**3GPP TSG-RAN WG4 Meeting # xxx R4-2419588
Orlando, US, 18th – 22nd November, 2024**

**Agenda item:** 4.1

**Source:** Moderator (Ericsson)

**Title:** Topic summary for [113][301] BSRF\_Maintenance

**Document for:** Information

# Introduction

The scope of this topic summary is BS RF maintenance agenda items. Topics are divided according to the agenda:

**Up to Rel-17 maintenance for LTE and NR and TEI:**

1. BS RF requirements and BS conformance testing (4.3)

UE/BS EMC requirements (4.4) ***(No Tdocs)***

Rel-15/16/17 TEI (BS RF related) (4.8) ***(No Tdocs)***

**Rel-18 maintenance for LTE and NR closed work items:**

Air-to-ground network for NR:
BS RF requirements and conformance testing (5.6.2) ***(No Tdocs)***

NR support for dedicated spectrum less than 5MHz for FR1:
BS RF requirements and conformance testing (5.8.2) ***(No Tdocs)***

NB-IoT/eMTC core & perf. requirements for NTN:
SAN RF requirement and conformance testing (5.9.2) ***(No Tdocs)***

1. NR NTN enhancements:
System parameters and UE RF requirements (5.21.1)
2. SAN RF requirements and conformance testing requirements (5.21.2)

IoT (Internet of Things) NTN (non-terrestrial network) enhancements:
SAN RF requirements (5.28.1) ***(No Tdocs)***

1. NR Network-controlled Repeaters:
RF core and RF conformance testing requirements (5.29.1)
2. EMC core and EMC conformance testing requirements (5.29.2)

Mobile IAB (Integrated Access and Backhaul) for NR:
RF core and RF conformance testing requirements (5.30.1) ***(No Tdocs)***
RRM core and performance requirements (5.30.2) ***(No Tdocs)***

1. Other Rel-18 non-spectrum related WIs:
BS/SAN/non-UE RF requirements (5.32.2)

Rel-18 TEI:
BS RF, demodulation performance and other topics (BS RF related) (5.33.3) ***(No Tdocs)***

# Topic #1: BS RF requirements and BS conformance testing (4.3)

## Companies’ contributions summary

**Discussion papers**

See also subtopic 1-1 on Low bands consideration for AAS BS.

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2418915 | Ericsson | Lower band consideration for AAS BS**Proposal 1:** Consider 600MHz as the AAS low frequency limit (AAS\_low\_limit).**Proposal 2:** Implement the clarification on AAS low frequency limit from Rel-17.**Proposal 3:** Based on the agreement on the AAS lower frequency limit, the following specifications should be checked and possibly updated: TS 38.141-2, TS 37.105, TS 37.145-2 and TS 38.176-2. **Proposal 4:** Add a note in all AAS and NR specifications clarifying that, below the AAS lower frequency limit, BS type 1-H and BS type 1-O are considered as not supported.**Proposal 5:** RAN4 to agree on the upper frequency limit for which a BS could be of type 1-C. The selected value may be derived using the maximum value of all proposals.**Proposal 6:** RAN4 to agree on the upper frequency limit for which a BS could be of type 1-H. The selected value may be derived using the maximum value of all proposals. |
| R4-2419382 | Nokia | On low bands consideration for AAS BS**Proposal**: a. Preferred [AAS\_low\_limit] frequency boundary to apply such clarification note: 1 GHzb. Preferred release for implementation of such clarification note: Rel-13 (37.145-2), Rel-15 (38.141-2), Rel-18 (38.115-2)c. List of expected specifications: 37.145-2, 38.141-2, 38.115-2 |
| R4-2419677 | Huawei, HiSilicon | Discussion on the lower frequency threshold for the AAS BS specifications**Proposal 1:** Do not define explicit limit for the lower frequency boundary in AAS BS specifications. **Proposal 2:** Adopt the following Note in impacted specifications (in Operating bands clause): “NOTE: This specification does not define any practical limit for the lower frequency boundary of the AAS BS, as those aspects are implementation specific.”**Proposal 3:** The following specifications to be updated with the clarification Note on the lower frequency boundary for AAS architecture: TS 37.105 Rel-15 onwards, TS 38.104 Rel-15 onwards, TS 38.106 Rel-17 onwards. |

