**3GPP TSG-RAN WG4 Meeting # 109 R4-** **2318229**

**Chicago, US, November 13 – 17, 2023**

**Agenda item:** 12.1

**Source:** Moderator (MediaTek inc.)

**Title:** Topic summary for [109][337] RAN\_task\_NTN\_test

**Document for:** Information

# Introduction

This is the Email thread covering the AI 12.1 and the following 2 papers from AI 5.2.4

* R4-2320878, [NR\_NTN\_solutions-Perf] CR to 38.101-5 Clarify test condition for NR NTN, Qualcomm Inc
* R4-2320890, [LTE\_NBIoT\_eMTC\_NTN\_req] CR to 36.102 Clarify test condition for IoT NTN, Qualcomm Inc

For more background, please refer to the following agreed documents

* R5-233672, LS on clarifications for Non-Terrestrial Networks, RAN WG5
* R4-2314001, Reply LS on clarifications for Non-Terrestrial Networks, RAN WG5
* RP-232682, Summary of offline discussions for NTN testing, RAN WG4 Chair, RAN WG5 Chair
* R4-2316967, WF on NTN RAN task, MediaTek inc.
* R4-2317006, Further Reply LS on clarifications for Non-Terrestrial Networks, Keysight

# Topic #1: NTN testing

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

## Companies’ contributions summary

Discussion papers

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2318399 | Samsung | RAN4 specifciation update  Observation 1: RAN4 Rel-17 IoT over NR and NR NTN requirements (RRM, RF and performance) are specified based on the assumption that UE shall be capable of pre-compensation of doppler shift and time delay for Satellite access link; and requirements agonistic to test conditions of doppler and time delay due to Satellite motion.  Observation 2: Constant delay and doppler adopted for Rel-17 UE conformance testing to verify UE precompensation functionality under uplink timing RRM test case(s) and frequency error RF test case(s).  Observation 3: Including test conditon with proposed constant doppler, and time delay range into RAN4 requirements sub-sections may bring confusion that RAN4 requirements only applicable for constant delay and zero/non-zero doppler.  Proposal 1: No changes to Rel-17 NR NTN/IoT NTN core/performance requirements including RF, demodulation and RRM requirements as specified in TS 38.101-5/TS 36.102 and TS 38.133/TS 36.133 for the agreed test condition of Rel-17 conformance testing.  Proposal 2: Include Rel-17 test condition (delay and doppler for satellite motion) clarification for NTN RRM test cases into RRM specification Annex section e.g. section B.5 of TS38.133.  Proposal 3: For Rel-17 RF and demodulation specifciations, two alternatives can be considered   * Alternative 1: Capture into RAN5 conformance test specification based on RAN4 recommendation * Alternative 2: Including test condition clarification into Annex section of RAN4 specification of TS 38.101-5 and 36.102   Test methodology related issue  Proposal 4: No more discussion in RAN4 on Rel-17 NTN conformance testing methodology unless received further request from RAN5.  Proposal 5: Time varied satellite propagator model can be discussed in future release pending further RAN-P guidance. |
| R4-2320549 | Ericsson | Observation 1 There is performance expectation gap between what is tested in frequency error in Rel-18 and what is expected at network side according to what is specified in RAN1 specification.  Proposal-1: Update the frequency error requirement in Rel-19 to include the testing of continuously update frequency pre-compensation. |
| R4-2320975 | THALES | Observation 1: A summary of SIB19/SIB31 values have been provided in this contribution for NTN UE/IoT testing purpose.  Observation 2: A complete set of SIB19/SIB31 values for NTN UE/IoT testing purpose are provided in TS 38.508-1 and TS 36.508 for both NGSO and GSO cases.  Observation 3: Please also refer to R5-237216 and R5-237213 contributions. |

