**3GPP TSG-RAN WG4 Meeting #98-e R4-210xxxx**

Online, 12 - 20 Apr 2021

**Source:** Huawei

**Title:** TP to TS 38.176-2 - OTA Rx dynamic range, clause 7.3

**Agenda Item:** 5.3.2.4.2.

**Document for:** Approval

# Introduction

This is a revision of R4-2107103 after 1st round review in RAN4#98e-bis, the following corrections have been made

Requirements below 3GHz should not be removed as we have band 41 – agree, however as the MU/TT is the same for all frequency ranges then I am not sure why BS spec has 3 columns here anyway (all values are the same) the conducted part has similar situation and only 1 column. I think this is better solution so I will use that (CR to tidy up BS spec next meeting)

Clause 7.4.2 has type AIB – corrected to IAB

As with comment for the OTA sensitivity, steps 5 and 6 apply only to FDD so have been removed. The reference to the measurement step in the test requirement section has been corrected (actually its wrong in BS spec and turns out to be correct here, BS spec needs correcting)

This text proposal completes clause 7.3 OTA Rx dynamic range.

The text is based on the NR BS test spec TS 38.141-2 and the core requirements in the IAB spec TS 38.174.

In this case the requirements only applies to the IAB-DU type 1-O so the section is very similar to 38.141-2, the following modifications have been made:

* Requirements below 3GHz are removed as there are no FR1 bands < 2.496 MHz (n41)
* The 5MHz channel has been removed

# TP to TS 38.176-2 v0.0.1

**--- Start of changes ---**

## 7.4 OTA dynamic range

### 7.4.1 Definition and applicability

The OTA dynamic range is a measure of the capability of the receiver unit to receive a wanted signal in the presence of an interfering signal inside the received *[IAB-DU] channel bandwidth*.

The requirement shall apply at the RIB when the AoA of the incident wave of a received signal and the interfering signal are from the same direction and are within the *OTA REFSENS RoAoA.*

The wanted and interfering signals apply to each supported polarization, under the assumption of *polarization match*.

### 7.4.2 Minimum requirement

For *IAB-DU type 1-O*, the minimum requirement is in TS 38.174 [2], clause 10.4.1.

### 7.4.3 Test purpose

The test purpose is to verify that at the IAB-DU receiver dynamic range, the relative throughput shall fulfil the specified limit.

### 7.4.4 Method of test

#### 7.4.4.1 Initial conditions

Test environment: Normal: see annex B.2.

RF channels to be tested for single carrier: M; see clause 4.9.1.

Directions to be tested: OTA REFSENS receiver target reference direction (D.54).

#### 7.4.4.2 Procedure

1) Place the IAB-DU with its manufacturer declared coordinate system reference point in the same place as calibrated point in the test system, as shown in annex E.2.2.

2) Align the manufacturer declared coordinate system orientation of the IAN-DU with the test system.

3) Align the IAB-DU with the test antenna in the declared direction to be tested.

4) Ensure the polarization is accounted for such that all the power from the test antenna is captured by the IAB-DU under test.

5) Set the test signal mean power so that the calibrated radiated power at the IAB-DU Antenna Array coordinate system reference point is as follows:

a) Set the signal generator for the wanted signal to transmit as specified in table 7.4.5.2-1 to 7.4.5.2-3.

b) Set the signal generator for the AWGN interfering signal at the same frequency as the wanted signal to transmit as specified in table 7.4.5.2-1 to 7.4.5.2-3.

6) Measure the throughput according to annex A.2 for each supported polarization.

For *multi-band RIB(s)* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carriers activated in the other band.

### 7.4.5 Test requirement

#### 7.4.5.1 General

The test requirement is calculated from the OTA wanted signal mean power level offset by the OTA dynamic range Test Tolerance specified in clause 4.1.

#### 7.4.5.2 Test requirements for *IAB-DU type 1-O*

For each measured carrier, the throughput measured in step 6 of clause 7.4.4.2 shall be ≥ 95 % of the maximum throughput of the reference measurement channel as specified in annex A.2 with parameters specified in tables 7.4.5.2-1 to 7.4.5.2-3.

