



Dell Expands Storage Tiers for the SMB — Introduces Low-Cost, Extensible Storage

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Management Summary

There are times when we should feel spoiled by how easy our life can be – and we do not even realize how good we have it. It wasn't that many years ago that getting a glass of cold water entailed more than getting off the couch and walking into the kitchen. Years ago, houses did not have hot and cold running water. You had to pump it from a well or carry it back from the river. Some houses had the luxury of a hand pump in the kitchen. Turning on a light took more than flipping a switch. Kerosene lamps had to be filled, and carefully, so as not to start a fire. Today, public utilities provide us with an almost never-ending supply of reasonably-priced water and electricity enabling us to build improved housing with greener lawns and comfortable air-conditioned office buildings. There can be limitations to the flow of water, caused by drought or contamination; a lightning storm or a bad driver can even halt the flow of electricity. However, when we need one of these infrastructure elements, we can generally just turn it on.

Unfortunately, we cannot say the same for the I.T. building blocks that populate our data centers. The 21st century enterprise has seen a tremendous growth in information requirements in the data center, with demands for additional terabytes of storage placed on the I.T. staff to ensure that sufficient disk capacity is available to enable the enterprise to accept orders and issue invoices. Each year we see new array products introduced with more capacity and more functionality than ever before. Unfortunately, many of these new products are incompatible with their predecessors, necessitating a new RFP, new evaluations, new cost analysis, awards, and what has become known as a *forklift* upgrade. Fortunately, many large enterprises have the IT staff available to cope with this complex process. **News Flash! Many smaller businesses, often called "SMBs", and even departments and remote offices of larger enterprises, have the same storage growth issues as their larger brethren.** Unfortunately, these customers do not have the same staff, or the purchasing power to attract the attention of the major storage vendors to develop solutions scaled to their requirements. Enter Dell, with a unique set of storage products that enable SMBs to scale their storage resource with a low-cost, easy to use solution.

With the introduction of the MD1000 last year and the MD3000 earlier this year, Dell provided their smaller enterprise customers with a low-cost, scalable, point-to-point storage solution. Dell is now turning their attention to the mid-sized enterprise, with multiple servers to be attached to a common storage resource, requiring even more expansion; introducing the *MD3000i*. To learn more about the addition of iSCSI to the MD3000 family, please read on.

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Data Center Information Proliferation

The unchecked growth in the deployment of x86 servers, along with a continuing explosion of data storage requirements to support them, haunts the CIO of every major enterprise, only now this same pain has penetrated the small and mid-sized enterprise (a.k.a., “SMB”), as new realities affect the SMB as well as the Fortune 500 Corporation. Data center managers in all enterprises must try to meet the *business-critical*, as well as *mission-critical*, demands within their businesses, while satisfying the needs of customers and partners, alike. Further, they must meet these needs while storage demand is doubling and the storage budget is not, even more critical for the SMB with limited IT staff. This does not even take into consideration the cost of energy to run this expansion. While servers are proliferating across the enterprise, increasing the number of nodes to be managed, the availability of costly energy to run them is not. In order to maintain enterprise growth and control costs, the data center staff must implement an expansion strategy that improves the utilization of the system infrastructure, starting with the *consolidation* of the IT environment to enable the *virtualization* of multiple applications within the consolidation.

Today’s best practices policies require the preservation and protection of an increasing wealth of mission-critical and business-critical data, historical email, financial data, etc., across a multi-tiered storage solution. Previously much of this was viewed as a nuisance, but now is required to protect the executive staff from potentially business-crippling lawsuits. For the last decade, enterprises have put mission-critical data on **high-performance** Fibre Channel (FC) SANs to respond instantly to all queries, those from corporate executives as well as customers, partners, factory personnel and order-entry clerks. The database has to be **reliable**, with 24x7 availability, to place orders and process invoices. System outages are simply unacceptable when an enterprise measures downtime in thousands of dollars rather than minutes. The IT staff has to be able to authenticate users, authorize access, and encrypt data. **Data protection** has similar urgency, although, as information ages, it carries less value for everyday data center operation. It can be stored on a less expensive secondary tier of high-capacity disks with less performance capability. *Archived* information is a third category. It must be saved and managed, but is rarely accessed. Here, *tape libraries* often prove to be the

price/performance leader. **The data center’s management faces the task of reducing the total cost of infrastructure ownership, both capital expenses and operating expenses.**

Typically, the enterprise data center has the staff and experience on FC SANs to establish service policies to manage these different tiers of data in a storage-centric environment, **experience that the average SMB¹ does not have.** The large enterprise can assign storage to a specific array in an appropriate tier of a multi-tiered architecture, according to the *value* of the data being stored. This could necessitate a heterogeneous infrastructure of storage components in order to reduce the TCO of the IT environment. Unfortunately, this often increases the complexity of an already convoluted architecture when the enterprise obtains storage from different vendors, with different management protocols, in order to satisfy data center needs.

