**3GPP T****SG-RAN WG4 Meeting #102-e R4-2207282**

**Electronic Meeting, February 21- March 3, 2022**

**Source: Qualcomm**

**Title:** **TP to TS 38.106 for Sections 1,2, and 3**

**Agenda item:** **10.5.1**

**Document for: Approval**

1. Introduction

This contribution provides the TP for TS 38.106-1, Sections 1, 2, and 3 on Scope, References, and Definitions of terms, symbols and abbreviations, respectively. The structure of NR Repeater Radio Transmission and Reception (Release 17) specification TS 38.106 can be referred.

1. TP to TR 38.106 for Sections 1, 2, and 3

<<<Start of the Text Proposal>>>

# 1 Scope

The present document establishes the minimum RF characteristics of NR Repeater.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.104: “NR; Base Station (BS) radio transmission and reception”.

[3] 3GPP TR 25.942: "RF system scenarios".

[4] Recommendation ITU-R SM.328: "Spectra and bandwidth of emissions".

[5] ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain".

[6] ITU-R Recommendation M.1545: “Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications – 2000”.

[7] 3GPP TS 38.115-1: “NR; Repeater conformance testing - Part 1: Conducted conformance testing”.

[8] 3GPP TS 38.115-2: “NR; Repeater conformance testing - Part 2: Radiated conformance testing”.

[9] ERC Recommendation 74-01, "Unwanted emissions in the spurious domain".

[10] "Title 47 of the Code of Federal Regulations (CFR)", Federal Communications Commission.

[11] 3GPP TS 38.141-1: "NR; Base Station (BS) conformance testing; Part 1: Conducted conformance testing".

[12] 3GPP TS 38.141-2: "NR; Base Station (BS) conformance testing; Part 2: Radiated conformance testing".

[13] 3GPP TS 38.101-1: “NR User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone”.

[14] 3GPP TS 38.101-2: “NR User Equipment (UE) radio transmission and reception: Part 2: Range 2 Standalone”.

[15] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios ".

[16] 3GPP TR 38.101-4: " NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".

[17] 3GPP TS 38.521-1: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone”.

[18] 3GPP TS 38.521-2: “NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone”.

[19] 3GPP TS 38.213: “NR; Physical layer procedures for control”.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

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].

**Antenna connector:** connector at the conducted interface of the *repeater type 1-C*

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

**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

**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

**Fractional bandwidth:** *fractional bandwidth* FBW is defined as $FBW=200∙\frac{F\_{FBWhigh}-F\_{FBWlow}}{F\_{FBWhigh}+F\_{FBWlow}}\%$

**Maximum 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

**Multi-band repeater:** Repeater Type 1-C whose antenna connector is associated with a transmitter and/or receiver that is characterized by the ability to process two or more pass band(s) in common active RF components simultaneously, where at least one pass band is configured at a different operating band than the other pass band(s) and where this different operating band is not a sub-band or superseding-band of another supported operating band

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

**NR repeater RF bandwidth**: RF bandwidth in which an NR repeater transmits and/or receives single or multiple carrier(s) within a supported *operating band*

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

**Pass band: [**The frequency range in which the repeater operates in with operational configuration, this frequency range can correspond to one or several consecutive nominal channels, if they are not consecutive each subset of channels shall be considered as an individual pass band, a repeater can have one or several pass bands, all channels within the passband(s) shall belong to a single operator or collaborating operators.]

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

**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 NR repeater is declared to radiate at the associated *beam peak direction* during the *transmitter ON period*

**Rated output power**: mean power level associated with a *pass band* the manufacturer has declared to be available at the *antenna connector*

**Rated TRP output power**: mean power level declared by the manufacturer, that the manufacturer has declared to be available at the RIB

**Reference beam direction pair:** Beam direction pair in the reference direction declared by the manufacturer.

**Repeater type 1-C**: NR repeater operating at FR1 with a requirement set consisting only of conducted requirements defined at individual antenna connectors.

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

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

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

**Transmission bandwidth:** RF Bandwidth of an instantaneous transmission from an NR repeater, measured in resource block units

**Transmitter OFF period:** time period during which the NR repeater is not allowed to transmit

**Transmitter ON period**: time period during which the NR repeater 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:

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

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

Prated,out Maximum rated output power conducted

Prated,out,EIRP Maximum rated output power EIRP

Prated,out,TRP Maximum rated output power TRP

Prated,in Input power intended to produce the *maximum rated output power*

Pmax,out *Maximum carrier output power* measuredper *antenna connector*

Pmax,out,,EIRP The maximum EIRPmeasuredat the RIB(s), and corresponding to the declared *rated TRP output power* (Prated,c,TRP)

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

## 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].

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

BW Bandwidth

EIRP Effective Isotropic Radiated Power

EVM Error Vector Magnitude

FBW Fractional Bandwidth

NR New Radio

OBUE Operating Band Unwanted Emissions

OOB Out-of-band

OTA Over-The-Air

PRB Physical Resource Block

RB Resource Block

RE Resource Element

RF Radio Frequency

RIB Radiated Interface Boundary

RB Resource Block

TAB Transceiver Array Boundary

TRP Total Radiated Power

UL Uplink

<<<End of the Text Proposal>>>

References

[1] R4-2115772, “Skeleton of TS 38.106”, CMCC