**3GPP TSG-RAN WG4 Meeting #102-e *R4-2206615***

**Electronic meeting, February 21 – March 3, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.101-2** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **17.4.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](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:*** |  | | | | | | | | | |
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| ***Source to WG:*** | MCC, Samsung | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2022-03-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **A** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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 can be 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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CRs merge the multiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.  **R4-2204004 Draft CR to TS 38.101-2 on corrections to UE maximum output power with additional requirements (R17\_CAT\_A)**  Some editorial corrections to UE maximum output power with additional requirements in 6.2.3 should be made.  **R4-2206065 Draft CR to 38.101-2: missing image location for CA IBE (cat. A)**  Mirror of R4-2206294  Image location detail is present in the single CC IBE requiement, but not present for CA cases.  **R4-2203610 Correction to Rel-15 FR2 RMCs**  For UL RMC:  The Payload size for the 1RB allocation in the Pi/2 BPSK UL RMC is not correct. According to 38.214 calculation rules, the payload size must be 24.  For DL RMC:  The number of binary channel bits per slot does not match the other parameters defined in the RMC in many cases.  The number of alloced slots per frame is misleading, since the RMCs are defined over two frames and only the value for the first frame is given, which is different from the value for the second frame.  The Max thoughput averaged over 1 frame does currently not always match the number of allocated slots per frame and should consider the larger number of slots per frame.  **R4-2203612 Correction to Rel-16 FR2 RMCs**  The number of binary channel bits per slot does not match the other parameters defined in the RMC in many cases.  The number of alloced slots per frame is misleading, since the RMCs are defined over two frames and only the value for the first frame is given, which is different from the value for the second frame.  The Max thoughput averaged over 1 frame does currently not always match the number of allocated slots per frame and should consider the larger number of slots per frame. | | | | | | | | |
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| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.  **R4-2204004 Draft CR to TS 38.101-2 on corrections to UE maximum output power with additional requirements (R17\_CAT\_A)**  Editorial corrections to UE A-MPR requirements in 6.2.3.  **R4-2206065 Draft CR to 38.101-2: missing image location for CA IBE (cat. A)**  Replicate image location detail in the IBE requirement from the single CC case to CA case.  **R4-2203610 Correction to Rel-15 FR2 RMCs**  Correct Payload size for UL Pi/BPSK RMC.  Correct Number of Binary Channel Bits Per Slot values.  Correct max throughput per frame.  Update number of allocated slots per frame.  Add clarifying notes to DL RMC tables  **R4-2203612 Correction to Rel-16 FR2 RMCs**  Correct Number of Binary Channel Bits Per Slot values.  Correct max throughput per frame.  Update number of allocated slots per frame.  Add clarifying notes to DL RMC tables | | | | | | | | |
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| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are copied below.  **R4-2204004 Draft CR to TS 38.101-2 on corrections to UE maximum output power with additional requirements (R17\_CAT\_A)**  The errors in 6.2.3 for UE maximum output power with additional requirements will remain.  **R4-2206065 Draft CR to 38.101-2: missing image location for CA IBE (cat. A)**  Image location remains ambigious for CA cases.  **R4-2203610 Correction to Rel-15 FR2 RMCs**  Wrong values remain in the spec.  **R4-2203612 Correction to Rel-16 FR2 RMCs**  Wrong values remain in the spec. | | | | | | | | |
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| ***Clauses affected:*** | | 6.2.3.1, 6.2.3.2.3, 6.2.3.4.2, 6.2.3.4.3, 6.2.3.4.4, 6.4A.2.3, A.2.3.1, A.3.3.2, A.3.3.4, A.3.3.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-2 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## << Start of change1 >>

### 6.2.3 UE maximum output power with additional requirements

#### 6.2.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band (the IE field *freqBandIndicatorNR*) and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements.

To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in clause 6.2.1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

Table 6.2.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2.3.1-2. Unless otherwise stated, the allowed total back off is maximum of A-MPR and MPR specified in clause 6.2.2.

Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network Signalling label | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources Blocks (*N*RB) | A-MPR (dB) |
| NS\_200 |  |  |  |  | N/A |
| NS\_201  (NOTE 1) | 6.5.3.2.2 | n258 |  |  | 6.2.3.2 |
| NS\_202 | 6.5.3.2.3 | n257, n258 | 50, 100, 200, 400 | Table 5.3.2-1 | 6.2.3.3 |
| NS\_203 | 6.5.3.2.4 | n258 | 50, 100, 200, 400 | Table 5.3.2-1 | 6.2.3.4 |
| NOTE 1: NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable. | | | | | |

Table 6.2.3.1-2: Mapping of Network Signalling label

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band | Value of *additionalSpectrumEmission*  (NOTE 1) | | | | | | | |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| n257 | NS\_200 | NS\_202 |  |  |  |  |  |  |
| n258 | NS\_200 | NS\_201  (NOTE 2) | NS\_202 | NS\_203 |  |  |  |  |
| n259 | NS\_200 |  |  |  |  |  |  |  |
| n260 | NS\_200 |  |  |  |  |  |  |  |
| n261 | NS\_200 |  |  |  |  |  |  |  |
| NOTE 1: *additionalSpectrumEmission* corresponds to an information element of the same name defined in sub-clause 6.3.2 of TS 38.331 [13].  NOTE 2: NS\_201 is obsolete, the associated additional spurious emission requirements are not applicable. | | | | | | | | |

#### 6.2.3.2 Void

##### 6.2.3.2.1 Void

Table 6.2.3.2.1-1: (Void)

##### 6.2.3.2.2 Void

Table 6.2.3.2.2-1: (Void)

##### 6.2.3.2.3 Void

Table 6.2.3.2.3-1: (Void)

##### 6.2.3.2.4 Void

##### 6.2.3.2.5 Void

#### 6.2.3.3 A-MPR for NS\_202

##### 6.2.3.3.1 A-MPR for NS\_202 for power class 1

For power class 1, A-MPR for NS\_202 shall be 11.0 dB.

##### 6.2.3.3.2 A-MPR for NS\_202 for power class 2

For power class 2, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.3 A-MPR for NS\_202 for power class 3

For power class 3, A-MPR for NS\_202 shall be 1.0 dB.

##### 6.2.3.3.4 A-MPR for NS\_202 for power class 4

For power class 4, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

##### 6.2.3.3.5 A-MPR for NS\_202 for power class 5

For power class 5, A-MPR for NS\_202 specified in clause 6.2.3.3.3 applies.

#### 6.2.3.4 A-MPR for NS\_203

##### 6.2.3.4.1 A-MPR for NS\_203 for power class 1

For power class 1, A-MPR for NS\_203 shall be 3.0 dB if Offset frequency < BWchannel, 0.0 dB otherwise.   
The Offset frequency is defined as the frequency from 24.25 GHz to the lower edge of the channel bandwidth.

##### 6.2.3.4.2 A-MPR for NS\_203 for power class 2

For power class 2, A-MPR for NS\_203 specified in subclause 6.2.3.4.3 applies.

##### 6.2.3.4.3 A-MPR for NS\_203 for power class 3

For power class 3, A-MPR for NS\_203 shall be 0 dB.

##### 6.2.3.4.4 A-MPR for NS\_203 for power class 4

For power class 4, A-MPR for NS\_203 specified in subclause 6.2.3.4.3 applies.

##### 6.2.3.4.5 A-MPR for NS\_203 for power class 5

For power class 5, A-MPR for NS\_203 specified in subclause 6.2.3.4.3 applies.

## << End of change1>>

## << Start of change2 >>

#### 6.4A.2.3 Inband emissions

##### 6.4A.2.3.1 General

Inband emission requirement is defined over the spectrum occupied by all configured UL and DL CCs. The measurement interval is as defined in clause 6.4.2.4. The requirement is verified with the test metric of In-band emission (Link=TX beam peak direction, Meas=Link angle).

For intra-band contiguous carrier aggregation, the requirements in this clause apply with all component carriers active and with one single contiguous PRB allocation in one of uplink component carriers. The inband emission is defined as the interference falling into the non-allocated resource blocks for all component carriers.

##### 6.4A.2.3.2 Inband emissions for power class 1

The average of the in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4A.2.3.2-1 for power class 1 UEs.