Draft CRs

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| **T-doc number** | **Company** | **Detail** |
| R4-2318072 | MediaTek inc., Samsung, Qualcomm | * Title: CR on clarification on test condition for IoT NTN * Spec: 36.133 * Rel: 18 (F) |
| R4-2318396 | Samsung, MediaTek, Qualcomm | * Title: [NR\_NTN\_solutions-Perf] CR to TS 38.133 Annex for NTN test condition (CAT F, Rel-17) * Spec: 38.133 * Rel: 17 (F) |
| R4-2318397 | Samsung | * Title: [NR\_NTN\_solutions-Perf] CR to TS 38.133 Annex for NTN test condition (CAT A, Rel-18) * Spec: 38.133 * Rel: 18 (A) |
| R4-2318441 | Apple, Ericsson | * Title: CR to 38.101-5 on clarification for non-zero Doppler condition for frequency error * Spec: 38.101-5 * Rel:17 (F) |
| R4-2318442 | Apple, Ericsson | * Title: CR to 38.101-5 on clarification for non-zero Doppler condition for frequency error * Spec: 38.101-5 * Rel: 18 (A) |
| R4-2320878 | Qualcomm Inc | * Title: [NR\_NTN\_solutions-Perf] CR to 38.101-5 Clarify test condition for NR NTN * Spec: 38.101-5 * Rel:17 (F) * Moderator’s note: Cat A CR for Rel-18 is missing. |
| R4-2320890 | Qualcomm Inc | * Title: [LTE\_NBIoT\_eMTC\_NTN\_req] CR to 36.102 Clarify test condition for IoT NTN * Spec: 36.102 * Rel:18 (F) |

## Open issues summary

### Sub-topic 1: RAN4 specification update

#### **Issue 1-1: [RRM] Where to capture the testing condition agreed in WF R4-2316967 and LS R4-2317006**

* Background: RAN4 has agreed test conditions for RF/RRM/Demod for NR/IOT-NTN in WF R4-2316967 and LS R4-2317006. Now the next step is to whether and how to capture these conditions
* Proposals
  + Option 1: Samsung
    - Include Rel-17 test condition (delay and doppler for satellite motion) clarification for NTN RRM test cases into RRM specification Annex section e.g. section B.5 of TS38.133.
* Recommended WF
  + Include test conditions (delay and doppler for satellite motion) clarification for NTN and IoT RRM test cases into RRM specification Annex section.
    - NR NTN: Annex B.5 of TS 38.133
    - IoT NTN: Annex B.8 of TS 36.133

#### **Issue 1-2: [RF&Demod] Where to capture the testing condition agreed in WF R4-2316967 and LS R4-2317006**

* Background: Same as Issue 1-1
* Proposals
  + Option 1: Samsung
    - Capture into RAN5 conformance test specification based on RAN4 recommendation
  + Option 2: Samsung
    - Including test condition clarification into Annex section of RAN4 specification of TS 38.101-5 and 36.102
* Recommended WF
  + Agree on Option 2 to be consistent with RRM spec

#### **Issue 1-3: [RF] Whether to update the frequency error requirement for continuously frequency pre-compensation in Rel-19**

* Proposals
  + Option 1: Ericsson
    - Update the frequency error requirement in Rel-19 to include the testing of continuously update frequency pre-compensation
* Recommended WF
  + Leave this issue to Plenary.
  + Collect views or clarifications from companies, if time allows.

#### **Issue 1-4: Arrangement to CRs**

* Proposals from Moderator

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| Device | Requirements | Spec | Recommendation |
| NR NTN | RF & Demod | 38.101-5 | R4-2318441, Apple: revised, if needed  R4-2320878, Qualcomm: Not pursued |
| NR NTN | RRM | 38.133 | R4-2318397, Samsung: revised, if needed |
| IoT NTN | RF & Demod | 36.102 | R4-2320890, Qualcomm: revised, if needed |
| IoT NTN | RRM | 36.133 | R4-2318072, MTK: revised, if needed |