**3GPP TSG-RAN WG4 Meeting #116bis R4-2515053**

**Prague, Czech Republic, October 13 ‒ October 17, 2025**

**Title:** Way Forward for [116bis][328] Rel-19 Demodulation\_Part3

**Agenda Item:** 6.23

**Source: Ericsson**

**Document for:** Approval

# NTN testing for NGSO

Channel models

**Agreement**: Eccentricity of satellite orbit

* No need to capture “The method specified in this sub clause is applicable to cases that Eccentricity (e) in Step 1-4 is more than zero” in the specification, because e≠0 for the initial ephemeris information developed in Rel-19 RAN4.

**Agreement**: Additional margin to IoT-NTN UE demodulation requirements when the time-varying Doppler shift and propagation delay model is applied

* For NB-IoT, add 0.5dB to the existing NPDSCH requirements.
* For eMTC, add 1.0dB to the existing PDSCH requirements.

**Agreement**: Impact of sampling frequency offset

* RAN4 does not need to consider the impact of sampling frequency offset for UE demodulation requirements.

**Way forward**: How to ensure the satellite elevation angles more than 30 degrees during the test

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| **Background**: RAN5 conformation test procedure specifies to run multiple subtest to measure the average throughput for a duration sufficient to achieve statistical significance (See TS 38.521-5 8.2.1.2.2.1.1\_1.3.2). |

* Interested companies are encouraged to study how TE ensures to apply the same Doppler shift and propagation delay model for each subtest. FFS how to capture in the specification.
  + Option 1: For each subtest, TE should start from the same initial ephemeris information (i.e., positionX, positionY, positionZ, velocityVX, velocityVY, velocityVZ) = (-2654249, 4386991, 1594205, 14581, -34487, 120182).

**Way forward:** Applicability of Rel-19 tests with time-varying Doppler shift and propagation delay model

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| **Background**  In Rel-17 RAN4 defined four PDSCH demodulation requirements for NR NTN (1-1, 1-2, 1-3, and 1-4).  In this WI, RAN4 has agreed to add 2 new test cases (1-5 and 1-6) by applying the time-varying Doppler shift and propagation delay model for NGSO to tests 1-1 and 1-2, as follows.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Test num. | Reference channel | Bandwidth (MHz) / Subcarrier spacing (kHz) | Modulation format and code rate | Propagation condition | Correlation matrix and antenna configuration | Reference value | | |  |  |  |  |  |  | Fraction of maximum throughput (%) | SNR (dB) | | 1-1 | R.PDSCH.1-1.1 FDD | 10 / 15 | QPSK, 0.30 | NTN-TDLA100-200 | 1x2, ULA Low | 70 | 0.3 | | 1-2 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | NTN-TDLC5-200 | 1x2, ULA Low | 70 | 7.6 | | 1-3 | R.PDSCH.1-1.1 FDD | 10 / 15 | QPSK, 0.30 | NTN-TDLC5-200 | 1x2, ULA Low | 70 | -0.4 | | 1-4 | R.PDSCH.1-1.1 FDD(1) | 10 / 15 | QPSK, 0.30 | NTN-TDLA100-200 | 1x2, ULA Low | 70 | 1.1 | | 1-5 | R.PDSCH.1-1.1 FDD | 10 / 15 | QPSK, 0.30 | NTN-TDLA100-200 | 1x2, ULA Low | 70 | [0.3+0.5] | | 1-6 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | NTN-TDLC5-200 | 1x2, ULA Low | 70 | [7.6+0.5] | | Note 1: The Maximum throughput is based on the HARQ processes with HARQ feedback enabled.  Note 2: For Tests 1-5 and 1-6, the time-varying Doppler shift and propagation delay model, specified in Annex E, is applied. | | | | | | | | |

For UE declaring Rel-19 UE,

* Option 1
  + Applicable tests are 1-5, 1-6, 1-3 and 1-4.
* Option 2
  + Applicable tests are 1-5, 1-6.

For UE declaring Rel-17/18 UE,

* Option 1a:
  + If UE declares to meet the requirements with time-varying Doppler shift and propagation delay, applicable tests are 1-5, 1-6, 1-3 and 1-4.
  + Otherwise, applicable tests are 1-1, 1-2, 1-3 and 1-4.
* Option 1b:
  + If UE declares to meet the requirements with time-varying Doppler shift and propagation delay, applicable tests are 1-5, 1-6.
  + Otherwise, applicable tests are 1-1, 1-2, 1-3 and 1-4.
* Option 2:
  + Applicable tests are 1-1, 1-2, 1-3 and 1-4.

Note the same test applicability rule is used for IoT-NTN UE demodulation requirements.