

On NTN IOT for Rel-18

Qualcomm

NTN IoT

- **Current status :**

- NTN IoT study item is completed, Rel-17 work item to be completed in Q2 2022.
- For Rel-17, due to study item acceleration, the scope of solutions is limited to “essential features”.
- For Rel-18, optimizations should be targeting the following aspects, aiming at improving **power and spectral efficiency**:
 - HARQ disabling.
 - Improvements on GNSS operation.
 - Other features and deployment scenarios not covered in Rel-17.
 - Other Rel-17 leftovers (depending on WI scope and outcome)

HARQ disabling

- During the study item, HARQ disabling was deemed beneficial but not essential.
 - Note that this feature is specified for NR NTN.
- Operating with HARQ-ACK enabled has the following issues:
 - Reduced throughput due to HARQ stalling.
 - Increased power consumption due to transmitting HARQ-ACK.
 - Increased uplink resource usage.
- Due to these reasons, we propose to **specify HARQ disabling** in Rel-18

Improvements on GNSS operation

- Rel-17 assumes GNSS operation. Relying on GNSS has the following issues:
 - Increased power consumption.
 - Inability to access the network in case GNSS is not available.
 - Short connections due to non-simultaneous GNSS and WAN operation.
- For Rel-18, we should enable support of eMTC / NB-IOT over NTN **without GNSS, or with reduced GNSS use**:
 - Potential impact: Close loop frequency control, new random access procedure / signals, gaps for GNSS acquisition, etc.
 - In order to support longer connections, other mechanisms may need to be introduced (e.g. ephemeris acquisition during a connection).

New deployment options

- **Beam-based mobility**: To avoid cell change when beam changes (especially for LEO), allow L1/L2 mobility across beams without handover
 - E.g. using non-anchor carrier / narrowband concepts.
- **Enhancements to discontinuous coverage**: Our expectation is that the enhancements in Rel-17 will not be enough to handle this case efficiently.
 - Should consider core network impacts.
 - Consider also aspects related to intermittent backhaul.

Other power / efficiency improvements

- **SIB acquisition enhancement:** Shared SI across multiple cells.
- **Mobility enhancements** using satellite information. Introduce CHO for eMTC
- **Leftovers:** Upon completion of Rel-17 work item, RAN should re-evaluate the degree of functionality achieved by Rel-17 specifications.
 - Due to time constraints, it is expected that many features will not be optimized for efficiency / power.



Thank you

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