

# TSG IoT

## Proposition for a work Item on IoT NTN UE test cases

A composite image showing a view of Earth from space, with a network of white lines and dots representing a satellite constellation overlaid on the planet's surface. The sun is visible in the upper right corner, creating a bright glow and lens flare effect. The Earth's surface shows continents and oceans in shades of blue and brown.

01

Who we are

# A Fully standard compliant Solution

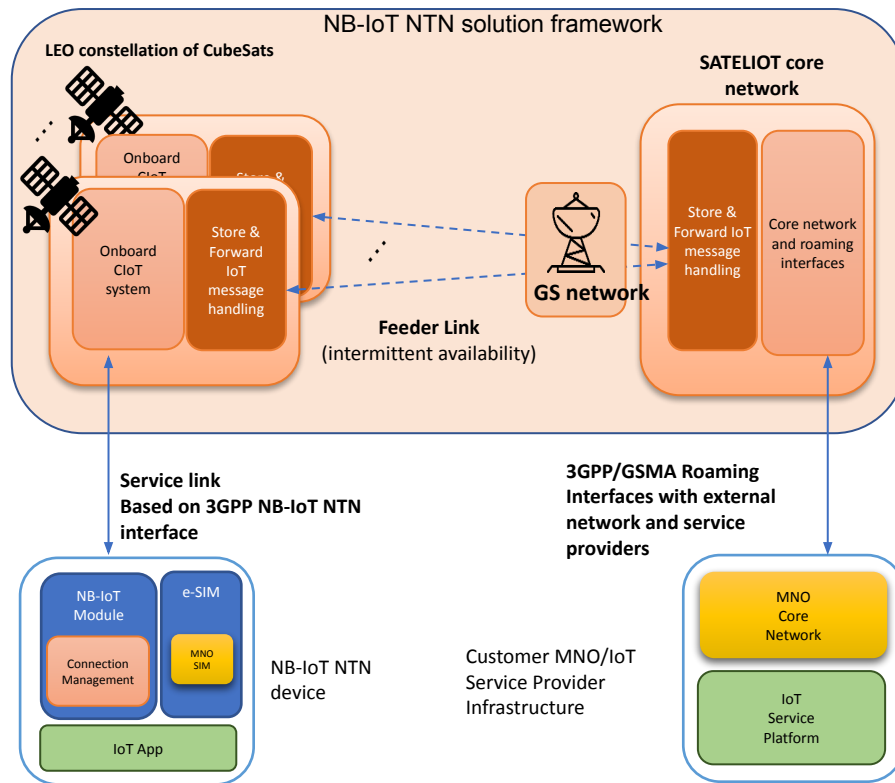
- Sateliot is a **5G NB-IoT NTN (Rel. 17) Coverage Extension** satellite operator in SSO Low Earth Orbit for **wholesale** service to **MNO** (NB-IoT Coverage Extension).
- Vertical agnostic Scalable Network architecture.
- Fully compliant with 3GPP Rel. 17.
  - First approach with Small Satellite in LEO (form factor CubeSat for example) constrained in antenna and PA (TR 36.763 Set-4).
- Enhanced with global service without continuous connection to the ground segment network, it means regenerative satellites, disruption in the feedlink and innovative **Store&Forward** approach in the 3GPP architecture.



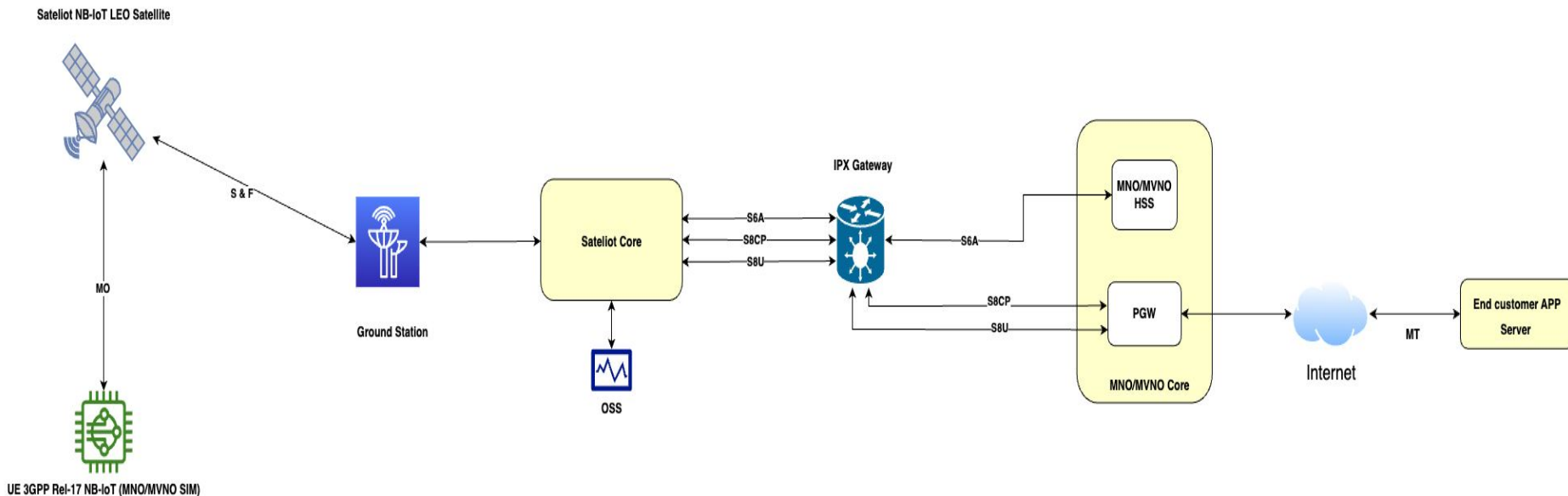
**Member of 3GPP since 2019** being, among space companies, a major contributor to the Rel. 17 IoT NTN Study Item.

