The IoT Connection.2024.v2: Hyperconverged TMT Networks... Space + Terrestrial Multi Play

D2D: the standard approach – already a reality
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Content

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3GPP & NTN

- 3GPP is working on satellite/NTN since 2017 (Rel-15)

- Lead to 2 key activities:

  – NR NTN (mobile broadband and more)

  – IoT NTN

- Satellite is addressed across all stages and all groups of 3GPP

  – SA1 – Service Requirements

  – SA2 – Architecture

  – RAN (1/2/3), RAN 4 – RF, RAN 5 – Mobile Terminal Conformance Testing

  – Other groups such as CT1, SA3, SA5, SA6...

- Satellite community is strongly involved with 20 very active companies representing the whole value chain (Satellite operators, System Integrators, Technology Providers, Research Institutes, SME, Space agency...)

- Award for **3GPP NTN as Technology of the Year 2023** at the Satellite 2024, Washington DC

3GPP – NTN – Features

Rel.	NR NTN	IoT NTN
15/16	Study phases: channel model for the non-terrestrial networks (deployment scenarios, parameters, impacts on NR)…	
17	Support for : • Transparent payload based **LEO scenario** with both Earth fixed &/or moving cell scenario • Transparent payload based **GEO scenario** addressing UE with GNSS capability. • **Provisioning of ephemeris…** • NR-NTN support for FR1 & FR2 bands • Band L/S (n255 / n256) **=> First phase for work item on satellite**	• **Study to support a 1st minimum essential solution in Rel-17 => Baseline for 1st Deployments** • LEO / GEO • IoT NTN specific enhancements not covered by NR_NTN: • Support for EPC • Mobility and Tracking Area • **Support of discontinuous coverage** without excessive UE power consumption • Band L/S (b255 / b256)

3GPP – NTN – Features

Rel	NR NTN	IoT NTN
18	• **Coverage Enhancements** • **Network verified UE location** • **NTN-TN and NTN-NTN mobility and service continuity enhancements (Cell reselection, Handover…)** • NR-NTN deployment in above 10 GHz bands • LS Band (n254) • Ka-bands (n510, n511, n512)	• Performance Enhancements (HARQ, GNSS operation) • Mobility Enhancements • **Enhancements to discontinuous coverage** • LS band (b254) • Extended L (b253)
19	• **Downlink Coverage enhancements** • Uplink Capacity/Throughput Enhancement • Support of Broadcast service • **Support of Regenerative payload => Mesh Topology: UE-SAT-UE communication** • LTE to NR NTN mobility • **Support of higher Tx power UE** in FR1 bands • Extended L Band (n253) • Ku bands	• **Support of Store and Forward** • **Uplink Capacity Enhancement** • Support of PWS • **Support of higher Tx power UE** in selected FR1 bands

