



vmware®
READY

STORAGE

2ND EDITION

ATTO
Application Guide
The Power Behind the Storage

ATTO

ATTO Technology, Inc.

Corporate Overview

For 30 years, ATTO has been an innovator in storage and network connectivity, from developing the first solid-state storage device to the latest data center appliances. ATTO develops high-performance products that manage latency in the most demanding real-time environments, resulting in accelerated application performance and enhanced transaction processing. ATTO delivers performance-based solutions to applications, infrastructure, big data, cloud and virtualized environments, including:

- Enterprise - Database, Web Servers, Back-Office Operations
- Departmental - Business Analytics, Supply Chain, Asset Management
- Business Continuity - MetroClusters
- Workgroup - CAD/CAE, Video Production/Finishing, Scientific, Energy, Medical

ATTO manufactures the industry's broadest portfolio of high-performance network and storage connectivity products, designed and optimized to work together to help customers better store, manage, analyze and deliver data.

- Fibre Channel, SAS/SATA, iSCSI, Ethernet, Thunderbolt™, NVMe, NVMe over Fabric, Host Bus Adapters, RAID Adapters, Network Interface Cards, storage controllers, Bridges, Thunderbolt adapters and software

ATTO delivers tested solutions which are qualified and VMware® certified with industry leading workstation, server, storage and application vendors. This ensures:

- Faster access to new technology
- Features that improve your workflow
- Maximized solution performance and productivity

ATTO provides a unique level of partnership with customers, solution providers and OEMs.



ATTO Founders Dave Snell, CTO, and Tim Klein, CEO

The Power Behind the Storage

"We would like to thank our valued industry partners and loyal customers for your continued support. ATTO's primary mission is to provide the best possible customer experience while offering the highest performing, industry leading products and technologies available."

-Timothy J. Klein, President and CEO, ATTO Technology, Inc.

ATTO VMware ESXi Certified Products

For well over a decade ATTO has been optimizing storage networking and connectivity products for VMware environments. Working with VMware to ensure interoperability, the list of current ATTO products certified with VMware ESXi® is extensive:

XstreamCORE 7500 16Gb Fibre Channel 2-port to 12Gb SAS 4 (x4) port storage controller

Celerity FC-321E	Gen 6 32Gb Fibre Channel	1-port	PCIe 3.0 x8
Celerity FC-322E	Gen 6 32Gb Fibre Channel	2-port	PCIe 3.0 x8
Celerity FC-324E	Gen 6 32Gb Fibre Channel	4-port	PCIe 3.0 x16
Celerity FC-161P	Gen 6 16Gb Fibre Channel	1-port	PCIe 3.0 x8
Celerity FC-162P	Gen 6 16Gb Fibre Channel	2-port	PCIe 3.0 x8
Celerity FC-164P	Gen 6 16Gb Fibre Channel	4-port	PCIe 3.0 x8
Celerity FC-81EN	8Gb Fibre Channel	1-port	PCIe 2.0 x8
Celerity FC-82EN	8Gb Fibre Channel	2-port	PCIe 2.0 x8
Celerity FC-84EN	8Gb Fibre Channel	4-port	PCIe 2.0 x8
ExpressSAS H1208	12Gb SAS/SATA	0 ext / 8 int ports	PCIe 3.0 x8
ExpressSAS H120F	12Gb SAS/SATA	0 ext / 12 int ports	PCIe 3.0 x8
ExpressSAS H1244	12Gb SAS/SATA	4 ext / 4 int ports	PCIe 3.0 x8
ExpressSAS H1248	12Gb SAS/SATA	4 ext / 8 int ports	PCIe 3.0 x8
ExpressSAS H1280	12Gb SAS/SATA	8 ext / 0 int ports	PCIe 3.0 x8
ExpressSAS H1288	12Gb SAS/SATA	8 ext / 8 int ports	PCIe 3.0 x8
ExpressSAS H12F0	12Gb SAS/SATA	16 ext / 0 int ports	PCIe 3.0 x8
ExpressSAS H6F0	6Gb SAS/SATA	16 ext / 0 int ports	PCIe 2.0 x8
ExpressSAS H608	6Gb SAS/SATA	0 ext / 8 int ports	PCIe 2.0 x8
ExpressSAS H60F	6Gb SAS/SATA	0 ext / 16 int ports	PCIe 2.0 x8
ExpressSAS H644	6Gb SAS/SATA	4 ext / 4 int ports	PCIe 2.0 x8
ExpressSAS H680	6Gb SAS/SATA	8 ext / 0 int ports	PCIe 2.0 x8

