**3GPP TSG-RAN WG4 Meeting #109 R4-2318122**

**Chicago, USA, November 13 – 17th, 2023**

**Agenda item:** 7.31.5

**Source:** Apple Inc.

**Title:** Topic summary for [109][116] LTE\_NR\_NTN\_LSband

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

# Topic #1: General aspects and system parameters

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2318405 | Apple, Globalstar | TP for 38.741 with editorial corrections for abbreviations, acronyms, etc. |
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## Open issues summary

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

### General aspects

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-1: General aspects for the TR**

* Proposals
  + R4-2318405 with TP for 38.741 with editorial corrections for abbreviations, acronyms, etc..
* Recommended WF
  + Agree R4-2318405

# Topic #2: UE RF requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2319935 | OPPO | Proposal 1: For the TX requirement listed in table 1 as “No discussion yet”, Reuse the legacy requirement in TS 38.101-5.   |  |  | | --- | --- | | (sub) Section in TS 38.101-5 | Discussed or not for L+S NTN band | | 6.2.1 Maximum output power | Agreed | | 6.2.2 MPR | Agreed | | 6.2.3 A-MPR | No | | 6.2.4 Configured transmitted power | No discussion yet | | 6.3.1 Minimum output power | No discussion yet | | 6.3.2 Transmit OFF power | No discussion yet | | 6.3.3 Transmit ON/OFF time mask | No discussion yet | | 6.3.4 Power control | No discussion yet | | 6.4.1 Frequency error | No discussion yet | | 6.4.2 Transmit modulation quality | No discussion yet | | 6.5.1 Occupied bandwidth | No discussion yet | | 6.5.2 Out of band emission | No discussion yet | | 6.5.3 Spurious emission | Agree on co-existence and additional spurious emission | | 6.5.4 Transmit intermodulation | No discussion yet |   Proposal 2: For the RX requirement listed in table 2 as “No discussion yet”, Reuse the legacy requirement in TS 38.101-5.   |  |  | | --- | --- | | (sub) Section in TS 38.101-5 | Discussed or not for L+S NTN band | | 7.3 Reference sensitivity | Agreed | | 7.4 Maximum input level | No discussion yet | | 7.5 Adjacent channel selectivity | No discussion yet | | 7.6 Blocking characteristics | Agreed | | 7.7 Spurious response | No discussion yet | | 7.8 Intermodulation characteristics | No discussion yet | | 7.9 Spurious emissions | No discussion yet | |
| R4-2319936 | OPPO | TP for 38.741 implementing proposals from R4-2319935 |
|  |  |  |
| R4-2318406 | Apple, Globalstar | Proposal 1: Capture additional power back-off simulation results in the NTN L-/S-band TR.  Proposal 2: Capture proposed A-MPR values for NS\_03N, NS\_04N and NS\_05N in TS 38.101-5. |
| R4-2318358 | Skyworks Solutions Inc. | A-MPR does not consider any help from the UL filter allowing co-banding options  A-MPR requirement should at least account for our worst-case values for QPSK but also consider that those did not check the emission requirements exhaustively and higher values may be justified:  For 5MHz: 2dB A-MPR for DFT-s-OFDM and 5.5dB for CP-OFDM  For 10 and 15MHz: 6dB A-MPR for DFT-s-OFDM and [8.5dB] for CP-OFDM  With 8.5dB back-off, emissions should be further verified at low voltage for CP-OFDM. |
| R4-2318407 | Apple, Globalstar | TP for TR 38.741 with additional A-MPR results |
| R4-2320649 | Qualcomm Inc. | TP for TR 38.741 with additional A-MPR results |
| R4-2318408 | Apple, Globalstar | TP for TR 38.741 with summarized A-MPR values |
|  |  |  |
| R4-2321017 | Apple Inc., Globalstar Inc., ZTE Corp., OPPO, Xiaomi, CAICT | CR for TS 38.101-5 |

## Open issues summary

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

### General aspects for Tx and Rx requirements

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-1: General aspects for the Tx and Rx requirements**

