DATASHEET

Ensemble® Storage Subsystems
STO-6001 Subsystem

A High-Performance and Environmental Configurable Storage Solution

- **Independent host and target system for maximum customization**
- **Built from off-the-shelf technologies**
- **Focused on data rate performance and deployment readiness**
- **Protocol-agnostic for system-specific customization**
- **Based on open hardware and software to support user configuration**

The Ensemble Storage family of storage subsystems from Mercury Systems is a key element in many deployed signal processing systems for both commercial and defense applications. Sensor processing applications are dealing with truly massive amounts of raw data, and while the creation of actionable information during operation is often a requirement, post-analysis and data forensics provide additional rationale for the enhancement of ISR systems with additional data storage capabilities. Additionally, access to high-performance storage can strongly enhance tactical situational awareness for the warfighter in the field.

The STO-6001 subsystem consists of two main units: the Storage Host Controller and the Storage Target. The Storage Host Controller interfaces with the main data processing subsystem and routes data and information of interest to the Storage Target. The Storage Target accepts incoming data streams and consolidates them on storage media for retrieval and/or playback. Ethernet-based protocols interconnect the Controller and the Target. The combination of these units is configurable to meet varying requirements in bandwidth, density, data protocol, software needs and physical environments.

By leveraging the capabilities of Mercury's solutions, storage requirements can be met in an efficient, cost-effective and high-performance manner, while meeting the stringent size, weight and power (SWaP) requirements facing today's embedded systems.

Storage Host Controller

The Storage Host Controller is responsible for taking in data from sensor and signal processing subsystems and translating it to the Storage Target subsystem. The Storage Host Controller utilizes a 6U OpenVPX Intel Low Density Server (LDS) module from Mercury to control the data flows and to provide a compatible software endpoint to the processing subsystem. In cases where the processing subsystem is made up of Intel®-based Mercury processing modules, such as the LDS6521 or HDS6601 modules, the Storage Host Controller can be tightly integrated with the MultiCore Plus software environment. This allows high-bandwidth, low-latency data plane communications to move data seamlessly to and through the Storage Host Controller.

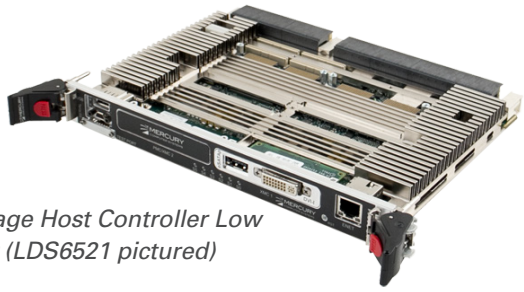
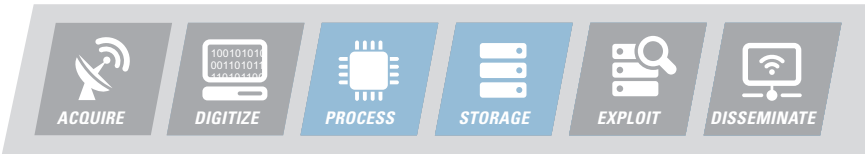


***Figure 1** - Storage Host Controller Low Density Server (LDS6521 pictured)*

Mercury Systems is a best-of-breed provider of commercially developed, open sensor and Big Data processing systems, software and services for critical commercial, defense and intelligence applications.



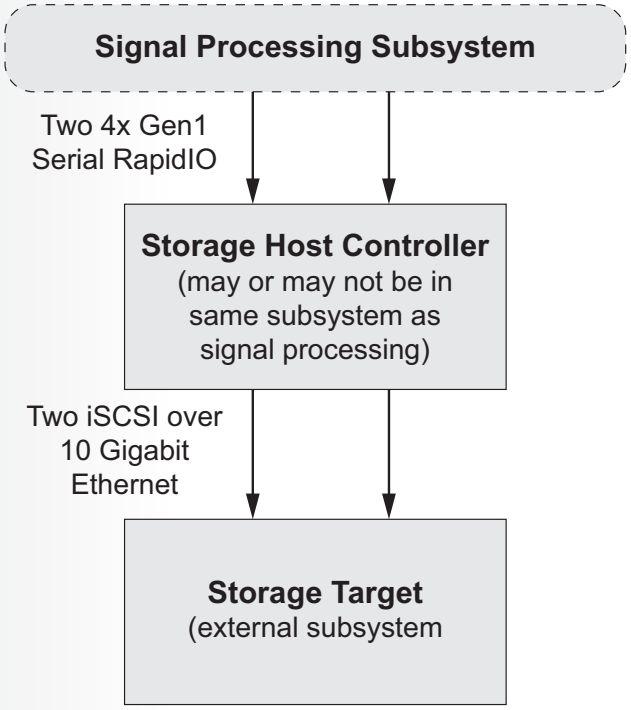
For other systems, the data can be streamed to the Storage Host Controller through any of the native commercial I/O interfaces available natively on the LDS module.

