
FRAUNHOFER VIEW ON RELEASE 18

3GPP RAN Workshop on Release 18, June 28th – July 2nd 2021, eMeeting

NR NTN Enhancements in Rel-18

Worldwide Direct Access via 5G Satellite

■ Objective

- The ongoing space race accelerates innovations in the space segment, which leads to new business opportunities utilizing a direct access via satellites
- Increasing interest in NTN related studies and specifications within 3GPP and SatCom Industry (ESOA as market representative partner)
- Enhance the Rel-17 specifications for non-terrestrial networks in 5G, based on TR 38.821
- Enabling more use cases and deployment options, like low-cost terminals and advanced satellite architectures

■ Scope (summary)

- Supporting advanced system and satellite architectures
- Waveform improvements
- Supporting Low-cost Terminals
- Positioning enhancements
- Flexible spectrum access and TN/NTN interoperability

NR-NTN Enhancements in Rel-18

Supporting flexible advanced system architectures:

- Support of regenerative satellite payloads
 - Complete gNB(s) on board of a satellite
 - Evaluation of best suitable CU-DU split option: e.g. CU on ground & DU on board of satellite
- NTN indirect access
 - Enable access by terrestrial UEs via SL to NTN-enabled UEs
 - Leveraging Rel-17 SL relaying specifications
- Inter-Satellite Links (ISL) & Satellite routing, incl. Xn Interface
- NTN Interconnectivity between GEO, LEO, HAPS

NR-NTN Enhancements in Rel-18

Waveform Improvements: Support of smaller bandwidths and more energy efficient waveforms

- Satellite payloads are sensitive to PAPR of OFDMA signals
- Small Cubesats with limited power not possible due to minimum NR bandwidth of 5 MHz
- Feasible in Rel-18: DFT-s-OFDM in DL; benefit compared to OFDMA regarding total degradation
- Waveform improvements potentially a topic beyond-5G / 6G

Supporting Low-cost Terminals:

- Rel-17 assumes UEs with GNSS capability
 - Rel-18 to support UEs without GNSS capability
 - Requires other methods for initial time & frequency sync
- Leveraging RedCap features and coverage enhancements for NTN
 - Limitation of maximum bandwidth and number of antennas applicable for NTN as well
 - Coverage enhancements in DL and UL applicable for low SNR range / low antenna gain

NR-NTN in Rel-18

NTN Positioning:

- Network based UE localization with 5G-NTN for improved reliability and flexibility

Flexible spectrum access and TN/NTN coexistence:

- Flexible BWP configuration similar to Beam Hopping Feature in DVB-S2X
- Enabling Dynamic Spectrum Sharing (DSS) between TN and NTN