**3GPP TSG-RAN WG4 Meeting #100-e *R4-2115868***

**Electronic meeting, August 16-27, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | TS 38.176-1 | **CR** | **xxx** | **rev** |  | **Current version:** | 16.0.0 |  |
|  | | | | | | | | |
| *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 | **x** | Core Network |  |

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| ***Title:*** | Big CR for TS 38.176-1 Maintenance | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | MCC, CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB-Perf | | | | |  | ***Date:*** | | | 2021-08-29 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | This big CR merges the mutilpe endorsed draft CRs: R4-2113489, R4-2114227, R4-2114320, R4-2115701, R4-2115702, R4-2115708, R4-2115710, R4-2115711, R4-2115712, R4-2115713, R4-2115717, R4-2115768.  The reason for change in each endorsed draft CR is copied below.  R4-2113489 Draft CR to TS 38.176-1 – alignment for test models acronyms  This draft CR introduces corrections to test model acronyms used for test models for some of the IAB tests.  Currently in TS 38.176-1 IAB test specification exist different approaches in some IAB test descriptions that use references to IAB test models (TMs).  Some of the tests use acronyms for test models from NR specification directly for example: “NR-FR1-TMx.x”. Such cases were aligned to acronym “IAB-DU-FR1-TMx.x” or “IAB-DU-FR1-TMx.x” or “IAB-MT-FR1-TMx.x” or “IAB-MT-FR  Some of the tests use acronyms “IAB-FR1-TM1.1” – as this refers to both DU and MT, however such acronym is not define in specification thus it should be directly with “DU” or “MT” added like “IAB-DU-FR1-TM1.1” or “IAB-MT-FR1-TM1.1”.  Similar draft CR is also submitted in [1] for conducted IAB test specification TS 38.176-2.  [1] R4-2113490 Draft CR to TS 38.176-2 – alignment for test models acronyms, Nokia, Nokia Shanghai Bell  R4-2114227 DraftCR to TS 38.176-1 – Corrections  Errors were found in the text.  R4-2114320 CR on TX conducted performance specification of IAB  6.1: Ncell defintion unclear, beam is not equal to the cell, cell can be covered with multiple beam  6.6.3.5.2: TT needs to be considered for test requriement of ACLR  Some typo in specification  R4-2115701 Maintenance CR to TS 38.176-1   1. Type of interfering signal of IAB-MT narrowband blocking interferer is not defined correctly. 2. 5MHz is not applicable for IAB-MT   R4-2115702 CR on conducted performance specification of IAB - Others  3.1: there are terminology for OTA and not used in conducted perforamnce specification, should be removed  3.2: some symbol related to antenna connector should be removed  R4-2115708 Draft CR to TS 38.176-1: Test efficiency optimization  Test efficiency optimization is not aligned between conducted and radiated requirements. Test requirement applicability has errors setting wrong or unnecessary rules.  R4-2115710 Draft CR to 38.176-1: Correction of antenna terminology  For the IAB performance requirements, the test procedures currently refer to “antenna connectors”. For BS, this terminology applies to BS type 1-C. IAB does not have type 1-C. For type 1-H, the term “TAB connectors” should be used.  R4-2115711 draftCR on IAB conducted conformance testing (Manufacturer declarations) to TS 38.176-1  Provide updated draft CR for NR IAB conducted conformance testing (Manufacturer declarations) as per work split.  R4-2115712 draftCR to TS 38.176-1 IAB-DU performance requirements  Provide corrections to the first published version of the TS sections on IAB-DU perefomance requirements as per work split  R4-2115713 Draft CR to 38.176-1: Applicability for IAB-MT requirements  Currently the applicability for IAB-MT requirements is not defined.  R4-2115717 draftCR on IAB-MT conducted conformance testing (CSI reporting and Interworking) to TS 38.176-1  Provide updated draft CR for NR IAB-MT conducted conformance testing (CSI reporting and Interworking) as per work split.  R4-2115768 Draft CR to TS 38.176-1: Correction of applicability rules for demodulation performance requirements  Applicability rules agreed for IAB performacnce verification are not captured in specification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.  R4-2113489 Draft CR to TS 38.176-1 – alignment for test models acronyms   1. Clause 6.3.1.3.4.2: rename NR-FR1-TMx.x to IAB-DU-FR1-TMx.x respectively in step 3 and 5. 2. Clause 6.6.2.4.1: addition of aprioperiate acronyms of TMs instead of undefine acronyms “IAB-FR1-TMx.x” 3. Clause 6.6.3.4.2: addition of aprioperiate acronyms of TMs instead of undefine acronyms “IAB-FR1-TMx.x”   Clause 6.6.4.4.2: addition of aprioperiate acronyms of TMs instead of undefine acronyms “IAB-FR1-TMx.x”  R4-2114227 DraftCR to TS 38.176-1 – Corrections  Term BS still existsi in some coppied text where it should be IAB as follows:  Table 4.1.2.2-1 BS chanel BW should be IAB channel BW  6.3.1.2.1 – BS should be IAB-DU  6.3.1.3.1 – BS should be IAB-DU  6.3.1.3.4.2 – step 3) BS should be IAB-DU  Table C.1-1, the note covering 4.2-6GHz should be note 1  R4-2114320 CR on TX conducted performance specification of IAB  6.1: remove beam relating to Ncell defintion  6.6.3.5.2: consider TT for test requriement of ACLR  Some typo in specification is corrected  R4-2115701 Maintenance CR to TS 38.176-1   1. Correct the type of interfering signal of IAB-MT narrowband blocking interferer; 2. Remove 5MHz for IAB-MT narrow band blocking.   R4-2115702 CR on conducted performance specification of IAB - Others  3.1: Remove terminology for OTA  3.2: Remove some symbol related to antenna connector of Type 1-C  R4-2115708 Draft CR to TS 38.176-1: Test efficiency optimization  Statements describing scenarios taking place only in radiated requiremetns are removed. Additional conditions for declarations added. Corrections to test requirement applicability. Editorial corrections.  R4-2115710 Draft CR to 38.176-1: Correction of antenna terminology  “Antenna connector” terminology updated to “TAB connector”.  R4-2115711 draftCR on IAB conducted conformance testing (Manufacturer declarations) to TS 38.176-1  For introducing IAB conducted conformance testing (Manufacturer declarations), update clause 4.6.  R4-2115712 draftCR to TS 38.176-1 IAB-DU performance requirements   1. Editorial changes to the references and tables 2. Removal of 5MHz CBW 3. Voding applicability rules   R4-2115713 Draft CR to 38.176-1: Applicability for IAB-MT requirements  IAB-MT requirements applicability is captured relating to capability signaling. The declarations align the applicability to the approach for IAB-DU and the capability table relates the applicability to RAN2 signaling.  Synchronization source added to figures in D.3 and note updated.  R4-2115717 draftCR on IAB-MT conducted conformance testing (CSI reporting and Interworking) to TS 38.176-1  For introducing IAB-MT conducted conformance testing (CSI reporting and Interworking), update clause 8.2.3.  R4-2115768 Draft CR to TS 38.176-1: Correction of applicability rules for demodulation performance requirements  Clarification of Applicability rules for IAB-DU | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  R4-2113489 Draft CR to TS 38.176-1 – alignment for test models acronyms  Specification will be misleading.  R4-2114227 DraftCR to TS 38.176-1 – Corrections  The requirements are not clear  R4-2114320 CR on TX conducted performance specification of IAB  Errors in specificaitons.  R4-2115701 Maintenance CR to TS 38.176-1  Type of interfering signal of IAB-MT narrowband blocking interferer is not defined correctly.  R4-2115702 CR on conducted performance specification of IAB - Others  Errors in specificaitons.  R4-2115708 Draft CR to TS 38.176-1: Test efficiency optimization  Misalignment and errors exist resulting in unfair treatment depending on whether a device conforms to radiated or conducted requirements. Errors in the applicability rules remain  R4-2115710 Draft CR to 38.176-1: Correction of antenna terminology  Incorrect terminology, potential confusion of IAB types.  R4-2115711 draftCR on IAB conducted conformance testing (Manufacturer declarations) to TS 38.176-1  There will be inconsistence between the specification 38.176-1 and RAN 4 agreements.  R4-2115712 draftCR to TS 38.176-1 IAB-DU performance requirements  It will be inconsistencies in the specification 38.176-1  R4-2115713 Draft CR to 38.176-1: Applicability for IAB-MT requirements  Unclear applicability for IAB-MT requirements.  R4-2115717 draftCR on IAB-MT conducted conformance testing (CSI reporting and Interworking) to TS 38.176-1  There will be inconsistence between the specification 38.176-1 and RAN 4 agreements.  R4-2115768 Draft CR to TS 38.176-1: Correction of applicability rules for demodulation performance requirements  Performance for IAB node cannot be guaranteed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | R4-2113489 Draft CR to TS 38.176-1 – alignment for test models acronyms  6.3.1.3.4.2, 6.6.2.4.1, 6.6.3.4.2, 6.6.4.4.2  R4-2114227 DraftCR to TS 38.176-1 – Corrections  4.1.2.2, 6.3.1.2.1, 6.3.1.3.1, 6.3.1.3.4.2, C.1  R4-2114320 CR on TX conducted performance specification of IAB  6.1, 6.3.1.3.1, 6.3.2.1.4.2, 6.6.3.5.2  R4-2115701 Maintenance CR to TS 38.176-1  7.4.2.5.2  R4-2115702 CR on conducted performance specification of IAB - Others  3.1, 3.2  R4-2115708 Draft CR to TS 38.176-1: Test efficiency optimization  4.13  R4-2115710 Draft CR to 38.176-1: Correction of antenna terminology  8.1.2.1.4.2, 8.1.2.2.4.2, 8.1.2.3.4.2, 8.1.3.1.4.2, 8.1.3.2.1.4.2, 8.1.3.2.2.4.2, 8.1.3.3.1.4.2, 8.1.3.3.2.4.2, 8.1.3.4.4.2, 8.1.3.5.4.2, 8.1.3.6.1.1.4.2, 8.1.3.6.1.2.4.2, 8.1.4.1.4.2, 8.2.2.2.4.2, 8.2.2.3.4.2, 8.2.3.2.4.2, 8.2.3.3.4.2, 8.2.3.4.4.2  R4-2115711 draftCR on IAB conducted conformance testing (Manufacturer declarations) to TS 38.176-1  4.6  R4-2115712 draftCR to TS 38.176-1 IAB-DU performance requirements  8.1  R4-2115713 Draft CR to 38.176-1: Applicability for IAB-MT requirements  8.2.2.1, D3  R4-2115717 draftCR on IAB-MT conducted conformance testing (CSI reporting and Interworking) to TS 38.176-1  8.2.3  R4-2115768 Draft CR to TS 38.176-1: Correction of applicability rules for demodulation performance requirements  8.1.1.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.176-2 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

***<Start of change>***

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**aggregated IAB channel bandwidth:** the RF bandwidth in which a IAB-DU or IAB-MT transmits and receives multiple contiguously aggregated carriers. The *aggregated IAB channel bandwidth* is measured in MHz

**active transmitter unit:** transmitter unit which is ON, and has the ability to send modulated data streams that are parallel and distinct to those sent from other transmitter units to one or more *IAB type 1-H* *TAB connectors* at the *transceiver array boundary*

**basic limit:** emissions limit relating to the power supplied by a single transmitter to a single antenna transmission line in ITU-R SM.329 [5] used for the formulation of unwanted emission requirements for FR1

**beam:** beam (of the antenna) is the main lobe of the radiation pattern of an *antenna array*

NOTE: For certain *antenna array*, there may be more than one beam.

**Channel edge:** lowest or highest frequency of the NR carrier, separated by the *IAB-MT channel bandwidth* or *IAB-DU channel bandwidth*.

**Carrier aggregation:** aggregation of two or more component carriers in order to support wider *transmission bandwidths*

**Carrier aggregation configuration:** a set of one or more *operating bands* across which the IAB-DU or IAB-MT aggregates carriers with a specific set of technical requirements

**co-location reference antenna**: a passive antenna used as reference for co-location requirements

**Contiguous spectrum:** spectrum consisting of a contiguous block of spectrum with no *sub-block gap(s)*.

**fractional bandwidth:** *fractional bandwidth* FBW is defined as

**highest carrier:** The carrier with the highest carrier frequency transmitted/received in a specified frequency band.

**IAB-donor**:gNB that provides network access to UEs via a network of backhaul and access links.

**IAB-DU channel bandwidth**: RF bandwidth supporting a single IAB-DU RF carrier with the *transmission bandwidth* configured in the uplink or downlink

NOTE 1: The *IAB-DU channel bandwidth* is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

NOTE 2: It is possible for the IAB to transmit to and/or receive from one or more UE bandwidth parts that are smaller than or equal to the *IAB transmission bandwidth configuration*, in any part of the *IAB transmission bandwidth configuration*.

**IAB-DU RF Bandwidth:** RF bandwidth in which an IAB-DU transmits and/or receives single or multiple carrier(s) within a supported *operating band*

**IAB-DU RF Bandwidth edge:** frequency of one of the edges of the *IAB-DU RF Bandwidth*.

**IAB-MT channel bandwidth**: RF bandwidth supporting a single IAB-MT RF carrier with the *transmission bandwidth* configured in the uplink or downlink

NOTE 1: The *IAB-MT channel bandwidth* is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

**IAB-MT RF Bandwidth**: RF bandwidth in which an IAB-MT transmits and/or receives single or multiple carrier(s) within a supported *operating band*

NOTE: In single carrier operation, the *IAB-MT RF Bandwidth* is equal to the *IAB-MT channel bandwidth*.

**IAB-MT RF Bandwidth edge:** frequency of one of the edges of the *IAB-MT RF Bandwidth*.

**IAB RF Bandwidth:** RF bandwidth in which an IAB-DU or IAB-MT transmits and/or receives single or multiple carrier(s) within a supported *operating band*

**IAB RF Bandwidth edge:** frequency of one of the edges of the *IAB RF Bandwidth*.

**IAB type 1-H:** IAB-DU or IAB-MT operating at FR1 with a *requirement set* consisting of conducted requirements defined at individual *TAB connectors* and OTA requirements defined at RIB

**IAB type 1-O:** IAB-DU or IAB-MT operating at FR1 with a *requirement set* consisting only of OTA requirements defined at the RIB

**IAB type 2-O:** IAB-DU or IAB-MT operating at FR2 with a *requirement set* consisting only of OTA requirements defined at the RIB

**inter-band gap**: The frequency gap between two supported consecutive *operating bands*.

**Inter RF Bandwidth gap:** frequency gap between two consecutive *IAB-DU* or *IAB-MT RF Bandwidths* that are placed within two supported *operating bands*

**lowest Carrier:** The carrier with the lowest carrier frequency transmitted/received in a specified frequency band.

**maximum carrier output power:** mean power level measured per carrier at the indicated interface, during the *transmitter ON period* in a specified reference condition

**measurement bandwidth**: RF bandwidth in which an emission level is specified

**multi-band connector**: *TAB connector* of *IAB type 1-H* associated with a transmitter or receiver that is characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different *operating band* than the other carrier(s) and where this different *operating band* is not a *sub-band* or *superseding-band* of another supported *operating band*

**multi-band RIB:** *operating band* specific RIB associated with a transmitter or receiver that is characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different *operating band* than the other carrier(s) and where this different *operating band* is not a *sub-band* or *superseding-band* of another supported *operating band*

**Non-contiguous spectrum:** spectrum consisting of two or more *sub-blocks* separated by *sub-block gap(s)*.

**operating band:** frequency range in which NR operates (paired or unpaired), that is defined with a specific set of technical requirements

NOTE: The *operating band*(s) for an IAB-DU and IAB-MT are declared by the manufacturer

**Parent node**: IAB-MT's next hop neighbour node; the parent node can be IAB-node or IAB-donor.

**Radio Bandwidth:** frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

**rated carrier output power:** mean power level associated with a particular carrier the manufacturer has declared to be available at the indicated interface, during the *transmitter ON period* in a specified reference condition

**rated total output power:** mean power level associated with a particular *operating band* the manufacturer has declared to be available at the indicated interface, during the *transmitter ON period* in a specified reference condition

**requirement set:** one of the NR requirement sets as defined for *IAB type 1-H*, *IAB type 1-O*, and *IAB type 2-O*

**single-band connector:** *IAB type 1-H* *TAB connector* supporting operation either in a single *operating band* only, or in multiple *operating bands* but does not meet the conditions for a *multi-band connector*.

**sub-band**: A *sub-band* of an operating band contains a part of the uplink and downlink frequency range of the operating band.

**sub-block:** one contiguous allocated block of spectrum for transmission and reception by the same IAB-DU or IAB-MT

NOTE: There may be multiple instances of *sub-blocks* within a *IAB RF Bandwidth*.

**sub-block gap:** frequency gap between two consecutive sub-blocks within a *IAB RF Bandwidth*, where the RF requirements in the gap are based on co-existence for un-coordinated operation

**superseding-band**: A *superseding-band* of an operating band includes the whole of the uplink and downlink frequency range of the operating band.

**TAB connector:** *transceiver array boundary* connector

**TAB connector RX min cell group:** *operating band* specific declared group of *TAB connectors* to which *IAB type 1-H* conducted RX requirements are applied

NOTE: Within this definition, the group corresponds to the group of *TAB connectors* which are responsible for receiving a cell when the *IAB type 1-H* setting corresponding to the declared minimum number of cells with reception on all *TAB connectors* supporting an *operating band*, but its existence is not limited to that condition

**TAB connector TX min cell group:** *operating band* specific declared group of *TAB connectors* to which *IAB type 1-H* conducted TX requirements are applied.

NOTE: Within this definition, the group corresponds to the group of *TAB connectors* which are responsible for transmitting a cell when the *IAB type 1-H* setting corresponding to the declared minimum number of cells with transmission on all *TAB connectors* supporting an *operating band*, but its existence is not limited to that condition

**transceiver array boundary:** conducted interface between the transceiver unit array and the composite antenna

**transmission bandwidth:** RF Bandwidth of an instantaneous transmission from an IAB-DU or IAB-MT, measured in resource block units

**transmitter OFF period:** time period during which the IAB-DU or IAB-MT transmitter is not allowed to transmit

**transmitter ON period**: time period during which the IAB-DU or IAB-MT transmitter is transmitting data and/or reference symbols

**transmitter transient period:** time period during which the transmitter is changing from the OFF period to the ON period or vice versa

## 3.2 Symbols

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

 Percentage of the mean transmitted power emitted outside the occupied bandwidth on the assigned channel

BWChannel *BS channel bandwidth*

BWChannel\_CA *Aggregated BS channel bandwidth*, expressed in MHz. BWChannel\_CA= Fedge\_high- Fedge\_low.

