TSG IoT

Proposition for a work Item on IoT NTN UE test cases

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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).

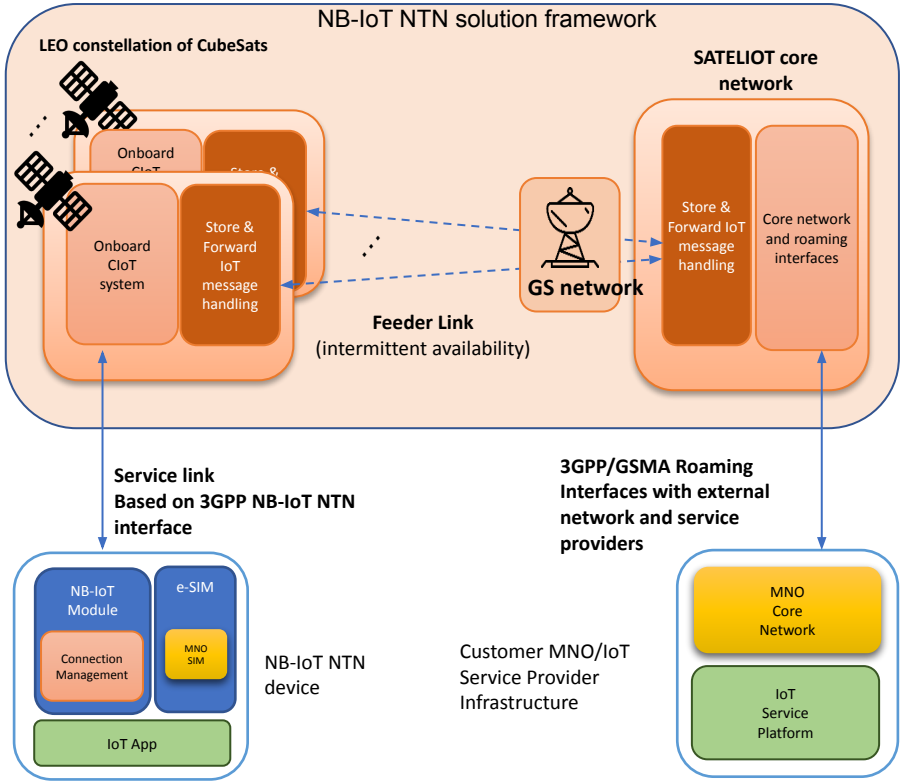
- Enhanced with global service without continuous connection to the ground segment network, it means regenerative satellites, disruption in the feedlink and innovative **Store&Forward** approach in the 3GPP architecture.

3GPP™ A GLOBAL INITIATIVE

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



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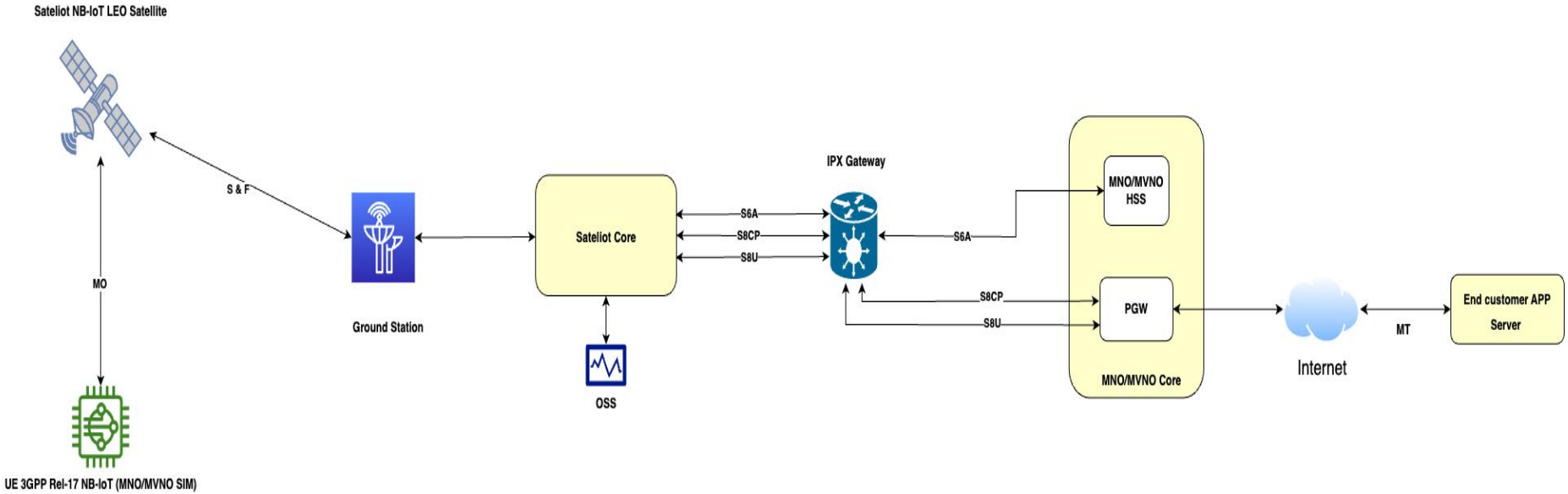
Proposed Core Architecture



