**3GPP TSG-RAN WG4 Meeting # 106bis-e R4-2306556**

**Online, April 17 – April 26, 2023**

**Agenda item:** 6.5

**Source:** Inmarsat

**Title:** WF on IoT NTN Extended L-band

**Document for:** Approval

# System Parameters

**Issue 1-1: Operating Bands and Band numbering**

 *Candidate options:*

* Option 1: The Extended L-band should be numbered as Table 2.1-1.

Table 2.1-1: E-UTRA operating bands for satellite access

|  |  |  |  |
| --- | --- | --- | --- |
| E‑UTRA Operating Band | Uplink (UL) operating bandBS receiveUE transmit | Downlink (DL) operating bandBS transmit UE receive | Duplex Mode |
| FUL\_low – FUL\_high | FDL\_low – FDL\_high |
| [253] | 1668 MHz | – | 1675 MHz | 1518 MHz | – | 1525 MHz | FDD |
| NOTE: Satellite bands are numbered in descending order from 256 |

* Option 2: Further discuss frequency range after further checking of the ECC report.

MODERATOR NOTE: The Extended L-band frequency range for UL and DL has been agreed as part of WID approval in RAN#99

*Tentative agreements:*

Agree on Band 253 as the band numbering.

***Recommended WF:***

* Considering WID agreement in RAN#99 and views from companies, agree on the frequency range in Option 1, but encourage companies to further check ECC Report 263.

Companies views (including 1st and 2nd round):

* Agree: Inmarsat, Mediatek, ZTE (3 companies)
* Disagree: Qualcomm (1 company)

**Issue 1-2: Channel numbering, Channel Raster and EARFCN**

*Candidate options:*

None

***Tentative Agreement:***

* Postpone discussion of Channel Numbering, Channel Raster and EARFCN after other system parameters are more stable.

**Issue 1-3: Default UE TX-RX separation**

*Candidate options:*

Proposal:

* Option 1: Agree on Default TX-RX separation of -150 MHz
* Option 2: Further discuss Default TX-RX separation

***Recommended WF****:*

* Consider if Option 1 can be agreed as a starting point, pending further checking of the frequency range.

Companies views (including 1st and 2nd round):

* Agree: Inmarsat, ZTE. (2 companies)
* Disagree: Qualcomm (1 company)

**Issue 1-4: Compliance with ECC recommendations**

*Candidate options:*

* Option 1: Evaluate the LTE NB1, NB2, and M1 blocking specification to determine if it complies with the ECC assumption for enhanced performance

*Recommended WF:*

* Companies to further check ECC Report 263 and evaluate, based on current blocking requirements for NB1, NB2 and M1, whether additional blocking requirements need to be considered.

Companies views (including 1st and 2nd round):

* Agree: Inmarsat, ZTE (2 companies)
* Disagree: Qualcomm (1 company)

#  UE RF Requirements

**Issue 2-1: UE Maximum Output Power**

*Candidate options:*

* Option 1: Reuse existing UE Maximum Output Power requirements from 36.102 at least as a starting point for further discussion, for category M1 and NB1/NB2, 23dBm with +/-2dB tolerance (Mediatek)
* Option 2: For the Extended L-band, the UE maximum output power for category M1 and category NB1 and NB2 can be specified in Table 2.5-1 and 2.5-2, respectively (ZTE)

**Table 2.5-1: UE Power Class for category M1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EUTRA band** | **Class 2****(dBm)** | **Tolerance****(dB)** | **Class 3 (dBm)** | **Tolerance (dB)** | **Class 5 (dBm)** | **Tolerance (dB)** |
| [253] |  |  | 23 | +/-2 | 20 | +/-2 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance. |

**Table 2.5-2: UE Power Class for category NB1 and NB2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EUTRA band** | **Class 3 (dBm)** | **Tolerance (dB)** | **Class 5 (dBm)** | **Tolerance (dB)** |
| [253] | 23 | +/-2 | 20 | +/-2 |

MODERATOR NOTE: One company expressed skepticism on inclusion of PC5. However other companies have expressed interest in keeping PC5, which is also currently supported by other NTN bands.

***Recommended WF****:*

* Agree Option 2

**Issue 2-2: MPR**

*Candidate options:*

Option 1: Reuse existing UE Maximum Output Power Reduction requirements from 36.102 at least as a starting point for further discussion, different MPR tables for category M1 and NB1/NB2 separately

***Tentative agreement:***

* Reuse existing MPR requirements from 36.102 at least as a starting point for M1 and NB1/NB2. Different MPR tables for category M1 and NB1/NB2 separately

**Issue 2-5: Transmission bandwidth for eMTC**

*Candidate options:*

* Option 1: For the Extended L-band, channel bandwidth and transmission bandwidth configuration for eMTC NTN operation should be defined as Table 2.2-1 (ZTE)

Table 2.2-1: Transmission bandwidth configuration NRB in E-UTRA channel bandwidths

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [MHz] | 1.4 |
| Transmission bandwidth configuration NRB | 6 |

***Tentative agreement:***

* Agree Option 1

***Recommended WF:***

* For the Extended L-band, use UE channel bandwidth and transmission bandwidth configuration for eMTC NTN UL operation defined in Table 2.2-1 below.

Table 2.2-1: Transmission bandwidth configuration NRB in E-UTRA channel bandwidths

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [MHz] | 1.4 |
| Transmission bandwidth configuration NRB | 6 |

**Issue 2-3: A-MPR**

*Candidate options:*

None.

***Tentative Agreement:***

* Further discuss whether A-MPR requirements are needed.

**Issue 2-4: Spurious emissions & additional spurious emissions**

*Candidate options:*

None.