* Proposals
  + Proposal 1: For the TX requirement listed in table 1 as “No discussion yet”, Reuse the legacy requirement in TS 38.101-5.
  + Proposal 2: For the RX requirement listed in table 2 as “No discussion yet”, Reuse the legacy requirement in TS 38.101-5.
* Recommended WF
  + Revise and agree TP in R4-2319936.
  + The following “highlighted” Tx requirements can be agreed as re-using legacy requirements from TS 38.101-5.

|  |  |
| --- | --- |
| (sub) Section in TS 38.101-5 | Discussed or not for L+S NTN band |
| 6.2.1 Maximum output power | Agreed |
| 6.2.2 MPR | Agreed |
| 6.2.3 A-MPR | No |
| 6.2.4 Configured transmitted power | No discussion yet |
| 6.3.1 Minimum output power | No discussion yet |
| 6.3.2 Transmit OFF power | No discussion yet |
| 6.3.3 Transmit ON/OFF time mask | No discussion yet |
| 6.3.4 Power control | No discussion yet |
| 6.4.1 Frequency error | No discussion yet |
| 6.4.2 Transmit modulation quality | No discussion yet |
| 6.5.1 Occupied bandwidth | No discussion yet |
| 6.5.2 Out of band emission | No discussion yet |
| 6.5.3 Spurious emission | Agree on co-existence and additional spurious emission |
| 6.5.4 Transmit intermodulation | No discussion yet |

* + The following “highlighted” Rx requirements can be agreed as re-using legacy requirements from TS 38.101-5.

|  |  |
| --- | --- |
| (sub) Section in TS 38.101-5 | Discussed or not for L+S NTN band |
| 7.3 Reference sensitivity | Agreed |
| 7.4 Maximum input level | No discussion yet |
| 7.5 Adjacent channel selectivity | No discussion yet |
| 7.6 Blocking characteristics | Agreed |
| 7.7 Spurious response | No discussion yet |
| 7.8 Intermodulation characteristics | No discussion yet |
| 7.9 Spurious emissions | No discussion yet |

### Tx requirements

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-5: A-MPR values**

* Proposals
  + Proposal 1: Additional A-MPR results from R4-2318358.
  + Proposal 2: Additional A-MPR results from R4-2318407
  + Proposal 3: Additional A-MPR results from R4-2320649
* Recommended WF
  + Agree TPs with additional A-MPR results and add them into TR 38.741.

**Issue 2-6: Harmonized A-MPR values**

* Proposals
  + Proposal 1: Harmonized A-MPR values from R4-2318408.
* Recommended WF
  + Revise R4-2318408 striving for capturing harmonized A-MPR values.
  + The following table captures A-MPR values for the “calibration points” at the *full* channel allocations taken from the existing results captured in the TR and contributions submitted to this meeting.

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|  | 5MHz channel center frequency | | | | | | | | | | | | | | | | | |
| 1612.5MHz | | | 1613.9MHz | | | 1615.5MHz | | | 1620.5MHz | | | 1622.4MHz | | | 1624MHz | | |
| CP  QP | DFT | | CP  QP | DFT | | CP  QP | DFT | | CP  QP | DFT | | CP  QP | DFT | | CP  QP | DFT | |
| QP | PI | QP | PI | QP | PI | QP | PI | QP | PI | QP | PI |
|  | **ETSI regulatory domain** | | | | | | | | | | | | | | | | | |
| A | 6 | 3.5 | 2.5 | 4 | 2.5 | 1 | 3 | 1 | 0.5 | 3 | 1 | 0.5 | 3 | 1 | 1 | 3 | 1.5 | 1.5 |
| Q | 6 | 4 | 3 | - | - | - | 3 | 1.5 | 0.1 | 3 | 0.8 | - | - | - | - | 3 | 1.2 | 0.7 |
| S | 5.5 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **=>** | [6] | [4] | [3] | [4] | [2.5] | [1] |  |  |  |  |  |  | [3] | [1] | [1] | [3] | [1.5] | [1.5] |
|  | **FCC regulatory domain** | | | | | | | | | | | | | | | | | |
| A | 6 | 3.5 | 2.5 | 4 | 2.5 | 1 | 3 | 1 | 0.5 | 3 | 1 | 0.5 |  |  |  | 3 | 1 | 0.5 |
| S | 5.5 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **=>** | [6] | [4] | [3] | [4] | [2.5] | [1] |  |  |  |  |  |  |  |  |  | [3] | [1] | [0.5] |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 10MHz channel center frequency | | | | | | | | |
| 1615MHz | | | 1620MHz | | | 1621.5MHz | | |
| CP-OFDM  QPSK | DFT-s-OFDM | | CP-OFDM  QPSK | DFT-s-OFDM | | CP-OFDM  QPSK | DTT-s-OFDM | |
| QPSK | PI/2 BPSK | QPSK | PI/2 BPSK | QPSK | PI/2 BPSK |
|  | **ETSI regulatory domain** | | | | | | | | |
| A | 12.5 | 7 | 6 | 4 | 3 | 2 | 4 | 2.5 | 2 |
| Q | 7.5 | 5 | 3.5 |  |  |  | 4.5 | 2.5 | 2 |
| S | 7 | 5 |  |  |  |  |  |  |  |
| **=>** | [9] | [6] | [4] | [4.5] | [3] | [2] | [4.5] | [2.5] | [2] |
|  | **FCC regulatory domain** | | | | | | | | |
| A | 12.5 | 7 | 6 | 4 | 2 | 1.5 | 3 | 2 | 1.5 |
| S | 7 | 5 |  |  |  |  |  |  |  |
| **=>** | [9] | [6] | [4] | [4] | [2] | [1.5] | [3] | [2] | [1.5] |

