



Under the Radar yet Over the Top — Dot Hill Delivers the Storage You Need

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Management Summary

Often, we don't know who made what's sitting on the table in front of us or from where the ingredients or parts inside came. Whether breakfast cereal or laptop/tablet, we often rely on the *brand* to help us classify the quality and desirability of that product. When shopping for groceries like corn flakes or oat "rings", we can choose from heavily promoted name brands, less promoted brands (but still from companies with recognizable names), store brands, specialty brands (e.g., organic), and even unbranded generics. With laptops and tablets, some brands are unique and available only from a single manufacturer (like Apple's *iMacs* and *iPads*) and others are available in many similar forms from many vendors that mostly are indistinguishable by average consumers (e.g., *Windows* laptops and *Android* tablets). These days, it is hard to distinguish one 7" Android tablet or 15.6" Windows laptop from another, except possibly by the brand name and more likely by the name of the manufacturer.

Most consumers are less concerned about what's inside or who made the underlying components. Often, similar products have similar ingredients and components and, in fact, many vendors' products may be manufactured in the same facility and often have the same "stuff" inside. Buyers need to decide which one to buy and brand or manufacturer may be the primary determinant. Most of the time, a brand needs to be developed (as to its distinctiveness) and promoted (to attain recognition) in order to be effective. This costs money (often a lot of money). Usually, the higher the brand's value, the higher the cost to the buyer.

In the data center, we face this reality every day. Business users do not know or care about the brand of server or storage being used; they care about whether the needed application and data are available when needed. They don't care whether there is Intel or AMD inside the server or whether the drives were made by Western Digital or Seagate. They also don't care about whether the servers and storage are from HP or Dell or some lesser-known vendor. All they care about is the quality of the services being delivered to them. You might say that users mostly are *brand insensitive* (regarding IT infrastructure).

So, who cares about the brand and manufacturer? The IT buyer, of course. Some organizations only buy premium-branded products, either by policy or by preference. They feel that they are getting something of added value for what likely is a higher cost. In times of high growth of storage capacity and constrained IT budgets, you may be ready to consider a less premium brand, especially if it turns out to be very similar to the high-priced brands and just possibly made by the same manufacturer (often called an "OEM"). This is especially true for smaller IT organizations, from entry-level to mid-sized, where delivering quality services within a constrained budget is the operating norm.

OEM boxes must meet a strict set of standards and certifications in order to be plug-compatible with any operating environment: *Windows*, *Linux*, *Solaris*, and *VMware*, to name a few. They also must have the reliability, high performance, and flexibility needed with these environments. One of the leading suppliers of storage to the big-name brands is Dot Hill.

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To satisfy those IT organizations that need solid functionality without the high gloss and cost of branding, Dot Hill has assembled a product line of AssuredSAN storage arrays to fit into most entry-to-mid-range IT environments, regardless of the needed I/O interface, storage capacity, or device format (HDD or SSD). To learn more about Dot Hill's AssuredSAN storage, please read on.

Entry-Level Storage Requirements

No matter what operating environment, for the entry-level or mid-sized data center the three most important non-cost factors for storage are *reliability*, *performance*, and *flexibility*. Typical uses for storage products in these enterprises include general IT, server virtualization, and specific applications, such as *Microsoft Exchange*.

Reliability

Reliability can be measured in many ways, but what it comes down to is uptime. Any storage array in an environment supporting mission-critical applications must have at least “five 9s” availability. This translates to just five minutes of downtime per year. In addition, the array must have redundancy and multiple hot-swap components in order to minimize the demands being placed upon scarce administrative resources. With a constrained budget, the average data center staff is certainly not expanding.

Performance

In terms of performance, the faster the storage response time, the faster applications can run. Better performance also increases the number of users that can be supported, resulting in higher application productivity. The greater the application productivity, the more responsive and competitive a solution can be.

