Hardware

Serval Nano DPU

Adaptive Edge Computing for Small Satellites

Mission-agnostic **Data Processing Unit** designed for **real-time on-board data processing** with **energy-efficient AI.** Built around the **AMD Versal AI Edge SoC**, Serval Nano DPU combines application and real-time processors, FPGA, DSP resources and AI Engines in a **reconfigurable platform. High-speed payload interfaces, NVMe memory** and an **independent Supervisor** enable integration with demanding payloads and spacecraft platforms.



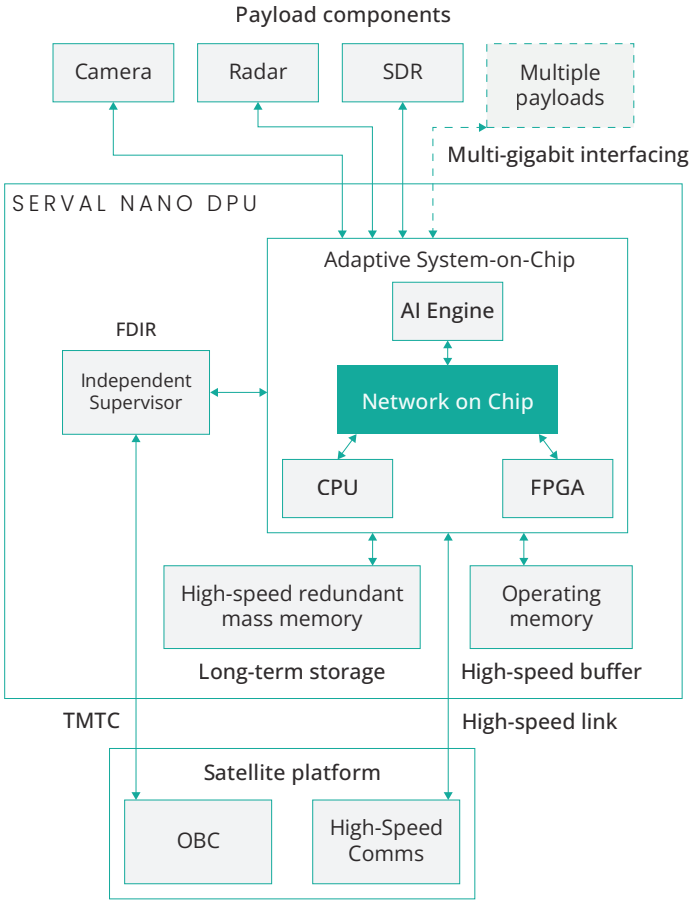
Compute Power at Low SWaP
Adaptive SoC with real-time CPUs, FPGA, AI Engines & high-speed I/O

Algorithm acceleration
Runs classical and AI workloads on board efficiently

Ease of integration
PC/104 form factor with standard or custom Interface Board

Architecture

Serval Nano DPU connects directly to payload and platform, handling high-throughput data acquisition, processing and storage in a single Low-SWaP unit.



Use cases

Supported missions

- Earth Observation
- Autonomous Navigation
- Scientific and Multi-Instrument Missions
- Payload Technology Demonstration

On-board capabilities

- Payload control & high-speed data acquisition
- High-speed NVMe mass storage
- Real-time image processing and AI inference
- Hardware-accelerated hyperspectral compression

Processing algorithms & software

A library of **pre-integrated software, programmable logic components and algorithms** is available for payload interfacing (SpaceWire, PUS-C) and on-board data processing - including **image pre-processing, cloud screening and hyperspectral compression.** All listed solutions are available on request.

Architecture	▪ Supervisor - telemetry, monitoring, boot control and FDIR ▪ Processing Core - based on the AMD Versal AI Edge Adaptive SoC ▪ Interface Board - off-the-shelf or tailor-made ▪ Optional cold-redundant configuration
Processing cores	▪ AMD Versal AI Edge VE2302 ▪ Dual-core Arm Cortex-A72 ▪ Dual-core Arm Cortex-R5F ▪ Programmable Logic ▪ 34 AI Engine-ML tiles ▪ 464 DSP Engines
Memory	▪ 8 GiB DDR4 with ECC ▪ 32 GiB pSLC eMMC ▪ 2 × 64 MiB NOR flash for Versal boot images (redundant, can be updated during the mission) ▪ 2 × 960 GiB NVMe mass memory (cold-redundant)
Interfaces	▪ 1 × Gigabit Ethernet ▪ 4 × 10G GTYP ▪ 19 × LVDS (XPIO) ▪ 7 × HDIO ▪ MIO: SPI, I2C, GPIO ▪ Supervisor telemetry & control interfaces: 2 × CAN, 2 × UART, PPS, optional SPI/I2C
Interface extensions	▪ SpaceWire ▪ RS-422 ▪ 4 × 10G Optical Interface ▪ 10G/40G Ethernet, CoaXPress-over-Fiber, SpaceFibre Other customisable interfaces available upon request
Software ecosystem	▪ Custom 64-bit Linux built with Yocto ▪ FreeRTOS-based Supervisor firmware ▪ Vitis AI development workflow
Environmental rating	▪ Qualification for launch and space environments at NASA GEVS levels ▪ Operating temperature: -25 °C to 75 °C
SWaP	▪ Aluminium enclosure with an efficient thermal path and a dedicated ASoC heat-spreading system ▪ Dimensions: 95.89 mm × 90.17 mm × 39.86 mm (PC/104-compatible) ▪ Mass: 616 g ▪ Supply voltage: 6.5 V to 14 V ▪ Power consumption: 6.5 W to 25 W