3GPP TSG-RAN WG4 Meeting #104-bis-e R4-2216066

Electronic Meeting, 10 October– 19 October, 2022

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.108** | **CR** | **0015** | **rev** | **-** | **Current version:** | **17.1.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Draft CR for 38.108 to maitain unwanted emissions clause | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_solutions-Core | | | | |  | ***Date:*** | | | 2022-09-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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:*** | | Based on the GTW discussion in RAN4#103 meeting, since the spurious emissions within operating band and out of operating band are same, there is no need to specify ΔfOBUE for SAN. Based on ITU-R SM.329, unwanted emissions consist of out-of-band emissions and spurious emissions. It’s recommended to replace operating band unwanted emission by out-of-band emissions in SAN specification.  In addition, ΔfOBUE is defined as Maximum offset of the operating band unwanted emissions mask from **the downlink operating band edge**. However, based on the agreement in RAN4#103 meeting, the boundary between the out-of-band mask and spurious domain for SAN should be specified as 2\*BWChannel from the **channel edge** based on ITU regulation. Thus, it isn’t appropriated to reuse ΔfOBUE for SAN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The definition about ΔfOBUE for SAN was removed.  Operating band unwanted emission was replaced by out-of-band emissions in SAN specification.  To align OTA unwanted emissions requirements with conductive requiremetns. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Some contradictions can be observed in current specification for operating band unwanted emission between OTA and conductive requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 3.2, 3.3, 4.5, 4.6, 6.6, 9.7 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## **<<Start of Change>>**

## 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.

SANChannel *SAN channel bandwidth.*

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

BWContiguous Contiguous *transmission bandwidth*, i.e. *SAN channel bandwidth* for single carrier.

BWGB,low The minimum guard band defined in clause 5.3.3 for lowest assigned component carrier.

BWGB,high The minimum guard band defined in clause 5.3.3 for highest assigned component carrier.

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

ΔFGlobal Global frequency raster granularity.

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

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

ΔminSENS Difference between conducted reference sensitivity and minSENS.

ΔOTAREFSENS Difference between conducted reference sensitivity and OTA REFSENS.

ΔFRaster Channel raster granularity.

EISminSENS The EIS declared for the *minSENS RoAoA.*

EISREFSENS OTA REFSENS EIS value.

FC *RF reference frequency* on the channel raster, given in table 5.4.2.2-1.

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.*

Ffilter Filter centre frequency.

Foffset,high Frequency offset from FC,high to the upper *SAN RF Bandwidth edge.*

Foffset,low Frequency offset from FC,low to the lower *SAN RF Bandwidth edge.*

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.*

FREF RF reference frequency.

FREF-Offs Offset used for calculating FREF.

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

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

GBChannel Minimum guard band defined in clause 5.3.3.

 Physical resource block number.

NRB *Transmission bandwidth configuration*, expressed in resource blocks.

NREF NR Absolute Radio Frequency Channel Number (NR-ARFCN).

NREF-Offs Offset used for calculating NREF scaling per cell, as calculated in clause 6.1.

PEIRP,N EIRP level for channel N.

Pmax,c,AC*Maximum carrier output power* measuredper *antenna connector.*

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 SAN is configured at the maximum rated carrier output TRP (Prated,c,TRP).

Prated,c,sys Prated,c,sys,GEO for SAN GEO class or Prated,c,sys,LEO for SAN LEO class.

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

Prated,c,sys,GEO The sum of Prated,c,TABC for all *TAB connectors* for a single carrier of the SAN GEO class.

Prated,c,sys,LEO The sum of Prated,c,TABC for all *TAB connectors* for a single carrier of the SAN LEO class.

Prated,c,TABC Prated,c,TABC,GEO for SAN GEO class or Prated,c,TABC,LEO for SAN LEO class.

Prated,c,TABC,GEO The *rated carrier output power per TAB connector* of the SAN GEO class*.*

Prated,c,TABC,LEO The *rated carrier output power per TAB connector* of the SAN LEO class*.*

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

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

PREFSENS Conducted Reference Sensitivity power level.

SSREF SS block reference frequency position.

