**3GPP TSG-RAN WG4 Meeting #114 R4-2502850**

**Athens, Greece, February 17th – 21st, 2025**

**Title:** WF on NR and IoT NTN bands

**Agenda Item:** 6.18, 6.19, 6.20

**Source:** Moderator (Aalyria)

**Document for:** Approval

# Topic #1: NR-NTN S-band

### Sub-topic 1-1: General Requirements and Coexistence Aspects

#### Issue 1-1-1: UE to UE Coexistence with band n2/n25

**Agreement:**

* Agree to two different additional spurious emission requirements, each associated to an NS value, and corresponding A-MPR, for protection of band b25/n25/b2/n2
  + -30 dBm/MHz (NS\_XX)
  + -40 dBm/MHz (NS\_YY)
* For the above requirements, the following statement will be captured in a normative way:
  + “The requirement applies based on coordination between operators and subject to regional/national regulation”
    - Apply the requirements to UE based on NS signal
* Agree to specify asymmetric channel bandwidths with 5, 10 and 15 MHz UL CHBW for band n252, with BCS0 including all permutation based on UL channel bandwidth

**Table 5.3.6-1: FDD asymmetric UL and DL channel bandwidth combinations**

|  |  |  |  |
| --- | --- | --- | --- |
| **NR Band** | **Channel bandwidths for UL (MHz)** | **Channel bandwidths for DL (MHz)** | **Asymmetric channel bandwidth combination set** |
| n252 | 5 | 10,15, 20 | 0 |
| 10 | 15, 20 |
| 15 | 20 |

**T-Mobile: to “requirement applies based on coordination…” 🡪 coordination between operators.**

#### Issue 1-1-2: UE NS For Additional Spurious emissions

* **Way Forward:**
  + **Adopt the following as starting point for the definition of the two NS values for protection of b25/n25/b2/n2**

**Boost Mobile: Implementing NOTE is OK. The easier way is to implement it in MPR table.**

**Apple: Capture it in TR.**

**Qualcomm: Note is compromise way. We can make it clear that UE applies requirement based on NS signaling. It is now that we do not define the 20MHz for UL?**

**AT&T: It is clearer to add the note in the NS mapping table.**

**Boost Mobile: Aysmmetric bandwidth table?**

**Apple: 20MHz is [ ]. We need which bandwidth we should simulate.**

**T-Mobile: Symmetric includes 20MHz in the table.**

**Qualcomm: Agree with T-Mobile. WID has 5~20MHz. 20MHz should be part of table.**

6.5.3.3.X Requirement for network signalling value "NS\_XX"

When "NS\_XX" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.2-X. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5.3.3.2-X: Additional requirements for "NS\_XX"

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency range**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** | **NOTE** |
| 5 MHz, 10 MHz, 15 MHz, 20MHz |
| 1930 ≤ f <1995 | -30 | 1MHz | XX |
| ~~NOTE XX: The requirement applies based on coordination, subject to regional/national regulation~~. . | | | |

**Agreement:**

* **the note will be moved to NS mapping table, including the contents below**
  + “The requirement applies based on coordination between operators and subject to regional/national regulation”
  + Apply the requirements to UE based on NS signal

6.5.3.3.Y Requirement for network signalling value "NS\_YY"

When "NS\_YY" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.2-Y. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5.3.3.2-Y: Additional requirements for "NS\_YY"

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency range**  **(MHz)** | **Channel bandwidth / Spectrum emission limit (dBm)** | **Measurement bandwidth** | **NOTE** |
| 5 MHz, 10 MHz, 15 MHz, 20MHz |
| 1930 ≤ f < 1995 | -40 | 1MHz | YY |
| ~~NOTE YY: The requirement applies based on coordination subject to regional/national regulation~~ | | | |

**Agreement:**

* **the note will be moved to NS mapping table, including the contents below**
  + “The requirement applies based on coordination between operators and subject to regional/national regulation”
  + Apply the requirements to UE based on NS signal

#### Issue 1-1-3: UE A-MPR for corresponding NS values

* **Way Forward:**
  + Specify different A-MPR values for each NS depending on the UL CHBW, RB start and LcRB.
    - FFS on exact values
  + Adopt the following table skeleton

Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network signalling label | Requirements (clause) | NR satellite Band | Channel bandwidth (MHz) | Resources blocks (*N*RB) | A-MPR (dB) |
| NS\_01 |  | Table 5.2.2-1  (NOTE 3) | 5, 10, 15, 20 | Table 5.3.2-1 | N/A |
| NS\_24 | 6.5.3.3.13 in 3GPP TS 38.101-1 [5] | n256 | 5, 10, 15, 20 | Table 6.2.3.15-1 in 3GPP TS 38.101-1 [5] | Clause 6.2.3.15 in 3GPP TS 38.101-1 [5]2 |
| NS\_02N | 6.5.3.3.2 | n255 | 5, 10, 15, 20 |  | N/A |
| NS\_100 | 6.5.2.4.2 in 3GPP TS 38.101-1 [5] | n2561 |  |  | Table  6.2.3.1-2 in 3GPP TS 38.101-1 [5] |
| NS\_03N | 6.5.3.3.3 | n254 | 5, 10, 15 |  | Clause 6.2.3.2 |
| NS\_04N | 6.5.2.3.1  6.5.3.3.4 | n254 | 5 |  | Clause 6.2.3.3 |
| NS\_05N | 6.5.2.3.2  6.5.3.3.4 | n254 | 5, 10, 15 |  | Clause 6.2.3.4 |
| NS\_XX | 6.5.3.3.X | n252 | 5, 10, 15, 20 |  | Clause 6.2.3.X |
| NS\_YY | 6.5.3.3.Y | n252 | 5, 10, 15, 20 |  | Clause 6.2.3.Y |
| NOTE 1: This NS can be signalled for NR satellite bands that have UTRA services deployed.  NOTE 2: A-MPR for the upper 5 MHz of the band is not specified, and therefore shall be used as a guard band.  NOTE 3: The NS\_01 label with the field *additionalPmax* [8] absent is default for all NR satellite bands.  NOTE 4: The NS is signalled based on coordination between operators and subject to regional/national regulation | | | | | |

6.2.3.2 A-MPR for NS\_XX

Table 6.2.3.X-X: A-MPR regions for NS\_XX

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UL Channel BW | Carrier Center Frequency | RB\_start\*12\*SCS (MHz) | LCRB\*12\*SCS (MHz) | A-MPR |
| 5MHz |  |  |  |  |
|  |  |  |
|  |  |  |  |
| 10MHz |  |  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |  |
|  |  |  |
| 15MHz |  |  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| 20MHz |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Table 6.2.3.X-X: A-MPR for NS\_XX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Modulation | A1 | A2 | A3 | A4 | A5 | A6 |
| DFT-s-OFDM | Pi/2 BPSK |  |  |  |  |  |  |
| QPSK |  |  |  |  |  |  |
| 16QAM |  |  |  |  |  |  |
| 64QAM |  |  |  |  |  |  |
| 256QAM |  |  |  |  |  |  |
| CP-OFDM | QPSK |  |  |  |  |  |  |
| 16QAM |  |  |  |  |  |  |
| 64QAM |  |  |  |  |  |  |
| 256QAM |  |  |  |  |  |  |

#### Issue 1-1-4: Protection of aeronautical radionavigation-satellite service (i.e. GNSS)

* **Way Forward:**
  + Specify the following additional spurious requirements for protection of the aeronautical radionavigation satellite service:

**Additional spurious emission requirements for band n252**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency range**  **(MHz)** | **Channel bandwidth / Spectrum emission limit1 (dBm)** | **Measurement bandwidth** | **NOTE** |
| 5 MHz, 10 MHz, 15 MHz, 20 MHz |
| 1559≤ f < 1610 | -50 | 700 Hz | Averaged over any 2 millisecond active transmission interval |
| 1559 ≤ f < 1610 | -40 | 1MHz | Averaged over any 2 millisecond active transmission interval |
| NOTE: The EIRP requirement in regulation is converted to conducted requirement using a 0 dBi antenna. | | | |