Flexibility

The platform must be flexible enough to support applications that demand high throughput or high capacity, without impeding the work that needs to be done. More flexibility means a range of choices of the types and capacities of the underlying drives to be deployed, be they HDDs (hard disk drives, both fast and high capacity) or SSDs (solid-state drives that provide rapid response with virtually no latency). It also means investment protection because you can expand by adding more drives of the desired type(s) in a choice of expansion chassis. Thus, flexibility means both choice and scalability, now and as needs grow. Doing multiple tiers of storage

within the same architecture means having one solution with many benefits tailored to storage requirements, including procuring only what is needed now and then adding more later (i.e., only when needed). It also means paying for high throughput only when that is required and paying only for the level of support that is needed.

Cost

Now, we need to consider cost. The overriding factor today in every data center is budget. The data center staff is under great pressure to reduce the total cost of ownership (TCO) of the IT infrastructure as much as possible and to protect the investments made in IT infrastructure. To do this requires acquisition of the most economical and scalable storage possible plus the fixing of the annual costs to eliminate surprises in the years to come as the capacities grow. No one can forecast the amount of storage that will be needed for future growth, but the staff can try to eliminate future surprises in their storage management software licensing costs.

Who is Dot Hill?

One company focusing specifically on providing, high performance, flexibility, and reliability to the entry-level and mid-range data center environment is Dot Hill. What is the first thing that you think of when I say “Dot Hill”? If you said “who is Dot Hill?” then you would not be alone. With three decades of experience in the design and manufacture of disk systems, Dot Hill operates under the radar for many entry and mid-market buyers, but has established itself as one of the largest storage companies that few have heard of.

With over 300 employees, Dot Hill has development centers on two continents, with headquarters in Longmont, Colorado, and a second development center in Hyderabad, India. A sound technology and a very strong patent portfolio, with over 100 patents and patents pending, has enabled Dot Hill to ship over 600,000 storage arrays, many to premium-brand vendors that sell the Dot Hill arrays as their own.

Dot Hill prides itself in innovation covering both hardware and software, including a ninth generation of RAID. They may not have the name recognition for storage as companies such as Dell, HP, and Quantum, but if you look under the covers of many of the storage products from these companies and others, you will be surprised at what you will find – *Dot Hill inside*. Besides OEM deals with these companies, and many

others, Dot Hill has long-standing relationships with worldwide distributors and resellers that sell the Dot Hill brand.

With a strict adherence to industry standards, Dot Hill has a wide variety of technology partners including more than a few names that you should recognize, including Apple, Red Hat, Microsoft, and Oracle. With partner-certified storage solutions, Dot Hill has developed an entire lineup of *AssuredSAN* storage devices to meet the many needs of any entry-level and mid-sized data centers.

Dot Hill AssuredSAN Product Family

There are four distinct series within Dot Hill's AssuredSAN family, covering the entry to mid-range data center that is experiencing growing demands in both storage capacity and throughput:

- **AssuredSAN 2000** – an easy to use, affordable RAID storage;
- **AssuredSAN 3000** – offers a choice of high-throughput connectivity options;
- **AssuredSAN 4000** – with accelerated throughput for media and entertainment, HPC, telecom, oil & gas; and
- **AssuredSAN Pro 5000** – with real-time automated storage tiering.

All are based on the robust AssuredSAN technology platform and supported by a worldwide presence.

AssuredSAN storage arrays are easy to use, with wizards for installation, configuration, and remote replication. Each model provides support for SAS, nearline SAS and SSD drives, with dual, redundant RAID controllers with RAID support for levels 0, 1, 3, 5, 6, 10, 50 available. Hard disk drives are available in 1TB, 2TB, 3TB, or 4TB capacities and support drive spin-down to enable users to reduce energy consumption during off-peak hours. Dot Hill's *RAIDar* management GUI provides a complete set of features and tools to ensure easy set up and management through an intuitive web-based interface.

Each model has redundant, hot-swap components for easy maintenance and uses the patented *EcoStor* technology that eliminates the need for any battery maintenance¹, protecting availability better than traditional batteries and protecting the environment from toxic battery waste, providing an environmentally responsible solution. Many

¹ EcoStor uses super capacitors and flash memory for infinite cache backup.

models are NEBS and Mil Spec compliant for telecomm and ruggedized requirements certified by Microsoft. In addition, all are RoHS and WEEE compliant, for protection against hazardous substances and for ability to recycle component parts. AssuredSAN arrays are rated at 99.999% availability.