## 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

AAS Active Antenna System

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

AoA Angle of Arrival

AWGN Additive White Gaussian Noise

BW Bandwidth

CA Carrier Aggregation

CP-OFDM Cyclic Prefix-OFDM

CW Continuous Wave

DFT-s-OFDM Discrete Fourier Transform-spread-OFDM

DM-RS Demodulation Reference Signal

EIRP Equivalent Isotropic Radiated Power

EIS Equivalent Isotropic Sensitivity

EVM Error Vector Magnitude

FR Frequency Range

FRC Fixed Reference Channel

GEO Geostationary Earth Orbiting

GSCN Global Synchronization Channel Number

ICS In-Channel Selectivity

LEO Low Earth Orbiting

MCS Modulation and Coding Scheme

NR New Radio

NR-ARFCN NR Absolute Radio Frequency Channel Number

NTN Non-Terrestrial Network

OOB Out-of-band

OSDD OTA Sensitivity Directions Declaration

OTA Over-The-Air

PRB Physical Resource Block

PT-RS Phase Tracking Reference Signal

QAM Quadrature Amplitude Modulation

RB Resource Block

RDN Radio Distribution Network

RE Resource Element

REFSENS Reference Sensitivity

RF Radio Frequency

RIB Radiated Interface Boundary

RMS Root Mean Square (value)

RoAoA Range of Angles of Arrival

RX Receiver

SAN Satellite Access Node

SCS Sub-Carrier Spacing

SSB Synchronization Signal Block

TAB Transceiver Array Boundary

TRP Total Radiated Power

TX Transmitter

## **<<End of Change>>**

## **<<Start of Change>>**

## 4.5 Regional requirements

Some requirements in the present document may only apply in certain regions either as optional requirements, or as mandatory requirements set by local and regional regulation. It is normally not stated in the 3GPP specifications under what exact circumstances the regional requirements apply, since this is defined by local or regional regulation.

Table 4.5-1 lists all requirements in the present specification that may be applied differently in different regions.

Table 4.5-1: List of regional requirements

| Clause number | Requirement | Comments |
| --- | --- | --- |
| 5.2 | *Operating bands* | Satellite *operating bands* may be applied regionally. |
| 6.6.4,  9.7 | Out-of-band emissions,  OTA unwanted emissions | For n255 operation in US, Limits in FCC Title 47 apply. |
| 6.6.5 | Tx spurious emissions,  OTA Tx spurious emissions | For n255 operation in US, Limits in FCC Title 47 apply. |

## 4.6 Applicability of minimum requirements

In table 4.6-1, the requirement applicability for each *requirement set* 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 4.6-1: Requirement set applicability

|  |  |  |
| --- | --- | --- |
| Requirement | Requirement set | |
|  | *SAN type 1-H* | *SAN type 1-O* |
| Satellite Access Network output power | 6.2 |  |
| Output power dynamics | 6.3 |  |
| Transmit ON/OFF power | NA |  |
| Frequency error | 6.5.1 |  |
| Modulation quality | 6.5.2 |  |
| Time alignment error | NA |  |
| Occupied bandwidth | 6.6.2 |  |
| ACLR | 6.6.3 |  |
| Out-of-band emissions | 6.6.4 |  |
| Transmitter spurious emissions | 6.6.5 |  |
| Transmitter intermodulation | NA | NA |
| Reference sensitivity level | 7.2 |  |
| Dynamic range | 7.3 |  |
| ACS | 7.4.1 |  |
| In-band blocking | NA |  |
| Out-of-band blocking | 7.5 |  |
| Receiver spurious emissions | NA |  |
| Receiver intermodulation | NA |  |
| In-channel selectivity | 7.8 |  |
| Performance requirements | 8 |  |
| Radiated transmit power | 9.2 | 9.2 |
| OTA Satellite Access Network output power |  | 9.3 |
| OTA output power dynamics |  | 9.4 |
| OTA transmit ON/OFF power |  | NA |
| OTA frequency error |  | 9.6.1 |
| OTA modulation quality |  | 9.6.2 |
| OTA time alignment error |  | NA |
| OTA occupied bandwidth |  | 9.7.2 |
| OTA ACLR | NA | 9.7.3 |
| OTA out-of-band emissions |  | 9.7.4 |
| OTA transmitter spurious emission |  | 9.7.5 |
| OTA transmitter intermodulation |  | NA |
| OTA sensitivity | 10.2 | 10.2 |
| OTA reference sensitivity level |  | 10.3 |
| OTA dynamic range |  | 10.4 |
| OTA ACS |  | 10.5.1 |
| OTA in-band blocking |  | NA |
| OTA out-of-band blocking | NA | 10.6 |
| OTA receiver spurious emission |  | NA |
| OTA receiver intermodulation |  | NA |
| OTA in-channel selectivity |  | 10.9 |
| Radiated performance requirements |  | 11 |

