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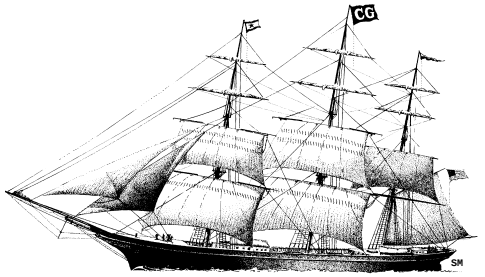

Navigating Information Technology Horizons℠

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Embracing the Old and the New – Dot Hill Puts Storage Intelligence in the Network

Analyst: Michael Fisch

Management Summary

While the world is still getting used to the idea of networked storage, our ears are again being tickled with promises of next-generation technologies. In many enterprises, direct-attach storage is rapidly giving way to more efficient and scalable storage area networks (SANs) and network-attached storage (NAS). SANs are being deployed to connect multiple servers to a pool of storage, and NAS provides high-performance file sharing over the corporate network. Market adoption of these technologies is still brisk, but now there is talk about *the next thing*.

Whatever the name or product class, the shift on the horizon involves moving storage intelligence into the network. Though storage software or intelligence used to reside exclusively in servers and storage arrays, next-generation storage networking platforms will take an expanded role for managing, moving, and protecting data. The reason is to drive greater efficiencies and economies of scale into the storage infrastructure.

While many startups are rushing to develop and bring to market such products, established vendors are typically less enthusiastic. After all, they have vested interests in selling the current generation of technologies.

In this context, it is refreshing to see Dot Hill, an established storage vendor, embrace the next generation. While continuing to deliver a robust line of SAN-enabled storage arrays, it now offers the Axis Storage Manager, an appliance that converges SAN and NAS and delivers advanced storage functionality in the network. It allows customers to squeeze more value out of storage assets through consolidation, advanced features like virtualization (i.e., logically present a physical pool of storage to servers) and simpler management. The net effect is more capable and cost-effective storage.

If you are looking for an alternative to the premium storage vendors, and are not afraid to consider a leap to *the next thing*, Dot Hill is one to consider. Read on for an overview of Dot Hill's storage offering and how it embraces both the old and the new.

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Solid Storage Arrays

Dot Hill's historical claim to fame is its solid line of storage arrays. The arrays are NEBS[1] Level 3 compliant, which sets the standard for robustness and reliability for telecommunications carrier-class infrastructure. In fact, Dot Hill claims to exceed this standard with 99.9998% uptime – only 45 seconds of downtime per year. Dot Hill's *SANnet* 3300 series also conforms to MIL-STD-810F, a ruggedization standard set forth by the U.S. Department of Defense that opens the door for selling to governmental and military customers. The bottom line is that Dot Hill storage arrays are designed for continuous availability.

Its *SANnet* storage arrays span the spectrum in terms of size, capacity, performance, and configurations. From 292 GB to 28.9 TB, from Fibre Channel (FC) to Ultra160 SCSI, from direct attach to SAN, from RAID[2] to JBOD[3], from rack-mount to desk-side form factors – they cover a range of needs. **Dot Hill aims for best price/performance with these products.**

Software is also available for the storage arrays. The management utility *SANscape* administers all *SANnet* arrays centrally. *SANpath*, a host-based agent, works in conjunction with *SANscape* to enhance performance and availability through path failover, load balancing, LUN masking[4], and dynamic LUN assignment[5]. Dot Hill also allows servers to access and share files over a SAN using SANergy File Sharing from Tivoli. Furthermore, its offering includes tape libraries for backup and professional services for design, implementation, testing, and training.

All of this sums up Dot Hill's traditional storage business. Its future, however, lies in another direction.

Intelligent Storage Networks

Most storage vendors have spent the last several years adding and refining functionality in their storage arrays. Point-in-time copy, remote replication, LUN masking – the list goes on. This provided real value to customers by increasing their ability to protect, manage, and fully utilize the information. It alleviated difficulties caused by deploying and managing storage software on a multitude of application servers, often running different operating systems. It also offloaded the processing of storage-related tasks from these servers, which liberated processing resources for their primary purpose – running production applications. This ultimately meant more productive workers and more effective business processes. It makes sense, except for one or two things.

Array-based software is proprietary – each vendor has their own version that only runs on their arrays. This discourages IT departments from buying hardware from multiple vendors because of the complexity of learning and managing multiple software packages. Features like remote replication also require customers to purchase multiple units from the same vendor. This creates a sort of lock-in situation, with the potential for higher prices.

