6GNTN

INTERNATIONAL COLLABORATION R&D PROJECT

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SES S.A.

Co-funded by the European Union

6GSNS

6G-NTN project has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101096479.

6G-NTN at glance

The goal of 6G-NTN is to become the flagship R&I project for **developing the 6G NTN component** and **driving its standardization** phase in 3GPP as part of Rel-20

6G-NTN Consortium

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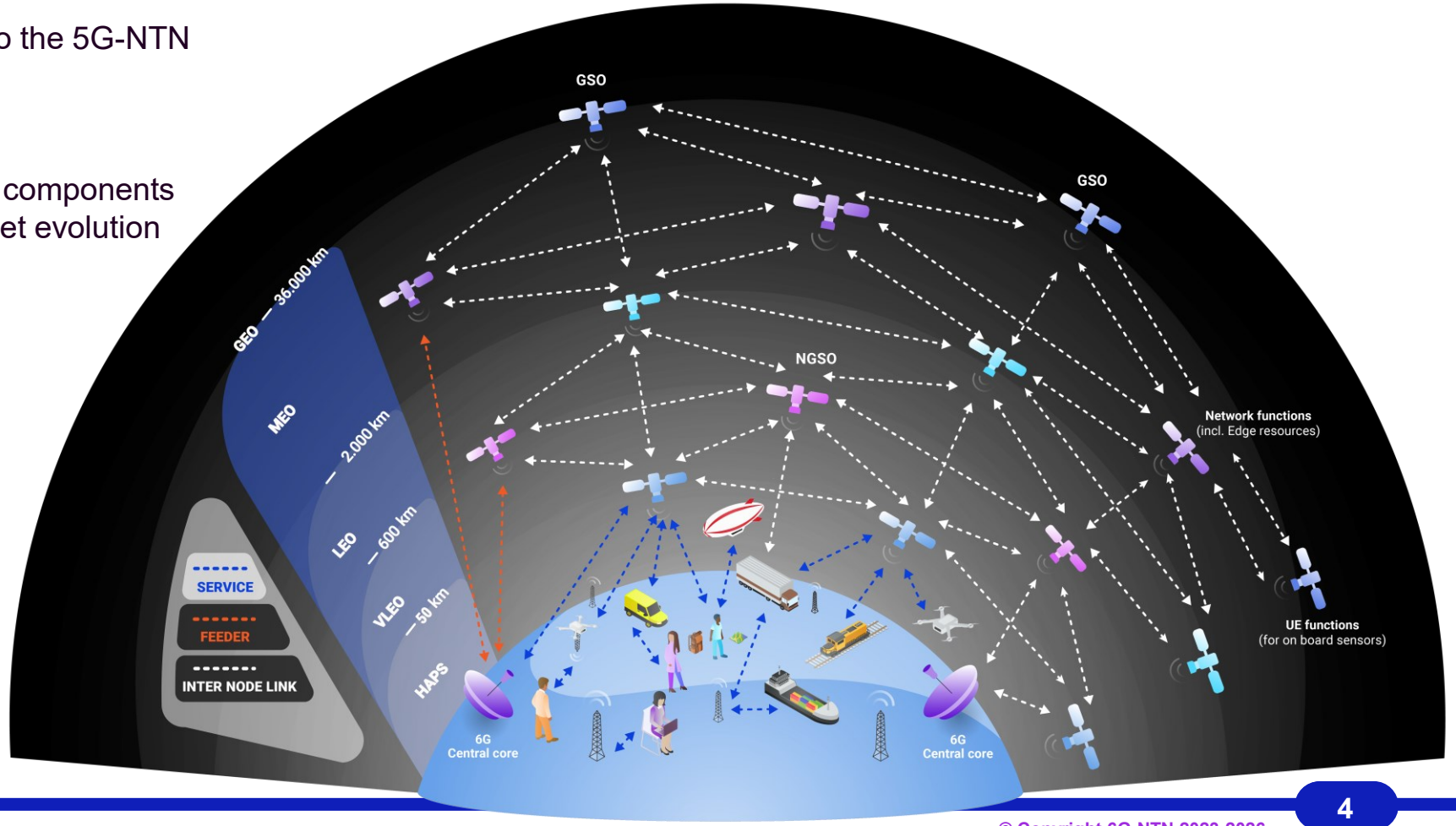
6G-NTN project is part of the cluster of European projects funded under the European Smart Networks and Services Joint Undertaking (**SNS JU**)

