NEXT GENERATION MICROPROCESSOR FUNCTIONAL PROTOTYPE SPACEWIRE ROUTER VALIDATION RESULTS

Session: SpaceWire Components

Short Paper

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ABSTRACT

The Next Generation MicroProcessor (NGMP) is a quad-processor system-on-chip currently being developed by Aeroflex Gaisler in activities commissioned and funded by the European Space Agency under contracts 22279/09/NL/JK and 18533/04/NL/JD. The design includes four LEON4 SPARC32 processors with a shared L2 cache, DDR2-800 SDRAM main memory interface, a SpaceWire router with eight external SpaceWire links and four internal AMBA ports, two 10/100/1000 Ethernet MACs, 32-bit 66 MHz PCI interface and other interfaces..

The SpaceWire router allows the NGMP to act both passively and actively in a SpaceWire network. The target frequency for the NGMP device is 400 MHz. Preliminary results for this target frequency show that, using only internal routing, the architecture is able to sustain a data throughput of 1.5 Gb/s per SpaceWire AMBA port. In a scenario where the two full-duplex Ethernet links and all SpaceWire AMBA ports are run at full speed, the sustainable throughput is roughly 1.5 Gb/s per Ethernet link and 1 Gb/s per SpaceWire AMBA port. In addition to this, the SpaceWire router will also be able to simultaneously route packets at maximum speed.

The implementation of NGMP in rad-hard technology was put on hold in April 2011, pending advances in the development of a suitable European Deep-Sub-Micron technology for space. Development has instead progressed in the development of a NGMP functional prototype (NGFP) targeting eASIC Nextreme2, a structured ASIC technology based on a 45 nm process. Chips have been received in August 2012, and an evaluation board has been manufactured. The presentation and paper will describe the validation work and validation results for the functional prototype's SpaceWire router.

NGFP validation boards are commercially available. A preliminary datasheet for NGFP / NGMP and further information can be obtained from:
http://microelectronics.esa.int/ngmp/