

WHITE PAPER

Expanding SAN Footprints to More Servers and Applications with iSCSI

Sponsored by: Hewlett-Packard

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June 2006

IDC OPINION

Hewlett-Packard's iSCSI storage expansion products provide significant advantages to users with substantial installed Fibre Channel (FC) storage infrastructure. These products also should be considered by users seeking to gain SAN benefits from stranded, unconsolidated servers. Their key advantages are as follows:

- ☒ Provide protection of investments in Fibre Channel-based array and switch infrastructure because of their multiprotocol support
- ☒ Provide low-cost entry into iSCSI-based technology, potentially utilizing existing space capacity and switch ports with the low cost of adding initiators
- ☒ Enable operational efficiencies to be gained through a single management structure for both FC and iSCSI hosts

METHODOLOGY

Findings for this study are based in part on three sources:

- ☒ Fifty (50) in-depth interviews with a cross-section of end users, conducted between 2004–2006
- ☒ IDC's ongoing storage shipments data
- ☒ IDC's ongoing storage shipments research

IN THIS WHITE PAPER

In this white paper, IDC examines the tactical and strategic value of expanding Fibre Channel-based SANs to previously stranded and isolated servers and to applications with low-cost, familiar Ethernet and iSCSI connections. The paper specifies core applications that typically benefit from this transition and examines Hewlett-Packard's iSCSI-based storage products as specific solutions.

SITUATION OVERVIEW

User Needs for Storage Solutions

Today's progressive datacenters face a significant dilemma when they consider the introduction of low-cost, industry-standard iSCSI storage interconnect technology in environments with a long-term architectural commitment and investment in Fibre Channel-based SANs. IDC believes that it is possible to combine these types of technology in a way that takes advantage of the strengths of both. Fibre Channel and iSCSI can be concurrently deployed with increased advantages not available when either technology is deployed alone. IDC also believes there is a path that enables a datacenter to protect its investments and bring early experience, decreased costs, and high value with Ethernet/iSCSI technology. The path is bringing to smaller servers the SAN advantages with Ethernet/iSCSI to Fibre Channel bridging technology.

One of the top priorities of IT organizations is reducing or containing costs. iSCSI bridging supports this goal in the following ways:

- ☒ **Consolidation.** A tried-and-true method for reducing or maintaining IT costs is consolidation — either at the datacenter, application, or component level. iSCSI brings another valuable workload to the IP LAN. In addition, it brings storage management and capacity efficiencies to an expanded set of servers and applications.
- ☒ **Improving the numerous small servers.** Smaller, low-cost blade servers are some of the most highly leveraged candidates for consolidation, yet the means to do so have been elusive. Management is eased by putting small servers on the enterprise SAN. If there is space capacity on the Fibre Channel SAN, the cost of bringing in more servers to the SAN through Ethernet/iSCSI may be minimal.
- ☒ **Improving SLA for the edge.** Providing the equivalent of consolidation for physically disbursed systems, especially those outside the enterprise datacenter, has been particularly difficult. Data protection options expand, and recovery QoS times may be dramatically improved with iSCSI SAN support.
- ☒ **Smarter use of staff.** Staff span of control and efficiency can be enhanced by standardization, which results in deeper skill development and better coverage. Consolidation of backup and recover tools, provisioning, and data replication have payoffs in fewer operational errors and fewer hours required.
- ☒ **Ease into new technologies.** True disruptions to IT processes may eventually pay off, but it is usually more effective to provide a smooth, seamless path to improvements. The lean staffing of today's datacenters suggests making small, easy-to-digest changes that build on existing skills and infrastructure. The introduction of familiar software tools of the Fibre Channel SAN integrated with the familiar, low-cost Ethernet/IP tools takes advantage of the strengths of both types of technology.

Investment Protection

Gaining the full life and value from major infrastructure investments is a core efficiency strategy. Bridging iSCSI-connected servers into Fibre Channel SANs is one way to bring SAN value closer to its theoretical maximum possibility.

