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

Online, 12 - 20 Apr 2021

**Source:** Huawei

**Title:** TP to TS 38.176-1 - Sensitivity, clause 7.2

**Agenda Item:** 5.3.2.3.2.

**Document for:** Approval

# Introduction

This is a revision of R4-2107100 after 1st round review in RAN4#98e-bis, no comments were made however the following updates have been made the following corrections have been made

The NB-IoT test models (G-FR1-A1-10, G-FR1-A1-11) have been removed

Note the IAB-MT MU/TT values remains under discussion so the IAB-MT values remain in square brackets. Also it has been confirmed that the IAB-DU will use the BS MU/TT values so the IAB-DU values are correct.

F<3GHz has been put back in as we have band 41 (as pointed out in review of the OTA sensitivity TP)

As with the comment for OTA sensitivity we have no FDD so the step to turn Tx on for FDD has been removed from the procedure.

This text proposal completes clause 7.2 conducted sensitivity.

* Requirements below 3GHz are removed as there are no FR1 bands < 2.496 MHz (n41)
* References to NB-IoT have been removed
* The 5MHz channel has been removed
* For IAB-MT the BS/IAB-DU TT have been applied, UE values are slightly different so values remain in square brackets for now.

# TP to TS 38.176-1 v0.0.1

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

## 7.2 Reference sensitivity level

### 7.2.1 Definition and applicability

The reference sensitivity power level PREFSENS is the minimum mean power received at the *TAB connector* for *IAB type 1-H* at which a throughput requirement shall be met for a specified reference measurement channel.

### 7.2.2 Minimum requirement

The minimum requirement for *IAB-DU type 1-H* is in TS 38.174 [2], clause 7.2.1.

The minimum requirement for *IAB-MT type 1-H* is in TS 38.174 [2], clause 7.2.2.

### 7.2.3 Test purpose

To verify that for each *IAB type 1-H* *TAB connector* at the reference sensitivity level the throughput requirement shall be met for a specified reference measurement channel.

### 7.2.4 Method of test

#### 7.2.4.1 Initial conditions

Test environment:

- Normal; see annex B.2.

- Extreme, see annexes B.3 and B.5.

RF channels to be tested for single carrier: B, M and T; see clause 4.9.1.

Under extreme test environment, the test shall be performed on each of B, M and T under extreme power supply conditions as defined in annex B.5.

NOTE: Tests under extreme power supply conditions also test extreme temperatures.

#### 7.2.4.2 Procedure

The minimum requirement is applied to all connectors under test.

The procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested; see clause 7.1.

1) Connect the connector under test to measurement equipment as shown in annex D.2.1.

2) Start the signal generator for the wanted signal to transmit the Fixed Reference Channels for reference sensitivity in clause 7.2.5 and according to annex A.1.

3) Set the signal generator for the wanted signal power as specified in clause 7.2.5.

4) Measure the throughput according to annex A.1.

In addition, for a *multi-band TAB connector*, the following steps shall apply:

5) For *multi-band TAB connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

### 7.2.5 Test requirements

#### 7.2.5.1 Test requirements for *IAB-DU type 1-H*

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.1 with parameters specified in table 7.2.5.1-1 for Wide Area IAB-DU, in table 7.2.5.1-2 for Medium Range IAB-DU and in table 7.2.5.1-3 for Local Area OAB-DU.

