

MDPA - Multi-DSP/micro Processor Architecture

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MDPA (Multi-DSP/micro-Processor Architecture) is a highly integrated system-on-chip system, which is an advancement on the architecture developed and used on the Inmarsat4 DSP payload. The MDPA is a concept based on a matrix of data processing nodes interconnected using SpaceWire (SpW), with external SpW interfaces to enable connection to other telecommunication, earth observation or science payload subsystem. An MDPA node is in effect a system-on chip which incorporates a highly integrated DVB-S modem co-processor combined with a powerful LEON2FT microprocessor function and relevant interfaces all integrated on the same device. This architecture acts as the controlling unit for the Data Path Subsystem (DPS) within the frame of the next generation of digital telecommunication payloads. Additionally the MDPA concept is laid out for high end control applications or medium rate data processing for earth observation or science payloads.

The functionality is provided by means of the following functions, integrated into a single chip

- The fault tolerant microprocessor core LEON2FT with additional support for floating point arithmetic.
- Data processing functions for acceleration of modem applications especially designed for telecommunication control channels
- 8x SpaceWire with routing capabilities, connected to the processor via AMBA; this enables DMA transfers directly to the LEON working memory.
- 2x MilBus (BC or RT), connected to the processor via AMBA and with DMA capability
- 1x CAN bus, connected to the processor via AMBA
- Embedded Test Module
- Debug Interfaces

The SpaceWire interfaces can be used to interconnect several MDPA nodes to a multi-processor configuration. This increases the overall processing performance and enhances the processing redundancy since a faulty node can be replaced by another one. The routing capabilities support the communication of the nodes with low processor interaction. In addition the high number of SpaceWire interfaces allows connection of several remote controlled devices for command and monitoring of subsystems. The modem function will be implemented as hardwired block on-chip. Other devices such as FFTC, GNSS or reconfigurable co-processors can be used externally, which are planned to be controlled via SpaceWire.

The MDPA is currently in development under DLR/Artes3 contract.