

Radio Signal Interference Detection from Space

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Contents

- Overview
- OPS-SAT Mission
- Radio Payload
- Summary

OPS-SAT Mission Statement

“OPS-SAT is a safe, hard/software laboratory, flying in a LEO orbit, reconfigurable at every layer from channel coding upwards, available for authorised experimenters to demonstrate innovative mission operation concepts.”

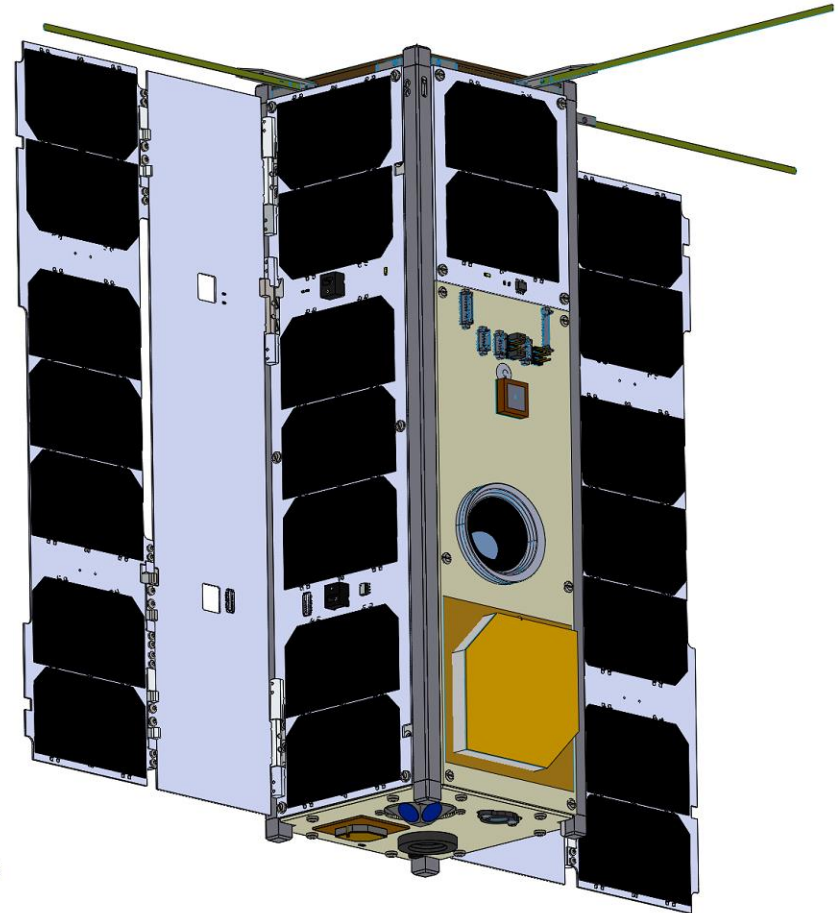
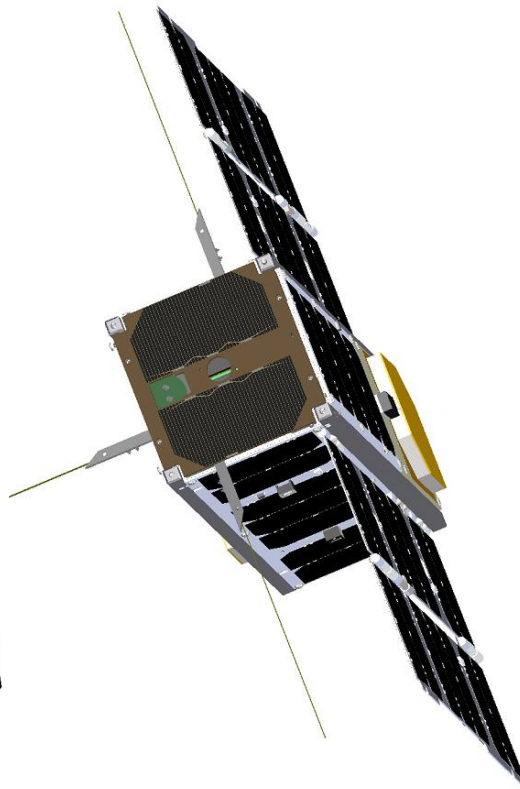
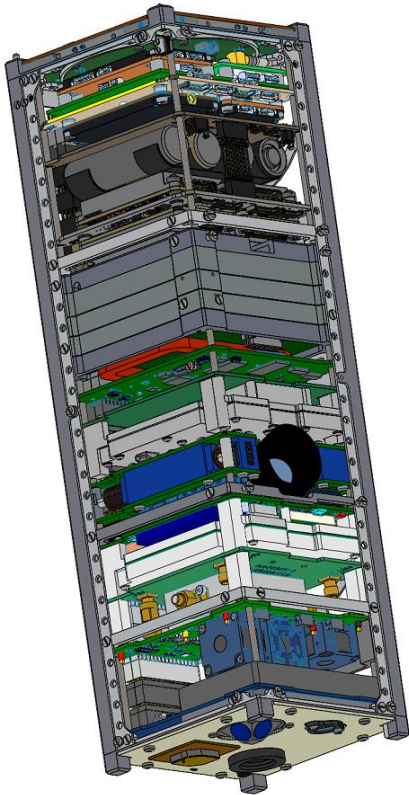
OR

