**3GPP TSG-RAN WG4 Meeting #101-e *R4-2117996***

**E-meeting, 1st November – 12th November 2021**

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| --- |
| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-4** | **CR** | **-** | **rev** | **-** | **Current version:** | **16.6.0** |  |
|  |
| *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)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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| --- |
|  |
| ***Title:***  | Draft CR on CSI reference measurement channels |
|  |  |
| ***Source to WG:*** | Intel Corporation |
| ***Source to TSG:*** | RAN4 |
|  |  |
| ***Work item code:*** | NR\_newRAT-Perf |  | ***Date:*** | 2021-10-22 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | CSI-RS type in Note 2 of CSI RMCs is not clarified |
|  |  |
| ***Summary of change:*** | Type of CSI-RS for PDSCH scheduling assumptions in CSI RMC is clarified |
|  |  |
| ***Consequences if not approved:*** | PDSCH scheduling for CSI RMC is confusing |
|  |  |
| ***Clauses affected:*** | A.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.521-4  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

**START OF CHANGE**

A.4 CSI reference measurement channels

This clause defines the DL signal applicable to the reporting of channel state information (Clauses 6 and 8).

Tables in this clause specifies the mapping of CQI index to Information Bit payload, which complies with the CQI definition specified in clause 5.2.2.1 of TS 38.214 [12] and with MCS definition specified in clause 5.1.3 of TS 38.214 [12].

**Table A.4-1: Mapping of CQI Index to Information Bit payload (CQI table 1)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.1-1 | TBS.1-2 |  |  |  |  |
| MCS table | 64QAM |
| Number of allocated PDSCH resource blocks | 66 | 66 |  |  |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 |  |  |  |  |
| Number of PDSCH MIMO layers | 1 | 2 |  |  |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 |  |  |  |  |
| Overhead for TBS determination | 6 | 6 |  |  |  |  |
| Available RE-s | 7590 | 7590 |  |  |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A |  |  |  |  |
| 1 | 0.2344 | 0 | QPSK | 1800 | 3624 |  |  |  |  |
| 2 | 0.2344 | 0 | 1800 | 3624 |  |  |  |  |
| 3 | 0.3770 | 2 | 2856 | 5640 |  |  |  |  |
| 4 | 0.6016 | 4 | 4480 | 8968 |  |  |  |  |
| 5 | 0.8770 | 6 | 6528 | 13064 |  |  |  |  |
| 6 | 1.1758 | 8 | 8712 | 17928 |  |  |  |  |
| 7 | 1.4766 | 11 | 16QAM | 11016 | 22032 |  |  |  |  |
| 8 | 1.9141 | 13 | 14343 | 28680 |  |  |  |  |
| 9 | 2.4063 | 15 | 17928 | 35856 |  |  |  |  |
| 10 | 2.7305 | 18 | 64QAM | 20496 | 40976 |  |  |  |  |
| 11 | 3.3223 | 20 | 25104 | 50184 |  |  |  |  |
| 12 | 3.9023 | 22 | 29192 | 58384 |  |  |  |  |
| 13 | 4.5234 | 24 | 33816 | 67584 |  |  |  |  |
| 14 | 5.1152 | 26 | 38936 | 77896 |  |  |  |  |
| 15 | 5.5547 | 28 | 42016 | 83976 |  |  |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-1 of TS 38.214 [12] |

**Table A.4-2: Mapping of CQI Index to Information Bit payload (CQI table 2, Rank 1 and Rank 2)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.2-1 | TBS.2-2 | TBS.2-3 | TBS.2-4 | TBS.2-5 | TBS.2-6 | TBS.2-7 | TBS.2-8 |
| MCS table | 256QAM |  |
| Number of allocated PDSCH resource blocks | 52 | 52 | 106 | 106 | 8 | 16 | 32 | 51 |
| Number of consecutive PDSCH symbols | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of PDSCH MIMO layers | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| Number of DMRS REs (Note 1) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Overhead for TBS determination | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Available RE-s for PDSCH | 6240 | 6240 | 12720 | 12720 | 960 | 1920 | 3680 | 6120 |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |  |
| 0 | OOR | OOR | OOR | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1 | 0.2344 | 0 | QPSK | 1480 | 2976 | 2976 | 5896 | 224 | 456 | 848 | 1864 |
| 2 | 0.3770  | 1 | 2408 | 4744 | 4744 | 9480 | 368 | 736 | 1416 | 4616 |
| 3 | 0.8770  | 3 | 5504 | 11016 | 11016 | 22536 | 848 | 1736 | 3240 | 10760 |
| 4 | 1.4766  | 5 | 16QAM | 9224 | 18432 | 18960 | 37896 | 1416 | 2856 | 5376 | 17928 |
| 5 | 1.9141  | 7 | 12040 | 24072 | 24576 | 49176 | 1864 | 3752 | 6912 | 23568 |
| 6 | 2.4063  | 9 | 15112 | 30216 | 30728 | 61480 | 2408 | 4608 | 8712 | 29192 |
| 7 | 2.7305  | 11 | 64QAM | 16896 | 33816 | 34816 | 69672 | 2600 | 5248 | 9992 | 33816 |
| 8 | 3.3223  | 13 | 20496 | 40976 | 42016 | 83976 | 3240 | 6400 | 12040 | 40976  |
| 9 | 3.9023  | 15 | 24576 | 49176 | 49176 | 98376 | 3752 | 7424 | 14344 | 48168 |
| 10 | 4.5234  | 17 | 28168 | 56368 | 57376 | 114776 | 4352 | 8712 | 16392 | 55304 |
| 11 | 5.1152  | 19 | 31752 | 63528 | 65576 | 131176 | 4864 | 9736 | 18432 | 62504 |
| 12 | 5.5547  | 21 | 256QAM | 34816 | 69672 | 69672 | 139376 | 5248 | 10760 | 20496 | 67584 |
| 13 | 6.2266 | 23 | 38936 | 77896 | 79896 | 159880 | 6016 | 12040 | 22536 | 75792 |
| 14 | 6.9141 | 25 | 43032 | 86040 | 88064 | 176208 | 6656 | 13320 | 25104 | 83976 |
| 15 | 7.4063  | 27 | 46104 | 92200 | 94248 | 188576 | 7040 | 14088 | 27144 | 90176 |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-2 of TS 38.214 [12] |