Table 6.4A.2.3.2-1: Requirements for in-band emissions for power class 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | | Applicable Frequencies |
| General | dB |  | | Any non-allocated RB in allocated component carrier and not allocated component carriers  (NOTE 2) |
| IQ Image | dB | -25 | Output power > 27 dBm | Image frequencies (NOTES 2, 3) |
| -20 | Output power ≤ 27 dBm |
| Carrier leakage | dBc | -25 | Output power > 17 dBm | Carrier frequency (NOTES 4, 5) |
| -20 | 4 dBm ≤ Output power ≤ 17 dBm |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of (- 25 dB) and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. is defined in NOTE 9.  NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Pi/2 BPSK with Spectrum Shaping, the limit is expressed as a ratio of measured power in one non-allocated RB to the measured power in the allocated RB with highest PSD.  NOTE 3: Image frequencies for UL CA are specified in relation to either UL or DL carrier frequency. The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the ~~carrier frequency~~ reported DC location position, but excluding any allocated RBs.  NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.  NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency, or in the two RBs immediately adjacent to the DC frequency but excluding any allocated RB.  NOTE 6: is the Transmission Bandwidth for kth allocated component carrier (see Figure 5.3.3-1).  NOTE 7: EVM s the limit for the modulation format used in the allocated RBs.  NOTE 8: is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. = 1 or = -1 for the first adjacent RB outside of the allocated bandwidth), and may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.  NOTE 9: is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm  NOTE 10: All powers are EIRP in beam peak direction. | | | | |

##### 6.4A.2.3.3 Inband emissions for power class 2

The average of the in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4A.2.3.3-1 for power class 2.

Table 6.4A.2.3.3-1: Requirements for in-band emissions for power class 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | | Applicable Frequencies |
| General | dB |  | | Any non-allocated RB in allocated component carrier and not allocated component carriers  (NOTE 2) |
| IQ Image | dB | -25 | Output power > 16 dBm | Image frequencies (NOTES 2, 3) |
| -20 | Output power ≤ 16 dBm |
| Carrier leakage | dBc | -25 | Output power > 6 dBm | Carrier frequency (NOTES 4, 5) |
| -20 | -13 dBm ≤ Output power ≤ 6 dBm |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of (- 25 dB) and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. is defined in NOTE 9.  NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Pi/2 BPSK with Spectrum Shaping, the limit is expressed as a ratio of measured power in one non-allocated RB to the measured power in the allocated RB with highest PSD.  NOTE 3: Image frequencies for UL CA are specified in relation to either UL or DL carrier frequency. The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the reported DC location position, but excluding any allocated RBs.  NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.  NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency, or in the two RBs immediately adjacent to the DC frequency but excluding any allocated RB.  NOTE 6: is the Transmission Bandwidth for kth allocated component carrier (see Figure 5.3.3-1).  NOTE 7: EVM s the limit for the modulation format used in the allocated RBs.  NOTE 8: is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. = 1 or = -1 for the first adjacent RB outside of the allocated bandwidth), and may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.  NOTE 9: is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm  NOTE 10: All powers are EIRP in beam peak direction. | | | | |

##### 6.4A.2.3.4 Inband emissions for power class 3

The average of the in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4A.2.3.4-1 for power class 3 UEs.

Table 6.4A.2.3.4-1: Requirements for in-band emissions for power class 3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | | Applicable Frequencies |
| General | dB |  | | Any non-allocated RB in allocated component carrier and not allocated component carriers  (NOTE 2) |
| IQ Image | dB | -25 | Output power > 10 dBm | Image frequencies (NOTES 2, 3) |
| -20 | Output power ≤ 10 dBm |
| Carrier leakage | dBc | -25 | Output power > 0 dBm | Carrier frequency (NOTES 4, 5) |
| -20 | -13 dBm ≤ Output power ≤ 0 dBm |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of (- 25 dB) and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. is defined in NOTE 9.  NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For Pi/2 BPSK with Spectrum Shaping, the limit is expressed as a ratio of measured power in one non-allocated RB to the measured power in the allocated RB with highest PSD.  NOTE 3: Image frequencies for UL CA are specified in relation to either UL or DL carrier frequency. The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the reported DC location position, but excluding any allocated RBs.  NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.  NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency, or in the two RBs immediately adjacent to the DC frequency but excluding any allocated RB.  NOTE 6: is the Transmission Bandwidth for kth allocated component carrier (see Figure 5.3.3-1).  NOTE 7: EVM s the limit for the modulation format used in the allocated RBs.  NOTE 8: is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. = 1 or = -1 for the first adjacent RB outside of the allocated bandwidth), and may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.  NOTE 9: is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm  NOTE 10: All powers are EIRP in beam peak direction. | | | | |

##### 6.4A.2.3.5 Inband emissions for power class 4

The average of the in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4A.2.3.5-1 for power class 4 UEs.