**Submitted CRs (Cat A CRs not listed)**

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417564 | Nokia | (NR\_newRAT-Perf) CR to TS 38.141-2 on EESS protection(Revised in R4-2419010) |
| R4-2417594 | Nokia | (LTE-RF) CR to TS 36.141 on removal of references to empty Annex E**Summary of change:** Void Annex E and refer to Annex A instead in the test procedures. |
| R4-2417675 | China Unicom | DraftCR on TS38.106 on mmWave EESS protection for NCR for R17(Withdrawn) |
| R4-2417676 | China Unicom | (NR\_repeaters-Core) CR on TS38.106 on mmWave EESS protection for NCR for R17**Summary of change:** Update the applicability notes for EESS protection in the 23.6-24.0 GHz frequency rangeNOTE: Cat A CR is missing. |
| R4-2417817 | CATT | CR for TS 38.108, Correction on NTN SAN requirement reference points**Summary of change:** To modify the connecting line between satellite gateway and satellite payload in NTN SAN requirement reference points. |
| R4-2417818 | CATT | CR for TS 38.181, Correction on NTN SAN requirement reference points**Summary of change:** To modify the connecting line between satellite gateway and satellite payload in the diagram of NTN SAN requirement reference points. |
| R4-2418683 | ZTE Corporation, Sanechips | (NR\_IAB-Core)CR on 38.174 [R17]Align the terminology and update the reference**Summary of change:** Correction of the reference number;Case6 is updated as Case-6 to align with TS 38.213. |
| R4-2418701 | ZTE Corporation, Sanechips | (NR\_IAB-Core) CR on TS38.174\_IAB BS EESS protection**Summary of change:** Update the applicability notes for EESS protection in the 23.6-24.0 GHz frequency range |
| R4-2418831 | ZTE Corporation, Sanechips | (LTE410\_Europe\_PPDR-Core) CR to Rel-17 38.106: Add missing LTE band 87 and band 88**Summary of change:** Add LTE band 87 and band 88 to additional spurious emissions basic limits section and co-located section. |
| R4-2418833 | ZTE Corporation, Sanechips | (LTE410\_Europe\_PPDR-Core) CR to Rel-17 38.115-1: Add missing LTE band 87 and band 88**Summary of change:** Add LTE band 87 and band 88 to additional spurious emissions basic limits section and co-located section. |
| R4-2418922 | Ericsson | (NR\_newRAT-Core) CR to TS 38104 - EESS protection CEPT**Summary of change**: Update the applicability conditions for the more stringent limit to protect EESS |
| R4-2418926 | Ericsson | (LTE410\_Europe\_PPDR-Perf) CR to TS 38.141-1 –bands 87-88 missing**Summary of change:** Add coexistence requirements for bands 87 and 88. |
| R4-2418929 | Ericsson | (LTE410\_Europe\_PPDR-Perf) CR to TS 38.141-2 –bands 87-88 missing**Summary of change:** Add coexistence requirements for bands 87 and 88. |
| R4-2419010 | Nokia | (NR\_newRAT-Perf) CR to TS 38.141-2 on EESS protection**Summary of change:** Update the applicability notes for EESS protection in the 23.6-24.0 GHz frequency range. |
| R4-2419223 | Huawei, HiSilicon | (TEI17) CR to TS 36.104 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in Table 6.6.4.2. |
| R4-2419225 | Huawei, HiSilicon | (TEI17) CR to TS 36.141 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in Table 6.6.4.5.3 |
| R4-2419227 | Huawei, HiSilicon | (TEI17) CR to TS 37.104 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in Table 6.6.1.2 |
| R4-2419229 | Huawei, HiSilicon | (TEI17) CR to TS 37.141 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in Table 6.6.1.5.4 |
| R4-2419231 | Huawei, HiSilicon | (TEI17) CR to TS 37.105 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in clause 9.7.6.2.2 and 9.7.6.4.2 |
| R4-2419233 | Huawei, HiSilicon | (TEI17) CR to TS 37.145-1 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in clause 6.6.6.5.2.4 |
| R4-2419235 | Huawei, HiSilicon | (TEI17) CR to TS 37.145-2 - BS spurious receiver protection note [MSR\_BSRF\_RX]**Summary of change:** A new NOTE is added in clause 6.7.6.3.5 |
| R4-2419383 | Nokia | [LTE410\_Europe\_PPDR-Core] CR to 38.104 on correction of Band 87 and 88 co-existence and co-location requirements (Rel-16)**Summary of change:** Band 87 and 88 are added to co-existence and co-location requirements |
| R4-2419386 | Nokia | [LTE410\_Europe\_PPDR-Core] CR to 38.174 on correction of Band 87 and 88 co-existence and co-location requirements (Rel-16)**Summary of change:** Band 87 and 88 are added to co-existence and co-location requirements |
| R4-2419674 | Huawei, HiSilicon | (NR\_IAB-Perf, NR\_mmWave\_protect-Perf) Implementation of updated EESS protection requirement notes**Summary of change:** 1. New reference addedOBUE and Rx spur requirement tables updated to reflect new regulation. |
| R4-2419679 | Huawei, HiSilicon | Corrections to applicability of TRP measurement methods and chambers**Summary of change:** 1. Clarification of the note on two TRP measurements for ACLR.
2. Removal of redundant information from the pre-scan note.
3. Clarification of the conditions applicable for the Pattern multiplication note.

