**3GPP TSG- Meeting #**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *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:*** | draftCR for 38.101 - inclusion of 8Rx Applicability Rule and definition of simplified and baseline Rx | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Introduction of PDSCH, PDCCH and PBCH applicability rules for 8Rx. Introduction of definitions of simplifeid and baseline receivers | | | | | | | | |
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| ***Summary of change:*** | | Updated tables in Clause 5.1.1.2, introduction of 8Rx Applicability rules, inclusion of new definition for simplified and baseline receiver. | | | | | | | | |
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| ***Consequences if not approved:*** | | 8Rx applicability rules will not be included in TS 38.101-4 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.1, 5.1.1.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-4 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Revision of R4-2407212 | | | | | | | | |

***<Start of change 1>***

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Baseline SU-MIMO 8Rx Receiver:** 8Rx receivers for SU-MIMO transmissions with support of up to 8 layers with joint 8Rx MIMO detector.

**DL BWP**: DL bandwidth part as defined in TS 38.213 [11].

**EN-DC**: E-UTRA-NR Dual Connectivity as defined in clause 4.1.2 of TS 37.340 [13].

**Enhanced Receiver Type 1:** SU-MIMO interference mitigation advanced receiver [14]

- R-ML (reduced complexity ML) receiver with enhanced inter-stream interference suppression for SU-MIMO transmissions with rank 2 with 2 RX antennas

- R-ML (reduced complexity ML) receiver with enhanced inter-stream interference suppression for SU-MIMO transmissions with rank 2, 3, and 4 with 4 RX antennas

**FR1**: Frequency range 1 as defined in clause 5.1 of TS 38.101-3 [8].

**FR2**: Frequency range 2 as defined in clause 5.1 of TS 38.101-3 [8].

**RedCap**: A UE with reduced capabilities as defined in clause 4.2 in TS 38.306 [14].

**Simplified SU-MIMO 8Rx Receiver:** 8Rx receivers for SU-MIMO transmissions with support of only up to 4 layers with two joint 4Rx MIMO detectors.

**SSB:** SS/PBCH block as defined in clause 7.8.3 of TS 38.211 [9].

***<End of change 1>***

***<Start of change 2>***

#### 5.1.1.2 Applicability of requirements for different number of RX antenna ports

The number of RX antenna ports for different RF operating bands is up to UE declaration.

The UE shall support 2, 4 or 8 RX antenna ports for different RF operating bands. The operating bands, where 4 RX antenna ports shall be the baseline, are defined in Clause 7.2 of TS 38.101-1 [6]. The UE requirements applicability for UEs with different number of RX antenna ports is defined in Table 5.1.1.2-1.

Table 5.1.1.2-1: Requirements applicability

|  |  |  |  |
| --- | --- | --- | --- |
| Supported RX antenna ports | Test type | Test list | Exceptions |
| UE supports only 2RX | PDSCH | All tests in Clause 5.2.2 |  |
|  | PDCCH | All tests in Clause 5.3.2 |  |
|  | PBCH | All tests in Clause 5.4.2 |  |
| UE supports only 4RX or both 2RX and 4RX | PDSCH | All tests in Clause 5.2.3 (Note 2) |  |
|  | PDCCH | All tests in Clause 5.3.3 (Note 2) |  |
|  | PBCH | All tests in Clause 5.4.2 or 5.4.3 (Note 1) |  |
| UE supports 8Rx, 4Rx and 2Rx | PDSCH | All tests in Clause 5.2.3 (Note 2, 3)  All tests in Clause 5.2.4 (Note 2) | If UE passes tests in Clause 5.2.4, UE can skip Test 2-1 and Test 2-2 in Clause 5.2.3 Table 5.2.3.1.1-4, Table 5.2.3.2.1-4 and Test 4-1 in Clause 5.2.3 Table 5.2.3.1.1-6, Table 5.2.3.2.1-6 |
| or | PDCCH | All tests in Clause 5.3.3 (Note 2,3) |  |
| UE supports only 8Rx and 4Rx | PBCH | All tests in Clause 5.4.3 (Note 1) |  |
| UE supports only 8Rx and 2Rx | PDSCH | All tests in Clause 5.2.2 (Note 2, 4)  All tests in Clause 5.2.4 (Note 2) | If UE passes tests in Clause 5.2.4, UE can skip Test 2-1 and Test 2-2 in Clause 5.2.2 Table 5.2.2.1.1-4, Table 5.2.2.2.1-4 |
|  | PDCCH | All tests in Clause 5.3.2 (Note 2,4) |  |
|  | PBCH | All tests in Clause 5.4.2 |  |
| UE supports only 8Rx | PDSCH | All tests in Clause 5.2.4 (Note 2) |  |
|  | PDCCH | N/A |  |
|  | PBCH | N/A |  |
| Note 1: Requirements for PBCH with 4Rx is up to UE declaration  Note 2: ‘*maxMIMO-Layers-r16*’ is not configured during the performance requirements testing for UE supporting Release 16 per-BWP MIMO layer adaptation.  Note 3: 8Rx capable UEs are tested on any of the 4Rx supported RF bands by connecting 4 out of 8 Rx with data source from system simulator, and the other 4 Rx are connected with zero input, depending on UE’s declaration and AP configuration. Requirements specified with 4Rx should be applied.  Note 4: 8Rx capable UEs are tested on any of the 2Rx supported RF bands by connecting 2 out of 8 Rx with data source from system simulator, and the other 6 Rx are connected with zero input, depending on UE’s declaration and AP configuration. Requirements specified with 2Rx should be applied.  Note 5: Tests defined for 8Rx capable UEs according to whether the UE is a ‘simplified 8Rx receiver’ or ‘baseline 8Rx receiver’ are specified in Table 5.1.1.3-1. | | | |

