**3GPP TSG-RAN WG4 Meeting # 102-e R4-210XXXX**

**Electronic Meeting, 21th  Feb– 3rd Mar 2022**

**Agenda item: 10.13.4**

**Source:** Moderator (ZTE)

**Title:** Email discussion summary for [102-e][311] NTN\_solutions-Part4

**Document for:** Information

# Introduction

The e-mail discussion covers NTN UE RF requirement, TP to TS 38.101-5 and TP to TR 38.863 on NTN UE RF part.

All contributions submitted are divided into the following Topics:

1. NTN UE Tx requirement
2. NTN UE Rx requirement
3. TP to TS 38.101-5
4. TP to TR 38.863

# Topic #1: UE Tx requirement

## Companies’ contributions summary

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2203863 | MTK | **Observation 1: In TS 38.101-1, TN requirements about spurious emissions for UE co-existence are provided for protected bands if needed. On the other hand, regarding NR NTN, one alternative way[1] was suggested to specify NTN UE TX spurious coexistence limit of [-50dBm] with all TN bands. Exception band is FFS.****Observation 2: Due to co-band between bands n24 and n255 and same frequency usage, to assume band n24 can be the exception band for n255 TX spurious coexistence.****Proposal 1: Regarding band n255’s TX spurious emission for UE co-existence for protecting all TN bands, to assume at least band n24 should be considered as the exception band.****Observation 3: Due to frequency overlapping between bands n65 and n256, to assume band n65 can be the exception band for n256 TX spurious coexistence.** **Proposal 2: Regarding band n256’s TX spurious emission for UE co-existence for protecting all TN bands, to assume at least band n65 should be considered as the exception band.** |
| R4-2203926 | CATT | **Proposal: The minimum output power for NTN UE can be relaxed by ~ 15dB compared to TN UE, e.g. -25 dBm.** |
| R4-2204504 | Qualcomm Incorporated | **Observation 1: The assumption of isolation region (1.5km) that is to reflect the realistic UE deployment in the co-existence study should be captured in TR 38.863 with other co-existence study assumptions, that is also the typical RAN4 way of working.** **Observation 2: In any case, the introduction on isolation region would not lead to the performance degradation for the TN since the victim is NTN DL in Case 1.****Proposal 1: To capture the descriptions on the assumption of 1.5km isolation region just in TR 38.863. A clarification that TN UEs not deploying in isolation region is for simplifying the simulation.** **Observation 3: When UE supports n65, it must support n1 as well.****Proposal 2: RAN4 to agree Option 1, i.e., dedicated 30MHz duplexer as the assumption for band n256.****Proposal 3: The protected TN bands for UE co-existence n255/n256 should be taken into the deployment of satellite. The spurious emission limit of protected bands for n24/n65 can be as the basis.****Proposal 6: To reuse the TN minimum output power requirements for NTN UE.****Proposal 7: To reuse the TN MPR values for NTN UE.****Proposal 8: To reuse the A-MPR values defined in NS\_24 and NS\_100 for n256.****Proposal 9: To reuse the A-MPR values defined in NS\_56 for n255.** |
| R4-2204809 | Xiaomi | **Proposal 1: Use same MPR requirement of TN UE for NTN UE****Proposal 2: A-MPR requirements for NTN UE are reused from TN UE and the mapping of network signalling label for n256 is specified as shown in table 4.****Proposal 3: Reusing A-MPR requirements and the mapping of network signalling label from n24 for NTN band n255 as shown in table 5.** |
| R4-2205050 | Ericsson | **Proposal1: Confirm the -50dBm level as the limit for coexistence with TN bands.****Proposal2: Specify spurious coexistence limit of -50dBm with all TN bands, band n65 should be considered as the only possible exception for n256 and band n24 the only exception for n255.****Proposal3: Reuse NS\_56 for n255 A-MPR (to be further discussed if a new NS number would be needed or not).****Proposal4: Reuse at least NS\_24 for n256, further discuss how to protect n2, n25 and n70, and if additional NS(s) would be needed.** |
| R4-2205286 | Huawei | **Observation 1: Based on the link budget, there is no much room to decrease the UE Tx power in order to guarantee the link connection.****Observation 2: The minimum output power can be larger than 10dBm.****Proposal 1: Since UE can meet this requirement easily, it should be clarified in the spec that there is no need to test minimum output power requirement to reduce the test burden.****Proposal 2: To specify the carrier leakage as below.**Table 1: Requirements for Carrier Leakage

|  |  |
| --- | --- |
| **Parameter** | **Relative Limit (dBc)** |
| Output power > 10 dBm  | -28 |

