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# 6G SNS

## 6G SHort range extreme communication IN Entities (6G-SHINE)

### Motivation

6G is expected to take the form of a 'network of networks'. It will integrate subnetworks with diverse characteristics in terms of coverage, operational purpose, and spectrum, including cellular, non-terrestrial, drone, campus and private networks.

**In-X subnetworks** are located at the very end of the 6G 'network of networks' to support highly localized and high-performance connectivity. For example, in-vehicle wireless subnetworks may replace the wired infrastructure for the anti-lock braking system (ABS), motor control and advanced driver-assisted systems (ADAS); in-robot subnetworks can wirelessly support fast closed loop control, e.g. force control; in-classrooms subnetworks can be used for extended reality (XR) applications for educational purposes. These use cases may be demanding extremely high data rates, or low latencies and high reliability – especially for life-critical applications.

### Workplan

The 6G-SHINE project plans to pioneer the main technology components for wireless in-X subnetworks and prepare their adoption to the future 6G standards. In this respect, the project plans to:

- Define relevant application scenarios, use cases and architectures for in-X subnetworks, and analyze related performance requirements.
- Characterize the radio propagation channel in the short-range scenarios and frequency bands of interest, considering <10 GHz, mmWave and sub-THz spectrum regions.
- Design new physical layer (PHY) and medium access control (MAC) enablers for scalable requirements in terms of latency, reliability or data rate, leveraging the opportunities offered by short



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### Budget

5.46 Mio. € over all, funding of 4.99 Mio. € by the European Union

### Project Duration

01.03.2023 to 31.08.2025  
(30 months)

### Website

<http://www.6gshine.eu>





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range subnetworks. Envisioned PHY/MAC enablers include short range beamfocusing techniques for constrained devices, reflective intelligent surfaces, intra-subnetwork macro diversity, predictive schedulers, flexible/full duplexing transmission.

- Develop cost effective radio resource and spectrum management techniques (considering both legitimate and malicious interferers) in dense dynamic subnetwork crowds. The project will explore fully distributed solutions -where subnetworks perform their decisions independently-, as well as centralized and hybrid approaches- where an umbrella 6G network can aid operations of subnetworks in its coverage area.
- Develop new methods for integration of subnetworks in the 6G architecture and efficient orchestration of spectrum and computational resources among in-X subnetworks and a wider 6G 'network of networks'.

## Perspective

The 6G-SHINE technology components will leverage the opportunities offered by short-range communications and connectivity with a broader 6G network, to ensure a low-cost high-performance radio design while dealing with major challenges such as signal blockage, interference due to densification, and proneness to malicious attacks.

## 12 Partners, 9 Countries

