

NTN development path

RAN Rel-18 Workshop

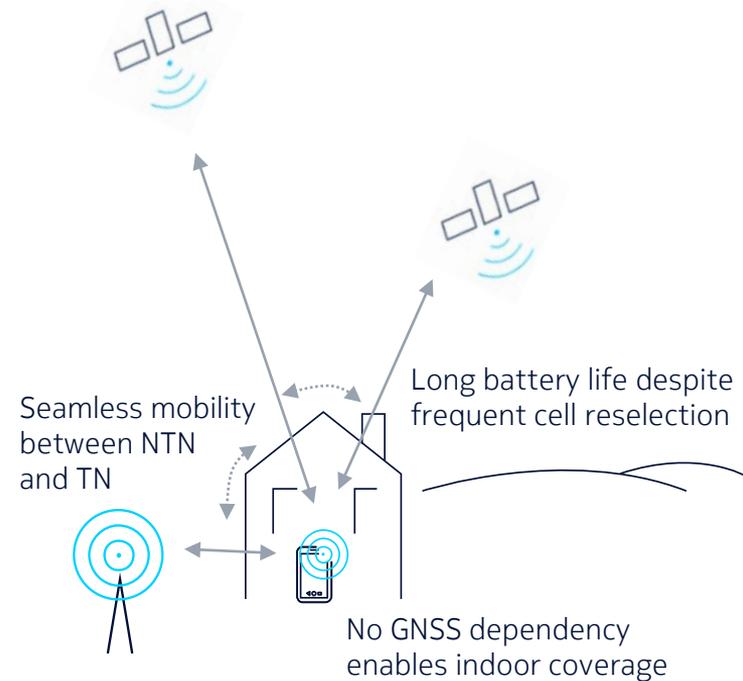
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Nokia, Nokia Shanghai Bell

NTN development path: Motivation

- Rel-17 introduces NR over NTN for the first time, as well as a SI (which may become a WI) on NB-IoT/e-MTC over NTN.
- Specific adaptations to support RedCap devices over NTN are not yet included.
- Some impediments exist for RedCap devices to operate over NTN:
 - Especially for LEO systems, the functioning of NR over NTN relies heavily on GNSS, limiting the coverage of the system to the GNSS coverage (excluding indoor operation), and adding complexity, cost and power consumption to the device.
 - In LEO systems, the number of cell reselections and handover can be very large due to the speed of the satellites. This is costly in terms of signaling and battery consumption.
 - Users in cells of 50 km diameter will experience a mobility event at least every 6 seconds (Earth moving cells).
 - For seamless connectivity indoors and outdoors, handover, mobility and possibly multiconnectivity would be needed.



Rel-18 NTN work should focus on enabling RedCap device operation both outdoors & indoors, and with low complexity & power consumption

NTN development path: Objectives

- Enable operation without GNSS in order to increase availability of NTN services [RAN1/RAN2/RAN4].
 - Requires new methods for timing advance estimation for both initial access and connected mode
 - Requires new method for Doppler estimation and/or pre-compensation
 - Requires new mobility enhancements.
- Enhancements to support mobility/reselection optimizations for moving LEO satellites, minimizing battery consumption and ensuring good performance [RAN2/RAN3].
 - Minimizing GNSS dependency and SIB reading
 - Sleep time / Power saving mode optimizations for sparse NTN deployments
- Improved mobility and interworking between TN and NTN in order to provide seamless connectivity [RAN2].
- Power optimization for NR-NTN IoT devices, especially in IDLE mode [RAN1/RAN2].
- Focus on RedCap devices, enabling access for all persons and devices to NTN.

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