



Terahertz technology

for ultra-broadband and ultra-wideband operation of backhaul and fronthaul links in systems with SDN management of network and radio resources



PHOTONICS PUBLIC PRIVATE PARTNERSHIP

TERAWAY project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under G.A No 871668 and it is an initiative of the Photonics Public Private Partnership.

Vision

'Enabling industrialization of THz wireless communication technology'

In line with the 5G vision for a fully mobile and connected society, Terahertz (THz) wireless communication is envisioned as a key technology to fulfill the future demands for ultra-broad bandwidth, high-capacity, reliable and ubiquitous wireless systems, beyond 5G.

Despite the technological progress and the discrete achievements in this field, the full potential of THz technology and its constructive impact in the telecom industry is yet to be exploited and realized.

TERAWAY comes as a technology-intensive project aiming to develop a new generation of THz transceivers able to overcome current limitations and challenge the commercial uptake and industrialization of THz technology.

Concept Objectives

Leveraging optical concepts and photonic integration techniques, TERAWAY will develop a technology base that combines the generation, emission and detection of wireless signals with selectable symbol rate and bandwidth up to 25.92 GHz within an ultra-wide range of carrier frequencies covering the W-band (92-114.5 GHz), D-band (130-174.8 GHz) and THz band (252-322 GHz).

The use of photonics will enable the development of multi-channel transceivers with amplification of the wireless signals in the optical domain and with

multi-beam optical beamforming capabilities, obtaining a radical increase in the directivity of each wireless beam.

In parallel, a new software defined networking (SDN) controller and an extended control hierarchy will be developed for the management of the network and the radio resources in a unified manner, capable of providing network slices to the support of diverse services.

TERAWAY transceivers will be evaluated at the 5G demo site of AALTO in Finland, under an application scenario of communication and surveillance coverage of outdoor mega-events, using moving nodes in the form of heavy-duty drones.

Impact

TERAWAY is expected to have a disruptive effect on the usability of the THz band by developing a technology base that will facilitate the thorough investigation of THz-transmission solutions and their incorporation into a meaningful system environment, establishing the conditions for their adoption by the next generation networks.

TERAWAY will make available a set of ground-breaking transceiver modules with 4-channel modules operating from 92 up to 322 GHz, offering up to 241 Gb/s total data rate with transmission reach more than 400 m in the THz band. Four (4) independently steered wireless beams will be used to establish BH and FH connections between fixed terrestrial and moving network nodes.

TERAWAY project aims to provide for the first time the possibility to organize the spectral resources of a network within W/D/THz bands into a common pool of radio resources that can be flexibly coordinated and used for BH and FH connectivity.



TERAWAY at a glance

Project Title: Terahertz technology for ultra-broadband and ultra-wideband operation of backhaul and fronthaul links in systems with SDN management of network and radio resources

Project Coordinator: Institute of Communication and Computer Systems of the National Technical University of Athens (GR)

Duration: November 2019 – October 2022

Partners: Institute of Communication & Computer Systems (GR), Fraunhofer Institute for Telecommunications, Heinrich-Hertz Institute (DE), Universidad Carlos III de Madrid (ES), LioniX International BV (NL), Optagon Photonics (GR), Telefónica Investigación y Desarrollo (ES), The Ferdinand-Braun-Institut, Leibniz-Institut fuer Hochstfrequenztechnik (DE), PHIX BV (NL), Intracom S.A. Telecom Solutions (GR), SIAE Microelettronica spa (IT), AALTO Korkeakoulusaatio SR (FI), Cumucore OY (FI)

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