Table 6.4A.2.3.5-1: Requirements for in-band emissions for power class 4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | | Applicable Frequencies |
| General | dB |  | | Any non-allocated RB in allocated component carrier and not allocated component carriers  (NOTE 2) |
| IQ Image | dB | -25 | Output power > 21 dBm | Image frequencies (NOTES 2, 3) |
| -20 | Output power ≤ 21 dBm |
| Carrier leakage | dBc | -25 | Output power > 11 dBm | Carrier frequency (NOTES 4, 5) |
| -20 | -13 dBm ≤ Output power ≤ 11 dBm |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of (- 25 dB) and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. is defined in NOTE 9.  NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For pi/2 BPSK with Spectrum Shaping, the limit is expressed as a ratio of measured power in one non-allocated RB to the measured power in the allocated RB with highest PSD.  NOTE 3: Image frequencies for UL CA are specified in relation to either UL or DL carrier frequency. The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the reported DC location position, but excluding any allocated RBs.  NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.  NOTE 5: The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency, or in the two RBs immediately adjacent to the DC frequency but excluding any allocated RB.  NOTE 6: is the Transmission Bandwidth for kth allocated component carrier (see Figure 5.3.3-1).  NOTE 7: EVM s the limit for the modulation format used in the allocated RBs.  NOTE 8: is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. = 1 or = -1 for the first adjacent RB outside of the allocated bandwidth), and may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.  NOTE 9: is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm  NOTE 10: All powers are EIRP in beam peak direction. | | | | |

## << End of change2>>

## << Start of change3 >>

### A.2.3.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.3.1-1: Reference Channels for DFT-s-OFDM pi/2-BPSK

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | pi/2 BPSK | 0 | 24 | 16 | 2 | 1 | 132 | 132 |
|  | 16 | 11 | pi/2 BPSK | 0 | 504 | 16 | 2 | 1 | 2112 | 2112 |
|  | 32 | 11 | pi/2 BPSK | 0 | 1032 | 16 | 2 | 1 | 4224 | 4224 |
|  | 64 | 11 | pi/2 BPSK | 0 | 2024 | 16 | 2 | 1 | 8448 | 8448 |
|  | 128 | 11 | pi/2 BPSK | 0 | 3976 | 24 | 2 | 2 | 16896 | 16896 |
|  | 256 | 11 | pi/2 BPSK | 0 | 7944 | 24 | 2 | 3 | 33792 | 33792 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in 38.214.  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: Indexes of active UL slots are given by Table A.2.3-1 with TDD UL-DL configuration specified in A2.3 for the requirements requiring at least one sub frame (1ms) for the measurement period. For other requirements, indexes of active UL slots are given by the slots satisfying mod(slot index+1, 5) = 0 with TDD UL-DL configuration specified in A.3.3.1.  NOTE 5: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.3.1-2: Void

**< Unchanged sections omitted >**

#### A.3.3.2 FRC for receiver requirements for QPSK

Table A.3.3.2-1 Fixed Reference Channel for Receiver Requirements (SCS 60 kHz, TDD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Channel bandwidth | MHz | 50 | 100 | 200 |
| Subcarrier spacing configuration |  | 2 | 2 | 2 |
| Allocated resource blocks |  | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 7) |  | 23 /24 | 23 / 24 | 23 / 24 |
| MCS index |  | 4 | 4 | 4 |
| Modulation |  | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} (NOTE 5) | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} (NOTE 6) | Bits | 4224 | 8456 | 16896 |
| Transport block CRC | Bits | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} (NOTE 5) | CBs | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} (NOTE 6) | CBs | 1 | 2 | 2 |
| Binary Channel Bits Per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} (NOTE 5) | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} (NOTE 6) | Bits | 14256 | 28512 | 57024 |
| Max. Throughput averaged over 1 frame (NOTE 8) | Mbps | 10.138 | 20.294 | 40.550 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 with periodicity 20 ms  NOTE 4: Slot i is slot index per 2 frames  NOTE 5: When this DL RMC used together with the UL RMC for the transmitter requirements requiring at least one sub frame (1ms) for the measurement period, Slot i, if mod(i, 8) = {3,4,5,6,7} for i from {0,…,79} together with the TDD UL-DL configuration specified in A2.3.  NOTE 6: When this DL RMC used together with the UL RMC for the transmitter requirements requiring at least one sub frame (1ms) for the measurement period, Slot i, if mod(i, 8) = {0,1,2} for i from {0,…,79} together with the TDD UL-DL configuration specified in A2.3.  NOTE 7: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 8: Throughput is averaged over 2nd frame of RMC. | | | | |

