**3GPP TSG-RAN WG4 Meeting # 112 R4-2413413**

**Maastricht, Netherlands, 19th – 23rd August 2024**

**Agenda item:** 8.8.5

**Source:** Moderator (Nokia)

**Title:** Topic summary for Topic summary for [112][313] NR\_IoT\_NTN\_less\_than\_5MHz\_BSRF

**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.*

Summary for contributions submitted under agenda items 8.8.3 for 8.8.3 Less than 5MHz for NTN.

List of candidate target of discussion for 1st round and 2nd round:

* 1st round: Discussion and agreement on open issues listed below.
* 2nd round: Continue discussion and agreement on open issues listed below.

# Topic #1: Core requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2411062 | CATT | Proposal 1: To use the proposals in Table 2.1 for NTN SAN RF requirements for NR NTN support 3 MHz channel bandwidth.Table 2.1: SAN RF requirements impact by 3 MHz

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| --- | --- | --- |
| **NR NTN SAN RF Tx / Rx requirements** | **NR TN BS spec affected by 3 MHz** | **Proposal for NTN 3 MHz** |
| Output power | Channel bandwidth agnostic, but additional requirements (regional) introduced for certain region such as n100  | No specification impactNo additional regional requirement for NTN SAN were identified |
| Total power dynamic range | 3 MHz channel bandwidth and dynamic range minimum requirements introduced  | Reuse the TN BS approach for 3 MHz channel bandwidth |
| Adjacent Channel Leakage Power Ratio | 3 MHz channel bandwidth introducedNo ACLR limit impact | Introduce 3 MHz channel bandwidthNo ACLR limit impact |
| Out of band emissions (OBUE for BS) | 3 MHz channel bandwidth and operating band unwanted emission minimum requirements introduced | No specification impact |
| Reference sensitivity level  | 3 MHz channel bandwidth and REFSENSE minimum requirements introducedFRC for 3 MHz defined | Introduce 3 MHz channel bandwidth for REFSENSE requirement, both GEO and LEO are affectedIntroduce new FRC for 3 MHz REFSENSE |
| Dynamic range | 3 MHz channel bandwidth and dynamic range minimum requirements introducedFRC for 3 MHz defined | Introduce 3 MHz channel bandwidth for dynamic range requirementIntroduce new FRC for 3 MHz dynamic range |
| Adjacent Channel Selectivity (ACS) | 3 MHz channel bandwidth introducedThe wanted signal power, interfere signal offset and type of interfering signal was modified | Reuse the TN BS approach for 3 MHz channel bandwidth |
| In-channel selectivity (ICS) | 3 MHz channel bandwidth and ICS minimum requirements introduced | Introduce 3 MHz channel bandwidth for ICS requirementIntroduce new FRC for 3 MHz ICS |

Observation 1: |
| R4-2411065 | CATT | Proposal 1: DraftCR for TS 38.108, Introduction on system parameters for SAN supporting less than 5 MHz channel bandwidth.Observation 1: |
| R4-2411857 | ZTE Corporation, Sanechips | Proposal 1: To use the proposals in Table 2.1 for SAN RF requirements for 3 MHz channel bandwidth in FR1-NTN bands.**Table 2.1 SAN RF requirements for 3MHz channel bandwidth in FR1-NTN bands**

|  |  |
| --- | --- |
| **NR BS RF Tx/Rx requirement** | **Proposal for 3MHz channel bandwidth in FR1-NTN bands** |
| 6.2 Satellite Access Node output power  | Channel bandwidth agnostic --> No specification impact. |
| 6.3.2 RE power control dynamic range | Channel bandwidth agnostic --> No specification impact. |
| 6.3.3 Total power dynamic range | Specification impact --> Minimum requirement calculated according to transmission bandwidth configuration in Table 6.3.3.2-1. |
| 6.4 Transmit ON/OFF power | Not applicable to SAN --> No specification impact. |
| 6.5 Transmitted signal quality | No specification impact. |
| 6.6.2 Occupied bandwidth | No specification impact. |
| 6.6.3 Adjacent Channel Leakage Power Ratio | Specification impact --> Same requirement limits as other channel bandwidth, but assume different adjacent channel carriers in Table 6.6.3.2-1 and Table 6.6.3.2-2. |
| 6.6.4 Out-of-band emissions | No specification impact. |
| 6.6.5 Transmitter spurious emissions | No specification impact |
| 6.7 Transmitter intermodulation | Not applicable for SAN --> No specification impact. |
| 7.2 Reference sensitivity level  | Specification impact --> Add minimum requirements for 3 MHz in Table 7.2.2-1 and Table 7.2.2-2. Scaling from 5 MHz can be used if the same SU as TN 3 MHz is adopted. |
| 7.3 Dynamic range | Specification impact --> Add minimum requirements for 3 MHz in Table 7.3.2-1. Scaling from 5 MHz can be used if the same SU as TN 3 MHz is adopted. |
| 7.4.1 Adjacent Channel Selectivity (ACS) | Specification impact --> Define ACS requirement similar to TN for 3MHz in Table 7.4.1.2-1, and assume same interferer frequency offset values as TN 3 MHz in Table 7.4.1.2-2. |
| 7.4.2 In-band blocking | Not applicable for SAN --> No specification impact. |
| 7.5 Out-of-band blocking  | No specification impact. |
| 7.6 Receiver spurious emissions | Not applicable for SAN --> No specification impact. |
| 7.7 Receiver intermodulation | Not applicable for SAN --> No specification impact. |
| 7.8 In-channel selectivity | Add minimum requirements for 3 MHz in Table 7.8.2-1, Table 7.8.2-2 and Table 7.8.2-3. Requirement limits depend on ICS FRC to be defined for 3MHz. |
| A.1 Fixed Reference Channels for RF Rx requirements (QPSK, R=1/3) | Specification impact --> FRC for 3MHz needs to be added in Table A.1-1. |
| A.2 Fixed Reference Channels for dynamic range (16QAM, R=2/3) | Specification impact --> FRC for 3MHz needs to be added in Table A.2-1. |