AssuredSAN arrays are available in the U.S. starting from \$10K to \$75K, depending upon model and configuration. This is anywhere from 15% to 50% less than competitive models, with no additional software licensing for capacity expansion. Let's look at some of the models.

Dot Hill AssuredSAN 2333

The *AssuredSAN 2333* delivers affordable, high-capacity storage without skimping on performance. It is built on a proven Dot Hill architecture and is ideal for a small business iSCSI SAN, providing inexpensive expansion with support for Windows, Linux, and Mac OS X servers. The 2333 RAID storage array has a 2U format and 1Gb iSCSI storage area network (SAN) interface, with two ports per controller and, thus, four per system.

It is both modular and scalable, and feature battery-free *SimulCache* low-latency mirroring that duplicates cache between the RAID controllers, simultaneously, for improved performance. The 2333 RAID storage array is ideal with many applications common in businesses and education, such as email, database, and file sharing. It offers easy management, an affordable price, and minimal maintenance.

The 2333, with up to 12 storage devices in the base chassis, expands easily by adding a JBOD expansion chassis, including the *AssuredSAN 3130* for 3.5" requirements. The data center staff can mix and match 2U 12-drive expansion chassis and 2U 24-drive expansion chassis to meet application requirements. Each AssuredSAN 2333 array supports up to seven expansion chassis, with a maximum of 96 drives supporting up to 384TB of storage.

Dot Hill AssuredSAN 3000

The AssuredSAN 3000 Series has been designed to deliver "rock solid" reliability at a competitive price, according to Dot Hill. It is easy to install and maintain without a dedicated storage administrator. It delivers outstanding value, performance, and scalability. These features are essential in any entry/mid-range environment where applications include databases, email, *Sharepoint*, and video editing. All storage arrays are designed to store data; the 3000 series

has also been designed to restore it in an instant.

The 3000 series comes in five variations, and may be configured from the factory to support Fibre Channel (FC), iSCSI, or SAS connectivity, and even a hybrid FC/iSCSI option. The base models are as follows.

- **AssuredSAN 3320 and 3330** – With eight 1Gb ports, these systems can increase data access and, with data management services that include *AssuredRemote Replication* software (discussed below), also provide data protection. They have been configured to support (24) 2.5” and (12) 3.5” drives, respectively.
- **AssuredSAN 3420 and 3430** – These systems have the same basic functionality as the 3320 and 3330, except with a 10Gb iSCSI interface. At the same time, these systems retain compatibility with 1Gb iSCSI networks.
- **AssuredSAN 3520 and 3530** – Designed specifically to optimize sequential workloads in a direct-attached environment, the 35xx models provide support for SATA and 3Gb and 6Gb SAS HDDs, along with SSDs for multi-tiered requirements. Data protection is provided by Dot Hill’s innovative *AssuredSnap* and *AssuredCopy* software (described below). With up to 1000 snapshots, they protect your business-critical applications. They may be configured to support (24) 2.5” drives (3520) and (12) 3.5” drives (3530) in the basis chassis.
- **AssuredSAN 3720 and 3730** – With an 8Gb FC host interface, the 3700 can double the throughput of the previously described models, providing the throughput required to support the most-demanding applications. The 3720 is configured to support (24) 2.5” drives while the 3730 supports (12) 3.5” drives in the base chassis. While the AssuredSAN 3720 and 3730 come with 8Gb FC standard, they are backward-compatible with 4Gb FC networks.
- **AssuredSAN 3920 and 3930** – Configured as a hybrid solution with both a 1Gb iSCSI and an 8Gb FC interface, the 3900 arrays are well positioned for maximum flexibility in any storage environment that requires block storage. Like the other members of the 3000 family, the 3920 and 3930 support (24) 2.5” and (12) 3.5” drives, respectively, in the base chassis. The AssuredRemote replication facility enables easy array-to-array replication, providing disaster recovery protection and business continuity with up to 1000 stored snapshots per

array.

- **AssuredSAN 3120 and 3230** – The AssuredSAN 3120 and 3130 are JBOD² chassis designed to provide an easy and cost effective means for SAS, iSCSI, and FC expansion. A total of seven 3.5” JBODs can provide expansion for all AssuredSAN 3000 arrays, with the 3120 providing up to (24) 2.5” devices, while the 3130 does the same for up to (12) 3.5” devices.