SAN expansion preferred over SAN duplication. Replication of SANs dilutes the value of a common pool of storage and, if carried far enough, turns SAN proliferation into a problem. Bridging Ethernet/iSCSI into existing Fibre Channel SANs avoids or at least delays this dilemma.

Enterprise-level features for smaller servers. All the availability features of the enterprise SAN — no single point of failure, the resiliency of RAID-6 allowing for multiple drive failures with no data loss — are available to all servers, including those bridged via iSCSI.

Right-sized connections for performance and cost optimization. Datacenters are increasingly concerned with hot spots and maxing out power and cooling capabilities. Oversized interconnects — using 4Gb connections when 1Gb provides good-enough performance and adequate headroom — needlessly adds to the power and cooling load. A variety of smaller servers storage I/O can actually be handled with speeds down to 100-T levels.

Single and integrated management dashboard. The single largest expense for most IT organizations, after capital spending, is operational support. Every new control point adds to operational overhead. By bridging to iSCSI, SAN storage dashboard operational monitoring and control tools remain exactly the same, except that they cover more of the storage and datacenter.

New workload and efficiency for existing investments. All datacenters have a degree of spare capacity. The existing extra switch ports and bandwidth headroom of the LAN can often be applied to storage traffic with minimal incremental capital investment. It may be possible to implement a portion of an initial iSCSI-based SAN expansion as a unique IP domain, while making at least partial use of already installed, but unused, spare switch, NIC, and storage capacity. These initial reuses reinforce the payoffs of beginning steps with iSCSI.

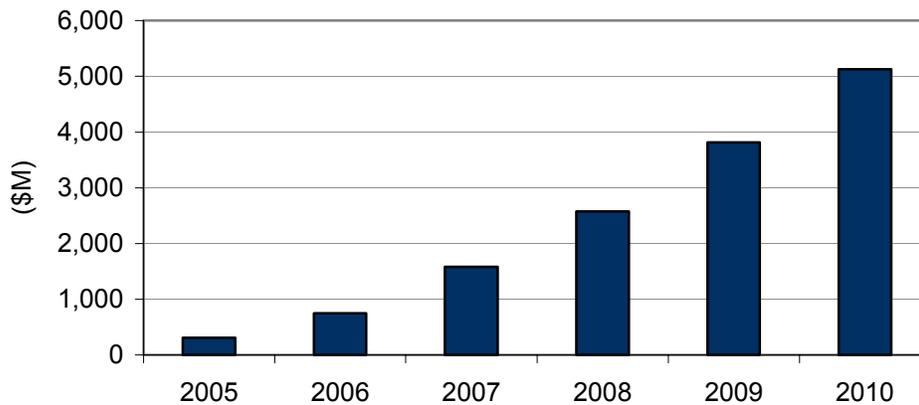
Exploitation of functionality — rich, mature, stable, IP protocols. IP networks provide a rich set of QoS, protection, and multipathing to optimize storage traffic. IP has many built-in functions that benefit storage over the LAN. One of the most obvious is the routing capability that automatically creates multipathing between server and storage. Another is the QoS benefits of VLANs and MPLS in providing guaranteed and isolated bandwidth dedicated to storage.

iSCSI Today: Emerging and Growing

IDC forecasts iSCSI as a disruptive technology that will, over time, be found to be an effective solution to the challenge of storage interconnects. After initially being applied to servers with moderate requirements, iSCSI will be improved over time and cover a wider spectrum of market needs. As Figure 1 illustrates, IDC projects worldwide market growth to just over \$5 billion by 2010.

FIGURE 1

iSCSI SAN Revenue Forecast, 2006–2010



Source: IDC, 2006

A path acknowledging today's storage reality. Taking the first step into iSCSI is easier when changes due to the first deployment are slight and when each additional connection supports the initial decision. Bridging, thanks to standard IP capability, expands to support multiple servers, as many as the 1GB bandwidth can handle. The single Ethernet interconnect is shared as part of the basic IP protocol.

Incorporating and adding an improved technology. An iSCSI expansion is the combination of the best of two worlds — low cost, easy-to-use interconnect technology combined with the rich functions and capability of the existing SAN.

