**3GPP TSG-RAN WG4 Meeting#98-bis-e R4-2106602**

**E-meeting,12th April– 20th April, 2021**

**Agenda item: 5.3.2.4.2**

**Source: ZTE Corporation**

**Title: TP to TS 38.176-2: RX ICS requirements**

**Document for:** **Approval**

1. Introduction

In the past RAN4#98e meetings, work split has been agreed among companies, therefore in this contribution, we want to share the draft TP for section 7.9 ICS requirements test for further discussion.

1. Reference

[1] R4-2103856,WF on IAB conformance specification work split and drafting guidelines, approved.

1. Annex

## <Start of TP>

## 7.9 OTA in-channel selectivity

### 7.9.1 Definition and applicability

In-channel selectivity (ICS) is a measure of the receiver ability to receive a wanted signal at its assigned resource block locations in the presence of an interfering signal received at a larger power spectral density. In this condition a throughput requirement shall be met for a specified reference measurement channel. The interfering signal shall be an NR signal as specified in annex E in TS 38.176-1 [x] and shall be time aligned with the wanted signal.

### 7.9.2 Minimum requirement

The minimum requirement for *IAB-DU type 1-O* is in TS 38.174 [X], clause 10.9.2.

The minimum requirement for *IAB-DU type 2-O* is in TS 38.174 [X], clause 10.9.3.

### 7.9.3 Test purpose

The purpose of this test is to verify the IAB receiver ability to suppress the IQ leakage.

### 7.9.4 Method of test

#### 7.9.4.1 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:

- For *IAB type 1-O*, receiver target reference direction (D.31),

- For *IAB type 2-O*, OTA REFSENS receiver target reference direction (D.54).

#### 7.9.4.2 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.2.7.

2) Align the manufacturer declared coordinate system orientation of the IAB node with the test system.

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

4) Align the IAB-DU to that the wanted signal and interferer signal is *polarization matched* with the test antenna(s).

5) Configure the beam peak direction for the transmitter according to the declared reference beam direction pair for the appropriate beam identifier.

6) Set the IAB-DU to transmit beam(s) of the same operational band as the *OTA REFSENS RoAoA* or OSDD being tested according to the appropriate test configuration in clauses 4.7 and 4.8.

7) Set the test signal mean power so the calibrated radiated power at the IAB Antenna Array coordinate system reference point is as specified as follows:

a) Adjust the signal generator for the wanted signal as specified in subclause 7.9.5.1 for *IAB-DU type 1-O* and subclause 7.9.5.2 for for *IAB-DU type 2-O*;

b) Adjust the signal generator for the interfering signal as specified in subclause 7.9.5.1 for IAB-DU type 1-O and subclause 7.9.5.2 for for IAB-DU type 2-O;

8) Measure throughput according to annex A.1 for each supported polarization.

9) Repeat the measurement with the wanted signal on the other side of the FC, and the interfering signal at opposite side of the FC and adjacent to the wanted signal.

10) Repeat for all the specified measurement directions and supported polarizations.

In addition, for *multi-band RIB(s)*, the following steps shall apply:

9) For *multi-band RIBs* 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.

### 7.9.5 Test requirement

#### 7.9.5.1 *IAB-DU type 1-O*

The requirement shall apply at the RIBwhen the AoA of the incident wave of the received signal and the interfering signal are the same direction and are within the *minSENS RoAoA*

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

For a wanted and an interfering signal coupled to the RIB, the following requirements shall be met:

- For *IAB-DU 1-O*, 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 7.9.5.1-1 for Wide Area IAB-DU, in table 7.9.5.1-2 for Medium Range IAB-DU and in table 7.9.5.1-3 for Local Area IAB-DU.

Table 7.9.5.1-1: Wide Area IAB-DU in-channel selectivity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | Interfering signal mean | Type of interfering |
| (MHz) | (kHz) | channel(annex A.1) | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) | signal |
| 5 | 15 | G-FR1-A1-7 | -98.9-ΔminSENS | -98.5-ΔminSENS | -98.2-ΔminSENS | -81.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -97-ΔminSENS  | -96.6-ΔminSENS  | -96.3-ΔminSENS  | -77.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 40, 50 | 15 | G-FR1-A1-4 | -90.6-ΔminSENS  | -90.2-ΔminSENS  | -89.9-ΔminSENS  | -71.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -99.6-ΔminSENS | -99.2-ΔminSENS | -98.9-ΔminSENS | -81.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -97.1-ΔminSENS  | -96.7-ΔminSENS  | -96.4-ΔminSENS  | -78.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -90.9-ΔminSENS  | -90.5-ΔminSENS  | -90.2-ΔminSENS  | -71.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -96.5-ΔminSENS  | -96.1-ΔminSENS  | -95.8-ΔminSENS  | -78.4 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -91-ΔminSENS | -90.6-ΔminSENS | -90.3-ΔminSENS | -71.6 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *IAB-DU channel bandwidth* of the wanted signal according to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the IAB-DU channel bandwidth of the wanted signal.  |