6G-NTN Vision

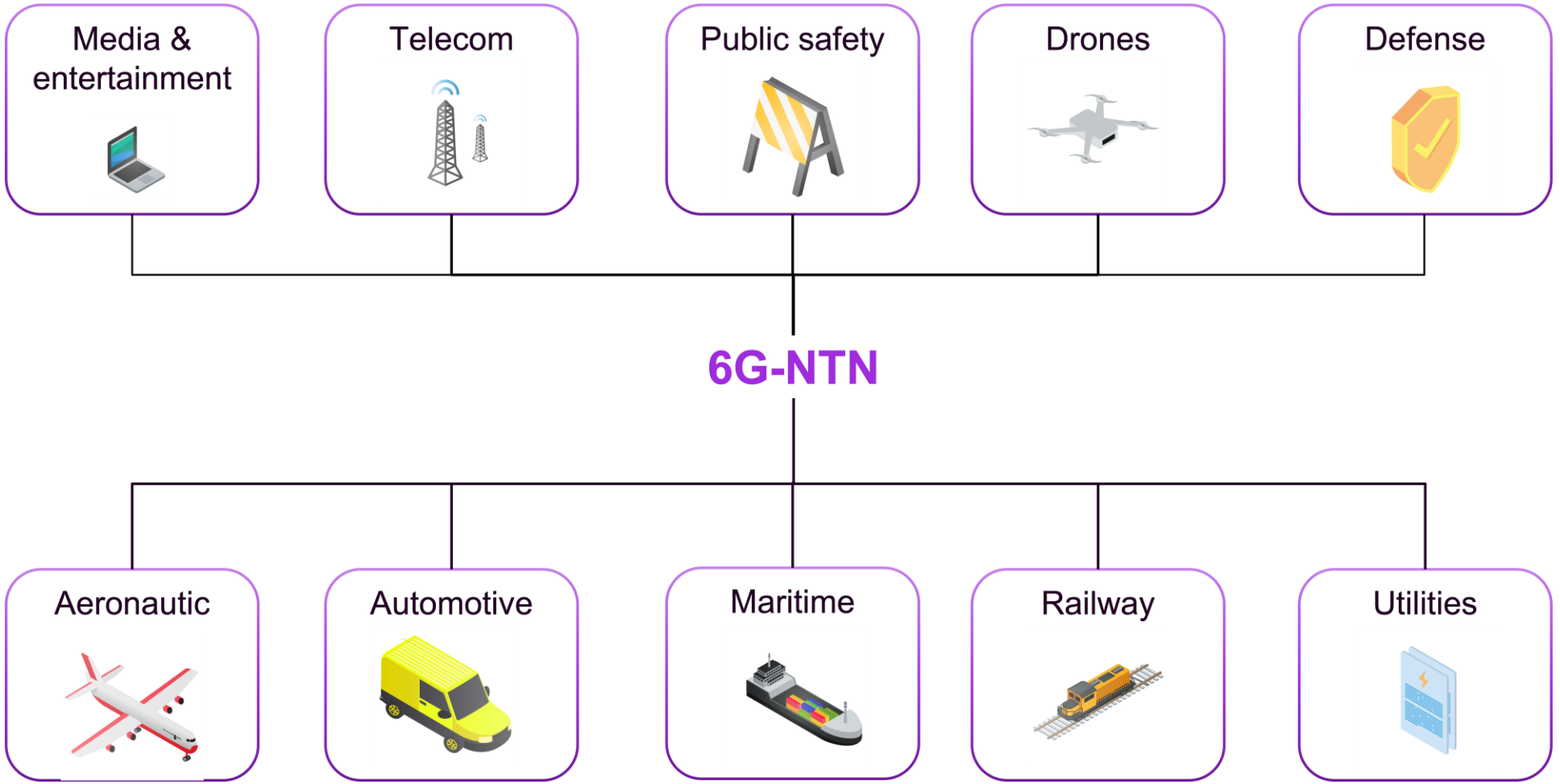
An NTN component fully integrated into the future 6G infrastructure and better meet the needs of vertical markets and end-users

- Disruptive performance with respect to the 5G-NTN
- Global coverage
- Increased resiliency
- Improved sustainability
- Interoperability between NTN and TN components
- Flexibility and agility to meet the market evolution