Make a cubesat that behaves like an advanced ESA satellite (as far as the ground can tell) and then let experimenters configure and take control of it.

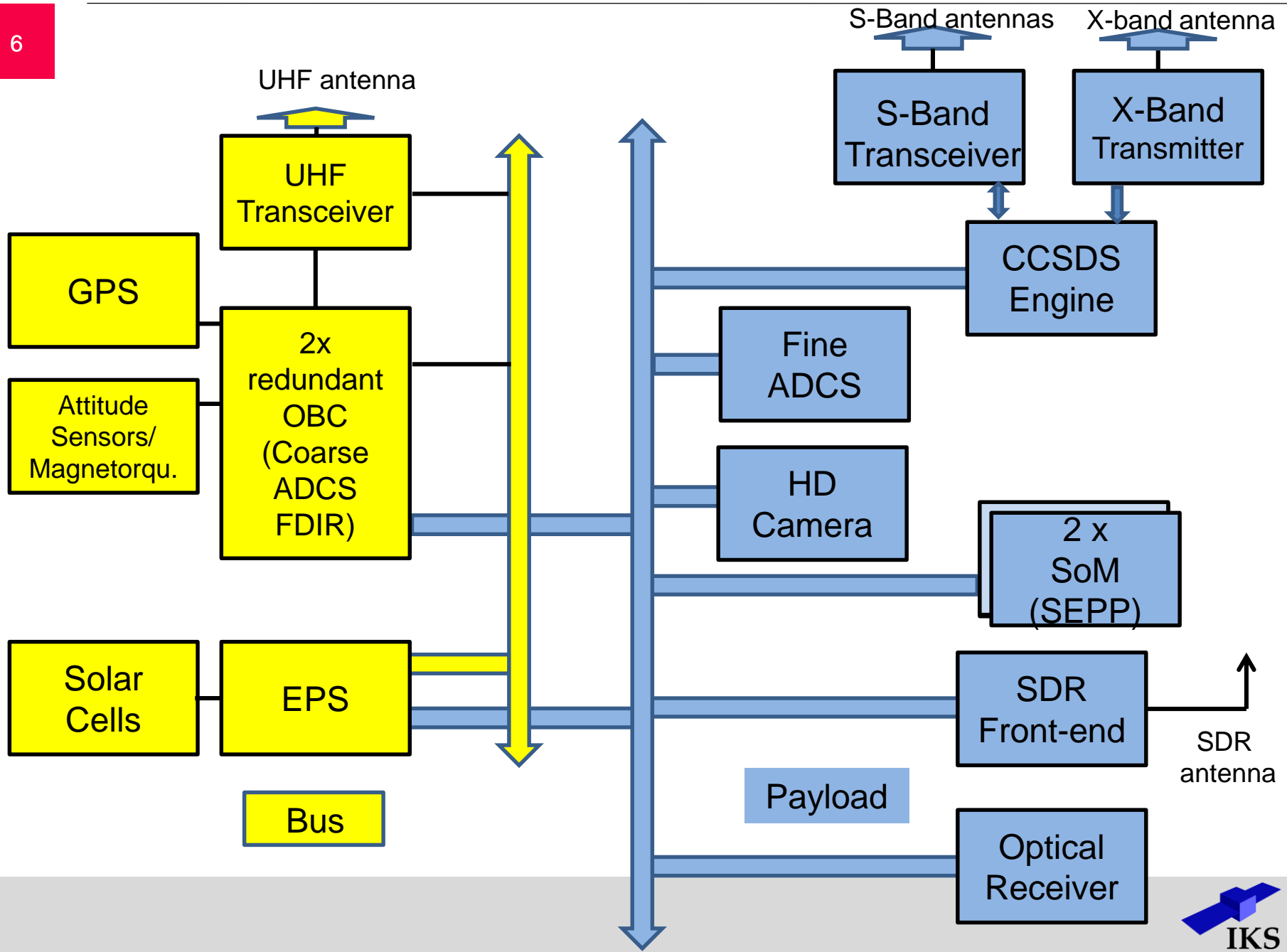
OPS-SAT Overview

3U CubeSat: 10x10x30 cm with deployable solar arrays

Power: 24 W

