**3GPP TSG-RAN WG4 Meeting # 114 R4-2500562
Athens, EU, 17th – 21st February, 2025**

**Agenda item:** 4.1.3

**Source:** Moderator (Ericsson)

**Title:** Topic summary for [114][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)***

1. Rel-15/16/17 TEI (BS RF related) (4.8)

**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)***

1. NR support for dedicated spectrum less than 5MHz for FR1:
BS RF requirements and conformance testing (5.8.2)
2. NB-IoT/eMTC core & perf. requirements for NTN:
SAN RF requirement and conformance testing (5.9.2)
3. NR NTN enhancements:
System parameters and UE RF requirements (5.21.1)
4. 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)

EMC core and EMC conformance testing requirements (5.29.2) ***(No Tdocs)***

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

1. Other Rel-18 non-spectrum related WIs:
BS/SAN/non-UE RF requirements (5.32.2)
2. Rel-18 TEI:
BS RF, demodulation performance and other topics (BS RF related) (5.33.3)

# Topic #1: BS RF requirements and BS conformance testing (4.3, 4.8, 5.8.2)

## Companies’ contributions summary

**Discussion papers**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2500972 | CATT | Discussion on channel raster for band n102**Proposal 1: Change the channel raster for band n102 in Table 5.4.2.3-1 of TS 38.104 from 796334 – <1> – 828333 to 795000 – <1> – 828333.** |
| R4-2500975 | CATT | Discussion on adding HAPS abbreviation and definition of HAPS BS classes to TS38.141-1/2**Proposal 1: Add HAPS abbreviation and definition of HAPS BS class to TS 38.141-1/2 from Rel-17 NR\_NTN\_solutions to correct the issue of HAPS BS class definition missing in TS 38.141-1/2.** |