BWConfig Transmission bandwidth configuration, expressed in MHz, where BWConfig = *N*RB x SCS x 12 kHz

BWtot *Total RF bandwidth*

Δf Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency

Δfmax f\_offsetmax minus half of the bandwidth of the measuring filter

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

ΔfOOB Maximum offset of the out-of-band boundary from the uplink *operating band* edge

FC *RF reference frequency* on the channel raster

FC,block, high Fc of the highest transmitted/received carrier in a sub-block

FC,block, low Fc of the lowest transmitted/received carrier in a sub-block

FC\_low The Fc of the lowest carrier, expressed in MHz

FC\_high The Fc of the highest carrier, expressed in MHz

Fedge\_low The lower edge of *aggregated BS channel bandwidth*, expressed in MHz. Fedge\_low = FC\_low - Foffset\_low

Fedge\_high The upper edge of *aggregated BS channel bandwidth*, expressed in MHz. Fedge\_high = FC\_high + Foffset\_high.

Foffset\_high Frequency offset from FC\_high to the upper *Base Station RF Bandwidth edge*, or from FC,block, high to the upper sub-block edge

Foffset\_low Frequency offset from FC\_low to the lower *Base Station RF Bandwidth edge*, or from FC,block, low to the lower sub-block edge

FDL\_low The lowest frequency of the downlink *operating band*

FDL\_high The highest frequency of the downlink *operating band*

f\_offset Separation between the channel edge frequency and the centre of the measuring filter

f\_offsetmax The offset to the frequency ΔfOBUE outside the downlink *operating band*

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*

Iuant gNB internal logical interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the gNB

Ncells The declared number corresponding to the minimum number of cells that can be transmitted by an *BS type 1-H* in a particular *operating band*

NRB Transmission bandwidth configuration, expressed in resource blocks

NRXU,active The number of active receiver units. The same as the number of *demodulation branches* to which compliance is declared for chapter 8 performance requirements

NRXU,counted The number of active receiver units that are taken into account for conducted Rx spurious emission scaling, as calculated in clause 7.6.1

NRXU,countedpercell The number of active receiver units that are taken into account for conducted RX spurious emissions scaling per cell, as calculated in clause 7.6.1

NTXU,counted The number of *active transmitter units* as calculated in clause 6.1, that are taken into account for conducted TX output power limit in clause 6.2.1, and for unwanted TX emissions scaling

NTXU,countedpercell The number of *active transmitter units* that are taken into account for conducted TX emissions scaling per cell, as calculated in clause 6.1

Pmax,c,TABC The *maximum carrier output power per TAB connector*

Prated,c,sys The sum of Prated,c,TABC for all *TAB connectors* for a single carrier

Prated,c,TABC The *rated carrier output power per TAB connector*

Prated,t,TABC The *rated total output power* declared at *TAB connector*

PREFSENS Conducted Reference Sensitivity power level

Wgap Sub-block gap or Inter RF Bandwidth gap size

***<End of change>***

***<Start of change>***

#### 4.1.2.2 Measurement of transmitter

Table 4.1.2.2-1: Maximum Test System uncertainty for transmitter tests

| Clause | Maximum Test System Uncertainty | Derivation of Test System Uncertainty |
| --- | --- | --- |
| 6.2 IAB output power | ±0.7 dB, f ≤ 3 GHz  ±1.0 dB, 3 GHz < f ≤ 6 GHz (Note) |  |
| 6.3.1 IAB-DU Output power dynamics | ± 0.4 dB |  |
| 6.3.2 IAB-MT Output power dynamics | ±0.7 dB, BW ≤ 40MHz  ±1.0 dB, 40MHz < f ≤ 100MHz |  |
| 6.4.1 Transmit OFF power | ±2.0 dB, f ≤ 3 GHz  ±2.5 dB, 3 GHz < f ≤ 6 GHz (Note) |  |
| 6.4.2 Transmitter transient period | N/A |  |
| 6.5.2.1 IAB-DU Frequency error | ± 12 Hz |  |
| 6.5.2.2 IAB-MT Frequency error | ±15 Hz, f ≤ 3.0GHz  ±36 Hz, f > 3.0GHz |  |
| 6.5.3 EVM | ± 1% |  |
| 6.5.4 Time alignment error | ± 25 ns |  |
| 6.6.2 Occupied bandwidth | 10 MHz IAB Channel BW: ±100 kHz  15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz IAB Channel BW: ±300 kHz  60 MHz, 70 MHz, 80 MHz, 90 MHz, 100 MHz IAB Channel BW: ±600 kHz |  |
| 6.6.3 Adjacent Channel Leakage power Ratio (ACLR) | ACLR/ CACLR  BW ≤ 20MHz: ±0.8 dB  BW > 20MHz: ±1.2 dB  Absolute power ±2.0 dB, f ≤ 3 GHz  Absolute power ±2.5 dB, 3 GHz < f ≤ 6 GHz (Note)  CACLR  BW ≤ 20MHz: ±0.8 dB  BW > 20MHz: ±1.2 dB  CACLR absolute power ±2.0 dB, f ≤ 3 GHz  CACLR absolute power ±2.5 dB, 3 GHz < f ≤ 6 GHz (Note) |  |
| 6.6.4 Operating band unwanted emissions | ±1.5 dB, f ≤ 3 GHz  ±1.8 dB, 3 GHz < f ≤ 6 GHz (Note) |  |
| 6.6.5.5.1.1 Transmitter spurious emissions, Mandatory Requirements | 9 kHz < f ≤ 4 GHz: ±2.0 dB  4 GHz < f ≤ 19 GHz: ±4.0 dB  19 GHz < f ≤ 26 GHz: ±4.5 dB |  |
| 6.6.5.5.1.2 Transmitter spurious emissions, Additional spurious emission requirements | ±2.0 dB for > -60 dBm, f ≤ 3 GHz  ±2.5 dB, 3 GHz < f ≤ 4.2 GHz  ±3.0 dB, 4.2 GHz < f ≤ 6 GHz  ±3.0 dB for ≤ -60 dBm, f ≤ 3 GHz  ±3.5 dB, 3 GHz < f ≤ 4.2 GHz  ±4.0 dB, 4.2 GHz < f ≤ 6 GHz |  |
| 6.6.5.2.3 Transmitter spurious emissions, Co-location | ±3.0 dB |  |
| 6.7 Transmitter intermodulation  (interferer requirements)  This tolerance applies to the stimulus and not the measurements defined in 6.6.3, 6.6.4 and 6.6.5 | The value below applies only to the interfering signal and is unrelated to the measurement uncertainty of the tests in 6.6.3 (ACLR), 6.6.4 (OBUE) and 6.6.5 (spurious emissions) which have to be carried out in the presence of the interferer.  ±1.0 dB | The uncertainty of interferer has double the effect on the result due to the frequency offset |
| NOTE: Test system uncertainty values for 4.2 GHz < f ≤ 6 GHz apply for IAB operates in licensed spectrum only. | | |

***<End of change>***

***<Start of change>***

## 4.6 Manufacturer declarations

The following *IAB type 1-H* declarations listed in table 4.6-1, when applicable to the IAB-DU or IAB-MT under test, are required to be provided by the manufacturer for the conducted requirements testing of the *IAB type 1-H*. Declarations may be provided independently for IAB-MT and IAB-DU.

For the *IAB type 1-H* declarations required for the radiated requirements testing, refer to TS 38.176-2 [3].

Table 4.6-1 Manufacturer declarations for *IAB-type 1-H* conducted test requirements

| Declaration identifier | Declaration | Description | Applicability | |
| --- | --- | --- | --- | --- |
| *IAB-DU type*  *1-H* | *IAB-MT type*  *1-H* |
| D.1 | IAB requirements set | Declaration of one of the IAB requirement's set as defined for *IAB type 1-H*. | x | x |
| D.2 | IAB class | IAB class of the IAB, declared as Wide Area IAB, Medium Range IAB, or Local Area IAB. | x | x |
| D.3 | *Operating bands* and frequency ranges | List of NR *operating band(s)* supported by *single-band connector(s)* and/or *multi-band connector(s)* of the IAB-DU or IAB-MT and if applicable, frequency range(s) within the *operating band(s)* that the IAB can operate in.  Declarations shall be made per *TAB connector* for *IAB type 1-H*. | x | x |
| D.4 | Spurious emission category | Declare the IAB-DU or IAB-MT spurious emission category as either category A or B with respect to the limits for spurious emissions, as defined in Recommendation ITU-R SM.329 [5]. | x | x |
| D.5 | Additional operating band unwanted emissions | The manufacturer shall declare whether the IAB-DU or IAB-MT under test is intended to operate in geographic areas where the additional operating band unwanted emission limits defined in clause 6.6.4.5 apply. | x | x |
| D.6 | Co-existence with other systems | The manufacturer shall declare whether the IAB-DU or IAB-MT under test is intended to operate in geographic areas where one or more of the systems GSM850, GSM900, DCS1800, PCS1900, UTRA FDD, UTRA TDD, E-UTRA, PHS and/or NR operating in another band are deployed. | x | x |
| D.7 | Co-location with other IAB | The manufacturer shall declare whether the IAB-DU or IAB-MT under test is intended to operate co-located with IAB of one or more of the systems GSM850, GSM900, DCS1800, PCS1900, UTRA FDD, UTRA TDD, E-UTRA and/or NR operating in another band. | x | x |
| D.8 | *Single band connector* or *multi-band connector* | Declaration of the single band or multi-band capability of *single band connector(s)* or *multi-band connector(s),* declared for every connector. | x | x |
| D.9 | Contiguous or non-contiguous spectrum operation support | Ability to support contiguous or non-contiguous (or both) frequency distribution of carriers when operating multi-carrier. Declared per *single band connector* or *multi-band connector*, per *operating band*. | x | x |
| D.10 | void | void |  |  |
| D.11 | Maximum *IAB RF Bandwidth* | Maximum *IAB RF Bandwidth* in the *operating band* for single-band operation. Declared per supported *operating band,* per *TAB connector* for *IAB type 1-H.* (Note 2) | x | x |
| D.12 | Maximum *IAB RF Bandwidth* for multi-band operation | Maximum *IAB RF Bandwidth* for multi-band operation. Declared per supported *operating band,* per *TAB connector* for *IAB type 1-H.* | x | x |
| D.13 | Total RF bandwidth (BWtot) | Total RF bandwidth BWtot of transmitter and receiver, declared per the band combinations (D.27). | x | x |
| D.14 | NR supported channel bandwidths and SCS | NR supported SCS and channel bandwidths per supported SCS. Declared per supported *operating band,* per *TAB connector* for *IAB type 1-H.* | x | x |
| D.15 | CA only operation | Declaration of CA-only operation (with equal power spectral density among carriers) but not multiple carriers, declared per *operating band* per *TAB connector* for *IAB type 1-H*. | x | x |
| D.16 | Single or multiple carrier | Capable of operating with a single carrier (only) or multiple carriers. Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H.* | x | x |
| D.17 | Maximum number of supported carriers per operating band in single band operation | Maximum number of supported carriers per supported *operation band* in single band operation*.* Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H.* (Note 2) | x | x |
| D.18 | Maximum number of supported carriers per operating band in multi-band operation | Maximum number of supported carriers per supported *operation band* in multi-band operation. (Note 2) | x | x |
| D.19 | Total maximum number of supported carriers in multi-band operation | Maximum number of supported carriers for all supported *operating bands* in multi-band operation*.* Declared for all connectors (D.18)*.* | x | x |
| D.20 | Other band combination multi-band restrictions | Declare any other limitations under simultaneous operation in the declared band combinations (D.35) for each *multi-band connector* which have any impact on the test configuration generation.  Declared for every *multi-band connector*. | x | x |
| D.21 | Rated carrier output power(Prated,c,AC, or Prated,c,TABC) | Conducted rated carrier output power, per *single band connector* or *multi-band connector.*  Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H*. (Note 1, 2) | x | x |
| D.22 | R*ated total output power* (Prated,t,AC, or Prated,t,TABC) | Conducted total rated output power*.*  Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H.*  For *multi-band connectors* declared for each supported *operating band* in each supported band combination. (Note 1, 2) | x | x |
| D.23 | Rated multi-band total output power, Prated,MB,TABC | Conducted multi-band rated total output power*.*  Declared per supported operating band combinations, per *multi-band connector*. (Note 1) | x | x |
| D.24 | Ncells | Number corresponding to the minimum number of cells that can be transmitted by a IAB in a particular *operating band* with transmission on all *TAB connectors* supporting the *operating band*. | x | x |
| D.25 | Maximum supported power difference between carriers | Maximum supported power difference between carriers. Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H.* (Note 3). | x | x |
| D.26 | Maximum supported power difference between carriers is different *operating bands* | Supported power difference between any two carriers in any two different supported *operating bands.* Declared per supported operating band combination, per *multi-band connector.* | x | x |
| D.27 | Operating band combination support | List of operating bands combinations supported by *single-band connector(s)* and/or *multi-band connector(s)* of the IAB. Declared per *TAB connector* for *IAB type 1-H.* | x | x |
| D.28 | void | void |  |  |
| D.29 | Intra-system interfering signal declaration list | List of *single band connector(s)* or *multi-band connector(s)* for which an intra-system interfering signal level is required to be declared. Declaration is required if the intra-system interfering signal level is larger than the co-location interfering signal level. | x | x |
| D.30 | Intra-system interfering signal level | The interfering signal level in dBm. Declared per supported *operating band*, per *TAB connector* for *IAB type 1-H* covered by D.29. | x | x |
| D.31 | TAE groups | Set of declared *TAB connector beam forming groups* on which the TAE requirements apply.  *All TAB connectors* belong to at least one *TAB connector beam forming group* (even if it's a *TAB connector beam forming group* consisting of one connector).  The smallest possible number of *TAB connector beam forming groups* need to be declared such that there is no *TAB connector* not contained in at least one of the declared *TAB connector beam forming groups*.  Declared per supported *operating band*. | x |  |
| D.32 | Equivalent connectors | List of *TAB connector* of *IAB type 1-H*, which have been declared equivalent.  Equivalent connectors imply that the *TAB connector* of *IAB type 1-H*, are expected to behave in the same way when presented with identical signals under the same operating conditions. All declarations made for the *TAB connector* of *IAB type 1-H* are identical and the transmitter unit and/or receiver unit driving the *TAB connector* of *IAB type 1-H* are of identical design. | x | x |
| D.33 | *TAB connector RX min cell group* | Declared as a group of *TAB connectors* to which RX requirements are applied. This declaration corresponds to group of *TAB connectors* which are responsible for receiving a cell when the *IAB type 1-H* setting corresponding to the declared minimum number of cells (Ncells) with transmission on all *TAB connectors* supporting an *operating band*. | X | x |
| D.34 | *TAB connector TX min cell group* | Declared group of *TAB connectors* to which TX requirements are applied. This declaration corresponds to group of *TAB connectors* which are responsible for transmitting a cell when the *IAB type 1-H* setting corresponding to the declared minimum number of cells (Ncells) with transmission on all *TAB connectors* supporting an *operating band*. | x | x |
| D.35 | void | void |  |  |
| D.36 | Relation between supported maximum RF bandwidth, number of carriers and Rated total output power | If the rated total output power and total number of supported carriers are not simultaneously supported, the manufacturer shall declare the following additional parameters:  - The reduced number of supported carriers at the rated total output power;  - The reduced total output power at the maximum number of supported carriers. | x | x |
| D.37 | *TAB connectors* used for performance requirement testing | To reduce test complexity, declaration of a representative (sub)set of *TAB connectors* to be used for performance requirement test purposes. At least one *TAB connector* mapped to each *demodulation branch* is declared. | x | x |
| D.38 | Inter-band CA | Band combinations declared to support inter-band CA (per CA capable *multi-band connector(s)*, as in D.15).  Declared for every *multi-band connector* which support CA. | x | x |
| D.39 | Intra-band contiguous CA | Bands declared to support intra-band contiguous CA (per CA capable *single band connector(s)* or *multi-band connector(s)*, as in D.15).  Declared per *TAB connector* for *IAB type 1-H*. | x | x |
| D.40 | Intra-band non-contiguous CA | Bands declared to support intra-band non-contiguous CA (per CA capable *single band connector(s)* or *multi-band connector(s)*, as in D.15).  Declared per or *TAB connector* for *IAB type 1-H.*. | x | x |
| D.41 | void | void |  |  |
| D.42 | void | void |  |  |
| D.43 | void | void |  |  |
| D.IAB-1 | Same RF implementation. | Declaration whether IAB-MT and IAB-DU have same RF implementation.] | x | x |
| D.100 | PUSCH mapping type | Declaration of the supported PUSCH mapping type as specified in TS 38.211 [9], i.e., type A, type B or both. | x |  |
| D.101 | PUSCH additional DM-RS positions | Declaration of the supported additional DM-RS position(s), i.e., pos0, pos1 or both. | x |  |
| D.102 | PUCCH format | Declaration of the supported PUCCH format(s) as specified in TS 38.211 [9], i.e., format 0, format 1, format 2, format 3, format 4. | x |  |
| D.103 | PRACH format and SCS | Declaration of the supported PRACH format(s) as specified in TS 38.211 [9], i.e., format: 0, A1, A2, A3, B4, C0, C2.  Declaration of the supported SCS(s) per supported PRACH format with short sequence, as specified in TS 38.211 [9], i.e., 15 kHz, 30 kHz or both. | x |  |
| D.104 | Additional DM-RS for PUCCH format 3 | Declaration of the supported additional DM-RS for PUCCH format 3: without additional DM-RS, with additional DM-RS or both. | x |  |
| D.105 | Additional DM-RS for PUCCH format 4 | Declaration of the supported additional DM-RS for PUCCH format 4: without additional DM-RS, with additional DM-RS or both. | x |  |
| D.106 | PUCCH multi-slot | Declaration of multi-slot PUCCH support. | x |  |
| D.107 | UL CA | For the highest supported SCS, declaration of the carrier combination with the largest aggregated bandwidth. If there is more than one combination, the carrier combination with the largest number of carriers shall be declared. | x |  |
| D.108 | Modulation order | Declaration of the supported modulation order, i.e. QPSK, 16QAM, 64QAM | x |  |
| D.109 | DFT-s-OFDM | Declaration of the supported of DFT-s-OFDM, i.e. supported or not supported. | x |  |
| D.200 | 256QAM for PDSCH for FR1 | Declaration of the supported of 256QAM modulation scheme for PDSCH for FR1, i.e. supported or not supported. |  | x |
| D.201 | Maximum number of ports across all configured NZP-CSI-RS resources per CC | Declaration of the maximum number of ports across all configured NZP-CSI-RS resources per CC, i.e. 2, 4, 8, 12, 16, 24, 32, 40, 48 … ,256 or not supported. |  | x |
| D.202 | Maximum number of PDSCH MIMO layers | Declaration of the the maximum number of spatial multiplexing layer(s) supported by the UE for DL reception, i.e. 2, 4, 8 or not supported. |  | x |
| NOTE 1: If an IAB-DU or IAB-MT is capable of 256QAM DL operation then two rated output power declarations may be made. One declaration is applicable when configured for 256QAM transmissions and the other declaration is applicable when not configured for 256QAM transmissions.  NOTE 2: Parameters for contiguous or non-contiguous spectrum operation in the operating band are assumed to be the same unless they are separately declared. When separately declared, they shall still use the same declaration identifier.  NOTE 3: The power difference is declared at highest rated output power. | | | | |

***<End of change>***

***<Start of change>***

## 4.13 Test efficiency optimization

When manufacture declares the same RF implementation for IAB-MT and IAB-DU (D.IAB-1) and the declarations in table 4.13-1 are the same for IAB-DU and IAB-MT, it is sufficient to test only IAB-MT or IAB-DU with the test requirement applicability according to Table 4.13-2 for Tx requirements and Table 4.13-3 for Rx requirements.

