=245 | 245 | 6 layers: TPMI=245 | 245 | 6 layers: TPMI=245 |
|  |  | 246-255 | reserved | 246 | 7 layers: TPMI=246 | 246 | 7 layers: TPMI=246 |
|  |  |  |  | … | … | … | … |
|  |  |  |  | 253 | 7 layers: TPMI=253 | 253 | 7 layers: TPMI=253 |
|  |  |  |  | 254-255 | reserved | 254 | 8 layers: TPMI=254 |
|  |  |  |  |  |  | 255 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5I: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7 or 8, and *CodebookTypeUL=Codebook2***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  *= 5*** | **Bit field mapped to index** | ***maxRank*  *= 6*** | **Bit field mapped to index** | ***maxRank = 7*** | **Bit field mapped to index** | ***maxRank*  *= 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 |
| 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 |
| 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 |
| 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 |
| 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 |
| 698-1023 | reserved | 668 | 6 layers: TPMI=0 | 668 | 6 layers: TPMI=0 | 668 | 6 layers: TPMI=0 |
|  |  | … | … | … | … | … | … |
|  |  | 683 | 6 layers: TPMI=15 | 683 | 6 layers: TPMI=15 | 683 | 6 layers: TPMI=15 |
|  |  | 684-1023 | reserved | 684 | 7 layers: TPMI=0 | 684 | 7 layers: TPMI=0 |
|  |  |  |  | … | … | … | … |
|  |  |  |  | 691 | 7 layers: TPMI=7 | 691 | 7 layers: TPMI=7 |
|  |  |  |  | 692-1023 | reserved | 692 | 8 layers: TPMI=0 |
|  |  |  |  |  |  | … | … |
|  |  |  |  |  |  | 695 | 8 layers: TPMI=3 |
|  |  |  |  |  |  | 696-1023 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5K: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7 or 8, and *CodebookTypeUL=Codebook3***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  *= 5*** | **Bit field mapped to index** | ***maxRank*  *= 6*** | **Bit field mapped to index** | ***maxRank*  *= 7*** | **Bit field mapped to index** | ***maxRank = 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 |
| 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 |
| 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 |
| 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 |
| 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 |
| 864-1023 | reserved | 864 | 6 layers: TPMI=0 | 864 | 6 layers: TPMI=0 | 864 | 6 layers: TPMI=0 |
|  |  | … | … | … | … | … | … |
|  |  | 943 | 6 layers: TPMI=79 | 943 | 6 layers: TPMI=79 | 943 | 6 layers: TPMI=79 |
|  |  | 944-1023 | reserved | 944 | 7 layers: TPMI=0 | 944 | 7 layers: TPMI=0 |
|  |  |  |  | … | … | … | … |
|  |  |  |  | 975 | 7 layers: TPMI=31 | 975 | 7 layers: TPMI=31 |
|  |  |  |  | 976-1023 | reserved | 976 | 8 layers: TPMI=0 |
|  |  |  |  |  |  | … | … |
|  |  |  |  |  |  | 991 | 8 layers: TPMI=15 |
|  |  |  |  |  |  | 992-1023 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5Q: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7, 8, *CodebookTypeUL=Codebook4,* and *ul-FullPowerTransmission* is configured to *fullpowerMode1***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank = 5*** | **Bit field mapped to index** | ***maxRank = 6*** | **Bit field mapped to index** | ***maxRank*  *= 7*** | **Bit field mapped to index** | ***maxRank = 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 | 7 | 1 layer: TPMI=7 |
| 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 | 8 | 2 layers: TPMI=8 |
| … | … | … | … | … | … | … | … |
| 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 | 35 | 2 layers: TPMI=35 |
| 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 | 36 | 3 layers: TPMI=36 |
| … | … | … | … | … | … | … | … |
| 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 | 91 | 3 layers: TPMI=91 |
| 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 | 92 | 4 layers: TPMI=92 |
| … | … | … | … | … | … | … | … |
| 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 | 161 | 4 layers: TPMI=161 |
| 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 | 162 | 5 layers: TPMI=162 |
| … | … | … | … | … | … | … | … |
| 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 | 217 | 5 layers: TPMI=217 |
| 218 | 1 layer: TPMI=255 | 218 | 6 layers: TPMI=218 | 218 | 6 layers: TPMI=218 | 218 | 6 layers: TPMI=218 |
| 219 | 2 layers: TPMI=256 | … | … | … | … | … | … |
| 220 | 3 layers: TPMI=257 | 245 | 6 layers: TPMI=245 | 245 | 6 layers: TPMI=245 | 245 | 6 layers: TPMI=245 |
| 221 | 4 layers: TPMI=258 | 246 | 1 layer: TPMI=255 | 246 | 7 layers: TPMI=246 | 246 | 7 layers: TPMI=246 |
| 222-255 | reserved | 247 | 2 layers: TPMI=256 | … | … | … | … |
|  |  | 248 | 3 layers: TPMI=257 | 253 | 7 layers: TPMI=253 | 253 | 7 layers: TPMI=253 |
