**3GPP TSG- Meeting #**

**Fukuoka, Japan, 20 – 24 May 2024**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** | **<->** | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** | draftCR to TS 38.176-1 mIAB demod requirements applicability and FRCs | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_mobile\_IAB-Perf | | | | |  | ***Date:*** | | | 2024-05-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Add applicability requirements and FRCs in TS 38.176-1 for mIAB-MT demod requirements based on the agreed test cases in R4-2406058. Endorsed CR R4-2406054 from RAN4#110-bis is included. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Applicability requirements and FRCs are added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Missing mIAB demod requirements in TS 38.176-1. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.6, 4.8.2, 8.1.1.2.1, 8.2.2.1.1.1  New clause: A.3B | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **N** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **N** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**< 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. The mIAB manufacturer’s declaration follows table 4.6-1.

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.38) 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.IAB-2 | IAB simultaneous operation | Declare support of IAB simultaneous operation, simultaneous transmission, or simultaneous reception or both. | x | x |
| D.IAB-3 | Maximum power imbalance for IAB simultaneous transmission | Declare the maximum PSD offset in dB of IAB-MT carrier and IAB-DU carrier for IAB simultaneous transmission | 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 IAB-MT for DL reception, i.e. 2, 4, 8 or not supported. |  | x |
| D.203 | Mobile IAB-node | Declaration of support of mobile feature for an IAB-node | x | 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.  NOTE 4: For declaration applied both IAB-MT and IAB-DU, it can be applied to IAB simultaneous operation where applicable. | | | | |

**< Next change >**

### 4.8.2 Requirement set applicability

In table 4.8.2-1, the requirement applicability for each requirement set of IAB-DU/mIAB-DU and IAB-MT/mIAB-MT is defined. For each requirement, the applicable requirement clause in the specification is identified. Requirements not included in a requirement set is marked not applicable (NA).

Table 4.8.2-1: Requirement set applicability for IAB-DUs and IAB-MTs

| Requirement | IAB-DU Requirement set | IAB-MT Requirement set |
| --- | --- | --- |
| Output power | 6.2 | 6.2 |
| Output power dynamics | 6.3 | 6.3 |
| Transmit ON/OFF power | 6.4 | 6.4 |
| Transmitted signal quality | 6.5 | 6.5 |
| Occupied bandwidth | 6.6.2 | 6.6.2 |
| ACLR | 6.6.3 | 6.6.3 |
| Operating band unwanted  emissions | 6.6.4 | 6.6.4 |
| Transmitter spurious emissions | 6.6.5 | 6.6.5 |
| Transmitter intermodulation | 6.7.5 | 6.7.5 |
| Reference sensitivity level | 7.2 | 7.2 |
| Dynamic range | 7.3 | NA |
| In-band selectivity and blocking | 7.4 | 7.4 |
| Out-of-band blocking | 7.5 | 7.5 |
| Receiver spurious emissions | 7.6 | 7.6 |
| Receiver intermodulation | 7.7 | 7.7 |
| In-channel selectivity | 7.8 | NA |
| Performance requirements | 8 | 8 |

**< Next change >**

### 8.1.1 General

#### 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.

Unless otherwise stated, the performance requirement tests for IAB-DU shall apply to mIAB-DU (see D.203 in Table 4.6-1).

**< Next 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.

Performance requirement tests in Suffix B shall apply for mIAB-MT (see D.203 in Table 4.6-1). Requirements applicability for mIAB-MT listed in the table 8.2.2.1.1.1-1 should be considered.

**Table 8.2.2.1.1.1-1: Test case to be skipped for mIAB-MT**

|  |  |  |
| --- | --- | --- |
|  | **Test case to be skipped** | **Test case to be passed** |
| PDSCH | Test number 1-2 in Table 8.2.2.1.5-2 | Test number 1-1 and 1-2 in Table 8.2.2B.1.2-1 |
| PDCCH | Test number 2 in Table 8.2.2.3.5-1 | Test number 1 in Table 8.2.2B.2.2-1 |
| Test number 3 in Table 8.2.2.3.5-1 | Test number 1 in Table 8.2.2B.2.2-2 |

**< Next change >**

## A.3B mIAB-MT Fixed Reference Channels

### A.3B.1 Fixed Reference Channels for PDSCH performance requirements (QPSK)

The parameters for the reference measurement channels are specified in table A.3B.1-1 for FR1 mIAB-MT PDSCH performance requirements.

Table A.3B.1-1: FRC parameters for mIAB-MT FR1 PDSCH performance requirements, QPSK

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | M-FR1-A.3B.1-1 |
| Channel bandwidth | MHz | 40 |
| Subcarrier spacing | kHz | 30 |
| Allocated resource blocks | PRBs | 106 |
| Number of consecutive PDSCH symbols |  | 12 |
| MCS table |  | 64QAM |
| MCS index |  | 4 |
| Modulation |  | QPSK |
| Target Coding Rate |  | 0.30 |
| Number of MIMO layers |  | 1 |
| Number of DMRS REs |  | [12] |
| Overhead for TBS determination |  | 0 |
| Information Bit Payload per Slot |  | [9224] |
| Transport block CRC per Slot |  | [24] |
| Number of Code Blocks per Slot |  | [2] |
| Binary Channel Bits Per Slot |  | [30528] |

### A.3B.2 Reference measurement channels for PBCH demodulation requirements

#### A.3B.2.1 Reference measurement channels for FR1

Table A.3B.2.1-1: PBCH Reference Channel

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | M.FR1-PBCH-1 |
| SS/PBCH block subcarrier spacing | kHz | 30 |
| Modulation |  | QPSK |
| Target coding rate |  | 56/864 |
| Payload (without CRC and timing related PBCH payload bits) | bits | 24 |

### A.3B.3 TDD UL-DL configurations

TDD UL-DL configurations for FR1 performance requirements are provided in Tables A.3B.3-1.

Table A.3B.3-1: TDD UL-DL configuration for SCS 30 kHz

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **UL-DL pattern** | |
| **FR1.30-1** | **FR1.30-5** |
| TDD Slot Configuration pattern (Note 1) | |  | 7DS2U | DSUU |
| Special Slot Configuration (Note 2) | |  | 6D+4G+4U | 12D+2G |
| *referenceSubcarrierSpacing* | | kHz | 30 | 30 |
| pattern1 |  |  |  |  |
| *dl-UL-TransmissionPeriodicity* | ms | 5 | 2 |
| *nrofDownlinkSlots* |  | 7 | 1 |
| *nrofDownlinkSymbols* |  | 6 | 12 |
| *nrofUplinkSlot* |  | 2 | 2 |
| *nrofUplinkSymbols* |  | 4 | 0 |
| pattern2 |  |  |  |  |
| *dl-UL-TransmissionPeriodicity* | ms | N/A | N/A |
| *nrofDownlinkSlots* |  | N/A | N/A |
| *nrofDownlinkSymbols* |  | N/A | N/A |
| *nrofUplinkSlot* |  | N/A | N/A |
| *nrofUplinkSymbols* |  | N/A | N/A |
| The number of slots between PDSCH and corresponding HARQ-ACK information (Note 3) | |  | 8 if mod(i,10) = 0 7 if mod(i,10) = 1 6 if mod(i,10) = 2 5 if mod(i,10) = 3 5 if mod(i,10) = 4 4 if mod(i,10) = 5 3 if mod(i,10) = 6 2 if mod(i,10) = 7 | 3 if mod(i,4) = 0 2 if mod(i,4) = 1 |

**< End of changes >**