For *IAB type 1-H* it is required that the DUT selection between requirements follows following rules:

- Out of maximum output transmit power, modulation quality and ACLR, operating band unwanted emissions and transmitter general spurious emissions, IAB-DU and IAB-MT are required to be the DUT at least once,

- Out of reference sensitivity, receiver spurious emissions, receiver intermodulation, IAB-DU and IAB-MT are required to be the DUT at least once.

In some cases, the test requirements are the same but the MU for the IAB-MT may be larger than for the IAB-DU. In cases where the test efficiency optimization is applicable the lower MU value should be used.

Table 4.13-1: Declarations required to be the same for IAB-DU and IAB-MT for test efficiency optimization to apply

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Declaration identifier | Declaration | Additional conditions | Applicability | |
|  |  |  | *IAB-DU type*  *1-H* | *IAB-MT type*  *1-H* |
| D.2 | IAB class | Medium range IAB-DU can apply test efficiency optimization with wide area IAB-MT in case other declarations in this table are the same. | x | x |
| D.3 | *Operating bands* and frequency ranges |  | x | x |
| D.8 | *Single band connector* or *multi-band connector* |  | x | x |
| D.11 | Maximum *IAB RF Bandwidth* |  | x | x |
| D.13 | Total RF bandwidth (BWtot) |  | x | x |
| D.14 | NR supported channel bandwidths and SCS |  | x | x |
| D.17 | Maximum number of supported carriers per operating band in single band operation |  | x | x |
| D.18 | Maximum number of supported carriers per operating band in multi-band operation |  | x | x |
| D.19 | Total maximum number of supported carriers in multi-band operation |  | x | x |
| D.20 | Other band combination multi-band restrictions |  | x | x |
| D.21 | Rated carrier output power(Prated,c,AC, or Prated,c,TABC) |  | x | x |
| D.22 | R*ated total output power* (Prated,t,AC, or Prated,t,TABC) |  | x | x |

Table 4.13-2: Test requirement applicability for TX requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Tx requirement | | Test efficiency optimization applicable | Test requirement applicability  (Note 1) |
| Maximum output power | | Yes |  |
| Output power dynamics (only for IAB-DU) | | No | (Note 2) |
| Output power dynamics (only for IAB-MT) | | No | (Note 2) |
| Transmitter OFF power | | Yes |  |
| Transient period | | Yes |  |
| IAB-DU Frequency Error | | No | (Note 2) |
| IAB-MT Frequency Error | | No | (Note 2) |
| Modulation quality | | Yes |  |
| Time alignment error (only for IAB-DU) | | No | (Note 2) |
| Occupied bandwidth | | Yes |  |
| ACLR | | Yes |  |
| Operating band unwanted emission | | Yes |  |
| Transmitter spurious emission | General requirement | Yes |  |
|  | Additional spurious emissions | Yes |  |
|  | Co-location with other base stations | Yes |  |
| OTA transmitter intermodulation | | Yes |  |
| Note 1: Test requirement applicability defines how to select whether IAB-DU or IAB-MT test requirement is applied. In case no applicability definition is provided or the applicability definition test requirement is the same for IAB-DU and IAB-MT, either can apply.  NOTE 2: Test efficiency optimization is not applicable and therefore original test requirement applies. | | | |

Table 4.13-3: Test requirement applicability for receiver requirements

|  |  |  |  |
| --- | --- | --- | --- |
| **Rx requirement** | | Test efficiency optimization applicable | **Test requirement applicability (Note 1)** |
| Reference sensitivity | | Yes |  |
| Dynamic range (only for IAB-DU) | | No | (Note 2) |
| Adjacent channel selectivity | | Yes | IAB-MT |
| In-band blocking | | Yes | IAB-MT |
| Out-of-band blocking | General requirement | Yes |  |
|  | Co-location requirement | Yes |  |
| Receiver spurious emissions | | Yes |  |
| Receiver intermodulation | | Yes | IAB-MT |
| In-channel selectivity (only for IAB-DU) | | No | (Note 2) |
| Note 1: Test requirement applicability defines how to select whether IAB-DU or IAB-MT test requirement is applied. In case no applicability definition is provided or the applicability definition test requirement is the same for IAB-DU and IAB-MT, either can apply.  NOTE 2: Test efficiency optimization is not applicable and therefore original test requirement applies. | | | |

***<End of change>***

***<Start of change>***

## 6.1 General

General test conditions for conducted transmitter tests are given in clause 4, including interpretation of measurement results and configurations for testing. IAB configurations for the tests are defined in clause 4.5.

If a number of *single-band connectors*, or *multi-band connectors* have been declared equivalent (D.32), only a representative one is necessary to be tested to demonstrate conformance.

In clause 6.6.3.5.3, if representative *TAB connectors* are used then per connector criteria (i.e. option 2) shall be applied.

For *IAB-DU* and *IAB-MT* the manufacturer shall declare the minimum number of supported geographical cells (i.e. geographical areas). The declaration is done separately for IAB-DU and IAB-MT. The minimum number of supported geographical cells (Ncells, D.24) relates to the setting with the minimum amount of cell splitting supported with transmission on all *TAB connectors* supporting the *operating band.*

For *IAB-DU* and *IAB-MT* manufacturer shall also declare *TAB connector TX min cell groups* (D.34). The declaration is done separately for IAB-DU and IAB-MT. Every *TAB connector* of the *IAB type 1-H* supporting transmission in an *operating band* shall map to one *TAB connector* *TX min cell group* supporting the same *operating band*,where mapping of *TAB connector*s to cells/beams is implementation dependent.

The number of *active transmitter units* that are considered when calculating the conducted TX emissions limits (NTXU,counted) for *IAB-DU and IAB-MT* is calculated as follows:

NTXU,counted = *min(NTXU,active, 8×Ncells)*

NTXU,countedpercell is used for scaling of *basic limits* and is derived as NTXU,countedpercell = NTXU,counted / Ncells

NOTE: NTXU,active depends on the actual number of *active transmitter unit*s and is independent to the declaration of Ncells.

***<End of change>***

***<Start of change>***

##### 6.3.1.2.1 Definition and applicability

The RE power control dynamic range is the difference between the power of an RE and the average RE power for an IAB-DU at *maximum carrier output power* (Pmax,c,TABC, or Pmax,c,AC) for a specified reference condition.

For *IAB type 1-H* this requirement shall apply at each *TAB connector* supporting transmission in the *operating band*.

***<End of change>***

***<Start of change>***

6.3.1.3 Total power dynamic range

6.3.1.3.1 Definition and applicability

The IAB-DU total power dynamic range is the difference between the maximum and the minimum transmit power of an OFDM symbol for a specified reference condition.

For *IAB type 1-H* this requirement shall apply at each *TAB connector* supporting transmission in the *operating band*.

NOTE: The upper limit of the dynamic range is the OFDM symbol power for an IAB-DU when transmitting on all RBs at maximum output power. The lower limit of the total power dynamic range is the average power for single RB transmission. The OFDM symbol shall carry PDSCH and not contain PDCCH, RS or SSB.

6.3.1.3.2 Minimum requirement

The minimum requirement applies per *single-band connector*, or per *multi-band connector*.

The minimum requirement for *IAB-DU* is in TS 38.174 [2], clause 6.3.1.3.

6.3.1.3.3 Test purpose

The test purpose is to verify that the total power dynamic range is within the limits specified by the minimum requirement.

6.3.1.3.4 Method of test

6.3.1.3.4.1 Initial conditions

Test environment: Normal, see annex B.2.

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

Set the channel set-up of the connector under as shown in annex D.1 for *IAB type 1-H*.

6.3.1.3.4.2 Procedure

For *IAB type 1-H* where there may be multiple *TAB connectors*, they may be tested one at a time or multiple *TAB connectors* may be tested in parallel as shown in annex D.1.1. Whichever method is used the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested.

1) Connect the *single-band connector(s)* under test as shown in annex D.1.1 for *IAB type 1-H*. All connectors not under test shall be terminated.

2) Set each connector under test to transmit according to the applicable test configuration in clause 4.8 using the corresponding test models in clause 4.9.2 at Prated,c,TABC for *IAB type 1-H* (D.21).

3) For *IAB-DU type 1-H*, set the IAB-DU to transmit a signal according to:

- IAB-DU-FR1-TM3.1a if 256QAM is supported without power back off, or

- IAB-DU-FR1-TM3.1 if 256QAM is supported with power back off, or

- IAB-DU-FR1-TM3.1 if 256QAM is not supported by IAB-DU.

4) Measure the OFDM symbol TX power (OSTP) as defined in the annex H.

5) For *IAB-DU type 1-H*, set to transmit a signal according to:

IAB-DU-FR1-TM2a if 256QAM is supported, or

IAB-DU-FR1-TM2 if 256QAM is not supported;

6) Measure the OFDM symbol TX power (OSTP) as defined in the annex H.

In addition, for *multi-band connectors*, the following steps shall apply:

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

***<End of change>***

***<Start of change>***

###### 6.3.2.1.4.2 Procedure

For *IAB type 1-H* where there may be multiple *TAB connectors*, they may be tested one at a time or multiple *TAB connectors* may be tested in parallel as shown in annex D.1.1. Whichever method is used the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested.

1) Connect the *single-band connector(s)* under test as shown in annex D.1.1 for *IAB type 1-H*. All connectors not under test shall be terminated.

2) Set each connector under test to transmit according to the applicable test configuration in clause 4.8 using the corresponding test models in clause 4.9.2 at Prated,c,TABC for *IAB type 1-H* (D.21).

3) Set the IAB-MT to transmit a signal according to IAB-MT-FR1-TM3.1

4) Measure the power over 1ms

5) Set to transmit a signal according to IAB-MT-FR1-TM2.

6) Measure the power over 1ms

In addition, for *multi-band connectors*, the following steps shall apply:

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

***<End of change>***

***<Start of change>***

6.6.2 Occupied bandwidth

6.6.2.1 General

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage /2 of the total mean transmitted power. See also Recommendation ITU-R SM.328 [6].

The value of /2 shall be taken as 0.5%.

The occupied bandwidth requirement shall apply during the *transmitter ON period* for a single transmitted carrier. The minimum requirement below may be applied regionally. There may also be regional requirements to declare the occupied bandwidth according to the definition in the present clause.

For *IAB type 1-H* this requirement shall be applied at each *TAB connector* supporting transmission in the *operating band.*

6.6.2.2 Minimum Requirements

The minimum requirement for *IAB type 1-H* is in TS 38.174 [2] clause 6.6.2.

6.6.2.3 Test purpose

The test purpose is to verify that the emission at the *TAB connector* does not occupy an excessive bandwidth for the service to be provided and is, therefore, not likely to create interference to other users of the spectrum beyond undue limits.

6.6.2.4 Method of test

6.6.2.4.1 Initial conditions

Test environment: Normal; see annex B.2.

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

*Aggregated IAB channel bandwidth* positions to be tested for contiguous carrier aggregation: MBW Channel CA; see clause 4.9.1.

1) Connect the measurement device to *TAB connector* as shown in annex D.1.1 for *IAB type 1-H*.

2) For a IAB declared to be capable of single carrier operation (D.16), start transmission according to the applicable test configuration in clause 4.8 using the corresponding test model IAB-DU-FR1-TM1.1 for *IAB-DU type 1-H* or IAB-MT-FR1-TM1.1 for *IAB-MT type 1-H* at manufacturer's declared rated output power (Prated,c,TABC, D.21).

For an IAB declared to be capable of contiguous CA operation, set the IAB to transmit according to IAB-DU-FR1-TM1.1 for *IAB-DU type 1-H* or IAB-MT-FR1-TM1.1 for *IAB-MT type 1-H* on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7.4 and 4.8.

6.6.2.4.2 Procedure

1) Measure the spectrum emission of the transmitted signal using at least the number of measurement points, and across a span, as listed in table 6.6.2.4.2-1. The selected resolution bandwidth (RBW) filter of the analyser shall be 30 kHz or less.

**Table 6.6.2.4.2-1: Span and number of measurement points for OBW measurements**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bandwidth** | ***IAB-DU channel bandwidth* or *IAB-MT channel bandwidth***  **BWChannel (MHz)** | | | | ***Aggregated IAB channel bandwidth* BWChannel\_CA（MHz）** |
|  | **10** | **15** | **20** | **> 20** | **> 20** |
| Span (MHz) | 20 | 30 | 40 |  |  |
| Minimum number of measurement points | 400 | 400 | 400 |  |  |

NOTE: The detection mode of the spectrum analyser will not have any effect on the result if the statistical properties of the out-of-OBW power are the same as those of the inside-OBW power. Both are expected to have the Rayleigh distribution of the amplitude of Gaussian noise. In any case where the statistics are not the same, though, the detection mode must be power responding. The analyser may be set to respond to the average of the power (root-mean-square of the voltage) across the measurement cell.

2) Compute the total of the power, P0, (in power units, not decibel units) of all the measurement cells in the measurement span. Compute P1, the power outside the occupied bandwidth on each side. P1 is half of the total power outside the bandwidth. P1 is half of (100 % - (occupied percentage)) of P0. For the occupied percentage of 99 %, P1 is 0.005 times P0.

3) Determine the lowest frequency, f1, for which the sum of all power in the measurement cells from the beginning of the span to f1 exceeds P1.

4) Determine the highest frequency, f2, for which the sum of all power in the measurement cells from f2 to the end of the span exceeds P1.

5) Compute the occupied bandwidth as f2 - f1.

In addition, for a multi-band capable IAB, the following step shall apply:

6) For multi-band capable IAB and single band tests, repeat the steps above per involved band where single carrier test models shall apply, with no carrier activated in the other band. In addition, when contiguous CA is supported, single band test configurations and test models shall apply with no carrier activated in the other band.

6.6.2.5 Test requirements

The occupied bandwidth for each carrier shall be less than the channel bandwidth as defined in TS 38.174 [2], table 5.3.5-1. For contiguous CA, the occupied bandwidth shall be less than or equal to the *aggregated IAB channel bandwidth* as defined in TS 38.174 [2], clause 5.3A.

***<End of change>***

***<Start of change>***

6.6.3 Adjacent Channel Leakage Power Ratio

6.6.3.1 General

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

The requirements shall apply outside the *IAB-DU RF Bandwidth, IAB-MT RF Bandwidth* or *Radio Bandwidth* whatever the type of transmitter considered (single carrier or multi-carrier) and for all transmission modes foreseen by the manufacturer’s specification.

For an IAB- node operating in *non-contiguous spectrum*, the ACLR requirement in clause 6.6.3.2 shall apply in *sub-block gaps* for the frequency ranges defined in table 6.6.3.2-3, while the CACLR requirement in clause 6.6.3.2 shall apply in *sub-block gaps* for the frequency ranges defined in table 6.6.3.2-4.

For a *multi-band connector*, the ACLR requirement in clause 6.6.3.2 shall apply in *Inter RF Bandwidth gaps* for the frequency ranges defined in table 6.6.3.2-3, while the CACLR requirement in clause 6.6.3.2 shall apply in *Inter RF Bandwidth gaps* for the frequency ranges defined in table 6.6.3.2-4.

The requirement shall apply during the *transmitter ON period*.

6.6.3.2 Minimum requirement

The minimum requirement applies per *single-band connector*, or per *multi-band connector* supporting transmission in the *operating band*.

The minimum requirement for *IAB type 1-H* is defined in TS 38.174 [2], clause 6.6.3.

6.6.3.3 Test purpose

To verify that the adjacent channel leakage power ratio requirement shall be met as specified by the minimum requirement.

6.6.3.4 Method of test

6.6.3.4.1 Initial conditions

Test environment: Normal; see annex B.2.

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

*IAB RF Bandwidth* positions to be tested for multi-carrier and/or CA:

- BRFBW, MRFBW and TRFBW in single-band operation; see clause 4.9.1.

- BRFBW\_T'RFBW and B'RFBW\_TRFBW in multi-band operation, see clause 4.9.1.

6.6.3.4.2 Procedure

For *IAB type 1-H* where there may be multiple *TAB connectors*, they may be tested one at a time or multiple *TAB connectors* may be tested in parallel as shown in annex D.1.1. Whichever method is used the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested.

1) Connect the *single-band connector* or *multi-band connector* under test to measurement equipment as shown in annex D.1.1 for *IAB type 1-H*. All connectors not under test shall be terminated.

The measurement device characteristics shall be:

- Measurement filter bandwidth: defined in clause 6.6.3.5.

- Detection mode: true RMS voltage or true average power.

2) For a connectors declared to be capable of single carrier operation only (D.16), set the representative connectors under test to transmit according to the applicable test configuration in clause 4.8 using the corresponding test models IAB-DU-FR1‑TM1.1 or IAB-MT-FR1-TM1.1 in clause 4.9.2 at *rated carrier output power* Prated,c,TABC for IAB type 1-H (D.21).

For a connector under test declared to be capable of multi-carrier and/or CA operation (D.15-D.16) set the connector under test to transmit on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7 and 4.8 using the corresponding test models or set of physical channels in clause 4.9.2.

