

THE EVOLUTION OF SPACEWIRE: A COMPARISON TO ESTABLISHED AND EMERGING TECHNOLOGIES

Session: SpaceWire Networks and Protocols

Short Paper

Robert A. Klar, Allison R. Bertrand

Southwest Research Institute, San Antonio, TX, 78238

E-mail: robert.klar@swri.org, allison.bertrand@swri.org

ABSTRACT

Designed for use particularly in space applications, SpaceWire offers many advantages over other comparable communications technologies. It requires relatively simple circuitry to implement, offers low power consumption, and supports high link speeds. It has rapidly gained acceptance and has been successfully employed in support of a wide variety of missions.

Since SpaceWire was standardized in 2003, it has been supplemented by several higher-level protocols for use in conjunction with it. A draft standard was published which specifies two such protocols, the Remote Memory Access Protocol (RMAP) and the Consultative Committee for Space Data Systems (CCSDS) Packet Transfer Protocol. With anticipated introduction of a standard for SpaceWire-RT (SpaceWire Reliable Timely), mechanisms are introduced for SpaceWire to provide for timely delivery of information with quality of service guarantees. Derived from SpaceWire, a standard for SpaceFibre is in development which promises even higher transfer speeds to complement systems built on SpaceWire.

This paper explores the evolution of SpaceWire over time. It compares and contrasts SpaceWire with other high-speed technologies such as Asynchronous Transfer Mode (ATM), Switched Ethernet, Peripheral Component Interconnect (PCI) and Rapid I/O. In particular, it discusses the trade-off between design complexity and performance.