5.1.1.3 Applicability of requirements for optional UE features

The performance requirements in Table 5.1.1.3-1 shall apply for UEs which support optional UE features only.

**Table 5.1.1.3-1: Requirements applicability for optional UE features**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **UE feature/capability [14]** | **Test type** | | **Test list** | **Applicability notes** | |
| SU-MIMO Interference Mitigation advanced receiver | FR1 FDD | PDSCH | Clause 5.2.2.1.1 (Test 3-1)  Clause 5.2.3.1.1 (Test 5-1) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.1 (Test 3-1)  Clause 5.2.3.2.1 (Test 5-1) |  | |
| Alternative additional DMRS position for co-existence with LTE CRS *(additionalDMRS-DL-Alt)* | FR1 FDD | PDSCH | Clause 5.2.2.1.4 (Test 1-2)  Clause 5.2.3.1.4 (Test 1-2) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.4 (Test 1-2)  Clause 5.2.3.2.4 (Test 1-2) |  | |
| Basic DL NR-NR CA operation (*supportedBandCombinationList*) | NR CA | SDR | Clause 5.5A.1 | 1)Up to 16 DL carriers  2)Same numerology across carrier for data/control channel at a given time | |
| Enhanced demodulation processing for HST-SFN joint transmission scheme with velocity up to 500km/h | FR1 FDD | PDSCH | Clause 5.2.2.1.9 (Test 1-1)  Clause 5.2.3.1.9 (Test 1-1) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.9 (Test 1-1)  Clause 5.2.3.2.9 (Test 1-1) |  | |
| Alternative 64QAM MCS table for PDSCHNew 64QAM MCS table for PDSCH (*dl-64QAM-MCS-TableAlt*) | FR1 FDD | PDSCH | Clause 5.2.2.1.5  Clause 5.2.3.1.5  Clause 5.2.2.1.6  Clause 5.2.3.1.6 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.5  Clause 5.2.3.2.5  Clause 5.2.2.2.6  Clause 5.2.3.2.6 |  | |
| CQI table with target BLER of 10^-5New CQI table (cqi-TableAlt) | FR1 FDD | PDSCH | Clause 5.2.2.1.5  Clause 5.2.3.1.5 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.5  Clause 5.2.3.2.5 |  | |
| PDSCH repetitions over multiple slots *(pdsch-RepetitionMultiSlots)* | FR1 FDD | PDSCH | Clause 5.2.2.1.6  Clause 5.2.3.1.6 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.6  Clause 5.2.3.2.6 |  | |
| UE PDSCH processing capability #2 *(pdsch-ProcessingType2)* | FR1 FDD | PDSCH | Clause 5.2.2.1.7  Clause 5.2.3.1.7 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.7  Clause 5.2.3.2.7 |  | |
| Pre-emption indication for DL *(pre-EmptIndication-DL)* | FR1 FDD | PDSCH | Clause 5.2.2.1.8  Clause 5.2.3.1.8 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.8  Clause 5.2.3.2.8 |  | |
| Single DCI based SDM transmission for multi-TRxP (singleDCI-SDM-scheme-r16) | FR1 FDD | PDSCH | Clause 5.2.2.1.11  Clause 5.2.3.1.11 |  | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.11  Clause 5.2.3.2.11 |  | |
| Multi DCI based multi-TRxP support (multiDCI-MultiTRP-r16) | FR1 FDD | PDSCH | Clause 5.2.2.1.12  Clause 5.2.3.1.12 |  | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.12  Clause 5.2.3.2.12 |  | |
| Single DCI based FDM Scheme-A for multi-TRxP(supportFDM-SchemeA-r16) | FR1 FDD | PDSCH | Clause 5.2.2.1.13  Clause 5.2.3.1.13 |  | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.13  Clause 5.2.3.2.13 |  | |