3) Measure ACLR for the frequency offsets both side of channel frequency as specified in table 6.6.3.5.2‑1. In multiple carrier case only offset frequencies below the lowest and above the highest carrier frequency used shall be measured.

4) For the ACLR requirement applied inside sub-block gap for non-contiguous spectrum operation, or inside *Inter RF Bandwidth gap* for multi-band operation:

a) Measure ACLR inside sub-block gap or *Inter RF Bandwidth gap* as specified in clause 6.6.3.5.2, if applicable.

b) Measure CACLR inside sub-block gap or *Inter RF Bandwidth gap* as specified in clause 6.6.3.5.2, if applicable.

5) Repeat the test with the channel set-up according to IAB-DU-FR1-TM1.2 or IAB-MT-FR1-TM1.2 in clause 4.9.2.

In addition, for *multi-band connectors*, the following steps shall apply:

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

***<End of change>***

***<Start of change>***

##### 6.6.3.5.2 Limits and *basic limits*

The ACLR is defined with a square filter of bandwidth equal to the transmission bandwidth configuration of the transmitted signal (BWConfig) centred on the assigned channel frequency and a filter centred on the adjacent channel frequency according to the tables below.

For operation in paired and unpaired spectrum, the ACLR shall be higher than the value specified in table 6.6.3.5.2‑1.

Table 6.6.3.5.2-1: IAB type 1-H ACLR limit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *IAB-DU channel bandwidth* and *IAB-MT channel bandwidth* of lowest/highest carrier transmitted BWChannel (MHz) | IAB-DU and IAB-MT adjacent channel centre frequency offset below the lowest or above the highest carrier centre frequency transmitted | Assumed adjacent channel carrier (informative) | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| 10, 15, 20 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 44.2 |
| 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 44.2 |
| BWChannel /2 + 2.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 44.2  (Note 3) |
| BWChannel /2 + 7.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 44.2  (Note 3) |
| 25, 30, 40, 50, 60, 70, 80, 90,100 | BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 43.8 dB |
|  | 2 x BWChannel | NR of same BW (Note 2) | Square (BWConfig) | 43.8 dB |
|  | BWChannel /2 + 2.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 43.8 dB (Note 3) |
|  | BWChannel /2 + 7.5 MHz | 5 MHz E-UTRA | Square (4.5 MHz) | 43.8 dB (Note 3) |
| NOTE 1: BWChannel and BWConfig are the *IAB-DU channel bandwidth and IAB-MT channel bandwidth* and *transmission bandwidth configuration* of the *lowest/highest carrier* transmitted on the assigned channel frequency.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: The requirements are applicable when the band is also defined for E-UTRA or UTRA. | | | | |

The ACLR absolute *basic limit* is specified in table 6.6.3.5.2‑2.

Table 6.6.3.5.2-2: *IAB type 1-H* ACLR absolute basic limit

|  |  |
| --- | --- |
| IAB-DU and IAB-MT category / class | ACLR absolute *basic limit* |
| Category A Wide Area IAB-DU and Category A Wide Area IAB-MT | -13 dBm/MHz |
| Category B Wide Area IAB-DU and Category B Wide Area IAB-MT | -15 dBm/MHz |
| Medium Range IAB-DU | -25 dBm/MHz |
| Local Area IAB-DU and  Local Area IAB-MT | -32 dBm/MHz |

For operation in non-contiguous spectrum or multiple bands, the ACLR shall be higher than the value specified in Table 6.6.3.5.2‑3.

Table 6.6.3.5.2-3: *IAB type 1-H* ACLR limit in non-contiguous spectrum or multiple bands

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *IAB-DU channel bandwidth* and *IAB-MT channel bandwidth* of lowest/highest carrier transmitted BWChannel (MHz) | Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz) | IAB-DU and IAB-MT adjacent channel centre frequency offset below or above the sub-block or *IAB RF Bandwidth edge* (inside the gap) | Assumed adjacent channel carrier | Filter on the adjacent channel frequency and corresponding filter bandwidth | ACLR limit |
| 10, 15, 20 | Wgap ≥ 15 (Note 3)  Wgap ≥ 45 (Note 4) | 2.5 MHz | 5 MHz NR (Note 2) | Square (BWConfig) | 44.2 dB |
|  | Wgap ≥ 20 (Note 3)  Wgap ≥ 50 (Note 4) | 7.5 MHz | 5 MHz NR (Note 2) | Square (BWConfig) | 44.2 dB |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | Wgap ≥ 60 (Note 4)  Wgap ≥ 30 (Note 3) | 10 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 43.8 dB |
|  | Wgap ≥ 80 (Note 4)  Wgap ≥ 50 (Note 3) | 30 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 43.8 dB |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: Applicable in case the *IAB-DU channel bandwidth* or *IAB-MT channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 10, 15, 20 MHz.  NOTE 4: Applicable in case the *IAB-DU channel bandwidth* or *IAB-MT channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz. | | | | | |

The Cumulative Adjacent Channel Leakage power Ratio (CACLR) in a *sub-block gap* or the *Inter RF Bandwidth gap* is the ratio of:

a) the sum of the filtered mean power centred on the assigned channel frequencies for the two carriers adjacent to each side of the *sub-block gap* or the *Inter RF Bandwidth gap*, and

b) the filtered mean power centred on a frequency channel adjacent to one of the respective *sub-block* edges or *IAB RF Bandwidth edges*.

The assumed filter for the adjacent channel frequency is defined in table 6.6.3.2-4 and the filters on the assigned channels are defined in table 6.6.3.2-6.

For operation in *non-contiguous spectrum* or multiple bands, the CACLR for NR carriers located on either side of the *sub-block gap* or the *Inter RF Bandwidth gap* shall be higher than the value specified in table 6.6.3.2-4.

Table 6.6.3.5.2-4: *IAB type 1-H* CACLR limit

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *IAB-DU channel bandwidth* and *IAB-MT channel* bandwidth of lowest/highest carrier transmitted BWChannel (MHz) | Sub-block or Inter RF Bandwidth gap size (Wgap) where the limit applies (MHz) | IAB-DU and IAB-MT adjacent channel centre frequency offset below or above the sub-block or *IAB RF Bandwidth edge* (inside the gap) | Assumed adjacent channel carrier | Filter on the adjacent channel frequency and corresponding filter bandwidth | CACLR limit |
| 10, 15, 20 | 5 ≤Wgap< 15 (Note 3)  5 ≤Wgap< 45 (Note 4) | 2.5 MHz | 5 MHz NR (Note 2) | Square (BWConfig) | 44.2 dB |
|  | 10 < Wgap< 20 (Note 3)  10 ≤Wgap< 50 (Note 4) | 7.5 MHz | 5 MHz NR (Note 2) | Square (BWConfig) | 44.2 dB |
| 25, 30, 40, 50, 60, 70, 80,90, 100 | 20 ≤Wgap< 60 (Note 4)  20 ≤Wgap< 30 (Note 3) | 10 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 43.8 dB |
|  | 40 < Wgap< 80 (Note 4)  40 ≤Wgap< 50 (Note 3) | 30 MHz | 20 MHz NR (Note 2) | Square (BWConfig) | 43.8 dB |
| NOTE 1: BWConfig is the transmission bandwidth configuration of the assumed adjacent channel carrier.  NOTE 2: With SCS that provides largest transmission bandwidth configuration (BWConfig).  NOTE 3: Applicable in case the *IAB-DU* *channel bandwidth* or *IAB-MT* *channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 10, 15, 20 MHz.  NOTE 4: Applicable in case the *IAB-DU* *channel bandwidth* or *IAB-MT channel bandwidth* of the NR carrier transmitted at the other edge of the gap is 25, 30, 40, 50, 60, 70, 80, 90, 100 MHz. | | | | | |

The CACLR absolute *basic limit* is specified in table 6.6.3.2‑5.

Table 6.6.3.2-5: *IAB type 1-H* CACLR absolute *basic limit*

|  |  |
| --- | --- |
| IAB-DU and IAB-MT category / class | CACLR absolute *basic limit* |
| Category A Wide Area IAB-DU and Category A Wide Area IAB-MT | -13 dBm/MHz |
| Category B Wide Area IAB-DU and Category B Wide Area IAB-MT | -15 dBm/MHz |
| Medium Range IAB-DU | -25 dBm/MHz |
| Local Area IAB-DU and Local Area IAB-MT | -32 dBm/MHz |

Table 6.6.3.5.2-6: Filter parameters for the assigned channel

|  |  |
| --- | --- |
| RAT of the carrier adjacent to the *sub-block* or *Inter RF Bandwidth gap* | Filter on the assigned channel frequency and corresponding filter bandwidth |
| NR | NR of same BW with SCS that provides largest *transmission bandwidth configuration* |

***<End of change>***

***<Start of change>***

6.6.4 Operating band unwanted emissions

6.6.4.1 Definition and applicability

Unless otherwise stated, the operating band unwanted emission (OBUE) limits for IAB-DU in FR1 are defined from ΔfOBUE below the lowest frequency of each supported downlink *operating band* up to ΔfOBUE above the highest frequency of each supported downlink *operating band*. The values of ΔfOBUE are defined in table 6.6.1‑1 for the NR *operating bands*.

Unless otherwise stated, the operating band unwanted emission (OBUE) limits for IAB-MT in FR1 are defined from ΔfOBUE below the lowest frequency of each supported uplink *operating band* up to ΔfOBUE above the highest frequency of each supported uplink *operating band*. The values of ΔfOBUE are defined in table 6.6.1‑2 for the NR *operating bands*.

The requirements shall apply whatever the type of transmitter considered and for all transmission modes foreseen by the manufacturer’s specification. In addition, for IAB-DU and IAB-MT operating in *non-contiguous spectrum*, the requirements apply inside any *sub-block gap*. In addition, for a IAB-MT or IAB-DU operating in multiple bands, the requirements apply inside any *Inter RF Bandwidth gap*.

*Basic limits* are specified in the tables below, where:

- Δf is the separation between the *channel edge* frequency and the nominal -3dB point of the measuring filter closest to the carrier frequency.

- f\_offset is the separation between the *channel edge* frequency and the centre of the measuring filter.

- f\_offsetmax is the offset to the frequency ΔfOBUE outside the downlink *operating band* of IAB-DU and uplink *operating band* of IAB-MT, where ΔfOBUE is defined in tables 6.6.1-1 and 6.6.1-2.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For a *multi-band connector* inside any *Inter RF Bandwidth gaps* with Wgap < 2\*ΔfOBUE, a combined *basic* limit shall be applied which is the cumulative sum of the *basic limit*s specified at the *IAB RF Bandwidth edges* on each side of the *Inter RF Bandwidth gap*. The *basic limit* for *IAB RF Bandwidth edge* is specified in clauses 6.6.4.2.1 to 6.6.4.2.4 below, where in this case:

- Δf is the separation between the *IAB RF Bandwidth edge* frequency and the nominal -3 dB point of the measuring filter closest to the *IAB RF Bandwidth edge*.

- f\_offset is the separation from the *IAB RF Bandwidth edge* frequency to the centre of the measuring filter.

- f\_offsetmax is equal to the *Inter RF Bandwidth gap* minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For a *multi-band connector* of IAB-DU, the operating band unwanted emission limits apply also in a supported downlink *operating band* without any carrier transmitted, in the case where there are carrier(s) transmitted in another supported downlink *operating band*. In this case, no cumulative *basic limit* is applied in the *inter-band gap* between a supported downlink *operating band* with carrier(s) transmitted and a supported downlink *operating band* without any carrier transmitted and

- In case the *inter-band gap* between a supported downlink *operating band* with carrier(s) transmitted and a supported downlink *operating band* without any carrier transmitted is less than 2\*ΔfOBUE, f\_offsetmax shall be the offset to the frequency ΔfOBUE MHz outside the outermost edges of the two supported downlink *operating bands* and the operating band unwanted emission *basic limits* of the band where there are carriers transmitted, as defined in the tables of the present clause, shall apply across both downlink bands.

- In other cases, the operating band unwanted emission *basic limits* of the band where there are carriers transmitted, as defined in the tables of the present clause for the largest frequency offset (Δfmax), shall apply from ΔfOBUE MHz below the lowest frequency, up to ΔfOBUE MHz above the highest frequency of the supported downlink *operating band* without any carrier transmitted.

For a *multi-band connector* of IAB-MT, the operating band unwanted emission limits apply also in a supported uplink *operating band* without any carrier transmitted, in the case where there are carrier(s) transmitted in another supported uplink *operating band*. In this case, no cumulative *basic limit* is applied in the *inter-band gap* between a supported uplink *operating band* with carrier(s) transmitted and a supported uplink *operating band* without any carrier transmitted and

- In case the inter-band gap between a supported uplink operating band with carrier(s) transmitted and a supported uplink operating band without any carrier transmitted is less than 2\* ΔfOBUE, f\_offsetmax shall be the offset to the frequency ΔfOBUE MHz outside the outermost edges of the two supported uplink operating bands and the operating band unwanted emission basic limits of the band where there are carriers transmitted, as defined in the tables of the present clause, shall apply across both uplink bands.

- In other cases, the operating band unwanted emission basic limits of the band where there are carriers transmitted, as defined in the tables of the present clause for the largest frequency offset (Δfmax), shall apply from ΔfOBUE MHz below the lowest frequency, up to ΔfOBUE MHz above the highest frequency of the supported uplink operating band without any carrier transmitted.

For a multicarrier *single-band connector* or a *single-band connector* configured for intra-band contiguous or non-contiguous *carrier aggregation* the definitions above apply to the lower edge of the carrier transmitted at the *lowest carrier* frequency and the upper edge of the carrier transmitted at the *highest carrier* frequency within a specified frequency band.

In addition, inside any *sub-block gap* for a *single-band connector* operating in *non-contiguous spectrum*, a combined *basic* limit shall be applied which is the cumulative sum of the *basic limit*s specified for the adjacent *sub-blocks* on each side of the *sub-block gap*. The *basic limit* for each *sub-block* is specified in clauses 6.6.4.2.1 to 6.6.4.2.4 below, where in this case:

- Δf is the separation between the *sub-block* edge frequency and the nominal -3 dB point of the measuring filter closest to the *sub-block* edge.

- f\_offset is the separation between the *sub-block* edge frequency and the centre of the measuring filter.

- f\_offsetmax is equal to the *sub-block gap* bandwidth minus half of the bandwidth of the measuring filter.

- Δfmax is equal to f\_offsetmax minus half of the bandwidth of the measuring filter.

For Wide Area IAB-DU and Wide Area IAB-MT, the requirements of either clause 6.6.4.2.1 (Category A limits) or clause 6.6.4.2.2 (Category B limits) shall apply.

For Medium Range IAB-DU, the requirements in clause 6.6.4.2.3 shall apply (Category A and B).

For Local Area IAB-DU and Local Area IAB-MT, the requirements of clause 6.6.4.2.4 shall apply (Category A and B).

The application of either Category A or Category B *basic limits* shall be the same as for Transmitter spurious emissions in clause 6.6.5.

6.6.4.2 Minimum requirement

The minimum requirement applies per single-band connector, or per multi-band connector supporting transmission in the operating band.

The minimum requirement for *IAB type 1-H* are defined in TS 38.174 [2], clause 6.6.4.2.

6.6.4.3 Test purpose

This test measures the emissions close to the assigned channel bandwidth of the wanted signal, while the transmitter is in operation.

6.6.4.4 Method of test

6.6.4.4.1 Initial conditions

Test environment: Normal; see annex B.2.

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

*IAB RF Bandwidth* positions to be tested for multi-carrier:

- BRFBW, MRFBW and TRFBW in single-band operation; see clause 4.9.1.

- BRFBW\_T'RFBW and B'RFBW\_TRFBW in multi-band operation, see clause 4.9.1.

6.6.4.4.2 Procedure

For *IAB type 1-H* where there may be multiple *TAB connectors*, they may be tested one at a time or multiple *TAB connectors* may be tested in parallel as shown in annex D.1.1. Whichever method is used the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested.

1) Connect the *single-band connector* or *multi-band connector* under test to measurement equipment as shown in annex D.1.1 for *IAB type 1-H*. All connectors not under test shall be terminated.

As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity, efficiency and avoiding e.g. carrier leakage, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

The measurement device characteristics shall be:

- Detection mode: True RMS.

2) For a connectors declared to be capable of single carrier operation only, set the representative connectors under test to transmit according to the applicable test configuration in clause 4.8 at *rated carrier output power* Prated,c,TABC (D.21). Channel set-up shall be according to IAB-DU-FR1-TM1.1 or IAB-MT-FR1-TM1.1.

For a connector under test declared to be capable of multi-carrier and/or CA operation set the connector under test to transmit on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7 and 4.8 using the corresponding test models or set of physical channels in clause 4.9.2.

3) Step the centre frequency of the measurement filter in contiguous steps and measure the emission within the specified frequency ranges with the specified measurement bandwidth. For connector under test declared to operate in multiple bands or non-contiguous spectrum, the emission within the *Inter RF Bandwidth* or *sub-block gap* shall be measured using the specified measurement bandwidth from the closest RF Bandwidth or sub block edge.

4) Repeat the test for the remaining test cases, with the channel set-up according to IAB-DU-FR1-TM1.2 or IAB-MT-FR1-TM1.2.

In addition, for *multi-band connectors*, the following steps shall apply:

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

***<End of change>***

***<Start of change>***

##### 7.4.2.5.2 Test requirements for IAB-MT

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel, with a wanted and an interfering signal coupled to *IAB type 1‑H* *TAB connector* using the parameters in tables 7.4.2.5.2-1, 7.4.2.5.2-2 and 7.4.2.5.2-3 for general blocking and narrowband blocking requirements. The reference measurement channel for the wanted signal is identified in clause 7.2.2 for each *IAB-MT channel bandwidth* and further specified in annex A.1. The characteristics of the interfering signal is further specified in annex E.

The in-band blocking requirements apply outside the *IAB-MT RF Bandwidth* or *Radio Bandwidth*. The interfering signal offset is defined relative to the *IAB-MT RF Bandwidth edges* or *Radio Bandwidth* edges.

The in-band blocking requirement shall apply from FDL,low - ΔfOOB to FDL,high + ΔfOOB. The ΔfOOB for *wide area IAB-MT* is defined in table 7.4.2.5.2-0.

