# VIRTUAL SATELLITE INTEGRATION AND THE SPACEWIRE INTERNET TUNNEL

**Session: SpaceWire Test and Verification**

**Long Paper**

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## ABSTRACT

The SpaceWire Internet Tunnel provides a method for geographically separated subsystems of a spacecraft to be "virtually integrated". This means that integration testing can be performed at a stage much earlier than is normally possible. The Tunnel replaces a SpaceWire link between two components with an Internet connection. All traffic which would normally cross the SpaceWire link is instead routed over the Internet.

The SpaceWire Internet Tunnel consists of hardware to send and receive traffic from the SpaceWire link, and software to route traffic between the hardware component and the Internet. Protocol Analysis software is also provided to allow the traffic crossing the Tunnel to be monitored.

The Tunnel does not just route data: it provides a complete replacement of the SpaceWire link. This means that, for example, if the link is disconnected at one end of the Tunnel, that link will appear to be disconnected at the other end. Although this might suggest that the Tunnel can be used in any situation to replace a SpaceWire link, there are limitations. Due to the use of the Internet, it is not normally possible to

achieve the high data rates of SpaceWire over the Tunnel. For this reason, there are some situations where it is not appropriate to use a Tunnel.

An ESA pilot study is currently being undertaken to test the suitability of the SpaceWire Internet Tunnel and virtual satellite integration. This involves a number of organisations in different countries using the Tunnel to test concepts, hardware and software, reporting back on their experiences.

The final paper will describe the SpaceWire Internet Tunnel in greater detail, highlighting the benefits it brings to testing and in which situations a Tunnel should and should not be used. It will also describe the pilot activity and its objectives.