Table 7.2.5.1-1: NR Wide Area IAB-DU reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -101 | -100.7 | -100.5 |
|  |  |  |  |  |  |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -101.1 | -100.8 | -100.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -98.2 | -97.9 | -97.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -94.6 | -94.3 | -94.1 |
| 50 |  |  |  |  |  |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 30 | G-FR1-A1-5 (Note 1) | -94.9 | -94.6 | -94.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 (Note 1) | -95 | -94.7 | -94.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the 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 7.2.5.1-2: NR Medium Range IAB-DU reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -96 | -95.7 | -95.5 |
|  |  |  |  |  |  |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -96.1 | -95.8 | -95.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -93.2 | -92.9 | -92.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -89.6 | -89.3 | -89.1 |
| 50 |  |  |  |  |  |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 30 | G-FR1-A1-5 (Note 1) | -89.9 | -89.6 | -89.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 60 | G-FR1-A1-6 (Note 1) | -90 | -89.7 | -89.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the 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 7.2.5.1-3: NR Local Area IAB-DU reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| *BS channel* | Sub-carrier | Reference | Reference sensitivity power level, PREFSENS (dBm) |
| *bandwidth* (MHz) | spacing (kHz) | measurement channel | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15 | 15 | G-FR1-A1-1 (Note 1) | -93 | -92.7 | -92.5 |
|  |  |  |  |  |  |
| 10, 15 | 30 | G-FR1-A1-2 (Note 1) | -93.1 | -92.8 | -92.6 |
| 10, 15 | 60 | G-FR1-A1-3 (Note 1) | -90.2 | -89.9 | -89.7 |
| 20, 25, 30, 40, | 15 | G-FR1-A1-4 (Note 1) | -86.6 | -86.3 | -86.1 |
| 50 |  |  |  |  |  |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 30 | G-FR1-A1-5 (Note 1) | -86.9 | -86.6 | -86.4 |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 60 | G-FR1-A1-6 (Note 1) | -87 | -86.7 | -86.5 |
| NOTE 1: PREFSENS is the power level of a single instance of the 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*. |

#### 7.2.5.2 Test requirements for *IAB-MT type 1-H*

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex A.1 with parameters specified in table 7.2.5.2-1 for Wide Area IAB-MT and in table 7.2.5.2-2 for Local Area IAB-MT.

Table 7.2.5.2-1: Wide Area IAB-MT reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| IAB-MT channel bandwidth (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | Reference sensitivity power level, PREFSENS(dBm) |
| f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15 | 30 | G-FR1-A1-22 (Note 1) | [-101.3] | [-101] | [-100.8] |
| 10, 15 | 60 | G-FR1-A1-23 (Note 1) | [-98.3] | [-98] | [-97.8] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-25 (Note 1) | [-94.7] | [-94.4] | [-94.2] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-26 (Note 1) | [-94.9] | [-94.6] | [-94.4] |
| NOTE 1: PREFSENS is the power level of a single instance of the 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-MT channel bandwidth*. |

Table 7.2.5.2-2: Local Area IAB-MT reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| IAB-MT channel bandwidth (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | Reference sensitivity power level, PREFSENS(dBm) |
| f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15 | 30 | G-FR1-A1-22 (Note 1) | [-93.3] | [-93] | [-92.8] |
| 10, 15 | 60 | G-FR1-A1-23 (Note 1) | [-90.3] | [-90] | [-89.8] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-25 (Note 1) | [-86.7] | [-86.4] | [-86.2] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-26 (Note 1) | [-86.9] | [-86.6] | [-86.4] |
| NOTE 1: PREFSENS is the power level of a single instance of the 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-MT channel bandwidth*. |

|  |  |  |  |
| --- | --- | --- | --- |
| IAB-MT channel bandwidth (MHz) | Sub-carrier spacing (kHz) | Reference measurement channel | Reference sensitivity power level, PREFSENS(dBm) |
| 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz |
| 10, 15  | 30 | G-FR1-A1-22 (Note 1) | [-93] | [-92.8] |
| 10, 15 | 60 | G-FR1-A1-23 (Note 1) | [-90] | [-89.8] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 30 | G-FR1-A1-25 (Note 1) | [-86.4] | [-86.2] |
| 20, 25, 30, 40, 50, 60, 70, 80, 90, 100  | 60 | G-FR1-A1-26 (Note 1) | [-86.6] | [-86.4] |
| NOTE 1: PREFSENS is the power level of a single instance of the 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-MT channel bandwidth*. |

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