Minimum conducted requirement is defined at the *TAB connector* for *IAB-MT.*

**Table 7.4.2.5.2-0: ΔfOOB offset for NR *operating bands***

|  |  |  |
| --- | --- | --- |
| **IAB-MT type** | ***Operating band* characteristics** | **ΔfOOB (MHz)** |
| *IAB type 1-H* | FDL,high – FDL,low < 100 MHz | 20 |
|  | 100 MHz ≤ FDL,high – FDL,low ≤ 900 MHz | 60 |

For an IAB-MT operating in *non-contiguous spectrum* within any *operating band*, the in-band blocking requirements apply in addition inside any *sub-block gap*, in case the *sub-block gap* size is at least as wide as twice the interfering signal minimum offset in Table 7.4.2.5.2-1. The interfering signal offset is defined relative to the *sub-block* edges inside the *sub-block gap*.

For a *multi-band connector*, the blocking requirements apply in the in-band blocking frequency ranges for each supported *operating band*. The requirement shall apply in addition inside any *Inter RF Bandwidth gap*, in case the *Inter RF Bandwidth gap* size is at least as wide as twice the interfering signal minimum offset in Table 7.4.2.5.2-1.

For an IAB-MT operating in *non-contiguous spectrum* within any *operating band*, the narrowband blocking requirement shall apply in addition inside any *sub-block gap*, in case the *sub-block gap size* is at least as wide as the channel bandwidth of the NR interfering signal in Table 7.4.2.5.2-3. The interfering signal offset is defined relative to the *sub-block* edges inside the *sub-block gap*.

For a *multi-band connector*, the narrowband blocking requirement shall apply in addition inside any *Inter RF Bandwidth gap*, in case the *Inter RF Bandwidth gap* size is at least as wide as the NR interfering signal in Table 7.4.2.5.2-3. The interfering signal offset is defined relative to the *IAB-MT RF Bandwidth* edges inside the *Inter RF Bandwidth gap*.

**Table 7.4.2.5.2-1: IAB-MT general blocking requirement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***IAB-MT channel bandwidth* of the *lowest/highest carrier* received (MHz)** | **Wanted signal mean power (dBm)** | **Interfering signal mean power (dBm)** | **Interfering signal centre frequency minimum offset from the lower/upper *IAB-MT RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap* (MHz)** | **Type of interfering signal** |
| 10, 15, 20 | PREFSENS + 6 dB | Wide Area IAB-MT: -43  Local Area IAB-MT: -35 | ±7.5 | 5 MHz CP-OFDM NR signal  15 kHz SCS, 25 RBs |
| 25, 30, 40, 50, 60, 70, 80, 90, 100 | PREFSENS + 6 dB | Wide Area IAB-MT: -43  Local Area IAB-MT: -35 | ±30 | 20 MHz CP-OFDM NR signal  15 kHz SCS, 100 RBs |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the IAB-MT *channel bandwidth* as specified in tables 7.2.2-1, 7.2.2-2. | | | | |

**Table 7.4.2.5.2-2: IAB-MT narrowband blocking requirement**

|  |  |  |
| --- | --- | --- |
| ***IAB-MT channel bandwidth* of the *lowest/highest carrier* received (MHz)** | **Wanted signal mean power (dBm)** | **Interfering signal mean power (dBm)** |
| 10, 15, 20, 25, 30, 40, 50, 60, 70, 80,90, 100 (Note 1) | PREFSENS + 6 dB | Wide Area IAB-MT: -49  Local Area IAB-MT: -41 |
| NOTE 1: The SCS for the *lowest/highest carrier* received is the lowest SCS supported by the IAB-MT for that IAB-MT *channel bandwidth*  NOTE 2: PREFSENS depends on the IAB-MT *channel bandwidth* as specified in tables 7.2.2-1 and 7.2.2-2.  NOTE 3: 7.5 kHz shift is not applied to the wanted signal. | | |

**Table 7.4.2.5.2-3: IAB-MT narrowband blocking interferer frequency offsets**

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| ***IAB-MT channel bandwidth* of the *lowest/highest carrier* received (MHz)** | **Interfering RB centre frequency offset to the lower/upper IAB-MT *RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap* (kHz) (Note 2)** | **Type of interfering signal** |
|  |  | 5 MHz CP-OFDM NR signal, 15 kHz SCS, 1 RB |
| 10 | ±(355+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 15 | ±(360+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 20 | ±(350+m\*180),  m=0, 1, 2, 3, 4, 9, 14, 19, 24 |  |
| 25 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 | 20 MHz CP-OFDM NR signal, 15 kHz SCS, 1 RB |
| 30 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 40 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 50 | ±(560+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 60 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 70 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 80 | ±(560+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 90 | ±(570+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| 100 | ±(565+m\*180),  m=0, 1, 2, 3, 4, 29, 54, 79, 99 |  |
| NOTE 1: Interfering signal consisting of one resource block positioned at the stated offset, the channel bandwidth of the interfering signal is located adjacently to the lower/upper IAB-MT *RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap*.  NOTE 2: The centre of the interfering RB refers to the frequency location between the two central subcarriers. | | |

***<End of change>***

***<Start of change>***

#### 8.1.1.2 Applicability rule

##### 8.1.1.2.1 General

Unless otherwise stated, for a IAB-DU supporting more than 8 *TAB connectors* (see D.37 in table 4.6-1), the performance requirement tests for 8 RX antennas shall apply, and the specific connectors used for testing are based on manufacturer declaration.

Unless otherwise stated, for a IAB-DU supporting different numbers of *TAB connectors* (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.

##### 8.1.1.2.2 Applicability of PUSCH performance requirements

8.1.1.2.2.1 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, PUSCH requirement tests shall apply only for each subcarrier spacing declared to be supported (see D.14 in table 4.6-1).

Unless otherwise stated, if IAB-DU supports more than one SCS then PUSCH requirement tests with highest modulation order shall apply only with lowest supported SCS and PUSCH requirement tests with other modulation orders shall apply only with highest supported SCS. Otherwise, all modulation orders are tested on supported SCS.

8.1.1.2.2.2 Applicability of requirements for different channel bandwidths

For each subcarrier spacing declared to be supported, the test requirements for a specific channel bandwidth shall apply only if the IAB-DU supports it (see D.14 in table 4.6-1).

Unless otherwise stated, for each subcarrier spacing declared to be supported, the tests shall be done only for the widest supported channel bandwidth. If performance requirement is not specified for this widest supported channel bandwidth, the tests shall be done by using performance requirement for the closest channel bandwidth lower than this widest supported bandwidth; the tested PRBs shall then be centred in this widest supported channel bandwidth.

8.1.1.2.2.3 Applicability of requirements for different configurations

Unless otherwise stated, PUSCH requirement tests shall apply only for the mapping type declared to be supported (see D.100 in table 4.6-1). If both mapping type A and type B are declared to be supported, the tests shall be done for either type A or type B; the same chosen mapping type shall then be used for all tests except the requirement for PUSCH mapping Type B with 2 symbol length allocated.

8.1.1.2.2.4 Applicability of requirements for uplink carrier aggregation

The tests for uplink carrier aggregation shall be carried out according to the declaration (see D.107 in table 4.6-1).

Unless otherwise stated, the tests for uplink carrier aggregation shall apply only for PUSCH with transform precoding disabled and shall be conducted on per component carrier basis.

8.1.1.2.2.5 Applicability of requirements for TDD with different UL-DL patterns

Unless otherwise stated, for each subcarrier spacing declared to be supported, if IAB-DU supports multiple TDD UL-DL patterns, only one of the supported TDD UL-DL patterns shall be used for all tests.

8.1.1.2.2.6 Applicability of requirements for transform precoding

Unless otherwise stated, the tests with transform precoding enabled shall apply only, if the IAB-DU supports it (see D.109 in table 4.6-1).

##### 8.1.1.2.3 Applicability of PUCCH performance requirements

8.1.1.2.3.1 Applicability of requirements for different formats

Unless otherwise stated, PUCCH requirement tests shall apply only for each PUCCH format declared to be supported (see D.102 in table 4.6-1).

8.1.1.2.3.2 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, PUCCH requirement tests shall apply only for each subcarrier spacing declared to be supported (see D.14 in table 4.6-1). If multiple subcarrier spacings are declared to be supported, each supported PUCCH format can be tested on one subcarrier spacing.

8.1.1.2.3.3 Applicability of requirements for different channel bandwidths

For each subcarrier spacing declared to be supported by the IAB-DU, the test requirements for a specific channel bandwidth shall apply only if the IAB-DU supports it (see D.14 in table 4.6-1).

Unless otherwise stated, for each subcarrier spacing declared to be supported, the tests shall be done only for the widest supported channel bandwidth. If performance requirement is not specified for this widest supported channel bandwidth, the tests shall be done by using performance requirement for the closest channel bandwidth lower than this widest supported bandwidth; the tested PRIAB-DU shall then be centred in this widest supported channel bandwidth.

8.1.1.2.3.4 Applicability of requirements for different configurations

Unless otherwise stated, PUCCH format 3 requirement tests shall apply only for the additional DM-RS configuration declared to be supported (see D.104 in table 4.6-1). If both options (without and with additional DM-RS) are declared to be supported, the tests shall be done for either without or with additional DM-RS; the same chosen option shall then be used for all tests.

Unless otherwise stated, PUCCH format 4 requirement tests shall apply only for the additional DM-RS configuration declared to be supported (see D.105 in table 4.6-1). If both options (without and with additional DM-RS) are declared to be supported, the tests shall be done for either without or with additional DM-RS; the same chosen option shall then be used for all tests.

8.1.1.2.3.5 Applicability of requirements for multi-slot PUCCH

Unless otherwise stated, multi-slot PUCCH requirement tests shall apply only if the IAB-DU supports it (see D.106 in table 4.6-1).

##### 8.1.1.2.4 Applicability of PRACH performance requirements

8.1.1.2.4.1 Applicability of requirements for different formats

Unless otherwise stated, PRACH requirement tests shall apply only for PRACH formats declared to be supported (see D.103 in table 4.6-1).

For IAB-DU declares to support more than one PRACH formats, limit the number of tests to any two cases chosen by the manufacturer. If IAB-DU declares to support more than one PRACH formats where formats for both long and short PRACH sequences are presented, require choosing formats with different sequences (see D.103 in table 4.6-1)

***<End of change>***

***<Start of change>***

8.1.2.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the channel bandwidth, defined in table 8.1.2.1.4.2-1.

Table 8.1.2.1.4.2-1: AWGN power level at the IAB-DU input



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 kHz | 10 | -83.3 dBm / 9.36MHz |
|  | 20 | -80.2 dBm / 19.08MHz |
|  | 10 | -83.6 dBm / 8.64MHz |
| 30 kHz | 20 | -80.4 dBm / 18.36MHz |
|  | 40 | -77.2 dBm / 38.16MHz |
|  | 100 | -73.1 dBm / 98.28MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A and the test parameters in table 8.2.1.4.2-2.

Table 8.2.1.4.2-2: Test parameters for testing PUSCH

|  |  |  |
| --- | --- | --- |
| Parameter | | Value |
| Transform precoding | | Disabled |
| Cyclic prefix | | Normal |
| Default TDD UL-DL pattern (Note 1) | | 15 kHz SCS:  3D1S1U, S=10D:2G:2U  30 kHz SCS:  7D1S2U, S=6D:4G:4U |
| HARQ | Maximum number of HARQ transmissions | 4 |
|  | RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
|  | DM-RS duration | single-symbol DM-RS |
|  | Additional DM-RS position | pos1 |
|  | Number of DM-RS CDM group(s) without data | 2 |
|  | Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
|  | DM-RS port(s) | {0}, {0, 1} |
|  | DM-RS sequence generation | NID0=0, nSCID =0 |
| Time domain resource assignment | PUSCH mapping type | A, B |
|  | Start symbol | 0 |
|  | Allocation length | 14 |
| Frequency domain resource assignment | RB assignment | Full applicable test bandwidth |
|  | Frequency hopping | Disabled |
| TPMI index for 2Tx two layer spatial multiplexing transmission | | 0 |
| Code block group based PUSCH transmission | | Disabled |
| NOTE 1: The same requirements are applicable with different UL-DL patterns. | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in table 8.1.2.1.5-1 to 8.1.2.1.5-14 is achieved at the IAB-DU input.

6) For each of the reference channels in table 8.1.2.1.5-1 to 8.1.2.1.5-14 applicable for the base station, measure the throughput.

##### 8.1.2.1.5 Test requirement

The throughput measured according to clause 8.1.2.1.4.2 shall not be below the limits for the SNR levels specified in table 8.1.2.1.5-1 to 8.1.2.1.5-14.

Table 8.1.2.1.5-1: Void



Table 8.1.2.1.5-2: Test requirements for PUSCH with 70% of maximum throughput, Type A, 10 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.1.5-3: Test requirements for PUSCH with 70% of maximum throughput, Type A, 20 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.1.5-4: Test requirements for PUSCH with 70% of maximum throughput, Type A, 10 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-5: Test requirements for PUSCH with 70% of maximum throughput, Type A, 20 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-6: Test requirements for PUSCH with 70% of maximum throughput, Type A, 40 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-7: Test requirements for PUSCH with 70% of maximum throughput, Type A, 100 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-8: Void



Table 8.1.2.1.5-9: Test requirements for PUSCH with 70% of maximum throughput, Type B, 10 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.1.5-10: Test requirements for PUSCH with 70% of maximum throughput, Type B, 20 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.1.5-11: Test requirements for PUSCH with 70% of maximum throughput, Type B, 10 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-12: Test requirements for PUSCH with 70% of maximum throughput, Type B, 20 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-13: Test requirements for PUSCH with 70% of maximum throughput, Type B, 40 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.1.5-14: Test requirements for PUSCH with 70% of maximum throughput, Type B, 100 MHz channel bandwidth, 30 kHz SCS

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***<End of change>***

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8.1.2.2.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the SCS and channel bandwidth, defined in table 8.1.2.2.4.2-1.

**Table 8.1.2.2.4.2-1: AWGN power level at the IAB-DU input**

|  |  |  |
| --- | --- | --- |
| **Sub-carrier spacing (kHz)** | **Channel bandwidth (MHz)** | **AWGN power level** |
| 15 | 5 | -86.5 dBm / 4.5MHz |
| 30 | 10 | -83.6 dBm / 8.64MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A and the test parameters in table 8.1.2.2.4.2-2.

**Table 8.1.2.2.4.2-2: Test parameters for testing PUSCH**

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Enabled |
| Cyclic prefix | | Normal |
| Default TDD UL-DL pattern (Note 1) | | 15 kHz SCS:  3D1S1U, S=10D:2G:2U  30 kHz SCS:  7D1S2U, S=6D:4G:4U |
| HARQ | Maximum number of HARQ transmissions | 4 |
|  | RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
|  | DM-RS duration | single-symbol DM-RS |
|  | Additional DM-RS position | pos1 |
|  | Number of DM-RS CDM group(s) without data | 2 |
|  | Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
|  | DM-RS port(s) | 0 |
|  | DM-RS sequence generation | NID0=0, group hopping and sequence hopping are disabled |
| Time domain resource assignment | PUSCH mapping type | A, B |
|  | Start symbol | 0 |
|  | Allocation length | 14 |
| Frequency domain resource assignment | RB assignment | 15 kHz SCS: 25 PRBs in the middle of the test bandwidth  30 kHz SCS: 24 PRBs in the middle of the test bandwidth |
|  | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| NOTE 1: The same requirements are applicable to different UL-DL patterns. | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in table 8.1.2.2.5-1 to 8.1.2.2.5-4 is achieved at the IAB-DU input.

6) For each of the reference channels in table 8.1.2.2.5-1 to 8.1.2.2.5-4 applicable for the base station, measure the throughput.

##### 8.1.2.2.5 Test requirement

The throughput measured according to clause 8.1.2.2.4.2 shall not be below the limits for the SNR levels specified in table 8.1.2.2.5-1 to 8.1.2.2.5-4.

Table 8.1.2.2.5-1: Test requirements for PUSCH with 70% of maximum throughput, Type A, 5 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.2.5-2: Test requirements for PUSCH with 70% of maximum throughput, Type A, 10 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.2.5-3: Test requirements for PUSCH with 70% of maximum throughput, Type B, 5 MHz channel bandwidth, 15 kHz SCS

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Table 8.1.2.2.5-4: Test requirements for PUSCH with 70% of maximum throughput, Type B, 10 MHz channel bandwidth, 30 kHz SCS

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***<End of change>***

***<Start of change>***

8.1.2.3.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to combination of SCS and channel bandwidth defined in table 8.1.2.3.4.2-1.

**Table 8.2.3.4.2-1: AWGN power level at the IAB-DU input**

|  |  |  |
| --- | --- | --- |
| **Sub-carrier spacing (kHz)** | **Channel bandwidth (MHz)** | **AWGN power level** |
| 30 | 10 | -80.6 dBm / 8.64 MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A and the specific test parameters are configured as below. The UCI information bit payload per slot is equal to 7 bits with CSI part 1 5bits, CSI part 2 2bit; and the UCI information bit payload per slot is equal to 40 bits with CSI part 1 20bits, CSI part 2 20bits.

**Table: 8.1.2.3.4.2-2: Test parameters for testing UCI multiplexed on PUSCH**

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Disabled |
| Cyclic prefix | | Normal |
| Default TDD UL-DL pattern (Note 1) | | 30 kHz SCS:  7D1S2U, S=6D:4G:4U |
| HARQ | Maximum number of HARQ transmissions | 1 |
|  | RV sequence | 0 |
| DM-RS | DM-RS configuration type | 1 |
|  | DM-RS duration | Single-symbol DM-RS |
|  | Additional DM-RS position | pos1 |
|  | Number of DM-RS CDM group(s) without data | 2 |
|  | Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
|  | DM-RS port(s) | {0} |
|  | DM-RS sequence generation | *NID0* = 0, *nSCID* = 0 |
| Time domain resource assignment | PUSCH mapping type | A, B |
|  | Start symbol | 0 |
|  | Allocation length | 14 |
| Frequency domain resource assignment | RB assignment | Full applicable test bandwidth |
|  | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| UCI | Number of CSI part 1 and CSI part 2 information bit payload | {5,2}, {20, 20} |
|  | *scaling* | 1 |
|  | *betaOffsetACK-Index1* | 11 |
|  | *betaOffsetCSI-Part1-Index1 and betaOffsetCSI-Part1-Index2* | 13 |
|  | *betaOffsetCSI-Part2-Index1 and betaOffsetCSI-Part2-Index2* | 13 |
|  | UCI partition for frequency hopping | Disabled |
| NOTE 1: The same requirements are applicable to different UL-DL patterns. | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in table 8.1.2.3.5-1 to 8.1.2.3.5-4 is achieved at the IAB-DU input during the UCI multiplexed on PUSCH transmissions.