| Single DCI based inter-slot TDM for multi-TRxP (supportInter-slotTDM-r16) | FR1 FDD | PDSCH | Clause 5.2.2.1.14  Clause 5.2.3.1.14 |  | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.14  Clause 5.2.3.2.14 |  | |
| Maximum number of TCI states in Single-DCI based inter-slot TDM (maxNumberTCI-states-r16) | FR1 FDD | PDSCH | Clause 5.2.2.1.14  Clause 5.2.3.1.14 | | The requirements apply only when maxNumberTCI-states-r16 = 2. |
| FR1 TDD | PDSCH | Clause 5.2.2.2.14  Clause 5.2.3.2.14 | |
| DRX Adaptation (*drx-Adaptation-r16*) | FR1 FDD | PDCCH | Clause 5.3.2.1.3 | If the Test 1 in Clause 5.3.2.1.3 is passed, the test coverage can be considered fulfilled without executing Test 3 in clause 5.3.2.1.1. | |
| FR1 TDD | PDCCH | Clause 5.3.2.2.3 | If the Test 1 in Clause 5.3.2.2.3 is passed, the test coverage can be considered fulfilled without executing Test 2 in clause 5.3.2.2.1. | |
| FR1 FDD | PDCCH | Clause 5.3.3.1.3 | If the Test 1 in Clause 5.3.3.1.3 is passed, the test coverage can be considered fulfilled without executing Test 3 in clause 5.3.3.1.1. | |
| FR1 TDD | PDCCH | Clause 5.3.3.2.3 | If the Test 1 in Clause 5.3.3.2.3 is passed, the test coverage can be considered fulfilled without executing Test 2 in clause 5.3.3.2.1. | |
| Validating P/SP-CSI-RS reception (*periodicAndSemi-PersistentCSI-RS-r16*) | FR1 TDD | PDSCH | Clause 5.2.2.2.15  Clause 5.2.3.2.15  Clause 5.2A.2.3  Clause 5.2A.3.3 | The requirements apply only in case tested UE supporting operations in shared spectrum access and validation of P/SP-CSI-RS reception based on DCI | |
| Supported UL channels for dynamic channel access mode (*ul-DynamicChAccess-r16*) or UL channel access for semi-static channel access mode (ul-Semi-StaticChAccess-r16) or both | FR1 TDD | PDSCH | Clause 5.2.2.2.15  Clause 5.2.3.2.15 | The requirements apply only in case tested UE supports one of UL channels for dynamic channel access mode and UL channel access for semi-static channel access mode | |
| 1024QAM modulation for PDSCH for FR1 (*pdsch-1024QAM-FR1-r17* or *pdsch-1024QAM-2MIMO-FR1-r17*) | FR1 FDD | PDSCH | Clause 5.2.2.1.1 (Test 1-8)  Clause 5.2.3.1.1 (Test 1-8) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.1 (Test 1-12)  Clause 5.2.3.2.1 (Test 1-12) |  | |
|  |  | SDR | Clause 5.5.1  Clause 5.5A.1 | 1024QAM MCS indexes are used only if UE supports 1024QAM for FR1 DL. | |
| Support of neighboring LTE cell CRS-IM in DSS scenario with NR 15 kHz SCS ( *CRS-IM-DSS-15kHzSCS-r17*) | FR1 FDD | PDSCH | Clause 5.2.2.1.18  Clause 5.2.3.1.17 | UE can support the feature on the CC(s) in a band only if the UE indicates support of rateMatchingLTE-CRS on that band. | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.19  Clause 5.2.3.2.18 |
| Support of neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth (*CRS-IM-nonDSS-15kHzSCS-r17*) | FR1 FDD | PDSCH | Clause 5.2.2.1.19 (Test 2-1)  Clause 5.2.3.1.18 (Test 2-1) | The UE can perform CRS-IM when MeasObjectEUTRA IE is configured, and the configured measurement gaps overlap with neighbour LTE cell PBCH position. | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.20 (Test 2-1)  Clause 5.2.3.2.19 (Test 2-1) |
