

# FoX Payload Processor

**Unit to control and process data for Payloads, Instruments, Robotics and Platform needs.  
For LEO, MEO and GEO through the FoX platform.**

The FoX Payload Processor is a high-performance unit to control and process data for payloads, instruments and robotics. Drawing on Beyond Gravity's experience from decades of successful digital electronics construction, it provides outstanding performance at a competitive cost. The FoX Payload Processor provides a solution for both software and gateway processing and is scalable depending on processing and storage needs.

The FoX Payload Processor is part of the FoX Electronics Platform which offers a multitude of functions and capabilities.

## Key Features

- **Outstanding performance at competitive cost.** Beyond Gravity's innovative component selection and test approach based on decades of successfully building space equipment delivers "traditional space" reliability & quality at "new space" cost.
- **Guaranteed resilience and flexibility due to design dedicated to space applications.**
- **High-speed processing** and fast communication interfaces.
- **3U SpaceVPX modular platform** allows you to scale processing as well as complement with other FoX Platform capabilities.
- **Designed for 10+ years** in LEO, MEO and GEO.

## Example Configurations



Mass: 3.6 kg  
Size: 148x128x217 mm<sup>3</sup>



Mass: 7.6 kg  
Size: 275x128x217 mm<sup>3</sup>

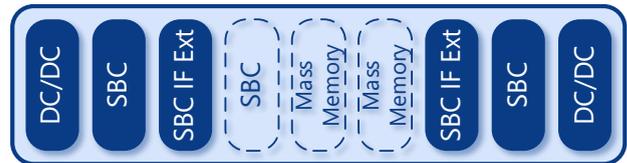
### FoX Payload Processor (4-slot)

- Compact Non-redundant Unit
- Single-board Computer
- Interface Extension (can be tailored for mission needs)
- Spare slot for e.g. more interfaces, mass memory etc



### FoX Payload Processor (9-slot)

- Dual-redundant Unit
- 2x Single-board Computers
- 2x Interface Extension (can be tailored for mission needs)
- Spare slots for more interfaces, processing power or mass memory



## Standard Modules

- Single-Board Computer
- Interface Extension
- Mass Memory
- Ethernet Switch
- Software Defined Radio
- GNSS Rx Module
- Master Reference Oscillator
- More to come...

## Radiation Tolerance

- All orbits suitable (additional shielding for long missions in challenging orbits)
- Latch-up free (53 MeV.cm<sup>2</sup>/mg)
- Component Total Ionising Dose (TID) > 36 kRad
- All memories with ECC
- Triple modular redundancy in FPGAs

## Physical / Environment

- Operating temperature: -20°C to +60°C
- TID allows >10 years in LEO
- Random Vibration 15g RMS
- Shock 2000g @ 2000Hz

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## FoX Module Details - Single-Board Computer (SBC)

### Key Features

- High performance processor and a powerful FPGA for flexibility in terms of communication, interface and processing capability
- Quad Core ARM, > 30.000 DMIPS
- 4 GiB DDR processing memory with ECC
- 20 GiB non-volatile storage with ECC
- Extension modules available providing additional external interfaces allowing to meet every mission's need

### External Interfaces

- 2 Ethernet (1000BASE-T, 10/100BASE-TX)
- 2 SpaceWire (LVDS)
- 2 UART (RS422/485)
- Processor Debug (UART + JTAG)
- FPGA Debug (UART + JTAG)
- GPIO (CMOS in/out)