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

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2500058 | Ericsson | CR to TS 38.141-1: Addition of test tolerance for BS total power dynamic range (CBWs 35 MHz and 45 MHz)**Summary of change:** The test requirements for 35 MHz and 45 MHz CBWs are adjusted to consider Test Tolerance by subtracting 0.4 dB. |
| R4-2500062 | Nokia | (LTE-RF) CR to TS 36.141 on removal of references to empty Annex E**Summary of change:** Redo the changes in the mirror CRs: Void Annex E and refer to Annex A instead in the test procedures. |
| R4-2500598 | ZTE Corporation, Sanechips | (NR\_NTN\_solutions-Core) CR to 38.181 Correct FRC naming for ICS requirement**Summary of change:** Correct FRC naming from “FR1” to “FR1-NTN” in section 7.8 and 10.9. |
| R4-2500973 | CATT | (NR\_6GHz\_unlic\_EU-Core)CR for TS38.104: Correction on channel raster for band n102**Summary of change:** Change the 796334 – <1> – 828333 to 795000 – <1> – 828333 for band n102 in Table 5.4.2.3-1 of TS 38.104. |
| R4-2500976 | CATT | (NR\_NTN\_solutions)CR for TS38.141-1: Adding HAPS abbreviation and definition of HAPS BS class for conformance requirements**Summary of change:** 1) Add HAPS abbreviation.2) Add definition of HAPS BS class |
| R4-2500978 | CATT | (NR\_NTN\_solutions)CR for TS38.141-2: Adding HAPS abbreviation and definition of HAPS BS class for conformance requirements**Summary of change:** 1) Add HAPS abbreviation.2) Add definition of HAPS BS class |
| R4-2500980 | CATT | (NR\_repeaters-Perf, NR\_mmWave\_protect-Perf)CR for TS38.115-2: On mmWave EESS protection**Summary of change:** Update the applicability notes for EESS protection in the 23.6-24.0 GHz frequency range. |
| R4-2501000 | CATT | Maintenance CR to TS 38.115-2: NCR conformance part**Summary of change:** To modify the editorial errors in clause 3.1, 3.2, 4.7, 4.8, 4.9, 6.2.2, 6.2.3, 6.5.2, 6.5.3, 6.5.4, 6.6.1, 6.6.2, 6.8.2, 6.9.2, 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, Annex.To add the missing abbreviations in clause 3.3To align the titles in table 4.1.2 with the actual titlesTo remove CA related descriptions (not supported by NCR) in clause 6.2.2, 6.2.3, 6.5.3.To correct the testing models in clause 6.5.2, 6.5.3, 6.5.4, 6.6.2, 6.8.2.To remove the redundant line breaks for specification |
| R4-2501857 | Huawei, HiSilicon | (NR\_newRAT-Perf) Correction to theta angle definition**Summary of change:** The definition is corrected to match that in 37.145-2, stating that zero deg is perpendicualr to the y/z plane. |
| R4-2502108 | Huawei, HiSilicon | (LTE410\_Europe\_PPDR-Perf) Introduction of missing blocking requirements for bands 87, 88**Summary of change:** Adding missing out-of-band blocking requirements for bands 87 and 88 |
| R4-2502129 | Huawei, HiSilicon | (NR\_RAIL\_EU\_900MHz-Core, NR\_RAIL\_EU\_1900MHz\_TDD-Core) NB-IoT operation modes clarification for FRMCS BS in multi-carrier operation**Summary of change:** Introduction of a clarification note for FRMCS multi-carrier operation, to avoid ambiguity on the supported NB-IoT operation modes for FRMCS BS operating in bands n100/n101. |
| R4-2502130 | Huawei, HiSilicon | (NR\_RAIL\_EU\_900MHz-Core, NR\_RAIL\_EU\_1900MHz\_TDD-Core) NB-IoT operation modes clarification for FRMCS BS in multi-carrier operation**Summary of change:** Introduction of a clarification note for FRMCS multi-carrier operation, to avoid ambiguity on the supported NB-IoT operation modes for FRMCS BS operating in bands n100/n101. |
| R4-2502131 | Huawei, HiSilicon | (NR\_RAIL\_EU\_900MHz-Perf, NR\_RAIL\_EU\_1900MHz\_TDD-Perf) NB-IoT operation modes clarification for FRMCS BS in multi-carrier operation**Summary of change:** Introduction of a clarification note for FRMCS multi-carrier operation, to avoid ambiguity on the supported NB-IoT operation modes for FRMCS BS operating in bands n100/n101. |
| R4-2502132 | Huawei, HiSilicon | (NR\_RAIL\_EU\_900MHz-Perf, NR\_RAIL\_EU\_1900MHz\_TDD-Perf) NB-IoT operation modes clarification for FRMCS BS in multi-carrier operation**Summary of change:** Introduction of a clarification note for FRMCS multi-carrier operation, to avoid ambiguity on the supported NB-IoT operation modes for FRMCS BS operating in bands n100/n101. |
| R4-2500462 | Huawei, HiSilicon | (TEI16) CR on 38.101-1 clarification of maximum transmission bandwidth configuration [Max\_Tx\_BW\_config]**Summary of change:** clarify that IE carrierBandwidth corresponds to the maximum transmission bandwidth configuration |
| R4-2500596 | ZTE Corporation, Sanechips | (NR\_FR1\_lessthan\_5MHz\_BW-Core) CR to TS38.104 Add NB-IoT RB power dynamic range for 3MHz**Summary of change:** Add NB-IoT RB power dynamic range requirement for 3MHz. |
| R4-2500597 | ZTE Corporation, Sanechips | (NR\_FR1\_lessthan\_5MHz\_BW-Perf) CR to TS38.141-1 Add NB-IoT RB power dynamic range and occupied bandwidth requirement for 3MHz**Summary of change:** Add NB-IoT RB power dynamic range requirement and occupied bandwidth requirement for 3MHz. |
| R4-2501364 | Ericsson | (NR\_FR1\_lessthan\_5MHz\_BW-Core) CR to TS 37104 - FoffsetRAT for NR 3MHz channel BW**Summary of change:** Update Foffset,RAT parameter for BC1 considering NR 3 MHz channel bandwidth |
| R4-2501365 | Ericsson | (NR\_FR1\_lessthan\_5MHz\_BW-Perf) CR to TS 37141 - FoffsetRAT for NR 3MHz channel BW**Summary of change:** Update Foffset,RAT parameter for BC1 considering NR 3 MHz channel bandwidth |
| R4-2500212 | Nokia | CR to TS 38.141-1 to add 3MHz for occupied bandwidth test**Summary of change:** Add span and number of measurement points for occupied bandwidth measurements for 3MHz.NOTE: Moved from AI 5.32.2 to 5.8.2. |

