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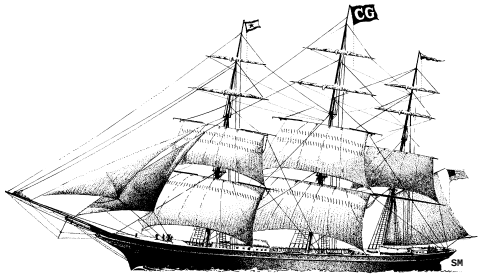

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Hitachi Delivers Best of Both Worlds – Super Storage Consolidation and Open Management

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Management Summary

Hitachi Data Systems wants its customers to have it both ways – enterprise scale and performance without sacrificing flexibility. The new Hitachi *Freedom Storage Lightning 9900 V* series of storage arrays deliver tremendous capacity for storage consolidation. In a sense, it's all the storage one could want. At the same time, Hitachi has announced support for the Common Information Model (CIM), a standard management interface that will allow independent software vendors (ISVs) to more easily support its storage arrays. This paves the way for simpler administration of multi-vendor storage environments – where Hitachi isn't the only box on the floor – using general-purpose storage area management (SAM) solutions.

The new 9900 V series is arguably the most powerful and scalable storage consolidation solution available. With up to 75 TB of capacity, 64 GB of mirrored cache, 32 Fibre Channel ports, a high-bandwidth, switched-fabric architecture, advanced software features, and new virtualization-assist technology, Hitachi can pack a massive amount of data into a single, integrated, highly-accessible platform. It is essentially a reservoir for information.

Moreover, Hitachi announced a strategy called *TrueNorth* that embraces open storage management based on the CIM and Simple Object Access Protocol (SOAP) standards. While ISV partners can currently access and configure Hitachi storage arrays through proprietary interfaces (API or CLI), CIM will enable automatic interoperability with any CIM-compatible software package. **As a result, Hitachi will more easily fit into multi-vendor storage environments through broad integration with third-party SAM software.**

If Hitachi's storage products are so complete, then why is it so eager to "play well" with others? **The answer is that this combination delivers an enhanced value proposition:**

- Lower total cost of ownership (TCO) as a stand-alone solution,
- Lower TCO in a multi-vendor environment, especially by protecting an enterprise's existing storage investments,
- And the potential to improve its own software by supporting multi-vendor environments.

Enterprises that want a complete platform for large-scale storage consolidation with the option of integrating it into a broader, diverse storage environment should have a look at Hitachi's latest offering. Read on for the details.

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Super Storage Consolidation

The basis of Hitachi's ability to deliver storage consolidation on a grand scale is its integrated line of global cache arrays – Hitachi Freedom Storage Lightning series (see sidebar).[1] They are built upon a non-blocking cross-bar switched architecture dubbed *HiStar* that can move massive amounts of data. HiStar is essentially the high-performance plumbing that interconnects up to 32 host server ports, 64 GB of mirrored cache, and 1,024 disk drives in a fully-configured 9980 V. It also allows the array to connect to a large number of servers running different workloads (i.e., transaction processing and streaming media) without performance degradation. The Lightning 9900 V series represents Hitachi's second-generation HiStar architecture.

In addition to well-engineered hardware, the Lightning series offer a number of software features that enhance performance, availability, security, and manageability:

- *CruiseControl* – Dynamic performance tuning
- *ShadowImage* – Point-in-time copy
- *TrueCopy* – Remote mirroring, synchronous or asynchronous
- *SANtinel* – Securely mapping LUNs[2] to servers in a SAN
- *FlashAccess* – Locking data in cache to improve application performance

The list of features continues, but the point is that the Lightning storage arrays are full-featured and well-integrated.