ThunderLink FC 2162 Thunderbolt 2 - to - 16Gb Fibre Channel 2-port

ThunderLink FC 2082 Thunderbolt 2 - to - 8Gb Fibre Channel 2-port

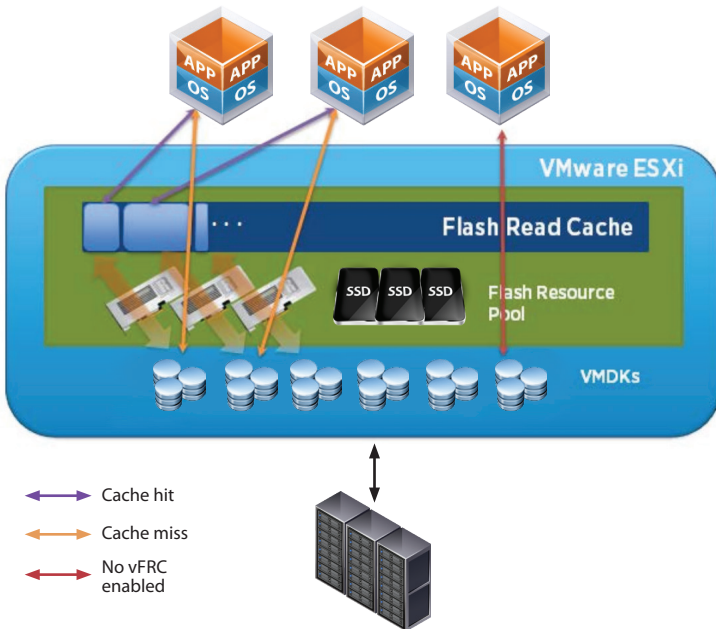
ATTO products will enhance the performance of any VMware ecosystem. This booklet provides use cases common to VMware environments and details how ATTO solves challenges better than any other connectivity solution. In fact, in several cases ATTO is the only solution available.

Increase Performance Up to 146% Without Increasing Server CapEx

Take advantage of VMware vSphere® Flash Read Cache™ (vFRC) with ATTO XstreamCORE®

Background:

VMware® vFRC is a feature that allows hosts to use SSDs as a caching layer for virtual machines to improve VM performance. Adding remote flash to ESXi™ hosts is available in VMware ESXi 6.5 Enterprise Plus. ESXi 6.7 supports Fibre Channel with multipathing. VMware has published performance numbers that show database performance increases of 47% - 146% through proper sizing and application of vFRC.



SSD drives and PCIe flash cards connected locally to the host server can be used to create a virtual flash resource. vFRC operates on top of the virtual flash resource and lets you provision space within the unified flash resource pool for their different workloads. vFRC interoperates well with other vSphere features like vMotion, snapshots, and suspend-resume.

Problem:

Database performance can be enhanced by caching the most frequently read data of a VM's virtual drive. Making SSD flash available to VMs allows for quicker response of common data. While adding SSDs directly in the server is possible, it may involve the time consuming process of rearranging physical drives inside the server and moving data and VMs around as part of the upgrade.

