**3GPP TSG-RAN WG4 Meeting #111R4-2408971**

**Fukuoka, Japan, 20 - 24 May, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | **0540** | **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:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 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:*** | | Move clause 7.2.2.2.7 to the right place.  Remove square brackets for FR2 multi-Rx minimum requirements for sDCI SDM in the new clause 7.2.2.2.7. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Delete clause 7.2.2.2.7 under clause 7.1.1.3 and add new clause 7.2.2.2.7 under clause 7.2.2.2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | There will be inconsist between specification and RAN4 agreements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.2.2.2.7 under 7.1.1.3 (Delete), 7.2.2.2.7 under 7.2.2.2 (New clause) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Delete: 7.2.2.2.7 under 7.1.1.3  New clause: 7.2.2.2.7 under 7.2.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2406011 | | | | | | | | |

*<START OF THE CHANGE 1>*

7.1.1.3 Applicability of requirements for optional UE features

<Unchanged part skipped>











*<END OF THE CHANGE 1>*

*<START OF THE CHANGE 2>*

7.2.2.2 TDD

<Unchanged part skipped>

7.2.2.2.7 Minimum requirements for PDSCH Single-DCI based SDM scheme

The performance requirements are specified in Table 7.2.2.2.7-3, with the addition of test parameters in Table 7.2.2.2.7-2 and the downlink physical channel setup according to Annex C.5.1.

The test purposes are specified in Table 7.2.2.2.7-1.

**Table 7.2.2.2.7-1: Tests purpose**

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify the PDSCH performance with Single-DCI based SDM scheme for multi-Rx simultaneous DL reception. | 1-1, 1-2 |