**Proposal 3: The in-band emission requirements specified in table 6.4.2.3 from TS 38.101-1 can be reused for NTN UE under the condition that Output power is larger than 10dBm.****Proposal 4: there is no need to specify the spurious emissions for UE co-existence since NTN handheld UE with TN function can only be deployed in the area where there is no IMT BS coverage.** |
| R4-2205470 | ZTE | **Proposal 1: n24 could be one exceptional band for n255 spurious emission for UE coexistence.** **Proposal 2: n65 could be one exceptional band for n256 spurious emission for UE coexistence.** **Proposal 3: to follow the legacy approach to define different spurious emission requirements for UE coexistence for different bands instead of to specify spurious coexistence limit of -50dBm with all TN bands.** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1:** where to capture isolation region (1.5km) information

* Proposals
	+ Option 1: To capture the descriptions on the assumption of 1.5km isolation region just in TR 38.863. A clarification that TN UEs not deploying in isolation region is for simplifying the simulation. [QC]
	+ Option 2: others
* Recommended WF

### Sub-topic 1-2

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1:** minimum output power

* Proposals
	+ Option 1: The minimum output power for NTN UE can be relaxed by ~ 15dB compared to TN UE, e.g. -25 dBm. [CATT]
	+ Option 2: reuse the TN minimum output power requirements for NTN UE [QC]
	+ Option 3: The minimum output power can be larger than 10dBm and no need to test minimum output power requirement to reduce the test burden. [Huawei]
	+ Option 4: others
* Recommended WF

For issue 1-2-2, this depend on the agreement of issue 1-2-1, then how to define carrier leakage agreement and in-band emission requirement, we propose not to discuss it in 1st round.

**Issue 1-2-2:** carrier leakage and in-band emission requirement

* Proposals
	+ Option 1: to keep aligned with output power larger than 10dBm [Huawei]
	+ Option 2: others
* Recommended WF:

 we propose not to postpone to the discussion until we have the agreement on minimum output power

### Sub-topic 1-3

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-3-1:** UE coexistence requirement

* Proposals
	+ Option 1: -50dBm [Ericsson, MTK]
	+ Option 2: not needed [Huawei]
	+ Option 3: others
* Recommended WF

**Issue 1-3-2:**  protected TN bands for UE co-existence n255/n256

* Proposals
	+ Option 1: all TN bands with some exceptional bands [Ericsson, MTK]
	+ Option 2: taken into the deployment of satellite and the spurious emission limit of protected bands for n24/n65 can be as the basis. [QC]
	+ Option 3: others
* Recommended WF

**Issue 1-3-3:**  exceptional TN bands for UE co-existence n256

* Proposals
	+ Option 1: n65 [Ericsson, ZTE, MTK]
	+ Option 2: others
* Recommended WF

**Issue 1-3-4:**  exceptional TN bands for UE co-existence n255

* Proposals
	+ Option 1: n24 [Ericsson, ZTE, MTK]
	+ Option 2: others
* Recommended WF

### Sub-topic 1-4

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 1-4-1: MPR**

* Proposals
	+ Option 1: to reuse TN MPR requirement [Xiaomi, QC]
	+ Option 2: others
* Recommended WF

**Issue 1-4-2:** A-MPR for n256

* Proposals
	+ Option 1: NS\_24 and FFS for how to protect n2, n25 and n70, and if additional NS(s) would be needed. [Ericsson]
	+ Option 2: NS\_24 and NS\_100 for n256 [QC, Xiaomi]
	+ Option 3: others
* Recommended WF

**Issue 1-4-3:** A-MPR for n255

* Proposals
	+ Option 1: Reuse NS\_56 for n255 A-MPR (to be further discussed if a new NS number would be needed or not). [Ericsson, [Xiaomi], [QC]]
	+ Option 4: others
* Recommended WF

## Companies views’ collection for 1st round

### Open issues

**Issue 1-1:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | **Issue 1-1:** *Comment* |
| Company B |  |

**Issue 1-2:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | **Issue 1-2-1:** *Comment***Issue 1-2-2:** *Comment***Issue 1-2-3:** *Comment* |
| Company B |  |

**Issue 1-3:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | **Issue 1-3-1:** *Comment***Issue 1-3-2:** *Comment***Issue 1-3-3:** *Comment* |
| Company B |  |

**Issue 1-4:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | **Issue 1-4-1:** *Comment***Issue 1-4-2:** *Comment***Issue 1-4-3:** *Comment* |
| Company B |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
|  | Company A |
| Company B |
|  |
|  | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Topic #3: UE Rx requirement

## Companies’ contributions summary

(Cat A CRs are not listed)

