# VALIDATION AND TESTING OF AN IP CODEC FOR HIGH BANDWIDTH SPACEWIRE LINK

**Session: SpaceWire Test and Verification**

**Short Paper**

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## ABSTRACT

In this paper we present the design, development and testing of a SpaceWire codec that is fully compliant with ESA standard ECSS-E-ST-50-12C. This codec is part of the high bandwidth communication infrastructure employed in the Spanish INTA Microsat satellites programme. Microsat is the first small satellite developed in Spain for Earth observation. SpaceWire is the standard point-to-point protocol used as a communications solution for data transfer from the Microsat's mid-resolution cameras to its Mass-Memory-Unit (MMU), and to move the data from the MMU to the S-band modem (2 to 8 Mbps), X-band modem (up to 82 Mbps), and Laser link (100 Mbps) for further download.

Four FPGAs families have been used to validate our design, namely Xilinx Spartan3E, Xilinx Virtex4, Actel Axcelerator and Actel Proasic3. Every FPGA implementation has been tested against commercial solutions such as Star Dundee's SpaceWire-PCI2, Star Dundee's SpaceWire USB-Brick and Aeroflex Gaisler's SpaceWire-RTC Development Suite. Part of the test setup employed to carry out the tests is the suite of utilities developed within our group. With these utilities, the user is able to configure the hardware, send and receive data, perform data transfer integrity tests, get information about the status of the SpaceWire interfaces and about the data rate of data transfers, among other tasks.

The results of all tests are presented, including synthesis and timing simulation results, occupation data for all the FPGA families mentioned and comparison of this occupation data with information available from alternative products. Real performance results are also presented, which include compatibility test results of this codec with Star Dundee's and Aeroflex Gaisler's solutions and throughput over 200 Mbps achieved during data transfers between these solutions.