**3GPP TSG-RAN WG4 Meeting #** **104-eR4-** **2214859**

**Electronic Meeting, August 15 – August 26, 2022**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | **draft** | **rev** | **-** | **Current version:** | **17.5.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Draft CR to TS38.101-4, addition of PDCCH requirements for RedCap UEs | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MediaTek | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_redcap-Perf | | | | |  | ***Date:*** | | | 2022-08-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***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:*** | | The PDCCH requirements for RedCap UEs were agreed to be defined. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add PDCCH requirements for RedCap UEs.   1. Adding new section 5.1.1.1 for 1Rx requirements, including full-duplex FDD and half-duplex FDD. 2. Adding new 5.3.1.2.4 and 5.3.2.2.4 for 2Rx requirements for FDD and TDD respectively. 3. Introducing REG bundle size 2 for TDD in section 5.3.2.2. 4. Adding new reference channel for RedCap TDD due to 20 MHz BW | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | PDCCH requirements for RedCap UEs are missing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | New sections 5.3.1.1, 5.3.1.2.4, 5.3.2.2.4  Sections, 5.3.2.2 and A.3.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS38.521-4 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**START OF CHANGE 1**

<SKIP UNCHANGED PART>

5.3.1 1RX requirements

5.3.1.1 FDD

The parameters specified in Table 5.3.2.1-1 are valid for all FDD tests unless otherwise stated.

**Table 5.3.1.1-1: Test Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** |  |
| CCE to REG mapping type |  | nonInterleaved |
| REG bundle size |  | 6 |
| Shift index |  | 0 |

5.3.1.1.1 Minimum requirements for RedCap

For the parameters specified in Table 5.3.1.1-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 5.3.1.1.1-1. The downlink physical setup is in accordance with Annex C.3.1.

**Table 5.3.1.1.1-1: Minimum performance for UE supporting full-duplex FDD or half-duplex FDD**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNR (dB)** |
| 1 | 10 | 48 | 1 | 8 | R.PDCCH. 1-1.3 FDD | TDLA30-10 | 2x1 Low | 1 | [5.7] |

5.3.1.2 TDD

The parameters specified in Table 5.3.1.2-1 are valid for all TDD tests unless otherwise stated.

**Table 5.3.1.2-1: Test Parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** |  |
| TDD UL-DL pattern |  | FR1.30-1 |
| CCE to REG mapping type |  | interleaved |
| Interleaver size |  | 3 |
| REG bundle size |  | 2 |
| Shift Index |  | 0 |

5.3.1.2.1 Minimum requirements for RedCap

For the parameters specified in Table 5.3.1.2-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 5.3.1.2.1-1. The downlink physical setup is in accordance with Annex C.3.1.

**Table 5.3.1.2.1-1: Minimum performance for PDCCH with 30 kHz SCS**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNR (dB)** |
| 1 | 20 | 48 | 1 | 4 | R.PDCCH. 2-1.5 TDD | TDLC300-100 | 1x1 | 1 | [TBD] |

**END OF CHANGE 1**

**START OF CHANGE 2**

<SKIP UNCHANGED PART>

5.3.2.1.4 Minimum requirements for RedCap

For the parameters specified in Table 5.3.2.1-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 5.3.2.1.4-1. The downlink physical setup is in accordance with Annex C.3.1.

**Table 5.3.2.1.4-1: Minimum performance for PDCCH with 15 kHz SCS**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNR (dB)** |
| 1 | 10 | 48 | 2 | 4 | R.PDCCH. 1-2.4 FDD | TDLA30-10 | 1x2 Low | 1 | 5.5 |
| 2 | 10 | 48 | 1 | 8 | R.PDCCH. 1-1.3 FDD | TDLA30-10 | 2x2 Low | 1 | -0.2 |

**END OF CHANGE 2**

**START OF CHANGE 3**

<SKIP UNCHANGED PART>

5.3.2.2 TDD

The parameters specified in Table 5.3.2.2-1 are valid for all TDD tests unless otherwise stated.

**Table 5.3.2.2-1: Test Parameters**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **1 Tx Antenna** | | | **2 Tx Antenna** |
| TDD UL-DL pattern |  | FR1.30-1 | | | |
| CCE to REG mapping type |  | Test 3: non-interleaved  Other tests: interleaved | | interleaved | |
| Interleaver size |  | 3 | | | |
| REG bundle size |  | Test 3: 6  Other tests: 2 | Test 1 in Table 5.3.2.2.2-1: 6  Other tests: 2 | | |
| Shift Index |  | 0 | | | |

**END OF CHANGE 3**

**START OF CHANGE 4**

<SKIP UNCHANGED PART>

5.3.2.2.4 Minimum requirements for RedCap

For the parameters specified in Table 5.3.2.2-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 5.3.2.2.4-1. The downlink physical setup is in accordance with Annex C.3.1.

**Table 5.3.2.2.4-1: Minimum performance for PDCCH with 30 kHz SCS**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test number** | **Bandwidth (MHz)** | **CORESET RB** | **CORESET duration** | **Aggregation level** | **Reference Channel** | **Propagation Condition** | **Antenna configuration and correlation Matrix** | **Reference value** | |
| **Pm-dsg (%)** | **SNR (dB)** |
| 1 | 20 | 48 | 1 | 2 | R.PDCCH. 2-1.5 TDD | TDLC300-100 | 1x2 Low | 1 | [3.2] |
| 2 | 20 | 48 | 1 | 4 | R.PDCCH. 2-1.6 TDD | TDLC300- 100 | 2x2 Low | 1 | [-0.3] |

**END OF CHANGE 4**

**START OF CHANGE 5**

<SKIP UNCHANGED PART>

A.3.3.2.2 Reference measurement channels for SCS 30 kHz FR1

**Table A.3.3.2.2-1: PDCCH Reference Channels (Time domain allocation 1 symbol)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | | |
| Reference channel |  | R.PDCCH.2-1.1 TDD | R.PDCCH.2-1.2 TDD | R.PDCCH.2-1.3 TDD | R.PDCCH.2-1.4 TDD | R.PDCCH.2-1.5 TDD | R.PDCCH.2-1.6 TDD |
| Subcarrier spacing | kHz | 30 | 30 | 30 | 30 | 30 | 30 |
| CORESET frequency domain allocation |  | 102 | 102 | 90 | 102 | 48 | 48 |
| CORESET time domain allocation |  | 1 | 1 | 1 | 1 | 1 | 1 |
| Aggregation level |  | 2 | 4 | 8 | 8 | 4 | 8 |
| DCI Format |  | 1\_0 | 1\_1 | 1\_1 | 2\_6 | 1\_1 | 1\_1 |
| Payload (without CRC) | Bits | 41 | 53 | 53 | 12 | 53 | 53 |

**END OF CHANGE 5**