In order to simplify this process and remove the complexity, the SMB must change the storage paradigm to satisfy a different set of needs based upon its IT environment. Typically, **the SMB is concerned about a limited, but growing, number of hosts in a server-centric environment with direct-attached storage (DAS).** In many cases, the SMB may be moving from a traditional architecture with *internal* storage in each of the application servers. The transition to unified, external storage cannot be complex. The SMB does not have the FC knowledge or infrastructure required to set up a traditional SAN to consolidate these islands of storage. The process needs to be simplified. The deployment of a consolidated storage environment requires an integrated storage management process in order to streamline all storage network policies. The emergence of iSCSI² as a viable alternative to FC allows the SMB, and the larger enterprise, to change that paradigm and deploy such a network because iSCSI enables consolidation with increased storage capability and reduced management complexity. Ideally, the data center can consolidate all of its storage requirements on an iSCSI SAN and connect this single pool of storage to all of the networked servers, although small operations can accomplish the same task using server virtualization with a direct connection using the SAS

¹ The same is true for departments and branch offices of the large enterprise.

² See the March 5, 2007, issue of *Clipper Notes* entitled *iSCSI SANs – Panacea or Placebo?* It’s available at <http://www.clipper.com/research/TCG2007037.pdf>.

protocol. The SMB may not have all the same complex requirements as the larger enterprise, but the SMB has many of the same concerns: capacity versus performance versus cost, with application and location dependence.

What Needs to be Done

In order to satisfy the demands of a changing IT paradigm, reducing the number of servers and centralizing the storage environment, the SMB, or remote office of an enterprise, has to deploy a **secure, reliable, scalable storage solution with ample performance, and sufficient throughput** to support future expansion. It must be easy to install, administer, and maintain. In terms of scalability, the storage array must be able to support in excess of 10 hosts and support in excess of 10TBs, assuming an internal capacity of 1TB per host. The SMB may not be able to afford a highly skilled FC administrator to install and maintain a complex solution, so the storage solution must be flexible enough for point-to-point connection or attachment via a low-cost Ethernet link. While not every SMB may have FC expertise at its disposal, most do have an IT staff trained to support the Ethernet technology used to interconnect all of the servers in the environment. In addition to the obvious advantages of having trained staff on hand, iSCSI also provides, built-in, the authorization, authentication, and encryption functionality required to secure your data and enable dynamic storage growth for virtualized applications attached to the iSCSI SAN to access additional storage to meet daily or seasonal peak period requirements.

The smallest enterprises with four or fewer servers do not need a *networked* solution. A flexible array with multiple direct-connect attachments may suffice, as long as it can scale into that larger configuration. Mid-sized installations, on the other hand, do require a simple network to enable the distribution of shared data between multiple users, although not necessarily one with the performance criteria of FC. Ideally, both of these solutions would have a common management infrastructure to ensure the protection of any investment that the SMB makes in their storage network. Typically, this means that the SMB needs to be able to identify a single partner for the acquisition of all its storage needs, whether high performance or high capacity, one with a commitment to deliver quality iSCSI products to the office workplace. One vendor that fits that description is Dell.

The Dell Storage Solution Set

Dell provides their customers with more product choice than the majority of storage vendors, with a selection of *AX* and *CX* SAN arrays from their storage partner EMC, as well as a complementary offering of homegrown direct attached (DAS) systems from their *PowerVault MD* storage product family. Dell has offered the iSCSI version of the *AX150*, the *AX150i*, since its inception; now they are extending the connectivity of the MD family to include iSCSI with the introduction of the *PowerVault MD3000i*. The MD3000i enables Dell to improve the applicability of SANs across the board – making them more affordable to all enterprises, even the SMB. They have lowered the TCO to deploy a SAN, removing a significant barrier to consolidation with simplified data access.

The MD3000i joins a family that already boasts two successful models, the *PowerVault MD1000*³ and the *PowerVault MD3000*. The MD1000 is a low-cost, modular, disk-storage expansion enclosure, scalable up to 15 SAS or SATA II devices in a 3U rack enclosure. With 500GB SATA drives installed, the MD1000 can store up to 7.5TB of business-critical data in an enclosure, or up to 22.5TB on a single RAID connection. Using SAS, the MD1000 can scale up to 13.5TB of mission-critical information on a single RAID loop, at 3Gbps.