6G-NTN Addressed Markets

Vertical stakeholders



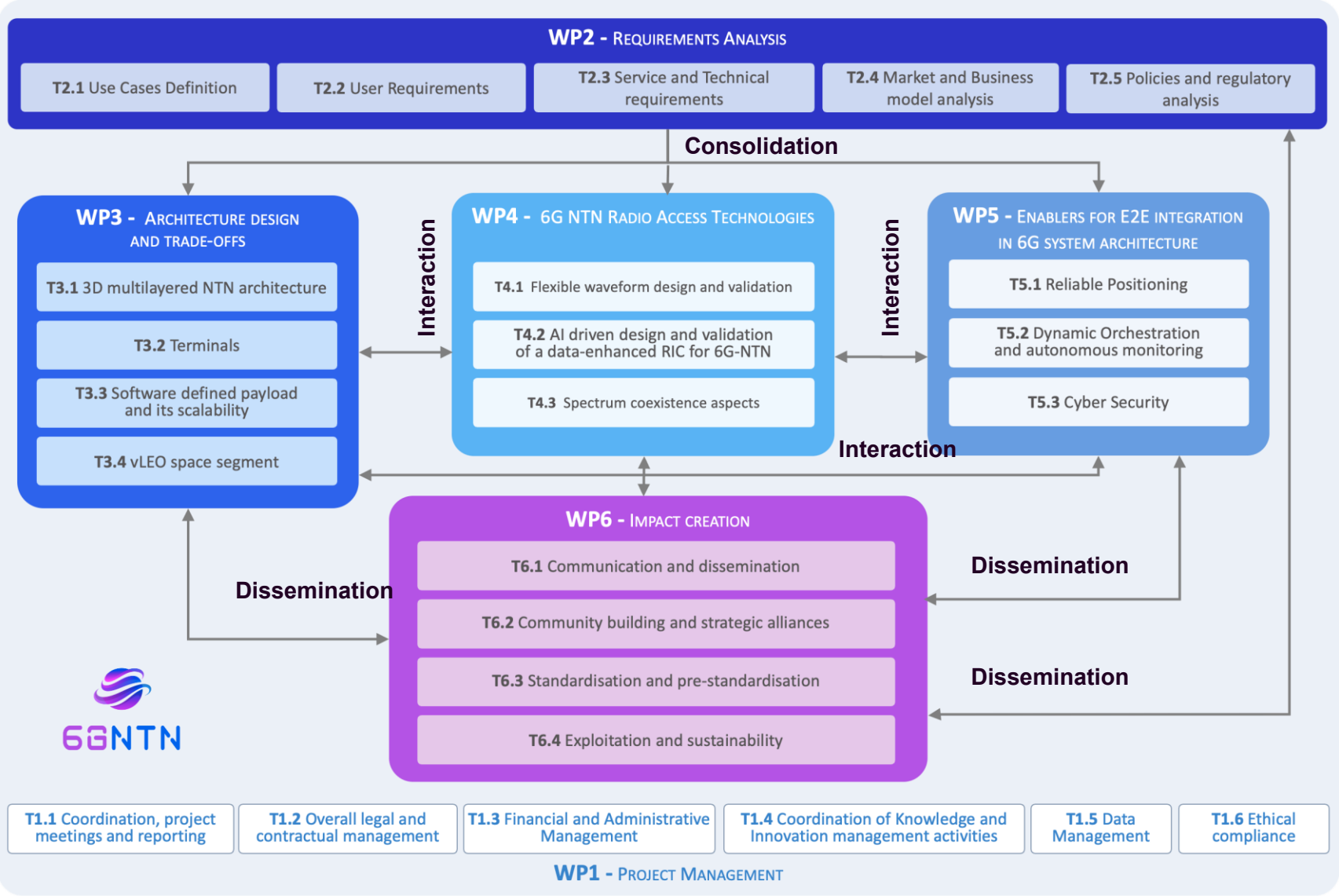
6G-NTN User Service KPIs

6G-NTN target services			eMBB performance		Quasi ULLRC performance		Location
Connectivity	Terminal Type	Band	Outdoor/ Open sky conditions	Indoor (light)	Outdoor/Open sky conditions		Outdoor/Open sky conditions
smart phones	3GPP UE Class 3	sub-6 GHz	up to 20 Mbps (DL) and 2 Mbps (UL)	at least SMS for emergency purposes	up to 1 Mbps	RTD over the air < 15 ms Reliability: 99.999%	Horizontal and vertical position error: < 10 cm Reliability (confidence level) > 95 % Service latency: < 1 s
cars and drones	USAT <15 cm equivalent aperture	sub-6 GHz	up to 80 Mbps @ 99.9% radio link availability	at least SMS @99.9% radio link availability	up to 4 Mbps @ 99.9% radio link availability		
		mmWave	up to 300 Mbps @99% radio link availability	N/A	up to 25 Mbps @ 99% radio link availability		
mobile platforms	VSAT >=60 cm equivalent aperture	sub-6 GHz	up to 80 Mbps @ 99.9% radio link availability	N/A	up to 4 Mbps @ 99.9% radio link availability		
		mmWave	up to 1.6 Gbps @ 99% radio link availability		up to 100 Mbps @ 99% radio link availability		

