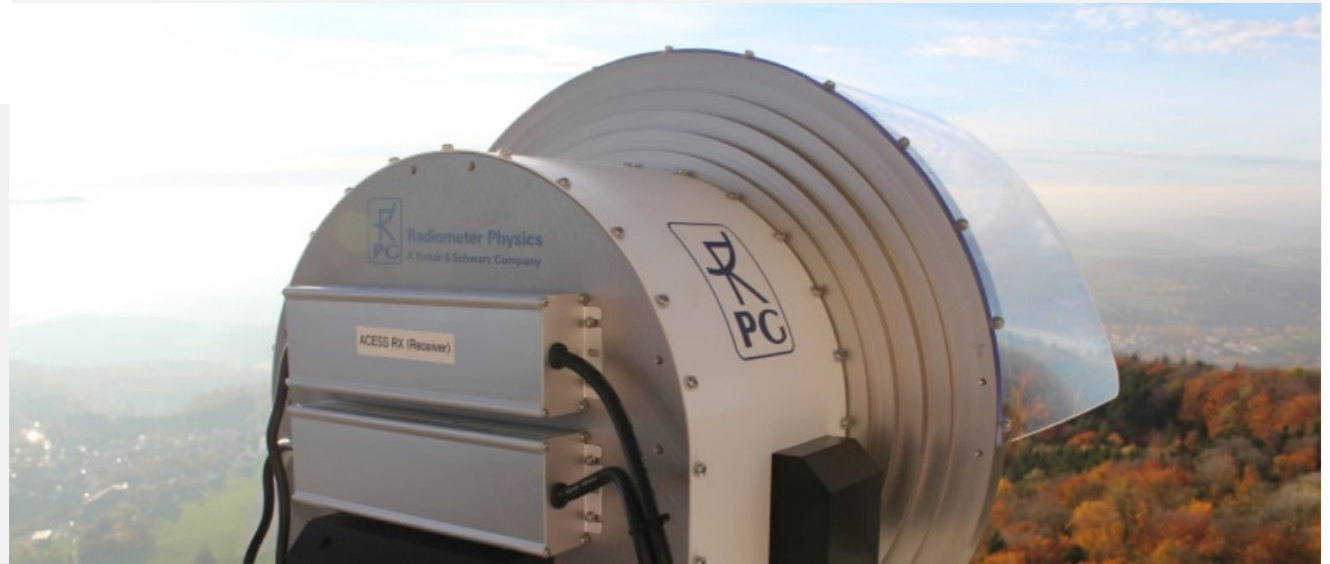


This project is co-funded by

Horizon 2020



## ThoR

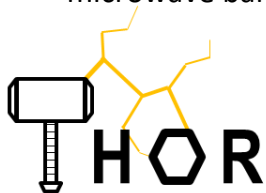
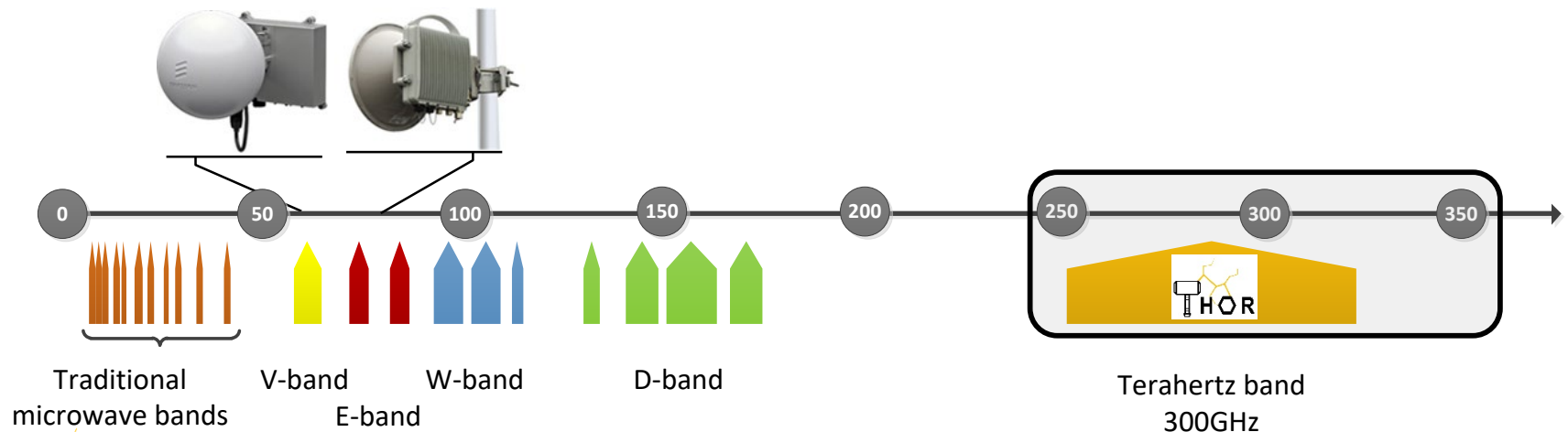
THz end-to-end wireless systems supporting ultra-high data Rate applications