IDC forecasts that an increasing numbers of organizations will be deploying iSCSI. Products that bridge from Fibre Channel support the trend and make the deployment easier. Users can make use of current arrays and SAN structure. Typically, there is flexibility to use either capacity-oriented disk drives (SATA) or performance-oriented disk drives (SAS). Any mix is possible.

Making the move at low cost. Low cost needs to be conceived in broad terms, including training and marginal cost of infrastructure to make the move and often the hidden cost of complexity. The total cost is not simply the capital price of the increment of capability. Total cost includes the cost of operations (simple when iSCSI is an extension of what is already happening), power consumption, and any changes to datacenter facilities.

Bridging to Ethernet/iSCSI for many users will be an acceptable path from low-cost entry to next-generation and converged IP networks. While a dedicated IP/iSCSI SAN network might appear to have advantages in the total separation, it may be more costly both short and longer term because of a duplication of hardware infrastructure and a new set of software tools.

Places/Applications for iSCSI

While much has been written about the obvious match of iSCSI to SMBs, which are moving to consolidated storage for the first time with no SAN or Fibre Channel history, the many applications for enterprise have been less carefully examined. Enterprises with a history of gaining value from SAN use have numerous opportunities to increase storage efficiencies or expand SAN benefits with bridging iSCSI technology. The following are some key areas of opportunity:

- ☒ **Microsoft Windows.** The iSCSI initiator is a no-cost embedded part of Windows support. In the unlikely event that additional performance from hardware accelerators is required, TOE supported HBAs can be used as I/O accelerators. IDC predicts that the Windows OS platform will be the initial sweet spot for iSCSI deployments.
- ☒ **Departmental, remote office, and small office environments.** With IP networking a likely existing technology in the branch/remote office, iSCSI is the natural interconnect to apply when storage requirements exceed internal server capabilities. These sites, with no prior Fibre Channel installations, should be assumed to be iSCSI situations, unless careful analysis suggests otherwise.
- ☒ **Support across campus.** Datacenter managers often provide support for local servers that are not collocated within the enterprise datacenter. Historically, needs for storage capacity for these servers required painful physical shifting of storage arrays to labs and computer closets. With iSCSI, the already deployed IP connection may have headroom for using iSCSI and the LAN to provide campuswide storage connections and support while retaining the actual arrays centrally.
- ☒ **Email — Exchange and Notes.** Email is growing more rapidly and across a broader set of users than most conventional applications. While capacities may become huge, the bandwidth and I/O rates are generally modest. iSCSI is an ideal interconnect to support a group of servers hosting an email application. By bridging to an existing SAN, the powerful SAN replication tools can be applied to the restoration needs of this frequent mission-critical application.
- ☒ **Backup/replication/recovery.** A good fit for iSCSI is the creation of copies and snapshots of data that are used as staging areas for migration to tape for archiving or for the possibility of short recovery times approaching a near-continuous degree of data protection and application uptime.
- ☒ **Reference data.** With some enterprises storing everything forever, older data and moderately accessed reference data often do not need the 2Gb and 4Gb speeds of Fibre Channel to provide expected performance. This growing tier of storage capacity will often be right-served with 1Gb Ethernet/iSCSI performance.

HP Products

HP offers a suite of products supporting users who are making the move to incorporate iSCSI in their technology tools. These products enable users to increase consolidation advantages while retaining the value and capability of a Fibre Channel storage architecture.

EVA iSCSI Connectivity Option

The HP EVA iSCSI solution is well positioned for medium to large and extra large organizations that have adopted networked storage and are looking to add additional servers to the SAN for improved ROI. It is also targeted to organizations interested in deploying iSCSI with low risk and cost. HP believes users will experience substantial cost savings and higher performance than dedicated and separate iSCSI solutions that require separate arrays and must be separately managed. Features include:

- Fibre Channel and/or iSCSI
- Up to 256 servers consolidated to EVA array
- Command View management common software for Fibre Channel and iSCSI

MSA1510i

The MSA1510i is positioned to be attractive to small and medium businesses (SMB) that have not previously adopted networked storage and have waited for today's mature iSCSI technology and attractive price points. The MSA provides better capacity utilization, simplified management, information pooling, increased reliability, and a platform for consistent backup and recovery. The HP solution delivers simplicity and low cost from the iSCSI SAN by utilizing management tools common with server DAS storage. It allows the flexibility of capacity-oriented SATA hard drives and/or performance-oriented SCSI.

