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Press release

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Fraunhofer HHI Launches Project PONTROSA to Drive Fiber Optic Expansion with Passive Optical Networks

In the PONTROSA project (Passive Optical Access Networks: Transceiver Technologies and System Architectures), the Fraunhofer Heinrich-Hertz-Institut (HHI) is advancing the development of passive optical networks (PON) to accelerate fiber optic expansion and unlock new applications for this technology. In collaboration with project partners, the Institute will develop innovative electronic and optical subsystems designed to significantly enhance the transmission capacity of future PONs. The project will run for three years, concluding in September 2027, and is funded by the German Federal Ministry of Education and Research with € 3.8 million, including € 1.3 million for Fraunhofer HHI.

Fiber optic networks rely on optical transceivers at the end of each fiber, seamlessly handling both transmission and reception of data. These devices connect households or businesses to the local network, while simultaneously linking it to the optical metro and long-haul networks of telecommunications providers. Given their efficiency, PONs have become the preferred network architecture over Active Optical Networks (AONs) worldwide.

A PON is a fiber optic network where data transmission occurs without active technologies like amplifiers or repeaters in the field. Instead, passive optical equipment such as splitters efficiently distributes the signal to multiple end points. This setup reduces cost and simplifies the network infrastructure. However, to meet future demands and address emerging application areas – such as connecting data centers and distributed mobile base stations – the achievable data rates of PONs must be significantly increased.

“Our goal is to dramatically increase the transmission capacities of PONs,” said Malte Hinrichs, research associate at Fraunhofer HHI. “We focus on combining high performance with low costs, reliability, and resilience. This approach ensures our technology is scalable and ready for practical application.”

The project team will design, fabricate, and integrate optimized electronic and photonic circuits into a complete system. They will use cost-efficient, scalable manufacturing technologies while analyzing digital signal processing requirements and developing appropriate methods.

“Fraunhofer HHI is one of the leading research institutions for InP-based optoelectronic components and integrated photonic circuits (PICs),” says Dr. Martin Möhrle, Head of the Laser Group at Fraunhofer HHI. “We develop high-end transmitters and detector components for optical data transmission, with a particular focus on PON applications.”

As part of the PONTROSA project, Fraunhofer HHI experts will investigate and validate advanced digital signal processing algorithms, contribute to the definition of the system architecture, and build the final demonstrator at the end of the project. To achieve this, the researchers will design transmitter components for the PICs of the new system, including high-speed EML and DFB lasers.

Increasing transmission capacity will expand PON applications. The insights gained in these networks could then also play a crucial role in the development of next-generation system and transceiver architectures for metro, long-distance, and satellite communications.

The PONTROSA project is coordinated by the Karlsruhe Institute of Technology (KIT). In addition to Fraunhofer HHI, the initiative involves Nokia Bell Labs, MaxLinear Deutschland GmbH, and Kiel University (CAU).

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URL for press release: https://www.hhi.fraunhofer.de/en/departments/pn/projects/pontrosa.html

PONTROSA project