7<sup>th</sup> EU-Japan Symposium on ICT Research and Innovation  
Vienna, 3 December 2018

Prof. Dr.-Ing. Thomas Kürner, TU Braunschweig, EU Project Coordinator

# The need for Terahertz wireless transport links

- 5G access networks are already approaching data rate requirements of several Tbps/km<sup>2</sup>
- Beyond 5G (B5G) networks are expected to ramp this even further
  - New applications and increased uptake
- Expected extension of wireless transport links to W- and D-band only provide mid-term alleviation
- The sub-mm-wave band beyond 300 GHz offers huge bandwidths in a spectral region without specific allocation made yet.
- For the first time, hardware is becoming available to exploit this potential



# ThoR consortium

This **EU-Japan project** is funded by the European Union and the National Institute of Information and Communications Technology (NICT), Japan

Horizon 2020

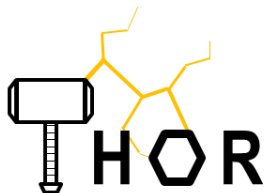


The consortium unites **12 partners** from ...

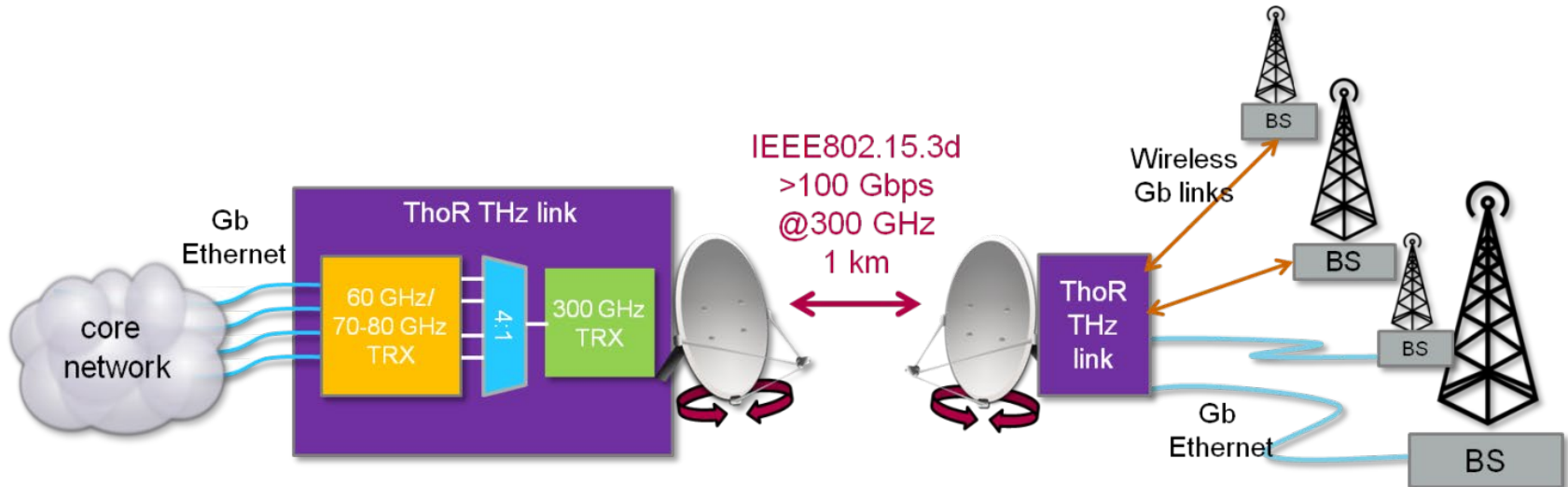
## ▪ Academia, Research



## ▪ and Industry



# ThoR approach: capability of 300 GHz backhaul/ fronthaul links

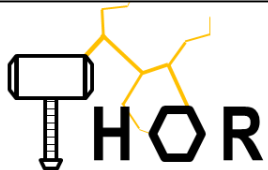


## Key Enabling Technologies (KETs)

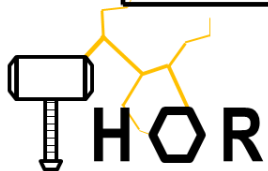
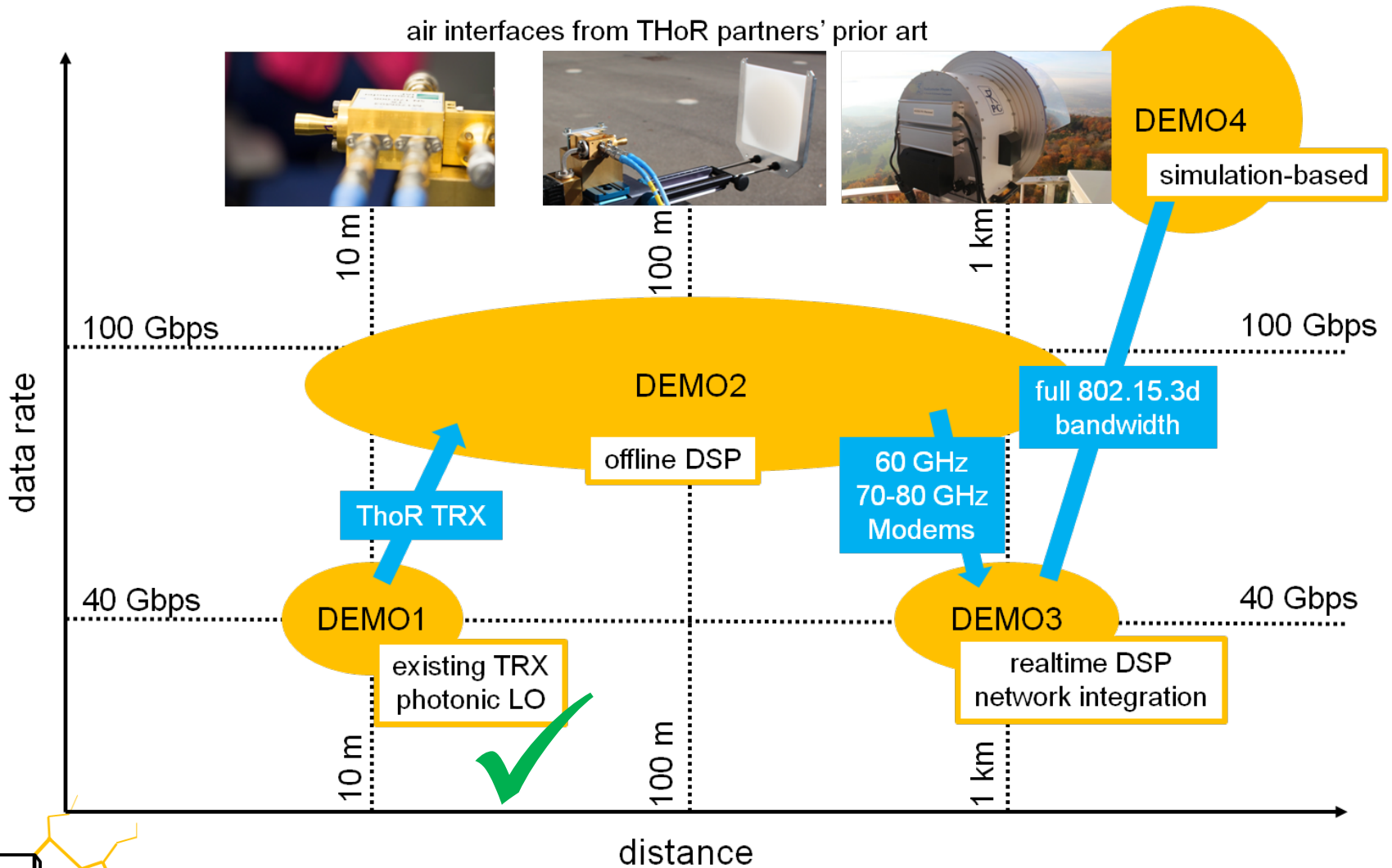
- 1-Photonics-based LO
- 2-Electronic THz amplifier and up-converter
- 3-High Power THz TWTA
- 4-Electronic THz receiver
- 5-Digital baseband & networking interface
- 6-Spectrum regulation and interference mitigation