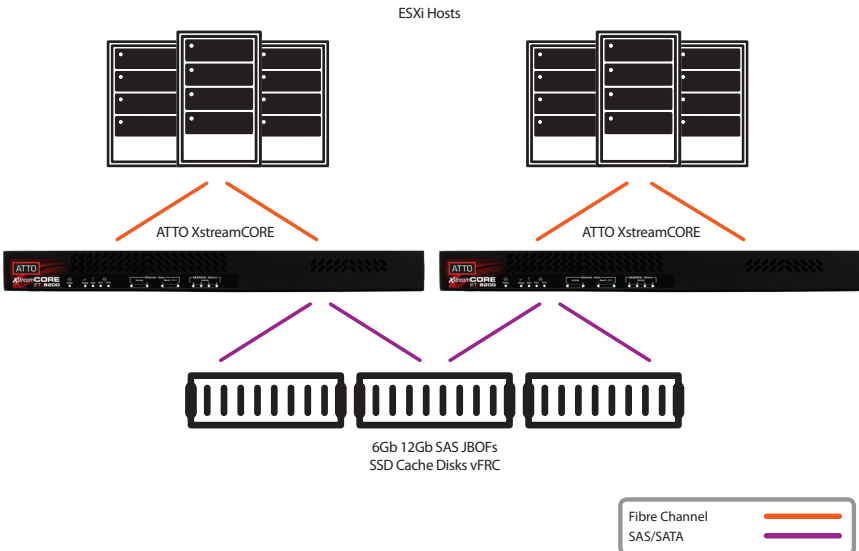
Solution:

ATTO XstreamCORE® presents external commodity shelves with up to 240 total SAS/SATA SSDs per appliance as LUNs on a Fibre Channel fabric that can be shared by up to a 64 ESXi hosts. These SSDs can be mapped to individual servers using ATTO Host Group Mapping. Fully redundant and multipathing read cache performance is now an option for VMware Enterprise Plus customers.

Benefits:

- XstreamCORE FC 7500/7550 presents SAS/SATA SSDs on Fibre Channel fabrics to ESXi hosts for use as local SSD flash to create read cache for VMs.
- Allows the use of commodity JBOFs to scale up to 240 total SSD devices per appliance.
- XstreamCORE has a robust mapping capability that allows hosts/servers to be assigned to individual drives, all drives or none of the drives. Access to storage is maintained even if a physical host fails.
- XstreamCORE features ATTO's xCORE processor which accelerates all I/O in hardware driving total performance up to 1.2M 4K IOPS & 6.4GB/s throughput per controller. ATTO *intelligent Bridging Architecture™* maintains consistent protocol conversion with only four microseconds of latency.

Adding SSDs as Read Cache via Fibre Channel



Free Your Servers from In-The-Box Storage

Reduce CapEx by adding colossal storage without buying more compute

Background:

Common datacenter architectures involve a hyper-converged system of storage and compute in a single node. The challenge is that adding capacity usually requires adding new full compute nodes as well as the associated licensing. ATTO XstreamCORE® is a storage controller used to add capacity with SAS/SATA RAID arrays, JBOD or JBOF enclosures to Fibre Channel or Ethernet fabrics and have them shared across multiple servers.

Problem:

Hyper-converged systems package compute, storage and memory as a single component. The inability to scale capacity independently leads to increased costs. Vendors often charge licensing fees by the CPU, which means end users need to pay even more for additional CPUs and memory when they simply need to scale storage.

Solution:

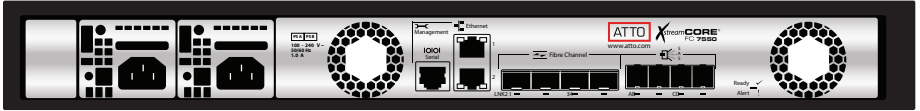
Storage disaggregation is the separation of compute and storage. ATTO XstreamCORE storage controllers enable storage disaggregation by creating a pool of storage behind the controllers that can be shared across all hosts. With options for both Fibre Channel and iSCSI fabrics, ATTO XstreamCORE can provide a scale out solution for most datacenters.