### Backplane Interfaces

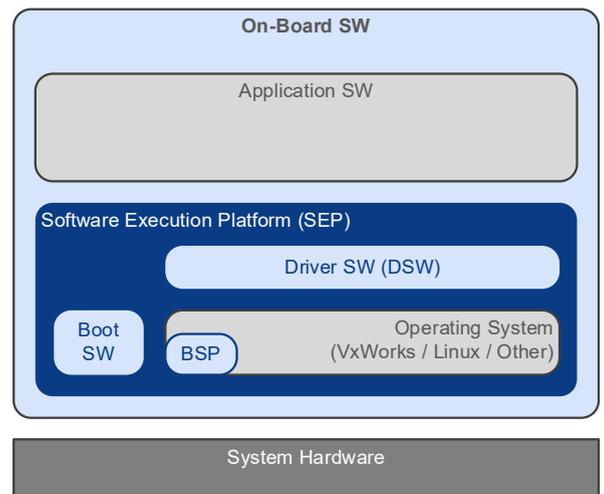
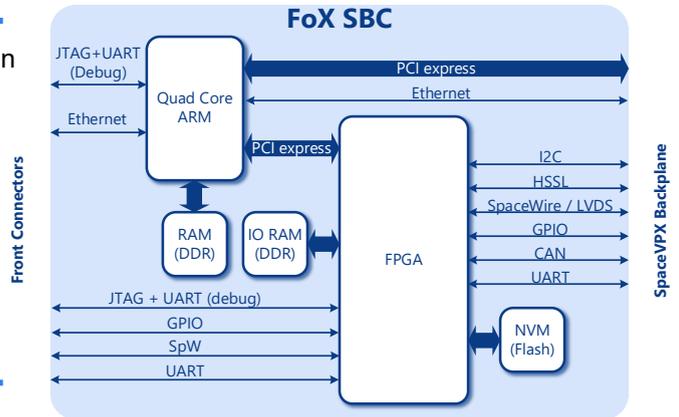
- 4x Ethernet (1000BASE-KX)
- 2x PCIe (Two 1-lane Root Complex)
- 4x HSSL (4 general purpose lanes)
- 2x CAN
- 2x SpaceWire (LVDS)
- 2x I2C

### Performance

- Quad core ARM processor
- >30000 DMIPS, >45000 CoreMarks, 58 GFlops
- 4/8 GiB DDR4 processing memory with ECC

### Software

- **Boot software:** Tests the processor, loads and starts app
- **Board Support Package** for Operating Systems:
  - VxWorks 7
  - RTEMS (available Q3 2026)
  - Linux (available 2027)
- **Driver SW (DSW):** API for all hardware functions;
- **Software Development Environment:** image building, loading, debugging



## FoX Module Details – SBC Interface Extension

### Key Features

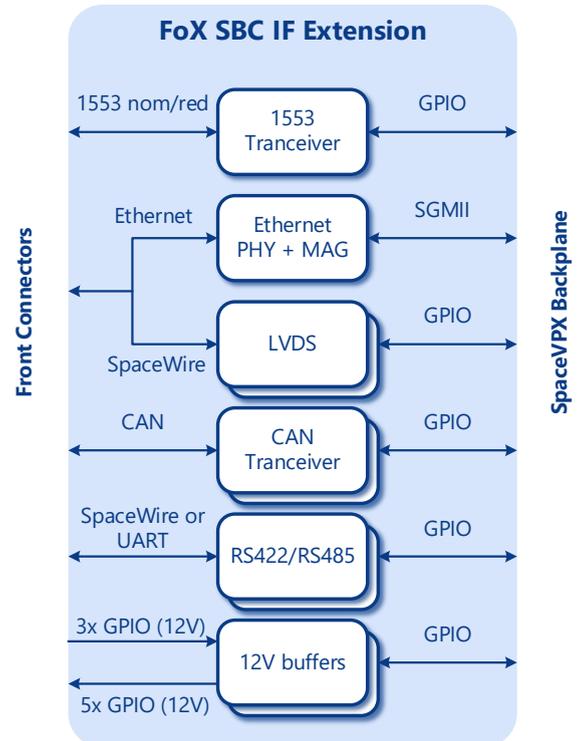
- Interface extension module to the FoX SBC modules
- Used to extend backplane signals to external connectors
- Easily tailored to mission needs

### Version A: External Interfaces

- 2x Ethernet (1000BASE-T, 10/100BASE-TX) or
- 2x SpaceWire (LVDS)
- 1x MIL-STD-1553B (Nom + Red)
- 2x CAN
- 2x UART (RS422 / RS485)
- 8x GPIO (12V, 3 in + 5 out)

### Version B: External Interfaces

- 8x SpaceWire (LVDS)



Interface Extension - Version A



## FoX Module Details - Mass Memory

### Key Features

- 1 TeraByte (EOL) mass storage
- Advanced error correcting capabilities
- Fast access from FoX SBCs
- Prepared for future extensions
  - Direct storage from instruments, cameras etc.
  - Direct downlink to ground

### External Interfaces

- 4x SpaceWire (LVDS)
- Debug (UART + JTAG)

### Backplane Interfaces

- 2x PCIe EP (1-lane)
- 4x SpaceWire (LVDS)
- 2x I2C