6) The tester sends a test pattern where UCI with CSI part 1 and CSI part 2 information can be multiplexed on PUSCH. The following statistics are kept: the number of incorrectly decoded CSI part 1 information transmission, the number of incorrectly decoded CSI part 2 information transmission during UCI multiplexed on PUSCH transmission.

##### 8.1.2.3.5 Test requirement

The fractional of incorrectly decoded UCI with CSI part 1 according to clause 8.1.2.3.4.2 shall be less than 0.1 % for SNR listed in table 8.1.2.3.5-1 and table 8.1.2.3.5-2. The fractional of incorrectly decoded UCI with CSI part 2 according to clause 8.1.2.3.4.2 shall be less than 1 % for SNR listed in table 8.1.2.3.5-3 and table 8.1.2.3.5-4.

Table 8.1.2.3.5-1: Test requirements for UCI multiplexed on PUSCH, Type A, CSI part 1, 10 MHz channel bandwidth, 30 kHz SCS

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| --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.2.3.5-2: Test requirements for UCI multiplexed on PUSCH, Type B, CSI part 1, 10 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.3.5-3: Test requirements for UCI multiplexed on PUSCH, Type A, CSI part 2, 10 MHz channel bandwidth, 30 kHz SCS

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Table 8.1.2.3.5-4: Test requirements for UCI multiplexed on PUSCH, Type B, CSI part 2, 10 MHz channel bandwidth, 30 kHz SCS

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| --- | --- | --- | --- | --- | --- | --- |
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***<End of change>***

***<Start of change>***

8.1.3.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the channel bandwidth and sub-carrier spacing defined in table 8.1.3.1.4.2-1.

**Table 8.1.3.1.4.2-1: AWGN power level at the IAB-DU input**

|  |  |  |
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|  |  |  |
| --- | --- | --- |
| Subcarrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
|  | 20 | -77.2 dBm / 19.08 MHz |
|  | 10 | -80.6 dBm / 8.64 MHz |
| 30 | 20 | -77.4 dBm / 18.36 MHz |
|  | 40 | -74.2 dBm / 38.16 MHz |
|  | 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9] and the specific test parameters are configured as mentioned in table 8.1.3.1.4.2-2:

**Table 8.1.3.1.4.2-2: Test Parameters**

|  |  |
| --- | --- |
| **Parameter** | **Test** |
| number of UCI information bits | 1 |
| Number of PRBs | 1 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | N/A for 1 symbol  Enabled for 2 symbols |
| First PRB after frequency hopping | The largest PRB index – (Number of PRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 13 for 1 symbol  12 for 2 symbols |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex B.

5) Adjust the equipment so that the SNR specified in table 8.1.3.1.5-1 or table 8.1.3.1.5-2 is achieved at the IAB-DU input during the ACK transmissions.

6) The tester sends a test pattern with the pattern outlined in figure 8.1.3.1.4.2-1. The following statistics are kept: the number of ACKs detected in the idle periods and the number of missed ACKs.

****

**Figure 8.1.3.1.4.2-1: Test signal pattern for single user PUCCH format 0 demodulation tests**

##### 8.1.3.1.5 Test requirement

The fraction of falsely detected ACKs shall be less than 1% and the fraction of correctly detected ACKs shall be larger than 99% for the SNR listed in table 8.1.3.1.5-1 and in table 8.1.3.1.5-2.

Table 8.1.3.1.5-1: Test requirements for PUCCH format 0 and 15 kHz SCS

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| --- | --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.3.1.5-2: Test requirements for PUCCH format 0 and 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number | Number | Propagation conditions | Number of | Channel bandwidth / SNR (dB) | | | |
| of TX antennas | of RX antennas | and correlation matrix  (annex F) | OFDM symbols | 10 MHz | 20 MHz | 40 MHz | 100 MHz |
| 1 | 2 | TDLC-300-100 Low | 1 | 10.4 | 10.4 | 10.1 | 9.8 |
| 2 | 4.8 | 4.2 | 4.4 | 4.1 |
| 1 | 4 | TDLC-300-100 Low | 1 | 4.0 | 4.0 | 3.6 | 3.9 |
| 2 | 0.3 | 0.2 | 0.1 | -0.2 |
| 1 | 8 | TDLC-300-100 Low | 1 | -0.4 | -0.4 | -0.5 | -0.4 |
| 2 | -3.1 | -3.2 | -3.4 | -3.3 |

***<End of change>***

***<Start of change>***

8.1.3.2.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the combinations of SCS and channel bandwidth defined in table 8.1.3.2.1.4.2-1.

**Table 8.1.3.2.1.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 kHz | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 kHz | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as below:

**Table 8.1.3.2.1.4.2-2: Test parameters**

|  |  |
| --- | --- |
| **Parameter** | **Values** |
| Cyclic prefix | Normal |
| Number of information bits | 2 |
| Number of PRBs | 1 |
| Number of symbols | 14 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index - (nrofPRBs -1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 0 |
| Index of orthogonal cover code (*timeDomainOCC*) | 0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjusting the equipment so that the SNR specified in table 8.1.3.2.1.5-1 and table 8.1.3.2.1.5-2 is achieved at the IAB-DU input during the transmissions.

6) The signal generator sends random codeword from applicable codebook, in regular time periods. The following statistics are kept: the number of ACK bits detected in the idle periods and the number of NACK bits detected as ACK.

8.1.3.2.1.5 Test requirement

The fraction of falsely detected ACK bits shall be less than 1% and the fraction of NACK bits falsely detected as ACK shall be less than 0.1% for the SNR listed in tables 8.1.3.2.1.5-1 and table 8.1.3.2.1.5-2.

Table 8.1.3.2.1.5-1: Required SNR for PUCCH format 1 with 15 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.3.2.1.5-2: Required SNR for PUCCH format 1 with 30 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number | Number | Propagation | Channel bandwidth / SNR (dB) | | | |
| of TX antennas | of RX antennas | conditions and correlation matrix (annex F) | 10 MHz | 20 MHz | 40 MHz | 100 MHz |
|  | 2 | TDLC-300-100 Low | -2.2 | -2.7 | -3.3 | -2.9 |
| 1 | 4 | TDLC-300-100 Low | -7.5 | -7.7 | -6.9 | -7.4 |
|  | 8 | TDLC-300-100 Low | -10.9 | -10.6 | -10.1 | -10.7 |

***<End of change>***

***<Start of change>***

8.1.3.2.2.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the combinations of SCS and channel bandwidth defined in table 8.1.3.2.2.4.2-1.

**Table 8.1.3.2.2.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 kHz | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 kHz | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as below:

**Table 8.3.2.2.4.2-2: Test parameters**

|  |  |
| --- | --- |
| **Parameter** | **Values** |
| Cyclic prefix | Normal |
| Number of information bits | 2 |
| Number of PRBs | 1 |
| Number of symbols | 14 |
| First PRB prior to frequency hopping | 0 |
| Intra-frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index - (nrofPRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 0 |
| Index of orthogonal cover code (*timeDomainOCC*) | 0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjusting the equipment so that the SNR specified in table 8.3.2.2.5-1 and table 8.3.2.2.5-2 is achieved at the IAB-DU input during the transmissions.

6) The tester sends random codewords from applicable codebook, in regular time periods. The following statistics are kept: the number of ACK bits falsely detected in the idle periods and the number of missed ACK bits. Each falsely detected ACK bit in the idle periods is accounted as one error for the statistics of false ACK detection, and each missed ACK bit is accounted as one error for the statistics of missed ACK detection.

Note that the procedure described in this clause for ACK missed detection has the same condition as that described in clause 8.1.3.2.1.4.2 for NACK to ACK detection. Both statistics are measured in the same testing.

8.1.3.2.2.5 Test requirement

The fraction of falsely detected ACK bits shall be less than 1% and the fraction of correctly detected ACK bits shall be larger than 99% for the SNR listed in tables 8.1.3.2.2.5-1 and table 8.1.3.2.2.5-2.

Table 8.1.3.2.2.5-1 Required SNR for PUCCH format 1 with 15 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.3.2.2.5-2 Required SNR for PUCCH format 1 with 30 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number | Number | Propagation | Channel bandwidth / SNR (dB) | | | |
| of TX antennas | of RX antennas | conditions and correlation matrix (annex F) | 10 MHz | 20 MHz | 40 MHz | 100 MHz |
|  | 2 | TDLC300-100 Low | -3.3 | -3.8 | -3.8 | -3.6 |
| 1 | 4 | TDLC300-100 Low | -7.4 | -7.5 | -7.8 | -7.7 |
|  | 8 | TDLC300-100 Low | -10.8 | -10.8 | -10.8 | -10.8 |

***<End of change>***

***<Start of change>***

8.1.3.3.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the channel bandwidth defined in table 8.1.3.3.1.4.2-1.

**Table 8.1.3.3.1.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as blow:

**Table 8.3.3.1.4.2-2: Test parameters**

|  |  |
| --- | --- |
| **Parameter** | **Values** |
| Cyclic prefix | Normal |
| Modulation order | QPSK |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | N/A |
| First PRB after frequency hopping | The largest PRB index - (Number of PRBs - 1) |
| Number of PRBs | 4 |
| Number of symbols | 1 |
| The number of UCI information bits | 4 |
| First symbol | 13 |
| DM-RS sequence generation | *NID*0=0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that the SNR specified in table 8.1.3.3.1.5-1 and table 8.1.3.3.1.5-2 is achieved at the IAB-DU input during the UCI transmissions.

6) The tester sends a test pattern with the pattern outlined in figure 8.1.3.3.1.4.2-1. The following statistics are kept: the number of ACKs detected in the idle periods and the number of missed ACKs.

****

**Figure 8.1.3.3.1.4.2-1: Test signal pattern for PUCCH format 2 demodulation tests**

8.1.3.3.1.5 Test requirement

The fraction of falsely detected ACKs shall be less than 1% and the fraction of correctly detected ACKs shall be larger than 99% for the SNR listed in table 8.1.3.3.1.5-1 and table 8.1.3.3.1.5-2.

Table 8.1.3.3.1.5-1: Required SNR for PUCCH format 2 with 15 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | | | |
|  |  |  |  | |  | |
|  |  |  |  | |  | |
|  |  |  |  | |  | |
|  |  |  |  | |  | |

Table 8.1.3.3.1.5-2: Required SNR for PUCCH format 2 with 30 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of TX | Number of RX | Propagation | Channel bandwidth / SNR (dB) | | | |
| antennas | antennas | conditions and correlation matrix (annex F) | 10MHz | 20MHz | 40MHz | 100MHz |
|  | 2 | TDLC300-100 Low | 6.1 | 6.2 | 6.1 | 6.3 |
| 1 | 4 | TDLC300-100 Low | 0.9 | 0.8 | 0.9 | 1.0 |
|  | 8 | TDLC300-100 Low | -3.0 | -3.0 | -2.9 | -2.7 |

***<End of change>***

***<Start of change>***

8.1.3.3.2.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the channel bandwidth defined in table 8.1.3.3.2.4.2-1.

**Table 8.1.3.3.2.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as blow:

**Table 8.1.3.3.2.4.2-2: Test parameters**

|  |  |
| --- | --- |
| **Parameter** | **Values** |
| Cyclic prefix | Normal |
| Modulation order | QPSK |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index – (Number of PRBs - 1) |
| Number of PRBs | 9 |
| Number of symbols | 2 |
| The number of UCI information bits | 22 |
| First symbol | 12 |
| DM-RS sequence generation | *NID*0=0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that the SNR specified in table 8.1.3.3.2.5-1 or table 8.1.3.3.2.5-2 is achieved at the IAB-DU input during the UCI transmissions.

6) The tester sends a test pattern with the pattern outlined in figure 8.1.3.3.2.4.2-1. The following statistics are kept: the number of incorrectly decoded UCI.

****

**Figure 8.1.3.3.2.4.2-1: Test signal pattern for PUCCH format 2 demodulation tests**

8.1.3.3.2.5 Test requirement

The fraction of incorrectly decoded UCI shall be less than 1% for the SNR listed in table 8.1.3.3.2.5-1 and table 8.1.3.3.2.5-2.

Table 8.1.3.3.2.5-1: Required SNR for PUCCH format 2 with 15 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of TX | Number of | Propagation | Channel bandwidth / SNR (dB) | | | |
| antennas | RX antennas | conditions and correlation matrix (annex F) | 10 MHz | | 20 MHz | |
|  | 2 | TDLC300-100 Low | 1.4 | | 1.8 | |
| 1 | 4 | TDLC300-100 Low | -2.6 | | -2.6 | |
|  | 8 | TDLC300-100 Low | -6.1 | | -6.2 | |

Table 8.1.3.3.2.5-2: Required SNR for PUCCH format 2 with 30 kHz SCS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of TX | Number of | Propagation | Channel bandwidth / SNR (dB) | | | |
| antennas | RX antennas | conditions and correlation matrix (annex F) | 10MHz | 20MHz | 40MHz | 100MHz |
|  | 2 | TDLC300-100 Low | 1.1 | 1.7 | 1.0 | 0.9 |
| 1 | 4 | TDLC300-100 Low | -2.7 | -2.3 | -2.7 | -2.8 |
|  | 8 | TDLC300-100 Low | -5.2 | -5.2 | -6.1 | -5.3 |

***<End of change>***

***<Start of change>***

8.1.3.4.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D.6.

2) Adjust the AWGN generator, according to the subcarrier spacing and channel bandwidth defined in table 8.1.3.4.4.2-1.

**Table 8.1.3.4.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
|  | 20 | -77.2 dBm / 19.08 MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
|  | 20 | -77.4 dBm / 18.36 MHz |
|  | 40 | -74.2 dBm / 38.16 MHz |
|  | 100 | 70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9]. The specific test parameters are configured as below:

**Table 8.1.3.4.4.2-2: Test parameters**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Test 1** | **Test 2** |
| Cyclic prefix | Normal | |
| Modulation order | QPSK | |
| First PRB prior to frequency hopping | 0 | |
| Intra-slot frequency hopping | enabled | |
| First PRB after frequency hopping | The largest PRB index - (Number of PRBs - 1) | |
| Group and sequence hopping | neither | |
| Hopping ID | 0 | |
| Number of PRBs | 1 | 3 |
| Number of symbols | 14 | 4 |
| The number of UCI information bits | 16 | 16 |
| First symbol | 0 | 0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that the SNR specified in table 8.1.3.4.5-1 or table 8.1.3.4.5-2 is achieved at the IAB-DU input during the UCI transmissions.

6) The tester sends a test pattern with the pattern outlined in figure 8.1.3.4.4.2-1. The following statistics are kept: the number of incorrectly decoded UCI.

****

**Figure 8.1.3.4.4.2-1: Test signal pattern for PUCCH format 3 demodulation tests**

##### 8.1.3.4.5 Test requirement

The fraction of incorrectly decoded UCI is shall be less than 1% for the SNR listed in table 8.1.3.4.5-1 and table 8.1.3.4.5-2.

Table 8.1.3.4.5-1: Required SNR for PUCCH format 3 with 15 kHz SCS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.3.4.5-2: Required SNR for PUCCH format 3 with 30 kHz SCS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test Number | Number of TX | Number of RX | Propagation conditions | Additional DM-RS | Channel bandwidth / SNR (dB) | | | |
|  | antennas | antennas | and correlation matrix  (annex F) | configuration | 10 MHz | 20 MHz | 40 MHz | 100 MHz |
| 1 | 1 | 2 | TDLC300-100 Low | No additional DM-RS | 1.5 | 1.2 | 1.2 | 1.5 |
| Additional DM-RS | 1.1 | 0.9 | 0.6 | 0.7 |
| 4 | TDLC300-100 Low | No additional DM-RS | -2.5 | -2.8 | -2.6 | -2.9 |
| Additional DM-RS | -3.1 | -3.5 | -3.4 | -3.6 |
| 8 | TDLC300-100 Low | No additional DM-RS | -6.0 | -6.1 | -6.2 | -6.2 |
| Additional DM-RS | -6.9 | -7.0 | -7.0 | -7.1 |
| 2 | 1 | 2 | TDLC300-100 Low | No additional DM-RS | 2.4 | 2.6 | 2.6 | 2.1 |
| 4 | TDLC300-100 Low | No additional DM-RS | -2.3 | -2.4 | -1.8 | -2.4 |
| 8 | TDLC300-100 Low | No additional DM-RS | -5.8 | -5.4 | -5.8 | -5.6 |

***<End of change>***

***<Start of change>***

8.1.3.5.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the subcarrier spacing and channel bandwidth defined in table 8.1.3.5.4.2-1.

**Table 8.1.3.5.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9]. The test parameters are configured as below:

**Table 8.1.3.5.4.2-2: Test parameters**

|  |  |
| --- | --- |
| **Parameter** | **Values** |
| Cyclic prefix | Normal |
| Modulation order | QPSK |
| First PRB prior to frequency hopping | 0 |
| Number of PRBs | 1 |
| Intra-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index - (Number of PRBs - 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Number of symbols | 14 |
| The number of UCI information bits | 22 |
| First symbol | 0 |
| Length of the orthogonal cover code | n2 |
| Index of the orthogonal cover code | n0 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that the SNR specified in table 8.1.3.5.5-1 or table 8.1.3.5.5-2 is achieved at the IAB-DU input during the UCI transmissions.

6) The tester sends a test pattern with the pattern outlined in figure 8.1.3.5.4.2-1. The following statistics are kept: the number of incorrectly decoded UCI.

****

**Figure 8.1.3.5.4.2-1: Test signal pattern for PUCCH format 4 demodulation tests**

##### 8.1.3.5.5 Test requirement

The fraction of incorrectly decoded UCI is shall be less than 1% for the SNR listed in table 8.1.3.5.5-1 and table 8.1.3.5.5-2.