MSA 1510i iSCSI offers:

- Scalable iSCSI storage solution for entry and mid-level customers
- Dual Gigabit Ethernet iSCSI port support for tiered storage with SCSI and SATA drives
- Easy-to-use Web-based management interface

NAS iSCSI Feature Pack Software

The iSCSI feature pack for HP ProLiant servers is designed for customers with storage consolidation for relatively few hosts.

- Unified storage server with file & print functionality and light workload demands for block access
- Limited application deployments (Exchange, SQL)
- Fairly static IT environment
- Price-sensitive entry-level customers: \$3–\$15,000 per solution

XP iSCSI Capability

The StorageWorks XP Arrays offer:

- Optional 8-port iSCSI CHIP pair for the XP10000 and XP12000 disk arrays
- Optional iSCSI CHIP pair also available to upgrade existing XP1024 and XP128 disk arrays

The XP iSCSI CHIP pair consists of a pair of iSCSI CHIP blades, each with four iSCSI ports. The XP iSCSI CHIP pair can be installed in an XP disk array along with Fibre Channel, ESCON, or FICON CHIP pairs providing a flexible mix of connectivity options.

The XP12000 can hold up to four CHIP pairs of any type or up to seven CHIP pairs of any type in a system that contains only one ACP pair. This allows up to 32 iSCSI ports on a fully loaded XP12000 and up to a maximum of 56 iSCSI ports.

The XP10000 can hold one iSCSI CHIP pair giving 8 iSCSI ports in addition to the included 16 Fibre Channel ports.

FUTURE OUTLOOK

Scenarios

IDC forecasts increasing deployments of IP iSCSI-based storage systems. HP products are positioned to provide the early first steps with IP, while gaining immediate overall infrastructure benefits. The adoption of a dual-interconnect strategy allows for appropriate connections at each decision point and capitalizes upon the benefits of SAN.

CHALLENGES/OPPORTUNITIES

Shifting the conversation of storage tiers to include right-sized interconnects.

A successful consolidation strategy, which involves the shrinking of the number of datacenters, number of applications, and providing efficient use of storage capacity through SANs can be expanded to right-size storage interconnects as well. Right-sized interconnects use less power and HVAC. They will typically provide better noise immunity and thus better integrity. It will be important for suppliers to invest to aid users to value right sizing of interconnects as another tool in consolidation and Ethernet/iSCSI application.

Creating a transition/capability for native IP SANs. As iSCSI market and datacenter penetration grows, suppliers will need to add native iSCSI products to their portfolios. For locations without a legacy Fibre Channel environment, native IP arrays will be the more attractive products.

Being positioned with 10Gb Ethernet. An additional set of datacenter managers will want to apply iSCSI/Ethernet only when they believe there is a viable replacement for today's proven Fibre Channel. IDC believes that 10Gb Ethernet is an enabler to that end. Suppliers will need a road map to iSCSI over 10Gb Ethernet and eventually deliver on the promise.

CONCLUSION/ESSENTIAL GUIDANCE

Hewlett-Packard's StorageWorks product line includes an important family of iSCSI bridging capability. These products ease users into the benefits of IP storage networking. Their capabilities provide investment protection and exploit the robust functions and control available in the Fibre Channel SAN.

This approach is well aligned with users' needs to get a toe in the water with iSCSI. Users with solid Fibre Channel experience and commitment should nonetheless use these opportunities to accelerate a combined iSCSI-Fibre Channel infrastructure and also gain the benefits of SAN from a larger portion of their datacenter storage capacity.

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