



Connecting Mac to HP EVA Storage

Leveraging EVA Resources

Simplified iSCSI to FC Routing



Executive Summary

HP introduced the EVA iSCSI Connectivity Option last year, and recently expanded the supported platforms to include the Macintosh OS X platform. As many of you know, HP has been a leader in the world of video and movies for years. Their systems and storage have been used to support leading feature films such as Shrek, Shrek Two, and Shrek the Third.

In the Mac market, the leading applications are video, audio, and education. This paper shows how the Mac iSCSI driver from ATTO Technology, Inc. and HP's EVA iSCSI Connectivity Option provide the performance needed for video applications. One of the keys to video performance is the right RAID implementation that distributes the data across multiple drive spindles and provides a high quality of service with low latency to avoid dropped frames.

Many universities and schools have a significant number of Mac workstations for students. Now they can provide those Mac systems with a low-cost method to share storage. ATTO's XtendSAN iSCSI driver and the EVA iSCSI Connectivity Option enable any Mac workstation to use iSCSI to connect to EVAs. This allows campus IT administrators to implement a solution using their existing IP infrastructure to provide the benefits of SAN storage.

Key Findings

- Using the EVA iSCSI Connectivity Option and the ATTO XtendSAN iSCSI drivers, IT managers have a low-cost and long distance way to share data for Mac applications.
- The EVA iSCSI Connectivity Option has the performance to meet the needs of demanding Mac video and audio applications.
- The EVA iSCSI Option can lower the cost of SAN connectivity to under \$100 per Mac system.

Introduction

The HP StorageWorks EVA iSCSI Connectivity Option can help IT managers improve ROI on their current EVA SAN investments. By adding iSCSI (SCSI over Ethernet) to expand the EVA platform's connectivity, every server and workstation in the enterprise can gain the benefits of SAN-based storage. Released in 2006, the EVA iSCSI Connectivity Option has now been expanded to include support for Macs. HP has partnered with ATTO Technology, Inc. to support their XtendSAN software to provide iSCSI support for the Mac on the EVA. Now the EVA can provide low-cost, high-performance storage and data protection services to Macs at a fraction of the cost of direct Fibre Channel connectivity.

Key benefits to IT managers for adding Mac users to their EVA SANs include:

- Centralized data and policy management
- Enhanced data protection for business continuance and regulatory requirements
- Ability to share tape automation and virtual tape libraries (VTL)
- Ability to share backup and data management licenses

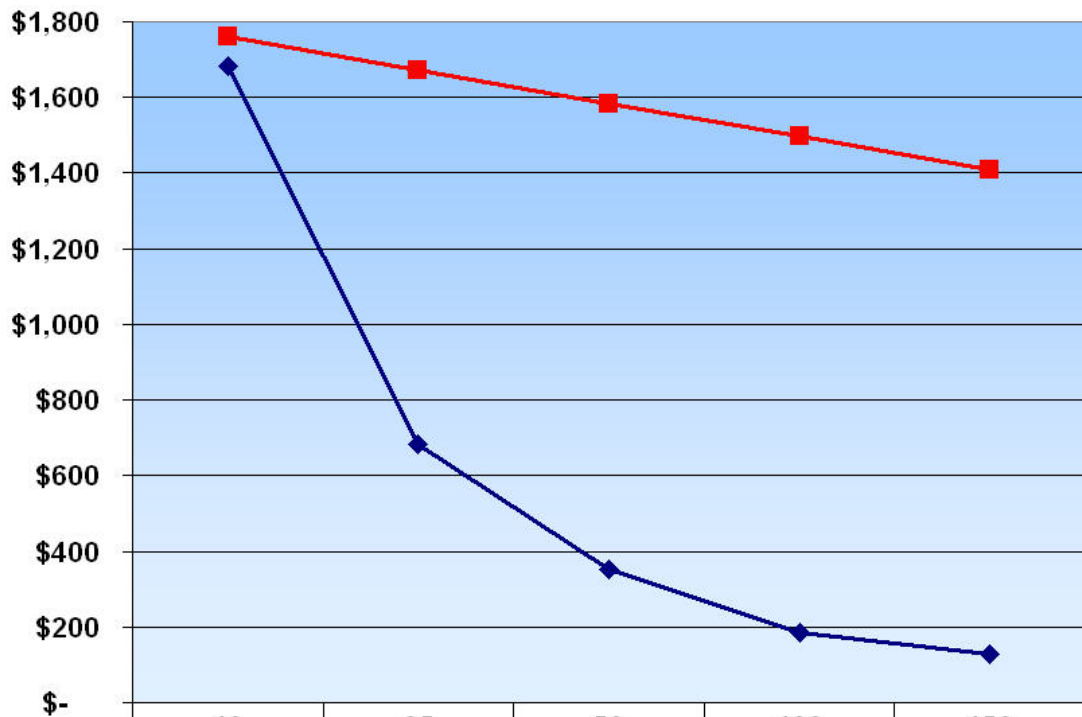
iSCSI on the EVA... Why Should You Care?