3GPP – NTN – Rel-20

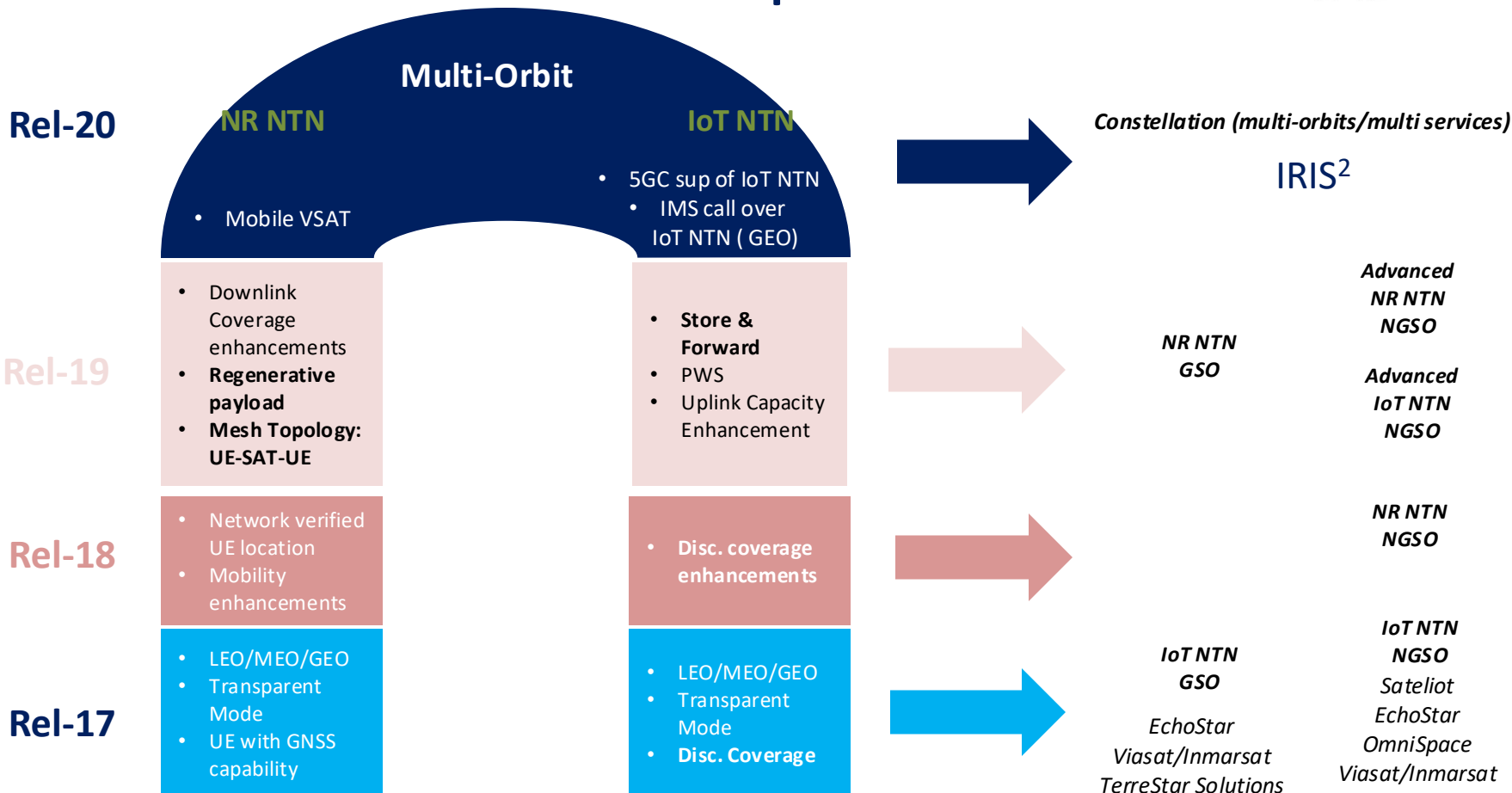| Release	Item ref	Lead WG	Title	3GPP doc	Completion	Rapporteurs
20	SI "5GSAT" ph3	SA1	Study on using Satellite Access phase 4; Stage 1 (Release 19)	TR 22.887	March 2025	Novamint

Current topics covered by SA1 study
- Multi-orbit
- Enhancement for emergency communication & critical services
- IMS voice call over GEO (on IoT NTN)
- Resilient Notification

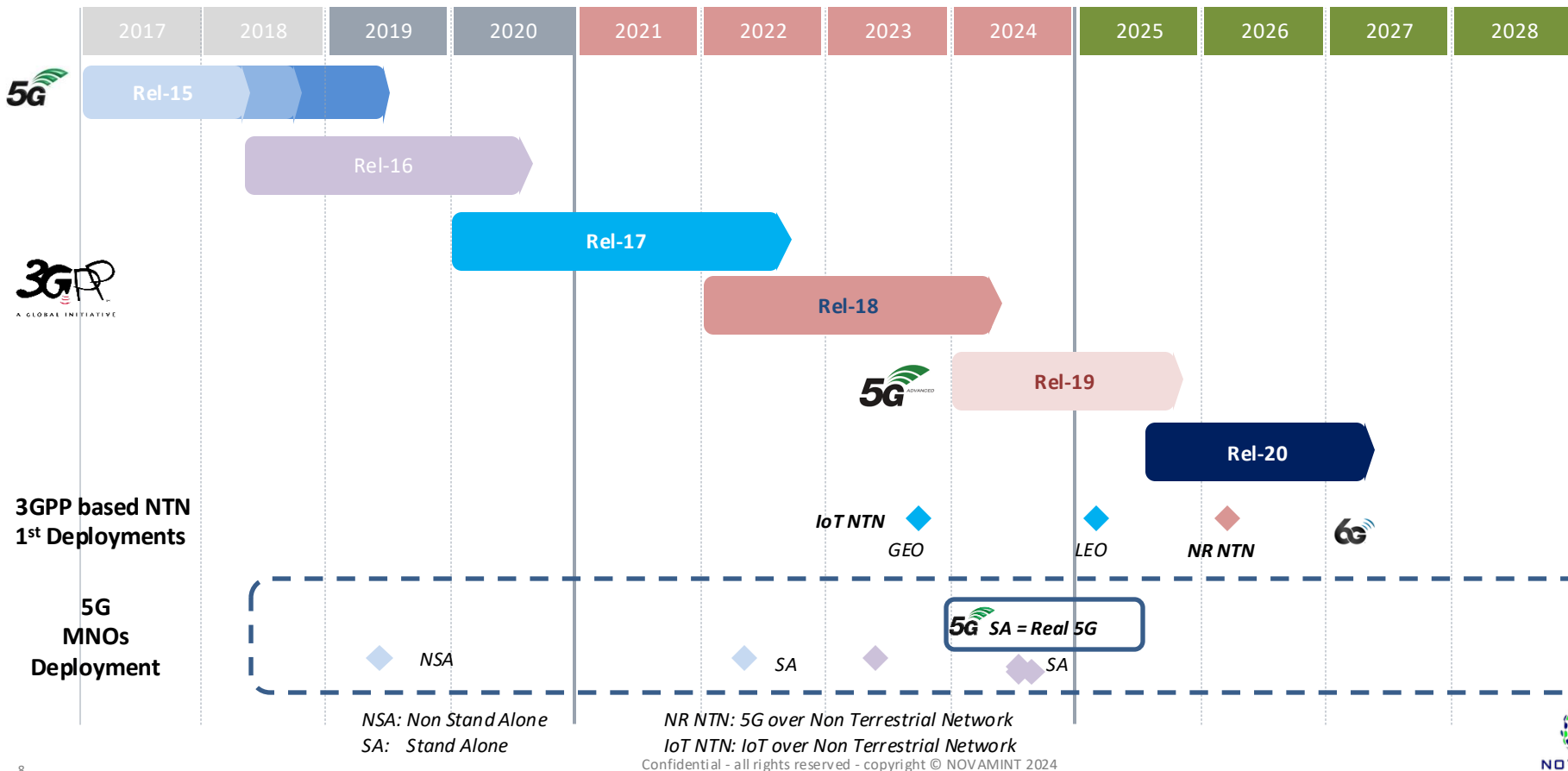Scope for Release 20 for next stages (SA2 & RAN) under definition
=> 1st scoping workshop in December 2024 (3GPP Plenaries RAN & SA)
$\Rightarrow$ Scope Rel-20 to be agreed in June 2025