**Table 7.2.2.2.7-2: Test Parameters**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | **Unit** | **Value** | |
| **TRxP #1(Note 1)** | **TRxP #2(Note 1)** |
| SSB | | | |  | SSB #0 | SSB #1 |
| PDCCH configuration | | TCI state | |  | TCI State #2 | N/A |
| CORESETPoolIndex | |  | 0 | N/A |
| CSI-RS for tracking | | First subcarrier index in the PRB used for CSI-RS | |  | k0=0 for CSI-RS resources 1,2,3,4 | k0=1 for CSI-RS resources 5,6,7,8 |
| First OFDM symbol in the PRB used for CSI-RS | |  | l0 = 6 for CSI-RS resources 1 and 3  l0 = 10 for CSI-RS resources 2 and 4 | l0 = 6 for CSI-RS resources 5 and 7  l0 = 10 for CSI-RS resources 6 and 8 |
| Number of CSI-RS ports (X) | |  | 1 for CSI-RS resource 1,2,3,4 | 1 for CSI-RS resource 5,6,7,8 |
| CDM Type | |  | ‘No CDM’ for CSI-RS resource 1,2,3,4,5,6,7,8 | |
| Density | |  | 3 | |
| CSI-RS periodicity | | Slots | 160 | |
| CSI-RS offset | | Slots | 80 for CSI-RS resources 1 and 2  81 for CSI-RS resources 3 and 4 | 80 for CSI-RS resources 5 and 6  81 for CSI-RS resources 7 and 8 |
| QCL info | |  | TCI state #0 | TCI state #1 |
| CSI-RS for beam refinement | | First subcarrier index in the PRB used for CSI-RS (k0) | |  | k0=0 for CSI-RS resource 1,2 | k0=1 for CSI-RS resource 3,4 |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | l0 = 8 for CSI-RS resource 1  l0 = 9 for CSI-RS resource 2 | l0 = 8 for CSI-RS resource 3  l0 = 9 for CSI-RS resource 4 |
| Number of CSI-RS ports (X) | |  | 1 for CSI-RS resource 1,2 | 1 for CSI-RS resource 3,4 |
| CDM Type | |  | 'No CDM' for CSI-RS resource 1,2 | 'No CDM' for CSI-RS resource 3,4 |
| Density (ρ) | |  | 3 for CSI-RS resource 1,2 | 3 for CSI-RS resource 3,4 |
| CSI-RS periodicity | |  | 160 for CSI-RS resource 1,2 | 160 for CSI-RS resource 3,4 |
| CSI-RS offset | |  | 0 for CSI-RS resource 1,2 | 0 for CSI-RS resource 3,4 |
| Repetition | |  | ON | ON |
| QCL info | |  | TCI state #2 | TCI state #3 |
| Duplex mode | | | |  | TDD | |
| Active DL BWP index | | | |  | 1 | |
| PDSCH configuration | Mapping type | | |  | Type A | |
| k0 | | |  | 0 | |
| Starting symbol (S) | | |  | 1 | |
| Length (L) | | |  | Specific to each Reference channel as defined in A.3.2.2 | |
| PRB bundling type | | |  | Static | |
| PRB bundling size | | |  | 2 | |
| Resource allocation type | | |  | Type 1 | |
| RBG size | | |  | Config2 | |
| VRB-to-PRB mapping type | | |  | Non-interleaved | |
| VRB-to-PRB mapping interleaver bundle size | | |  | N/A | |
| PDSCH DMRS configuration | Antenna port indexes | | |  | 1000 | 1002 |
| TCI state | | |  | TCI State #2 | TCI State #3 |
| DMRS Type | | |  | Type 1 | |
| Number of additional DMRS | | |  | 1 | |
| Maximum number of OFDM symbols for DL front loaded DMRS | | |  | 1 | |
| TCI State #0 | Type 1 QCL information | | SSB index |  | SSB #0 | N/A |
| QCL Type |  | Type C | N/A |
| Type 2 QCL information | | SSB index |  | SSB #0 | N/A |
| QCL Type |  | Type D | N/A |
| TCI State #1 | Type 1 QCL information | | SSB index |  | N/A | SSB #1 |
| QCL Type |  | N/A | Type C |
| Type 2 QCL information | | SSB index |  | N/A | SSB #1 |
| QCL Type |  | N/A | Type D |
| TCI State #2 | Type 1 QCL information | | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking’ configuration | N/A |
| QCL Type |  | Type A | N/A |
| Type 2 QCL information | | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking’ configuration | N/A |
| QCL Type |  | Type D | N/A |
| TCI State #3 | Type 1 QCL information | | CSI-RS resource |  | N/A | CSI-RS resource 5 from 'CSI-RS for tracking’ configuration |
| QCL Type |  | N/A | Type A |
| Type 2 QCL information | | CSI-RS resource |  | N/A | CSI-RS resource 5 from 'CSI-RS for tracking’ configuration |
| QCL Type |  | N/A | Type D |
| PTRS configuration | Frequency density (*KPT-RS*) | | |  | 2 | 2 for Test 1-2, Disabled for Test 1-1 |
| Time density (*LPT-RS*) | | |  | 1 | 1 for Test 1-2, Disabled for Test 1-1 |
| Resource Element Offset | | |  | 2 | 3 for Test 1-2, N/A for Test 1-1 |
| Resource allocation | | | |  | Full-overlapping | |
| Timing offset of the second TRxP from the first TRxP | | | | us | -0.0625 | |
| Frequency offset of the second TRxP from the first TRxP | | | | Hz | 600 | |
| Number of HARQ Processes | | | |  | 8 | |
| The number of slots between PDSCH and corresponding HARQ-ACK information | | | |  | Specific to each TDD UL-DL pattern and as defined in Annex A.1.2 | |
| Precoding configuration | | | |  | SP Type I, independent precoding generation is applied for both TRxPs, random per slot with PRB bundling granularity. | |
| Note 1: PDSCH transmission is done from both TRxPs (PDSCH Layer 0 is transmitted from TRxP #1 and PDSCH layer 1 is transmitted from TRxP #2) | | | | | | |

**Table 7.2.2.2.7-3: Minimum performance**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **TDD UL-DL pattern** | **Propagation condition** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.5-16.1 TDD | 100 / 120 | 16QAM, 0.48 | FR1.120-1 | TDLA30-35 | 4x4, FR2- mTRxP-mRX  ρ = -12dB | 70 | 15.9 |
| 1-2 | R.PDSCH.5-16.2 TDD | 100 / 120 | 16QAM, 0.48 | FR1.120-1 | TDLA30-35 | 4x4, FR2- mTRxP-mRX  ρ = -12dB | 70 | 15.6 |
| Note 1: The propagation conditions apply to each of TRxP #1 and TRxP #2 and are statistically independent  Note 2: Correlation matrix according to the RFR2-mTxRP-mRX in B.2.3.3. TRxP#1 uses TX antenna indices (1,2) and TRxP#2 uses TX antenna indices (3,4) corresponding to the respective antenna configuration matrix rows.  Note 3: SNR is defined per UE Rx chain. SNR of Rx chain *i* (i=1,2) is derived based on Es from TRxP#i, as defined in 4.5.2. | | | | | | | | |

*<END OF THE CHANGE 2>*