

# PRESS RELEASE

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**PRESS RELEASE**June 7, 2018 || Page 1 | 2

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## Fraunhofer IIS demonstrates direct IoT connectivity via GEO satellite

**Erlangen, Germany: The Fraunhofer Institute for Integrated Circuits IIS has successfully demonstrated the direct transmission of sensor data from multiple transmitters via a geostationary satellite. For the test transmission, the institute employed portable, ground-based transmitters equipped with small, omnidirectional C-band antennas. Fraunhofer IIS developed this particular transmission method specifically for Internet of Things applications that use satellites (Satellite IoT).**

The particular challenges associated with using GEO satellites for IoT applications are, first, the vast distance between the transmitters and the satellites (about 36,000 km) and, second, that satellites in orbit tend to use the same frequencies. This is why antennas on the ground must be relatively large, with high amplification and suitable directional capabilities, to minimize interference to neighboring satellites and systems.

### Successful data transmission even at extremely low transmit power

The transmission concept used for the technology demonstration makes it possible to establish a direct connection from IoT sensor nodes to a GEO satellite using portable transmission terminals equipped with a small, omnidirectional C-band antenna developed at Fraunhofer IIS. The waveform has been specially optimized for low data rates and enables successful data transmissions even at extremely low transmit power.

Transmit power has been reduced enough for the waveform to be transmitted below the threshold mandated for C-band communications. This makes omnidirectional antennas a viable option, since they require no alignment and will still not interfere with other satellite systems. The solution's real advantage is that it can be operated using small, cost-effective transmitter and receiver terminals that offer long battery life.

### Direct IoT satellite connectivity without terrestrial infrastructure

IoT connectivity via satellite is the most practicable solution in situations where small amounts of data have to be transmitted and no mobile communications or terrestrial IoT network infrastructure is available. The demonstration using GPS data from individual sensors showed that in the future, Satellite IoT can also be used for blue force

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#### Editorial notes

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tracking. Other potential applications include temperature and humidity monitoring in agriculture, and condition monitoring for oil and gas infrastructure for maintenance purposes and to detect leaks early on.

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**PRESS RELEASE**June 7, 2018 || Page 2 | 2

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**Using existing satellite infrastructure for global IoT applications**

Future developments should make it possible to add the transmission of IoT data to regular satellite operations without having to increase satellite capacity. This means that global IoT applications could make use of existing satellite infrastructure.



**Using this C-band antenna (foreground),  
Fraunhofer IIS successfully transmitted  
sensor data via a geostationary satellite.**

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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](http://www.iis.fraunhofer.de/en)