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# Introduction

This is a text proposals for Clause 3.

# TP to TS 38.176-2 v.0.1.0

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

#  Definitions of terms, symbols and abbreviations

## 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].

 **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*

**Aggregated IAB-DU channel bandwidth**: The RF bandwidth in which an IAB-DU transmits and receives multiple contiguously aggregated carriers. The aggregated IAB-DU channel bandwidth is measured in MHz.

Aggregated IAB-MT Channel Bandwidth: The RF bandwidth in which an IAB-MT transmits and receives multiple contiguously aggregated carriers. The aggregated IAB-MT channel bandwidth is measured in MHz.

**basic limit:** emissions limit relating to the power supplied by a single transmitter to a single antenna transmission line in ITU-R SM.329 [16] 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.

**beam centre direction:** direction equal to the geometric centre of the half-power contour of the beam

**beam direction pair:** data set consisting of the *beam centre direction* and the related *beam peak direction*

**beam peak direction:** direction where the maximum EIRP is found

**beamwidth:** beam which has a half-power contour that is essentially elliptical, the half-power beamwidths in the two pattern cuts that respectively contain the major and minor axis of the ellipse

**BS channel bandwidth**: RF bandwidth supporting a single NR RF carrier with the *transmission bandwidth* configured in the uplink or downlink

NOTE 1: The *BS 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 BS to transmit to and/or receive from one or more UE bandwidth parts that are smaller than or equal to the *BS transmission bandwidth configuration*, in any part of the *BS transmission bandwidth configuration*.

**BS type 1-H:** NR base station operating at FR1 with a *requirement set* consisting of conducted requirements defined at individual *TAB connectors* and OTA requirements defined at RIB

**BS type 1-O:** NR base station operating at FR1 with a *requirement set* consisting only of OTA requirements defined at the RIB

**BS type 2-O:** NR base station operating at FR2 with a *requirement set* consisting only of OTA requirements defined at the RIB

**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)*.

**directional requirement:** requirement which is applied in a specific direction within the *OTA coverage range* for the Tx and when the AoA of the incident wave of a received signal is within the *OTA REFSENS RoAoA* or the *minSENS RoAoA* as appropriate for the receiver

**equivalent isotropic radiated power:** equivalent power radiated from an isotropic directivity device producing the same field intensity at a point of observation as the field intensity radiated in the direction of the same point of observation by the discussed device

NOTE: Isotropic directivity is equal in all directions (i.e. 0 dBi).

**equivalent isotropic sensitivity:** sensitivity for an isotropic directivity device equivalent to the sensitivity of the discussed device exposed to an incoming wave from a defined AoA

NOTE 1: The sensitivity is the minimum received power level at which specific requirement is met.

NOTE 2: Isotropic directivity is equal in all directions (i.e. 0 dBi).

**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-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 IAB-MT bandwidth parts that are smaller than or equal to the *IAB transmission bandwidth configuration*, in any part of the *IAB transmission bandwidth configuration*.

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

**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

**maximum carrier TRP output power:** mean power level measured perRIB during the *transmitter ON period* for a specific carrier in a specified reference condition and corresponding to the declared *rated carrier TRP output* power (Prated,c,TRP)

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

**minSENS:** the lowest declared EIS value for the OSDD's declared for OTA sensitivity requirement.

**minSENS RoAoA:** The *reference RoAoA* associated with the OSDD with the lowest declared EIS

**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

**OTA coverage range**: a common range of directions within which TX OTA requirements that are neither specified in the *OTA peak directions sets* nor as *TRP requirement* are intended to be met

**OTA peak directions set:** set(s) of *beam peak directions* within which certain TX OTA requirements are intended to be met, where all *OTA peak directions set(s)* are subsets of the *OTA coverage range*

NOTE:     The *beam peak directions* are related to a corresponding contiguous range or discrete list of *beam centre directions*by the *beam direction pairs* included in the set.

**OTA REFSENS RoAoA:** the RoAoA determined by the contour defined by the points at which the achieved EIS is 3dB higher than the achieved EIS in the reference direction assuming that for any AoA, the receiver gain is optimized for that AoA

NOTE: This contour will be related to the average element/sub-array radiation pattern 3dB beamwidth.

**OTA sensitivity directions declaration:** set of manufacturer declarations comprising at least one set of declared minimum EIS values (with *IAB-DU* or *IAB-MT channel bandwidth*), and related directions over which the EIS applies

NOTE: All the directions apply to all the EIS values in an OSDD.