NOTE: Co-location requirements are not applicable to SAN.

## **<<End of Change>>**

## **<<Start of Change>>**

## 6.6 Unwanted emissions

### 6.6.1 General

Unwanted emissions consist of out-of-band emissions and spurious emissions according to ITU definitions [2]. In ITU terminology, out of band emissions are unwanted emissions immediately outside the *SAN channel bandwidth* resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The out-of-band domain requirement for the SAN transmitter is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and out-of-band emissions.

Table 6.6.1-1: Void



For *SAN type 1-H* the unwanted emission requirements are applied per the *TAB connector TX min cell groups* for all the configurations supported by the SAN.

There is in addition a requirement for occupied bandwidth.

### 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 [8].

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

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

#### 6.6.2.2 Minimum requirement for *SAN type 1-H*

The occupied bandwidth for each carrier shall be less than the *SAN channel bandwidth*.

### 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 *SAN 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.

#### 6.6.3.2 Minimum requirement for *SAN type 1-H*

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.

The ACLR shall be higher than the value specified in Table 6.6.3.2-1/2.

Table 6.6.3.2-1: SAN ACLR limit for GEO class

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SAN channel bandwidth of lowest/highest carrier transmitted BWChannel (MHz) | SAN 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 |
| 5, 10, 15, 20 | BWChannel | NR of same BW (NOTE 2) | Square (BWConfig) (NOTE 1) | 14 |
|  | 2 x BWChannel | NR of same BW (NOTE 2) | Square (BWConfig) (NOTE 1) | 14 |
| NOTE 1: BWChannel and BWConfig are the *SAN 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). | | | | |

Table 6.6.3.2-2: SAN ACLR limit for LEO class

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SAN channel bandwidth of lowest/highest carrier transmitted BWChannel (MHz) | SAN 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 |
| 5, 10, 15, 20 | BWChannel | NR of same BW (NOTE 2) | Square (BWConfig)  (NOTE 1) | 24 |
|  | 2 x BWChannel | NR of same BW (NOTE 2) | Square (BWConfig) (NOTE 1) | 24 |
| NOTE 1: BWChannel and BWConfig are the *SAN 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). | | | | |

### 6.6.4 Out-of-band emissions

#### 6.6.4.1 General

Unless otherwise stated, the out-of-band emissions limits for SAN in FR1 are defined from channel edge up to frequencies separated from the channel edge by 200% of the necessary bandwidth.

The requirements shall apply whatever the type of transmitter considered and for all transmission modes foreseen by the manufacturer’s specification.

*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.

- PSDchannel represents the Power Spectral Density of the channel for a given channel bandwidth

- BWChannel is the considered NR *channel bandwidth* or SAN total *RF bandwidth* for a given *operating band*.

- is the *SAN class parameter* in dB identified to characterize different SAN classes.

For a multi-carrier *single-band connector* 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.

- The out-of-band emissions *basic limits* of the band where there are carriers transmitted, as defined in the tables of the present clause for the largest frequency offset (2× BWChannel), shall apply from channel edge up to frequencies separated from the channel edge by 200% of the necessary bandwidth.

6.6.4.2 Minimum requirements for *SAN type 1-H*

For SAN operating in Bands n256, n255, the requirements are specified in table 6.6.4.2-1 for GEO and LEO class respectively, in line with Annex 5 of ITU recommendation SM.1541-6 [9].

The SAN out-of-band emissions requirements for GEO and LEO classes are therefore defined as described in Table 6.6.4.2‑1 below.