### Sub-topic 1-2: UE RF

*Sub-topic description: General UE RF Requirements*

#### Issue 1-2-1: SS Raster

~~One proposal to keep only Case A, one proposal with Case A and Case B.~~

* **~~Way Forward:~~** 
  + ~~For the NTN FDD band with UE transmitting at 2000 - 2020 MHz and SAN transmitting at 2180 - 2200 MHz, specify the synchronization raster entries with SSB pattern:~~
    - ~~Option 1: Case A only~~
    - ~~Option 2: Case B~~
    - ~~Option 3: Case C~~
    - ~~Option 4: Case B and Case C.~~

**Qualcomm: the way forward only lists all the options and no agreement. Option 1 is sufficient.**

**Moderator: this is pending from last meeting. We should decide what we are going to do for Case B,C.**

**Echostar: We agree to Case A and respect to Case B and C come back next meeting.**

**CATT: For current stage, there is no Sat operator confirmation of other cases. Case A is sufficient.**

**ZTE: There is no need to introduce both Case B and C.**

**~~MODERATOR NOTE:~~**

* **~~Case A has already been agreed several meetings ago.~~**
* **~~Previous agreement in RAN4#113 was as follows:~~**
  + ~~For the NTN FDD band with UE transmitting at 2000 - 2020 MHz and SAN transmitting at 2180 - 2200 MHz, the synchronization raster entries with SSB pattern Case B and Case C could be introduced.~~

#### Issue 1-2-2: UE Asymmetric Channel Bandwidths

* Way Forward:
  + Specify Asymmetric channel bandwidths as follows (see Draft CR)

**Table 5.3.6-1: FDD asymmetric UL and DL channel bandwidth combinations**

|  |  |  |  |
| --- | --- | --- | --- |
| **NR Band** | **Channel bandwidths for UL (MHz)** | **Channel bandwidths for DL (MHz)** | **Asymmetric channel bandwidth combination set** |
| n252 | 5 | 10,15, 20 | 0 |
| 10 | 15, 20 |
| 15 | 20 |
| NOTE 1: The assignment of the paired UL and DL channels are subject to a TX-RX separation as specified in clause 5.4.4.  NOTE 2: As indicated in TS38.306 [11], it is mandatory for UEs to support asymmetric channel BCS0 if there is an asymmetric BCS0 defined for the band. | | | |

#### Issue 1-2-3: UE REFSENS

Summary: 2 Proposals with n252 co-banding with n256/n65, 1 proposal no co-banding, but values may need revisiting

* Way Forward:
  + Specify n252 UE REFSENS based on

| Operating band / SCS / Channel bandwidth | | | | | |
| --- | --- | --- | --- | --- | --- |
| Operating Band | SCS kHz | 5  MHz (dBm) | 10  MHz (dBm) | 15  MHz (dBm) | 20  MHz (dBm) |
|  | 15 | [-99.5] | [-96.3] | [-94.5] | [-93.3] |
| n252 | 30 |  | [-96.6] | [-94.6] | [-93.5] |
|  | 60 |  | [-97.0] | [-94.9] | [-93.7] |

Skyworks: we may do not have different requirements. Look at the numbers in the end.

Qualcomm: Intention is not to define two sets of requirements.

#### Issue 1-2-4: UE Out-of-band Blocking

* Way Forward:
  + Further discuss the Out-of-Band Blocking requirements for band n252 based on the options following
    - Option 1, with no co-banding assumption with n256 and n65

Table 2.2-1: Out of-band blocking for NR satellite bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating Band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -44 | -30 | -15 |
| n252 | Finterferer (CW) | MHz | -70 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -95 < f – FDL\_low ≤ -70  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 95  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n2542 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n255 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n2561 | Finterferer (CW) | MHz | -100 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -145 < f – FDL\_low ≤ -100  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 145  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| NOTE 1: Band n256 lower frequency ranges are modified to enable specific implementations  NOTE 2: Band n254 power level of the interferer (Pinterferer) for Range 3 shall be modified to -20 dBm for Finterferer > 2585 MHz and FInterferer < 2775 MHz.  NOTE 3: void  NOTE 4: void | | | | | |

* + Option 2 with assumption of n252 co-banding with n256 and n65

Table 1: Out of-band blocking for n252

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating Band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -44 | -30 | -15 |
| n2521 | Finterferer (CW) | MHz | -110 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -155 < f – FDL\_low ≤ -110  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 155  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n2561 | Finterferer (CW) | MHz | -100 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -145 < f – FDL\_low ≤ -100  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 145  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| NOTE 1: Band n256 and n252 lower frequency ranges are modified to enable specific implementations | | | | | |

* + Option3: reuse the OOB requirements of band B23

Qualcomm: option 2.

