**3GPP TSG-RAN4 Meeting # 111 *R4-2409885***

 **Fukuoka City, Fukuoka, Japan, 20th – 24th May 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-4** | **CR** | **Draft CR** | **rev** | **-** | **Current version:** | **18.3.0** |  |
|  |
| *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:***  | draft CR to 38.101-4: Introduction of FDD 2Rx PDSCH requirements for advanced receiver for MU-MIMO |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 2024-05-13 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* *Rel-20 (Release 20)* |
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| ***Reason for change:*** | Introducing the minimum requirements of FDD 2Rx for PDSCH with advanced receiver for MU-MIMO |
|  |  |
| ***Summary of change:*** | 1. Introduce the test purpose, test parameters and minimum requirement.
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|  |  |
| ***Consequences if not approved:*** | The minimum requirement of FDD 2Rx for PDSCH with advanced receiver for MU-MIMO is missing |
|  |  |
| ***Clauses affected:*** | 5.2.2.1.16 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **x** |  |  Test specifications | TS 38.521-4  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** | Resubmission of the endorsed draft CR |
|  |  |
| ***This CR's revision history:*** |  |

----------------------------------------------------- Beginning of Change 1------------------------------------------------------------

##### 5.2.2.1.16 Minimum requirements for PDSCH with intra cell inter user interference

The performance requirements are specified in Table 5.2.2.1.16-3, with the addition of test parameters in Table 5.2.2.1.16-2 and the downlink physical channel setup according to Annex C.3.1. The performance requirements for UE UE supporting Enhanced Receiver Type 2 are specified in Table 5.2.2.1.16-5, with the addition of test parameters in Tables 5.2.2.1.16-2, 5.2.2.1.16-4 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.1.16-1.

Table 5.2.2.1.16-1: Tests purpose

|  |  |
| --- | --- |
| Purpose | Test index |
| Verify the PDSCH performance under 2 receive antenna conditions when the PDSCH transmission of target UE is interfered by co-scheduled UE  | 1-1 |
| Verify PDSCH performance under 2 receive antenna conditions, when the PDSCH transmission of target UE is interfered by co-scheduled UE with Enhanced Receiver Type 2~~advanced receiver for MU-MIMO~~ when modulation order for co-scheduled UE is explicitly signaled by DCI. | 2-1 |
| Verify PDSCH performance under 2 receive antenna conditions, when the PDSCH transmission of target UE is interfered by co-scheduled UE with Enhanced Receiver Type 2~~advanced receiver for MU-MIMO~~ when modulation order for co-scheduled UE is detected. | 2-2 |

Table 5.2.2.1.16-2: Test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | Unit | Target UE | Co-scheduled UE |
| Duplex mode |  | FDD |
| Active DL BWP index |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| k0 |  | 0 |
| Starting symbol (S)  |  | 2 |
| Length (L) |  | 12 |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Antenna ports indexes |  | 1000 | 1001 |
| Number of PDSCH DMRS CDM group(s) without data |  | 1 | 1 |
| PDSCH & PDSCH DMRS Precoding configuration |  | Single Panel Type I, Randomized precoder selection for every PRB bundle and updated per slot, with equal probability of each applicable i1/i2 combination or codebookIndex, chosen from section 5.2.2.2.1 of TS 38.214 [12]. | Single Panel Type I, Randomized precoder selection for every PRB bundle and updated per slot, with equal probability of each applicable i1/i2 combination or codebookIndex, chosen from section 5.2.2.2.1 of TS 38.214 [12].Any column of precoder matrix is not equal to any column of precoder matrix of Target UE for test 1-1. Select the precoder to ensure any column of precoder is orthogonal to any column of precoder for the target PDSCH for test 2-1 and 2-2 |
| MU-MIMO Beamforming Model |  | As specified in B.4.2 |
| Number of HARQ Processes |  | 4 | N/A |
| The number of slots between PDSCH and corresponding HARQ-ACK information |  | 2 | N/A |
| Note 1: The DMRS scrambling ID is same for both target UE and Co-scheduled UE. |

Table 5.2.2.1.16-3: Minimum performance for PDSCH of target UE with intra-cell inter user interference

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test num | Reference channel | Bandwidth (MHz) / Subcarrier spacing (kHz) | Modulation format and code rate | Propagation condition | Correlation matrix and antenna configuration | Reference value |
| Target UE | Co-scheduled UE | Fraction of maximum throughput (%) | SNR (dB) |
| 1-1 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | Random 16QAM symbols | TDLC300-100 | 2x2, ULA Low | 70 | 18.0 |

The parameters in Table 5.2.2.1.16-4 are configured for requirements with advanced receiver for MU-MIMO.

Table 5.2.3.1.16-4: Assitance Information parameters for requirements with Enhanced Receiver Type 2~~advanced receiver for MU-MIMO~~

|  |  |
| --- | --- |
| Parameter | Value |
| AdvancedReceiver-MU-MIMO-r18 | precodingAndResourceAllocation | True |
| pdsch-TimeDomainAllocation | True |
| mcs-Table | qam256 |
| advReceiver-MU-MIMO-DCI-1-1 | Enabled |
| Co-scheduled UE information in DCI (Table 7.3.1.2.2-12 of TS38.212) | 1 for Test 2-16 for Test 2-2 |

Table 5.2.2.1.16-5: Minimum performance for target UE with Rank 1 with Enhanced Receiver Type 2~~advanced receiver for MU-MIMO~~

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel | Bandwidth (MHz) / Subcarrier spacing (kHz) | Modulation format and code rate | Propagation condition  | Correlation matrix and antenna configuration | Reference value |
| Target UE | Co-scheduled UE | Fraction ofmaximumthroughput(%) | SNR (dB) |
| 2-1 | ~~R.PDSCH.1-2.1 FDD~~R.PDSCH.5-1.3 FDD | 10 / 15 | 16QAM, 0.48 | QPSK | TDLC300-100 | 2x2, ULA Medium  | 70 | [16.3] |
| 2-2 | R.PDSCH.5-1.3 FDD | 10 / 15 | 64QAM,0.43 | 16QAM | TDLC300-100 | 2x2, ULA Medium | 70 | [24.4] |

-----------------------------------------------------------End of change 1---------------------------------------------------------------