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

**polarization match:** condition that exists when a plane wave, incident upon an antenna from a given direction, has a polarization that is the same as the receiving polarization of the antenna in that direction

**radiated interface boundary**: *operating band* specific radiated requirements reference where the radiated requirements apply

NOTE: For requirements based on EIRP/EIS, the *radiated interface boundary* is associated to the far-field region

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

**rated beam EIRP:** For a declared beam and *beam direction pair*, the *rated beam EIRP* level is the maximum power that the IAB-DU or IAB-MT is declared to radiate at the associated *beam peak direction* during the *transmitter ON period*

**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 carrier TRP output power:** mean power level declared by the manufacturer per carrier, for IAB-DU or IAB-MT operating in single carrier, multi-carrier, or carrier aggregation configurations that the manufacturer has declared to be available at the RIB during the *transmitter ON period*

**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

**rated total TRP output power:** mean power level declared by the manufacturer, that the manufacturer has declared to be available at the RIB during the *transmitter ON period*

**reference beam direction pair:** declared *beam direction pair*, including reference *beam centre direction* and reference *beam peak direction* where the reference *beam peak direction* is the direction for the intended maximum EIRP within the *OTA peak directions set*

**receiver target:** AoA in which reception is performedby *IAB type 1-H* or *IAB type 1-O*

**receiver target redirection range:** union of all the *sensitivity RoAoA* achievable through redirecting the *receiver target* related to particular OSDD

**receiver target reference direction:** direction inside the *OTA sensitivity directions declaration* declared by the manufacturer for conformance testing. For an OSDD without *receiver target redirection range*, this is a direction inside the *sensitivity RoAoA*

**reference RoAoA**: the *sensitivity RoAoA* associated with the *receiver target reference direction* for each OSDD.

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

**sensitivity RoAoA:** RoAoA within the *OTA sensitivity directions declaration*, within which the declared EIS(s) of an OSDD is intended to be achieved at any instance of time for a specific IAB-DU or IAB-MT direction setting

**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

**total radiated power:** is the total power radiated by the antenna

NOTE: The *total radiated power* is the power radiating in all direction for two orthogonal polarizations. *Total radiated power* is defined in both the near-field region and the far-field region

**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

BeWθ,REFSENS Beamwidth equivalent to the *OTA REFSENS RoAoA* in the θ-axis in degrees. Applicable for FR1 only.

BeWφ,REFSENS Beamwidth equivalent to the *OTA REFSENS RoAoA* in the φ-axis in degrees. Applicable for FR1 only.

BWChannel *BS channel bandwidth*

BWChannel\_CA *Aggregated BS Channel Bandwidth*, expressed in MHz. BWChannel\_CA = Fedge,high- Fedge,low.

BWConfig *Transmission bandwidth configuration*, where BWConfig = *N*RB x SCS x 12

BWContiguous Contiguous *transmission bandwidth*, i.e. *BS channel bandwidth* for single carrier or *Aggregated BS channel bandwidth* for contiguously aggregated carriers. For non-contiguous operation within a band the term is applied per *sub-block*.

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

ΔFR2\_REFSENS Offset applied to the FR2 OTA REFSENS depending on the AoA

ΔminSENS Difference between conducted reference sensitivity and minSENS

ΔOTAREFSENS Difference between conducted reference sensitivity and OTA REFSENS

EISminSENS The EIS declared for the *minSENS RoAoA*

EISREFSENS OTA REFSENS EIS value

EISREFSENS\_50M Declared OTA reference sensitivity basis level for FR2 based on a reference measurement channel with 50MHz *BS channel bandwidth*

Ês Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the IAB-MT antenna connector

FFBWhigh Highest supported frequency within supported *operating band*, for which *fractional bandwidth* support was declared

FFBWlow Lowest supported frequency within supported *operating band*, for which *fractional bandwidth* support was declared

FC,low The Fc of the *lowest carrier*, expressed in MHz.

FC,high The Fc of the *highest carrier*, expressed in MHz.

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

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

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.

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

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

Fstep,X Frequency steps for the OTA transmitter spurious emissions (Category B)

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

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

Io The total received power density, including signal and interference, as measured at the IAB-MT antenna connector.

Ioc The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the IAB-MT antenna connector.