Table 8.1.3.5.5-1: Required SNR for PUCCH format 4 with 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Table 8.1.3.5.5-2: Required SNR for PUCCH format 4 with 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX | Number of RX | Propagation conditions and | Additional DM-RS configuration | Channel bandwidth / SNR (dB) | | | |
| antennas | antennas | correlation matrix (annex F) |  | 10 MHz | 20 MHz | 40 MHz | 100 MHz |
| 1 | 2 | TDLC300-100 Low | No additional DM-RS | 3.7 | 3.4 | 3.7 | 3.4 |
| Additional DM-RS | 3.4 | 2.9 | 3.7 | 2.8 |
| 4 | TDLC300-100 Low | No additional DM-RS | -1.1 | -1.3 | -1.1 | -1.5 |
| Additional DM-RS | -1.4 | -1.9 | -1.9 | -1.8 |
| 8 | TDLC300-100 Low | No additional DM-RS | -5.0 | -4.9 | -4.9 | -4.9 |
| Additional DM-RS | -5.6 | -5.5 | -5.8 | -5.6 |

***<End of change>***

***<Start of change>***

8.1.3.6.1.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the combinations of SCS and channel bandwidth defined in Table 8.1.3.6.1.1.4.2-1.

**Table 8.1.3.6.1.1.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as below:

**Table 8.1.3.6.1.1.4.2-2: Test parameters for multi-slot PUCCH format 1**

|  |  |
| --- | --- |
| **Parameter** | **Test** |
| Cyclic prefix | Normal |
| Number of information bits | 2 |
| Number of PRBs | 1 |
| Number of symbols | 14 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | disabled |
| Inter-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index - (nrofPRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 0 |
| Index of orthogonal cover code (*timeDomainOCC*) | 0 |
| Number of slots for PUCCH repetition | 2 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjusting the equipment so that the SNR specified in table 8.1.3.6.1.1.5-1 is achieved at the IAB-DU input during the transmissions.

6) The tester sends random codeword from applicable codebook, in regular time periods. The following statistics are kept: the number of ACK bits detected in the idle periods and the number of NACK bits detected as ACK.

***<End of change>***

***<Start of change>***

8.1.3.6.1.2.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the combinations of SCS and channel bandwidth defined in table 8.1.3.6.1.2.4.2-1.

**Table 8.1.3.6.1.2.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36 MHz |
| 20 | -77.2 dBm / 19.08 MHz |
| 30 | 10 | -80.6 dBm / 8.64 MHz |
| 20 | -77.4 dBm / 18.36 MHz |
| 40 | -74.2 dBm / 38.16 MHz |
| 100 | -70.1 dBm / 98.28 MHz |

3) The characteristics of the wanted signal shall be configured according to TS 38.211 [9], and the specific test parameters are configured as below:

**Table 8.1.3.6.1.2.4.2-2: Test parameters for multi-slot PUCCH format 1**

|  |  |
| --- | --- |
| **Parameter** | **Test** |
| Cyclic prefix | Normal |
| Number of information bits | 2 |
| Number of PRBs | 1 |
| Number of symbols | 14 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | disabled |
| Inter-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index - (nrofPRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 0 |
| Index of orthogonal cover code (*timeDomainOCC*) | 0 |
| Number of slots for PUCCH repetition | 2 |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjusting the equipment so that the SNR specified in table 8.1.3.6.1.2.5-1 is achieved at the IAB-DU input during the transmissions.

6) The tester sends random codewords from applicable codebook, in regular time periods. The following statistics are kept: the number of ACK bits falsely detected in the idle periods and the number of missed ACK bits. Each falsely detected ACK bit in the idle periods is accounted as one error for the statistics of false ACK detection, and each missed ACK bit is accounted as one error for the statistics of missed ACK detection.

Note that the procedure described in this clause for ACK missed detection has the same condition as that described in clause 8.1.3.6.1.1.4.2 for NACK to ACK detection. Both statistics are measured in the same testing.

***<End of change>***

***<Start of change>***

8.1.4.1.4.2 Test procedure

1) Connect the IAB-DU tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-DU *TAB connectors* for diversity reception via a combining network as shown in annex D. 3.

2) Adjust the AWGN generator, according to the SCS and channel bandwidth.

**Table 8.1.4.1.4.2-1: AWGN power level at the IAB-DU input**



|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 15 | 10 | -80.3 dBm / 9.36MHz |
| 20 | -77.2 dBm / 19.08MHz |
| 30 | 10 | -80.6 dBm / 8.64MHz |
| 20 | -77.4 dBm / 18.36MHz |
| 40 | -74.2 dBm / 38.16MHz |
| 100 | -70.1 dBm / 98.28MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding UL reference measurement channel defined in annex A and the test parameter *msg1-FrequencyStart* is set to 0.

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the frequency offset of the test signal according to table 8.1.4.1.5-1 or 8.1.4.1.5-2 or 8.1.4.1.5-3 or 8.1.4.1.6-1 or 8.1.4.1.6-2 or 8.1.4.1.6-3 or 8.1.4.1.6-4.

6) Adjust the equipment so that the SNR specified in table 8.1.4.1.5-1 or 8.1.4.1.5-2 or 8.1.4.1.5-3 or 8.1.4.1.6-1 or 8.1.4.1.6-2 or 8.1.4.1.6-3 or 8.1.4.1.6-4 is achieved at the IAB-DU input during the PRACH preambles.

7) The test signal generator sends a preamble and the receiver tries to detect the preamble. This pattern is repeated as illustrated in figure 8.1.4.1.4.2-1. The preambles are sent with certain timing offsets as described below. The following statistics are kept: the number of preambles detected in the idle period and the number of missed preambles.

****

**Figure 8.1.4.1.4.2-1: PRACH preamble test pattern**

The timing offset base value for PRACH preamble format 0 is set to 50% of Ncs. This offset is increased within the loop, by adding in each step a value of 0.1us, until the end of the tested range, which is 0.9us. Then the loop is being reset and the timing offset is set again to 50% of Ncs. The timing offset scheme for PRACH preamble format 0 is presented in figure 8.1.4.1.4.2-2.

****

**Figure 8.1.4.1.4.2-2: Timing offset scheme for PRACH preamble format 0**

The timing offset base value for PRACH preamble format A1, A2, A3, B4, C0 and C2 is set to 0. This offset is increased within the loop, by adding in each step a value of 0.1us, until the end of the tested range, which is 0.8 us. Then the loop is being reset and the timing offset is set again to 0. The timing offset scheme for PRACH preamble format A1, A2, A3, B4, C0 and C2 is presented in figure 8.1.4.1.4.2-3.

****

**Figure 8.1.4.1.4.2-3: Timing offset scheme for PRACH preamble format A1 A2, A3, B4, C0 and C2**

***<End of change>***

***<Start of change>***

#### 8.2.2.1 General

##### 8.2.2.1.1 Applicability of requirements

##### 8.2.2.1.1.1 General

Unless otherwise stated, for a IAB-MT declared to support more than 2 demodulation branches (for *IAB-MT type 1-O* and *IAB-MT type 2-O*), the performance requirement tests for 2 demodulation branches shall apply, and the mapping between connectors and demodulation branches is up to IAB-MT implementation.

The tests requiring more than [20] dB SNR level are set to N/A in the test requirements.

##### 8.2.2.1.1.2 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, the tests shall apply only for each subcarrier spacing declared to be supported (see D.7 in table 4.6-1).

##### 8.2.2.1.1.3 Applicability of requirements for TDD with different UL-DL patterns

Unless otherwise stated, for each subcarrier spacing declared to be supported, if IAB-MT supports multiple TDD UL-DL patterns, only one of the supported TDD UL-DL patterns shall be used for all tests.

##### 8.2.2.1.1.4 Applicability of requirements for IAB-MT features

Unless otherwise stated, the PDSCH 256QAM tests (Test 1-1 of Clause 8.2.2.2.5) shall apply only if 256QAM for PDSCH for FR1 is declared to be supported (see D.200 in table 4.6-1, *pdsch-256QAM-FR1*).

Unless otherwise stated, the PDSCH tests (Tests 4, 5 of clause 8.2.2.2.5) shall apply only in case the number of NZP-CSI-RS ports in the test case satisfies maximum number of ports across all configured NZP-CSI-RS resources per CC declared to be supported (see D.201 in table 4.6-1, *maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC*).

Unless otherwise stated, the PDSCH tests (Tests 3, 4, 5 of clause 8.2.2.2.5) shall apply only in case the PDSCH MIMO rank in the test case does not exceed the maximum number of PDSCH MIMO layers declared to be supported (see D.202 in table 4.6-1, *maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC*).

NOTE: Applicability information may be obtained based on vendor declaration (Section 4.6) or alternatively from reading capability signaling.

***<End of change>***

***<Start of change>***

8.2.2.2.4.2 Procedure

1) Connect the IAB tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-MT *TAB connectors* for diversity reception via a combining network as shown in annex D.6

2) Adjust the AWGN generator and adjust the AWGN power level to -77.2 dBm / 38.16MHz.

3) The characteristics of the wanted signal shall be configured according to the corresponding DL reference measurement channel defined in annex A and the test parameters in table 8.2.2.2.4.2-1.

**Table 8.2.2.2.4.2-1: Test parameters for testing PDSCH**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | TDD |
| Active BWP index | |  | 1 |
| Default TDD UL-DL pattern (Note 1) | |  | 7D1S2U, S=6D:4G:4U |
| PDSCH transmission scheme | |  | Transmission scheme 1 |
| Carrier configuration | Offset between Point A and the lowest usable subcarrier on this carrier (Note 1) | RBs | 0 |
|  | Subcarrier spacing | kHz | 30 |
| DL BWP configuration #1 | Cyclic prefix |  | Normal |
|  | RB offset | RBs | 0 |
|  | Number of contiguous PRB | PRBs | 106 |
| PDSCH DMRS configuration | Antenna ports indexes |  | {1000} for Rank 1 tests {1000, 1001} for Rank 2 tests  {1000-1002} for Rank 3 tests  {1000-1003} for Rank 4 tests |
|  | Position of the first DMRS for PDSCH mapping type A |  | 2 |
| Number of PDSCH DMRS CDM group(s) without data |  | 1 for Rank 1 and Rank 2 tests  2 for Rank 3 and Rank 4 tests |
| DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
|  | k0 |  | 0 |
|  | Starting symbol (S) |  | 2 |
|  | Length (L) |  | Specific to each Reference channel |
|  | PDSCH aggregation factor |  | 1 |
|  | PRB bundling type |  | Static |
|  | PRB bundling size |  | 2 |
|  | Resource allocation type |  | Type 0 |
|  | RBG size |  | Config2 |
|  | VRB-to-PRB mapping type |  | Non-interleaved |
|  | VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PT-RS configuration | |  | PT-RS is not configured |
| Maximum number of code block groups for ACK/NACK feedback | |  | 1 |
| Maximum number of HARQ transmission | |  | 4 |
| HARQ ACK/NACK bundling | |  | Multiplexed |
| Redundancy version coding sequence | |  | {0,2,3,1} |
| PDSCH & PDSCH DMRS Precoding configuration | |  | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination, and with PRB bundling granularity |
| Note 1: The same requirements are applicable to TDD with different UL-DL patterns.  Note 2: Point A coincides with minimum guard band as specified in TS 38.174 [2] for tested channel bandwidth and subcarrier spacing. | | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in tables 8.2.2.2.5.1-1, 8.2.2.2.5.1-2, 8.2.2.2.5.1-3 or 8.2.2.2.5.2-1-4 (as applicable) is achieved at the IAB-MT input.

6) For each of the reference channels in tables 8.2.2.2.5.1-1, 8.2.2.2.5.1-2, 8.2.2.2.5.1-3 or 8.2.2.2.5.2-1-4 applicable for the IAB-MT, measure the throughput.

***<End of change>***

***<Start of change>***

8.2.2.3.4.2 Procedure

1) Connect the IAB tester generating the wanted signal, multipath fading simulators and AWGN generators to all IAB-MT *TAB connectors* for diversity reception via a combining network as shown in annex D.6.

2) Adjust the AWGN generator and adjust the AWGN power level to -77.2 dBm / 38.16MHz.

3) The characteristics of the wanted signal shall be configured according to the corresponding DL reference measurement channel defined in annex A and the test parameters in table 8.2.2.3.4.2-1.

**Table 8.2.2.3.4.2-1: Test parameters for testing PDCCH**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **1 Tx Antenna** | | | **2 Tx Antenna** |
| CCE to REG mapping type |  | interleaved | | interleaved | |
| Interleaver size |  | 3 | | | |
| REG bundle size |  | 2 | 6 | | |
| Shift Index |  | 0 | | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in tables 8.2.2.3.5.1-1, 8.2.2.3.5.2-2, 8.2.2.3.6.1-3, 8.2.2.3.6.2-4 (as applicable) is achieved at the IAB-MT input.

6) For each of the reference channels in table 8.2.2.3.5.1-1, 8.2.2.3.5.2-2, 8.2.2.3.6.1-3, 8.2.2.3.6.2-4 applicable for the IAB-MT, measure the missed detection.

***<End of change>***

***<Start of change>***

### 8.2.3 CSI reporting requirements

#### 8.2.3.1 General

##### 8.2.3.1.1 Applicability rule for IAB-MT

###### 8.2.3.1.1.1 General

Unless otherwise stated, for an IAB-MT declared to support more than 4 *TAB connectors* (for *IAB type 1-H*), the performance requirement tests for 4 RX antennas shall apply, and the specific connectors used for testing is up to IAB-MT implementation.

Testing of performance requirements for RI and PMI reporting is optional.

###### 8.2.3.1.1.2 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, the tests shall apply only for each subcarrier spacing declared to be supported (see D.14 in table 4.6-1).

###### 8.2.3.1.1.3 Applicability of requirements for TDD with different UL-DL patterns

Unless otherwise stated, for each subcarrier spacing declared to be supported, if IAB-MT supports multiple TDD UL-DL patterns, only one of the supported TDD UL-DL patterns shall be used for all tests.

###### 8.2.3.1.1.4 Applicability of requirements for IAB-MT features

Unless otherwise stated, for *IAB type 1-H*, the CSI reporting tests shall apply only in case the number of NZP-CSI-RS ports in the test case satisfies maximum number of ports across all configured NZP-CSI-RS resources per CC declared to be supported (see D.201 in table 4.6-1*, maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC*).

Unless otherwise stated, for *IAB type 1-H*, the CSI reporting tests shall apply only in case the PDSCH MIMO rank in the test case does not exceed the maximum number of PDSCH MIMO layers declared to be supported (see D.202 in table 4.6-1*, maxNumberMIMO-LayersPDSCH*).

Note: Applicability information may be obtained based on vendor declaration (Section 4.6) or alternatively from reading capability signaling.

#### 8.2.3.2 Reporting Channel Quality Indicator (CQI)

##### 8.2.3.2.1 Definition and applicability

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective conditions is determined by the reporting variance and the BLER performance using the transport format indicated by the reported CQI median. The purpose is to verify that the reported CQI values are in accordance with the CQI definition given in TS 38.214 [24]. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

Which specific test(s) are applicable to IAB-MT is based on the test applicability rules defined in clause 8.2.1.2.

##### 8.2.3.2.2 Minimum requirement

The minimum requirement is in TS 38.174 [2] clause 8.2.3.1.

##### 8.2.3.2.3 Test purpose

The test shall verify the receiver's ability to report CQI values accordance with the CQI definition given in TS 38.214 [24].

##### 8.2.3.2.4 Method of test

8.2.3.2.4.1 Initial conditions

Test environment: Normal, see annex B.2.

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

8.2.3.2.4.2 Test procedure

1) Connect the IAB-MT tester generating the wanted signal and AWGN generators to all IAB-MT *TAB* connectors for diversity reception via a combining network as shown in annex D.5 and D.6.

2) Adjust the AWGN generator, according to the channel bandwidth, defined in table 8.2.3.2.4.2-1.

Table 8.2.3.2.4.2-1: AWGN power level at the IAB-MT input

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 30 kHz | 40 | -77.2 dBm / 38.16MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding DL reference measurement channel defined in annex A and the test parameters in table 8.2.3.2.4.2-2.

Table 8.2.3.2.4.2-2: Test parameters for testing CQI reporting

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 40 | | | |
| Subcarrier spacing | | kHz | 30 | | | |
| Default TDD UL-DL pattern (Note 1) | |  | 7D1S2U, S=6D:4G:4U | | | |
| SNR | | dB | 5 | 6 | 11 | 12 |
| Propagation channel | |  | AWGN | | | |
| Antenna configuration | |  | 2x4 | | | |
| Beamforming Model | |  | As specified in Annex J.3 | | | |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic | | | |
| Number of CSI-RS ports (*X*) |  | 2 | | | |
| CDM Type |  | FD-CDM2 | | | |
| Density (ρ) |  | 1 | | | |
| First subcarrier index in the PRB used for CSI-RS (k0, k1) |  | Row 3,(6,-) | | | |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 13 | | | |
| NZP CSI-RS-timeConfig periodicity and offset | slot | 10/1 | | | |
| ReportConfigType | |  | Periodic | | | |
| CQI-table | |  | Table 2 | | | |
| reportQuantity | |  | cri-RI-PMI-CQI | | | |
| cqi-FormatIndicator | |  | Wideband | | | |
| pmi-FormatIndicator | |  | Wideband | | | |
| Sub-band Size | | RB | 16 | | | |
| Csi-ReportingBand | |  | 1111111 | | | |
| CSI-Report periodicity and offset | | slot | 10/9 | | | |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel | | | |
| Codebook Mode |  | 1 | | | |
| CodebookSubsetRestriction |  | 010000 | | | |
| RI Restriction |  | N/A | | | |
| CQI/RI/PMI delay | | ms | 9.5 | | | |
| Maximum number of HARQ transmission | |  | 1 | | | |
| Measurement channel | |  | M-FR1-A.3.5-2 | | | |
| Note 1: The same requirements are applicable for TDD with different UL-DL pattern. | | | | | | |

4) Adjust the equipment so that required SNR specified in table 8.2.3.2.4.2-2 is achieved at the IAB-MT input.

5) For each test specified in table 8.2.3.2.4.2-2 applicable for the IAB-MT, measure the median CQI and the BLER at median CQI and (median CQI+1 or median CQI-1) as per clause 8.2.3.2.5.

##### 8.2.3.2.5 Test requirement

For the parameters specified in Table 8.2.3.2.4.2-2, and using the downlink physical channels specified in Annex A, the test requirements are specified by the following:

a) The reported CQI value according to the reference channel shall be in the range of ±1 of the reported median more than 90% of the time.

b) If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, then the BLER using the transport format indicated by the (median CQI+1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, then the BLER using transport format indicated by (median CQI-1) shall be less than or equal to 0.1.