Mediatek: three approaches.

Echostar: it should not be based on n65 which is not implemented.

Mediatek: We do not implement n65.

### Sub-topic 1-3: SAN RF

*Sub-topic description: SAN RF requirements for band n252*

#### Issue 1-3-1: SAN SS Raster

* **~~Way Forward:~~** 
  + ~~For the NTN FDD band with UE transmitting at 2000 - 2020 MHz and SAN transmitting at 2180 - 2200 MHz, specify the synchronization raster entries with SSB pattern:~~
    - ~~Option 1: Case A only~~
    - ~~Option 2: Case B~~
    - ~~Option 3: Case C~~
    - ~~Option 4: Case B and Case C.~~

### Sub-topic 1-4: RRM Requirements

*Way Forward:*

* *Endorse the following draft CR*

|  |  |  |
| --- | --- | --- |
| [**R4-2501179**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501179.zip) | ZTECorporation,Sanechips | Draft CR to TS 38.133: Introduction of a new NTN S-band |

# Topic #2 IoT-NTN S-band

### Sub-topic 2-1: UE RF

*Sub-topic description: UE RF requirements*

#### Issue 2-1-1: UE TX-RX Separation

* **Way Forward:**
  + - Specify B252 variable TX-RX frequency separation as follows for Cat M1

Table 5.4A.3-1: Default UE TX-RX frequency separation

| E-UTRA Operating Band | TX – RX  carrier centre frequency separation |
| --- | --- |
| 252 | 80 MHz1  161.4 to 198.6 MHz2 |
| NOTE 1: Default TX-RX separation.  NOTE 2: The verification of flexible TX-RX frequency separation within this range is limited to reference sensitivity. Further details are specified in clause 7.3A. | |

**Table 7.3A-4: TX – RX carrier centre frequency separation for REFSENS verification**

|  |  |  |
| --- | --- | --- |
| **E-UTRA**  **Operating Band** | **Channel bandwidth** | **TX – RX carrier centre frequency separation for REFSENS verification** |
| 252 | 1.4 MHz | 161.4 MHz, 198.6 MHz |

* + - Specify B252 variable TX-RX frequency separation as follows for Cat NB1 and NB2

Table 5.4B.3-1: Default UE TX-RX frequency separation

| E-UTRA Operating Band | TX – RX  carrier centre frequency separation |
| --- | --- |
| 252 | 80 MHz1  160.2 to -199.8 MHz2 |
| NOTE 1: Default Tx-Rx separation.  NOTE 2: The verification of flexible TX-RX frequency separation within this range is limited to reference sensitivity. Further details are specified in clause 7.3B. | |

**Table 7.3B-2: TX – RX carrier centre frequency separation for REFSENS verification**

|  |  |  |
| --- | --- | --- |
| **E-UTRA**  **Operating Band** | **Channel bandwidth** | **TX – RX carrier centre frequency separation for REFSENS verification** |
| 252 | 0.2 MHz | 160.2 MHz, 199.8 MHz |

#### Issue 2-1-2: UE Out of band Blocking for Cat M1

Both Options 1/2 for B252 co-banded filter with B256, of which Option 2 also proposes co-banding with B65 and Option 1 values don’t align with B256

* Way Forward
  + Aligned with the assumptions agreed for NR.
  + ~~Specify out of band blocking for Cat M1 as follows:~~
    - ~~Option 1: Assuming co-banding with B256~~