Hitachi's latest release, the Lightning 9900 V series, steps everything up a notch. Not only does it double performance and the number of disk drives[3], but it offers virtualization-assist features that enhance consolidation:

- **Host Storage Domains** – These are virtual pools of storage that can be carved out of the array and assigned to individual servers or server groups. The 9900 V can dynamically add or delete LUNs in a storage domain as well as monitor and manage its individual performance. Think of them as virtual arrays within the physical array that simplify administration in a shared environment.
- **Virtual Storage Ports** – Enabled by Host Storage Domains, this feature allows multiple, heterogeneous servers to access storage through a single array port in a SAN configuration. As a result, more servers can connect through fewer ports, especially in environments with multiple operating systems (i.e., *Windows NT/2000, Solaris, HP-UX*, etc.) and redundant data paths. This can save considerable costs in storage ports, Fibre Channel (FC) switch ports, cables, etc., as

Hitachi Freedom Storage Lightning Series at a Glance

Note: Specifications in parenthesis will be available by year-end 2002.

9980 V

Max Capacity	75 TB (150 TB)
Max Ports	32 FC / FICON / ESCON (64)
Max Cache	64 GB mirrored (128 GB)
Size	Up to 5 frames

9970 V

Max Capacity	9 TB (18 TB)
Max Ports	24 FC / FICON / ESCON (48)
Max Cache	32 GB mirrored (64 GB)
Size	Single frame

9960

Max Capacity	88 TB
Max Ports	32 FC / FICON / ESCON
Max Cache	32 GB mirrored
Size	Up to 7 frames

9910

Max Capacity	8 TB
Max Ports	24 FC / FICON / ESCON
Max Cache	16 GB mirrored
Size	Single frame

[1] Hitachi also offers a smaller, modular storage array for mid-range environments called the Thunder 9200.

[2] Logical Unit Numbers – units of storage capacity comprised of multiple blocks.

[3] The 9900 V series supports 36 and 73 GB drives, with plans for 147 GB later this year. The 9900 series supports a large but slower 181 GB drive, as well as 18 / 36 / 73 GB.

well as help simplify management. SANtinel provides security for Virtual Storage Ports, and host servers can be assigned priorities to manage port bandwidth.

- **Upgradeable Storage Port Blades** – As Hitachi rolls out support for additional network protocols in the future, such as iSCSI[4] or even NAS[5], customers will able to plug the new blades into existing storage arrays. This provides a measure of investment protection and opens the door for increased consolidation.

In short, Hitachi continues headlong down the path of enhancing its integrated platforms for massive storage consolidation. By pushing the envelope of capacity, performance, and functionality while remaining competitive on price, Hitachi positions itself for continued success at the high end of the storage market.

Open Management

Hitachi's TrueNorth strategy of open management is based on a framework that incorporates the CIM and SOAP standards (see sidebar). This framework provides standards-based interoperability at the management interface and effectively opens the door for third-party storage area management (SAM) applications to integrate with and manage Hitachi storage.

SAM is a rapidly developing category of software that handles the complexity of storage management from a top-down perspective.[6] Like an orchestra conductor, it attempts to direct and coordinate diverse storage environments. It helps users get the most out of their storage assets while minimizing administrative work. **SAM addresses a pain enterprises feel acutely – management complexity – and many vendors are developing or have already released products in this space.**

To integrate with third-party software, Hitachi has previously provided independent software vendors (ISVs) access to its storage arrays via proprietary application programming interfaces (APIs). While this method works, it requires ISVs to incorporate proprietary interfaces for every devices they wish to support – a costly and never-ending effort. **CIM provides a common language that all CIM-enabled applications and storage devices can speak, vastly simplifying integration.**

Furthermore, CIM cuts both ways by also giving Hitachi's software the potential to manage other vendors' CIM-enabled hardware. Today, the Hitachi HiCommand Device Manager supports Hitachi storage plus Sun's T3 array. In the future, expect Hitachi's software to become more supportive of multi-vendor environments as it executes on the TrueNorth vision and as CIM support becomes more widespread in the industry.