Adding the EVA iSCSI Connectivity Option to the enterprise allows IT managers to expand the EVA's reach. Adding Mac users to the platform improves utilization and ROI. This allows IT managers to leverage existing IP networking infrastructure and storage expertise in the data center.

Key benefits/reasons for expanding the reach of your EVA across the enterprise include:

- **Lower Storage Costs** — Centralized management reduces the staff required to support storage, provides better utilization of storage assets and reduces the risk of human errors.
- **Replace DAS** — The EVA iSCSI Connectivity Option can provide better performance than DAS. DAS also creates application and server availability risks. If the locally attached disk fails, the server fails to provide the production application it was deployed to deliver.
- **Improved Data Protection** — Centralized SANs provide the right tools and staff to meet business continuance and regulatory requirements.
- **Improved Asset Management and ROI** — Amortizing the cost of highly reliable Fibre Channel storage over more servers expands the ROI of Fibre Channel based disk/tape storage.
- **Investment Protection** — The EVA iSCSI Connectivity Option makes existing SAN equipment more valuable for a longer time.
- **Leverage SAN Resources** — Enterprise SANs have already invested in significant tools for management, data protection, security, and policy adherence.
- **“Right Size” the Data Pipe** — Each application has a specific set of data rate and IOP requirements. The iSCSI interface of the EVA iSCSI Connectivity Option is ideal for most low-cost server applications and non-transaction systems.
- **iSCSI with QoS and VLANs** — The EVA iSCSI Connectivity Option is designed to take advantage of QoS and VLAN solutions already in place in most enterprises.
- **Familiarity** — The EVA iSCSI Connectivity Option is fully integrated and managed by EVA Command View, an application familiar to all EVA users; they do not need to learn a new management application.
- **Low Cost SAN Connection** — The EVA iSCSI Connectivity Option provides SAN connectivity for all servers via standard Ethernet. Up to 150 servers can be connected at a fraction of the cost of installing FC HBAs.

Lowering SAN Production Costs



The Business Case for iSCSI to Fibre Channel SAN Connectivity

A single EVA iSCSI Connectivity Option can support up to 150 iSCSI initiators. The chart above shows the connection cost disparity between FC Host-SAN ports and iSCSI-FC connection via a router. As you can see the cost per port drops dramatically as additional low-cost servers and Macs are added to the EVA, via the iSCSI Connectivity Option. This chart illustrates how the cost per connection can be driven significantly under \$150.

ROI is about Maximizing Utilization

According to ESG (Enterprise Strategy Group) speaking at Storage Networking World, Spring 2006, most enterprise storage SANs, like the EVA, are under 50% utilized. The EVA iSCSI Connectivity Option provides a great way to expand the value of the EVA across the enterprise. The EVA can easily support up to 150 servers per iSCSI Connectivity Option box, increasing SAN utilization and providing the overall benefits of the SAN to more systems.

The Right Mac iSCSI Software Solution

ATTO's XtendSAN, iSCSI Initiator for OS X, allows Mac users to utilize and benefit from Internet SCSI (iSCSI), one of the fastest growing networking protocols today. iSCSI allows users to take advantage of their existing Ethernet expertise and infrastructure while reaping the benefits of SAN storage.

The ATTO XtendSAN package for Mac OS X consists of an iSCSI device driver and management interface. Mac users expect OS X compatible software to reflect the simplicity and elegance that OS X is renowned for and XtendSAN is no exception, as management and configuration are simplified thanks to an intuitive graphical user interface (GUI). The iSCSI driver is responsible for moving data from the storage stack over to the network stack, where it can be passed to and from the EVA SAN using a standard Gigabit Ethernet network. The management interface provides the ability to configure specific protocol options and manage target devices through a graphical user interface.