Table 7.4.5.2-1: Wide Area IAB-DU dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IAB-DU | Subcarrier | Reference | Wanted signal mean power (dBm) | Interfering | Type of |
| channel bandwidth (MHz) | spacing (kHz) | measurement channel(annex A.2) |  |  |  | signal mean power (dBm) / BWConfig | interfering signal |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 10 | 15 | G-FR1-A2-1 |  |  | -70.4 – ΔOTAREFSENS | -79.3 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -71.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -68.1 – ΔOTAREFSENS |  |  |
| 15 | 15 | G-FR1-A2-1 |  |  | -70.4 – ΔOTAREFSENS | -77.5 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -71.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -68.1 – ΔOTAREFSENS |  |  |
| 20 | 15 | G-FR1-A2-4 |  |  | -64.2 – ΔOTAREFSENS | -76.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 25 | 15 | G-FR1-A2-4 |  |  | -64.2 – ΔOTAREFSENS | -75.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 30 | 15 | G-FR1-A2-4 |  |  | -64.2 – ΔOTAREFSENS | -74.4 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 40 | 15 | G-FR1-A2-4 |  |  | -64.2 – ΔOTAREFSENS | -73.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 50 | 15 | G-FR1-A2-4 |  |  | -64.2 – ΔOTAREFSENS | -72.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 60 | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS | -71.3 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 70 | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS | -70.7 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 80 | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS | -70.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 90 | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS | -69.5 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| 100 | 30 | G-FR1-A2-5 |  |  | -64.2 – ΔOTAREFSENS | -69.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -64.5 – ΔOTAREFSENS |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *IAB-DU channel bandwidth*. |

Table 7.4.5.2-2: Medium Range IAB-DU dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IAB-DU | Subcarrier | Reference | Wanted signal mean power (dBm) | Interfering | Type of |
| channel bandwidth (MHz) | spacing (kHz) | measurement channel(annex A.2) |  |  |  | signal mean power (dBm) / BWConfig | interfering signal |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 10 | 15 | G-FR1-A2-1 |  |  | -65.4 – ΔOTAREFSENS | -74.3 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -66.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -63.1 – ΔOTAREFSENS |  |  |
| 15 | 15 | G-FR1-A2-1 |  |  | -65.4 – ΔOTAREFSENS | -72.5 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -66.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -63.1 – ΔOTAREFSENS |  |  |
| 20 | 15 | G-FR1-A2-4 |  |  | -59.2 – ΔOTAREFSENS | -71.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 25 | 15 | G-FR1-A2-4 |  |  | -59.2 – ΔOTAREFSENS | -70.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 30 | 15 | G-FR1-A2-4 |  |  | -59.2 – ΔOTAREFSENS | -69.4 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 40 | 15 | G-FR1-A2-4 |  |  | -59.2 – ΔOTAREFSENS | -68.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 50 | 15 | G-FR1-A2-4 |  |  | -59.2 – ΔOTAREFSENS | -67.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | --59.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 60 | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS | -66.3 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 70 | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS | -65.7 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 80 | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS | -65.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 90 | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS | -64.5 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| 100 | 30 | G-FR1-A2-5 |  |  | -59.2 – ΔOTAREFSENS | -64.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -59.5 – ΔOTAREFSENS |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *IAB-DU channel bandwidth*. |

Table 7.4.5.2-3: Local Area IAB-DU dynamic range

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| IAB-DU | Subcarrier | Reference | Wanted signal mean power (dBm) | Interfering | Type of |
| channel bandwidth (MHz) | spacing (kHz) | measurement channel(annex A.2) |  |  |  | signal mean power (dBm) / BWConfig | interfering signal |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| 10 | 15 | G-FR1-A2-1 |  |  | -62.4 – ΔOTAREFSENS | -71.3 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -64.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -60.1 – ΔOTAREFSENS |  |  |
| 15 | 15 | G-FR1-A2-1 |  |  | -62.4 – ΔOTAREFSENS | -69.5 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-2 |  |  | -64.1 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-3 |  |  | -60.1 – ΔOTAREFSENS |  |  |
| 20 | 15 | G-FR1-A2-4 |  |  | -56.2 – ΔOTAREFSENS | -68.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 25 | 15 | G-FR1-A2-4 |  |  | -56.2 – ΔOTAREFSENS | -67.2 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 30 | 15 | G-FR1-A2-4 |  |  | -56.2 – ΔOTAREFSENS | -66.4 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 40 | 15 | G-FR1-A2-4 |  |  | -56.2 – ΔOTAREFSENS | -65.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 50 | 15 | G-FR1-A2-4 |  |  | -56.2 – ΔOTAREFSENS | -64.1 – ΔOTAREFSENS | AWGN |
|  | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS |  |  |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 60 | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS | -63.3 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 70 | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS | -62.7 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 80 | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS | -62.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 90 | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS | -61.5 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| 100 | 30 | G-FR1-A2-5 |  |  | -56.2 – ΔOTAREFSENS | -61.1 – ΔOTAREFSENS | AWGN |
|  | 60 | G-FR1-A2-6 |  |  | -56.5 – ΔOTAREFSENS |  |  |
| NOTE: The wanted signal mean power is the power level of a single instance of the corresponding reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *IAB-DU channel bandwidth*. |

**--- End of changes ---**