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2203864 | MTK | **Observation 1: There is no available duplexer with 30MHz BW for band n256 at this stage. To reuse n65 duplexer can have the advantage of compatibility and speeding up NTN n256 development to market.** **Observation 2: As shown in Figure 1, there is UE n65 coexistence spurious emission requirement for TDD-band n34. UE coexistence requirement between bands n256 and n34 is also needed. The n65/n256 spurious emission for protected band n34 could be around -50dBm/MHz.** **Observation 3: In [2], it is indicated that even if the BW is reduced to 30 MHz for considering new duplexer to meet UE coexistence spurious emission requirement for band n34, rejection capability at n34 frequency range will be same as n65 (only a few dB) and the improvement of IL will not be 0.5 dB.** **Proposal 1: From aspects of FE implementation, FE IL/Rejection performance, compatibility, and time-to-market for NTN band n256, to reuse n65 duplexer for n256 is possible due to low difference for IL and rejection capability.** **Proposal 2: Based on observations, the n256 REFSENS is suggested as shown in Table 1.**

| Operating band / SCS / Channel bandwidth |
| --- |
| Operating Band | SCS kHz | 5MHz(dBm) | 10MHz(dBm) | 15MHz(dBm) | 20MHz(dBm) | 25MHz(dBm) | 30 MHz (dBm) | 35 MHz (dBm) | 40MHz(dBm) | 45 MHz (dBm) | 50MHz(dBm) |
| n256 | 15 | -99.5 | -96.3 | -94.5 | -93.3 |  |  |  |  |  |  |
| 30 |  | -96.6 | -94.6 | -93.5 |  |  |  |  |  |  |
| 60 |  | -97.0 | -94.9 | -93.7 |  |  |  |  |  |  |

**Table 1 REFSENSE of n256** |
| R4-2203927 | CATT | **Proposal: The maximum input power for NTN UE can be relaxed by 15dB from TN UE, e.g. -40dBm.** |
| R4-2204504 | Qualcomm Incorporated | **Observation 3: When UE supports n65, it must support n1 as well.****Proposal 2: RAN4 to agree Option 1, i.e., dedicated 30MHz duplexer as the assumption for band n256.****Proposal 3: The protected TN bands for UE co-existence n255/n256 should be taken into the deployment of satellite. The spurious emission limit of protected bands for n24/n65 can be as the basis.****Proposal 4: The REFSENSE for band n256 is depending on the decision on duplexer assumption. If 90MHz duplexer is selected, then we should go with option 1 otherwise option 2 should be agreed.****Proposal 5: To consider 20dB relaxation for maximum input level compared with TN.** |
| R4-2205287 | Huawei | **Proposal 1: dedicated 30MHz duplexer can be reused for band n256.****Proposal 2: To specify the REFSENS for band n255 as below in table 3 and table 4.**Table 1: Two antenna port reference sensitivity QPSK PREFSENS

| Operating band / SCS / Channel bandwidth / Duplex-mode |
| --- |
| Operating Band | SCS kHz | 5MHz(dBm) | 10MHz(dBm) | 15MHz(dBm) | 20MHz(dBm) | Duplex Mode |
| n256 | 15 | -100.0 | -96.8 | -95.0 | -93.8 | FDD |
|  | 30 |  | -97.1 | -95.1 | -94.0 |  |
|  | 60 |  | -97.5 | -95.4 | -94.2 |  |

Table 4: Uplink configuration for reference sensitivity

| Operating band / SCS / Channel bandwidth / Duplex-mode |
| --- |
| Operating Band | SCS kHz | 5MHz | 10MHz | 15MHz | 20MHz | Duplex Mode |
| n256 | 15 | 25 | 50 | 75 | 100 | FDD |
|  | 30 |  | 24 | 36 | 50 |  |
|  | 60 |  | 10 | 18 | 24 |  |

**Proposal 3: it should be clarified in the spec that there is no need to test Maximum input level requirement to reduce the test burden.****Proposal 4: there is no need to specify the ACS test parameter which is based on the Maximum input level. The interference for ACS can be restricted by the possible maximum input level.** |
| R4-2205471 | ZTE | **Proposal 1: to define NTN UE REFSENS requirement for n256 with option 2.** |
| R4-2205654 | HUGHES Network Systems Ltd,Skyworks | **Proposal 1:** Reuse the 90MHz band n65 duplexer for UE operation in band n256**Proposal 2:** Define REFSENS for band n256 based on Table 7.3.2-1a, band n65 in [5] (provided below as reference): Table 7.3.2-1a: Two antenna port reference sensitivity QPSK PREFSENS for FDD bands

| Operating band / SCS / Channel bandwidth |
| --- |
| Operating Band | SCS kHz | 5MHz(dBm) | 10MHz(dBm) | 15MHz(dBm) | 20MHz(dBm) | 25MHz(dBm) | 30 MHz (dBm) | 35 MHz (dBm) | 40MHz(dBm) | 45 MHz (dBm) | 50MHz(dBm) |
| n65 | 15 | -99.5 | -96.3 | -94.5 | -93.3 |  |  |  |  |  |  |
| 30 |  | -96.6 | -94.6 | -93.5 |  |  |  |  |  |  |
| 60 |  | -97.0 | -94.9 | -93.7 |  |  |  |  |  |  |

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## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 2-1-1:** Duplexer for n256

* Proposals
	+ Option 1: dedicated 30MHz [QC,Huawei, ZTE]
	+ Option 2: reusing n65 [MTK,HUGHES, Skyworks]
* Recommended WF

Further discuss the REFSENS requirement in the intermediate round if we have the agreement on duplexer.