The XtendSAN solution provides:

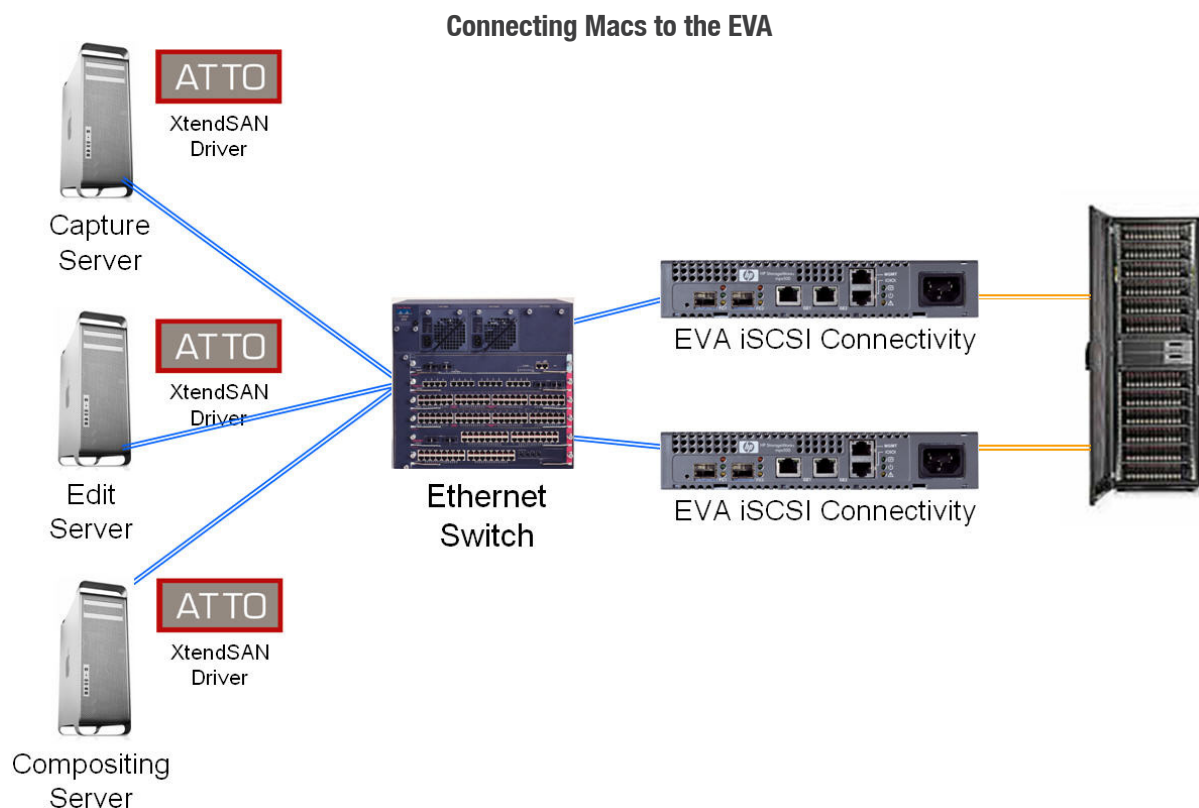
- **High Performance** — Transport more data (up to 320MB/sec.) in less time with a high performance architecture supporting multiple streams of uncompressed video.
- **Smooth Data Streaming** — Improve Quality of Service to support collaborative editing workflows in audio/video applications.
- **Concurrent Sessions** — XtendSAN allows Mac hosts to support multiple I/O initiators per system to support better performance.
- **One-Click Installation** — Simplify configuration and management with an elegant and easy-to-use graphical user interface (GUI).
- **Available as Universal Binary** — Works natively on both Power PC and Intel-based Macs XtendSAN can be installed on the X-servers, PowerBooks and Power Macs.

Mac, Video, and iSCSI

Performance

The primary concern in video performance is consistency of delivery to avoid dropped frames. When building SANs for video applications, drive latency is much more important than basic throughput. This is why using a larger EVA Fiber Channel array to spread the video across multiple drive spindles is critical.