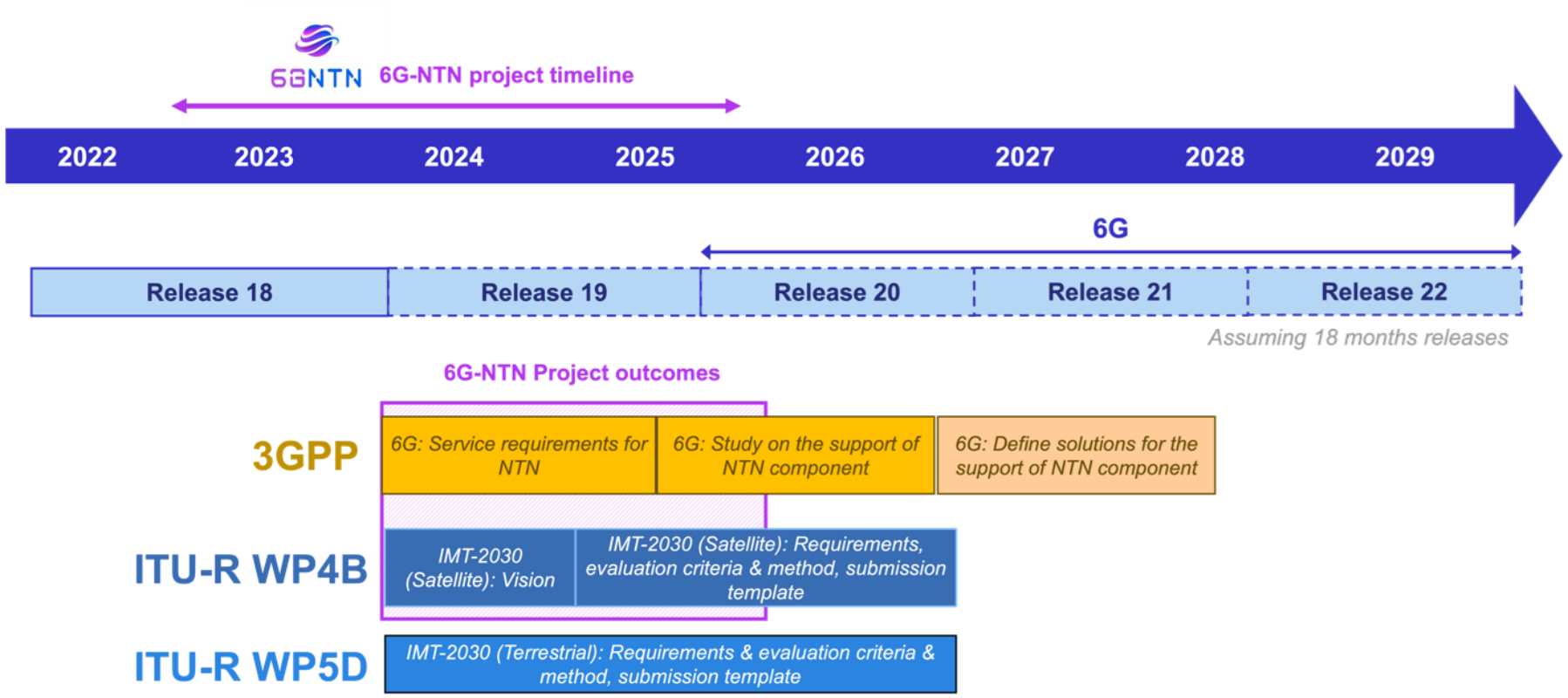
6G-NTN Key Societal Value Indicators

- **Inclusiveness** through a global coverage providing 6G services in areas where deployment of terrestrial solutions is not economically viable
- **Resilience** through massive redundancy in terms of connectivity between multi-layer network nodes at various altitudes
- **Efficiency** through optimised spectrum usage based on efficient spectrum coexistence and spectrum sharing techniques
- **Sustainability** through Artificial Intelligence driven radio resource management, mobility and traffic routing
- **Interoperability** through a standardised flexible waveform for 6G integrated radio access network

6G-NTN Work Logic



6G-NTN Timeline with 3GPP Schedule



The 6G-NTN project will define a roadmap for the development of the building blocks needed for enabling integrated NTN service provisioning and disruptive market offer in the 2030-35 timeframe.

6GNTN

THANKS

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6G-NTN Facts and Figures

Addressing call: ”SNS-2022-STREAM-B-01-03: Communication Infrastructure Technologies and Devices”

Overall goal: Develop an NTN component fully integrated with the 6G infrastructure able to provide enhanced Mobile BroadBand (eMBB) and Ultra Reliable Low latency (URLL) services to vertical industries and consumers terminals in indoor and outdoor conditions.

Targeted TRL: 2 - 4

Duration: 36 months

Project kick-off: 1 January 2023

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6G-NTN Objectives

OBJ 1

- Identify the **target service and operational requirements** for 6G NTN component

OBJ 2

- Design/sizing of a **3D NTN** to meet the target user requirements

OBJ 3

- Design trade-off and assessment of **compact terminals targeted by the 3D NTN component**

OBJ 4

- Design flexible **software defined payload** across flying platforms and frequency bands

OBJ 5

- Design **key characteristics/features of a flexible waveform** for 6G's integrated radio access network

OBJ 6

- Design and evaluation of **AI data-enhanced multi-orbit multi-connectivity radio intelligent controller**

OBJ 7

- Design and development of **dynamic orchestration of Virtual Network Functions** in a 3D network for 6G

OBJ 8

- Design a **reliable and accurate positioning function** for the 6G system with a precision below 10 cm