Proposed Core Architecture Sateliot

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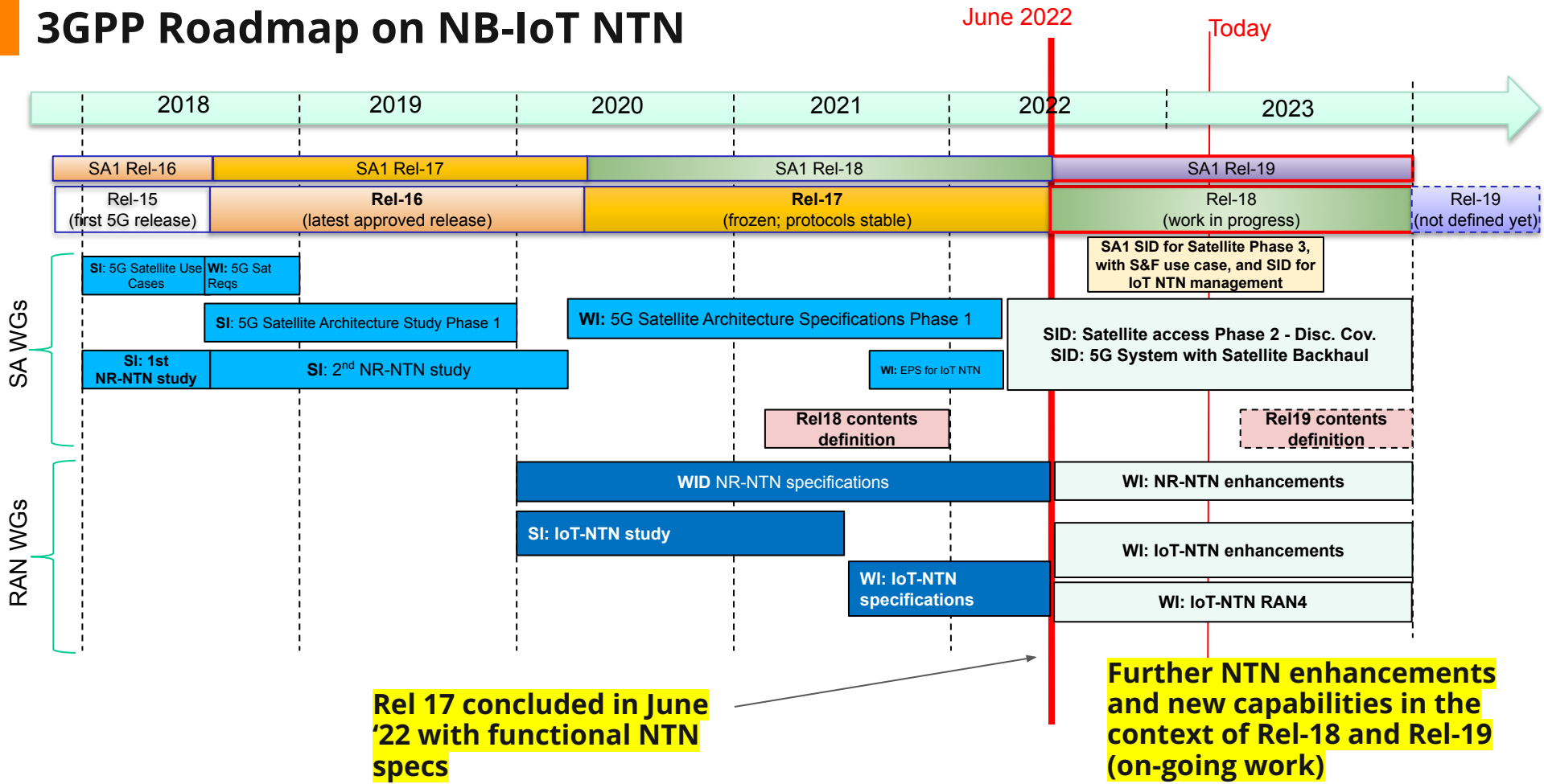
02

3GPP NB-IoT NTN Standard

3GPP Roadmap on NB-IoT NTN



SI: Study Item / Feasibility Analysis
WI: Work Item / Normative work
The roadmap is a simplified/illustrative representation of the 3GPP work plan for NTN