The second concern is to configure the array so each user has their own LUN space on a set of drives to reduce access contentions and reduce random seeks. This enables multiple users to maximize bandwidth with the lowest latency from the EVA. If one user wants to access a file on another user's volume, he can copy the data from the other volume to his own. Giving each user his own set of drives maximizes performance while minimizing the chance that two hosts will access the same drive at the same time.



For high definition video applications, 150MB/sec. of bandwidth between the workstation and the switch is sufficient to support video capture and editing. The EVA iSCSI Connectivity Option can support up to 640 MB/sec in a typical redundant configuration, which is over 4 times faster than high definition real-time digital video. In video applications, over Ethernet, the typical bottlenecks occur in the connection between the switch and the storage. To reduce this and provide load balancing and fail-over, each EVA iSCSI Connectivity Option provides 2 ports of IP and 2 ports of FC, supporting up to 32 EVA controller ports via a maximum configuration of 16 router boxes. The following table shows the typical bandwidth demands of key video formats:

Video Format	Bandwidth Needed
Standard definition: DV25	3.6 MB/sec.
Standard definition: DV50	7.2MB/sec.
Standard definition: 8-Bit Uncompressed	20MB/sec.
Standard definition: 10-Bit Uncompressed	30MB/sec.
High Definition: DVCPRO 720p	8MB/sec.
High Definition: DVCPRO 1080i	14.4MB/sec.
High Definition: 8-Bit Uncompressed 720p	120MB/sec.
High Definition: 8-Bit Uncompressed 1080i	150MB/sec.

In video applications, consistency of delivery is vital. Therefore EVA iSCSI Connectivity Option allows IT managers to use jumbo frames to improve quality of service. The standard MTU size for a TCP data packet is 1,514 Bytes. The larger packet size provided in jumbo frames offers greater performance. Configuring the NIC (Network Interface Card) for 9K jumbo frames will improve performance considerably by transferring more data per packet, reducing the IP management overhead by 83%.

Security

The EVA iSCSI Connectivity Options provide multiple ways to ensure security of data including support for:

- Virtual Local Area Networks (VLANs)
- Access Control Lists (ACLs)
- Internet Storage Name Services (iSNS)
- CHAP (Challenge Handshake Authentication Protocol (CHAP).

These are all standard networking tools that can be used to provide secure access and transport of the data onto the EVA. iSCSI also provides some additional options to increase data security, including iSCSI digests which provide additional protection against data being corrupted in transit.

Education on the EVA

The Mac is a leading platform in the education market and Xtend SAN enables any Mac server or workstation to use the on-board NIC as an iSCSI connection. This enables teams and individuals to share files, protect research materials, and collaborate on projects. Campus IT administrators can provide these services and keep costs down by using iSCSI. Users only need to add the ATTO XtendSAN driver and be granted access by the Campus administrator.

EVA iSCSI Connectivity Option

The EVA iSCSI Connectivity Option bridges iSCSI to Fibre Channel SANs to provide IT administrators with a cost efficient-method of connecting servers to SANs.

EVA iSCSI Connectivity Option Overview

Performance and Fail Over

- 272 MB/sec iSCSI Data Rate
- Over 36,000 IOPs
- HA via dual units in 1U shelf

Connections and Management

- Dual 1 Gb iSCSI ports
- Dual 2 Gb FC SFP slots
- Dual Management Ports



Software and Tools

- Command View
- Microsoft, Mac & Linux iSCSI
- CHAP IP Security

Physical Dimensions

- 1U High, ½ Rack width
- Fits 2 units in 19" Rack width
- Single AC Power
- Low Power, Under 48W
- Entire Unit is a FRU

The HP StorageWorks EVA iSCSI Connectivity Option with Mac drivers from ATTO provides a high performance, secure, and low-cost option for connecting Macs to EVAs. Adding iSCSI to expand the EVA platform's connectivity extends the benefits of SAN-based storage to every server and Mac in the enterprise. Adding this multi-protocol solution to the EVA can enable greater utilization of the EVA, lower management costs, provide better data protection, and application availability for more servers and Mac workstations across the enterprise.

Summary and Conclusion

The EVA iSCSI Connectivity Option and the ATTO XtendSAN iSCSI drivers help IT managers maximize their investment in HP EVA storage. This solution extends the benefits of centralized SAN data protection to Mac workstations.

For more information on these solutions please contact us at: http://www.qlogic.com/products/san_MultiProtocol.asp

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