Table A.3.3.2-2 Fixed Reference Channel for Receiver Requirements (SCS 120 kHz, TDD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| Channel bandwidth | MHz | 50 | 100 | 200 | 400 |
| Subcarrier spacing configuration |  | 3 | 3 | 3 | 3 |
| Allocated resource blocks |  | 32 | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 7) |  | 47 / 48 | 47 / 48 | 47 / 48 | 47 / 48 |
| MCS index |  | 4 | 4 | 4 | 4 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 1/3 | 1/3 | 1/3 | 1/3 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} (NOTE 5) | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} (NOTE 6) | Bits | 2088 | 4224 | 8456 | 16896 |
| Transport block CRC | Bits | 16 | 24 | 24 | 24 |
| LDPC base graph |  | 2 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} (NOTE 5) | CBs | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} (NOTE 6) | CBs | 1 | 1 | 2 | 2 |
| Binary Channel Bits Per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} (NOTE 5) | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} (NOTE 6) | Bits | 6912 | 14256 | 28512 | 57024 |
| Max. Throughput averaged over 1 frame (NOTE 8) | Mbps | 10.022 | 20.275 | 40.589 | 81.101 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 with periodicity 20 ms  NOTE 4: Slot i is slot index per 2 frames  NOTE 5: When this DL RMC used together with the UL RMC for the transmitter requirements requiring at least one sub frame (1ms) for the measurement period, Slot i, if mod(i, 16) = {7,…,15} for i from {0,…,159} together with the TDD UL-DL configuration specified in A2.3.  NOTE 6: When this DL RMC used together with the UL RMC for the transmitter requirements requiring at least one sub frame (1ms) for the measurement period, Slot i, if mod(i, 16) = {0,…,6} for i from {0,…,159} together with the TDD UL-DL configuration specified in A2.3.  NOTE 7: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 8: Throughput is averaged over 2nd frame of RMC. | | | | | |

#### A.3.3.3 FRC for receiver requirements for 16QAM

#### A.3.3.4 FRC for receiver requirements for 64QAM

Table A.3.3.4-1 Fixed Reference Channel for Receiver Requirements (SCS 60 kHz, TDD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Channel bandwidth | MHz | 50 | 100 | 200 |
| Subcarrier spacing configuration |  | 2 | 2 | 2 |
| Allocated resource blocks |  | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 6) |  | 23 / 24 | 23 / 24 | 23 / 24 |
| MCS index |  | 19 | 19 | 19 |
| Modulation |  | 64QAM | 64QAM | 64QAM |
| Target Coding Rate |  | 1/2 | 1/2 | 1/2 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | Bits | 20496 | 40976 | 81976 |
| Transport block CRC | Bits | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |
| For Slot i, if mod(i, 10) = {0,1,2} for i from {1,…,79} | CBs | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | CBs | 3 | 5 | 10 |
| Binary Channel Bits Per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | Bits | 40392 | 80784 | 161568 |
| Max. Throughput averaged over 1 frame (NOTE 7) | Mbps | 49.190 | 98.343 | 196.742 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 with periodicity 20 ms  NOTE 4: Slot i is slot index per 2 frames  NOTE 5: PTRS is configured on symbols containing PDSCH with 1 port, per 2PRB in frequency domain, per symbol in time domain. Overhead for TBS calculation is assumed to be 6.  NOTE 6: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 7: Throughput is averaged over 2nd frame of RMC. | | | | |

