**3GPP TSG-RAN WG4 Meeting # 104-e R4-22xxxxx**

**Electronic Meeting, August 15-26, 2022**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.175** | **CR** | Draft | **rev** |  | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <http://www.3gpp.org/Change-Requests>.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Draft CR to TS 38.175 IAB exclusion band and radiated emission | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | ZTE | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB-Core | | | | |  | ***Date:*** | | | 2022-7-7 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The requirements for exclusion band and radiated emission in TS38.174 and TS 38.176 are separated for IAB-DU and IAB-MT. However such requirements in TS38.175 do not distinguish IAB-DU and IAB-MT. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Some changes have been made via exclusion band and radiated emission. IAB-DU and IAB-MT are considered separately in clauses 4.4 and 8.2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The exclusion band and radiated emission requirements would not separated for IAB-MT and IAB-DU, which is not aligned with IAB RF and conformance requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.4, 8.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

3.2 Symbols

For the purposes of the present document, the following symbols apply:

BWChannel Channel bandwidth

ΔfOBUE Maximum offset of the *operating band* unwanted emissions mask from the downlink *operating band* edge

FDL,low The lowest frequency of the downlink *operating band*

FDL,high The highest frequency of the downlink *operating band*

FUL,low The lowest frequency of the uplink *operating band*

FUL,high The highest frequency of the uplink *operating band*

**--------------Next text changes -------------**

4.4 Exclusion bands

4.4.1 Transmitter exclusion band

The *transmitter exclusion band* for IAB is the frequency range over which no tests of radiated immunity of a transmitter are made. As the IAB node may operate its access and backhaul link in different NR IAB *operating band*, the *transmitter exclusion band* for IAB applies separately for the access and backhaul link. The *transmitter exclusion band* applies to *IAB type 1-O*.

The *transmitter exclusion band* is defined as:

FDL,low – ΔfOBUE <f < FDL,high + ΔfOBUE

Where:

- Values of FDL,low and FDL,high, FUL,low and FUL,high are defined for each NR IAB *operating band* in TS 38.174 [2], clause 5.2.

- The value of ΔfOBUE is derived considering the width of the NR IAB *operating band*, and is defined as in table 4.4.1-1 and table 4.4.1-2.

**Table 4.4.1-1: ΔfOBUE offset value for NR IAB-DU**

|  |  |  |
| --- | --- | --- |
| **IAB-DU type** | ***Operating band* characteristics** | **ΔfOBUE (MHz)** |
| *IAB-DU type 1-O* | FDL,high – FDL,low < 100 MHz | 10 |
|  | 100 MHz ≤ FDL,high – FDL,low ≤ 900 MHz | 40 |

**Table 4.4.1-2: ΔfOBUE offset value for NR IAB-MT**

|  |  |  |
| --- | --- | --- |
| **IAB-MT type** | ***Operating band* characteristics** | **ΔfOBUE (MHz)** |
| *IAB-MT type 1-O* | FUL,high – FUL,low < 100 MHz | 10 |
|  | 100 MHz ≤ FUL,high – FUL,low ≤ 900 MHz | 40 |



For IAB node capable of multi-band operation, the total transmitter exclusion band is a combination of the exclusion bands for each operating band supported by IAB node.

NOTE: As the radiated immunity testing is defined in the frequency range 80 MHz to 6 GHz, there is no *transmitter exclusion band* defined for *IAB type 2-O*.

**--------------Next text changes -------------**

8.2 Radiated emission

8.2.1 Radiated emission, IAB

This test is applicable to *IAB type 1-H*. This test shall be performed on a representative configuration of IAB node.

For *IAB type 1-O* and *IAB type 2-O*, the radiated emission is covered by radiated spurious emission requirement in TS 38.174 [2], conforming to the test requirement in TS 38.174[2].

8.2.1.1 Definition

This test assesses the ability of IAB node to limit unwanted emission from the *enclosure port*.

8.2.1.2 Test method

a) A test site fulfilling the requirements of ITU-R SM.329 [20] shall be used. The IAB node shall be placed on a non-conducting support and shall be operated from a power source via a RF filter to avoid radiation from the power leads. One of the following two alternative measurement methods shall be used:

1) Field strength method measurement

The test method shall be in accordance with CISPR 32 [6]. The field strength measurements shall be performed on a test site that is validated according to the methods and requirements of CISPR 16-1-4 [23].

Unless otherwise stated, measurements are conducted at 3 m or 10 m on an open area test site (OATS) or semi anechoic chamber (SAC) for frequencies up to 1 GHz, or at 3 m on a free space open area test site (FSOATS) or fully-anechoic room (FAR) for frequencies above 1 GHz. Unless otherwise stated, all measurements are done with RMS detector and with the -3 dB bandwidth of the measuring filter equal to the reference bandwidth in table 8.2.1.3-1.

NOTE 1: Test site validation methods for radiated emissions tests are defined in CISPR 16-1-4 [23], clause 6 and 7. Examples of test site validation methods are listed below:

- 30 - 1000 MHz frequency range: Normalized Site Attenuation (NSA), Reference Site Method (RSM).

- 1 - 18 GHz frequency range: SVSWR standard test procedure, SVSWR reciprocal test procedure.