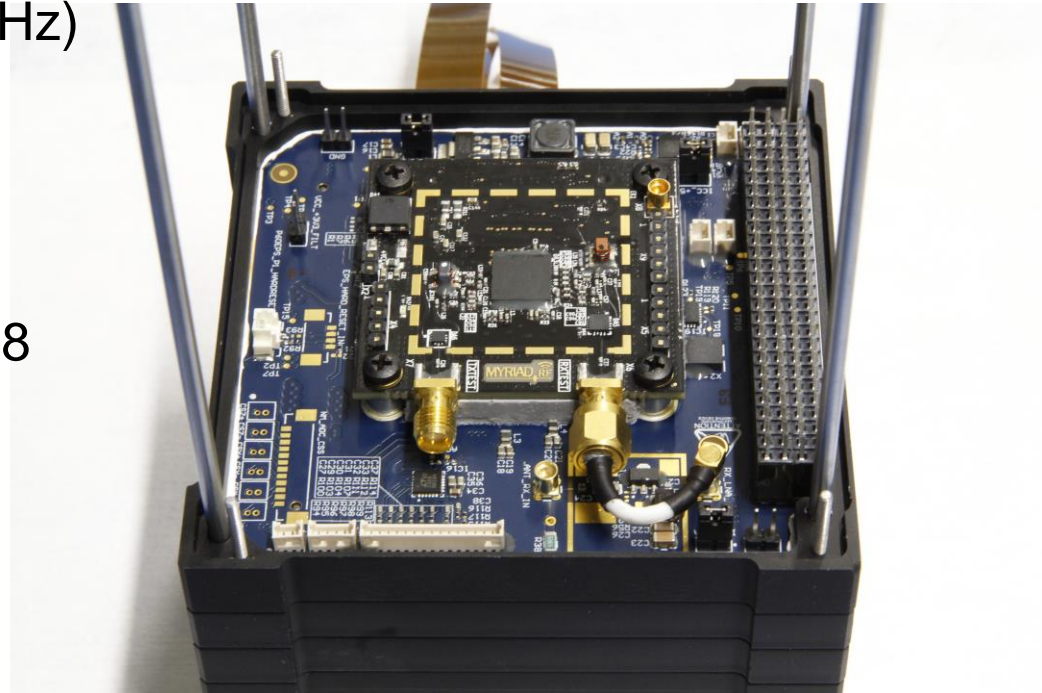






Software Defined Radio Receiver

- Optimised for UHF signal monitoring (430 – 440 MHz)
- Experiment triggered by interference on BRITE satellites
- Covers frequency range up to 1.8 GHz
- Connected to a UHF monopole antenna



