SPACE SYSTEMS SYMPOSIUM (D1)
Enabling Technologies for Space Systems (2)

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THE SMART SSR DTN ROUTER

Abstract

Delay Tolerant Networking (DTN) is an approach to data communications which overcomes the technical difficulties associated with networks that lack continuous connectivity between participating nodes. Space based networks typically must address this issue. International standards are being developed to facilitate solutions leading towards the overall goal of an Interplanetary Internet (IPN). Recent standards applicable to space applications have included the CCSDS File Delivery Protocol (CFDP), the Bundle Protocol (IETF RFC 5050), and Licklider Transmission Protocol (IETF RFC 5326).

In a delay tolerant network standard routing protocols are incapable of effectively establishing routes. These protocols try to first establish a complete end to end route before forwarding the data. In a network that lacks continuous connectivity a "store and forward" approach is more effective. Data is incrementally moved and stored throughout the network in advance of establishing a complete end-to-end route. This suggests that DTN routers should be coupled with the capability to store large amounts of data. In conjunction with NASA's DTN Readiness Program, this is the approach taken by the SmartSSR DTN router.

The SmartSSR is a component that combines a large NAND flash array with a general purpose processor in order to host several closely related functions in a way that efficiently provides their services to the other components of the spacecraft. Based on the LEON3FT processor and SpaceWire interfaces, it provides on-board networked file system functionality in conjunction with the JPL ION implementation of the DTN protocol suite. This paper describes the hardware and software architecture of the prototype SmartSSR DTN router.