Customization of the protocol interface to the Storage Target is accomplished via off-the-shelf Network Interface Controller (NIC) XMC modules. The Storage Host Controller can support multiple protocols, such as raw 10 Gigabit Ethernet or iSCSI. Because the interface is managed via XMC, cost is reduced while ensuring ease of customization.

Storage Target

Mercury has a long history of building embedded subsystems from best-of-breed components. In the case of this storage solution, Solid State Disk (SSD) technology is the heart of the subsystem. Mercury has developed techniques and processes to leverage SSD technology into both commercial and rugged subsystems, ensuring that these commercial technologies can be deployed with confidence.

When non-rugged environmental requirements are in place, the Storage Target utilizes off-the-shelf server technologies for the controlling processor. This allows easy technology refreshes and reduces costs in situations where environmental ruggedness is not required. Rugged Storage Target systems are based on a 3U or 6U OpenVPX controlling processor. In all cases, SSD technology forms the heart of the Storage Target — either unmodified 2.5" SSDs for commercial Storage Targets, or rugged SSD technology to meet challenging environmental requirements. This allows the lab-based emulation of deployable storage systems with commercially available components.



Storage subsystems from Mercury leverage I/O technologies from both internal intellectual property as well as third-party partners as needed. To meet the requirements of a broad selection of applications, the ability to customize data protocol and behaviors is needed. The selected protocol must align with program needs such as performance (bandwidth and latency), security and capacity, while remaining capable of rugged environmental deployment. Software support on the Storage Target is based on the Linux operating system and leverages such open protocols as NFS and CIFS. Open source software such as SCST can be leveraged as needed as well. Support for other protocols such as Fibre Channel, iSCSI, serial FPDP and iSCSI-over-Ethernet are also supported on the Storage Target. RAID support for RAID 0, 1, 5 and 6 are available; consult factory for additional configuration details.

The architectures of the Storage Host Controller and Storage Target are optimized for cost and customization. Minor design changes to support specific program requirements can be accomplished at reasonable costs, given the flexible nature of the base Mercury subsystems. And since the leveraged elements are standards-based and commercial-based, technology refresh efforts are easy to implement and longevity of supply concerns can be minimized.

***Figure 2** - An example of a commercial Storage Target subsystem*

Specifications

Storage Host Controller

Input: Two 4x Serial RapidIO (Gen 1) interfaces
- Input can be customized; consult factory for options

Output: Two 10 Gigabit Ethernet interfaces
- Protocol support customizable
- Includes iSCSI-over-Ethernet, other NAS protocols

Storage Processor
- LDS652x Low Density Server from Mercury Systems
- Intel®-based processing
- RedHat® Linux® support

Storage Target
- Input: Two 10 Gigabit Ethernet interfaces
- Storage Capability (non-rugged system): Up to 24 SSDs
  - Up to 24 TB (assumes 1 TB SSD usage)
- Protocol Support:
  - NFS, CIFS, Fibre Channel, iSCSI, Serial FPDP

Standard Configuration

Input to Storage Host Controller	2x Gen1 SRIO
Output from Storage Host Controller	2x 10 Gigabit Ethernet
Input to Storage Target	2x 10 Gigabit Ethernet
Protocol support	iSCSI over Ethernet
OS support	RedHat Linux
Limitations	SHC use limited to homogeneous processing systems (all PPC or all Intel)

Environmental

Storage Host Controller Temperature	
Operating	0°C to 40°C
Storage	-40°C to +85°C
Humidity	
Operating	10-95%, non-condensing
Vibration	0.003 g^2/Hz; 20-2000 Hz, 1 hr/axis
Shock	20g, z-axis; 32g, x-, y-axes; 11 ms half-sine pulse
Altitude	
Operating	0-10,000 ft
Temperature	
Operating	10°C to 35°C
Storage	-40°C to +70°C
Humidity	
Operating	8-90%, non-condensing

Support for rugged environmental requirements available for both Storage Host Controller and Storage Target; consult factory for details.

Ensemble®

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