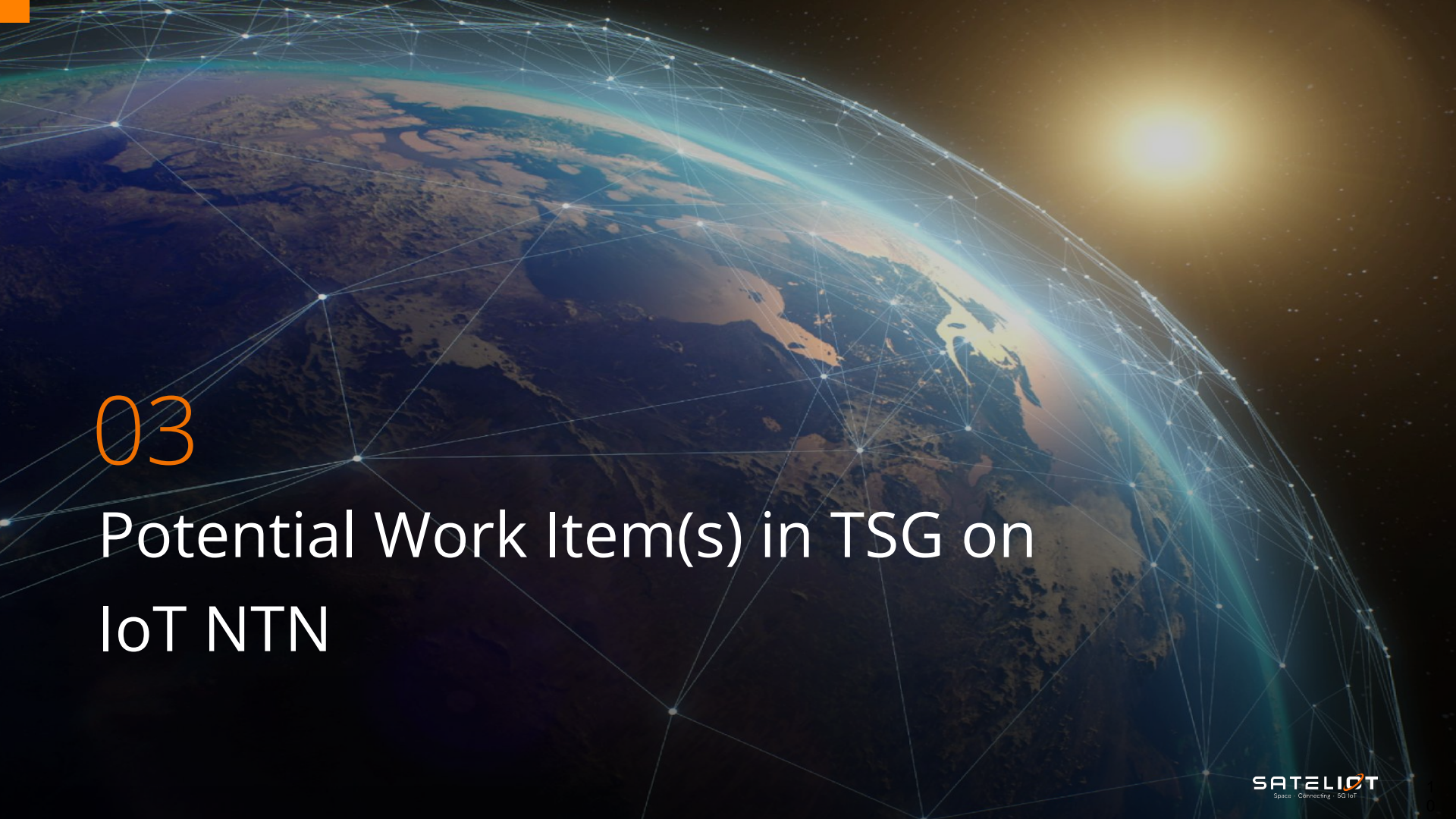
3GPP IoT NTN features per Release

	IoT NTN features
Rel-17 (concluded)	Support of a minimum 1st essential solution: ➔ Transparent payload ➔ UE with GNSS capability ➔ **LEO (including LEO 600)** and GEO ➔ Provisioning of ephemeris ➔ Support for EPC ➔ Mobility and Tracking Area ➔ **Support of discontinuous coverage without excessive UE power consumption** ➔ IoT NTN core performances & support Band S/L
Rel-18 (on going)	➔ Performance Enhancements (HARQ, GNSS operation) ➔ Mobility Enhancements ➔ **Enhancements to discontinuous coverage**
Rel-19 (potential scope)	➔ **Store and Forward** (i.e. eNB + ePC network elements) ➔ Support of GNSS independent operation ➔ IoT-NTN and TN mobility enhancement ➔ Enhanced HARQ disablement ➔ Higher power IoT NTN UE

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)**



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

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