SYSTEM ASPECTS OF SPACEWIRE NETWORKS

Session: SpaceWire mission and applications

Short Paper

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ABSTRACT

The well established SpaceWire standard provides a point-to-point communication with hundreds of Mega-bit per second data transfer in full-duplex operation. To efficiently use SpaceWire devices in an on-board system many aspects have to be taken into account already early in the system definition phase. Among others the following points have to be considered: provided data rates, supported protocols, provided interface to configure and control the SpaceWire devices, interaction with software, compatibility of equipments from different suppliers assuming master/slave concepts, etc..

The presentation will give an overview about some system concepts and their implementation using e.g. the SMCS332SpW, the SMCS116SpW and special FPGA implementations including a SpaceWire interface in a typical topology.

Critical issues are:

- Interfacing between software and the SpaceWire device itself. For example DMA capability avoids a blockage of the processor by pure data transfers, i.e. autonomous data transfer of the device.
- Proper Interrupt handling, for e.g. completion of transfer, especially optimized for reducing the interrupt frequency.
- Remote control of SpaceWire devices (used in remote or Input/Output devices), controlled via protocol carried on-top of SpaceWire. Most protocols consist of a header/command and the data to be transferred. It is necessary to support the software/system in an easy way by the generation/assembly of a packet including protocol.

Taking into account the discussed issues an optimized SpaceWire system / network can be defined, using devices from the already existing family of SpaceWire products.