**3GPP TSG-RAN WG4 Meeting #110bis *R4-2405343***

**Changsha, China, April 15 – April 19, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.863** | **CR** | **DraftCR** | **rev** | **-** | **Current version:** | **18.1.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR for TR 38.863 to introduce some technical background for R18 NTN VSAT UE Rx requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_enh-Core | | | | |  | ***Date:*** | | | 2024-04-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19) Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To introduce some rationales and background for VSAT EIS requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | To introduce some rationales and background for VSAT EIS requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | In current TR 38.863, the latest agreements for VSAT EIS requirements are not captured. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.4.3.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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>>**

#### 7.4.3.3 Radiated receiver characteristics for Ka band VSAT

##### 7.4.3.3.1 Polarization characteristics

Due to the faraday rotation effect in the atomosphere, the circular polarization is usually used for satellite communication. The minimum requirements on the receiver characteristics apply under RHCP (right hand circular polarization) or LHCP (left hand circular polarization).

##### 7.4.3.3.2 OTA reference sensitivity level

If 62dBm EIRP can be assumed for LEO600 SAN with 30 degree elevation angle scenario, the DL budget calculation is shown below to get the DL received signal at OTA (effective isotropic received signal).

Table 7.4.3.3.2-1: The calculation of DL budget for LEO600 scenario

|  |  |
| --- | --- |
|  | LEO600 |
| **NTN SAN EIRP (dBm)** | 62 |
| **Elevation angle (degree)** | 30 |
| **Slant range (km)** | 1075 |
| **center frequency (GHz)** | 17 |
| **freePathloss** | 177.68 |
| **VSAT DL Received signal level at OTA (dBm)** | -115.68 |

If -5dB G/T can be assumed to calculate the EIS requirements, the following calculation can be used to derived it.

EIS=10\*log10(k)+30+10\*log10(BW)+SNR+IM-G/T

BW is channel bandwidth. (candidate value: 50MHz)

IM is implementation margin. 2dB can be assumed.

SNR is the required SNR for demodulation. -1dB can be assumed.

G/T: -5dB.

K: is Boltzmann constant, 1.38\*10-23 J/K

Based on the calculation, the 50MHz minimum EIS for fixed VSAT communicating with LEO only with electronical steering antenna is -115.6dBm, which is valid for DL link budget.

If 82dBm EIRP can be assumed for GSO SAN with 30 degree elevation angle scenario, the DL budget calculation is shown below to get the DL received signal at OTA (effective isotropic received signal).

Table 7.4.3.3.2-1: The calculation of DL budget for GSO scenario

|  |  |
| --- | --- |
|  | GSO |
| **NTN SAN EIRP (dBm)** | 87 |
| **Elevation angle (degree)** | 30 |
| **Slant range (km)** | 38611 |
| **center frequency (GHz)** | 17 |
| **freePathloss** | 208.78 |
| **VSAT DL Received signal level at OTA (dBm)** | -121.78 |

If 6dB G/T can be assumed to calculate the EIS requirements, the following calculation can be used to derived it.

EIS=10\*log10(k)+30+10\*log10(BW)+SNR+IM-G/T

BW is channel bandwidth. (candidate value: 50MHz)

IM is implementation margin. 2dB can be assumed.

SNR is the required SNR for demodulation. -1dB can be assumed.

G/T: 6 dB.

K: is Boltzmann constant, 1.38\*10-23 J/K

Based on the calculation, the 50MHz minimum EIS for other types is -122 dBm, which is valid for DL link budget.

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