# Store & Forward approach allow low service from the day 1

- Smallsat platform
- Regenerative payload
- Low density LEO constellation
- Compliance to 3GPP NB-IoT NTN protocols and 3GPP/GSMA roaming architectures
- In-built Store & Forward capabilities to cope with discontinuous feeder connectivity
- Fully compatible with real-time continuous coverage and always-on connection



# Proposed Core Architecture



Proposed Core Architecture Sateliot



The background of the slide is a composite image. It features a view of the Earth from space, showing the curvature of the planet and the horizon. Overlaid on this is a complex network of white lines and dots, representing a satellite constellation or a global communication network. The lines connect various points across the globe, creating a web-like structure. In the upper right corner, a bright, glowing sun or star is visible, casting a warm light across the scene. The overall color palette is dominated by the blues and greys of the Earth and space, with the white network lines providing a high-contrast element.

02

# 3GPP NB-IoT NTN Standard

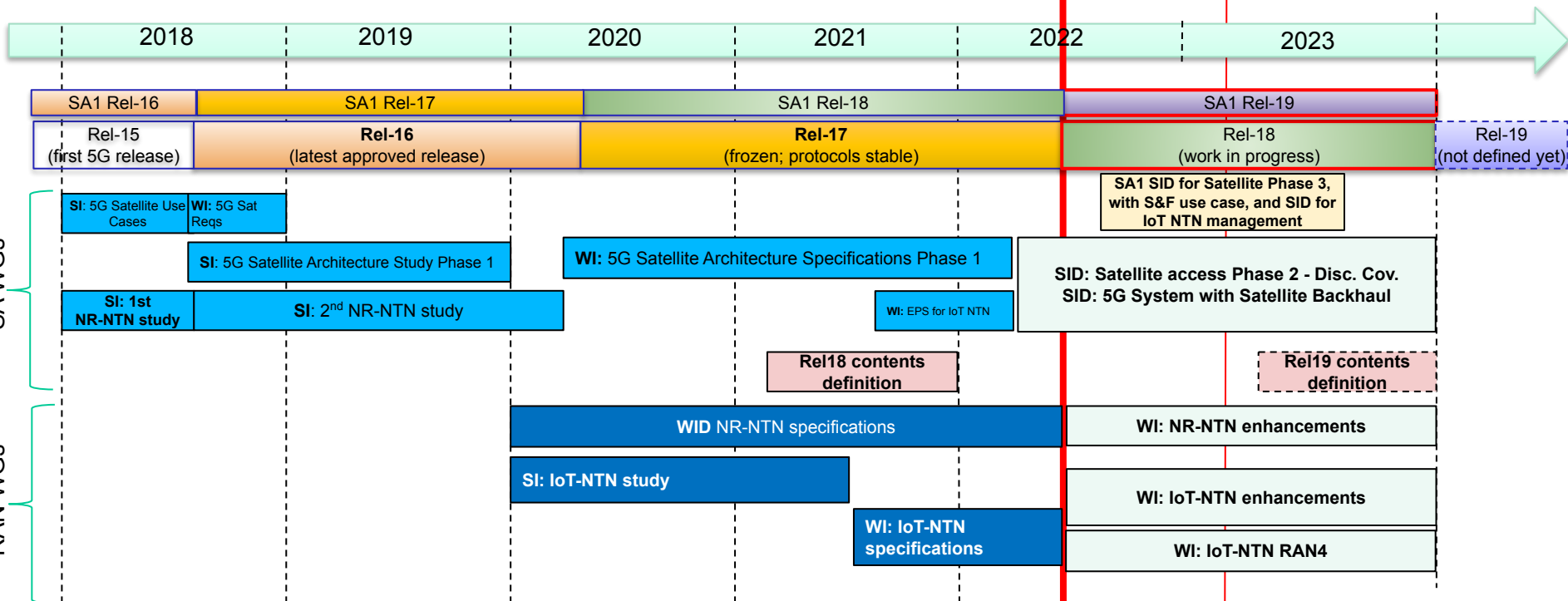
# 3GPP Roadmap on NB-IoT NTN

June 2022

Today

SA WGs

RAN WGs



**Rel 17 concluded in June '22 with functional NTN specs**

**Further NTN enhancements and new capabilities in the context of Rel-18 and Rel-19 (on-going work)**

SI: Study Item / Feasibility Analysis

WI: Work Item / Normative work

The roadmap is a simplified/illustrative representation of the 3GPP work plan for NTN