Dot Hill AssuredSAN 4000

Designed with a powerful processor, the AssuredSAN 4000 storage systems are tuned for sequential workloads, making them ideal data storage solutions for high-performance computing, oil and gas seismic data analysis, telecommunications data capture, media streaming, video post-production editing, and broadcasting. These storage arrays offer expanded scalability plus up to 5200 MB/second sequential reads and 3000 MB/second sequential writes, all with a high degree of reliability. With redundant controllers, power supplies, fans, and hot-swappable drives, business continuity is assured with 99.999% availability.

As with the AssuredSAN 3000, the 4000 comes in multiple versions supporting both SAS and FC, with the 4520 and 4530 supporting SAS and the 4720 and 4730 providing FC. The 4520 and 4720 base chassis are configured for up to 24 2.5” drives, including SSDs, while the 4530 and 4730 chassis can support up to 12 3.5” drives, with up to 48TB per chassis. Each model has four ports per controller, with up to eight in a single system. With SSDs, the 4520 and 4720 can deliver extremely high sequential throughput, at a sustained 100,000 IOPS. This positions the AssuredSAN 4000 for use in real-time access to business-critical data, such as databases and business analytics. The AssuredSAN 4000 includes dual controllers, fans, power, and hot swappable drives as standard, with the patented EcoStor battery-less cache backup to eliminate the need for battery maintenance, boosting availability.

In addition to these models, Dot Hill has recently announced the *AssuredSAN 4004*. This new suite of products features Dot Hill’s ninth generation RAID controller with “best-in-class”³ transfer rates up to 6400 MB/second sequential reads and 5300 MB/second sequential writes.

² Just a Bunch of Disks.

³ According to Dot Hill.

Besides improving performance within the 4000 family, the 4004 delivers improved value and flexibility. In addition to SAS, the data center can deploy a storage array that also supports FC and SCSI in a single system (what Dot Hill calls “hybrid connectivity”). For example, this enables FC for local data needs while, at the same time, providing iSCSI for remote replication or branch access. The 4004 is a multi-purpose storage system that works with shared file systems to support multiple, simultaneous streams of 2K, 4K, HD, and 3D video content. Dot Hill has positioned the 4004 against EMC’s *VNX 5300*, Dell’s *PowerVault*, IBM’s *V3700* and NetApp’s *E2600T/E5400B*, with at least 50% more reads at a comparable price. Dot Hill characterizes the AssuredSAN 4004 as “wicked fast”. (Anyone from New England can translate that for you as “awesome”.)

Scalability for the AssuredSAN 4000 is provided by the AssuredSAN 4124 (2.5” drives) and 4134 (3.5” drives) JBOD expansion chassis. These are easy to deploy, low-cost chassis to extend the FC or SAS capacity. With up to seven expansion chassis permitted, the 4000 provides the capability to deliver a large amount of storage within a single system, whether all of the same type of storage or in a mixed mode with the potential for tiering.

Dot Hill AssuredSAN 5000

The AssuredSAN Pro 5000 has been designed as a real-time tiering solution for dynamic workloads with dynamic tiering. It is a hybrid SSD and HDD SAN storage system for the data center that really wants to accelerate I/O. With the integrated *RealStor* tiering software (see description below), the data center can improve data responsiveness and simplify storage management and expansion by continuously moving “hot” data to the SSD tier. The Pro 5000 detects data storage priorities and optimizes delivery in real time, processing up to 80% of the hot data from the SSD tier.

With up to 28 drives per chassis and a total of 10 chassis per system, the Pro 5000 has enough scalability for most mid-range enterprises. Dot Hill also provides a variety of options that mix SSDs with high-performance SAS and nearline drives, in both two-tier and three-tier configurations. A typical two-tiered configuration might mix up to 4 SSDs with up to 44 SAS drives, while a three-tiered configuration can mix the SSDs with high-performance SAS *and* nearline (high-capacity) SAS.

