

PRESS RELEASE

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5G-ECONET project aims to optimize the energy efficiency of campus networks

Erlangen, Germany: 5G campus networks are being used more in industry because they offer greater flexibility in production and logistics. To guarantee reliable quality of service and uninterrupted network availability, they require a constant supply of energy. But CO2 reduction targets and high energy prices are presenting operators with some major challenges: How can the network's energy consumption be reduced without compromising the quality of service required? The Fraunhofer Institute for Integrated Circuits IIS has teamed up with four partners in the 5G-ECONET project to find out.

5G campus networks are well-suited for industrial applications due to their low latency, high reliability, and wireless connectivity. At the same time, Open RAN-based networks offer as yet untapped potential to optimize energy consumption. Especially against the backdrop of climate change and rising energy costs, this topic is becoming increasingly important to operators. This is why the 5G-ECONET project is exploring sustainable ways to maximize energy savings without inhibiting the performance of private 5G networks. Artificial intelligence (AI) methods have a role to play here as well.

Efficient, optimized, AI-assisted

The first step toward optimizing the energy efficiency of 5G campus networks is to thoroughly analyze how they are built, how they work, and how they can be managed. To this end, the project partners are creating AI-assisted simulator components, which they will use to examine various methods of saving energy. This will make it possible to generate accurate forecasts of the intensity of network use and quality of service. The researchers will then feed these insights back into the designs for new energy-efficient campus networks.

The 5G-ECONET partners are also investigating whether it's possible to turn off certain network elements in line with resource demand without compromising quality of service. They are also developing machine learning (ML) approaches in the form of applications for real networks and testing them using simulations. In Open RAN campus networks, these algorithms interact with the control elements and automatically adjust the operating parameters of the network. In this way, the total energy demand of the 5G network match the current requirements.

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From the test bed to the operator's campus network

What first gets examined through simulations will then be tested in practice: a further part of the project will be to establish an Open RAN test bed to try out new functions. This is where the partners will take their theoretical research findings and the components they have developed and put them through their paces, demonstrating the effects on energy consumption in practice. The new methods for optimizing energy consumption can be applied both to existing as well as new provider networks. Together with adaptive applications, these methods ensure power-saving operation.

Fusion of industry and research

The 5G-ECONET research project is funded by the German Federal Ministry for Digital and Transport as part of the InnoNT subsidy program and will run until December 2024. Coordinated by Fraunhofer IIS, the project benefits from the complementary expertise of partners from research and industry: AiVader GmbH, exceeding solutions GmbH, Keysight Technologies Deutschland GmbH, and the Institute for Technical Informatics and Engineering Informatics at the Technische Universität Ilmenau.

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The Fraunhofer-Gesellschaft, headquartered in Germany, is the world's leading applied research organization. Its research activities are conducted by 76 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of around 38,000, who work with an annual research budget of roughly €3.0 billion.

The **Fraunhofer Institute for Integrated Circuits IIS**, headquartered in Erlangen, Germany, conducts world-class research on microelectronic and IT system solutions and services. Today, it is the largest institute of the Fraunhofer-Gesellschaft. Research at Fraunhofer IIS revolves around two guiding topics:

In the area of **"Audio and Media Technologies"**, the institute has been shaping the digitalization of media for more than 30 years now.

Fraunhofer IIS was instrumental in the development of mp3 and AAC and played a significant role in the digitalization of the cinema. Current developments are opening up whole new sound worlds and are being used in virtual reality, automotive sound systems, mobile telephony, streaming and broadcasting.

In the context of **"cognitive sensor technologies"**, the institute researches technologies for sensor technology, data transmission technology, data analysis methods and the exploitation of data as part of data-driven services and their accompanying business models. This adds a cognitive component to the function of the conventional "smart" sensor.

More than 1170 employees conduct contract research for industry, the service sector and public authorities. Founded in 1985 in Erlangen, Fraunhofer IIS now has locations in 11 cities: Erlangen (headquarters), Nuremberg, Fürth and Dresden, as well as Bamberg, Deggendorf, Ilmenau, Munich, Passau, Waischenfeld and Würzburg. 72 percent of the budget of 189.7 million euros a year is financed by contract research projects.

Institutional funding from the Fraunhofer-Gesellschaft covers 28 percent of the budget.

Detailed information on: www.iis.fraunhofer.de/en