Other editorial corrections. |
| R4-2419689 | Huawei, HiSilicon | (LTE410\_Europe\_PPDR-Perf) CR to 38.176-1: missing Band 87 and 88 co-existence and co-location requirements, Rel-16**Summary of change:** Adding co-existence and co-location requirements for bands 87 and 88. |
| R4-2419692 | Huawei, HiSilicon | (LTE410\_Europe\_PPDR-Perf) CR to 38.176-2: missing Band 87 and 88 co-existence and co-location requirements, Rel-16**Summary of change:** Adding co-existence and co-location requirements for bands 87 and 88. |

## Open issues summary

### Sub-topic 1-1: Low bands consideration for AAS BS

In last RAN4#112bis meeting, a way forward (R4-2417198) was agreed to clarify from which frequency an AAS BS could be considered. Companies were encouraged to share their preferences for the November 2024 meeting.

Summary of proposals:

|  |  |  |  |
| --- | --- | --- | --- |
| Proponent | [AAS\_low\_limit]  | From release | Specifications impacted |
| Ericsson (R4-2418915) | 600 MHz | Rel-17 | TS 38.141-2TS 37.105TS 37.145-2TS 38.176-2(+ Note in all AAS and NR specifications) |
| Nokia (R4-2419382) | 1 GHz | Rel-13 (37.145-2)Rel-15 (38.141-2)Rel-18 (38.115-2) | TS 37.145-2TS 38.141-2TS 38.115-2 |
| Huawei, HiSilicon (R4-2419677) | No lower limit | Rel-15 | TS 37.105TS 38.104 TS 38.106 (Rel-17) |

The WF states that the [AAS\_low\_limit] may be derived as min(proposal\_1, …, proposal\_n)

**Issue 1-1a: AAS low band limit and implementation**

* Proposed low limit
	+ Option 1: 600 MHz (lowest from above)
	+ Option 2: No low limit (clarify that no practical limit is defined)
* Recommended WF
	+ TBA

**Issue 1-1b: AAS low band note**

* Implement note on low band limit in the following specifications (Options can be combined)
	+ Options: Some or all of the specifications listed in the table above.
* Recommended WF
	+ Determine an exact criterion for which specs are relevant and select based on that criterion.

**Issue 1-1c: AAS low band note release implementation**

* Implement note(s) on low band limit as follows:
	+ Option 1: Rel-13
	+ Option 2: Rel-15
	+ Option 3: Rel-17
* Recommended WF
	+ Option 3: Rel-17 (The note does not correct any technical error with high impact and is thus not essential for earlier releases.)

