

SPACEWIRE TEST AND DEMONSTRATION UTILISING THE INTEGRATED PAYLOAD PROCESSING MODULE

Session: SpaceWire test and verification

Short Paper

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ABSTRACT

A demonstration platform has been developed by CAEN AURELIA SPACE srl and ABSTRAQT srl for the Onboard Payload Data Processing laboratory at ESTEC. The demonstration platform consists of three Integrated Payload Processing Modules (IPPM), which emulates a simplified On-Board Data Handling system.

The IPPM is a self-contained Leon2 based computer equipped with a large amount of on-board memory and with a wide inter-networking capability. For the purpose of demonstration, each of the IPPMs have been assigned dedicated roles. One as Instrument unit (IU), the second as Payload Data Handling Unit (PDHU) and the third as Satellite Management Unit (SMU). The SMU communicates with a Ground Control Unit (GCU) simulated by a PC, for telemetry and science data up/down links. The PDHU stores image data coming from the IU in a Mass Memory Unit (MMU) simulated by another PC and performs JPEG compression before or after data storage.

The primary objective of the activity has been to initiate a development of a framework for further experimentation and development of communication protocols and onboard services using primarily SpaceWire as main transport medium. SpaceWire-RT is a candidate protocol to be implemented in the current demonstration SW. The demonstration framework will aid to identify best practices when using ESA building blocks for onboard data systems such as the AT697 Leon2 and the AT7910E SpaceWire router 10X coupled with use of Open Source RTOS such as RTEMS.

A portable and configurable IPPM software library has been developed in order to facilitate the development of applications in an RTEMS environment. The library supports both as subset PUS services and the RMAP protocol and provides a platform-independent interface to the underlying hardware and operating system.

A user-friendly GUI offers the possibility to configure, monitor and control the system, through dedicated configuration menus. The status of SpW, CAN and MIL-1553 communication channels is continuously monitored, as well as the time synchronisation and status of the application processes for each IPPM board.