

Experiment Computer System

A General-Purpose Space Payload Processor for the Demonstration and Science Experiments (DSX) Satellite

The **Experiment Computer System (ECS)** integrates, stores, processes and forwards data from ten different payloads. This high-end, general purpose processing capability presents a single, simple interface to the spacecraft computer. Founded on hardware and real-time OS by industry leaders, ECS' role is to offload the bus computer from intensive computational tasks, provide mass data storage, manage the downlink and allow for an aggressive, early integration approach to retire interface risk.

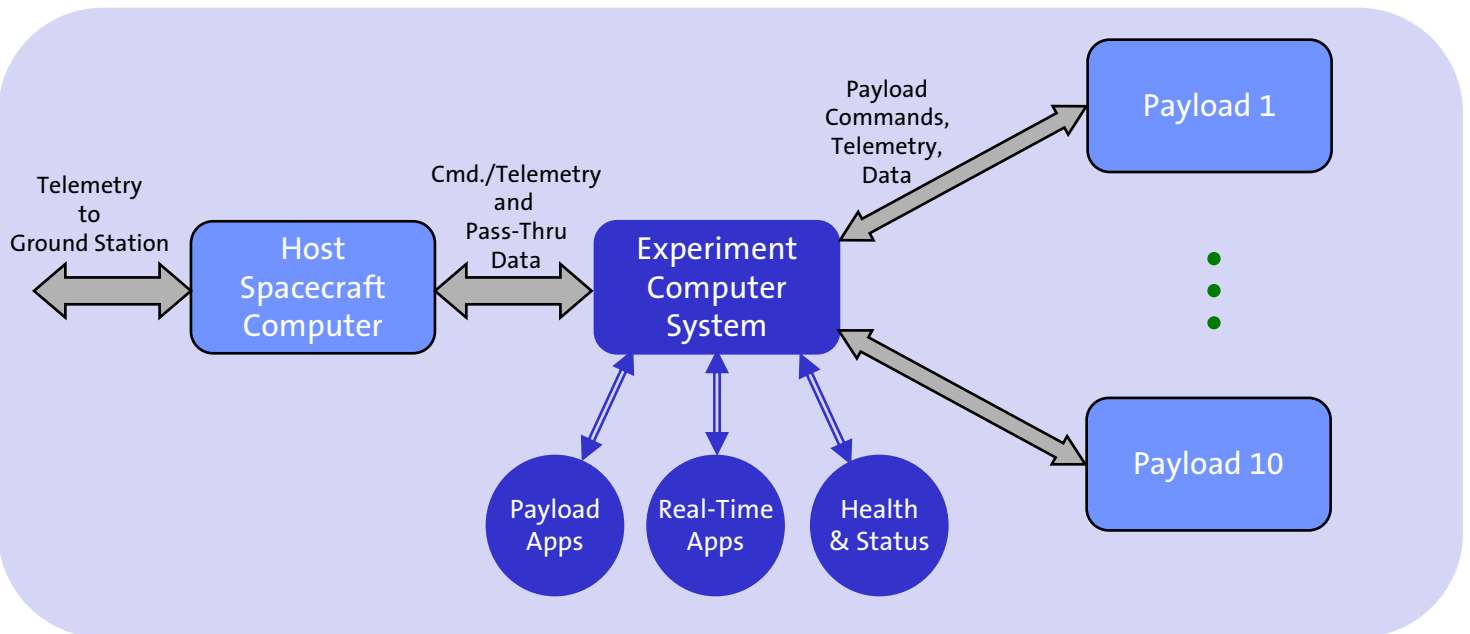
Integrated ECS Prototype



DSX Payload I/F Test Facility



Engineering Unit Network I/F Card



- High-End General Purpose: 1800 MIPS, 10 Gbyte Storage, 100 KRad (Box Level), Processor Uncorrected SEE 1/208 years in MEO
 - Maxwell SCS-750 Single Board Computer in 32 MHz cPCI Backplane
 - Seakr Mass Storage and High-Speed Payload I/F (2 x 8 Mbps Serial) Card
 - PSI RS-422 Payload I/F Card (10 RS-422, 2 Mbps each)
 - Seakr Enclosure, 10.2”L x 7.8” W x 7.0”H, 17 LBS, 50 W AVG @ 28 V
- Extensive Existing Software Infrastructure (Implemented C++/VxWorks)
 - Monitors health of all client software tasks, terminating those that become unresponsive. Keeps track of all software processes, maintains event logs and performance statistics.
 - Communications: Messaging service to allow communications between experiment software components, instruments, bus, and ground.
 - Scheduler: Wake-up calls for software tasks, allow time-based payload application execution
 - Time Synchronization: Maintains synchronization of timebase between bus, ECS, and payloads.
 - File Manager: Service to allow mgmt of data using standard filesystem interface, including stored science data, configurations, batch cmd files, etc. Handles file uplink/downlink outside of payload contexts.
 - Extensive Matlab-like math library (matrix, eig, svd, etc.) in C++ simplifies conversion of data processing algorithms

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