## 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)



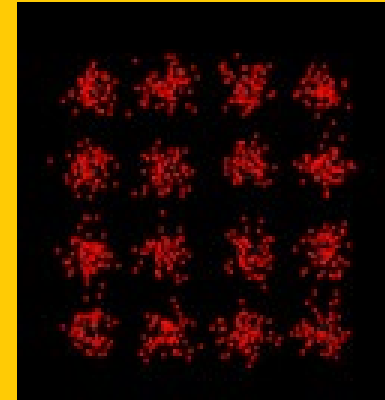
# ThoR demonstration concept



# ThoR Demo-1 already completed in November 2018 (Month 5)

DEMO-1 for THOR *using available devices and systems of the consortium:*

- Validation of the concept of the super heterodyne approach: **DONE**
- Validation of transmission beyond 40 Gbps, multi-formats and also using 2 channels: **DONE**
- Reach 10 meter THz link, over the air, using electronic LO or photonic LO: **DONE**

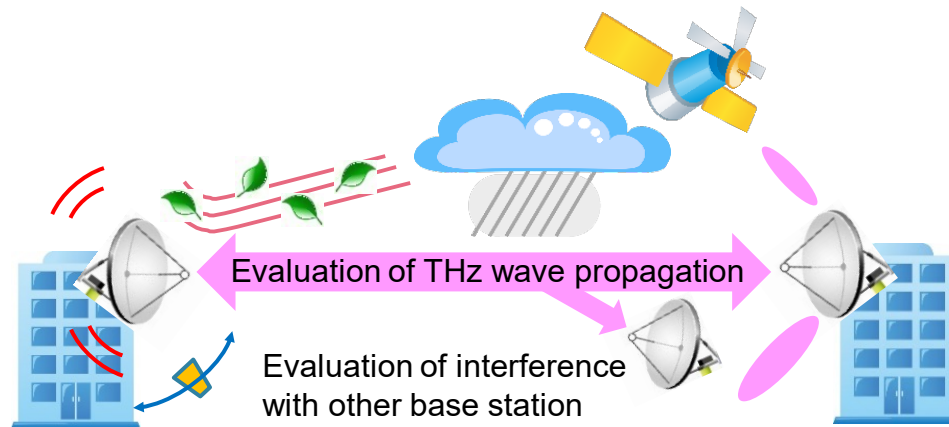


**DEMO-1: 41 Gbps at 300 GHz over 10m**



# THz antennas, propagation and interference studies

- Evaluation of THz antennas and propagation
  - Measurement of THz antenna patterns
  - Propagation experiments with 300 GHz wireless links
- Deriving planning guidelines for 300 GHz BH/FH links
- Sharing investigations with passive services, development of interference mitigation techniques
  - Simulation of THz propagation for sharing study



# Thank you for your attention!

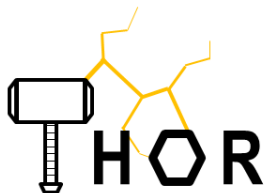
## ご清聴ありがとうございました



For any enquiries please contact:

Bruce Napier; Vivid Components

[bruce@vividcomponents.co.uk](mailto:bruce@vividcomponents.co.uk)



This project has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation, under grant agreement No. 814523. ThoR has also received funding from the National Institute of Information and Communications Technology in Japan (NICT).

[ThorProject.eu](http://ThorProject.eu)