# 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** |
| ~~R4-2500486~~ | ~~Qualcomm Incorporated~~ | ~~On 200 MHz BW and 2 layer MIMO capabilities~~**~~Proposal 1: For FR2-NTN, define only 100 MHz as mandatory channel BW.~~** **~~Proposal 2: Make UL MIMO support optional for FR2-NTN.~~****~~Proposal 3: Agree text for the LS in Appendix.~~** NOTE: Moved to thread [137]. |
| R4-2501370 | Ericsson | (NR\_NTN\_enh-Core) Doppler shift issues for guard band and transmission bandwidth configuration**Proposal: There is no issue with any RB shifting in the guard band of a NR channel bandwidth signal due to Doppler shift. This Doppler shift is already handled in the assigned frequency band.** |
| R4-2501446 | Huawei, HiSilicon | (NR\_NTN\_enh-Core) Discussion on potential solution on Doppler shift issues for guard band and transmission bandwidth configuration**Proposal 1: RAN4 can consider solution 4, but clarifying the RF requirements applicability when edge RB falling into the guard band from UE perspective.** |
| ~~R4-2501448~~ | ~~Huawei, HiSilicon~~ | ~~(NR\_NTN\_enh-Core) Discussion and draft replied LS on the FR2-NTN UE capabilities for 200Mhz channel bandwidth and 2 MIMO layers~~**~~Proposal 1: UE capabilities for 200Mhz channel bandwidth are mandatory for FR2-NTN bands.~~****~~Proposal 2: UE capabilities for 2 MIMO layers are not mandatory for FR2-NTN bands.~~**NOTE: Moved to thread [137]. |
| R4-2501826 | Nokia | draft LS reply on UE Capabilities for FR2-NTN NOTE: No proposals. Draft LS out. |

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

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| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2501053 | CATT | (NR\_NTN\_enh-Core) CR for TS 38.101-5 Correction on FR2-NTN frequency range**Summary of change:** 1) Change “FR2 band” to “FR2-1 band” |
| R4-2501054 | CATT | (NR\_NTN\_enh-Core) CR for TS 38.108 Correction on FR2-NTN frequency range**Summary of change:** 1) Change “FR2 band” to “FR2-1 band” |
| R4-2501447 | 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 the RF requirements applicability when edge RB falling into the guard band from UE perspective. |
| R4-2501952 | 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 with the same wording used in in section 6.5B.3.2 of TS 36.102. |
| R4-2502249 | THALES | (NR\_NTN\_enh-Core) Maintenance CR on 38.101-5 - Removing NTN 256QAM from Rel-18 FR1-NTN**Summary of change:** Cleaning up the specification by removing 256QAM, from the Annexes A.2.2.5 and A.2.2.9, but also from 6.2.3.2, 6.2.3.3, 6.2.3.4. |

## Open issues summary

### Sub-topic 2-1: Doppler shift issues for guard band and transmission bandwidth configuration

**Issue 2-1: Potential solution for doppler shift issues**

* Proposals
	+ Proposal 1: RAN4 can consider solution 4, but clarifying the RF requirements applicability when edge RB falling into the guard band from UE perspective. (Qualcomm, Thales, Ericsson).
	+ Proposal 2: Based on solution 1 when the absolute doppler frequency shift value is larger than one SCS (Huawei).
* Recommended WF
	+ Continue discussion.

