



## Hitachi Gives Enterprises *One Thing* – TagmaStore Universal Storage Platform

Analyst: Michael Fisch

### Management Summary

Take a moment to think about the big picture of storage. What do you really want? Go beyond the tactical issues of the day, like capacity expansion or a problematic backup window. What does your storage utopia look like? **Most of us would want to manage a single pool of storage.** Not to sound trite, but it is easier to manage one thing than many. This is the premise of virtualization. It requires less human effort and resources are used more efficiently. However, **the storage requirements of an enterprise are many and varied, and one thing cannot imply one-size-fits-all.** The storage pool must be able to meet a variety of different requirements simultaneously, which implies multiple tiers of storage. Since these requirements change over time, resources must also be able to ebb and flow freely in and among tiers. **Storage utopia must encompass this paradox of unity, diversity, and fluidity.** Storage vendors are working on various technologies and architectures for delivering it.

For its part, Hitachi recently announced a unique and compelling approach called the *TagmaStore Universal Storage Platform* (USP). The USP is not just the next generation of Hitachi's *Lightning* enterprise storage line. Of course, as you would expect, it features a big improvement in scalability, connectivity, and performance. The system tops out at a massive 165 TB of internal capacity (332 TB with upcoming new drives), 2 million IOPS, and 192 Fibre Channel ports. **But the most significant breakthrough is the USP's ability to incorporate external storage into its internal virtualization layer.** This means other - even third party - storage arrays can connect to the back of the USP and become part of a unified, centrally-managed pool that scales to a practically limitless 32 PB. By the end of the year, Hitachi will release software for partitioning the pool into virtual tiers with dedicated cache, ports, and capacity. It will also be able to replicate remotely any data in the pool for business continuity, in addition to point-in-time copies and volume migration. **The USP combines the power and functionality of Hitachi's latest enterprise storage array with multi-box, heterogeneous virtualization.**

The USP has the advantage of starting with Hitachi's broad and highly evolved capabilities for data and storage management. It also offers a path to unified storage without sacrificing continuity with the present. At base level, the USP is a high-end storage platform for meeting current requirements. Enterprises can then move incrementally over time to a unified pool by connecting arrays behind the USP. It comes in three models: the *USP100*, *USP600*, and *USP1100*. Read on for details.

### IN THIS ISSUE

➤ You Want One Thing .....	2
➤ TagmaStore Universal Storage Platform .....	2
➤ Conclusion .....	3

## You Want One Thing

**Virtualization is a major theme running through the evolution of storage.**<sup>1</sup> It is the ability to aggregate physical disks into larger, abstracted units. Virtualization is a means to mask physical complexity, simplify administration, and attain better utilization of capacity. RAID<sup>2</sup> was an early form that grouped together disks for enhancing resiliency and performance. More advanced storage arrays have capabilities for virtualizing their internal disks, beyond RAID groups. Volume managers perform virtualization for individual servers. However, **data centers today still have many discrete storage systems that are not virtualized in aggregate.** Looking forward, one can see that virtualization will eventually encompass all heterogeneous storage within an enterprise. **It makes sense to create a unified storage pool in which resources ebb and flow dynamically and non-disruptively. When it comes to managing discrete units of storage, less is more.**

**At the same time, unified must not imply uniform because different applications and data have different storage requirements.** Some need high performance; others can take advantage of low-cost storage, and so forth. Moreover, the storage requirements of a single data set even change through its cradle-to-grave lifecycle. A unified storage pool must also be able to subdivide into virtual slices or tiers with different price/performance characteristics. **Thus, tiered storage<sup>3</sup> and data (information) lifecycle management<sup>4</sup> are also major storage trends.**

## TagmaStore Universal Storage Platform

**With the TagmaStore Universal Storage Platform (USP), Hitachi has taken a big step forward in the areas of heterogeneous virtualization and tiered storage.** *Tagma* is a Greek word for putting things in order, suggesting the USP's ability to bring order to storage. As a combination of Hitachi's latest enterprise storage system and virtualization machine, the USP

complements the current *Lightning* product line. In addition to being a bigger and faster storage system, the USP can include other, external storage arrays into its virtualization layer and create a unified storage pool. **Think of the USP as a high-end array and heterogeneous virtualization platform combined into one.**

The USP comes in three models with varying levels of capacity, connectivity, and bandwidth. (See the table on the next page.) The *USP1100* is the largest, with up to 1,152 internal disks, 68 GB/s of cached bandwidth, and 192 Fibre Channel or 48 FICON or 96 ESCON host connections. It has 64 switched data paths that deliver a 641% increase in cached bandwidth over the previous generation array. It also boasts 2 million total IOPS<sup>5</sup>, which puts it in the front of the pack for the storage performance race. The *USP600* has 512 disks and 37 GB/s of bandwidth, and the *USP100* has up to 256 disks and 17 GB/s. All models are based on Hitachi's third-generation *Universal Star Network* architecture, a high-bandwidth crossbar switch that interconnects cache, disk drives, and external connections. It is the foundation of the platform's ability to deliver high overall performance and across a variety of different workloads. This architecture also includes a separate network for control information consisting of 192 paths at 13 GB/s total bandwidth. This gives the USP a total of 81 GB/s of internal bandwidth and the capability to conduct 256 concurrent memory operations.