Benefits:

- Allows storage and compute to scale independently of each other and disaggregates storage so that it can be shared on a Fibre Channel or iSCSI SAN.
- Attached SAS LUNs are mapped and presented as Fibre Channel LUNs on a Fibre Channel fabric or as iSER and/or iSCSI targets on Ethernet.
- XstreamCORE has a robust mapping capability that allows hosts/servers to be assigned to individual drives, all drives or none of the drives. Access to storage is maintained even if a physical host fails.
- No need to migrate data upon server failure or maintenance. Simply use XstreamCORE to remap storage LUNs to the replacement server.
- XstreamCORE features the ATTO xCORE processor which accelerates all I/O in hardware driving total performance up to 1.2M 4K IOPS & 6.4GB/s throughput per controller.

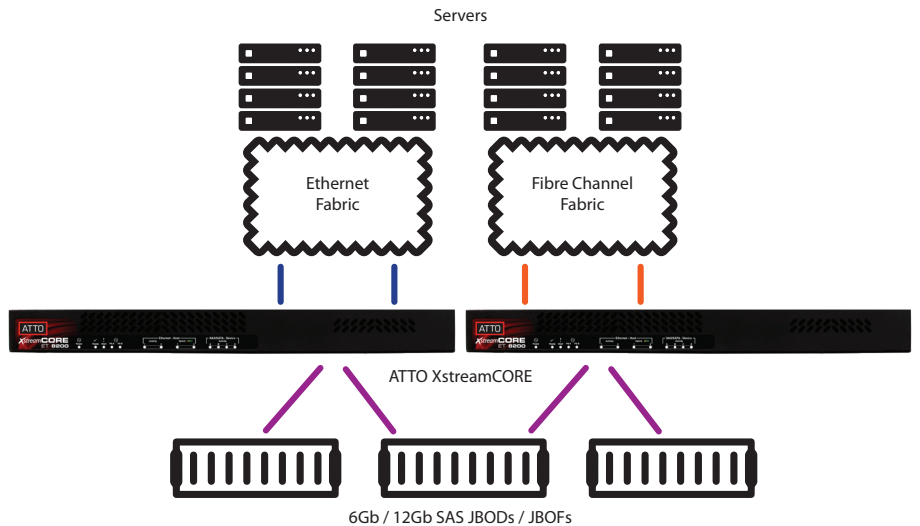
Benefits Cont'd:

- Typically, additional licensing fees are not required.
- Connects to shares of up to 960 SSDs, HDDs or tape drives to physical hosts/server nodes.
- Deterministic latency of sub-four microseconds.



XstreamCORE® FC 7550

ATTO Storage Controller					
Product	4K IOPS	Throughput	Host Ports	x4 SAS Ports	SKU
XstreamCORE FC 7500	735,000	3,200 MB/s	(2) - 16Gb Fibre Channel	4 (16 PHYs)	XCFC-7500-002
XstreamCORE FC 7550	1.2M	6,400 MB/s	(4) - 16Gb Fibre Channel	4 (16 PHYs)	XCFC-7550-004
XstreamCORE FC 7600	1.2M	6,400 MB/s	(2) - 32Gb Fibre Channel	4 (16 PHYs)	XCFC-7600-002
XstreamCORE ET 8200	1.1M	6,000 MB/s	(2) 40Gb Ethernet	4 (16PHYs)	XCET-8200-002



Extend the Life of Your Storage Arrays

ATTO XstreamCORE® connects SAS storage to a Fibre Channel or iSCSI SAN where it can be shared across multiple servers

Background:

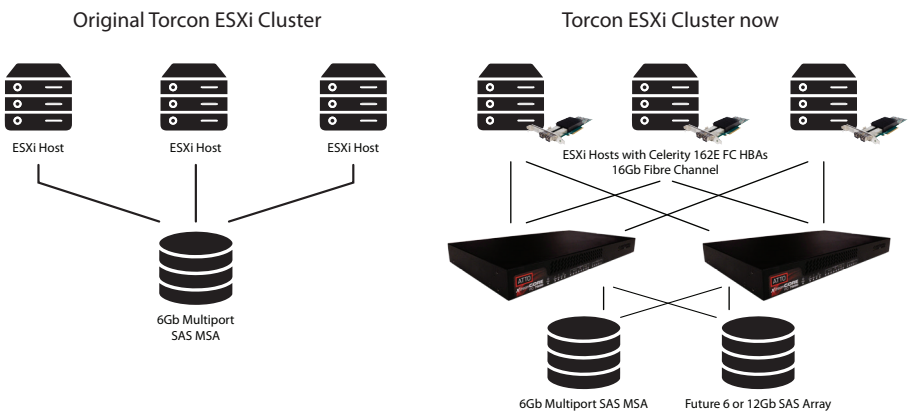
Many organizations use direct-attached SAS storage arrays. As infrastructures expand and virtualize, the limitations of direct attached storage silos become evident and SAN technology is preferred. However, conversion of arrays from SAS to Fibre Channel can be costly, time consuming and pose a risk for data loss. ATTO XstreamCORE is a storage controller designed to connect SAS/SATA RAID arrays, JBODs or JBOFs enclosures to Fibre Channel or Ethernet fabrics.

Problem:

Direct-attached SAS storage can result in underutilized or un-scalable data silos. Operations like vMotion® can take hours to complete moving data from one server/DAS pair to another through the Ethernet network while host resources are often constrained and stressed.

Solution:

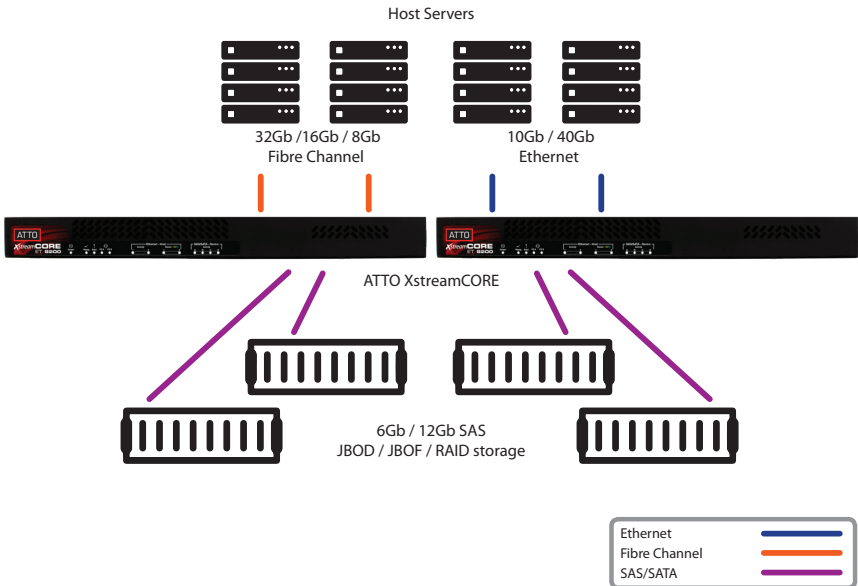
ATTO XstreamCORE® easily transforms existing direct-attached SAS storage into a pool of scalable, shared Fibre Channel or iSCSI storage that allows the addition of new capacity or hosts with no downtime. All attached hosts can have equal access and visibility to the storage on the fabric. This allows VMs to be migrated between hosts without the need to migrate data from the storage unit. This reduction typically allows for vMotions completing in less than a minute as opposed to potential hours.



Benefits:

- Increases lifespan and maximizes ROI of existing storage solutions by converting existing SAS devices to Fibre Channel or iSCSI.
- XstreamCORE presents SAS LUNs on a 16/32Gb Fibre Channel or a 10/40Gb Ethernet fabric so that all hosts have access to all shared storage.
- Improves VM live migration completion time from hours down to minutes with no data migration required.
- XstreamCORE features ATTO xCORE processor which accelerates all I/O in hardware driving total performance up to 1.2M 4K IOPS & 6.4GB/s throughput per controller.
- Installs quickly without data risk and is VMware vSphere® 6.x certified.

