**3GPP TSG- Meeting #**

**, , -**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** |  | **rev** | **1** | **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)*.* |
|  |

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

|  |
| --- |
|  |
| ***Title:***  | (NR\_NTN\_enh-Core) CR for TS 38.101-5 to modify the mistakes for Tx requirements (R18) |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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 canbe 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | 1. To improve the wordings in general clause 9.2.1.0.
2. To update the on/off time mask requirements and align with the off power requirements.
3. To modify the editorial errors in clause 9.3.3.6 SRS time mask.
4. To clarify the definition of Δf and f\_offset in out-of-band emission.
5. The NS value 7 is reserved based on current RAN2 framework.
 |
|  |  |
| ***Summary of change:*** | 1) To improve the wordings in general clause 9.2.1.0.2) The on/off time mask requirements are updated to align with the off power requirements.3) To modify the editorial errors in clause 9.3.3.6 SRS time mask.4) To clarify the definition of f and f\_offset in out-of-band emission.5) The NS value 7 is reserved based on current RAN2 framework. |
|  |  |
| ***Consequences if not approved:*** | It is unclear about some definitions and some mistakes are not modified. |
|  |  |
| ***Clauses affected:*** | 9.2.1.0, 9.3.3.1, 9.3.3.6, 9.5.2, 9.7.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.521-5 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

## **<<Start of Change for TS 38.101-5>>**

#### 9.2.1.0 General

The NTN VSAT classes are specified based on the assumptions of certain NTN VSAT types with specific device architectures including antenna beam steering types. The requirements are specified for different NTN VSAT types. And for the hybrid beam steering capable NTN VSAT, which can adjust its antenna(s) or beam(s) in both electronic steering and mechanical steering ways, the applicable requirements should follow either electronic or mechanical beam steering requirements depending on the NTN VSAT type it declared. The NTN VSAT types can be found in Table 9.2.1.0-1 below.

Table 9.2.1.0-1: The definitions of NTN VSAT Types

|  |  |  |
| --- | --- | --- |
| NTN VSAT class | NTN VSAT type | Type description |
| Fixed VSAT | 1 | Fixed VSAT communicating with GSO and LEO with mechanical steering antenna. |
|  | 22 | Fixed VSAT communicating with GSO and LEO with electronic steering antenna. |
|  | 3 | Fixed VSAT communicating with LEO only with electronic steering antenna. |
| Mobile VSAT | 4 | Mobile VSAT communicating with GSO with mechanical steering antenna. |
|  | 52 | Mobile VSAT communicating with GSO with electronic steering antenna. |
| NOTE 1: The NTN VSAT types are assuming NTN VSAT has only one antenna beam towards one satellite at a given time in this release.NOTE 2: NTN VSAT may need power reduction to comply with OFF-axis EIRP requirement defined in clause 9.2.2. There is no requirement for the potential power reduction. |

## **<<Next of Change>>**

#### 9.3.3.1 General

The transmit ON/OFF time mask defines the transient period(s) allowed

- between transmit OFF power and transmit ON power symbols (transmit ON/OFF)

- between continuous ON-power transmissions when power change or RB hopping is applied.

In case of RB hopping, transition period is shared symmetrically.

Unless otherwise stated the minimum requirements in clause 9.5 apply also in transient periods.

The transmit ON/OFF time mask is defined as a directional requirement. The requirement is verified in beam locked mode at beam peak direction. The maximum allowed EIRP OFF power level is -36dBm/MHz at beam peak direction. The requirement is verified with the test metric of EIRP (Link=TX beam peak direction, Meas=Link angle).

In the following sub-clauses, following definitions apply:

- A slot transmission is a Type A transmission.

- A long subslot transmission is a Type B transmission with more than 2 symbols.

- A short subslot transmission is a Type B transmission with 1 or 2 symbols.

## **<<Next of Change>>**

#### 9.3.3.6 SRS time mask

In the case a single SRS transmission, the ON power is defined as the mean power over the symbol duration excluding any transient period; Figure 9.3.3.6-1.



Figure 9.3.3.6-1: Single SRS time mask for NR UL transmission

In the case multiple consecutive SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. See Figure 9.3.3.6-2



Figure 9.3.3.6-2: Consecutive SRS time mask for the case when no power change is required

When power change between consecutive SRS transmissions is required, then Figure 9.3.3.6-3 and Figure 9.3.3.6-4 apply.



Figure 9.3.3.6-3: Consecutive SRS time mask for the case when power change is required and when 60kHz SCS is used in FR2-NTN



Figure 9.3.3.6-4: Consecutive SRS time mask for the case when power change is required and when 120kHz SCS is used in FR2-NTN

## **<<Next of Change>>**

### 9.5.2 Out of Band Emissions

#### 9.5.2.1 General

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an adjacent channel leakage power ratio. Additional requirements to protect specific bands are also considered.

The requirements in sub-clause 9.5.2.2 only apply when both UL and DL of an NTN VSAT are configured for single CC operation, and they are of the same bandwidth.

