

## TERA hertz integrated systems enabling 6G Terabit-per-second ultra-massive MIMO wireless networks

### TERA6G Factsheet

**Call identifier:** HORIZON-JU-SNS-2022-STREAM-B-01-02

**Grant Agreement No.:** 101096949

**Timeline:** 1 January 2023 – 30 June 2026

**Overall budget:** € 6,114,000

**EC contribution:** € 5,892,962

#### Contact information:

**Project Coordinator:**

[Prof. Guillermo Carpintero](mailto:guiller@ing.uc3m.es)  
[guiller@ing.uc3m.es](mailto:guiller@ing.uc3m.es)

**Project website:** [uc3m.es/research/tera6g](https://uc3m.es/research/tera6g)

**Consortium:** 10 partners (5 EU countries)



TERA6G is a HORIZON EUROPE project funded by the European Union whose objective is to develop a new generation and State-of-the-Art THz transceivers employing massive MIMO for beyond-5G networks.

#### Enabling the Fiber-over-the-air Concept

TERA6G aims to the development of wireless links with Terabit-per-second data throughput capacity, using hybrid photonic integration technology advances to develop disruptive wireless transceivers providing:

**Agility:** Ultra-wide bandwidth (up to 30 GHz per channel, handling any modulation scheme) and continuous frequency tuning of the carrier frequency from 30 GHz to 450 GHz, reaching into the Terahertz (THz) range.

**Scalability:** Development of scalable Multiple-Input/Multiple-Output (MIMO) capable of handling a large number of beams with 2-dimensional antenna arrays with beamforming and beam-steering,

**Reconfigurability:** TERA6G modules frequency agility and number of available wireless pencil-beams unlock implementing a variety of functions, from wireless data transmission to channel sounding and radar ranging.