Table 6.6.4.2-1: SAN LEO and GEO Classes out-of-band emissions basic limits

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | Basic limits  (dBm) | Measurement bandwidth |
| 0 MHz ≤ Δf < 2× BWChannel | 0.002 MHz ≤ f\_offset < 2× BWChannel + 0.002 MHz |  | 4 kHz |
| NOTE 1: PSDchannel = Prated,c, sys – 10log10(BWChannel) – 24, unit dBm/4kHz.  NOTE 2: SE limit is spurious emission limit specified in spurious emission clause 6.6.5.  NOTE 3: PSD attenuation as in ITU-R SM.1541-6 [9], Annex 5 OoB domain emission limits for space services.  NOTE 4: =0 dB for GEO class and =3 dB for LEO class. | | | |

### 6.6.5 Transmitter spurious emissions

#### 6.6.5.1 General

The transmitter spurious emission limits shall apply from 30 MHz to the fifth harmonic of the upper frequency edge of the DL operating band, excluding the frequency range of out-of-band Emissions and SAN channel bandwidth. For some *operating bands*, the upper limit is higher than 12.75 GHz in order to comply with the 5th harmonic limit of the downlink *operating band*, as specified in ITU-R recommendation SM.329 [2].

The requirements shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

Unless otherwise stated, all requirements are measured as mean power (RMS).

#### 6.6.5.2 Minimum requirements for *SAN type 1-H*

##### 6.6.5.2.1 General transmitter spurious emissions requirements

The requirements in table 6.6.5.2.1-1 shall apply.

Table 6.6.5.2.1-1: General SAN transmitter spurious emission limits in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Spurious frequency range | Prated,c,sys | Basic limit | Measurement bandwidth | Notes |
| 30 MHz – 5th harmonic of the upper frequency edge of the DL operating band | ≤ 47 dBm | -13 dBm | 4 kHz | NOTE 1, NOTE 2, NOTE 3 |
|  | > 47 dBm | Prated,c,sys – 60 dBm |  |  |
| NOTE 1: *Measurement bandwidth*s as in ITU-R SM.329 [2], s4.1.  NOTE 2: Upper frequency as in ITU-R SM.329 [2], s2.5 table 1.  NOTE 3: The lower frequency limit is replaced by 0.7 times the waveguide cut-off frequency, according to ITU-R SM.329 [2], for systems having an integral antenna incorporating a waveguide section, or with an antenna connection in such form, and of unperturbed length equal to at least twice the cut-off. | | | | |

##### 6.6.5.2.2 Protection of the own Satellite Access Node receiver

This requirement shall be applied for NR FDD operation in order to prevent the receivers of the SAN being de-sensitized by emissions from its own SAN transmitter. It is measured at the *TAB connector* for *SAN type 1-H* for any type of SAN which has common or separate Tx/Rx *TAB connectors*.

The spurious emission *basic limits* are provided in table 6.6.5.2.2-1.

Table 6.6.5.2.2-1: SAN spurious emissions *basic limits* for protection of the SAN receiver

|  |  |  |
| --- | --- | --- |
| Frequency range | *Basic limits* | *Measurement bandwidth* |
| FUL,low – FUL,high | -96 dBm | 100 kHz |

##### 6.6.5.2.3 Additional spurious emissions requirements

The additional spurious emissions requirement is not applicable for SAN.

##### 6.6.5.2.4 Co-location with other Satellite Access Nodes

The co-location requirement is not applicable for SAN.

## **<<End of Change>>**

## **<<Start of Change>>**

## 9.7 OTA unwanted emissions

### 9.7.1 General

Unwanted emissions consist of so-called out-of-band emissions and spurious emissions according to ITU definitions ITU-R SM.329 [2]. In ITU terminology, out of band emissions are unwanted emissions immediately outside the *SAN channel bandwidth* resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The OTA out-of-band domain requirement for the *SAN type 1-O* is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and out-of-band emissions.

Table 9.7.1-1: Void



The unwanted emission requirements are applied per cell for all the configurations. Requirements for OTA unwanted emissions are captured using TRP, *directional requirements* or co-location requirements as described per requirement.

There is in addition a requirement for occupied bandwidth.

### 9.7.2 OTA occupied bandwidth

#### 9.7.2.1 General

The OTA 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 [8].

