

SPACEWIRE PLUG-AND-PLAY: FAULT-TOLERANT NETWORK MANAGEMENT FOR ARBITRARY NETWORK TOPOLOGIES.

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Short Paper

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ABSTRACT

The SpaceWire Plug-and-Play protocol (SpW PnP) defines a set of common features for SpaceWire devices to facilitate recognition and configuration of arbitrary network topologies. It has been elaborated in a joint effort together with NASA and other partners in the frame of the SpW PnP Working Group. It will enable the implementation of different network discovery and configuration methodologies depending upon a specific network management philosophy.

This paper will present a fault-tolerant implementation with multiple network node managers using the SpW PnP protocol. The proposed approach supports arbitrary network topology changes due to failures or user intervention. Specifically, it can automatically reconfigure the network when any device or subnet is un-plugged by the user and plugged again in another location without requiring reset. This can be used for fast prototyping or space manned missions.

The implementation is mainly software-based. Unique hardware identifiers are not required by the network discovery algorithm. Instead, they are generated by software and written to device registers defined by the SpaceWire PnP standard. A simple locking mechanism prevents collisions between multiple network managers attempting to configure the same device. Polling method or active notification is used to register a new device in the network. A master network node manager ensures that all routing tables are consistent.

This methodology has been successfully prototyped with ordinary computers acting as network node managers, using RMAP protocol to emulate SpW PnP. The final paper will present the proposed implementation in different scenarios, with the Remote Terminal Controller unit defined as a network node manager.