**Issue 1-1d: AAS high band for BS type 1\_H and 1-C**

* Proposals for upper frequency limit for AAS BS specifications:
	+ Option 1: Agree on the upper frequency limit for which a BS could be of type 1-C
	+ Option 2: Agree on the upper frequency limit for which a BS could be of type 1-H
* Recommended WF
	+ TBA

# Topic #2: NR NTN enhancements: System parameters and UE RF requirement (5.21.1)

## Companies’ contributions summary

**Discussion papers**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2417840 | CATT | Discussion on NTN system parameters for co-existence**Proposal 1:** Add equivalent satellite antenna aperture values for Ka-band NTN co-existence study to TR 38.863.**Proposal 2:** Update the G/T (dB K-1) for Ka-band NTN co-existence study in Table 6a.2.2.1-4 of TR 38.863. |
| R4-2419057 | Huawei, HiSilicon | (NR\_NTN\_enh-Core) Discussion on potential solution on Doppler shift issues for guard band and transmission bandwidth configuration**Proposal 1:** Solution 2 is selected to address this issue. It’s allowed for some UEs to report one capability whether UE is capable of supporting the deployment in NGSO scenario when the edge RB fall into the guard band.**Proposal 2**: Send LS to RAN2 and request RAN2 to design the corresponding UE capability. |

**Draft LS out**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2419058 | Huawei, HiSilicon | (NR\_NTN\_enh-Core) Draft LS on solutions to address doppler shift issue that RB falls into guard band**To:** RAN2**ACTION:** RAN4 would like respectfully request RAN2 to design this UE capability and take the information above into account in future meetings.(for background, see R4-2419057) |

**Submitted CRs (Cat A CRs not listed)**

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417841 | CATT | CR for TR 38.863, On NTN system parameters for Ka-band co-existence**Summary of change:**1. Add equivalent satellite antenna aperture according to WF R4-2316906 in RAN4#108bis.
2. Update G/T (dB K-1) for GEO, LEO-1200, and LEO-600.
 |
| R4-2418839 | CHTTL, SGS Wireless | (NR\_NTN\_enh-Core) Correction on Off-axis EIRP density and off-axis cross-polarization of NTN Ka band n510, n511**Summary of change:** Fix the table 9.2.2.2-2 to align with the regulation.Correct one typo in Table 9.6.2-3 Cross-polarization gain limit. |
| R4-2418853 | Qualcomm Incorporated, THALES, Ericsson | (NR\_NTN\_enh-Core) CR for TS 38.101-5 to clarify Doppler shift issues**Summary of change:** To clarify Doppler shif issues in the sections of specturm emission mask |
| R4-2419059 | Huawei, HiSilicon | (NR\_NTN\_enh-Core) CR for TS 38.101-5 to clarify Doppler shift issues for guard band and transmission bandwidth configuration**Summary of change:** To clarify Doppler shif issues in the sections of specturm emission mask |
| R4-2419713 | THALES | Corrections to VSAT UE Mandatory instead of Additional Requirements**Summary of change:** Remove “additional” term. It is not clear what is the intention here. |

# Topic #3: NR NTN enhancements: SAN RF requirements and conformance testing requirements (5.21.2)

## Companies’ contributions summary

**Submitted CRs (Cat A CRs not listed)**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417838 | CATT | (NR\_NTN\_enh-Core) CR for TS 38.108, Correction on OTA out-of-band blocking requirement for SAN type 2-O**Summary of change:**1. Add ΔfOOB for FUL,high – FUL,low < 4000 MHz for SAN type 2-O in Table 10.6.3.1-2.
2. Remove [] for 1500MHz ΔfOOB.
 |
| R4-2417839 | CATT | CR for TS 38.181, Correction on OTA out-of-blocking requirement for SAN type 2-O**Summary of change:**1. Add ΔfOOB for FUL,high – FUL,low < 4000 MHz for SAN type 2-O in Table 10.6.3.1-2.
2. Remove [] for 1500MHz ΔfOOB.
3. Simplification of the out-of-band blocking requirement.
 |

