

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Space Systems and Architectures Featuring Cross-Platform Compatibility (7)

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PLUG-AND-PLAY WITH SPACEWIRE AND SOIS IN A MODULAR, RECONFIGURABLE
COMPUTING ARCHITECTURE

Abstract

The Modular Architecture for Robust Computing (MARC) is an ESA-funded research and development project being undertaken by SciSys UK, Astrium UK and SEA. MARC is developing a decentralised onboard computer composed of inter-operable, replaceable modules using SpaceWire as a communication backbone with a hierarchical FDIR mechanism.

The hardware architecture is closely coupled to the software aims of the Generic Fault-tolerant Software Architecture using SOIS (GenFAS) software framework, developed by SciSys. This standards-driven software platform provides PUS-based Data Handling Services, communication functions using the CCSDS Spacecraft Onboard Interface Services (SOIS), FDIR management and a software deployment and upgrade mechanism. The SOIS services promote interoperability and independence from interface technology, part of which are the services related to plug-and-play supporting device discovery, enumeration and virtualisation.

This paper introduces the MARC hardware architecture and the GenFAS software framework, explaining its role in the provision of SOIS services. The MARC system, utilising flight representative components and a next-generation network architecture, provided SciSys with the ideal opportunity to trial SpaceWire plug-and-play techniques which have been developed by some of the paper's authors. The SpaceWire-PnP protocol is presented as background, and its relevance and potential impact are discussed. The implementation in the GenFAS framework is discussed, highlighting its position within the SOIS architecture. Preliminary results are given, indicating the success of this early pilot.

Finally, the paper closes by indicating the directions for future research and development, some of which have already begun at SciSys.