Table 7.9.5.1-2: Medium Range IAB-DU in-channel selectivity

| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | Interfering signal mean | Type of interfering |
| --- | --- | --- | --- | --- | --- |
| (MHz) | (kHz) | channel(annex A.1) | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) | signal |
| 5 | 15 | G-FR1-A1-7 | -93.9-ΔminSENS  | -93.5-ΔminSENS  | -93.2-ΔminSENS  | -76.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -92-ΔminSENS  | -91.6-ΔminSENS  | -91.3-ΔminSENS  | -72.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 40, 50 | 15 | G-FR1-A1-4 | -85.6-ΔminSENS  | -85.2-ΔminSENS  | -84.9-ΔminSENS  | -66.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -94.6-ΔminSENS  | -94.2-ΔminSENS  | -93.9-ΔminSENS  | -76.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -92.1-ΔminSENS  | -91.7-ΔminSENS  | -91.4-ΔminSENS  | -73.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -85.9-ΔminSENS  | -85.5-ΔminSENS  | -85.2-ΔminSENS  | -66.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -91.5-ΔminSENS  | -91.1-ΔminSENS  | -90.8-ΔminSENS  | -73.4 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -86-ΔminSENS  | -85.6-ΔminSENS  | -85.3-ΔminSENS  | -66.6 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *IAB-DU channel bandwidth* of the wanted signal according to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the IAB-DU channel bandwidth of the wanted signal. |

Table 7.9.5.1-3: Local area IAB-DU in-channel selectivity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR channel bandwidth | Subcarrier spacing | Reference measurement | Wanted signal mean power (dBm) | Interfering signal mean | Type of interfering |
| (MHz) | (kHz) | channel(annex A.1) | f ≤ 3.0 GHz | 3.0 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6.0 GHz | power (dBm) | signal |
| 5 | 15 | G-FR1-A1-7 | -90.9-ΔminSENS  | -90.5-ΔminSENS  | -90.2-ΔminSENS  | -73.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 10 RBs |
| 10, 15, 20, 25, 30 | 15 | G-FR1-A1-1 | -89-ΔminSENS  | -88.6-ΔminSENS  | -88.3-ΔminSENS  | -69.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 25 RBs |
| 40, 50 | 15 | G-FR1-A1-4 | -82.6-ΔminSENS  | -82.2-ΔminSENS  | -81.9-ΔminSENS  | -63.4 - ΔminSENS | DFT-s-OFDM NR signal, 15 kHz SCS, 100 RBs |
| 5 | 30 | G-FR1-A1-8 | -91.6-ΔminSENS  | -91.2-ΔminSENS  | -90.9-ΔminSENS  | -73.4 - ΔminSENS | DFT-s- NR signal, 30 kHz SCS, 5 RBs |
| 10, 15, 20, 25, 30 | 30 | G-FR1-A1-2 | -89.1-ΔminSENS  | -88.7-ΔminSENS  | -88.4-ΔminSENS  | -70.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 10 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-5 | -82.9-ΔminSENS  | -82.5-ΔminSENS  | -82.2-ΔminSENS  | -63.4 - ΔminSENS | DFT-s-OFDM NR signal, 30 kHz SCS, 50 RBs |
| 10, 15, 20, 25, 30 | 60 | G-FR1-A1-9 | -88.5-ΔminSENS  | -88.1-ΔminSENS  | -87.8-ΔminSENS  | -70.4 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 5 RBs |
| 40, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-6 | -83-ΔminSENS  | -82.6-ΔminSENS  | -82.3-ΔminSENS  | -63.6 - ΔminSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 24 RBs |
| NOTE: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *IAB-DU channel bandwidth* of the wanted signal according to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the IAB-DU channel bandwidth of the wanted signal. |

#### 7.9.5.2 *IAB-DU type 2-O*

For *IAB-DU type 2-O*, 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 7.9.5.2-1.

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

Table 7.9.5.2-1: OTA in-channel selectivity requirement for *IAB-DU type 2-O*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR channel bandwidth (MHz) | Subcarrier spacing (kHz) | Reference measurement channel(annex A.1) | Wanted signal mean power (dBm)(Note 2) | Interfering signal mean power (dBm)(Note 2) | Type of interfering signal |
| 50 | 60 | G-FR2-A1-4 | EISREFSENS\_50M + 3.4 + ΔFR2\_REFSENS | EISREFSENS\_50M + 10 + ΔFR2\_REFSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 32 RBs |
| 100, 200 | 60 | G-FR2-A1-1 | EISREFSENS\_50M + 6.4 + ΔFR2\_REFSENS | EISREFSENS\_50M + 13 + ΔFR2\_REFSENS | DFT-s-OFDM NR signal, 60 kHz SCS, 64 RBs |
| 50 | 120 | G-FR2-A1-5 | EISREFSENS\_50M + 3.4 + ΔFR2\_REFSENS | EISREFSENS\_50M + 10 + ΔFR2\_REFSENS | DFT-s-OFDM NR signal, 120 kHz SCS, 16 RBs |
| 100, 200, 400 | 120 | G-FR2-A1-2 | EISREFSENS\_50M+ 6.4 + ΔFR2\_REFSENS | EISREFSENS\_50M + 13 + ΔFR2\_REFSENS | DFT-s-OFDM NR signal, 120 kHz SCS, 32 RBs |
| NOTE 1: Wanted and interfering signal are placed adjacently around Fc, where the Fc is defined for *IAB-DU channel bandwidth* of the wanted signal according to the table 5.4.2.2-1 in TS 38.104 [2]. The aggregated wanted and interferer signal shall be centred in the IAB-DU channel bandwidth of the wanted signal.NOTE 2: EISREFSENS\_50M is defined in TS38.174 [xx], clause 10.2.1.2. |

## <End of TP>