

MODULAR ARCHITECTURE FOR ROBUST COMPUTING (MARC)

Session: SpaceWire onboard equipment and software

Short Paper

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ABSTRACT

The paper describes the outputs from the definition phase of the ESA GSTP-funded Modular Architecture for Robust Computing (MARC) project.

The MARC project's aim is to demonstrate the essential features of a fault tolerant, high availability distributed avionics system. The MARC concept is for a modular processing system that is interconnected by a SpaceWire network. The SpaceWire network can be expanded to include new functions and to provide duplicate paths to achieve the level of redundancy needed for a particular mission. Redundant processing, memory or IO modules can be added to improve system availability and/or performance.

The hardware architecture is closely coupled to the software aims of Generic Fault-tolerant software Architecture using SOIS (GenFAS), which allows software builds to be allocated to available processor modules, and re-allocated in the event of a failed processor module.

The monitoring and control of the fault recovery and redundancy strategies and how this impacts the system performance shall be analysed by Astrium.

The demonstrator hardware will be designed, manufactured and tested by SEA and then used by SciSys UK Ltd. to host their GenFAS software. Subsequently EADS Astrium Ltd. will use the completed system to verify their FDIR system analysis and performance predictions.

The MARC architecture is designed to provide a scalable solution that can meet the demanding needs of future missions. An important aspect of the demonstrator hardware is that the key components are space qualifiable parts; permitting the design to be upgraded to a fully space qualified system with minimal changes. Similarly the

GenFAS software shall be developed in accordance with space qualified software standards (ECSS-E-40).