2) Substitution method measurement (also called a substitution method)

Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser). At each frequency at which a component is detected, the IAB node shall be rotated and the height of the test antenna adjusted to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power (e.r.p.) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p, as defined in ITU-R SM.329 annex 1 [20].

e.r.p. (dBm) = e.i.r.p. (dBm) - 2.15

b) The IAB node shall transmit with maximum power declared by the manufacturer with all transmitters active. Set the base station to transmit a signal as stated in subclause 4.5.

c) For IAB-DU the received power shall be measured over the frequency range from 30 MHz to FDL,low - ΔfOBUE and from FDL,high + ΔfOBUE up to 12750 MHz. The video bandwidth shall be approximately three times the resolution bandwidth. If this video bandwidth is not available on the measuring receiver, it shall be the maximum available and at least 1 MHz. For some *operating bands*, the upper limit is higher than 12.75 GHz in order to comply with the 5th harmonic limit of the downlink *operating band*, as specified in ITU-R recommendation SM.329 [20].Unless otherwise stated, all measurements are done as mean power (RMS).

d) For IAB-MT the received power shall be measured over the frequency range from 30 MHz to FUL,low - ΔfOBUE and from FUL,high + ΔfOBUE up to 12750 MHz. The video bandwidth shall be approximately three times the resolution bandwidth. If this video bandwidth is not available on the measuring receiver, it shall be the maximum available and at least 1 MHz. For some *operating bands*, the upper limit is higher than 12.75 GHz in order to comply with the 5th harmonic limit of the uplink *operating band*, as specified in ITU-R recommendation SM.329 [20].Unless otherwise stated, all measurements are done as mean power (RMS).

8.2.1.3 Limits

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out of band emissions and spurious emissions are based on ITU-R Recommendations SM.329 [20] and SM.1539 [21]. The *IAB type 1-H* shall meet the limits below:

**Table 8.2.1.3-1: Limits for radiated emissions from IAB type 1-H**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Range** | **e.r.p.**  **(dBm)** | **Field strength at 3 m (dBµV/m)**  **(NOTE 4)** | **Field strength at 10 m**  **(dBµV/m)**  **(NOTE 4)** | **Reference bandwidth** | **NOTE** |
| 30 MHz ≤ f < 1000 MHz | -36 | 65.4 (NOTE 5) | 54.9 (NOTE 5) | 100 kHz |  |
| 1 GHz ≤ f < 12.75 GHz | -30 | 67.4 | Not applicable | 1 MHz |  |
| 12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the DL operating band in GHz | -30 | 67.4 | Not applicable | 1 MHz | 1 |
| FDL,low - ΔfOBUE < f < FDL,high +ΔfOBUE (for IAB-DU) | Not defined | Not defined | Not defined | Not defined | 2,3 |
| FUL,low - ΔfOBUE < f < FUL,high +ΔfOBUE (for IAB-MT) |
| NOTE 1: For IAB-DU, this spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the DL *operating band* is reaching beyond 12.75 GHz. For IAB-MT, this spurious frequency range applies only for *operating bands* for which the 5th harmonic of the upper frequency edge of the UL *operating band* is reaching beyond 12.75 GHz.  NOTE 2: For IAB node capable of multi-band operation, the frequency ranges relating to the RF bandwidths of all supported *operating bands* apply.  NOTE 3: ΔfOBUE is defined in clause 6.6.1 of TS 38.174 [2].  NOTE 4: The field strength measurements shall be conducted on OATS or SAC for frequencies up to 1 GHz, or on FSOATS or FAR for frequencies above 1 GHz.  NOTE 5: Limits for radiated emissions are translated from the e.r.p. limit of -36 dBm into the field strength limit of 61.4 dBµV/m (at 3m) or 50.9 dBµV/m (at 10m), and increased by the site gain value of 4 dB. The value of the site gain is based on ITU-R Recommendations SM.329 [20]. | | | | | |

8.2.1.4 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the radiated emission measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;

- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;

- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the values in table 8.2.1.4-1 for IAB node.

Table 8.2.1.4-1 specifies the maximum measurement uncertainty of the test system. The test system shall enable the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95 % is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

**Table 8.2.1.4-1: Maximum measurement uncertainty (IAB node)**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Uncertainty for EUT dimension ≤ 1 m** | **Uncertainty for EUT dimension >1 m** |
| Effective radiated RF power between 30 MHz to 180 MHz | ±6 dB | ±6 dB |
| Effective radiated RF power between 180 MHz to 4 GHz | ±4 dB | ±6 dB |
| Effective radiated RF power between 4 GHz to 12,75 GHz | ±6 dB | ±9 dB (NOTE) |
| Field strength between 30 MHz to 12,75 GHz | ±6 dB | ±6 dB |
| NOTE: This value may be reduced to ±6 dB when further information on the potential radiation characteristic of the EUT is available. | | |

NOTE: If the test system for a test is known to have a measurement uncertainty greater than that specified in table 8.2.1.4-1, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the test system over and above that specified in table 8.2.1.4-1 is used to tighten the test requirements - making the test harder to pass.

This procedure will ensure that a test system not compliant with table 8.2.1.4-1 does not increase the probability of passing an EUT that would otherwise have failed a test if a test system compliant with table 8.2.1.4-1 had been used.

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