All out of band emissions for FR2-NTN are specified as TRP.

The spectrum emission mask of the NTN VSAT applies to frequencies starting from the ± edge of the assigned NR channel bandwidth.

#### 9.5.2.2 Spectrum emission mask

##### 9.5.2.2.1 General NR spectrum emission mask

The power of any NTN VSAT emission shall not exceed the Basic limits specified in Table 9.5.2.2-1 for the specified channel bandwidth. The requirement is verified in beam locked mode with the test metric of TRP (Link=TX beam peak direction, Meas=TRP grid). Where:

- Δf is the separation between the Transmission BW *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.Table 9.5.2.2.1-1: General NR spectrum emission mask for FR2-NTN

|  |  |  |  |
| --- | --- | --- | --- |
| 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× BW | 0.5 MHz ≤ f\_offset < 2× BW + 0.5 MHz | $$max\left(11, TRP\_{rated} – 10log10(BW) –40×log10\left(\frac{ f\_{\\_offset}-0.5}{BW}×2+1\right)\right)dBm$$ | 1 MHz |
| NOTE 1: TRPrated is the declared rated output power lower than or equal to TRPmax specified in sub-clause 9.2.1;NOTE 2: Transmission BW is in the unit of MHz;NOTE 3: The 11dBm/1MHz value corresponds to the spurious emission limit specified in spurious emission sub-clause 9.5.3, and is converted from the SE limit requirement defined on 4 kHz to a value defined over 1 MHz;NOTE 4: PSD attenuation as in ITU-R SM.1541-6 [6], Annex 5 OoB domain emission limits for earth stations. |

##### 9.5.2.2.2 Additional spectrum emission mask

For bands n511 and n510 the mean power of emissions shall be attenuated below the mean output power of the transmitter (measured in dBm) in accordance with [FCC 25.202].

The power of any NTN VSAT emission shall not exceed the Basic limits specified in Table 9.5.2.2.2-1 for the specified channel bandwidth. The requirement is verified in beam locked mode with the test metric of TRP (Link=TX beam peak direction, Meas=TRP grid). Where: f\_offset is the separation between the *channel edge* frequency and the centre of the measuring filter.

**Table 9.5.2.2.2-1: Additional spectrum emission mask**

|  |  |  |
| --- | --- | --- |
| Frequency offset of measurement filter centre frequency, f\_offset | Basic limits(dBm) | Measurement bandwidth |
| 0.002MHz+0.5xBW ≤ f\_offset < 1xBW-0.002MHz | TRPrated(dBm) - 25 dB | 4 kHz |
| 0.002MHz+1xBW ≤ f\_offset < 2.5xBW-0.002MHz | TRPrated(dBm) - 35 dB | 4 kHz |
| 0.002MHz+2.5xBW ≤ f\_offset < 2nd harmonic of the upper frequency edge of the UL operating band in GHz | -13 dBm | 4 kHz |
| NOTE 1: TRPrated is the declared rated output power lower than or equal to TRPmax specified in sub-clause 9.2.1;NOTE 2: Transmission BW is in the unit of MHz;NOTE 3: *Measurement bandwidth*s as in ITU-R SM.329 [16], s4.1.NOTE 4: Upper frequency as in ITU-R SM.329 [16], s2.5 table 1. |

## **<<Next of Change>>**

### 9.7.1 General

Additional regional requirements can be signalled by the network. Each group of additional regional requirements is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR NTN frequency band number of the applicable FR2-NTN operating band and an associated value in the field *additionalSpectrumEmission.* Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [8]*.*

Table 9.7.1-1 specifies the additional regional requirements with their associated network signalling values, the applicable satellite orbit scenario(s) and applicable FR2-NTN operating band(s) for each NS value. The mapping of NR frequency band numbers and values of the additionalSpectrumEmission to network signalling labels is specified in Table 9.7.1-2.

Table 9.7.1-1: Additional regional requirements indicated by Network Signalling label

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Network Signalling label | Requirements (clause) | Applicable Satellite orbit scenario | NR satellite Band | Channel bandwidth (MHz) |
| NS\_200N |  | GSO and LEO | Table 5.2.3-1 | 50, 100, 200, 400 |
| NS\_201N | Clause 9.2.2.3Clause 9.5.3.2Clause 9.5.3.3Clause 9.6.1.1Clause 9.6.1.2Clause 10.8 | GSO | n512 | 50, 100, 200, 400 |
| NS\_202N | Clause 9.5.3.2Clause 9.5.3.3Clause 9.6.1.1 | LEO | n512 | 50, 100, 200, 400 |

Table 9.7.1-2: Mapping of network signalling label

|  |  |
| --- | --- |
| NR satellite band | Value of additionalSpectrumEmission |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| n512 | NS\_200N | NS\_201N | NS\_202N |  |  |  |  | Reserved |
| n511 | NS\_200N | Reserved |
| n510 | NS\_200N | Reserved |
| NOTE 1: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of 3GPP TS 38.331 [8].NOTE 2: For band n511 and n510, only NS\_200N can be used to map. |

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