

UNIVERSAL SPACEWIRE INTERFACE TO/FROM VME AND TO/FROM PCI

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Long Paper

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ABSTRACT

NLR developed in co-ordination with Satellite Services (Katwijk, Netherlands) an universal SpaceWire interface that is fully ready for production.

The main goal of this project was to design a SpaceWire interface that can be used in a PC environment (PCI bus) aswell as in an embedded PC environment (VME / compact PCI), have maximum performance and is flexible in use. The production should also be commercial attractive. To be flexible, we have chosen to use the PCI Mezzanine Format (PMC) for the SpaceWire interface module. The high performance is achieved by implementing its functionality in VHDL around the ESA VHDL SpaceWire core. The API, the special drivers and the test software for this SpaceWire interface module can be executed on different platforms and are ready to use.

The SpaceWire interface accommodates 3 DS links (Data Strobe encoding) via Canon D-miniature connectors and it is connected to the PCI local bus of the PowerPC board by a high-performance 132 MB/s PCI interface.

Special features of this SpaceWire interface: transmit speed reaches up to 200 Mbit/s; time-tagging for both incoming and outgoing packets, worm-hole routing, segmenting of large data structures, priority settings for each channel and routing of the channels.

The front-end driver software for the PowerPC is based on the VxWorks real-time kernel and it supports the processing of host-initiated protocol messages. The host PC contains test software running in a LabWindows/LabView environment. It offers a set of windows to control all settings of nodes and links and enables data to be transmitted and received to and from the links.

Applications

Potential applications of the SpaceWire VME interface are in real-time systems, such as AOCS test systems. For the connection of commercial sensor equipment, such as a camera, the 1355 PMC module can be combined with other PMC modules (RS-232, RS-422 or IEEE-1394) on the same VME PowerPC board. The upcoming CompactPCI standard supports PCI Mezzanine Card (PMC) on CompactPCI also.