*Background:*

*Solution 1: the first RB and the last RB in the Maximum transmission bandwidth configuration can’t be deployed by NGSO SAN when the edge RB fall into the guard band due to the doppler shift pre-compensation.*

*Solution 2: UE can report a static capability whether UE is capable of supporting the deployment in NGSO scenario that the edge RB fall into the guard band.*

*Solution 3: UE can indicate a dynamic information to network whether the edge RB can be deployed or not based on whether the doppler shift is negligible or not.*

*Solution 4: A guard band at least equivalent to maximum doppler shift expected the NGSO constellation between the channel edge of UE channel bandwidth and spectrum block edge is accounted for as a part of system deployment configuration by the operator.*

*NOTE 1: other solutions are not precluded.*

# Topic #3: NR NTN enhancements: SAN RF requirements and conformance testing requirements (5.9.2, 5.21.2)

## Companies’ contributions summary

**Discussion papers**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2500985 | CATT | Discussion on figures and definitions related to non-regenerative payload and gateway for IoT NTN**Proposal 1: Add the same corrections for NR NTN in agreed CRs [1,2,3,4] to TS 36.108 and 36.181 for IoT NTN.** |

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

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
| R4-2500986 | CATT | (LTE\_NBIOT\_eMTC\_NTN\_req-Core) CR for TS36.108, Correction on non-regenerative payload and gateway for IoT NTN**Summary of change:** 1) Change “satellite-Gateway” to “satellite-gateway” for definition of feeder link.2) Change “bent pipe payload” to “transparent payload” for definition of satellite.3) Change “transparent NTN payload” to “transparent payload” and change “a gateway” to “with satellite-gateway” for definition of Satellite Access Node.4) Upate the figures for requirement reference points for SAN type 1-H and SAN type 1-O to align usage of “satellite payload”. |
| R4-2500987 | CATT | (LTE\_NBIOT\_eMTC\_NTN\_req-Perf) CR for TS36.181, Correction on non-regenerative payload and gateway for IoT NTN**Summary of change:** 1) Change “satellite-Gateway” to “satellite-gateway” for definition of feeder link.2) Change “bent pipe payload” to “transparent payload” for definition of satellite.3) Add definition of Satellite Access Node for usage of figures for requirement reference points.4) Add definition of satellite-gateway for usage of figures for requirement reference points.5) Upate the figures for requirement reference points for SAN type 1-H and SAN type 1-O to align usage of “satellite payload”. |
| R4-2501368 | Ericsson | (NR\_NTN\_enh-Core) CR to TS 38108 - Missing SAN classes for type 2-O**Summary of change:** Add that classes LEO and GEO are also applicable to SAN type 2-O. |

# 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** |
| R4-2500192 | Nokia | CR to TS 38.115-1 with clauses corrections**Summary of change:** Correction of clause 6.5.3.4 numeration. |
| R4-2500193 | Nokia | CR to TS 38.115-1 with clauses corrections**Summary of change:** Correction of clause 6.5.3.4 numeration. |

# Topic #5: Other Rel-18 non-spectrum related WIs: BS/SAN/non-UE RF requirements (5.32.2, 5.33.3)

## Companies’ contributions summary

**Discussion papers**

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title/Proposals** |
| R4-2502119 | Huawei, HiSilicon | Discussion on the updated ITU-R SM.329 recommendation (v13; 09/2024) for BS RF specifications NOTE: No proposals, discussion related to set of CRs: R4-2502120, R4-2502121, R4-2502122, R4-2502123, R4-2502124, R4-2502125, R4-2502126, R4-2502127 |
| R4-2501897 | NTT DOCOMO, INC. | (TEI18) Discussion on adding LTE band34 for HAPS**Proposal 1: Introducing Band 34 for HAPS BS and the class refers to Wide Area BS class.** |