3GPP – NTN – Roadmap to D2D

Multi-Orbit

Rel-20

NR NTN

- Mobile VSAT

IoT NTN

- 5GC sup of IoT NTN
- IMS call over IoT NTN (GEO)

Constellation (multi-orbits/multi services)

$IRIS^2$

Rel-19

- Downlink Coverage enhancements
- **Regenerative payload**
- **Mesh Topology: UE-SAT-UE**

- **Store & Forward**
- PWS
- Uplink Capacity Enhancement

NR NTN GSO

Advanced NR NTN NGSO

Advanced IoT NTN NGSO

Rel-18

- Network verified UE location
- Mobility enhancements

- **Disc. coverage enhancements**

NR NTN NGSO

Rel-17

- LEO/MEO/GEO
- Transparent Mode
- UE with GNSS capability

- LEO/MEO/GEO
- Transparent Mode
- **Disc. Coverage**

IoT NTN GSO

EchoStar
Viasat/Inmarsat
TerreStar Solutions

IoT NTN NGSO

Sateliot
EchoStar
OmniSpace
Viasat/Inmarsat

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5G – From standard to reality

2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028

5G
- Rel-15
- Rel-16
- **Rel-17**
- **Rel-18**
- **Rel-19**
- **Rel-20**

3GPP based NTN 1st Deployments
- IoT NTN — GEO
- LEO
- NR NTN
- 6G

5G MNOs Deployment

5G SA = Real 5G

- NSA
- SA
- SA
- SA

NSA: Non Stand Alone
SA: Stand Alone

NR NTN: 5G over Non Terrestrial Network
IoT NTN: IoT over Non Terrestrial Network

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3GPP NTN & D2D – Summary

- D2D is already supported for IoT NTN:

    – GEO – already commercial

    – NGSO - commercial launches in 2025

- NR NTN is to follow in the next 2/3 years

- In only 4 releases, 3GPP will have addressed all aspects allowing to support all D2D perspectives and all satellite deployments types

- Slower than proprietary – However it is made right

    – Fully standardized and interoperable

    – Interworking natively with Terrestrial networks

    – Will develop a large interoperable ecosystem beneficial for all – no lock in

    – Will allow proper certification

3GPP NTN – Conclusion

- **Interested in Satellite** ?