~~Table X: Out of-band blocking parameters for category M1 UE~~

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~Operating Band~~ | ~~Parameter~~ | ~~Unit~~ | ~~Range 1~~ | ~~Range 2~~ | ~~Range 3~~ |
|  | ~~P~~~~interferer~~ | ~~dBm~~ | ~~-44~~ | ~~-30~~ | ~~-15~~ |
| ~~252~~~~3~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-70 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-95 < f – F~~~~DL\_low~~ ~~≤ -70~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 95~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~NOTE 3: Band 252 lower frequency ranges are modified to enable specific implementations.~~ | | | | | |

* + ~~Option 2: Assuming co-banding with B256 and B65~~

~~Table 1: Out of-band blocking for 252 and 256~~

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~Operating Band~~ | ~~Parameter~~ | ~~Unit~~ | ~~Range 1~~ | ~~Range 2~~ | ~~Range 3~~ |
|  | ~~P~~~~interferer~~ | ~~dBm~~ | ~~-44~~ | ~~-30~~ | ~~-15~~ |
| ~~252~~~~1~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-110 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-155 < f – F~~~~DL\_low~~ ~~≤ -110~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 155~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~256~~~~1~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-100 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-145 < f – F~~~~DL\_low~~ ~~≤ -100~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 145~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~NOTE 1: Band 256 and 252 lower frequency ranges are modified to enable specific implementations~~ | | | | | |

#### Issue 2-1-3: UE Out of band Blocking for Cat NB1/NB2

Both Options 1/2 for B252 co-banded filter with B256, of which Option 2 also proposes co-banding with B65 and Option 1 values don’t align with B256

* Way Forward
  + Aligned with the assumptions agreed for NR.
  + ~~Specify out of band blocking for Cat NB1 and NB2 as follows:~~
    - ~~Option 1: Assuming co-banding with B256~~
* ~~Table Y: Out-of-band blocking parameters for category NB1 and NB2 UE~~

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~Operating Band~~ | ~~Parameter~~ | ~~Unit~~ | ~~Range 1~~ | ~~Range 2~~ | ~~Range 3~~ |
| ~~P~~~~w~~ | ~~dBm~~ | ~~REFSENS + 6 dB~~ | | |
| ~~P~~~~interferer~~ | ~~dBm~~ | ~~-44~~ | ~~-30~~ | ~~-15~~~~3~~ |
| ~~252~~~~6~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-70 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-95 < f – F~~~~DL\_low~~ ~~≤ -70~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 95~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~NOTE 6: Band 252 lower frequency ranges are modified to enable specific implementations.~~ | | | | | |

* + ~~Option 2 : Assuming co-banding with B256 and B65:~~

~~Table 1: Out of-band blocking for 252 and 256~~

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~Operating Band~~ | ~~Parameter~~ | ~~Unit~~ | ~~Range 1~~ | ~~Range 2~~ | ~~Range 3~~ |
|  | ~~P~~~~interferer~~ | ~~dBm~~ | ~~-44~~ | ~~-30~~ | ~~-15~~ |
| ~~252~~~~1~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-110 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-155 < f – F~~~~DL\_low~~ ~~≤ -110~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 155~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~256~~~~1~~ | ~~F~~~~interferer~~ ~~(CW)~~ | ~~MHz~~ | ~~-100 < f – F~~~~DL\_low~~ ~~< -15~~  ~~or~~  ~~15 < f – F~~~~DL\_high~~ ~~< 60~~ | ~~-145 < f – F~~~~DL\_low~~ ~~≤ -100~~  ~~or~~  ~~60 ≤ f – F~~~~DL\_high~~ ~~< 85~~ | ~~1 ≤ f ≤ F~~~~DL\_low~~ ~~– 145~~  ~~or~~  ~~F~~~~DL\_high~~ ~~+ 85 ≤ f~~  ~~≤ 12750~~ |
| ~~NOTE 1: Band 256 and 252 lower frequency ranges are modified to enable specific implementations~~ | | | | | |

### Sub-topic 2-2: RRM Requirements

*Way Forward:*

* *Endorse the following draft CR.*

|  |  |  |
| --- | --- | --- |
| [**R4-2501181**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501181.zip) | ZTECorporation,Sanechips | Draft CR to TS 36.133: Introduction of a new IoT NTN S-band |

