Interplanetary Overlay Network Bundle Protocol Implementation

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The Interplanetary Overlay Network (ION) system's BP package, an implementation of the Delay-Tolerant Networking (DTN) Bundle Protocol (BP) and supporting services, has been specifically designed to be suitable for use on deep-space robotic vehicles. Although the ION BP implementation is unique in its use of zero-copy objects for high performance, and in its use of resource-sensitive rate control, it is fully interoperable with other implementations of the BP specification (Internet RFC 5050).

The ION BP implementation is built using the same software infrastructure that underlies the implementation of the CCSDS (Consultative Committee for Space Data Systems) File Delivery Protocol (CFDP) built into the flight software of Deep Impact. It is designed to minimize resource consumption, while maximizing operational robustness. For example, no dynamic allocation of system memory is required. Like all the other ION packages, ION's BP implementation is designed to port readily between Linux and Solaris (for easy development and for ground system operations) and VxWorks (for flight systems operations). The exact same source code is exercised in both environments.

Initially included in the ION BP implementations are the following: libraries of functions used in constructing bundle forwarders and convergence-layer (CL) input and output adapters; a simple prototype bundle forwarder and associated CL adapters designed to run over an IP-based local area network; administrative tools for managing a simple DTN infrastructure built from these components; a background daemon process that silently destroys bundles whose time-to-live intervals have expired; a library of functions exposed to applications, enabling them to issue and receive data encapsulated in DTN bundles; and some simple applications that can be used for system check-out and benchmarking.

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47454.