**3GPP TSG- Meeting # *R5-253531***

**Malta, Malta, 19th May 2025 - 23rd May 2025**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.521-2** | **CR** | **1147** | **rev** | **1** | **Current version:** | **18.6.0** |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | FR2 MU - PC3 update for OBW UL MIMO test in 38.521-2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Keysight Technologies | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI15\_Test, 5GS\_NR\_LTE-UEConTest | | | | |  | ***Date:*** | | | 2025-05-08 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | Certain progress has been made for PC3 MU and TT analysis in discussion R5-253527. Impacted test cases should be updated accordingly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Updated OBW UL MIMO test for PC3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test specification will remain incomplete for PC3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.5D.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Revision 1:  -Set new values in [] for UL MIMO when MBW is different than used for SISO.  -Reverted declaration from non-tetable to FFS for FR2c 400MHz.  -Editor’s notes updated accordingly. | | | | | | | | |

## <<< START OF CHANGES >>>

### 6.5D.1 Occupied bandwidth for UL MIMO

Editor’s note: This clause is complete for Band n257, n258, n259, n260 and n261 for PC3. The following aspects are for future consideration:

- Measurement Uncertainty and testability is FFS for PC3 FR2b and FR2c 400 MHz, PC3 FR2c 200 MHz and other power classes. These channel bandwidths are skipped until the testability has been clarified.

6.5D.1.1 Test purpose

To verify that the UE occupied bandwidth for all transmission bandwidth configurations supported by the UE supporting UL MIMO are less than their specific limits when UE is configured using UL MIMO transmission.

6.5D.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward that supporting UL MIMO.

6.5D.1.3 Minimum conformance requirements

For UE configured with UL MIMO, the minimum conformance requirements are defined in clause 6.5.1.3. The requirements shall be met with the UL MIMO configurations specified in Table 6.5D.1.3-1.

Table 6.5D.1.3-1: UL MIMO configuration

|  |  |  |
| --- | --- | --- |
| Transmission scheme | DCI format | TPMI Index |
| Codebook based uplink | DCI format 0\_1 | 0 |

The normative reference for this requirement is TS 38.101-2 [3] clause 6.5D.1.

6.5D.1.4 Test description

6.5D.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each combination of channel bandwidth and subcarrier spacing, are shown in Table 6.5D.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 6.5D.1.4.1-1: Test Configuration Table

|  |  |  |  |
| --- | --- | --- | --- |
| Initial Conditions | | | |
| Test Environment as specified in TS 38.508-1 [10] clause 4.1 | | Normal | |
| Test Frequencies as specified in TS 38.508-1 [10] clause 4.3.1 | | Low range, Mid range, High range | |
| Test Channel Bandwidths as specified in TS 38.508-1 [10] clause 4.3.1 | | All | |
| Test SCS as specified in Table 5.3.5-1 | | Lowest | |
| Test Parameters | | | |
| Test ID | Downlink Configuration | Uplink Configuration | |
|  | - | Modulation | RB allocation (NOTE 1) |
| 1 | CP-OFDM QPSK | Outer\_full |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 for PC2, PC3 and PC4 or Table 6.1-2 for PC1.  NOTE 2: The following Channel Bandwidths shall be skipped for PC3 until the testability has been clarified: - 400 MHz for all frequency ranges - 200 MHz for FR2c | | | |

1. Connection between SS and UE is shown in TS 38.508-1 [10] Annex A, Figure A.3.3.1.1 for TE diagram and clause A.3.4.1.1 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [10] clause 4.4.3.

3. Downlink signals are initially set up according to Annex C, and uplink signals according to Annex G.

4. The UL Reference Measurement channels are set according to Table 6.5D.1.4.1-1.

5. Propagation conditions are set according to Annex B.0

6. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On,* Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [10] clause 4.5. Message contents are defined in clause 6.5D.1.4.3

6.5D.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0\_1 for C\_RNTI to schedule the UL RMC according to Table 6.5D.1.4.1-1. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. The PDCCH DCI format 0\_1 is specified with condition 2TX\_UL\_MIMO in 38.508-1 [10] subclause 4.3.6.1.1.2

2. Set the UE in the Tx beam peak direction found with a 3D EIRP scan as performed in Annex K.1.1. Allow at least BEAM\_SELECT\_WAIT\_TIME (NOTE 1) for the UE Tx beam selection to complete.

3. Send continuously uplink power control "up" commands in every uplink scheduling information to the UE; allow at least 200 ms for the UE to reach maximum output power. Allow at least BEAM\_SELECT\_WAIT\_TIME (NOTE 1) for the UE Tx beam selection to complete.

4. SS activates the UE Beamlock Function (UBF) by performing the procedure as specified in TS 38.508-1 [10] clause 4.9.2 using condition Tx only.

5. Measure the EIRP spectrum distribution within N-times or more frequency range over the requirement for Occupied Bandwidth specification centring on the current carrier frequency. The characteristics of the filter shall be approximately Gaussian (typical spectrum analyser filter). The measuring duration is one active uplink subframe. EIRP is captured from both polarizations, theta and phi. The ratio of measured bandwidth to channel bandwidth N is specified in Table 6.5D.1.4.2-1.

Table 6.5D.1.4.2-1: Ratio of measured bandwidth to channel bandwidth

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Occupied channel bandwidth / Channel bandwidth | | | |
|  | 50  MHz | 100  MHz | 200  MHz | 400  MHz |
| n257, n258, n261 | 1.5 | 1.5 | 1.5 | 1.5 |
| n260 | 1.5 | 1.5 | 1.5 | [1.3] |
| n259 | 1.5 | 1.5 | [1.3] | TBD |

6. Calculate the total EIRP from both polarizations, theta and phi, within the range of all frequencies measured in step 5 and save this value as "Total EIRP". EIRP measurement procedure is defined in Annex K.

7. Identify the measurement window whose centre is aligned on the centre of the channel for which the sum of the power measured in theta and phi polarization is 99% of the “Total EIRP”.

8. The “Occupied Bandwidth” is the width of the measurement window obtained in step 7.

NOTE 1: The BEAM\_SELECT\_WAIT\_TIME default value is defined in Annex K.

6.5D.1.4.3 Message contents

Message contents are according to TS 38.508-1 [10] subclause 4.6 ensuring Table 4.6.3-182 with condition 2TX\_UL\_MIMO.

6.5D.1.5 Test requirement

The measured Occupied Bandwidth shall not exceed values in Table 6.5D.1.5-1.

Table 6D.5.1.5-1: Occupied channel bandwidth

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Occupied channel bandwidth / Channel bandwidth | | | |
|  | 50  MHz | 100  MHz | 200  MHz | 400  MHz |
| Channel bandwidth (MHz) | 50 | 100 | 200 | 400 |

## <<< END OF CHANGES >>>