**3GPP TSG RAN WG1 #122 R1-2506540**

**Bengaluru, India, Aug 25th – 29th, 2025**

Title: [Draft] Reply LS on the RAN simulation assumptions for ULBC

Response to: S4-251584

Release: Release 20

Work Item: FS\_ULBC

Source: Qualcomm [RAN1]

To: SA4

Cc: RAN4, RAN2, SA2, CT1

**Contact Person:**

Name: Alberto Rico

E-mail Address: albertor@qti.qualcomm.com

**1. Overall Description:**

RAN1 has discussed the SA4 LS S4-251584 and would like to provide the following replies to SA4’s questions:

**Q1:** SA4 kindly asks RAN1 to confirm the evaluation assumptions in the attachment, and provide feedback, if any.

**RAN1 reply to Q1:**

On the evaluation assumptions, RAN1 generally agrees with the overall set of parameters selected by SA4, with the following comments:

* On the modulation order, RAN1 would like to highlight that MCS indices 0 and 1 use pi/2 BPSK for single tone transmissions. It is up to SA4 to decide whether to evaluate pi/2 BPSK with MCS indices 0 and 1.
* For the downlink CNR, the relevant UE parameter is noise figure (and/or G/T) instead of transmit power. RAN1 recommends SA4 corrects the following sentence:
  + DL CNR=-3.3dB, 0dBi UE antenna gain, 15kHz SCS, 12 tones, 1 UE receive antenna, noise figure of 7dB.
* If SA4 wants to evaluate 40ms bundling, RAN1 specifications may support this case by assuming 15kHz SCS (single and multi-tone) in the uplink. It is up to SA4 whether to consider this case in their evaluations.
* RAN1/2 have not yet started the work on designing SPS. Therefore, RAN1 currently cannot confirm whether the example frame structure for SPS (related to Figure 5.2.2.3-2 and associated text) will be supported.
* In previous RAN1 evaluations related to voice, RAN1 has considered 2% BLER as the target performance metric. It is up to SA4 to decide what values to use in their evaluations.
* Power classes are to be confirmed by RAN4.
* Although the example Figure 5.2.2.3-1 is supportable by RAN1 specifications in most scenarios, it may not be supportable in the case where the cell is very large (e.g. >3000km), when the UE does not support TA report and the network does not support UE-specific K-offset. The example Figure 5.2.2.3-1 itself also requires the UE to be configured with two HARQ processes and with HARQ feedback disabled.

**Q2:** In Table 6.1.3.3-1 of TR 38.821, how the RX G/T value (-31.6 dB/T) in the table or equivalently the antenna gain and noise figure for DL for NB-IoT with GEO are determined, whether it is a worst-case scenario, and whether SA4 can assume this value in the simulation?

**RAN1 reply to Q2:**

The parameter G/T is calculated as follows (per TR 38.821):



where is receive antenna gain, is noise figure, is ambient temperature, is antenna temperature, and is the received antenna gain.



For the value of -31.6dB/K, it is obtained with , , and .



Although values smaller than -31.6 dB/K can be derived based on some assumptions in TR 36.763 (e.g. NF=9dB), RAN1 considers that the value of -31.6dB/K may be used by SA4 in their evaluations. Some companies in RAN1 consider that values higher than -31.6dB/K can be supported in commercial implementations, but RAN1 could not reach consensus on these values.

**2. Actions:**

**To SA4:**

**ACTION:**

RAN1 respectfully requests SA4 to take the above information into account.

**3. Dates of Next RAN1 Meetings:**

RAN1#122-bis Oct 13 – 17, 2025 Prague, CZ

RAN1#123 Nov 17 – 21, 2025 Dallas, US