



**3GPP TSG RAN Meeting #97-e
Electronic Meeting, September 12-16, 2022**

RP-222096

Agenda Item: 9.3.2.7

Source: Xiaomi

Document for: Discussion

Discussion on Rel-18 NTN Coverage enhancement

Coverage enhancement for UL

- Based on RAN 1's observations and conclusions [1],
 - CE is unnecessary for PUCCH format 1, PUCCH format 3, PUSCH for 3 kbps and Msg.3.
 - CE is necessary for Msg4 HARQ-ACK and PUSCH for VoIP.
- It is still controversial that whether study CE for PRACH in NTN. Based on the following observations from RAN1 [1],
 - Ten sources observed that the existing specification for PRACH format 2 can meet the performance requirement
 - Ten sources observed that the existing specification for PRACH format B4 cannot meet the performance requirement with a gap of 1.2 to 11.9 dB
 - Considering that PRACH format B4 can provide better robustness in resisting frequency offset, it is suggested to study coverage enhancement for PRACH format B4, and NTN-specific solutions should be studied to avoid overlap with Rel.18 further NR coverage enhancement.
- Propose to Study coverage enhancement for the following UL channels in the normative stage.
 - PRACH
 - Msg4 HARQ-ACK
 - PUSCH for VoIP

Coverage enhancement for DL

- It was agreed in [2] that ITU limitation of power flux density should be taken into account for CE evaluation. However, there is no consensus in RAN1 that which ITU regulation should be referred and how many dB should be assumed for satellite power reduction.
- Based on RAN1's discussion [3], the following regulations are considered by companies:
 - Option 1: ITU regulation - Table 5-2 (Rev.WRC-19)
 - Option 2: ITU regulation - Table 21-4 (Rev.WRC-19)
 - Option 3: ITU regulation - Annex to Resolution 212 (Rev.WRC-19)
- Different ITU regulations would lead to different satellite EIRP assumptions and further impact the identified DL channels for coverage enhancement.
- Propose RAN to conclude which ITU regulation is referred for satellite power reduction for evaluation.

Reference

- [1] Chair's notes RAN1_110 v17, Toulouse, France, August 22nd – 26th, 2022
- [2] RP-221819, Revised WID: NR NTN (Non-Terrestrial Networks) enhancements, Budapest, Hungary, June 6-9, 2022
- [3] R1-2208268, Summary #5 on 9.12.1 Coverage enhancement for NR NTN, Toulouse, France, August 22nd – 26th, 2022

Thank you