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FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS

PRESS RELEASE

First over-the-air beam hopping test successfully concluded

Erlangen, Germany: Current satellite communication systems use static beams, with little or no options of adjusting beam capacity to a varying demand. Beam hopping, based on the DVB-S2X broadcasting standard, allows redirecting capacity between beams, making satellite systems more flexible and efficient. Working with WORK Microwave and Eutelsat, the Fraunhofer Institute for Integrated Circuits IIS has successfully demonstrated beam hopping in an over-the-air test for the first time.

Rising demand for worldwide mobile communications on land, in the air and at sea calls for satellite coverage tailored to individual needs. As part of the "BEHOP – Beam Hopping Emulator for Satellite Systems" project, initiated and funded by the European Space Agency (ESA), Fraunhofer IIS is collaborating with WORK Microwave and Eutelsat to research technologies that will deliver more flexibility and higher performance in satellite communication. BEHOP is intended to pave the way for beam hopping, a feature that is supported by Eutelsat Quantum, a satellite due to enter into service in 2020.

Spot beams with higher data capacity instead of broad coverage

At present, most satellites operate spot beams at constant power and with a fixed allocation of capacity over a broad coverage region. Beam hopping, however, allows efficient communication by putting power when and where required. It transmits adjusted beams that enable great flexibility as to how capacity is distributed. Currently, no system in orbit supports beam hopping completely.

Beam hopping test via satellite with DVB-S2X

In June 2018, Fraunhofer IIS collaborated with WORK Microwave to test beam hopping for the first time using a conventional Eutelsat satellite. To this end, the beam hopping payload emulator developed at Fraunhofer IIS was added to the uplink transmission chain along with WORK Microwave's beam hopping enabled modulator with integrated synchronization algorithms. In the downlink the corresponding demodulators from Fraunhofer IIS was used as receiver. The transmission technique is based on the DVB-S2X standard's Annex E Super-Framing structure, which enables several innovative technologies such as beam hopping, precoding and interference management solutions.

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By way of this demonstration, the project partners proved that the beam hopping concept and technology are ready to be implemented. The demonstration validated that data arrives at the satellite in sync with the beam hopping pattern and that the system is able to automatically adjust and update resource allocations whenever capacity requirements may change. This successful test paves the way for a next generation of satellites.

IN COOPERATION WITH

WORK MICROWAVE

eutelsat

esa

The Fraunhofer-Gesellschaft is the leading organization for applied research in Europe. Its research activities are conducted by 72 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of 25,000, who work with an annual research budget totaling more than 2.3 billion euros.

The **Fraunhofer Institute for Integrated Circuits IIS** is one of the world's leading application-oriented research institutions for microelectronic and IT system solutions and services. It is the largest of all Fraunhofer Institutes. 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.

970 employees conduct contract research for industry, the service sector and public authorities. Founded in 1985 in Erlangen, Fraunhofer IIS has now 14 locations in 11 cities: Erlangen (headquarters), Nuremberg, Fürth, Dresden, further in Bamberg, Waischenfeld, Coburg, Würzburg, Ilmenau, Deggendorf and Passau. The budget of 184 million euros is mainly financed by projects. 22 percent of the budget is subsidized by federal and state funds.

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