APPLICATION

The Fraunhofer On-Board Processor (FOBP) was conceived for several applications connected to the Heinrich Hertz Satellite system, which is designed to operate in a geostationary earth orbit for 15 years.

The FOBP supports a range of applications including:

– Satellite communication with a return channel for nomadic and mobile users
– Broadband communication up to 450MHz
– Flexible adaptation to existing systems due to its scalable bandwidth, which ranges from broadband to narrowband, such as for sensor data (power meters)
– On-board processing for applications such as adaptive coding and modulation (ACM)
– On-board switching (via IP for instance)
– Digital measurement of solar radiation and total ionizing dose (TID) direct in the FOBP
– Dynamic adaptation of the FPGA firmware to the current solar radiation condition
– Adaptable to future transmission standards through reconfiguration of the payload

OUR SERVICES

– Verification platform with a live satellite link for testing communication applications
– Integration of your on-board processing algorithm into the FOBP
– Support for satellite-based communication systems
– Implementation of RF and signal processing components in accordance with your requirements
– Professional consulting and individual requirements analysis using established scientific methods
– Technical and business feasibility studies

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FOBP
FRAUNHOFER ON-BOARD PROCESSOR

SmallGEO platform developed by OHB System
Image: OHB System
**FOBP**

**FRAUNHOFER ON-BOARD PROCESSOR**

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**AT A GLANCE**

The German Space Agency (DLR) is overseeing the development and operation of the Heinrich Hertz Satellite mission, including the testing of innovative communication technologies.

Fraunhofer IIS is participating in the mission by developing an on-board processor (FOBP) for the satellite system. In contrast to conventional transponders, this FOBP is regenerative and reconfigurable, two features that make it possible to research and test new transmission methods.

Fraunhofer IIS is responsible for the following parts of the mission:

- Development of new protocols, e.g. for direct satellite communication
- Testing of new modulation and coding schemes
- In-orbit verification of radiation sensors:
  - Absorbed radiation dose (UV EPROM)
  - Solar particle events (SRAM, BRAM in FPGA)
- Research into adaptive single event upset (SEU) mitigation methods for configuring the optimal redundancy in an FPGA
- In-orbit verification of the HallinOne® technology for contactless measurement of the FPGA power consumption

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**TECHNICAL FEATURES**

- Hardware architecture based on two state-of-the-art low-radiation FPGAS that can be reconfigured from the earth station to guarantee maximum flexibility for a wide variety of applications:
  - Radiation-hard, high-speed ADCs and DACs that enable direct sampling of the L-band intermediate frequency
  - Availability of higher bandwidth - up to 450 MHz - enables high data rates for broadband communication with stationary terminals and mobile devices

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**Overall view of the FOBP**

1. FOBP box
2. FOBP incl. single modules

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**Modular view of the FOBP**

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**Footprint of the Heinrich Hertz Satellite in Germany**

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