



Horizon Europe 6G-NTN R&D project
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In this statement, the Horizon Europe 6G-NTN project consortium would like to provide feedback to RSPG on its opinion stated in "The development of 6G and possible implications for spectrum needs and guidance on the rollout of future wireless broadband networks" and dated 14th June 2023

1) The 6G-NTN consortium does welcome European Radio Spectrum Policy Group (RSPG) opinion which

- *7. Recognises the role of and need for non-terrestrial networks to support 6G development further current initiatives on 5G. Non-terrestrial networks could become an important additional connectivity layer to terrestrial connectivity services, e.g. to provide coverage in underserved areas, provide global connectivity to logistics and transport, support disaster relief and serve as a fallback layer or backhaul for terrestrial networks.*

2) The 6G-NTN consortium also acknowledges the following roles of non-terrestrials (NTN) in 5G and 6G identified by RSPG:

- *"interim or disaster relief solution*
- *for 5G and 6G specific applications with high data rates the use is limited, use as fall back to for 4G kind of applications in case of emergency may be a valid scenario*
- *providing coverage to isolated/underserved areas*
- *broadband connectivity in worldwide logistics, transport and energy sectors*
- *certain IoT applications*
- *redundancy purposes*
- *backhauling"*

Furthermore, the 6G-NTN project is considering in priority use cases of benefits for vertical stakeholders such as automotive, transport (aeronautic, maritime and railway), utilities, public safety, media and entertainment, agriculture and defence. This includes

- The provision of enhanced emergency communications with light indoor coverage and trusted/accurate location
- The support of increased driving autonomy of land vehicles as well as airborne and maritime drones
- The response to complex crisis involving massive connectivity between multiple stakeholders

It is also addressing key enhancements to the network operation in the areas of resiliency, energy consumption and spectrum usage.



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3) However given their capacity limitations, Non-terrestrial networks (NTN) are unlikely to become *“competitive to terrestrial networks”*, however they will certainly contribute to the *“global continuity and enhanced reliability of the 5G/6G service”*, *“to improve the resilience of 5G/6G communication during large-scale disasters”* and *“to extend network coverage in underserved areas enabling ubiquity of communications and service continuity”*.

4) In order to support the aforementioned use cases and enhanced network operations, the 6G-NTN project is investigating the feasibility of providing higher service performances compared to 5G as listed in the table below. Note however that these target performances may be revisited during the project and will not necessarily be standardized.

Service performances	Performance values of NTN in 5G, as per 3GPP targets and ITU-R Satellite IMT-2020 requirements	Target service performance under investigation in the 6G-NTN project
Data rate (DL/UL) wrt Handheld devices	1/0.1 Mbps (Outdoor only) @ up to 3 km/h	Outdoor conditions: Tens of Mbps @ up to 3 km/h Light indoor/in car conditions @ up to 250 km/h (if on board a vehicle): At least Short Message Service capability
Data rate (DL/UL) wrt Vehicle or drone (flying and surface) mounted devices	[50/25] Mbps @ up to 250 km/h (with 60 cm aperture)	Hundreds of Mbps (Outdoor only) @ up to 250 km/h (with <20 cm equivalent aperture)
Data rate (DL/UL) wrt Large Aeronautic, maritime platforms mounted devices	[50/25] Mbps @ up to 250 km/h	Thousands of Mbps (Outdoor only) @ up to 1200 km/h (with <60 cm equivalent aperture)
Location service (target accuracy and acquisition time) in outdoor conditions only	NW-based verification of the UE-provided GNSS location with accuracy of a few km and within <100 seconds	respectively down to 0.1 meter and < 1 second (95% reliability through Network positioning method)
Coverage	Outdoor only	Light indoor/In car
Reliability	up to 99.99%	up to 99.999%
Latency	down to 10 ms (RTD) at 90° elevation for LEO satellites	down to 10 ms (RTD) at 30° elevation for LEO satellites
Connection density	Up to 500 per km ²	>1000 per km ²

5) In line with RSPG opinion, *“Efforts to integrate non-terrestrial components into 5G and 6G could be of great benefit.”*, the 6G-NTN project is researching technical enablers for the native integration of satellite and HAPS with mobile and wireless access technologies in the 6G system.



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6) Last it shall be noted that as part of the research 6G-NTN project, the following frequency band options for NTN in 6G are being considered for optimization, coexistence analysis & performance assessment:

Targeted user equipment	Frequency band options considered in the 6G-NTN project
Smartphones & low cost IoT devices	FR1: FSS and MSS allocations in L & S bands and C band
Vehicle/drone mounted devices and to large Aeronautic, maritime platforms	Above 10 GHz: FSS and MSS allocations in Ka band, Ku band and Q/V bands

Note that these frequency band options may be revisited during the project. The selection of these options does not imply any standardization plan by any of the consortium members.