

SPACE SYSTEMS SYMPOSIUM (D1)
Lessons Learned in Space Systems (5)

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DESIGN AND EVALUATION OF LARGE CAPACITY FLASH MEMEORY SOLID STATE
RECORDER WITH INTEGRAL CFDP CAPABILITY

Abstract

The use of fully functional file systems is becoming more common on spacecraft designed specifically for science missions, while requirements for storage capacity and high speed data capture rates are increasing. A file system offers several advantages from a software engineering perspective, and is often a requirement for the use of other desirable software components, such as the CCSDS File Delivery Protocol (CFDP). Often these file systems are used in conjunction with volatile, high speed memory, such as a RAM-based DOS file system, but the use of flash memory provides several advantages including more storage capacity for less mass and power. In addition, flash memory is non-volatile, which enhances reliability. Although flash file systems are common software products in embedded and other systems, the space environment levies requirements that are not always easily met by commercial, off-the-shelf packages. Among these considerations are over-current protection, wear leveling, stringent power management, EDAC encoding of the data stream, and provisions for high speed recording from flight instruments. This paper describes the design and evaluation of a large capacity (1 Terabit) solid state recorder capable of 100 mbs data capture over SpaceWire, that utilizes COTS software to provide a fully functional file system interface and incorporates a CFDP protocol entity as an integral component for data downlink.