

3GPP TSG RAN Rel-19 Workshop
Taipei, June 15 – 16, 2023

RWS-230475



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Agenda Item : 5
Source : InterDigital, Inc.
Title : Views on NTN enhancement for
Rel-19
Document for : Discussion

NR NTN and IoT NTN: A History in 3GPP

Rel-15: Initial feasibility study on NR NTN (2017-2018)

- Architectures, scenarios, and channel models

Rel-16: Study item on NR NTN (2018 - 2019)

- Gap analysis to support NTN in NR

Rel-17: Work item on NR NTN (2020-2022)

- Support for time/frequency pre-compensation, timing relationships, mobility, tracking area management

Rel-17: Study item on IoT NTN (2020)

- Gap analysis to support NTN in LTE

Rel-17: Work Item on IoT NTN (2021-2022)

- Support for time/frequency pre-compensation, timing relationships, discontinuous coverage

2017

2018

2019

2020

2021

2022

2023

2024

Rel-18: Work Item on enhanced NR NTN (2022-2024)

- Support for NW verified UE location, UL coverage, and service continuity between terrestrial and non-terrestrial networks

Rel-18: Work Item on enhanced IoT NTN (2022-2024)

- Support for mobility, discontinuous coverage and performance

Rel-19: Decision on Rel-19 scope (2023Q4)

Motivation for Rel-19 NTN

Release 17 **introduced basic NTN functionality**, focusing on the transparent satellite payload scenario and necessary adaptations to NR and LTE to work in a non-terrestrial environment.



Release 18 **refined the initial NTN release** by improving service continuity between terrestrial and non-terrestrial networks, supporting commercial smartphones and >10GHz deployments, and finalizing the leftover aspects of Rel-17 IoT NTN



Release 19 will increase diversity of supported device types, QoS requirements, and network architectures to facilitate deployment and integration of NTN into existing networks.

Rel-19 NTN: Proposed scope

Support for regenerative payload

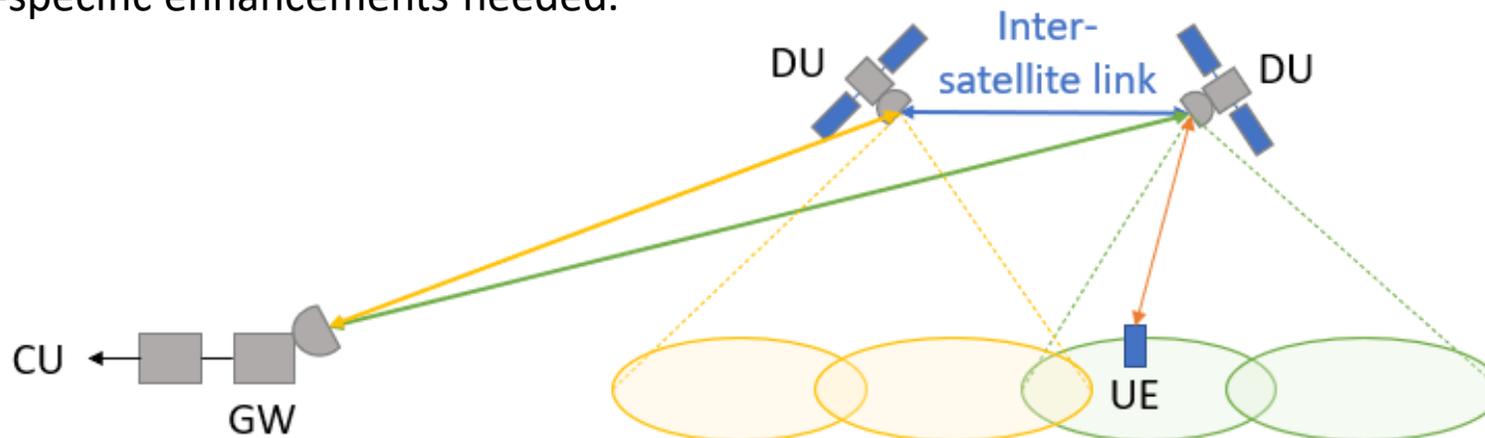
Offers vastly improved latency characteristics (UE-gNB RTT reduced by half) to support lower latency services. Provides flexibility to different types of satellite deployments.