The PowerVault MD3000 storage array provides redundant point-to-point access for one or two *PowerEdge* servers, or a pair of clustered servers. It provides simplicity, performance, and availability for mission-critical applications. It can be configured with dual active/active RAID controllers with 512MB of mirrored cache on each, and multi-path I/O management to ensure availability. If redundancy is not required, the MD3000 can support up to four PowerEdge hosts. The MD3000 supports up to 15 SAS⁴ devices, or combined with MD1000 arrays, up to 45 SAS disks. This scalability enables the data center to protect the investment made in MD1000 enclosures.

As SMBs, or remote offices, grow, the need for a consolidated storage array to have a simplified connection to more than four servers becomes essential. By replacing the front-end

³ See **The Clipper Group Navigator** dated June 23, 2006, entitled *Dell Expands Storage Portfolio – Provides Choice for All Tiers*, and available at <http://www.clipper.com/research/TCG2006051.pdf>

⁴ The MD3000 will support SATA II devices in 4Q07.

SAS connections of the MD3000 with four 1Gb Ethernet interfaces, Dell has extended the connectibility of the PowerVault MD3000i to 16 hosts, enabling the smaller enterprise to deploy an IP SAN without the cost or complexity of FC.

The MD3000i is an iSCSI SAN that simplifies data management and provides data protection at significantly lower cost than a traditional FC SAN, with comparable performance, but not the complexity. With a throughput of up to 400MB/s and 64,000 IOPS from cache, the MD3000i can deliver the performance required by a growing business with the same storage capacity as the MD3000, but without the over provisioning intrinsic to FC. iSCSI also facilitates the installation of a virtualized environment. With iSCSI, the data center can implement a simplified deployment of VMware's *VMotion*, and other similar products, utilizing the existing network fabric to access a single pool of data storage.

Qualified with any x86 server, the MD3000i can support up to 15 SAS drives with a maximum capacity of 6TB in a single 3U enclosure, using 400GB SAS drives. With the addition of two MD1000 enclosures to the back-end of the MD3000i, maximum capacity for the chain extends to 45 SAS devices, 18TB. When the MD3000i is certified for SATA II devices later this year, capacity will almost double with 750GB drives. Dell has introduced two versions of this array, a standard model with a single RAID controller, and a high-availability model with dual active/active controllers. Each controller supports up to 512MB of battery-backed, mirrored cache (1GB total) that can provide up to 72 hours of data protection. These controllers support RAID levels 0, 1, 5, and 10.

The MD3000i, like the MD3000, has a fully functional management capability, Dell's *Modular Disk Storage Manager*. The Storage Manager is a client-based Java application with a user-friendly interface to reduce the complexity of installation, configuration, management, and diagnostic tasks. It provides the data center with standard multi-path failover management of redundant data paths between the host server and the storage array to ensure business continuity. Dell also offers a set of advanced data management functionality with optional virtual disk snapshot and virtual disk copy features. MD Storage Manager allows the data center to take multiple snapshots of its data at discrete points in time to enable the data center to recover in the event that anyone alters or deletes a file in error. The data

center can also create a full, replicated copy of source data using the virtual disk copy functionality for applications that require minimal performance overhead and full recoverability of the source volume.

Conclusion

iSCSI provides a safe and economical way for any organization to deploy a simplified storage area network. In fact, it is a superior storage access protocol for the deployment of consolidated storage arrays within a virtualized server network for SMBs. It reduces the barriers to SAN entry with affordable components, existing infrastructure, and ubiquitous networking knowledge readily available, enabling the data center to deploy an environment to balance workloads across a simplified network of servers with fewer nodes to manage. iSCSI provides a robust, secure environment with authorization, authentication, and encryption functionality to protect your data.

iSCSI enables the SMB to provision to need, without having to incur the overhead of a complex FC network. It is ideal for the implementation of a virtualized environment where the data center can avail itself of products such as VMware's *VMotion* to utilize system resources fully.

Unfortunately, not all iSCSI solutions are the same. They depend upon HBAs, disk arrays, system integration, and more to enable the deployment of high-performance, reliable, low cost iSCSI products. Poor solutions have been delivered that elicit fears of poor performance and poor reliability, factors that have less to do with the iSCSI protocol itself and more to do with the vendor you select. Choose wisely!

Dell has implemented a solution based upon proven technology. With PowerEdge servers and PowerVault storage products, Dell has used high-performance, reliable building blocks to ensure implementation success. Replacing the SAS front-end with iSCSI will not reduce the quality of their product set, only extend its capabilities. If you are looking to grow your environment and lower your TCO, look to Dell to provide the iSCSI solution for your office.



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