**3GPP TSG- Meeting #**

**, Netherlands, - , Aug, 2024**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network | **X** | Core Network |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | CR on performance requirements for PUCCH format 2 for TS 38.141-2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_FR1\_lessthan\_5MHz\_BW-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The performance part of NR FR1 less than 5MHz BW was completed in RAN4#111 meeting, the big CR has been implemented into the spec. However, some change of CR R4-2409845 is not implemented in current spec. There is a misalignment between spec 38141-2 Rel18 and CR in R4-2409845 in Table 8.3.3.2.5.1-1. Resubmit the CR R4-2409845 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Add new column for requirement of PUCCH format 2 with 3MHz * Add the AWGN power level setting for 5MHz in Table 8.3.3.2.4.2-2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The PUCCH with less than 5MHz can not be verified well | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.3.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

Table 8.3.3.2.4.2-2: AWGN power level at the BS input

|  |  |  |  |
| --- | --- | --- | --- |
| BS type | Sub-carrier spacing  (kHz) | Channel bandwidth  (MHz) | AWGN power level |
| BS type 1-O (Note 4) | 15 kHz | 3 | -88.7-ΔOTAREFSENS dBm /2.7 MHz |
| 5 | -83.5 - ΔOTAREFSENS dBm / 4.5MHz |
|  |  | 10 | -80.3 - ΔOTAREFSENS dBm / 9.36 MHz |
|  |  | 20 | -77.2 -ΔOTAREFSENS dBm / 19.08 MHz |
|  | 30 kHz | 10 | -80.6 - ΔOTAREFSENS dBm / 8.64 MHz |
|  |  | 20 | -77.4 - ΔOTAREFSENS dBm / 18.36 MHz |
|  |  | 40 | -74.2 - ΔOTAREFSENS dBm / 38.16 MHz |
|  |  | 100 | -70.1 - ΔOTAREFSENS dBm / 98.28 MHz |
| BS type 2-O (Note 5) | 60 kHz | 50 | EISREFSENS\_50M + ΔFR2\_REFSENS + 15 dBm / 47.52MHz |
|  |  | 100 | EISREFSENS\_50M + ΔFR2\_REFSENS + 18 dBm / 95.04 MHz |
|  | 120 kHz | 50 | EISREFSENS\_50M + ΔFR2\_REFSENS + 15 dBm / 46.08 MHz |
|  |  | 100 | EISREFSENS\_50M + ΔFR2\_REFSENS + 18 dBm / 95.04 MHz |
|  |  | 200 | EISREFSENS\_50M + ΔFR2\_REFSENS + 21 dBm / 190.08 MHz |
|  |  | 400 | EISREFSENS\_50M + ΔFR2\_REFSENS + 24 dBm / 380.16 MHz |
|  | 480 kHz | 400 | EISREFSENS\_50M + ΔFR2\_REFSENS + 24 dBm / 380.16 MHz |
| NOTE 1: ΔOTAREFSENS as declared in D.53 in table 4.6-1 and clause 7.1.  NOTE 2: ΔFR2\_REFSENS = -3 dB as declared in clause 7.1.  NOTE 3: EISREFSENS\_50M as declared in D.28 in table 4.6-1.  NOTE 4: The AWGN power level contains an AWGN offset of 16dB by default. If needed for test purposes, the AWGN level can be reduced from the default by any value in the range 0dB to 16dB. Changing the AWGN level does not impact the validity of the test, as it reduces the effective base band SNR level.  NOTE 5: The AWGN power level contains an AWGN offset of 15dB by default. If needed for test purposes, the AWGN level can be reduced from the default by any value in the range 0dB to 15dB. Changing the AWGN level does not impact the validity of the test, as it reduces the effective base band SNR level. | | | |

8) The signal generator sends a test pattern with the pattern outlined in figure 8.3.3.2.4.2-1. The following statistics are kept: the number of incorrectly decoded UCI.



Figure 8.3.3.2.4.2-1: Test signal pattern for PUCCH format 2 demodulation tests

##### 8.3.3.2.5 Test requirement

8.3.3.2.5.1 Requirements for BS type 1-O

The fraction of incorrectly decoded UCI is shall be less than 1% for the SNR listed in table 8.3.3.2.5.1-1 and table 8.3.3.2.5.1-2.

Table 8.3.3.2.5.1-1: Required SNR for PUCCH format 2 with 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of | Number of | Cyclic | Propagation | Channel bandwidth / SNR (dB) | | | |
| TX antennas | demodulation branches | Prefix | conditions and correlation matrix (annex J) | 3 MHz | 5 MHz | 10 MHz | 20 MHz |
| 1 | 2 | Normal | TDLC300-100 Low | 2.1 | 0.8 | 1.4 | 1.8 |

Table 8.3.3.2.5.1-2: Required SNR for PUCCH format 2 with 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of | Number of | Cyclic | Propagation | Channel bandwidth/ SNR (dB) | | | |
| TX antennas | demodulation branches | Prefix | conditions and correlation matrix (annex J) | 10MHz | 20 MHz | 40MHz | 100MHz |
| 1 | 2 | Normal | TDLC300-100 Low | 1.1 | 1.7 | 1.0 | 0.9 |

8.3.3.2.5.2 Requirements for *BS type 2-O*

The fraction of incorrectly decoded UCI is shall be less than 1% for the SNR listed in table 8.3.3.2.5.2-1 to table 8.3.3.2.5.2-4.

Table 8.3.3.2.5.2-1: Required SNR for PUCCH format 2 with 60 kHz SCS in FR2-1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of | Number of | Cyclic | Propagation | Channel bandwidth / SNR (dB) | |
| TX antennas | demodulation branches | Prefix | conditions and correlation matrix (annex J) | 50 MHz | 100 MHz |
| 1 | 2 | Normal | TDLA30-300 Low | 3.2 | 1.7 |

Table 8.3.3.2.5.2-2: Required SNR for PUCCH format 2 with 120 kHz SCS in FR2-1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of | Number of | Cyclic | Propagation | Channel bandwidth / SNR (dB) | | |
| TX antennas | demodulation branches | Prefix | conditions and correlation matrix (annex J) | 50 MHz | 100 MHz | 200 MHz |
| 1 | 2 | Normal | TDLA30-300 Low | 1.8 | 1.8 | 1.7 |

Table 8.3.3.2.5.2-3: Required SNR for PUCCH format 2 and 120 kHz SCS in FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of TX | Number of demodulation | Cyclic Prefix | Propagation conditions and correlation matrix (annex J) | Channel bandwidth / SNR (dB) |
| antennas | branches |  |  | 100 MHz |
| 1 | 2 | Normal | TDLA30-650 Low | 2.7 |

Table 8.3.3.2.5.2-4: Required SNR for PUCCH format 2 and 480 kHz SCS in FR2-2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of TX | Number of demodulation | Cyclic Prefix | Propagation conditions and correlation matrix (annex J) | Channel bandwidth / SNR (dB) |
| antennas | branches |  |  | 400 MHz |
| 1 | 2 | Normal | TDLA10-650 Low | 3.2 |

<End of Change 1>