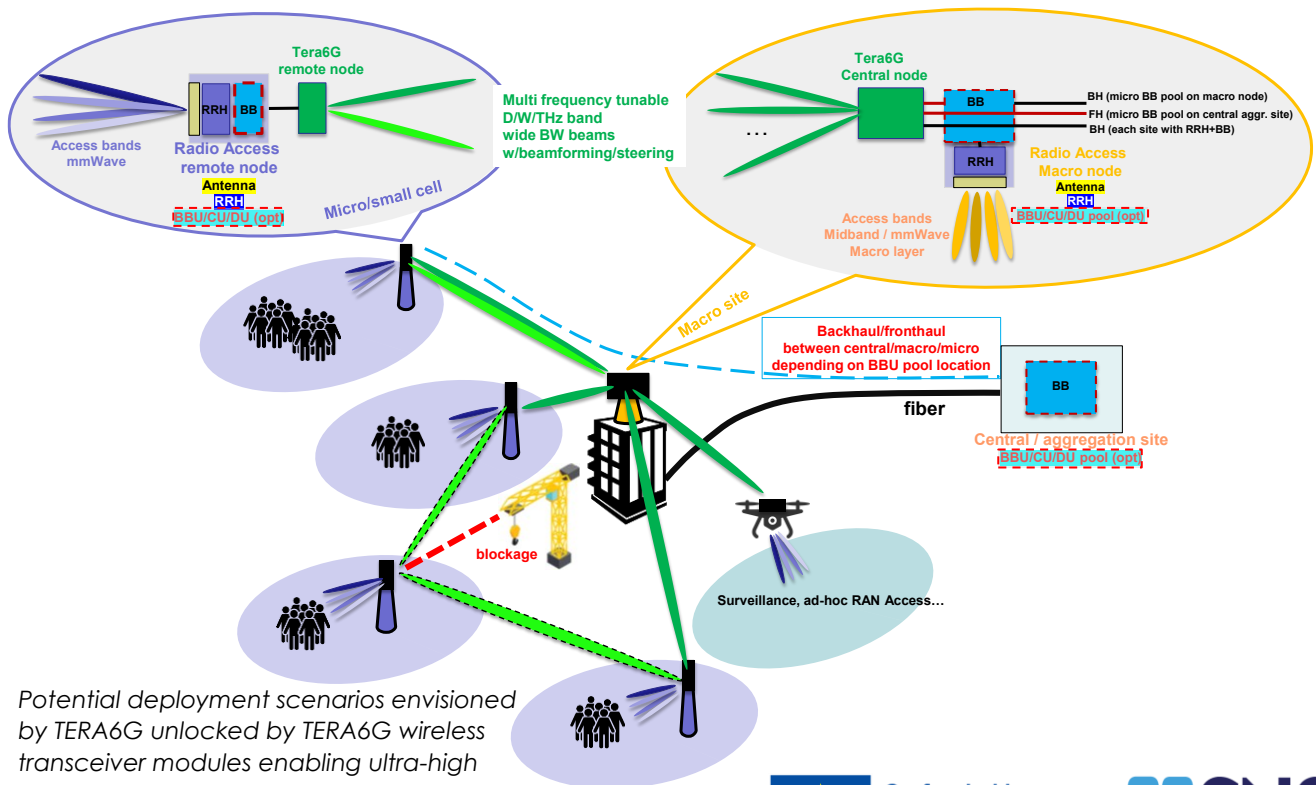
#### Objectives

- Scalable **multi-MIMO Blass Matrix Transmitter** module handling up to 4 beams transmitted from a 2D array with 16 antenna elements in a 4x4 array.
- Scalable **multi-MIMO incoherent multi-band Receiver** module handling 4 beams with 4 different LO oscillators received at a 4x4 antenna array.
- **Reconfigurable transceiver modules**, capable of implementing different independent functionalities on each beam.
- **"Fiber over the air"** and THz smart management, integrating THz wireless technologies and systems, and designing Network Functions allowing their management as part of network slicing functionality aiming at dynamic automated management of multi-beam wireless system resources, fully programmable end-to-end orchestrated communication networks.
- Dynamic networks based on **adaptive, energy-efficient, multi-beam nodes**, developing methods and algorithms to maximize system energy efficiency adapting dynamically physical layer resources.



TERA6G project has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101096949

	Beneficiary	Acronym	Country	Researchers Involved
1.	Universidad Carlos III de Madrid	UC3M	ES	Prof. Guillermo Carpintero, Dr. Luis González Guerrero, Dr. Jose Manuel Delgado Mendinueta, Mrs. Jérica César Cuello
2.	Institute of Communications & Computer Systems	ICCS	EL	Prof. Hercules Avramopoulos, Dr. Nikolaos Lyras, Dr. Christos Tsokos, Dr. Christos Kouloumentas, Dr. Maria Massaouti, Dr. Costis Christogiannis, Mr. Efstathios Andrianopoulos
3.	Fraunhofer Heinrich-Hertz Institute	FhG-HHI	DE	<b>Hybrid PICs:</b> Norbert Keil, Dr. David de Felipe, Tianwen "Charles" Qian, Madeleine Weigel, Philipp Winklhofer, Martin Kresse <b>InP THz:</b> Robert Kohlhaas, Simon Nellen, Milan Deumer <b>InP Foundry:</b> Klemens Janiak, Durvasa Y Gupta <b>InP Laser:</b> Michael Theurer
4.	LioniX International BV	LXI	NL	Dr. Ahmad Mohammad, Dr. Chris Roeloffzen, Dr. Paul van Dijk
5.	PHIX BV	PHIX	NL	Joost Van Kerkhof, Dr. Zerihun Tegegne Milan Milosevic, Dr Bradley Snyder, Mr Andrea Alippi, Mrs Nienke Nijenhuis, Dr Gijs van Ouwkerk
6.	University of Piraeus Research Center	UPRC	EL	Prof. Angeliki Alexiou, Dr Sotiris Droulias, Mr. Giorgos Stratidakis
7.	Oulun Yliopisto	UOULU	FI	Prof. Markku Juntti, Joonas Kokkonen, Marko Leinonen, Juha Pyhtilä, Klaus Nevala
8.	Cumucore OY	CMC	FI	Dr. Jose Costa-Requena, Mr. Abraham Afriyie, Mr. Abdulkadir Mohammed
9.	Intracom Telecom Solutions	ICOM	EL	Dimitrios Kritharidis, Dr. Evangelos Pikasis, Dr Georgios Ropokis, Konstantinos Chartsias, Konstantinos Stamatidis
10.	Telefónica Investigacion y Desarrollo	TID	ES	Eduardo Yusta Padilla, Luis Miguel Contreras



Potential deployment scenarios envisioned by TERA6G unlocked by TERA6G wireless transceiver modules enabling ultra-high throughput transport connectivity to multiple remote ends as radio sites.