With *RealStor*, the Pro 5000 becomes a “seriously smart”⁴ storage solution, detecting data storage priorities and optimizing the delivery of high priority data in real time. Within *RealStor*, Dot Hill delivers *RealTier* storage algorithms to continuously and dynamically identify data hotspots, moving them to faster media to leverage the utilization of SSD drives, thus improving the overall performance of mission-critical applications.

The consolidation and virtualization of the modern data center dramatically increases the demands being placed on storage in the IT infrastructure. The Pro 5000 can reduce contention, thus improving response time for queries and the efficiency of the data center. This can translate to 100K read IOPS, with up to 650K IOPS from cache, and a read throughput of 5200 MB/second and a write throughput of 3000 MB/second.

Dot Hill DMS Software

Dot Hill’s array management software includes the following capabilities.

- **AssuredCopy** provides the ability to create full volume copies or backups of disk volumes. These copies can be used to quickly restore whole volumes, folders or individual files.
- **AssuredSnap** allows point-in-time snapshots to be taken on a Dot Hill array, which can then be used for backup and recovery processes.
- **AssuredRemote** allows administrators to easily establish remote replication between two Dot Hill storage arrays at different locations, contributing to a full disaster recovery plan.
- **AssuredVRA** (Virtual RAID Adaptor) is a powerful way of building RAID-protected arrays out of internal server storage and server-attached external JBODs. RAID protects against hardware or system malfunction and prevents the loss of valuable customer data.
- **FDE Encryption** will be available in March on 1.2TB SFF drives for added protection for government compliance.

Dot Hills RealStor Software

Dot Hill’s advanced-function *RealStor* software provides the most desired advanced storage management capabilities and is included with each AssuredSAN Pro 5000 array. What that means is that you don’t have to pay more when you add more storage to an existing array by connecting expansion chassis. This can be a real

⁴ According to Dot Hill.

money saver.

The following RealStor features are offered.

- **RealTier Automated Tiering** measures data usage and automatically moves the most frequently accessed data to faster storage, dynamically.
- **RealPool Automatic Pooling** eliminates low-level provisioning, creating pools of storage for critical applications, freeing IT managers from complex administrative tasks.
- **RealThin Provisioning** provides AssuredSAN arrays with the capability to streamline administrative tasks, only dedicating physical storage to a volume when it is needed.
- **RealQuick Rebuild Functionality** minimizes the exposure time of running with unprotected data with RAID redundancy within each tier.
- **AssuredRemote** remote replication provides the enables disaster recovery protection and business continuity for up to 1024 snapshots per array.

Dot Hill Warranty and Support

All Dot Hill arrays come with a three-year, advanced exchange, no-charge warranty with the hardware, and a 90-day no-charge warranty on the software. There are three levels of support beyond the warranty – Silver, Gold, and Platinum.

- **Silver Support** – Technical support staff is on call during normal business hours, which are 5 days a week, 8 AM to 5:00 PM local time and will respond on site by the next business day.
- **Gold Support** – Provides technical support during normal business hours, five days a week, 8:00 AM to 5:00 PM local time. On-site support is provided by the next business day. It also includes same-day advance shipment and parts depot access during the same hours.
- **Platinum Support** – Provides 24-hour continuous support, which includes seven-day-a-week, 24-hours-a-day technical support coverage and four-hour on-site response. There is access to advance exchange from repair centers and from the regional parts depots. Parts are shipped 7x24x365 to arrive within 4 hours of the fault confirmation, if the customer location is within 100 miles of the restocking location.

Conclusion

What is more important to your enterprise data center: cost, performance, reliability, and flexibility or name brand recognition? Dot Hill has designed and manufactured a family of storage arrays designed and priced specifically for the entry-level and mid-range enterprise that can deliver what you need.

If you have a team of storage experts who can be dedicated to disparate arrays, provide provisioning expertise where needed, when needed, and can tune those arrays for the maximum performance of both HDDs and SSDs, then you may not need Dot Hill. However, if you do not have unlimited resources and an unlimited budget and thus you are looking for a way to do more while paying less, then Dot Hill may have the solution that your data center needs. Take a look at Dot Hill's AssuredSAN line of storage arrays; they may have the performance, flexibility and reliability you need at a price that you can afford.



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