HiCommand Management Framework

Hitachi launched the *HiCommand Management Framework* as part of its *TrueNorth* strategy. It employs CIM, a common interface for storage device management developed by the Storage Networking Industry Association, and SOAP, a standard messaging bus for communications between management applications. The framework gives IT departments what they have long been clamoring for: interoperability, at least at the management interface level. Hitachi's own software modules will use the framework, and third-party applications can plug into it as well to manage Hitachi storage devices. The Hitachi *HiCommand Device Manager* is the first to support it, and the company plans to roll out additional modules for copy management, performance management, storage pool management, and automated policy-based management in 2002 and early 2003.

Benefits to the Enterprise

So, how does all of this benefit enterprises? Consider three scenarios.

[4] iSCSI is a protocol for providing block-level storage access over IP networks.

[5] Network-attached storage – provides heterogeneous file sharing.

[6] See *Storage Area Management – Conducting a Symphony of Storage* in **The Clipper Group Explorer** at www.clipper.com/publications.html.

Hitachi as a Stand-Alone Solution

In this instance, an enterprise deploys Hitachi Lightning arrays for the purpose of storage consolidation. In any forum, the idea of consolidation implies greater efficiencies and economies of scale, and storage is no exception. Moving information from a variety of discrete, direct-attach storage arrays to a shared, centralized platform allows a much higher level of utilization. Wasted overhead capacity is significantly trimmed back. Furthermore, it is much easier to manage and back up data when consolidated. This is a major cost saver because administrative costs are several-to-many times storage acquisition costs over its useful life. Hitachi's advanced software features further enhance this leverage. **The net result is a much lower TCO – an essential benefit in light of the large and growing share of storage in the IT budget.**

That's the benefit of consolidation – but how does open management matter in a stand-alone configuration? The answer is *options*. **Enterprises have the option to deploy storage from other vendors, if need be, while still retaining the benefit of centralized management using SAM software.** There could be any number of reasons for doing this: deploying legacy storage, meeting a special storage requirement, or creating leverage for price negotiations. Regardless of the reason, there is a real, though intangible, value to having room to maneuver. Financial gurus know this, and have concocted all sorts of models to quantify the value of options. **Flexibility, even if unexercised, is worth something.**

Another benefit is broader *innovation*. Open management allows enterprises to benefit not only from innovations at Hitachi, but also from third-party software vendors as well.

Hitachi in a Multi-Vendor Storage Environment

In a multi-vendor environment, an enterprise deploys storage hardware from multiple vendors. **Thanks to SAM software and open management, all storage can be managed as a single entity.**

Several benefits accrue from this approach. Enterprises can enjoy super consolidation from Hitachi Lightning while still making use of legacy or existing storage without sacrificing management simplicity. It also facilitates the creation of storage classes for rationalizing storage procurement. This is where enterprises use robust, high-performance storage for mission-critical applications and low-end, less-costly storage for less-critical applications. **Both of these tactics work to lower storage TCO and would be much more difficult without open management based on CIM.**

Hitachi's Future Software Enhancements

Hitachi has also positioned itself to enhance its own software in the future. As previously mentioned, CIM allows Hitachi storage to be managed by others as well as the potential for Hitachi's software to manage other vendor's hardware. **No doubt, Hitachi will pursue heterogeneous management in time and thereby improve the value and capabilities of its software.** Enterprises that invest in Hitachi software today stand to benefit from these enhancements in the future.

Conclusion

Hitachi's new combination of super consolidation and open management satisfies the need to have it all – without the fear of being stuck. Enterprises can achieve major TCO reductions via consolidation and centralized management, whether in a Hitachi-only configuration or a diverse, multi-vendor environment. **It is completeness without exclusivity; power and scale without lock-in.**

As a storage vendor, Hitachi has grown its reputation and market share in recent years through innovative engineering and aggressive marketing of its high-end storage arrays. Its recent announcement of the Lightning 9900 V series and the TrueNorth vision reaffirms this direction while adding a greater degree of openness. **Enterprises that want the benefits of large-scale storage consolidation and management flexibility would do well to consider the new Hitachi Lightning 9900 V series.**

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