(MEW Aerospace)

Processor Core

(Satellite Experimental Payload Processor - SEPP)

2 x System on Module

Altera Cyclone V SoC

in cold redundancy

2 x ARM-9 processor

Memory

- 1 GB DDR3 RAM (ECC)

Mass Memory

- 8 GB

Direct interface to SDR board

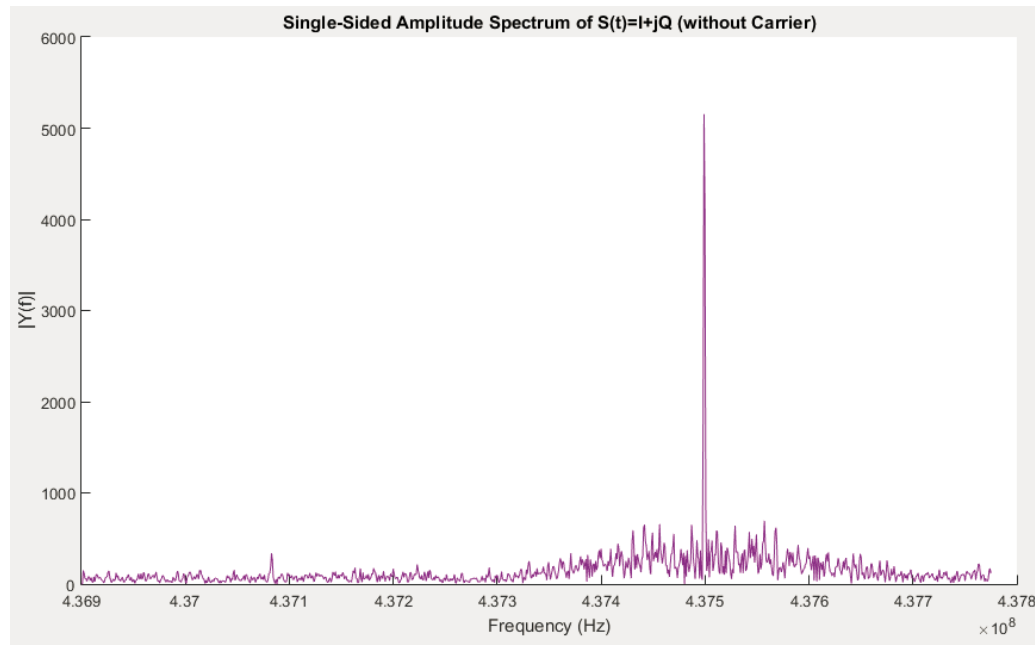
Used for signal capturing and processing



By TU Graz

Signal Monitoring

Measurement of interference signals in UHF band
 „Spectrum analyser in Space“



Signal Samples

Procedure 1:

- Stored in memory of SEPP
- Downlinked to ground (S-, X-band)
- Processing on ground

Procedure 2:

- Signal samples processed in SEPP

Spectrum delivered to ground

Downlink via S- or X-band

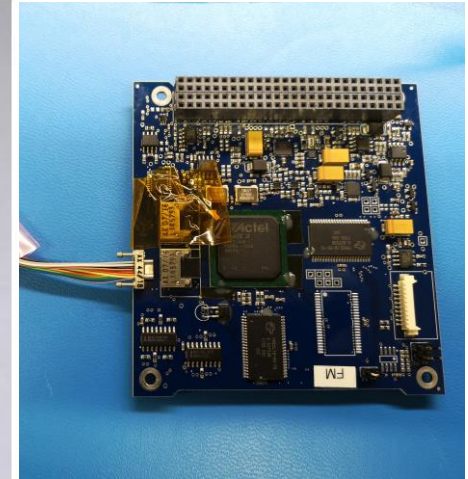


S-band transceiver with Diplexer (256/1000 kbit/s)

