

# INTEGRATION OF INTERNET PROTOCOLS WITH SPACEWIRE USING AN EFFICIENT NETWORK BROADCAST

**Session: SpaceWire Networks and Protocols**

## **Short Paper**

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### **ABSTRACT**

SpaceWire, is gaining popularity for space applications because of its simple circuitry, low power consumption, and high link speeds. Unlike the ubiquitous Ethernet which dominates the terrestrial Internet, SpaceWire does not include a link-layer broadcast mechanism. Common protocols for the Internet that provide for automatic network configuration such as the Address Resolution Protocol (ARP) and the Dynamic Host Configuration Protocol (DHCP) are often built on a broadcast mechanism. As a result, address resolution tables and host Internet Protocol (IP) addresses must be manually configured on SpaceWire networks.

This paper describes an efficient, loop-free, link-layer broadcast service for SpaceWire that supports automatic IP network discovery, configuration and management. Since it is implemented in the host software device drivers, our simple approach requires no changes to existing router or host interface hardware. It facilitates an easy integration path for existing protocol stacks and enables the use of standard ARP and DHCP implementations. It is based on the concept of a SpaceWire subnet which consists of a router and its directly connected hosts. One host per subnet acts as the subnet server. The subnet server distributes broadcast messages locally to hosts on the same router. To extend a broadcast globally, the subnet server sends the message to the other subnet servers. We include performance results from simulation experiments, analytical analysis, and a prototype implementation. Since this research enables the convenient use of existing higher-level protocols and applications, it provides much promise for reducing the cost and time required to develop SpaceWire systems.