**3GPP TSG-RAN WG5 Meeting #99 R5-23xxxx**

**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: -

**Contact Person:**

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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 zero 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 appears in TS 36.102 sections 6.4A.1 and 6.4B.1

**Q1: Will these zero Doppler conditions imply that no emulation of Doppler shift in the DL and no test system Doppler compensation in the UL related to satellite orbit is required regardless of the ntn-ScenarioSupport-r17 under test?**

Even zero Doppler conditions are emulated, RAN5 understanding is that the UE will keep doing the pre-compensation of service link Doppler based on ephemeris information and UE, which could degrade the performance measured unless pre-compensation is deactivated. Minimizing the periodicity of SIB19 or SIB31 updates could not help in preventing the performance degradation if UE decides to skip some of these SIB19/SIB31 updates to save batteries.

**Q2: Under these zero Doppler conditions, is UE required to deactivate the service link Doppler pre-compensation (maybe through a specific test mode)?**

**Q3: In case a specific test mode is required and assuming that requirements defined in TS 38.101-5 and 36.102 are applicable to either GSO and NGSO satellites, would it be required to signal different SIB19/31 information ephemeris information for each type of satellite aligned with the ntn-ScenarioSupport-r17 supported by the device?**

**Q4: Will zero Doppler conditions have any implications on delays (e.g. no implications, constant delays only, zero delays,…)?**

In NTN frequency error requirements, one of the verification cases implies zero Doppler conditions.

**Q5: Can it be assumed that second verification case of NTN frequency error requirements is based in non-zero Doppler conditions?**

**Q6: In case any NTN frequency error test needs to be done under non-zero Doppler conditions, shall Doppler be constant or variable?**

**Q7: In case any NTN frequency error test needs to be done under non-zero Doppler conditions, shall delay be constant or variable?**

**Q8: Are NTN performance requirements in section 8 in TS 38.101-5 and TS 36.102 defined under these zero Doppler conditions? In case not, are they defined under constant or variable Doppler/delay conditions?**

**Q9: Are NTN RRM requirements in TS 38.133 and TS 36.133 defined under these zero Doppler conditions? In case not, are they defined under constant or variable Doppler/delay conditions?**

**Q10: In case of constant Doppler and delays, is UE required to deactivate variable service link Doppler and delay pre-compensation (maybe through a specific test mode) depending on the type of ntn-ScenarioSupport-r17 under test?**

**Q11: Has RAN4 considered revisiting Non-Terrestrial Networks UE core requirements to include additional requirement relaxations depending on the type of satellite (GSO vs NGSO) to accommodate impact of more realistic non-zero Doppler conditions even if in a future release?**

Most of the requirements inTS 38.101-5 and in TS 36.102 (all except for NTN frequency error requirements) don’t explicitly state how UE gets its location.

**Q12: Can it be assumed that, if not specified how UE gets its location, it does not have any impact on requirements and RAN5 can decide?**

**Q13: For demod and RRM test requirements including multipath propagation conditions, are the requirements defined in such a way that UE location is fixed during the whole duration of the requirement test?**

**2. Actions:**

**To RAN WG4:**

**ACTION:** RAN5 would like to kindly ask RAN4 to provide requested clarifications..

**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