***Tentative Agreement:***

* Further discuss spurious emissions requirements.

**Issue 2-6: Transmission bandwidth for NB-IoT**

*Candidate options:*

* Option 1: For the Extended L-band, channel bandwidth and transmission bandwidth configuration for NB-IoT NTN operation should be defined as Table 2.2-2 (ZTE).

Table 2.2-2: Transmission bandwidth configuration *N*RB, *N*tone 15kHz and *N*tone 3.75kHz in NB1 and NB2 channel bandwidth

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [kHz] | 200 |
| Transmission bandwidth configuration *N*RB | 1 |
| Transmission bandwidth configuration *N*tone 15kHz | 12 |
| Transmission bandwidth configuration *N*tone 3.75kHz  | 48 |

*Tentative Agreement:*

* Agree on Option 1 as a starting point with clarification that this applies to UL only.

***Recommended WF:***

* For the Extended L-band, use UE channel bandwidth and transmission bandwidth configuration for NB-IoT NTN UL operation defined in Table 2.2-2 below as a starting point.

Table 2.2-2: Transmission bandwidth configuration *N*RB, *N*tone 15kHz and *N*tone 3.75kHz in NB1 and NB2 channel bandwidth

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [kHz] | 200 |
| Transmission bandwidth configuration *N*RB | 1 |
| Transmission bandwidth configuration *N*tone 15kHz | 12 |
| Transmission bandwidth configuration *N*tone 3.75kHz  | 48 |

**Issue 2-7: In-band blocking**

*Candidate options:*

* Option 1: Reuse existing In-band blocking requirements from 36.102 at least as a starting point for further discussion, if there is no specific concern. Different band group may have different In-band blocking tables for category M1 and NB1/NB2 separately. (Mediatek)
* Option 2: Further discuss in-band blocking requirements

***Recommended WF****:*

* Consider in-band blocking requirements from 36.102 as a starting point for further discussion, pending clarifications on system parameters.

Companies views (including 1st and 2nd round):

* Agree: Inmarsat, Sony, Mediatek, ZTE (4 companies)
* Disagree: Qualcomm (1 company)

**Issue 2-8: Out-of-band blocking**

*Candidate options:*

* Option 1: Consider reusing basic Out-of-band blocking requirements for the UE as a starting point, and further discuss any additional blocking requirements based on ECC Recommendations and ETSI requirements for the 1518 MHz DL band edge
* Option 2: Further discuss out-of-band blocking requirements

*Recommended WF:*

* Agree Option 1.

Companies views (including 1st and 2nd round):

* Agree: Inmarsat, Sony, Mediatek, ZTE (4 companies)
* Disagree: Qualcomm (1 company)

**Issue 2-11: Draft running CR for TS 36.102**

*Candidate options:*

None

*Tentative Agreement:*

* Postpone discussion of CRs to later meetings when agreement is reached on system parameters and general requirements.

# SAN RF Requirements

**Issue 4-1: Channel Bandwidth for eMTC NTN**

*Candidate options:*

* Option 1: For the Extended L-band, channel bandwidth and transmission bandwidth configuration for eMTC NTN operation should be defined as Table 2.2-1 (ZTE)

Table 2.2-1: Transmission bandwidth configuration NRB in E-UTRA channel bandwidths

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [MHz] | 1.4 |
| Transmission bandwidth configuration NRB | 6 |

*Tentative Agreement:*

* Use Option 1 as a starting point and further discuss SAN channel bandwidth for eMTC to align with UE

*Recommended WF:*

* For the Extended L-band, use SAN channel bandwidth and transmission bandwidth configuration for eMTC NTN operation defined in Table 2.2-1 below as a starting point, and further discuss to align with UE.

Table 2.2-1: Transmission bandwidth configuration NRB in E-UTRA channel bandwidths

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [MHz] | 1.4 |
| Transmission bandwidth configuration NRB | 6 |

**Issue 4-2: Channel Bandwidth for NB-IoT NTN**

*Candidate options:*

* Option 1: For the Extended L-band, channel bandwidth and transmission bandwidth configuration for NB-IoT NTN operation should be defined as Table 2.2-2. (ZTE)

Table 2.2-2: Transmission bandwidth configuration *N*RB, *N*tone 15kHz and *N*tone 3.75kHz in NB1 and NB2 channel bandwidth

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [kHz] | 200 |
| Transmission bandwidth configuration *N*RB | 1 |
| Transmission bandwidth configuration *N*tone 15kHz | 12 |
| Transmission bandwidth configuration *N*tone 3.75kHz  | 48 |

*Tentative Agreement*:

* Use Option 1 as a starting point and further discuss SAN channel bandwidth for NB-IoT to align with UE.

*Recommended WF*:

* For the Extended L-band, use SAN channel bandwidth and transmission bandwidth configuration for NB-IoT NTN operation should defined in Table 2.2-2 as a starting point and further discuss to make sure it is aligned with agreements on the UE side.

Table 2.2-2: Transmission bandwidth configuration *N*RB, *N*tone 15kHz and *N*tone 3.75kHz in NB1 and NB2 channel bandwidth

|  |  |
| --- | --- |
| Channel bandwidth BWChannel [kHz] | 200 |
| Transmission bandwidth configuration *N*RB | 1 |
| Transmission bandwidth configuration *N*tone 15kHz | 12 |
| Transmission bandwidth configuration *N*tone 3.75kHz  | 48 |

**Issue 4-3: Draft running CR for TS 36.108**

*Candidate options:*

None.

*Tentative Agreement:*

* Postpone discussion of CRs to later meetings when agreement is reached on system parameters and general requirements.