**3GPP TSG-RAN WG5 Meeting #99 R5-233672**

**Incheon, Korea, 22nd -26th May 2023**

Title: LS on clarifications for Non-Terrestrial Networks

Response to: -

Release: Rel-17

Work Item: NR\_NTN\_solutions, LTE\_NBIoT\_eMTC\_NTN\_req

Source: RAN WG5

To: RAN WG4

Cc: -

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Attachments:

**1. Overall Description:**

In TS 38.101-5 Sections 6.1 and 7.1, it is indicated that all requirements for NR NTN in such specification, except for frequency error, shall be verified when Doppler conditions are set to zero. Even when not yet in TS 36.102, similar agreement was achieved for IoT NTN in R4-2303538 Issue 2-6.

In TS 38.101-5 Section 6.4.1, it is indicated that NR NTN frequency error requirement will be verified for at least 2 cases of which one has zero Doppler conditions. Similar statements for IoT NTN frequency error requirements appear in TS 36.102 sections 6.4A.1 and 6.4B.1.

While defining NTN test cases, RAN5 found concerns in the following areas:

Requirements applicability to different types of satellites:

Q1a: Are all the section 6 and section 7 RF Tx/Rx requirements defined in TS 38.101-5 applicable to both GSO and NGSO?

Q1b: Are there any NR NTN demod performance requirements applicable to GSO (even if not defined in TS 38.101-5)?

Q1a also applies to section 6 and section 7 requirements defined in TS 36.102. Please answer in the context of TS 36.102 also.

Zero Doppler conditions:

Q2a: With regards to zero Doppler conditions indicated in section 6 and section 7 requirements in TS 38.101-5:

Q2a1: Specifically, for NGSO where satellite orbit introduces a time varying Doppler shift and time varying propagation delay, is it expected to emulate zero Doppler condition in conformance testing of these section 6 and section 7 requirements?

Q2a2: For GSO (different from GEO), do we need to emulate any Doppler shift/propagation delay in conformance testing?

Q2a3: For GEO, do we need to emulate any Doppler shift/propagation delay in conformance testing?

Q2a questions also apply to section 6 and section 7 requirements defined in TS 36.102. Please answer in the context of TS 36.102 also.

Q2b: Under the zero Doppler conditions defined in section 6/7 of TS 38.101-5 and TS 36.102, what are RAN4 assumptions for UE Doppler and delay pre-compensation mechanisms for conformance testing: activated or deactivated?

Q2c: Are the zero Doppler or time varying assumptions applicable for conformance testing of RRM test cases in TS 38.133 Annex A.14 and in TS 36.133 Annexes A.13 and A.14?

Q2d: Are the zero Doppler or time varying assumptions applicable for conformance testing of demod performance requirements in section 8 in TS 38.101-5 and 36.102?

Other than zero Doppler conditions:

Q3a: For the NTN frequency error requirements defined in section 6.4.1 of TS 38.101-5, what is RAN4 assumption in terms of constant/variable Doppler and delay conditions for the other than zero Doppler conditions for GSO (different from GEO), GEO and NGSO?

TS 38.101-5 snippet of clause 6.4.1 is captured below for reference.

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Q3b: In case of constant Doppler conditions, does RAN4 assume the UE Doppler and delay pre-compensation mechanisms only apply to the constant Doppler while they don’t apply to any time-varying Doppler or time delay introduced by satellite model in conformance testing?

Q3a and Q3b also apply to frequency error requirements defined in TS 36.102 section 6.4A.1 and 6.4B.1. Please answer in the context of TS 36.102 also.

Satellite propagator model:

Q4a: For section 6, section 7, section 8 requirements defined in TS 38.101-5, is RAN4 assuming implementation of a satellite propagator model for the service link in conformance testing? This question also applies to section 6, section 7 and section 8 requirements defined in TS 36.102. Please answer in the context of TS 36.102 also.

Q4b: Which RRM test cases listed under Annex A.14 are assuming a satellite motion trajectory based on the ephemeris using Eckstein-Hechler model as defined in TS 38.133 Annex B.5 (applicable also to 36.133 as per agreement in R4-2306370)?

UE location updates for multipath fading channels:

Q5a: For conformance testing of TS 38.101-5 section 8 requirements in multipath fading channel, should UE location updates follow UE motion?

Q5b: For conformance testing of TS 38.133 Annex A.14 RRM test cases in multipath fading channel, should UE location updates follow UE motion?

Q5a and Q5b also apply to section 8 requirements of TS 36.102 and RRM test cases in TS 36.133. Please answer in the context of TS 36.102 and TS 36.133 also.

**2. Actions:**

**To RAN WG4:**

**ACTION:** RAN5 would like to kindly ask RAN4 to provide above requested clarifications. Early feedback to any of the questions will unblock NTN conformance test definition in RAN5 specifications.

**3. Date of Next RAN WG5 Meetings:**

TSG RAN WG5 Meeting #100 August 21st – 25th, 2023 Toulouse, FR

TSG RAN WG5 Meeting #101 November 13th – 17th, 2023 Chicago, US