In addition, some software features must encompass all storage arrays and servers simultaneously, including heterogeneous makes and models, to be completely effective. Storage virtualization and storage resource management fit into this category, for example. Array-based solutions for these features would not be optimal, and server-based solutions carry the limitations mentioned previously.

With this in mind, **Dot Hill decided to take a future-oriented approach and put storage functionality neither in arrays nor in servers, but in the network that joins them together[6].** This has taken the form of *Axis Storage Manager* – a storage-networking appliance that delivers advanced functionality and connects SCSI[7] and FC storage to both IP[8] and FC networks.

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1 Network Equipment Building Systems

2 Redundant Array of Independent Disks – describes various techniques for protecting data by storing it on multiple, redundant disks

3 Just a Bunch Of Disks – no RAID controller

4 LUN masking restricts volume access to authorized servers in order to protect data from being inadvertently overwritten and/or accessed by those who are unauthorized.

5 Dynamic LUN assignment allows storage assets to be reallocated without interruption or downtime

6 See *Intelligent Storage Networks – Creating a More Cost-Effective Storage Infrastructure* in **The Clipper Group Explorer** dated February 22, 2002, at www.clipper.com/publications.htm

7 Specifically, Ultra160 SCSI

8 TCP/IP over Ethernet

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Several key benefits stem from this approach of centralizing intelligence in the network:

- **Lower administration costs** – Storage can be administered as a single entity rather than as disparate islands of information, resulting in economies of scale in management, higher utilization of capacity, and lower total cost of ownership.
- **Lower acquisition costs** – Enterprises can deploy storage according to the price/performance requirements of each application, even from multiple vendors. This ability to assign "classes of storage" to applications is a big cost saver. High-end and more costly storage can be used with mission-critical applications, while other applications can use less-expensive storage.
- **Extended value and useful life** – All storage assets, both existing and future acquisitions, can take advantage of advanced functionality, thereby extending their value and useful life.

In short, this approach enables a more functional and cost-effective storage infrastructure.

Axis Storage Manager

The *Axis Storage Manager* resides between storage devices and clients/servers. On the storage system side, Axis has one Ultra160 SCSI and one FC port, providing connectivity to SANs, RAID arrays, JBOD arrays, tape libraries, and backup servers. On the client/server side, Axis has a FC port that provides block-level data access to SANs, and a 1 Gbps Ethernet and a 10/100 Ethernet port that provide both block- and file-level access to IP networks. The block-level protocol is similar to iSCSI. Support for iSCSI will be added upon final approval of the standard. File-level access turns plain storage into NAS[9]. The system scales by adding incremental *Axis* units, and future versions are expected to have additional ports. The typical amount of storage behind each unit might range from 250 GB to 10 TB.

The following features are standard:

- **Storage Resource Management** – Discovering, mapping, analyzing and reporting storage assets
- **Virtualization** – Presenting a centralized pool of storage as a single, logical entity
- **Storage Routing** – Conversion between IP, FC, and SCSI
- **Client/Server Security** – Ensuring only authorized servers and users access storage
- **Centralized Management** – Managing all storage devices from one Web interface

Optional features include:

- **Remote Replication** – Asynchronous remote mirroring over IP networks
- **Real-time Mirroring** – Synchronous mirroring over FC (10+ km) distances
- **Point-in-time Copy** – Creation of "snapshot" volumes
- **Disaster Recovery** – Fail-over to a remote site
- **File Services** – Turning SAN and/or direct-attach storage into NAS
- **High-availability Clustering** – Two *Axis* units configured for fail-over
- **Serverless Backup** – Support for NDMP backup protocol.

Axis comes in three models geared for different applications – Remote, HA (High Availability), and Basic – with U.S. list prices of $40K, $30K, and $20K, respectively. Prices for optional features range from $3K to $10K per unit. The Remote and HA models includes some bundled options.

Conclusion

Dot Hill has a promising future based on its decision to skip a generation of array-based features and move directly to intelligent storage networking positions. As the overall market moves in this direction, the attractiveness of Dot Hill's straightforward line of robust storage arrays will rise. Enterprises may not need as many of the highest-functionality enterprise arrays as in past years, preferring to place the smarts in the storage network.

If you are looking at future-oriented technologies to make your storage infrastructure more capable while lowering overall costs, take a close look at Dot Hill. With one foot in the old and the other in the new, they may have what you seek.

9 Supports NFS and CIFS file sharing standards.

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

About the Author

Michael Fisch **is a Senior Contributing Analyst with the Clipper Group.** He brings over six years of experience in marketing and engineering at computer hardware and software manufacturers. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a market analyst. Prior to 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 MFisch@clipper.com or at (781) 235-0085 Ext. 36.***

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