- [NR + IoT] Regenerative payload case (including all or part of RAN functions) – Start with a 6-month study item phase to down-scope potential architectures (e.g, gNB on board satellite, gNB split etc.) prior to standardization.

DL coverage enhancements

Supports paging and DL reception for UEs in poor coverage scenarios. Leverages the “cooperative user” to improve channel conditions.

- [NR + IoT] Enhanced paging to support a notification/alert for UE terminating calls – Start with a 6-month study phase to identify NTN-specific enhancements needed.



Rel-19 NTN: Proposed scope

Improved flexibility for mobility/connectivity between different orbits and TN

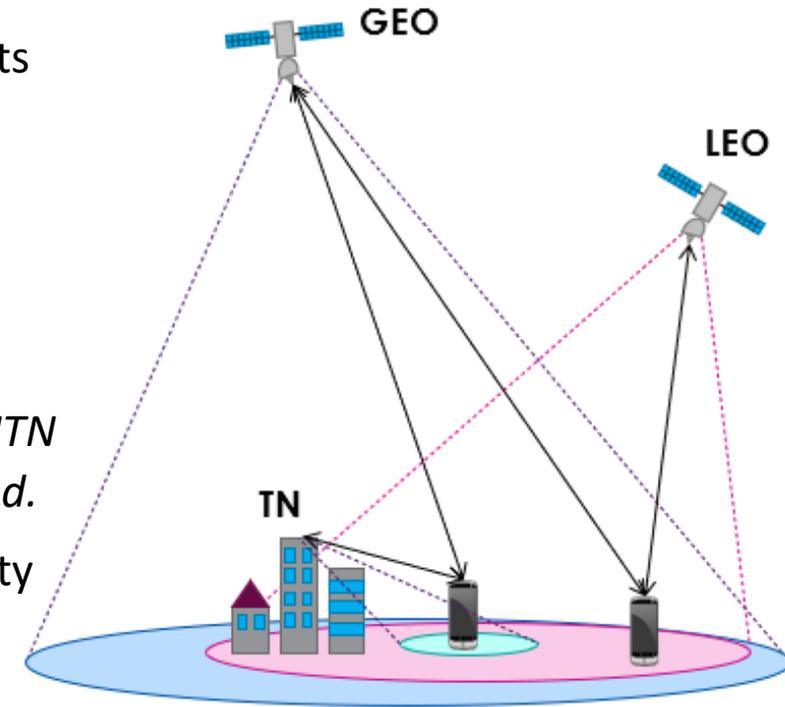
Leverages advantages of different orbits (e.g., latency and coverage characteristics) to support variety of device types and QoS requirements.

- [NR + IoT] Optimization of NTN-NTN mobility and service continuity between orbits (e.g. LEO-GEO)
- [NR + IoT] Dual connectivity/carrier aggregation between satellites and between TN/NTN

Extension of discontinuous coverage support

Supports sparse deployments of satellite constellations, which is critical during early NTN deployments and deeply rural areas where continuous NTN coverage is not guaranteed.

- [NR only] Support for discontinuous coverage scenario in NR (e.g. service continuity enhancements)
- [NR + IoT] Support for discontinuous feeder-link (i.e., “store and forward”)
- [NR + IoT] Enhanced support of discontinuous coverage in RRC_Connected mode



Rel-19 NTN: Proposed scope

Performance improvements for IoT NTN devices

Carries over existing enhancements from NR NTN to improve IoT NTN devices with less specification effort.

- [IoT only] Application of R18 NR NTN enhancements to LTE
 - Mobility and service continuity enhancements for both NTN/NTN and NTN/TN
 - NW verified UE location enhancements

Expansion of RAT dependent positioning in NTN

Supports non-GNSS capable device types, reduces measurement gaps for NB-IoT devices with long connection times.

- [NR + IoT] RAT dependent positioning improvement using satellites
 - May be either a new study item or merged into positioning WI.
- [NR + IoT] Integration of NTN positioning and TN positioning

