

PRESS RELEASE

PRESS RELEASEApril 18, 2024 || Page 1 | 4

Fraunhofer IIS opens laboratory in space

Erlangen, Germany: Radiation, vacuum, and substantial temperature fluctuations: extreme conditions prevail in space, presenting a tough challenge for satellite communications. With the Fraunhofer On-Board Processor (FOBP), experiments can be conducted in space to explore whether new technologies are operational under real conditions. The FOBP passed its final tests last week and has begun its service on board the Heinrich Hertz satellite of the German Space Agency at the German Aerospace Center (DLR).

Satellite communications players are often faced with the fact that higher-performance technologies come into use only once their functionality has also been proven in space. This delays progress and limits the satellite industry's innovation potential. To remove these obstacles, Fraunhofer IIS has opened the FOBP, a laboratory in space equipped with a special feature: the satellite's payload can be controlled from Earth at any time, even at an altitude of 36,000 kilometers, and reprogrammed for different use cases. "You can think of it like a smartphone that installs updates to meet new demands," says Rainer Wansch, Head of the RF and SatCom Systems department.

The opportunities for the industry to use the experimental platform are just as diverse as satellite communications themselves. Their smooth operation depends on disparate elements coming together to form a seamless transmission chain. Such elements include the components installed in a satellite as well as the modems and antennas that enable communication from the ground. For these individual elements to work together in an optimum fashion, research is underway into various concepts that aim to manage capacity as efficiently as possible.

Help in the event of a disaster

Fraunhofer IIS is also conducting its own experiments to find out exactly how more powerful satellite communications could help improve the exchange of information on Earth in the future. One of the projects is an outcome of the

Head of Corporate Communications

Thoralf Dietz | Phone +49 9131 776-1630 | thoralf.dietz@iis.fraunhofer.de | Fraunhofer Institute for Integrated Circuits IIS | Am Wolfsmantel 33 | 91058 Erlangen, Germany | www.iis.fraunhofer.de

Editor

Claudia Wutz | Phone +49 9131 776-4071 | claudia.wutz@iis.fraunhofer.de | Fraunhofer Institute for Integrated Circuits IIS | www.iis.fraunhofer.de

disastrous flooding in Germany's Ahr Valley two years ago. Water damage to the infrastructure there was so severe that it knocked out mobile communications for days. The aim now is to investigate how the FOBP's flexibility can help provide rescue services with secure and stable direct access to the satellite. "This would guarantee communication in the event of a disaster, even independently of mobile communications and their commercial providers," Wansch says.

This example illustrates how satellites are playing an increasingly important role in ground communications. In the new generation of mobile communications, these objects are now being systematically integrated into the 5G network. The aim is to create non-terrestrial networks in which terrestrial and satellite-based data traffic merge to form hybrid networks. These are intended to ensure that mobile communications reach even remote regions. How 5G can be connected via satellite is also being researched in an experiment with the FOBP.

Space simulation in Erlangen

Research institutes and companies can use the space laboratory in close cooperation with Fraunhofer IIS. The communications experiments are supported by the institute's test infrastructure in Erlangen, which includes a ground station with a multiband satellite antenna that can monitor and control the FOBP. Fraunhofer IIS also has a thermal vacuum chamber in Erlangen, where technologies can be prepared for real use under simulated space conditions in an identical FOBP model.

The Heinrich Hertz Mission and its partners

The Heinrich Hertz mission marks the first launch of a dedicated German communications satellite for researching and testing new technologies and communications scenarios. The mission will thus make an important contribution to Germany's information society. The Heinrich Hertz mission is being led by the German Space Agency at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) in Bonn on behalf of the Federal Ministry for Economic Affairs and Climate Action (Bundesministerium für Wirtschaft und Klimaschutz; BMWK) and with the participation of the Federal Ministry of Defence (Bundesministerium der Verteidigung; BMVg). OHB-System AG was contracted to develop and build the satellite. The companies IABG GmbH, MDA AG and TESAT GmbH & Co. KG are also involved in the development and testing of the satellite. OHB Digital Connect is

PRESS RELEASEApril 18, 2024 || Page 2 | 4

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS

responsible for the ground segment in collaboration with CGI. The satellite control centre is located in Bonn. The locations for the mission's new ground stations are in Hürth (North Rhine-Westphalia) and Neustrelitz (Mecklenburg-Western Pomerania). Arianespace is responsible for launching the mission on board an Ariane 5 launch vehicle (VA261). A total of 42 partners are involved in the mission, of which 14 are involved in the scientific payload.

PRESS RELEASE

April 18, 2024 || Page 3 | 4



Trial run: In a thermal vacuum chamber, the FOBP prepared for real-world deployment under simulated space conditions. © Fraunhofer IIS/Paul Pulkert | Image in print quality: www.iis.fraunhofer.de/pr.



PRESS RELEASEApril 18, 2024 || Page 4 | 4

Mission control: In this room, our engineers monitor the FOBP and issue commands. © Fraunhofer IIS/Paul Pulkert | Image in print quality: www.iis.fraunhofer.de/pr..

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 1200 employees conduct contract research for industry, the service sector and public authorities. Founded in 1985 in Erlangen, Fraunhofer IIS now has locations in 12 cities: Erlangen (headquarters), Nuremberg, Fürth and Dresden, as well as Bamberg, Deggendorf, Ilmenau, Munich, Passau, Triesdorf, Waischenfeld and Würzburg. 47% of the budget of 241 million euros in 2023 is financed by funds from industry and 35% from public project funds. The remaining budget is covered by institutional funding from the Fraunhofer-Gesellschaft and other income. Detailed information on: www.iis.fraunhofer.de/en
