**3GPP TSG-RAN WG4 Meeting #104bis-e *R4-2217317***

**Electronic Meeting, October 10-19, 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-5** | **CR** | **0007** | **rev** | **1** | **Current version:** | **17.1.0** |  |
|  | | | | | | | | |
| *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:*** | CR to 38.101-5 on corrections related to 64QAM requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_solutions-Core | | | | |  | ***Date:*** | | | 2022-10-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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:*** | | During the RAN4 #101bis meeting an agreement was reached to “Include 64QAM (DL and UL ) for NTN satellite UE as optional feature with granularity [per UE]” [R4-2203036]. Since the NTN UE RF specification (38.101-5) refers to the terrestrial UE RF specificatoin (38.101-1) for transmit modulation quality and max input level requirements, it is necessary to reflect the optionality of 64QAM in the specification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Clarify the following requirements:  - Explicitly list which modulations are applicable to the NTN transmission modulation quality requirement  - Correct the optional applicability of the 64 QAM RMC to the maximum input level requirement and introduce a placeholder reference to the 16 QAM RMC  - Introduce a new RMC table for 16QAM (SCS 15 kHz, FDD) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The modulation applicability of the transmit modulation quality requirement is not aligned with the NTN UE modulation capabilities.  The max input level RMC is not aligned with the NTN UE modulation capabilities. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.4.2, 7.4, A.3.2.X (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.521-5 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<< start of change 1 >>

## 6.4 Transmit signal quality

### 6.4.1 Frequency error

The NTN satellite UE basic measurement interval of modulated carrier frequency is 1 UL slot. The NTN satellite UE pre-compensates the uplink modulated carrier frequency by the estimated Doppler shift according to 3GPP TS 38.300 [9] clause 16.14.2. The mean value of basic measurements of NTN UE modulated carrier frequency shall be accurate to within ± 0.1 PPM observed over a period of 1 ms of cumulated measurement intervals compared to ideally pre-compensated reference uplink carrier frequency.

[NOTE: The ideally pre-compensated reference uplink carrier frequency consists of the UL carrier frequency signalled to the UE by SAN and UL pre-compensated Doppler frequency shift. For the test case, the location of the UE is explicitly provided to the UE from the test equipment.]

Requirement will be verified for at least two cases of which one has zero Doppler conditions.

### 6.4.2 Transmit modulation quality

The requirements for transmit modulation quality defined in 3GPP TS 38.101-1 [5] clause 6.4.2 shall apply for NTN satellite UE for the following modulations: QPSK, 16QAM, and, if supported by the UE, 64QAM.

<< end of change 1 >>

<< start of change 2 >>

## 7.4 Maximum input level

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel. The throughput shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in 3GPP TS 38.101-1 [5] Annexes A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in 3GPP TS 38.101-1 [5] Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4-1.

Table 7.4-1: Maximum input level

|  |  |  |
| --- | --- | --- |
| **Rx Parameter** | **Units** | **Channel bandwidth (MHz)** |
| **5, 10, 15, 20** |
| Power in Transmission Bandwidth Configuration3 | dBm | -402 |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum uplink configuration specified in Table 7.3.2-2 with PCMAX\_L,f,c as defined in clause 6.2.4.  NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 in TS38.101-1 [5] for 64 QAM if 64 QAM is supported by the UE or A.3.2.X for 16 QAM otherwise.  NOTE 3: Power in transmission bandwidth configuration value is rounded to the nearest 0.5dB value. | | |

<< end of change 2 >>

<< start of change 3 >>

### A.3.2.X FRC for maximum input level for 16QAM

Table A.3.2.X-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 64QAM)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | | | | |
| Channel bandwidth | MHz | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Subcarrier spacing configuration |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Allocated resource blocks |  | 25 | 52 | 79 | 106 | 133 | 160 | 216 | 270 |
| Subcarriers per resource block |  | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per Frame |  | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| MCS Index |  | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| MCS Table for TBS determination | 64QAM | | | | | | | | |
| Modulation |  | 16 QAM | 16 QAM | 16 QAM | 16 QAM | 16 QAM | 16 QAM | 16 QAM | 16 QAM |
| Target Coding Rate |  | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Information Bit Payload per Slot |  |  |  |  |  |  |  |  |  |
| For Slots 0,1 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| For Slots 2,3,4,5,6,7,8,9 | Bits | 5120 | 10760 | 16392 | 22032 | 27656 | 32776 | 45096 | 55304 |
| Transport block CRC | Bits | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| LDPC base graph |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |  |  |  |
| For Slot 0,1 | CBs | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| For Slots 2,3,4,5,6,7,8,9 | CBs | 2 | 4 | 5 | 7 | 8 | 10 | 13 | 16 |
| Binary Channel Bits per Slot |  |  |  |  |  |  |  |  |  |
| For Slot 0,1 | Bits | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| For Slots 2,3,4,5,6,7,8,9 | Bits | 10800 | 22464 | 34128 | 45792 | 57456 | 69120 | 93312 | 116640 |
| Max. Throughput averaged over 1 frame | Mbps | 4.096 | 8.608 | 13.114 | 17.626 | 22.125 | 26.221 | 36.077 | 44.243 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1 of TS38.101-1 [5].  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 | | | | | | | | | |

<< end of change 3 >>