# Topic #4: NR Network-controlled Repeaters: RF core and RF conformance testing requirements (5.29.1)

## Companies’ contributions summary

**Submitted CRs (Cat A CRs not listed)**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417819 | CATT | CR for TS 38.114, Correction on terminology of RF repeater**Summary of change:** Alignment of terminology for Rel-17 repeaterNOTE: This should be under agenda item 5.29.2 |
| R4-2417823 | CATT | Maintenance CR to TS 38.115-2: NCR conformance part**Summary of change:** To modify the typo and missing requirement defined for NCRTo remove the redundant line breaks for specification |
| R4-2419420 | NEC | CR to 38.115-1: Repeater terminologies (rel-17)**Summary of change:** Replace “NR repeater” or “repeater” by “RF repeater” or “repeater”. If the terminology covers only rel-17 repeater in rel-18 specification, it is replaced by “RF repeater”. If the terminology covers both rel-17 repeater and NCR in rel 18 specifications, it is replace by “repeater”. |
| R4-2419421 | NEC | CR to 38.115-1: Operating band unwanted emissions (rel-17)**Summary of change:** “Minimum requirements” under test requirement clauses are replaced by “limits”. |
| R4-2419422 | NEC | CR to 38.115-1: Operating band unwanted emissions (rel-18)**Summary of change:** “Minimum requirements” under test requirement clauses are replaced by “limits”. |
| R4-2419423 | NEC | CR to 38.115-2: Rated TRP output power limit**Summary of change:** Correct the table title for table 6.2.2.1-1.Remove the TRP limit from table 6.2.2.1-2 and correct the corresponding text. |
| R4-2419424 | NEC | CR to 38.106: ACLR requirements for NCR**Summary of change:** Modify the notes in the ACLR limit tables to make the nominal channel bandwidth to be the possible widest channel bandwidth of the NCR-Fwd carrier. |
| R4-2419425 | NEC | CR to 38.115-1: ACLR requirements for NCR**Summary of change:** Add text to make the nominal channel bandwidth to be the possible widest channel bandwidth of the NCR-Fwd carrier. |
| R4-2419426 | NEC | CR to 38.115-2: ACLR requirements for NCR**Summary of change:** Add NOTEs in the ACLR limit tables to make the nominal channel bandwidth to be the possible widest channel bandwidth of the NCR-Fwd carrier for the simultaneous NCR-Fwd and NCR-MT transmission case. |
| R4-2419465 | Nokia | CR to TS 38.106 with terminology alignment for Rel-17**Summary of change:** Add NOTEs in the ACLR limit tables to make the nominal channel bandwidth to be the possible widest channel bandwidth of the NCR-Fwd carrier for the simultaneous NCR-Fwd and NCR-MT transmission case. |
| R4-2419466 | Nokia | CR to TS 38.106 with terminology alignment for Rel-18**Summary of change:** Updates of terminology in affect clauses listed below. |
| R4-2419467 | Nokia | CR to TS 38.115-1 with co-location requirements for repeaters**Summary of change:** Correction to clause 6.5.4.5.3 and removal “type 1-C”. |
| R4-2419468 | Nokia | CR to TS 38.115-2 with NCR type 1-H missing in some requirements**Summary of change:**1. Clause 3.1: NCR type 1-H added
2. Clause 4.2: NCR type 1-H refrence point added
3. Clause 4.6: NCR type 1-H deflacarions added
4. Clause 6: NCR type 1-H added
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# Topic #5: NR Network-controlled Repeaters: 5. EMC core and EMC conformance testing requirements (5.29.2)

## Companies’ contributions summary

**Submitted CRs (Cat A CRs not listed)**

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417820 | CATT | CR for TS 38.114, Correction on terminology of NCR and RF repeater**Summary of change:**  Alignment of terminology for Rel-18 repeater |

# Topic #6: Other Rel-18 non-spectrum related WIs: BS/SAN/non-UE RF requirements (5.32.2)

## Companies’ contributions summary

**Submitted CRs (Cat A CRs not listed)**

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2417532 | Nokia | (FS\_NR\_BS\_RF\_evo) CR to TR 38.877 on correction on feasibility of frequency-independent phase shifters for MB BS**Summary of change:** Modify texts in TR to clarify wide-band frequency-flat phase response phase shifters can still be a useful implementation under certain conditions. |