### Sub-topic 2-3: TR 36.764 Update

#### Issue 2-3-1: TR Section Skeleton

*Way Forward:*

* *Updated TR 36.764 adding the following section*

|  |
| --- |
| 8 FDD band B252 (IoT-NTN FDD S\_band)8.1 Regulation8.1.1 Regional Applicability8.2 UE requirements8.2.1 Channel arrangement8.2.2 UE transmitter characteristics8.2.2.1 Maximum output power8.2.2.2 Emission requirements and NS values8.2.2.2.1 Spurious emission8.2.3 UE receiver characteristics8.2.3.1 Reference sensitivity8.2.3.2 Blocking requirements8.2.4 A-MPR Evaluation8.3 BS requirements |

# Topic #3: NR-NTN L-bands

### Sub-topic 3-1: General Aspects and Regulatory Input

*Sub-topic description: Regulatory aspects*

#### Issue 3-1-1: Capturing of ETSI EN Requirements

* Way Forward
  + Capture existing in-band and out-of-band emission requirements for L-bands **n251, n250 and n253** as defined by ETSI EN 301 681 in a new table under a new sub-clause under Clause 6.5.2 (Conducted transmitter characteristics, Out-of-Band emissions) as Additional Regional Emission Requirements.
    - Introduce a NOTE specifying that the requirements are converted from radiated requirements (i.e. EIRP) in ETSI EN 301 681 to conducted requirements, assuming a 0dBi antenna with flat frequency response integral to the UE.
      * Detailed reference with specific version of EN 301 681 spec being referenced shall be included.
    - FFS for UE with high gain antenna or UE with non-integral antenna.
    - Come back in next meeting with specific NS values to be specified

Qualcomm: ETSI works on the new harmonized standard. Which out-of-band emission is under discussions. If that happes, the requirements EN 301 681 is not applicable, and we should remove the requirements from the spec.

Moderator: this issue was discussed for a long time. The WF is captured due to some confusion. Agree with Qualcomm comment. Welcome interested operators comment on this. We propose to capture it.

Inmarsat: Agree with Moderator and Qualcomm.

Qualcomm: Action in 3GPP should be based on the other document other than EN 301 681.

#### Issue 3-1-2: Mechanisms for Protection of Radioastronomy

* Way Forward:
  + For n251, n250, n253 protection of Radio Astronomy, consider the following two mechanisms as a baseline:
    - Network-controlled RB scheduling is considered as a baseline based on operator’s control
    - FFS whether a new NS value should be specified to signal the additional emission limit at the edge of the band, to signal cells in proximity or overlap to RA stations
      * Clarify the specific emission limits required and the frequency range applicability, and whether a specific value of geographical distance for the limit is considered, when defining proximity to a RA station

Qualcomm: the lowest of bullet should be sub-bullet. Distance is frequency-distance or geographical.

### Sub-topic 3-2: UE RF

*Sub-topic description: System parameters and UE RF aspects*

*Open issues and candidate options before meeting:*

#### Issue 3-2-1: UE Out-of-band blocking

* + Way Forward:
    - Consider the following out-of-band blocking requirements for band n253, n251 and n250 as a starting point for further verification (come back in next meeting):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating Band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -44 | -30 | -15 |
| n251, n250 | Finterferer (CW) | MHz | [-60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60] | [-85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85] | [1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750] |
| n253 | Finterferer (CW) | MHz | [-60 < f – FDL\_low < -15  or  **15 < f – FDL\_high < 94]** | [-85 < f – FDL\_low ≤ -60  or  **94 ≤ f – FDL\_high < 119]** | [1 ≤ f ≤ FDL\_low – 85  or  **FDL\_high + 119 ≤ f**  **≤ 12750]** |

### Sub-topic 3-4: RRM Requirements

*Sub-topic description: RRM aspects*

* *Way Forward:*
  + *Endorse the following draft CR.*

|  |  |  |
| --- | --- | --- |
| [**R4-2501180**](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Docs/R4-2501180.zip) | ZTECorporation,Sanechips | **Draft CR to TS 38.133: Introduction of a new NTN L-band** |