

# OBSERVING AND TESTING SPACEWIRE THROUGH PCI EXPRESS

**Session: SpaceWire test and verification**

## **Short Paper**

Paul E. McKechnie and Steve Parkes

*STAR-Dundee, c/o University of Dundee, School of Computing, Dundee, DD1 4HN,  
Scotland, UK*

*E-mail: paul@star-dundee.com*

### **ABSTRACT**

In order to test, validate and verify systems that implement the SpaceWire protocol, monitoring hardware needs to be used to observe and stimulate the components comprising the system under test. Currently, SpaceWire links can be observed and stimulated with monitors that transfer packets over USB, Ethernet or PCI buses. For example, the USB Brick sold by STAR-Dundee allows packets to be sent and received by a host computer over the USB 2.0 bus. Link analysers are also available that passively monitor connections and capture packet sequences. However, the data rates of USB and PCI restrict the number of SpaceWire links that can be served simultaneously.

PCI Express (PCIe) is the successor to PCI which supports faster data rates compared to PCI and USB. This paper will describe an implementation of a SpaceWire PCIe card, which permits packets to be routed between SpaceWire interfaces and the host computer. The amount of data that can be captured and the visibility of the system under test are improved by the increased data rates supported by PCIe.

The PCIe card can also support packet sniffing and spooling to an on-board memory, which has greater throughput and lower protocol overhead compared to the host connection. The throughput provided by the on-board memory allows multiple connections to be monitored simultaneously.

Finally, the monitoring capabilities of the PCIe card are complemented by a deterministic packet transmission mechanism. The on-board memory is used to store a predefined sequence of packets, which can be transmitted at regular intervals or in response to an event.