**Table A.4-3: Mapping of CQI Index to Information Bit payload (CQI table 2, Rank 3 and Rank 4)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.3-1 | TBS.3-2 | TBS.3-3 | TBS.3-4 |  |  |
| MCS table | 256QAM |
| Number of allocated PDSCH resource blocks | 52 | 52 | 106 | 106 |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 | 12 | 12 |  |  |
| Number of PDSCH MIMO layers | 3 | 4 | 3 | 4 |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 | 24 | 24 |  |  |
| Overhead for TBS determination | 0 | 0 | 0 | 0 |  |  |
| Available RE-s for PDSCH | 6240 | 6240 | 12720 | 12720 |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A | N/A | N/A |  |  |
| 1 | 0.2344  | 0 | QPSK | 4360 | 5896 | 8976 | 11784 |  |  |
| 2 | 0.3770  | 1 | 7048 | 9480 | 14344 | 18976 |  |  |
| 3 | 0.8770  | 3 | 16392 | 22032 | 33816 | 45096 |  |  |
| 4 | 1.4766  | 5 | 16QAM | 27656 | 36896 | 56368 | 75792 |  |  |
| 5 | 1.9141  | 7 | 35856 | 48168 | 73776 | 98376 |  |  |
| 6 | 2.4063  | 9 | 45096 | 60456 | 92200 | 122976 |  |  |
| 7 | 2.7305  | 11 | 64QAM | 51216 | 67584 | 104496 | 139376 |  |  |
| 8 | 3.3223  | 13 | 62504 | 81976 | 127080 | 167976 |  |  |
| 9 | 3.9023  | 15 | 73776 | 98376 | 147576 | 196776 |  |  |
| 10 | 4.5234  | 17 | 83976 | 112648 | 172176 | 229576 |  |  |
| 11 | 5.1152  | 19 | 96264 | 127080 | 196776 | 262376 |  |  |
| 12 | 5.5547  | 21 | 256QAM | 104496 | 139376 | 213176 | 278776 |  |  |
| 13 | 6.2266 | 23 | 116792 | 155776 | 237776 | 319784 |  |  |
| 14 | 6.9141 | 25 | 129128 | 172176 | 262376 | 352440 |  |  |
| 15 | 7.4063  | 27 | 139376 | 184424 | 278776 | 376896 |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-2 of TS 38.214 [12] |

**Table A.4-4: Mapping of CQI Index to Information Bit payload (CQI table 3)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.4-1 | TBS.4-2 |  |  |  |  |
| MCS table | 64QAMLowSE |
| Number of allocated PDSCH resource blocks | 52 | 106 |  |  |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 |  |  |  |  |
| Number of PDSCH MIMO layers | 1 | 1 |  |  |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 |  |  |  |  |
| Overhead for TBS determination | 0 | 0 |  |  |  |  |
| Available RE-s for PDSCH | 6240 | 12720 |  |  |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A |  |  |  |  |
| 1 | 0.0586 | 0 | QPSK | 368 | 768 |  |  |  |  |
| 2 | 0.0977 | 2 | 608 | 1256 |  |  |  |  |
| 3 | 0.1523 | 4 | 984 | 2024 |  |  |  |  |
| 4 | 0.2344 | 6 | 1480 | 2976 |  |  |  |  |
| 5 | 0.3770 | 8 | 2408 | 4744 |  |  |  |  |
| 6 | 0.6016 | 10 | 3752 | 7680 |  |  |  |  |
| 7 | 0.8770 | 12 | 5504 | 11016 |  |  |  |  |
| 8 | 1.1758 | 14 | 7296 | 14856 |  |  |  |  |
| 9 | 1.4766 | 16 | 16QAM | 9224 | 18960 |  |  |  |  |
| 10 | 1.9141 | 18 | 12040 | 24576 |  |  |  |  |
| 11 | 2.4063 | 20 | 15112 | 30728 |  |  |  |  |
| 12 | 2.7305 | 22 | 64QAM | 16896 | 34816 |  |  |  |  |
| 13 | 3.3223 | 24 | 20496 | 42016 |  |  |  |  |
| 14 | 3.9023 | 26 | 24576 | 49176 |  |  |  |  |
| 15 | 4.5234 | 28 | 28168 | 57376 |  |  |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking and CSI-RS for CSI acquisition or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicity |

**END OF CHANGE**