European Commission

ThoR

ThoR will apply European and Japanese state-of-the-art photonic and electronic technologies to build an ultra-high bandwidth, high dynamic range transceiver operating at 300 GHz combined with state-of-the-art digital signal processing units.

AT A GLANCE

Project title:
TeraHertz end-to-end wireless systems supporting ultra high data Rate applications

Projects coordinator
TECHNISCHE UNIVERSITAET BRAUNSCHWEIG (Germany)

Partners from:
DEUTSCHE TELEKOM AG (Germany)
FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Germany)
SIKLU COMMUNICATION LTD (Israel)
UNIVERSITE DE LILLE (France)
UNIVERSITAET STUTTGART (Germany)
VIVID COMPONENTS LTD (UK)

Duration:
07/2018 - 06/2021

Total cost:
1.5 M€

EC Contribution:
1.5 M€

Programme:
H2020-EU.2.1.1-Industrial Leadership

Further information:
www.thorproject.eu

Context and motivation
Data traffic densities of several Tbps/km² are already predicted for 5G networks. To service a fully mobile and connected society networks beyond 5G must undergo tremendous growth in connectivity, data traffic density and volume as well as the required multi-level ultra-densification.

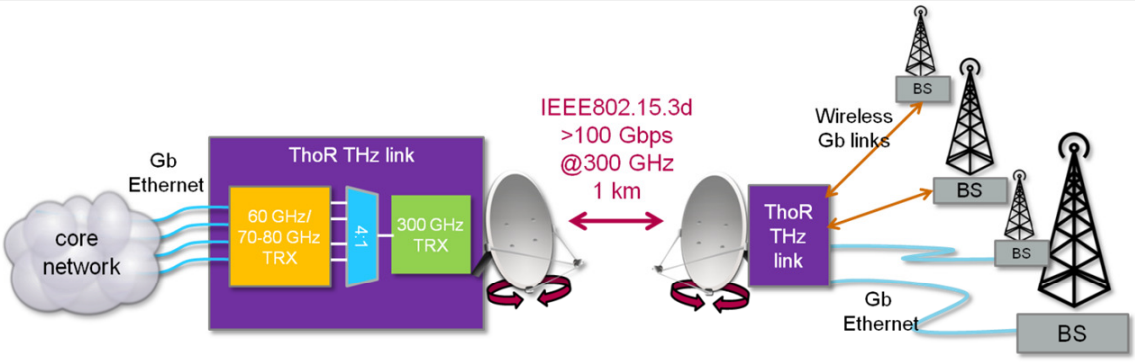
Solution
The ThoR project will provide technical solutions for the backhauling/fronthauling of this traffic. The ThoR consortium brings together the leading Japanese and European players from industry, R&D and academia, whose prior work defines the state-of-the-art in high data rate long range point-to-point THz links. This team has been instrumental in defining and implementing the new IEEE 802.15.3d Standard “100 Gbps Wireless Switched Point-to-Point Physical Layer.” ThoR’s technical concept builds on this standard, in a striking and innovative combination using state-of-the-art chip sets and modems operating in the standardized 60 and 70 GHz bands, which are aggregated on a bit-transparent high performance 300 GHz RF wireless link offering >100 Gbps real-time data rate capacity.

Expected impact
ThoR will apply European and Japanese state-of-the-art photonic and electronic technologies to build an ultra-high bandwidth, high dynamic range transceiver operating at 300 GHz combined with state-of-the-art digital signal processing units in two world-first demonstrations: a)>100 Gbps P2P link over 1 km at 300 GHz using pseudo data in indoor and outdoor controlled environments b)>40 Gbps P2P link over 1 km at 300 GHz using emulated real data in a live operational communication network.

This will require specific THz PHY technology advances (KETs) in photomixers, amplifiers including Travelling Wave Tube amplifiers, receivers, upconverters and channel aggregation.

The success of ThoR will represent the first operational use of THz frequencies in ICT and this influential and powerful consortium will directly influence and shape the frequency regulation activities beyond 275 GHz through agenda item 1.15 of WRC 2019.

ThoR approach: capability of 300 GHz backhaul/ fronthaul links



Key Enabling Technologies (KETs)

1-Photonics-based LO
2-Electronic THz amplifier and up-converter
3-High Power THz TWTA
4-Electronic THz receiver
5-Digital baseband & networking interface
6-Spectrum regulation and interference mitigation

Key Performance indicators (KPIs)

1-Transmitter linearity, bandwidth & output power
2-Spectral purity of photonic THz LO
3-Bandwidth, noise & linearity in the receiver
4-Real-time data rate processing capability
5-Spectral efficiency (bit/s/Hz)
6-System capacity (Gbps×km)