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

The minimum requirement below may be applied regionally. There may also be regional requirements to declare the OTA occupied bandwidth according to the definition in the present clause.

The OTA occupied bandwidth is defined as a *directional requirement* and shall be met in the manufacturer's declared *OTA coverage range* at the RIB.

#### 9.7.2.2 Minimum requirement for *SAN type 1-O*

The OTA occupied bandwidth for each carrier shall be less than the *SAN channel bandwidth*.

### 9.7.3 OTA Adjacent Channel Leakage Power Ratio (ACLR)

#### 9.7.3.1 General

OTA 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 measured power is TRP.

The requirement shall be applied per RIB.

#### 9.7.3.2 Minimum requirement for *SAN type 1-O*

The ACLR limit specified in tables 6.6.3.2-1 for SAN GEO class and 6.6.3.2-2 for SAN LEO class shall apply.

For a RIB operating in multi-carrier, the ACLR requirements in clause 6.6.3.2 shall apply to SAN channel bandwidths of the outermost carrier for the frequency ranges defined in tables 6.6.3.2-1 and 6.6.3.2-2.

### 9.7.4 OTA out-of-band emissions

#### 9.7.4.1 General

The OTA limits for operating band unwanted emissions are specified as TRP per RIB unless otherwise stated.

#### 9.7.4.2 Minimum requirement for *SAN type 1-O*

Out-of-band emissions in FR1 are limited by OTA out-of-band emissions limits. Unless otherwise stated, the out-of-band emissions limits in FR1 are defined from channel edge up to frequencies separated from the channel edge by 200% of the necessary bandwidth.

The requirements shall apply whatever the type of transmitter considered and for all transmission modes foreseen by the manufacturer's specification. For a RIB operating in multi-carrier, the requirements apply to SAN channel bandwidths of the outermost carrier for the frequency ranges defined in clause 6.6.4.1.

The OTA out-of-band emissions requirement for SAN type 1-O shall not exceed each applicable limit in clause 6.6.4.2.

### 9.7.5 OTA transmitter spurious emissions

#### 9.7.5.1 General

Unless otherwise stated, all requirements are measured as mean power.

The OTA spurious emissions limits are specified as TRP per RIB unless otherwise stated.

#### 9.7.5.2 Minimum requirement for *SAN type 1-O*

##### 9.7.5.2.1 General

The OTA transmitter spurious emission limits for FR1 shall apply from 30 MHz to the 5th harmonic of the upper frequency edge of the DL operating band, excluding the frequency range of out-of-band emissions and SAN channel bandwidth.

The requirements shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

##### 9.7.5.2.2 General OTA transmitter spurious emissions requirements

The *basic limits* of table 9.7.5.2.2-1 shall apply.

Table 9.7.5.2.2-1: General SAN transmitter spurious emission limits in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Spurious frequency range | Prated,c,TRP  (dBm) | Basic limit  (dBm) | Measurement bandwidth  (kHz) | Notes |
| 30 MHz – 5th harmonic of the upper frequency edge of the DL operating band | ≤ 47 | -13 | 4 | NOTE 1, NOTE 2, NOTE 3 |
|  | > 47 | Prated,c,TRP – 60dB |  |  |
| NOTE 1: *Measurement bandwidth*s as in ITU-R SM.329 [2], s4.1.  NOTE 2: Upper frequency as in ITU-R SM.329 [2], s2.5 table 1.  NOTE 3: The lower frequency limit is replaced by 0.7 times the waveguide cut-off frequency, according to ITU-R SM.329 [2], for systems having an integral antenna incorporating a waveguide section, or with an antenna connection in such form, and of unperturbed length equal to at least twice the cut-off. | | | | |

##### 9.7.5.2.3 Protection of the SAN receiver of own

This requirement shall be applied for NR FDD operation in order to prevent degradation of own receivers by emissions from a type 1-O SAN.

This requirement is a co-location requirement as defined in clause 4.9, the power levels are specified at the *co-location reference antenna* output.

The total power of any spurious emission from both polarizations of the *co-location reference antenna* connector output shall not exceed the limits in clause 6.6.5.2.2.

## **<<End of Change>>**