## 3GPP IoT NTN features per Release

	IoT NTN features
<b>Rel-17 (concluded)</b>	<p>Support of a minimum 1st essential solution:</p> <ul style="list-style-type: none"><li>→ Transparent payload</li><li>→ UE with GNSS capability</li><li>→ <b>LEO (including LEO 600)</b> and GEO</li><li>→ Provisioning of ephemeris</li><li>→ Support for EPC</li><li>→ Mobility and Tracking Area</li><li>→ <b>Support of discontinuous coverage without excessive UE power consumption</b></li><li>→ IoT NTN core performances &amp; support Band S/L</li></ul>
<b>Rel-18 (on going)</b>	<ul style="list-style-type: none"><li>→ Performance Enhancements (HARQ, GNSS operation)</li><li>→ Mobility Enhancements</li><li>→ <b>Enhancements to discontinuous coverage</b></li></ul>
<b>Rel-19 (potential scope)</b>	<ul style="list-style-type: none"><li>→ <b>Store and Forward</b> (i.e. eNB + ePC network elements)</li><li>→ Support of GNSS independent operation</li><li>→ IoT-NTN and TN mobility enhancement</li><li>→ Enhanced HARQ disablement</li><li>→ Higher power IoT NTN UE</li></ul>



# Status of IoT NTN UE

- **First UEs implementing NB-IoT NTN Release 17** already/soon available and expected **for commercial launches by MNOs from 2023 onwards.**
- **IoT NTN UE certification needed** to support commercial launches
- Status of UE Certification aspects:
  - Ongoing work in RAN5 for IoT NTN UE test cases: 96% completed
  - Target to be completed by **June 23**
  - **Work Item to start in GCF likely in Q3-23**
- However, RAN5 test cases only reflecting IoT NTN perspective and not the fact that UE will support both terrestrial and Satellite.
- It is worth to note that some aspects of IoT NTN are not addressed in 3GPP and are left to UE *implementation.*
- **It is urgent to develop test cases allowing to support commercial launches of UE implementing IoT NTN Release 17 (at minimum for NB-IoT)**

The background of the slide is a composite image. It features a view of the Earth from space, showing the curvature of the planet and the blue of the oceans. Overlaid on this is a network of white lines and dots, representing a satellite network or a global communication grid. The lines connect various points across the globe, creating a mesh-like structure. In the upper right corner, there is a bright, glowing sun or star, casting a warm light across the scene. The overall color palette is dominated by the blues of the Earth, the whites of the network lines, and the golden-yellow of the sun.

03

## Potential Work Item(s) in TSG on IoT NTN

# Proposition of Work Item on IoT NTN test cases for TSG IoT

- GSMA TSG should start **a work item on IoT NTN test cases** identifying the requirements and the corresponding test cases for a UE supporting both Terrestrial and Satellite connectivity (at minimum for NB-IoT) for the benefits of the MNOs.
- The work item should focus on topics that are important for a IoT service and the main use cases targeted by providing IoT NTN in addition to Terrestrial (Asset monitoring and Asset tracking)
- **Potential topics to be addressed:**
  - Basic operations taking into account satellite access (including discontinuous coverage)
  - Device behaviour in different scenarios (TN access available or TN access not available for the different NTN access (LEO, GEO...)) (including cold start?)
  - Power consumption aspects
  - Device management aspects
  - GNSS aspects
  - Minimum support for Store and forward aspects

TN: Terrestrial Network - cellular

NTN: Non Terrestrial Network - satellite

# Open questions

- Starting with essential test cases for certification of IoT NTN for Version 1 targeting 6 months to be completed
- Dedicated spec for IoT NTN vs extension to existing one (TS 40 for example)
- One specification including Requirements and test cases (like TS 40) or 2 specifications (one for requirements, one for guidelines (like TS 34/35, 50/52...))
- Other future topics to be addressed by TSG IoT: power consumption guidelines, Higher power IoT NTN UE, store and forward guidelines...

# Thanks

[www.sateliot.space](http://www.sateliot.space)

Barcelona · San Diego · Space

—

Marco Guadalupi · marco.guadalupi@sateliot.com

+1(650)4+34 607 57 37 40