The initial release includes software called *Universal Volume Manager* that can incorporate external storage arrays into the system's virtualization layer. The arrays connect to the external ports on the USP, and the USP can configure, manage, access, and present them to host servers as regular volumes. It can also apply software services to them like point-in-time copy (*ShadowImage*) and non-disruptive volume migration (formerly *Cruise Control*). Initially supported external platforms include *Lightning 9900* and *9900 V Series*, *Thunder 9500 V Series* (which can offer low-cost SATA drives), and the *7700E*. EMC *Symmetrix DMX* and IBM *ESS* are planned for 2005. HDS will grow this list over time, prioritized by customer demand. **The net result is a heterogeneous storage environment that is both tiered and virtualized.**

Additional software features – *Virtual Partition Manager* and *Universal Replicator* – are scheduled for release in December 2004. **Virtual Partition**

<sup>1</sup> This theme runs through computing in general, for that matter.

<sup>2</sup> Redundant array of independent disks.

<sup>3</sup> See *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* in **The Clipper Group Explorer** dated August 29, 2002, at <http://www.clipper.com/research/TCG2002030.pdf>.

<sup>4</sup> See *Top 10 Things You Should Know About Information Lifecycle Management* in **The Clipper Group Explorer** dated May 11, 2004, at <http://www.clipper.com/research/TCG2004041R.pdf>.

<sup>5</sup> Maximum into cache – actual performance varies.

## TagmaStore Universal Storage Platform - At A Glance

	USP100	USP600	USP1100
Max disks	256	512	1152
Max internal capacity	37 TB*	74 TB*	165 TB*
Max internal + external capacity	32 PB	32 PB	32 PB
FC drive types	73 GB @ 15k 146 GB @ 10k 300 GB @ 10k*	73 GB @ 15k 146 GB @ 10k 300 GB @ 10k*	73 GB @ 15k 146 GB @ 10k 300 GB @ 10k*
Max cache	64 GB	64 GB	128 GB
Max FC host connections	64	192	192
Cached bandwidth	17 GB/s	34 GB/s	68 GB/s

\* Capacities will double when 300 GB drives become available in Q1 2005.

Source: Hitachi Data Systems

**Manager creates up to 32 independently-managed virtual storage machines that extend to storage attached to the USP.** The partitions include specific allocations of cache, ports, and internal or external capacity. They form the basis of storage tiers with specified service levels of performance, availability, and cost. They are also a means for asset tracking and chargeback. Local administrators can use a software utility called *MyDomain* to manage an assigned virtual storage machines.

**Universal Replicator is a tool for synchronous and asynchronous replication over distance between USPs, including internal and external storage volumes.** For instance, target volumes can be low-cost SATA disks inside a Thunder 9500 V Series system. Universal Replicator allows for centralized management of replication across the enterprise. It uses disk-based journaling for asynchronous replication that requires less cache and is more efficient with network bandwidth, which saves costs in both areas. It also uses a "pull" technique where the target system controls the process and improves the performance at the mission-critical source. Future support will include multi-target and pass-through capabilities.

### Conclusion

**The benefits of virtualization are simpler management, improved resource utilization, and lower storage total cost of ownership. These benefits grow as the scope increases, and Hitachi TagmaStore Universal Storage Platform takes virtualization beyond a single array to encompass possibly an entire data center.** It takes the concept of tiered storage beyond one array to encompass multiple arrays, multiple drive types, and virtual storage machines with dedicated

cache, ports, and capacity. This provides a multiplicity of options for placing data at an optimized service level tier.

While other virtualization solutions start from scratch and add functionality slowly over time, **Hitachi is unique in starting with a highly functional enterprise storage system and adding heterogeneous virtualization capabilities.** This lets it move quickly toward use as a fully functional, enterprise-wide virtualization solution. From the deployment perspective, enterprises can move incrementally toward unified storage pool, starting with a high-end array and connecting external storage as needed or desired. Even if an enterprise does not have near-term plans to virtualize external assets, there is value in having that option.

For those use to thinking in terms of two-vendor procurement strategies, bear in mind that **the only way to achieve a unified storage pool is to have a single vendor at the centralized point of virtualization and management**, though the hardware underneath may come from multiple vendors. The best one can achieve otherwise is two separate pools without synergies between them. **The advantages of a unified pool seem to outweigh any risks associated with having one vendor at the point of control.**

**The bottom line is that Hitachi's TagmaStore Universal Storage Platform is a clever approach to delivering next-generation storage.** If your enterprise has significant storage requirements, consider the USP.



### ***About The Clipper Group, Inc.***

***The Clipper Group, Inc.***, is an independent consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at [www.clipper.com](http://www.clipper.com).***

### ***About the Author***

***Michael Fisch*** is Director of Storage and Networking for The Clipper Group. He brings over eight years of experience in the computer industry working in sales, market analysis and positioning, and engineering. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a competitive market analyst. Before that, he worked in international channel development, manufacturing, and technical support at Extended Systems, Inc. Mr. Fisch earned an MBA from Babson College and a Bachelor's degree in electrical engineering from the University of Idaho.

- ***Reach Michael Fisch via e-mail at [mike.fisch@clipper.com](mailto:mike.fisch@clipper.com) or at 781-235-0085 Ext. 25. (Please dial "1-25" when you hear the automated attendant.)***

### ***Regarding Trademarks and Service Marks***

***The Clipper Group Navigator, The Clipper Group Explorer, The Clipper Group Observer, The Clipper Group Captain's Log, and "clipper.com"*** are trademarks of The Clipper Group, Inc., and the clipper ship drawings, "*Navigating Information Technology Horizons*", and "*teraproductivity*" are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

### ***Disclosure***

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

### ***Regarding the Information in this Issue***

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.