**3GPP TSG-RAN WG4 Meeting # 102-e R4-2203957**

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

Title: TP for 38.108: clause 9.7 OTA unwanted emissions

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# Introduction

This contribution provides a text proposal for 38.108: clause 9.7 OTA unwanted emissions [1].

# Reference

[1] TR 38.108, 0.0.1

# Text proposal

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## 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 emissions requirement for the *SAN type 1-O* is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and operating band unwanted emissions (OBUE). The OTA Operating band unwanted emissions define all unwanted emissions in each supported downlink *operating band* plus the frequency ranges ΔfOBUE above and ΔfOBUE below each band. OTA Unwanted emissions outside of this frequency range are limited by an OTA spurious emissions requirement.

The maximum offset of the operating band unwanted emissions mask from the *operating band* edge is ΔfOBUE. The value of ΔfOBUE is defined in table 9.7.1-1 for *SAN type 1-O* for the SAN *operating bands*.

Table 9.7.1-1: Maximum offset ΔfOBUE outside the downlink *operating band*

|  |  |  |
| --- | --- | --- |
| SAN type | *Operating band* characteristics | ΔfOBUE (MHz) |
| *SAN type 1-O* | FDL,high – FDL,low < 100 MHz | 10 |

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 [3].

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 in table 6.6.3.2-1 or the ACLR absolute basic limits in table 6.6.3.2-2, whichever is less stringent, 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 table 6.6.3.2-1.

### 9.7.4 OTA operating band unwanted 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 operating band unwanted emission limits. Unless otherwise stated, the operating band unwanted emission limits 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 9.7.1-1 for the satellite operating bands.

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 operating band unwanted emission 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 12.75 GHz, excluding the frequency range 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*, where the ΔfOBUE is defined in table 9.7.1-1.

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.

*SAN type 1-O* requirement consists of OTA transmitter spurious emission requirements based on TRP and co-location requirements not based on TRP.

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

The Tx spurious emissions requirements for *SAN type 1-O* shall not exceed each applicable limit above 30 MHz in clause 6.6.5.2.1.

##### 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.

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