Iot The received power spectral density of the total noise and interference for a certain IAB-MT (power integrated over the RE and normalized to the subcarrier spacing) as measured at the IAB-MT antenna connector

 The power spectral density of a white noise source (average power per RE normalised to the subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the IAB-MT antenna connector

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*

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

 Timing offset between uplink and downlink radio frames at the UE, as defined in clause 4.2.3 in TS 38.213

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

PCMAX, *f*, *c* The configured maximum output power for carrier f of serving cell c in each slot

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

Pmax,c**,**TRP*Maximum carrier TRP output power* measuredat the RIB(s), and corresponding to the declared *rated carrier TRP output power* (Prated,c,TRP)

Pmax,c,EIRP The maximum carrier EIRPwhen the NR BS is configured at the maximum rated carrier output TRP (Prated,c,TRP)

Prated,c,cell The *rated carrier output power* per *TAB connector TX min cell group*

Prated,c,EIRP *The rated carrier EIRP output power* declaredper RIB

Prated,c,FBWhigh The rated carrier EIRPfor the higher supported frequency range within supported *operating band,* for which *fractional bandwidth* support was declared

Prated,c,FBWlow The rated carrier EIRP for the lower supported frequency range within supported *operating band,* for which *fractional bandwidth* support was declared

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,c,TRP *Rated carrier TRP output power* declaredper RIB

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

Prated,t,TRP *Rated total TRP output power* declaredper RIB

PREFSENS Conducted Reference Sensitivity power level

SSB\_RP Received (linear) average power of the resource elements that carry SSB signals and channels, measured at the IAB-MT antenna connector

Tc Basic time unit, defined in clause 4.1 of TS 38.211 [8]

Wgap *Sub-block gap* or *Inter RF Bandwidth gap* size

## 3.3 Abbreviations

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

 AA Antenna Array

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

AoA Angle of Arrival

AWGN Additive White Gaussian Noise

BFD Beam Failure Detection

BFD-RS BFD Reference Signal

BLER Block Error Rate

BM-RS Beam Management Reference Signal

BS Base Station

BW Bandwidth

BWP Bandwidth Part

CA Carrier Aggregation

CACLR Cumulative ACLR

CBD Candidate Beam Detection

CCE Control Channel Element

CORESET Control Resource Set

CP Cyclic Prefix

CP-OFDM Cyclic Prefix-OFDM

CSI Channel-State Information

CSI-RS CSI Reference Signal

CW Continuous Wave

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal

DM-RS Demodulation Reference Signal

DRX Discontinuous Reception

EIS Equivalent Isotropic Sensitivity

EIRP Equivalent Isotropic Radiated Power

E-UTRA Evolved UTRA

EVM Error Vector Magnitude

FBW Fractional Bandwidth

FR Frequency Range

FRC Fixed Reference Channel

GSM Global System for Mobile communications

IAB Integrated Access and Backhaul

IAB-DU IAB Distribution Unit

IAB-MT IAB Mobile Termination

ITU‑R Radiocommunication Sector of the International Telecommunication Union

ICS In-Channel Selectivity

L1-RSRP Layer 1 RSRP

LA Local Area

MCS Modulation and Coding Scheme

MGRP Measurement Gap Repetition Period

MR Medium Range

NB-IoT Narrowband – Internet of Things

NR New Radio

NR-ARFCN NR Absolute Radio Frequency Channel Number

OBUE Operating Band Unwanted Emissions

OOB Out-of-band

OSDD OTA Sensitivity Directions Declaration

OTA Over-The-Air

PCell Primary Cell

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PCell Primary Cell

PRACH Physical RACH

PDCCH Physical Downlink Control Channel

PDSCH Physical Downlink Shared Channel

PRACH Physical RACH

PRB Physical Resource Block

PSCell Primary SCell

PSS Primary Synchronization Signal

pTAG Primary Timing Advance Group

PUCCH Physical Uplink Control Channel

PUSCH Physical Uplink Shared Channel

QAM Quadrature Amplitude Modulation

QCL Quasi Co-Location

RB Resource Block

RDN Radio Distribution Network

RE Resource Element

REFSENS Reference Sensitivity

REG Resource Element Group

RF Radio Frequency

RIB Radiated Interface Boundary

RLM Radio Link Monitoring

RLM-RS Reference Signal for RLM

RMS Root Mean Square (value)

RoAoA Range of Angles of Arrival

RRC Radio Resource Control

RRM Radio Resource Management

RX Receiver

SCell Secondary Cell

SCS Sub-Carrier Spacing

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SS-RSRP Synchronization Signal based Reference Signal Received Power

SSB Synchronization Signal Block

SSB\_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels, measured at the UE antenna connector.

SSS Secondary Synchronization Signal

TA Timing Advance

TAB Transceiver Array Boundary

TCI Transmission Configuration Indicator

TX Transmitter

TRP Total Radiated Power

UTRA Universal Terrestrial Radio Access

WA Wide Area

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