- **Come to us** & challenge us

- We are preparing **6G**

- **Bring your use cases, your requirements**…

- We will integrate it in the standard path

- You can also join the new initiative from the satellite community – **NTN Forum**

=> https://connectivity.esa.int/form/ntn-forum-registration-page

Novamint – Who we are

Novamint

- ✪ We are **independent and entrepreneurs at heart**

- ✪ We help **our clients embrace and leverage STANDARDS to achieve sustainable performance** for their business

- ✪ We offer consulting services that include individual consultants and Project Management Office (PMO) team

- ✪ We have 30 years experience **from the inside** at the heart of the **Internet/Telecom/cellular/IoT evolution**

- ✪ We have an unique combination of **system-level expertise**, **Deep knowledge of the telecommunications industry** and Expertise in **cutting-edge technologies**

- ✪ We have **Leadership on driving 3GPP/GSMA/ITU** standardization and a **proven influence on 5G/cellular IoT** devices/chipsets **roadmaps, Industry Initiatives and release scope**

- ✪ **Well known and recognized in standards** to represent verticals perspectives with a **Unique and Independent voice**

- ✪ We develop technical specifications and solutions that will be standard that will be services & products

- ✪ We **work with key telecommunications operators, suppliers and infrastructure managers** across the world

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What we do – very well

✪ **STANDARDIZATION:** We work to Integrate Verticals & Corporations Use Cases into 5G/IoT requirements and standards

✪ **INNOVATIONS:** We develop IoT & Telecom projects for Corporations or Associations

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The Benefits we deliver

- ✓ We take **full responsibility / Ownership** of your project

- ✓ we deliver **on time + on budget + to quality**

- ✓ we **reduce your costs OPEX + CAPEX**

- ✓ We **accelerate the time-to-market** of your project

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Novamint actions in standards

- **Active participation to the meetings:** online AND physically worldwide

- **Drive an end-to-end process through Standardisation across multiple Working Groups**

- **Preparation + Analysis of contributions:** Study & Work Items / Technical Report / Technical Specification

- **Socialise your position, Finding supporters** (MNOs, chipsets/device makers, Network vendors, Satcom players, verticals…)

- **Alignment meetings** with some key 3GPP players

- **Presentation/defending the contributions** in meeting (with potential revisions)

About me

Director IoT/Telecom, Spectrum and Standards at Novamint

30 years experience **from the inside** at the heart of the **Internet/Telecom/cellular/IoT evolution** with SFR (launched SMS), Vivendi Universal, Vodafone, Proximus (launched 3G), Deutsche Telekom (launched 4G)

Active member in telecom standards (ETSI, 3GPP...) since 2017
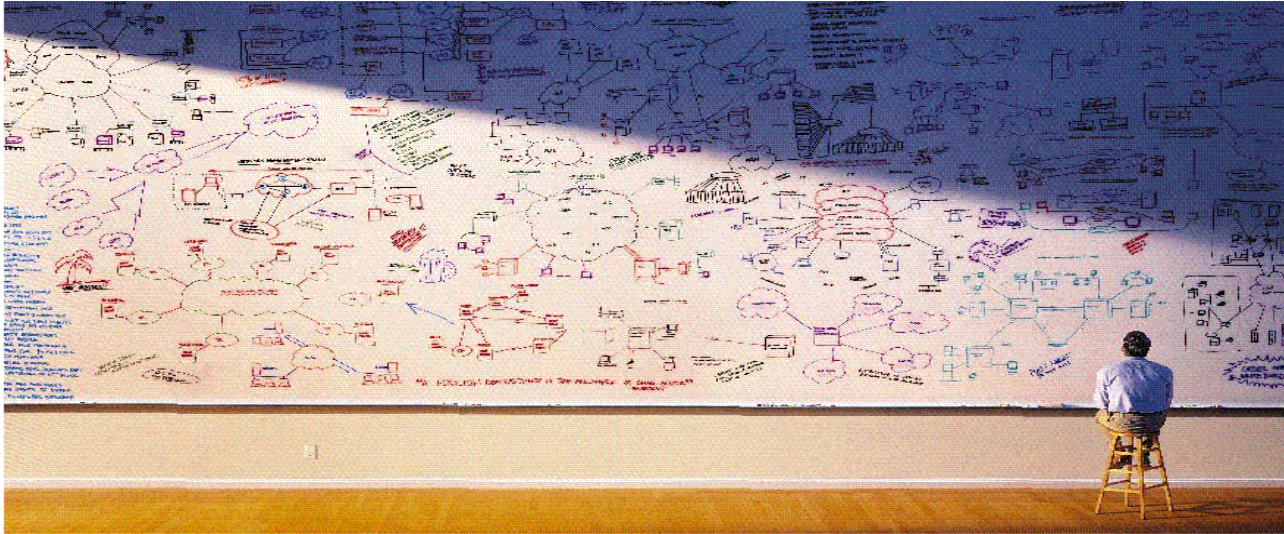
Top 1 contributor in 3GPP SA1 in 2023 & 2024 (before key telecom companies)

Board Positions:

- **EUWENA:** Board member/ Chair of the Use case Working Group
- **ETSI:** Elected Board member since 2023
- **NTN Forum:** Vice chair of the Steering Board / Chair of the Verticals Working Group

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Challenge us with your Projects!

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