#### 8.2.3.3 Reporting of Precoding Matrix Indicator (PMI)

##### 8.2.3.3.1 Definition and applicability

The minimum performance requirements of PMI reporting are defined based on the precoding gain, expressed as the relative increase in throughput when the transmitter is configured according to the UE reported PMI compared to the case when the transmitter is using random precoding, respectively. When the transmitter uses random precoding, for each PDSCH allocation a precoder is randomly generated with equal probability of each applicable i1 and i2 combination and applied to the PDSCH. A fixed transport format (FRC) is configured for all requirements.

The requirements for transmission mode 1 with higher layer parameter *codebookType* set to 'typeI-SinglePanel' are specified in terms of the ratio:



In the definition of **, for 4TX and 8TX PMI requirements, is 90 % of the maximum throughput obtained at  using the precoders configured according to the UE reports, and is the throughput measured at with random precoding.

##### 8.2.3.3.2 Minimum requirement

The minimum requirement is in TS 38.174 [2] clause 8.2.3.2.

##### 8.2.3.3.3 Test purpose

The test shall verify the receiver's ability to achieve throughput gain under multipath fading propagation conditions using reporting PMI comparing to using random PMI.

##### 8.2.3.3.4 Method of test

8.2.3.3.4.1 Initial conditions

Test environment: Normal, see annex B.2.

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

8.2.3.3.4.2 Test procedure

1) Connect the IAB-MT tester generating the wanted signal and AWGN generators to all IAB-MT *TAB* connectors for diversity reception via a combining network as shown in annex D.5 and D.6.

2) Adjust the AWGN generator, according to the channel bandwidth, defined in table 8.2.3.3.4.2-1.

Table 8.2.3.3.4.2-1: AWGN power level at the IAB-MT input

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 30 kHz | 40 | -77.2 dBm / 38.16MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding DL reference measurement channel defined in annex A and the test parameters in table 8.2.3.3.4.2-2.

Table 8.2.3.3.4.2-2: Test parameters for testing PMI reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | Test 2 |
| Bandwidth | | MHz | 40 | 40 |
| Subcarrier spacing | | kHz | 30 | 30 |
| Default TDD UL-DL pattern (Note 1) | |  | 7D1S2U, S=6D:4G:4U | 7D1S2U, S=6D:4G:4U |
| Propagation channel | |  | TDLA30-5 | TDLA30-5 |
| Antenna configuration | |  | High XP 4 x 4  (N1,N2) = (2,1) | High XP 8 x 4  (N1,N2) = (4,1) |
| Beamforming Model | |  | As specified in Annex J.3 | As specified in Annex J.3 |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic | Periodic |
| Number of CSI-RS ports (*X*) |  | 4 | 8 |
| CDM Type |  | FD-CDM2 | CDM4 (FD2, TD2) |
| Density (ρ) |  | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0, k1) |  | Row 4, (0,-) | Row 8, (4,6) |
| First OFDM symbol in the PRB used for CSI-RS (l0, l1) |  | (13,-) | (5,-) |
| NZP CSI-RS-timeConfig periodicity and offset | slot | 10/1 | 10/1 |
| ReportConfigType | |  | Periodic | Periodic |
| CQI-table | |  | Table 1 | Table 1 |
| reportQuantity | |  | cri-RI-PMI-CQI | cri-RI-PMI-CQI |
| cqi-FormatIndicator | |  | Wideband | Wideband |
| pmi-FormatIndicator | |  | Wideband | Wideband |
| Sub-band Size | | RB | 16 | 16 |
| csi-ReportingBand | |  | 1111111 | 1111111 |
| CSI-Report periodicity and offset | | slot | 10/9 | 10/9 |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel | typeI-SinglePanel |
| Codebook Mode |  | 1 | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | (2,1) | (4,1) |
| (CodebookConfig-O1,CodebookConfig-O2) |  | (4,1) | (4,1) |
| CodebookSubsetRestriction |  | 11111111 | 0x FFFF |
| RI Restriction |  | 00000001 | 00000010 |
| CQI/RI/PMI delay | | ms | 5.5 | 6.5 |
| Maximum number of HARQ transmission | |  | 4 | 4 |
| Measurement channel | |  | M-FR1-A.3.5-5 | M-FR1-A.3.5-6 |
| Note 1: The same requirements are applicable for TDD with different UL-DL pattern.  Note 2: When Throughput is measured using random precoder selection, the precoder shall be updated in each slot (0.5 ms granularity) with equal probability of each applicable i1, i2 combination.  Note 3: If the UE reports in an available uplink reporting instance at slot#n based on PMI estimation at a downlink slot not later than slot#(n-4) for Test 1 or slot#(n-6) for Test 2, this reported PMI cannot be applied at the gNB downlink before slot#(n+4) for Test 1 or slot#(n+6) for Test 2 respectively.  Note 4: Randomization of the principle beam direction shall be used as specified in Annex F.2.4.2.4. | | | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in clause 8.2.3.3.1 is achieved at the IAB-MT input.

6) For each test specified in table 8.2.3.3.4.2-2 applicable for the IAB-MT, calculate **.

##### 8.2.3.3.5 Test requirement

For the parameters specified in Table 8.2.3.3.4.2-2, and using the downlink physical channels specified in Annex A, the test requirements are specified in Table 8.2.3.3.5-1.

Table 8.2.3.3.5-1 Test requirements for PMI reporting

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Test 1** | **Test 2** |
| ** | 1.29 | 1.49 |

#### 8.2.3.4 Reporting of Rank Indicator (RI)

##### 8.2.3.4.1 General

The purpose of this test is to verify that the reported rank indicator accurately represents the channel rank. The accuracy of RI reporting is determined by the relative increase of the throughput obtained when transmitting based on the reported rank compared to the case for which a fixed rank is used for transmission.

##### 8.2.3.4.2 Minimum requirements

The minimum requirement is in TS 38.174 [2] clause 8.2.3.3.

##### 8.2.3.4.3 Test purpose

The test shall verify the receiver's ability to report rank indicator accurately represents the channel rank.

##### 8.2.3.4.4 Method of test

8.2.3.4.4.1 Initial conditions

Test environment: Normal, see annex B.2.

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

8.2.3.4.4.2 Test procedure

1) Connect the IAB-MT tester generating the wanted signal and AWGN generators to all IAB-MT *TAB* connectors for diversity reception via a combining network as shown in annex D.5 and D.6.

2) Adjust the AWGN generator, according to the channel bandwidth, defined in table 8.2.3.4.4.2-1.

Table 8.2.3.4.4.2-1: AWGN power level at the IAB-MT input

|  |  |  |
| --- | --- | --- |
| Sub-carrier spacing (kHz) | Channel bandwidth (MHz) | AWGN power level |
| 30 kHz | 40 | -77.2 dBm / 38.16MHz |

3) The characteristics of the wanted signal shall be configured according to the corresponding DL reference measurement channel defined in annex A and the test parameters in table 8.2.3.4.4.2-2.

Table 8.2.3.4.4.2-2: Test parameters for testing RI reporting

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | Test 2 | Test 3 | Test 4 |
| Bandwidth | | MHz | 40 | 40 | 40 | 40 |
| Subcarrier spacing | | kHz | 30 | 30 | 30 | 30 |
| Default TDD UL-DL pattern (Note 1) | |  | 7D1S2U, S=6D:4G:4U | 7D1S2U, S=6D:4G:4U | 7D1S2U, S=6D:4G:4U | 7D1S2U, S=6D:4G:4U |
| SNR | |  | -2 | 16 | 16 | 22 |
| Propagation channel | |  | TDLA30-5 | TDLA30-5 | TDLA30-5 | TDLA30-5 |
| Antenna configuration | |  | ULA Low 2x4 | ULA Low 2x4 | ULA High 2x4 | ULA Low 4x4 |
| Beamforming Model | |  | As specified in Annex J.3 | As specified in Annex J.3 | As specified in Annex J.3 | As specified in Annex J.3 |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic | Periodic | Periodic | Periodic |
| Number of CSI-RS ports (X) |  | 2 | 2 | 2 | 4 |
| CDM Type |  | FD-CDM2 | FD-CDM2 | FD-CDM2 | FD-CDM2 |
| Density (ρ) |  | 1 | 1 | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0, k1) |  | Row 3 (6,-) | Row 3 (6,-) | Row 3 (6,-) | Row 4 (0,-) |
| First OFDM symbol in the PRB used for CSI-RS (l0, l1) |  | (13,-) | (13,-) | (13,-) | (13,-) |
| NZP CSI-RS-timeConfig periodicity and offset | slot | 10/1 | 10/1 | 10/1 | 10/1 |
| ReportConfigType | |  | Periodic | Periodic | Periodic | Periodic |
| CQI-table | |  | Table 2 | Table 2 | Table 2 | Table 2 |
| reportQuantity | |  | cri-RI-PMI-CQI | cri-RI-PMI-CQI | cri-RI-PMI-CQI | cri-RI-PMI-CQI |
| cqi-FormatIndicator | |  | Wideband | Wideband | Wideband | Wideband |
| pmi-FormatIndicator | |  | Wideband | Wideband | Wideband | Wideband |
| Sub-band Size | | RB | 16 | 16 | 16 | 16 |
| csi-ReportingBand | |  | 1111111 | 1111111 | 1111111 | 1111111 |
| CSI-Report periodicity and offset | | slot | 10/9 | 10/9 | 10/9 | 10/9 |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel | typeI-SinglePanel | typeI-SinglePanel | typeI-SinglePanel |
| Codebook Mode |  | 1 | 1 | 1 | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | N/A | N/A | N/A | (2,1) |
| CodebookSubsetRestriction |  | 010000 for fixed rank 2,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank | 11111111 |
| RI Restriction |  | N/A | N/A | N/A | 00000010 for fixed Rank 2 and 00001111 for follow RI |
| CQI/RI/PMI delay | | ms | 9.5 | 9.5 | 9.5 | 9.5 |
| Maximum number of HARQ transmission | |  | 1 | 1 | 1 | 1 |
| RI Configuration | |  | Fixed RI = 2 and follow RI | Fixed RI = 1 and follow RI | Fixed RI = 1 and follow RI | Fixed RI = 2 and follow RI |
| Note 1: The same requirements are applicable for TDD with different UL-DL pattern.  Note 2: Measurements channels are specified in Table A.3.5-1. M-FR1-A.3.5-1 is used for Rank 1 case. M-FR1-A.3.5-2 is used for Rank 2 case. M-FR1-A.3.5-3 is used for Rank 3 case. M-FR1-A.3.5-4 is used for Rank 4 case. | | | | | | |

4) The multipath fading emulators shall be configured according to the corresponding channel model defined in annex F.

5) Adjust the equipment so that required SNR specified in Table 8.2.3.4.4.2-2 is achieved at the IAB-MT input.

6) For each test specified in table 8.2.3.4.4.2-2 applicable for the IAB-MT, calculate **.

##### 8.2.3.4.5 Test requirement

The test requirement for RI reporting is defined as

a) The ratio of the throughput obtained when transmitting based on IAB-MT reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ ;

b) The ratio of the throughput obtained when transmitting based on IAB-MT reported RI and that obtained when transmitting with fixed rank 2 shall be ≥ ;

For the parameters specified in Table 8.2.3.4.4.2-2 and using the downlink physical channels specified in Annex A, the test requirements are specified in Table 8.2.3.4.5-1.

Table 8.2.3.4.5-1 Test requirements for RI reporting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Test 1** | **Test 2** | **Test 3** | **Test 4** |
| **1 | N/A | 1.05 | 0.9 | N/A |
| **2 | 0.9 | N/A | N/A | 0.9 |

***<End of change>***

***<Start of change>***

# C.1 Measurement of transmitter

Table C.1-1: Derivation of test requirements (Transmitter tests)

| Test | Minimum requirement in TS 38.174 [2] | Test Tolerance (TT) | Test requirement in the present document |
| --- | --- | --- | --- |
| 6.2 IAB output power | See TS 38.174 [2], clause 6.2 | Normal and extreme conditions:  0.7 dB, f ≤ 3.0 GHz  1.0 dB, 3.0 GHz < f ≤ 6GHz (Note 1) | Formula:  Upper limit + TT, Lower limit - TT |
| 6.3.1 IAB-DU Output power dynamics | See TS 38.174 [2], clause 6.3.1 | 0.4 dB | Formula:  Total power dynamic range – TT (dB) |
| 6.3.2 IAB-MT Total power dynamic range | See TS 38.174 [2], clause 6.3.2 | ±0.7 dB, BW ≤ 40MHz  ±1.0 dB, 40MHz < f ≤ 100MHz | Formula:  Total power dynamic range – TT (dB) |
|  |  |  |  |
| 6.4.1 Transmitter OFF power | See TS 38.174 [2], clause 6.4.1 | 2.0 dB, f ≤ 3.0 GHz  2.5 dB, 3.0 GHz < f ≤ 6 GHz  (Note 1) | Formula:  Minimum Requirement + TT |
| 6.4.2 Transient period | See TS 38.174 [2], clause 6.4.2 | N/A |  |
| 6.5.2.1 IAB-DU Frequency error | See TS 38.174 [2], clause 6.5.1.1 | 12 Hz | Formula:  Frequency Error limit + TT |
| 6.5.2.2 IAB-MT Frequency error | See TS 38.174 [2], clause 6.5.1.2 | ±15 Hz, f ≤ 3.0GHz  ±36 Hz, f > 3.0GHz | Formula:  Frequency Error limit + TT |
| 6.5.4 Modulation quality (EVM) | See TS 38.174 [2], clause 6.5.2 | 1% | Formula:  EVM limit + TT |
| 6.5.4 Time alignment error | See TS 38.174 [2], clause 6.5.3.1 | 25ns | Formula:  Time alignment error limit + TT+ TT |
| 6.6.2 Occupied bandwidth | See TS 38.174 [2], clause 6.6.2 | 0 Hz | Formula:  Minimum Requirement + TT |
| 6.6.3 Adjacent Channel Leakage Power Ratio (ACLR) | See TS 38.174 [2], clause 6.6.3 | ACLR/CACLR:  BW ≤ 20MHz:  0.8dB  BW > 20MHz:  1.2 dB  Absolute ACLR/CACLR:  0 dB | Formula:  ACLR Minimum Requirement - TT  Absolute limit +TT |
| 6.6.4 Operating band unwanted emissions | See TS 38.174 [2], clause 6.6.4 | Offsets < 10MHz  1.5 dB, f ≤ 3.0GHz  1.8 dB, 3.0GHz < f ≤ 6GHz  (Note 1)  Offsets ≥ 10MHz  0dB | Formula:  Minimum Requirement + TT |
| 6.6.5.5.1 General transmitter spurious emissions requirements  Category A | See TS 38.174 [2], clause 6.6.5.2.1 | 0dB | Formula:  Minimum Requirement + TT |
| 6.6.5.5.1 General transmitter spurious emissions requirements  Category B | See TS 38.174 [2], clause 6.6.5.2.1 | 0dB | Formula:  Minimum Requirement + TT |
| 6.6.5.5.2 Additional spurious emissions requirements | See TS 38.174 [2], clause 6.6.5.2.2 | 0dB | Formula:  Minimum Requirement + TT |
| 6.6.5.5.3 Co-location with other base stations | See TS 38.174 [2], clause 6.6.5.2.3 | 0dB | Formula:  Minimum Requirement + TT |
| 6.7 Transmitter intermodulation | See TS 38.174 [2], clause 6.7 | 0dB | Formula: Ratio + TT |
| NOTE 1: TT values for 4.2 GHz < f ≤ 6.0 GHz apply for IAB operates in licensed spectrum only.  NOTE 2: TT values are applicable for normal condition unless otherwise stated. | | | |

***<End of change>***

***<Start of change>***

# D.3 IAB type 1-H performance requirements

## D.3.1 Performance requirements for PUSCH and PUCCH on single antenna port in multipath fading conditions

transceiver unit array

#1

#2

#K

transceiver array boundary

Transceiver array boundary connector TAB(n)

Load

AWGN Generator

AWGN GeneratorAWGN Generator

IAB tester

Feedback

Synchronization source (if used, see NOTE 2)

**Figure D.3.1-1: Functional set-up for performance requirements for PUSCH and PUCCH for IAB with Rx diversity (2 Rx case shown)**

NOTE 1: The feedback could be done as an RF feedback, either using NR channels or using other means, or as a digital feedback. The HARQ Feedback should be error free.

NOTE 2: In tests performed with signal generators, a synchronization signal may be provided between the IAB node and the signal generator, or a common (e.g., GNSS) source may be provided to both IAB node and the signal generator, to enable correct timing of the wanted signal. The method of synchronization with the TE is left to test implementation.

NOTE 3: It is left up to implementation how L1/L2 is configured for testing.

## D.3.2 Performance requirements for PUSCH, PDSCH, PDCCH transmission and PMI/RI reporting on two antenna ports in multipath fading conditions

transceiver unit array

#1

#2

#K

transceiver array boundary

Transceiver array boundary connector TAB(n)

Load

Channel

Simulator

Channel

Simulator

Channel

Simulator

Channel

Simulator

IAB tester

Tx 1

Tx 2

feedback

AWGN GeneratorAWGN Generator

AWGN GeneratorAWGN Generator

Synchronization source (if used see NOTE 2)

**Figure D.3.2-1: Functional set-up for performance requirements for PUSCH, PDSCH and PDCCH transmission on two antenna ports in multipath fading conditions (2 Rx case shown)**

NOTE 1: The feedback could be done as an RF feedback, either using NR channels or using other means, or as a digital feedback. The HARQ Feedback should be error free.

NOTE 2: In tests performed with signal generators, a synchronization signal may be provided between the IAB node and the signal generator, or a common (e.g., GNSS) source may be provided to both IAB node and the signal generator, to enable correct timing of the wanted signal. The method of synchronization with the TE is left to test implementation.

NOTE 3: It is left up to implementation how L1/L2 is configured for testing.

## D.3.3 Performance requirements for PUSCH, PRACH transmission and CQI reporting in static conditions

transceiver unit array

#1

#2

#K

transceiver array boundary

Transceiver array boundary connector TAB(n)

Load

AWGN Generator

AWGN GeneratorAWGN Generator

IAB tester

Synchronization source (if used see NOTE 1)

**Figure D.3.3-1: Functional set-up for performance requirements for PUSCH and PRACH in static conditions for IAB-DU with Rx diversity (2 Rx case shown)**

NOTE 1: In tests performed with signal generators, a synchronization signal may be provided between the IAB node and the signal generator, or a common (e.g., GNSS) source may be provided to both IAB node and the signal generator, to enable correct timing of the wanted signal. The method of synchronization with the TE is left to test implementation.

NOTE 2: It is left up to implementation how L1/L2 is configured for testing.

***<End of change>***