| Support of neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth (*CRS-IM-nonDSS-NWA-15kHzSCS-r17*) | FR1 FDD | PDSCH | Clause 5.2.2.1.19 (Test 1-1)  Clause 5.2.3.1.18 (Test 1-1) | If the Test 2-1 in Clause 5.2.2.1.19 is passed, the test coverage can be considered fulfilled without executing Test 1-1 in clause 5.2.2.1.19.  If the Test 2-1 in Clause 5.2.3.1.18 is passed, the test coverage can be considered fulfilled without executing Test 1-1 in clause 5.2.3.1.18. | |
| FR1 TDD | PDSCH | Clause 5.2.2.2.20 (Test 1-1)  Clause 5.2.3.2.19 (Test 1-1) | If the Test 2-1 in Clause 5.2.2.2.20 is passed, the test coverage can be considered fulfilled without executing Test 1-1 in clause 5.2.2.2.20.  If the Test 2-1 in Clause 5.2.3.2.19 is passed, the test coverage can be considered fulfilled without executing Test 1-1 in clause 5.2.3.2.19. | |
| CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth (*crs-IM-nonDSS-30kHzSCS-r17*) | FR1 TDD | PDSCH | Clause 5.2.2.2.20 (Test 2-2)  Clause 5.2.3.2.19 (Test 2-2) | The UE can perform CRS-IM when MeasObjectEUTRA IE is configured, and the configured measurement gaps overlap with neighbour LTE cell PBCH position. | |
| CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth (crs*-IM-nonDSS-NWA-30kHzSCS-r17*) | FR1 TDD | PDSCH | Clause 5.2.2.2.20 (Test 1-2)  Clause 5.2.3.2.19 (Test 1-2) | If the Test 2-2 in Clause 5.2.2.2.20 is passed, the test coverage can be considered fulfilled without executing Test 1-2 in clause 5.2.2.2.20.  If the Test 2-2 in Clause 5.2.3.2.19 is passed, the test coverage can be considered fulfilled without executing Test 1-2 in clause 5.2.3.2.19. | |
| Support for SFN scheme A for PDCCH scheduling SFN Scheme A PDSCH *(sfn-SchemeA-r17)* | FR1 FDD | PDSCH | Clause 5.2.2.1.20  Clause 5.2.3.1.19 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.21  Clause 5.2.3.2.20 |  | |
| Support for SFN scheme B for PDCCH scheduling SFN Scheme B PDSCH *(sfn-SchemeB-r17)* | FR1 FDD | PDSCH | Clause 5.2.2.1.21  Clause 5.2.3.1.20 |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.2.2.22  Clause 5.2.3.2.21 |  | |
| Support for PDCCH with intra-slot repetition *(mTRP-PDCCH-Repetition-r17)* | FR1 FDD | PDCCH | Clause 5.3.2.1.5  Clause 5.3.3.1.4 |  | |
|  | FR1 TDD | PDCCH | Clause 5.3.2.2.5  Clause 5.3.3.2.4 |  | |
| Support for TDD-TDD intra-band non-colocated NR-CA deployment (intraBandNR-CA-non-collocated-r18) | FR1 TDD | PDSCH | Clause 5.2A.2.6 | The requirements apply on in case the UE indicates support of 256QAM modulation scheme for PDSCH for FR1 (pdsch-256QAM-FR1) | |
| Baseline SU-MIMO 8Rx receiver | FR1 FDD | PDSCH | Clause 5.2.4.1.1(Tests 1-1,3-1) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.4.2.1(Tests 1-1,3-1) |  | |
| Simplified SU-MIMO 8Rx receiver | FR1 FDD | PDSCH | Clause 5.2.4.1.1(Tests 2-1,4-1) |  | |
|  | FR1 TDD | PDSCH | Clause 5.2.4.2.1(Tests 2-1,4-1) |  | |

***<End of change 2>***