OBJ 9

- Design **enabling features for spectrum usage optimisation** between the different network nodes

OBJ 10

- Maximise the **impact of 6G-NTN** and strengthening Europe's industrial leadership in the sector

6G-NTN Expected Impact [1/2]

Expected outcome	Planned contribution	Scientific	Economical/Technological	Societal
Fixed backhaul and long-haul networks with performance levels compatible with 6G KPI's in terms of data-rate, capacity, latency, and flexibility	Usage of: • higher bandwidth (up to 200 Mbps with USAT or up to 1 Gbps with VSAT) • lower latency capabilities (down to 10 ms)	Usage of Q/V band on the service link of satellite network	Connectivity to: • public safety's vehicle-mounted or nomadic tactical bubble • Access points on board trains, public transport road vehicles and cars for passengers • drones for video surveillance of critical infrastructures • vehicle-mounted access point for in-field media news gathering • customer premises in remote areas	Reduce the digital divide and provide ubiquitous connectivity service

6G-NTN Expected Impact [2/2]

Expected outcome	Planned contribution	Scientific	Economical/Technological	Societal
Maximisation of coverage and access to B5G and 6G services where terrestrial networks are not economically viable	Definition of a NTN component for 6G able to provide: • increased data rate, • latency reduction, • improved location accuracy	Assessment of the feasibility of deploying and operating: • VLEO • HAPS complementing satellite at MEO or GEO orbits	Analysis of the following criteria impacting the economic viability and relevant business model: • Number of satellites and launches • satellite life duration • payload design to cost • terminal price point	The support of: • economically viable uRLLC • advanced eMBB services Via NTN will enable to address new use cases of: • the vertical industries • consumer market
Development of 3D scalable networks capable to address flying devices, primarily designed for 2D usage	High resilience from the 3D network	The high resiliency is achieved through massive connectivity between the different network nodes of the 3D network via: • RF inter-node links • Optical based inter-node links	The 3D network serves: • the flying devices • any mobile platforms	Support of the increasing critical communication requirements of the digital economy