SPACEWIRE PLUG-AND-PLAY: A ROADMAP

Session: SpaceWire Networks and Protocols

Long Paper

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ABSTRACT

SpaceWire Plug-and-Play has emerged as a topic of widespread interest, with organisations from across the world requiring some plug-and-play features in a wide variety of contexts. Under the guidance of NASA/GSFC, the plug-and-play group of the SpaceWire working group developed the principles of a plug-and-play protocol for SpaceWire, with the aim of producing a concrete implementation. The authors of this paper further developed the concept by shifting the implementation to RMAP, providing the ability to leverage existing IP and experience, and simplifying the proposals. The CCSDS SOIS stack depends on the facilities provided by plug-and-play, and will play an important role in the future development of this protocol.

The paper begins by reviewing the history of SpaceWire plug-and-play, focusing closely on the driving forces behind the developments so far and the reasons for its development. The current position of plug-and-play support is discussed in two contexts: the status and content of the fledgling standard, and its implementation; and the implementation of SpaceWire plug-and-play features on standard hardware. For the latter point, a detailed case study is presented, based on the SpW-10X router and the RTC device.

The most important development to the future of plug-and-play will be the forthcoming SpaceWire-RT protocol, providing quality of service to SpaceWire traffic. It is crucial that plug-and-play fits within the scope of SpaceWire-RT. This paper presents a roadmap detailing how plug-and-play will interoperate with SpaceWire-RT, and the migration path that should be taken to ensure maximum functionality and flexibility, whilst retaining support for existing hardware. Part of this roadmap will be a clear description of the services plug-and-play is able to provide to hardware and software systems (e.g. through SOIS) as the protocol develops.