TeraGreen

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TeraGreen

Towards Energy-Efficient Tbps Wireless Links

This 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 GA N° 101139117.

teragreen.eu

6GSNS

Co-funded by the European Union

General Project Information

TeraGreen is an innovative European project launched in January 2024 under the Smart Networks and Services Joint Undertaking.

Over 48 months, our consortium will develop cutting-edge solutions for sustainable wireless communications.

Our Consortium:

- TU Delft (Netherlands) - Coordinator
- Chalmers University of Technology (Sweden)
- TU Dresden (Germany)
- Infineon Technologies AG (Germany)
- Ericsson AB (Sweden)
- OTE AE (Greece)

Key Facts:

✓ Grant Agreement: 101139117
✓ Programme: HORIZON-JU-SNS-2023
✓ Duration: 2024-2027
✓ Focus: Energy-efficient wireless communications

Management Structure and Procedures

The TeraGreen project is coordinated by TU Delft, who acts as the intermediary between the partners and the Funding Authority (Smart Networks and Services Joint Undertaking).

TeraGreen Project Management Structure

6GSNS

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Project Leadership:

- European Commission - Smart Networks and Services Joint Undertaking (SNS JU)

Project Coordination by TU Delft

- Acts as central coordinator
- Manages scientific and technical aspects

General Assembly

- Main decision-making body

Advisory Board

- Independent expert guidance

Executive Board

- Work Package Leaders

Seven Work Package Teams (WP1-WP7)

- Each with dedicated Leader
- Focused team per package

TU Delft

TECHNISCHE UNIVERSITÄT DRESDEN

Infineon

ERICSSON

OTE

OBJECTIVES AND AMBITION

Objective 1

TeraGreen develops lens integrated SiGe-BiCMOS transceivers in the THz band that can transmit and receive high-speed, energy-efficient pico-second signals

Objective 2

TeraGreen performs a proof of concept of high-speed and high-efficient wireless transmission for a medium range link distance at THz using silicon technology for the first time

Objective 3

TeraGreen develops quasi-optical MIMO array architectures to exploit the high degree of spatial multiplexing of the THz spectrum

Objective 4

TeraGreen performs the first proof of concept that Tbit/sec wireless transmission in the THz spectrum using near-field spatial multiplexing is possible

Use cases

TeraGreen considers four use cases:
a) Fronthaul in ultra-dense small cell networks
b) High throughput fixed wireless access (FWA)
c) Live immersive XR in large-scale events
d) Wireless data centers

In the context of ultra-dense small cell networks, TeraGreen addresses the critical challenge of providing energy-efficient and high-capacity fronthaul solutions using terahertz (THz) communication. Small cells are essential for delivering high data rates and low latency in 6G networks, especially in dense urban environments. However, the fronthaul links must handle massive amounts of data traffic. TeraGreen's THz-based solutions offer ultra-high bandwidth for these fronthaul links, ensuring seamless communication while significantly reducing energy consumption.

TeraGreen's use case on high-throughput Fixed Wireless Access (FWA) focuses on delivering ultra-fast, energy-efficient internet connectivity to homes, businesses, and remote areas using THz communication. By leveraging THz spectrum, TeraGreen enables multi-gigabit per second (Gbps) data rates, allowing users to experience fiber-like speeds wirelessly without the need for costly physical infrastructure like fiber optic cables.

TeraGreen's use case on live immersive extended reality (XR) in large-scale events focuses on delivering seamless, high-bandwidth experiences that enable participants to interact in real time with virtual elements, no matter the scale of the audience. Using THz communication, TeraGreen provides the ultra-low latency and high data rates required to support immersive technologies such as augmented reality (AR) and virtual reality (VR) at events like concerts, sports games, or conferences.

Finally, TeraGreen's use case on wireless data centers aims to revolutionize the efficiency and scalability of next-generation data centers by utilizing THz communications. With the increasing demands of cloud computing, AI, and big data analytics, traditional wired infrastructure can become a bottleneck in terms of speed, flexibility, and energy consumption. TeraGreen offers ultra-high throughput, low-latency wireless links that can replace or complement fiber-optic connections within data centers, enabling faster data transmission between servers, storage units, and other critical components.

Next steps

The TeraGreen project continues to make significant progress in advancing sustainable semiconductor solutions.

Following our successful 2nd consortium meeting held in Athens, Greece on October 2-3, 2024, the project partners aligned on key deliverables and next steps toward our objectives.

Key Highlights:

- Comprehensive review of project achievements
- Strategic planning sessions for upcoming milestones
- Strengthening collaboration between consortium partners
- Setting clear targets for the next project phase

Looking Ahead:

- Our first project review meeting is scheduled for March 21, 2025. To prepare for the review, we have scheduled a plenary meeting for March 6-7, 2025 in Munich, Germany.

Stay Connected:

- Visit our project website: https://teragreen.eu
- Connect with us on LinkedIn: TeraGreen Project
- Subscribe to our newsletter for regular updates