**Issue 2-1-2:** maximum input power

* Proposals
	+ Option 1: relaxed by 15dB from TN UE, e.g. -40dBm. [CATT]
	+ Option 2: relaxed by 20dB from TN UE, . [QC]
	+ Option 3: no need to test the maximum input power [Huawei]
	+ Option 4: other
* Recommended WF

**Issue 2-1-3:** ACS requirement in case 2

* Proposals
	+ Option 1: no need to specify the ACS test parameter which is based on the Maximum input level. The interference for ACS can be restricted by the possible maximum input level [Huawei]
	+ Option 2: other
* Recommended WF

## Companies views’ collection for 1st round

### Open issues

**Issue 2-1:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | **Issue 2-1:** *Comment* |
| Company B |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: TP to TS 38.101-5

## Companies views’ collection for 1st round

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2203959TP for 38.101-5: clause 6.3 output power dynamics | Company A |
| Company B |
|  |
| R4-2204169TP to TS 38.101-5 on clause 7.5 NTN UE ACS | Company A |
| Company B |
|  |
| R4-2204170TP to TS 38.101-5 on clause 7.6 Blocking characteristics | Company A |
| Company B |
|  |
| R4-2204344Draft text proposal to update TS 38.101-5 Chapter 1 | Company A |
| Company B |
|  |
| R4-2204505TP on TS 38.101-5 for general part of transmitter characteristics | Company A |
| Company B |
|  |
| R4-2204807TP for TS38.101-5 on section 6.2 transmitter power | Company A |
| Company B |
|  |
| R4-2204810TP for TS38.101-5 on section 7.8 Intermodulation characteristics | Company A |
| Company B |
|  |
| R4-2205052pCR to TS 38.101-5 - Scope | Company A |
| Company B |
|  |
| R4-2205053pCR to TS 38.101-5 - Receiver requirements general | Company A |
| Company B |
|  |
| R4-2205235pCR for TS 38.101-5: NS value and additional spurious requirements for n255 | Company A |
| Company B |
|  |
| R4-2205290TP for 38.101-5 on Output RF spectrum emissions for satellite UE | Company A |
| Company B |
|  |
| R4-2205291TP for 38.101-5 on Rx Spurious emissions and spurious response for satellite UE | Company A |
| Company B |
|  |
| R4-2205472TP for TS 38.101-5: Genera(5.1) and Operating Band(5.2) | Company A |
| Company B |
|  |
| R4-2205473TP for TS 38.101-5: Maximum input level (7.4) | Company A |
| Company B |
|  |
| R4-2205608TP to TS 38.101-5 on 7.3 Reference sensitivity  | Company A |
| Company B |
|  |

# Topic #4: TP to TR 38.863

## Companies views’ collection for 1st round

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2203960TP for 38.863: clause 7.3.2 Conducted transmission characteristics | Company A |
| Company B |
|  |
| R4-2204506TP on TR 38.863 for NTN UE Tx requirements | Company A |
| Company B |
|  |
| R4-2204506TP on TR 38.863 for NTN UE Tx requirements | Company A |
| Company B |
|  |
| R4-2204592Draft TP to update TR 38.863 clause 7.4.3.2 on NTN UE ACS | Company A |
| Company B |
|  |
| R4-2204593Draft TP to update TR 38.863 clause 7.4.3.2 on Blocking characteristics | Company A |
| Company B |
|  |
| R4-2204808TP for 38.863 on MPR and A-MPR requirement for NTN UE | Company A |
| Company B |
|  |
| R4-2204811TP for 38.863 on Intermodulation characteristics for NTN UE | Company A |
| Company B |
|  |
| R4-2204812TP for 38.863 on spurious response for NTN UE | Company A |
| Company B |
|  |
| R4-2205043TP for TR 38.863: Unwanted emissions for NTN satellite UEs transmitting in 1626.5 to 1660.5 MHz | Company A |
| Company B |
|  |
| R4-2205110TP for TR 38.863: Updates to UE Maximum Output Power for n255 | Company A |
| Company B |
|  |
| R4-2205288TP for 38.863 on UE transmitter characteristics for satellite access | Company A |
| Company B |
|  |
| R4-2205289TP for 38.863 on UE Receiver characteristics for satellite access | Company A |
| Company B |
|  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |
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|  |  |  |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)