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| --- | --- | --- | --- | --- | --- | --- |
|  | 15MHz channel center frequency | | | | | |
| 1617.5MHz | | | 1619MHz | | |
| CP-OFDM  QPSK | DTF-s-OFDM | | CP-OFDM  QPSK | DTF-s-OFDM | |
| QPSK | PI/2 BPSK | QPSK | PI/2 BPSK |
|  | **ETSI regulatory domain** | | | | | |
| A | 13.5 | 11.5 | 11.5 | 11 | 9.5 | 7.5 |
| Q | 7.5 | 5 | 6.5 | 7 | 4.5 | 3.5 |
| S | 8.5 | 5.5 |  |  |  |  |
| **=>** | [10] | [7] | [6.5] | [9] | [7] | [5.5] |
|  | **FCC regulatory domain** | | | | | |
| A | 13.5 | 9.5 | 9 | 11 | 8.5 | 6 |
| S | 8.5 | 5.5 |  |  |  |  |
| **=>** | [10] | [7] | [6.5] | [9] | [7] | [5.5] |

### Rx requirements

*Sub-topic description*

*Open issues and candidate options before meeting:*

## Running CRs

**Issue 2-10: Running CR for TS 38.101-5**

* Recommended WF
  + By the end of the meeting, revise CRs for TS 38.101-5 (R4-2321017) and agree it based on input from contributions and further agreements made during the meeting.

# Topic #3: RRM requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2321018 | Apple, Globalstar, ZTE Corp | Endorsed CR for TS 38.133 from the previous meeting |
|  |  |  |

## Open issues summary

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

### RRM requirements

*Sub-topic description: RRM requirements for NTN L-/S-band*

*Open issues and candidate options before meeting:*

### Running CRs

*Sub-topic description: Running CR for TS 38.133*

*Open issues and candidate options before meeting:*

**Issue 3-2: Running CR for TS 38.133**

* Recommended WF
  + Agree running CRs for TS 38.133

# Topic #4: SAN RF

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2319557 | ZTE Corporation, Apple Inc., Globalstar Inc | CR for TS 38.108 |
| R4-2318312 | CATT | CR for TS 38.181 |
|  |  |  |

### SAN RF

*Sub-topic description: RRM requirements for NTN L-/S-band*

*Open issues and candidate options before meeting:*

### Running CRs

*Sub-topic description: Running CR for TS 38.133*

*Open issues and candidate options before meeting:*

**Issue 4-2: Running CR for the SAN part**

* Recommended WF
  + Agree CRs for TS 38.108 and TS 38.181

# Recommendations for Tdocs

## 1st round

**New tdocs**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
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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** | **Revised to** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-23xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-23xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-23xxxxx |  | 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