By Syrlinks



50 Mbit/s X-band transmitter



CCSDS Engine with ESA IP Core

By SRC/Creotech

OPS-SAT - SMILE

Ground segment

SMILE is the **S**pecial **M**ission **I**nfrastructure **L**ab **E**nvironment at ESOC/Darmstadt

- a 3.7 m S- and X-band and a UHF antenna
- an Operations Lab with e.g. different modems (SDR, Cortex, GOMspace), operator positions, etc ..



TUG Backup Ground Station

Remotely controlled from Darmstadt with support by TU Graz team



Summary

- OPS-SAT is an innovative CubeSat
- Behaving like any other ESA spacecraft (as seen from ground)
- Demonstrating novel operational services (especially MO services)
- Providing a flexible platform for a variety of software and hardware experiments
- Radio signal monitoring one of the experiments

OPS-SAT Consortium

TU Graz (Technical Lead)

UniTel IT-Innovationen (A), Prime

Subcontractors:

Berlin Space Technologies (D)

GMV (PL)

GOMSPACE (DK)

MAGNA STEYR Aerospace (A)

MEW Aerospace (D)

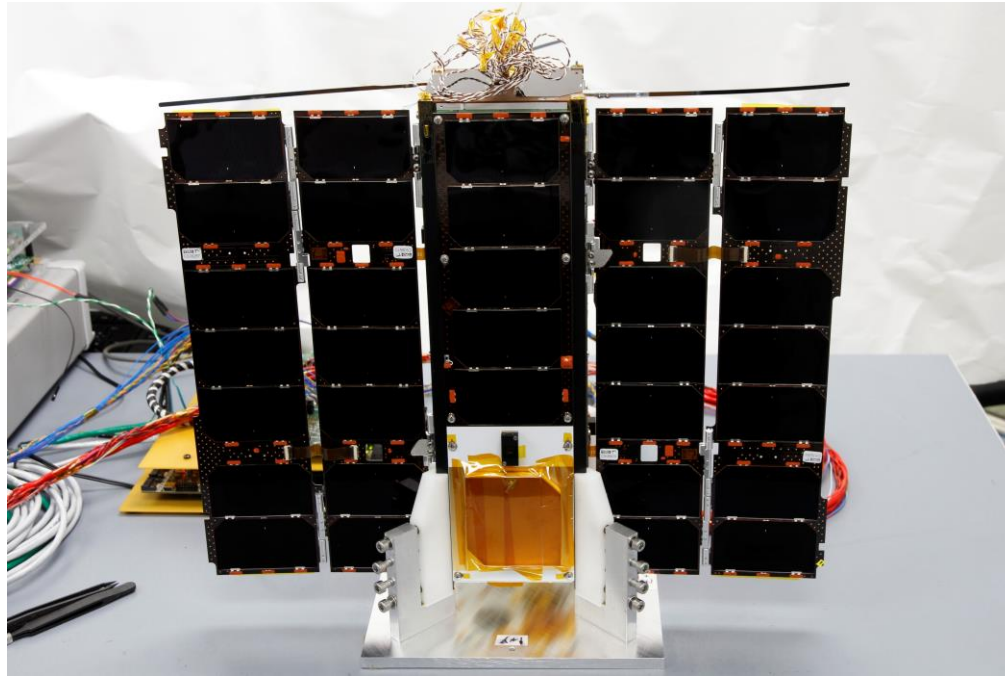
Space Research Centre & CREOTECH, Warsaw (PL)

Suppliers:

SYRLINKS (F)

Clydespace (UK)

The OPS-SAT project is part of ESA's GSTP programme



Thank you for your attention!