

ANTELOPE OBC

On-board computer designed to keep your mission safe

ABOUT ANTELOPE

Antelope is a combination of an **On-Board Computer (OBC)** and a **Data Processing Unit (DPU)**. It is the powerful heart of the satellite, responsible for satellite control and basic task performance such as communication handling, monitoring the satellite's subsystems, handling the classic **Fault Detection, Isolation and Recovery (FDIR)** mechanism and performing planned tasks. Thanks to the powerful **(160 GOPS) FPGA system** it can also handle complicated on-board data processing tasks enabling Earth Observation (EO), telecommunication and other demanding data processing applications.

Antelope was designed to **maximize spacecraft safety**. Thanks to customised mechanisms which protect against effects related to space radiation it can be applicable in more demanding missions. There is an option of **additional security level** provided by the **machine learning algorithms** which, on the basis of telemetric data, **detect events which may be considered as threatening to the security of the mission**. If such an event is detected, the computer will notify the operator in order to take corrective action. The DPU could also be paired to the different sensors and analyse their data in situ.

Antelope is part of the **Smart Mission Ecosystem** – hardware, software and AI-powered algorithms designed to complete your mission.

ANTELOPE IS BUILT OUT OF 2 KEY MODULES



OBC

The On-Board Computer PC-104 form factor, based on **Hercules RM57** expanded with **8 or 16 MiB of MRAM** and **4 or 8 GiB of NAND Flash memory**.



DPU

The Data Processing Unit module supports the calculations with **Zynq Ultrascale+ MPSoC**, expanded with **8 GiB of DDR4** and **8 GiB of NAND Flash**.

OPERATING SYSTEM

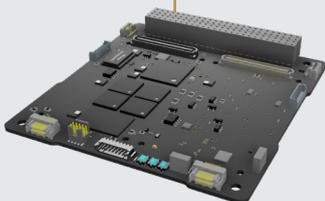
Antelope is managed by **Oryx OBC** – a **modular flight software tool** developed for the mission control of small satellites. Thanks to its modular architecture, based on building blocks, it supports the rapid development of the mission's software by using a vast library of components – **logging, scheduling, testing and communication** to name but a few.

Oryx exposes an API that can be accessed by the **small Lua scripts**, providing access to selected sensors and peripherals, which is definitely a game changer!

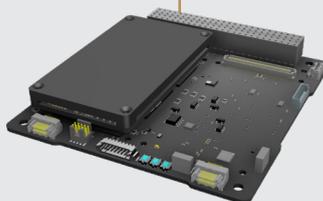
POSSIBLE CONFIGURATIONS

Antelope has **three available configurations**. It can act as a regular **on-board computer** and monitor subsystems, control the satellite's operations, perform communication and command the payloads. The second configuration provides the **OBC with a DPU module** responsible for AI-based on-board data processing. The third configuration extends the possibilities to the maximum thanks to the **redundant DPU**. Choose the version that best suits your mission!

ANTELOPE OBC



ANTELOPE OBC+DPU (NON-REDUNDANT)



ANTELOPE OBC+DPU (REDUNDANT)



TECHNICAL SPECIFICATION

	OBC	DPU
PROCESSING CORES	<p>RM57 Herkules microcontroller:</p> <ul style="list-style-type: none">◆ Dual 300 MHz ARM Cortex-R5F with FPU in lock-step	<p>Equipped with Zynq UltraScale+ MPSoC ZU2EG/ZU3EG/ZU4EG/ZU5EG:</p> <ul style="list-style-type: none">◆ Quad ARM Cortex-A53 CPU up to 1.5 GHz◆ Dual ARM Cortex-R5 in lock-step◆ FPGA for custom function implementation <p>DPU with Kintex Ultrascale is also possible on request.</p>
MEMORY	<ul style="list-style-type: none">◆ 12 MiB of MRAM◆ ECC protected Program Flash◆ 1-4 GiB SLC flash-based filesystem storage with ECC◆ 256 kiB of FRAM	<ul style="list-style-type: none">◆ 8 GiB DDR4 with ECC◆ 4 or 8 GB SLC NAND Flash
INTERFACES	<ul style="list-style-type: none">◆ Interfaces: CAN, I2C, GPIO, LVDS, SPI, RS422/485, UART◆ Additional custom interfaces upon request: SpaceWire, Ethernet◆ LVDS/RS422 interfaces compatible with X/S-Band radios and CCSDS-compatible communication channel upon request	<ul style="list-style-type: none">◆ Interfaces: LVDS, SPI, RS422/485, GTY and GTH transceivers◆ Additional custom interfaces upon request: SpaceWire
SPECIFICATIONS	<ul style="list-style-type: none">◆ Supply Voltage: 5.5 to 14 V (VBAT) or 5V regulated◆ Operating Temperature: -40 to 85°C◆ Supercap-powered RTC◆ Flash FPGA for custom function implementation	<ul style="list-style-type: none">◆ Supply Voltage: 5.5 to 14 V (VBAT) or 5V regulated◆ Operating Temperature: -40 to 85°C◆ FPGA bitstream loaded by OBC (reconfigurable in orbit)
SOFTWARE ECOSYSTEM	<ul style="list-style-type: none">◆ Custom embedded software◆ KP Labs's On-board Computer Software – Oryx	<ul style="list-style-type: none">◆ 64-bit Linux or bare-metal applications
FORM-FACTOR	<ul style="list-style-type: none">◆ PC-104 board	<ul style="list-style-type: none">◆ 70x45mm daughter board compatible with OBC

PW-SAT3 CASE STUDY



Antelope will be utilized by the PW-Sat3 satellite, coupled with KP Labs's on-board computer software - Oryx. PW-Sat3 is an in-orbit demonstrator of a new cold gas propulsion and is planned to be launched in 2023. **Antelope will be responsible for satellite management and mission safety.**

ABOUT US

KP Labs is a NewSpace company based in Poland. We deliver AI computers and software to bring autonomy to demanding space missions. We are a team of more than 70 space enthusiasts who do not think that the sky is the limit.

SOUNDS GOOD?

Contact us at sales@kplabs.pl to attain the benefits your organization deserves!