Table A.3.3.4-2 Fixed Reference Channel for Receiver Requirements (SCS 120 kHz, TDD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| Channel bandwidth | MHz | 50 | 100 | 200 | 400 |
| Subcarrier spacing configuration |  | 3 | 3 | 3 | 3 |
| Allocated resource blocks |  | 32 | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 6) |  | 47 / 48 | 47 / 48 | 47 / 48 | 47 / 48 |
| MCS index |  | 19 | 19 | 19 | 19 |
| Modulation |  | 64QAM | 64QAM | 64QAM | 64QAM |
| Target Coding Rate |  | 1/2 | 1/2 | 1/2 | 1/2 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | Bits | 9992 | 20496 | 40976 | 81976 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | CBs | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | CBs | 2 | 3 | 5 | 10 |
| Binary Channel Bits Per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | Bits | 19584 | 40392 | 80784 | 161568 |
| Max. Throughput averaged over 1 frame (NOTE 7) | Mbps | 47.962 | 98.381 | 196.685 | 393.485 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame  NOTE 4: Slot i is slot index per frame  NOTE 5: PTRS is configured on symbols containing PDSCH with 1 port, per 2PRB in frequency domain, per symbol in time domain. Overhead for TBS calculation is assumed to be 6.  NOTE 6: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 7: Throughput is averaged over 2nd frame of RMC. | | | | | |

## << End of change3 >>

## << Start of change4 >>

#### A.3.3.5 FRC for receiver requirements for 256QAM

Table A.3.3.5-1 Fixed Reference Channel for Receiver Requirements (SCS 60 kHz, TDD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | |
| Channel bandwidth | MHz | 50 | 100 | 200 |
| Subcarrier spacing configuration |  | 2 | 2 | 2 |
| Allocated resource blocks |  | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 6) |  | 23 / 24 | 23 / 24 | 23 / 24 |
| MCS index |  | 24 | 24 | 24 |
| Modulation |  | 256QAM | 256QAM | 256QAM |
| Target Coding Rate |  | 4/5 | 4/5 | 4/5 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | Bits | 44040 | 88064 | 176208 |
| Transport block CRC | Bits | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} | CBs | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | CBs | 6 | 11 | 21 |
| Binary Channel Bits Per Slot |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,79} | Bits | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,79} | Bits | 53856 | 107712 | 215424 |
| Max. Throughput averaged over 1 frame (NOTE 7) | Mbps | 105.696 | 211.354 | 422.899 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame  NOTE 4: Slot i is slot index per 2 frames  NOTE 5: PTRS is configured on symbols containing PDSCH with 1 port, per 2PRB in frequency domain, per symbol in time domain. Overhead for TBS calculation is assumed to be 6.  NOTE 6: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 7: Throughput is averaged over 2nd frame of RMC. | | | | |

Table A.3.3.5-2 Fixed Reference Channel for Receiver Requirements (SCS 120 kHz, TDD)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | |
| Channel bandwidth | MHz | 50 | 100 | 200 | 400 |
| Subcarrier spacing configuration |  | 3 | 3 | 3 | 3 |
| Allocated resource blocks |  | 32 | 66 | 132 | 264 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 |
| Allocated slots per Frame (NOTE 6) |  | 47 / 48 | 47 / 48 | 47 / 48 | 47 / 48 |
| MCS index |  | 24 | 24 | 24 | 24 |
| Modulation |  | 256QAM | 256QAM | 256QAM | 256QAM |
| Target Coding Rate |  | 4/5 | 4/5 | 4/5 | 4/5 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | Bits | 21504 | 44040 | 88064 | 176208 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | CBs | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | CBs | 3 | 6 | 11 | 21 |
| Binary Channel Bits Per Slot |  |  |  |  |  |
| For Slots 0 and Slot i, if mod(i, 5) = {3,4} for i from {0,…,159} | Bits | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,159} | Bits | 26112 | 53856 | 107712 | 215424 |
| Max. Throughput averaged over 1 frame (NOTE 7) | Mbps | 103.219 | 211.392 | 422.707 | 845.798 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.  NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame  NOTE 4: Slot i is slot index per 2 frames  NOTE 5: PTRS is configured on symbols containing PDSCH with 1 port, per 2PRB in frequency domain, per symbol in time domain. Overhead for TBS calculation is assumed to be 6.  NOTE 6: First number corresponds to the number slots allocated in the first frame of the RMC; second number corresponds to the number slots allocated in the second frame of the RMC.  NOTE 7: Throughput is averaged over 2nd frame of RMC. | | | | | |

## << End of change4>>