|  |  | 249 | 4 layers: TPMI=258 | 254 | 1 layer: TPMI=255 | 254 | 8 layers: TPMI=254 |
|  |  | 250-255 | reserved | 255 | 2 layers: TPMI=256 | 255 | 1 layer: TPMI=255 |
|  |  |  |  | 256 | 3 layers: TPMI=257 | 256 | 2 layers: TPMI=256 |
|  |  |  |  | 257 | 4 layers: TPMI=258 | 257 | 3 layers: TPMI=257 |
|  |  |  |  | 258-511 | reserved | 258 | 4 layers: TPMI=258 |
|  |  |  |  |  |  | 259-511 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5R: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7, 8, *CodebookTypeUL=Codebook2,* and *ul-FullPowerTransmission* is configured to *fullpowerMode1***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  *= 5*** | **Bit field mapped to index** | ***maxRank = 6*** | **Bit field mapped to index** | ***maxRank*  *= 7*** | **Bit field mapped to index** | ***maxRank*  *= 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 | 31 | 1 layer: TPMI=31 |
| 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 | 32 | 2 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 | 303 | 2 layers: TPMI=271 |
| 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 | 304 | 3 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 | 567 | 3 layers: TPMI=263 |
| 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 | 568 | 4 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 | 635 | 4 layers: TPMI=67 |
| 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 | 636 | 5 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 | 667 | 5 layers: TPMI=31 |
| 668 | 1 layer: TPMI=32 | 668 | 6 layers: TPMI=0 | 668 | 6 layers: TPMI=0 | 668 | 6 layers: TPMI=0 |
| 669-1023 | reserved | … | … | … | … | … | … |
|  |  | 683 | 6 layers: TPMI=15 | 683 | 6 layers: TPMI=15 | 683 | 6 layers: TPMI=15 |
|  |  | 684 | 1 layer: TPMI=32 | 684 | 7 layers: TPMI=0 | 684 | 7 layers: TPMI=0 |
|  |  | 685-1023 | reserved | … | … | … | … |
|  |  |  |  | 691 | 7 layers: TPMI=7 | 691 | 7 layers: TPMI=7 |
|  |  |  |  | 692 | 1 layer: TPMI=32 | 692 | 8 layers: TPMI=0 |
|  |  |  |  | 693-1023 | reserved | … | … |
|  |  |  |  |  |  | 695 | 8 layers: TPMI=3 |
|  |  |  |  |  |  | 696 | 1 layer: TPMI=32 |
|  |  |  |  |  |  | 697-1023 | reserved |

-------------------------------------------Unchanged parts are omitted-------------------------------------------**Table 7.3.1.1.2-5S: Precoding information and number of layers, for 8 antenna ports, if transform precoder is disabled, *maxRank*  = 5, 6, 7, 8, *CodebookTypeUL=Codebook3,* and *ul-FullPowerTransmission* is configured to *fullpowerMode1***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | ***maxRank*  *= 5*** | **Bit field mapped to index** | ***maxRank = 6*** | **Bit field mapped to index** | ***maxRank*  *= 7*** | **Bit field mapped to index** | ***maxRank*  *= 8*** |
| 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 | 0 | 1 layer: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 | 15 | 1 layer: TPMI=15 |
| 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 | 16 | 2 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 | 119 | 2 layers: TPMI=103 |
| 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 | 120 | 3 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 | 423 | 3 layers: TPMI=303 |
| 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 | 424 | 4 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 | 703 | 4 layers: TPMI=279 |
| 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 | 704 | 5 layers: TPMI=0 |
| … | … | … | … | … | … | … | … |
| 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 | 863 | 5 layers: TPMI=159 |
| 864 | 1 layer: TPMI=16 | 864 | 6 layers: TPMI=0 | 864 | 6 layers: TPMI=0 | 864 | 6 layers: TPMI=0 |
| 865 | 2 layers: TPMI=104 | … | … | … | … | … | … |
| 866 | 3 layers: TPMI=304 | 943 | 6 layers: TPMI=79 | 943 | 6 layers: TPMI=79 | 943 | 6 layers: TPMI=79 |
| 867-1023 | reserved | 944 | 1 layer: TPMI=16 | 944 | 7 layers: TPMI=0 | 944 | 7 layers: TPMI=0 |
|  |  | 945 | 2 layers: TPMI=104 | … | … | … | … |
|  |  | 946 | 3 layers: TPMI=304 | 975 | 7 layers: TPMI=31 | 975 | 7 layers: TPMI=31 |
|  |  | 944-1023 | reserved | 976 | 1 layer: TPMI=16 | 976 | 8 layers: TPMI=0 |
|  |  |  |  | 977 | 2 layers: TPMI=104 | … | … |
|  |  |  |  | 978 | 3 layers: TPMI=304 | 991 | 8 layers: TPMI=15 |
|  |  |  |  | 979-1023 | reserved | 992 | 1 layer: TPMI=16 |
|  |  |  |  |  |  | 993 | 2 layers: TPMI=104 |
|  |  |  |  |  |  | 994 | 3 layers: TPMI=304 |
|  |  |  |  |  |  | 995-1023 | reserved |

-------------------------------------------Unchanged parts are omitted------------------------------------------- |