

Next Generation Wireless Networks Challenge: Advancing High Performance, Low Energy Systems for Terahertz, Wireless Optical, and Sensing Domains

Background

The Next Generation Wireless Networks Challenge aims to support companies/organisations to develop new systems/components/subcomponents (across hardware and software) advancing capabilities in wireless communications, specifically focusing on the terahertz, wireless optical, and sensing domains. The challenge seeks to encourage industry leaders to deliver prototypes of high-performance, low-energy system and component technologies that can revolutionise wireless networks. By delivering these prototypes by 2025, the challenge aims to address the increasing demand for advanced wireless connectivity solutions in crowded spectrum space. Additionally, the challenge emphasises the importance of commercial scalability, with the objective of facilitating the commercial rollout of these technologies by 2030.

Objectives:

- **Prototype Delivery:** The primary objective of this challenge is to develop and deliver prototypes of high-performance, low-energy system and component technologies in the terahertz, wireless optical, and sensing domains. These prototypes should showcase groundbreaking advancements in wireless network technologies and demonstrate superior performance and energy efficiency.
- **Connectivity Solutions:** The challenge aims to drive the development of connectivity solutions that can meet the growing demand for advanced wireless communication in crowded spectrum space. The prototypes should serve as the foundation for reliable, high-capacity wireless networks that can fulfil the connectivity needs of the UK and global markets.
- **Commercial Scalability:** The challenge focuses on prototypes that exhibit commercial scalability. The developed technologies should have the potential for widespread deployment and integration into existing and future wireless networks. The scalability plan should consider factors such as cost-effectiveness, interoperability, regulatory compliance, and market demand.

Scope and Deliverables:

- **Research and Development:** Participants are encouraged to conduct research and development activities to advance high-performance, low-energy system and component technologies in the terahertz, wireless optical, and sensing domains. The focus should be on developing innovative solutions that push the boundaries of wireless network capabilities and enhance connectivity.
- **Prototyping:** Participants must deliver functional prototypes that showcase the capabilities of their proposed technologies. These prototypes should demonstrate high performance, low energy consumption, and compatibility with the target wireless network domains. Participants should provide comprehensive documentation, test results, and analysis to support the effectiveness and viability of their prototypes.
- **Performance Metrics:** The delivered prototypes will be evaluated based on key performance metrics, including data transmission rates, capacity, energy efficiency,

spectral efficiency, and range. Participants should provide thorough performance data to demonstrate the superiority of their solutions compared to existing wireless network technologies.

- **Scalability Assessment:** Participants should assess the commercial scalability of their prototypes. This assessment should consider factors such as manufacturability, deployment complexity, compatibility with existing infrastructure, regulatory compliance, and market demand. A clear roadmap and plan for commercial rollout should be provided, outlining steps for mass production, integration, and market penetration.

Collaboration and Evaluation

Collaboration: Participants are encouraged to collaborate with industry partners, research institutions, and relevant stakeholders to leverage collective expertise and resources. Collaboration should foster innovation, accelerate prototype development, and ensure alignment with global standards and market needs.

Evaluation: The delivered prototypes will be evaluated by a panel of experts based on their performance, energy efficiency, scalability, and alignment with the objectives of the challenge. The evaluation process will consider the potential impact of the prototypes on advancing wireless network technologies and meeting global connectivity demands.