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

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Title / Summary of change** |
|  |  |  |
| R4-2502120 | Huawei, HiSilicon | (LTE\_Relay-Core) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2502121 | Huawei, HiSilicon | (RInImp9-Rfmulti) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed.Other reference corrections. |
| R4-2502122 | Huawei, HiSilicon | (AAS\_BS\_LTE\_UTRA-Core) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2502123 | Huawei, HiSilicon | (AAS\_BS\_LTE\_UTRA-Core) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2502124 | Huawei, HiSilicon | (RInImp9-Rfmulti) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2502125 | Huawei, HiSilicon | (AAS\_BS\_LTE\_UTRA-Perf) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2502126 | Huawei, HiSilicon | (NR\_newRAT-Core) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. Similar correction is also introduced to other referneces. |
| R4-2502127 | Huawei, HiSilicon | (NR\_NTN\_solutions) Correction of reference to Suspended version of ITU-R SM.329 Recommendation**Summary of change:** Outdated reference to a Suspended version of the ITU recommendation is corrected. To avoid future need for similar corrections, a non-specific reference is used, i.e. SM.329 version number is removed. |
| R4-2500104 | Nokia | (TEI18) CR to 38.104 on corrections to co-existence table [bands\_coex\_req]**Summary of change:** Requirements in co-existence table are corrected. |
| R4-2500105 | Nokia | (TEI18) CR to 38.141-1 on corrections to co-existence table [bands\_coex\_req]**Summary of change:** Requirements in co-existence table are corrected. |
| R4-2500106 | Nokia | (TEI18) CR to 38.141-2 on corrections to co-existence table [bands\_coex\_req]**Summary of change:** Requirements in co-existence table are corrected. |
| R4-2501737 | Inmarsat, Viasat, EchoStar, Thales | (TEI18) CR to 38.108 NB-IoT NTN inband operation with NR NTN [NTNNBIoT\_inbandNTNNR]**Summary of change:** Addition of NR NTN SAN support for in-band operation, including additional performance metrics required to be followed for NB-IoT support. |
| R4-2501764 | EchoStar, Thales, Inmarsat, Viasat | (TEI18) CR to 38.181 NB-IoT inband operation with NR NTN [NTNNBIoT\_inbandNTNNR]**Summary of change:** Updates RF test methods and conformance requirements for NB-IoT operation in NTN NR in-band. |
| R4-2501880 | ZTE Corporation | (TEI18) CR to 36.181 NB-IoT In-band operation with NTN NR [LTE\_NBIoT\_eMTC\_NTN\_req-Core]**Summary of change:** Addition of NB-IoT SAN support for in-band operation in NTN NR. |
| R4-2501898 | NTT DOCOMO, INC. | 36.104 CR to introduce LTE band 34 for HAPS BS [LTE\_HAPS\_B34]**Summary of change:** Adding band 34 for HAPS BS. |
| R4-2501899 | NTT DOCOMO, INC. | 36.141 CR to introduce LTE band 34 for HAPS BS [LTE\_HAPS\_B34]**Summary of change:** Adding band 34 for HAPS BS. |
| R4-2502090 | THALES, EchoStar, Inmarsat, Viasat | (TEI18) CR to 36.108 NB-IoT In-band operation with NTN NR [NTNNBIoT\_inbandNTNNR]**Summary of change:** Addition of NB-IoT SAN support for in-band operation in NTN NR. |

## Open issues summary

### Sub-topic 5-1: Reference of RAN4 specifications to ITU-R SM.329 recommendation

**Issue 5-1: Type of reference**

* Potential options
	+ Option 1: Specific reference (i.e. **SM.329-13**)
	+ Option 2: Non‑specific reference (i.e. **SM.329**)
* Recommended WF
	+ Option 2, which would be future proof and is also aligned with TS 36.104 and TS 38.104.