



# Terahertz based Ultra High Bandwidth Wireless Networks.

Website:  
[www.terapod-project.eu](http://www.terapod-project.eu)

Project Start:  
**September 2017**

Duration:  
**36 months**

Total cost:  
**€3.46M**

Programme:  
**H2020-ICT-2016-2- "Networking  
research beyond 5G"**

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This project has received funding from the  
European Union's Horizon 2020 research and  
innovation programme under grant agreement  
761579 (TERAPOD)



*The TERAPOD project aims to investigate and demonstrate the feasibility of ultra high bandwidth wireless access networks operating in the Terahertz (THz) band. The proposed TERAPOD THz communication system will be developed, driven by 'beyond 5G' usage scenario requirements, will be demonstrated with a "first adopter" operational setting (Data Center) and will significantly progress innovations across the full communications protocol stack.*

## TERAPOD VISION

TERAPOD pursues the ambitious vision of the short-range Tbit/s wireless connectivity paradigm, by exploiting 3 of the most promising emerging THz device technologies, namely (1) resonant tunnelling diodes, (2) uni-traveling carrier photodiodes and (3) Schottky barrier diodes to enable the development and integration of the building blocks required for ultra-broadband communications in the THz spectrum. Therefore, TERAPOD employs an holistic approach where multiple technologies are explored simultaneously.

The vision of TERAPOD project is that to push the boundaries of the THz communications, the combination and integration of multiple technologies is required and should be explored to pave the way for future Tb/s wireless communications.

## TERAPOD OBJECTIVES

The goal of Terapod will be achieved through four key objectives:

1

Advance the Technology Readiness Level (TRL) of THz communication devices and systems, out of the lab and towards industrial and SME uptake, within the context of beyond 5G usage scenario requirements.

2

Demonstrate the feasibility of THz communication systems in beyond 5G scenarios through a fully integrated 'first adopter' Data Center demonstrator.

3

Address the non-technical barriers to adoption of THz communication in the areas of Regulation and Standardisation.

4

Promote scientific research and innovation of THz communications systems in Europe.



## TERAPOD CONCEPT

The demand for bandwidth in wireless communications has doubled every 18 months since 1980 following the well-known Edholm's law. A 2016 Cisco report concludes that by 2020, Wi-Fi and mobile devices will account for 66 percent of all IP traffic up from 48 percent in 2015, while the global internet traffic is expected to grow three-fold between 2015 and 2020. This means an approximate four-fold increase in the demand for wireless connectivity. This growing demand results essentially from increased traffic requirements from existing users, which translates into higher wireless data-rate requirements. In fact, it is expected that wireless data-rates of multiple tens of Gbit/s will be required by the year 2020. In order to support these future demands, there is an urgent need to develop new technology platforms beyond currently available wireless technology where only marginal gains are possible.

The saturation of wireless spectrum access is leading to innovations in areas such as spectrum resource usage and massive multiple input multiple output (MIMO) systems. It is widely thought however that the low hanging fruits of innovation for wireless communication are all but exploited with only marginal gains possible. For a real step change towards the coveted 1Tbps wireless transmission, new areas of the spectrum must be utilized. This has been clearly identified in the ICT-09-2017 specific challenge of pushing spectrum access above 90GHz towards THz. Recent breakthroughs in terahertz systems by key members of the TERAPOD consortium are overturning the "Terahertz gap" stigma associated with the previously difficult to access spectrum. With the emergence of viable THz communications systems on the horizon, it is crucial to contribute THz communication and networking to the technology roadmap for beyond the 5G timeframe and a step closer to industrial uptake.

## TERAPOD IMPACT

1

Accelerating improved data centre management through the availability of THz wireless communications. The technology could be a market game changer in the modern data centre industry.

2

Designers, manufacturers and users will be provided with a range of tools (simulations developed by TUBS) for assembling and building THz comms systems.

3

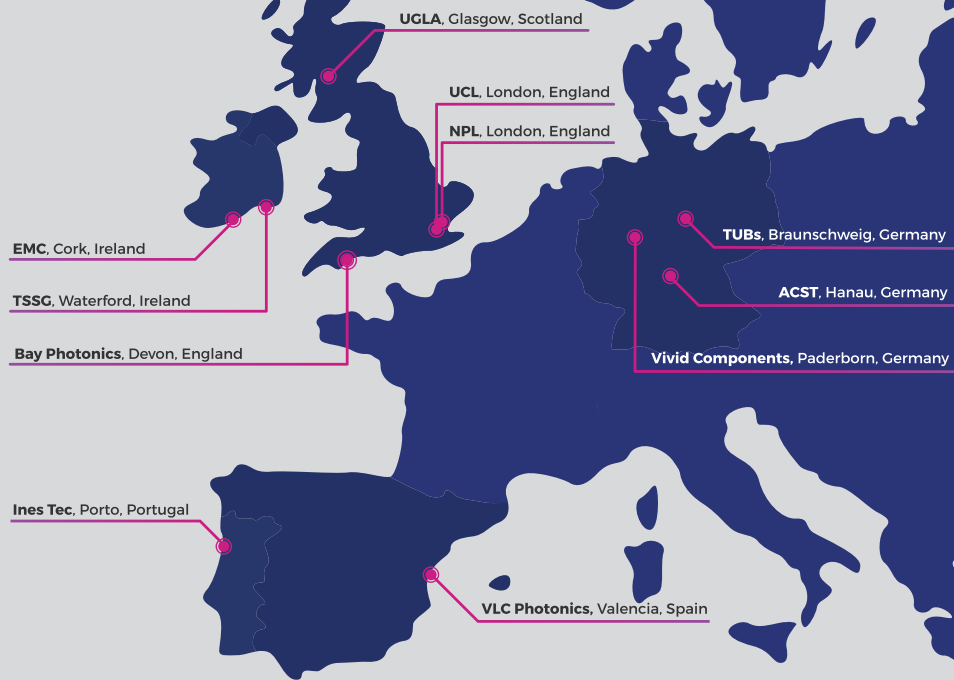
TERAPOD's robust dissemination plan [Section 2.2 a) and WP7] will allow the research and innovation advances in THz communication systems and protocols to be disclosed to the scientific and engineering community enabling further research and development to be undertaken in THz science, technology, and in wireless communications as well as a myriad of other applications (e.g. imaging, analysis, space, etc.).

4

The technology that is researched and innovated in TERAPOD will help to grow the THz market for applications primarily in wireless communication. The project consortium comprises 1 MNC market leader and 3 SMEs who are committed to exploiting the technological outputs to increase their competitiveness.

5

Global take-up and adoption of standardised metrics for THz comms systems, including SMEs and multinationals.



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