Observation 1: |
| R4-2412528 | Samsung | Proposal 1: For 6.3.3 total power dynamic range: 3MHz CHBW need to be added as 11.7 dB by assuming 15RB for 3MHz/15kHz.Proposal 2: 3MHz CHBW need to added into section 6.6.3 ACLR without change on the requirements.Proposal 3: For 7.2 Reference sensitivity level, new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-7”:Proposal 4: For 7.3 Dynamic range, new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-15”:Proposal 5: For 7.4 ACS, new requirements need to be specified for 3MHz Proposal 6: For 7.8 ICS, new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-20”:Proposal 7: For 10.3 OTA Reference sensitivity level (SAN 1-O), new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-7”:Proposal 8: For 10.4 OTA Dynamic range (SAN 1-O), new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-15”:Proposal 9: For 10.5 ACS (SAN 1-O), new requirements need to be specified for 3MHz Proposal 10: For 10.9 ICS (SAN 1-O), new requirements need to be specified for 3MHz by reusing TN FRC “G-FR1-A1-20”:Observation 1: |
| R4-2413363 | Ericsson India Private Limited | Proposal 1: As the starting point, consider reusing the Tx and Rx RF requirements specified for 3 MHz channel bandwidth for TN BS wherever possible, as presented in Table 1 and Table 2 of this contribution.Table 1: SAN RF Tx requirements overview - 3 MHz channel BW

|  |  |
| --- | --- |
| **Requirements** | **Impact** |
| SAN output power  | No impact expected. |
| Output power dynamics |
| RE power control dynamic range | No impact expected. |
| Total power dynamic range | Requirement for 3 MHz channel BW shall be added, consider 11.7dB as for TN BS. |
| Transmit ON/OFF power | No impact expected. |
| Transmitted signal quality |
| Frequency error | No impact expected. |
| Modulation quality | No impact expected. |
| Time alignment error | No impact expected. |
| Unwanted emissions |
| Occupied bandwidth | No impact expected. |
| Adjacent Channel Leakage Power Ratio | Requirement for 3 MHz channel BW shall be added for both GEO and LEO class. |
| Out-of-band emissions | Study whether a new OBUE mask shall be specified for 3MHz (for OOBE basic limits). |
| Transmitter spurious emissions | No impact expected. |
| Transmitter intermodulation | No impact expected. |

Rx requirementsTable 2: SAN RF Rx requirements overview - 3 MHz channel BW

|  |  |
| --- | --- |
| **Requirements** | **Impact** |
| Reference sensitivity level | Requirement for 3 MHz channel BW shall be added in Table 7.2.2-1 and Table 7.2.2-2. Consider scaling from 5 MHz. Study whether the existing FRC G-FR1-A1-7 can be reused for 3 MHz CBW Refsens (same as for TN BS). |
| Dynamic range  | Requirement for 3 MHz channel BW shall be added.Add minimum requirements for 3 MHz in Table 7.3.2-1. Consider scaling from 5 MHz. Study whether to introduce FRC G-FR1-A2-15 for 3 MHz (same as for TN BS). |
| ACS | Requirement for 3 MHz channel BW shall be added.Study whether PREFSENS+8dB wanted signal mean power should be specified in Table 7.4.1.2-1. In Table 7.4.1.2-2, study whether the same type of interfering signal and the interfering signal center frequency offset could be reused from 3 MHz BS CBW for TN. |
| In-band blocking | No impact expected. |
| Out of band blocking | No impact expected. |
| Receiver spurious emission | No impact expected. |
| Receiver intermodulation | No impact expected. |
| In-channel selectivity | Requirement for 3 MHz channel BW (interferer) shall be added in Table 7.8.2-1 and Table 7.8.2-2. Study whether to introduce ICS FRC G-FR1-A1-20 for 3 MHz (same as for TN BS). |

Observation 1: |

## Open issues summary

*Before 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 meeting:*

**Issue 1-1: Out-of-band emissions**

* Proposals
	+ Option 1: No specification impact. (CATT, ZTE, Samsung)
	+ Option 2: Study whether a new OBUE mask shall be specified for 3MHz (for OOBE basic limits). (Ercisson)
* Recommended WF
	+ TBD

### Sub-topic 1-2

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-2: FRC for Refsens**

* Proposals
	+ Option 1: Reuse TN FRC G-FR1-A1-7. (Samsung, Ericsson)
	+ Option 2: Define new FRC.
* Recommended WF
	+ TBD

### Sub-topic 1-3

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-3: FRC for Dynamic Range**

* Proposals
	+ Option 1: Reuse TN FRC G-FR1-A1-15. (Samsung)
	+ Option 2: Define new FRC. (Ericsson)
* Recommended WF
	+ TBD

# Recommendations for Tdocs

|  |  |  |
| --- | --- | --- |
| **Tdoc number** | **Recommendation**  | **Comments** |
| R4-2411062 | Noted |  |
| R4-2411065 | Noted |  |
| R4-2411857 | Noted |  |
| R4-2412528 | Noted |  |
| R4-2413363 | Noted |  |

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