SAS Storage Presented on a SAN



“XstreamCORE FC 7550 has allowed (us) the flexibility to expand our storage without having to completely re-architect the current setup. It has provided a seamless migration path to newer all-flash vendor agnostic solutions and gave new life to hardware we would otherwise replace.”

Shawn Winters
Torcon director of technology

Maximize Your Mac!

Virtualize Mac Pro® hosts and Microservers with ESXi™ and ATTO ThunderLink® Thunderbolt™ adapters

Background:

VMware ESXi is the world's leading hypervisor, and vSAN™ is VMware's native hyper-convergence software. User benefits include flexibility, scalability and agility. The speed to provision and ease of management make for a compelling use case when it comes to hybrid cloud, remote workgroups and disaster recovery.

Problem:

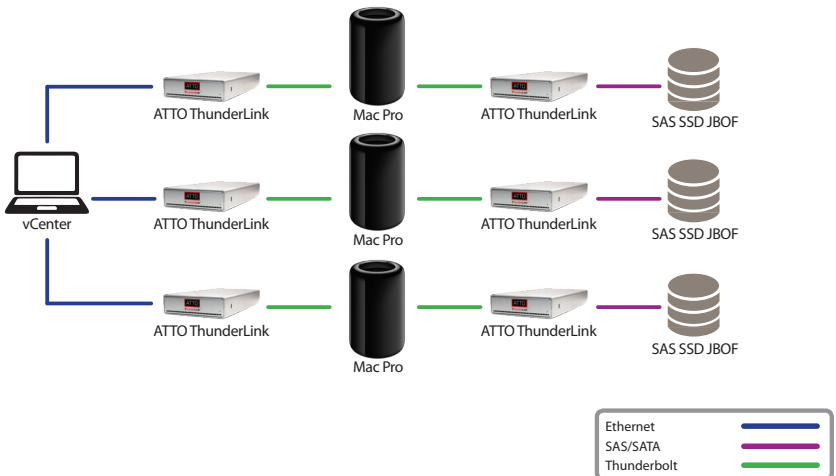
Some development and test platforms such as the Apple Mac Pro® and other microservers have ample performance but do not have the ability to connect to the block storage needed for expansion via internal PCIe slots. The only option for storage connectivity is to use the external Thunderbolt port as the I/O transport.

Solution:

ATTO ThunderLink® adapters offer the Thunderbolt-to-SAS, Ethernet, or Fibre Channel connectivity needed to expand storage. This allows features and functions such as vSAN to run efficiently. A specialized ESXi driver enables the ThunderLink to present external SAS JBOFs so that vSAN can provision and manage the storage.

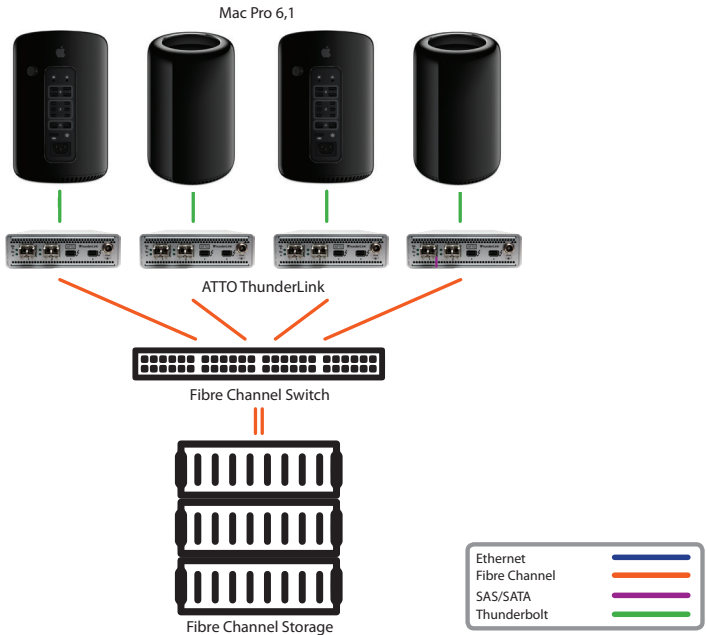
Benefits:

- ThunderLink adapters offer a purpose-built option to provide Thunderbolt connectivity to external block storage.
- ATTO provides VMware®-certified ESXi drivers. For a list of currently available certified drivers please consult the VMware Compatibility Guide.



Benefits Cont'd:

- Software or web development, testing and validation environments using Mac® platforms.
- Deployment and roll outs for OS updates and applications.
- Test bed for VMware updates, changes and additions.
- Suitable for commercial, education, and government ecologies.



“Thunderbolt-enabled VMware ESXi™ by ATTO with the ThunderLink product line allowed us to create a vSphere setup based on Mac to be able to provide virtualization services for our macOS® Servers. Mixing virtual hardware, snapshots and Veeam backup with the simplicity of macOS server is a game changer for the SMB market.”

Yoann Gini
Founder, Abelianni
Security and Systems Architect
Specializing in IT solutions for Apple

Fastest Time to Block Data Over Ethernet

iSCSI or iSER storage networks without a target server

Background:

Creating an iSCSI SAN allows multiple hosts to share a pool of storage over an Ethernet network. iSCSI block-based storage can be considerably faster than Network Attached Storage (NAS).

Problem:

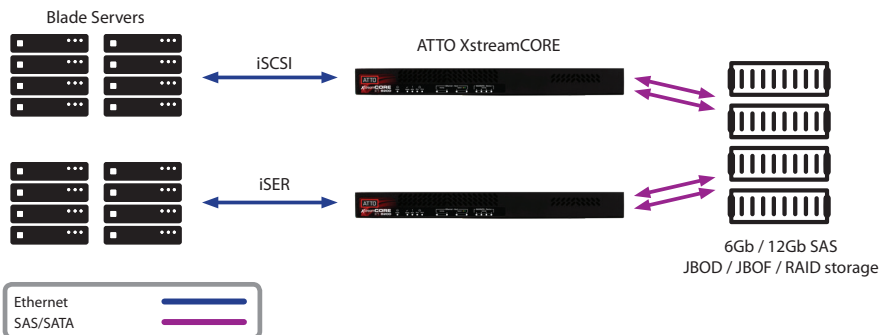
Server nodes using iSCSI to connect to SAS storage can be complex to setup and manage. It requires multiple hardware and software components and licenses. It also introduces considerable latency.

Solution:

ATTO XstreamCORE® presents SAS storage as iSCSI or iSER targets allowing servers to connect to highly efficient block storage. It provides shared connectivity for up to 64 individual iSCSI servers to up to 960 total SAS/SATA SSDs or HDDs housed in commodity JBODs. These drives can be totally isolated from some servers or shared across many.

Benefits:

- Eliminate the need for iSCSI server controller nodes.
- XstreamCORE features ATTO xCORE processor which accelerates all I/O in hardware ensuring a deterministic, consistent protocol conversion latency of less than four microseconds.
- Total performance of up to 1.2M 4K IOPS & 6.4GB/s throughput per controller.
- ATTO intelligent Bridging Architecture™ is designed with powerful hardware and advanced conversion algorithms to enable efficient, consistent protocol conversion adding under four microseconds of latency.
- SSDs/HDDs presented as iSCSI LUNs.



Break Free From Blade Server Storage Limitations

Scale out to massive amounts of inexpensive commodity storage

Background:

A blade server is a stripped-down server computer with a modular design optimized to minimize the use of physical space and energy and often dedicated to a single application. Blade servers allow more processing power in less rack space, simplifying cabling and reducing power consumption.

Problem:

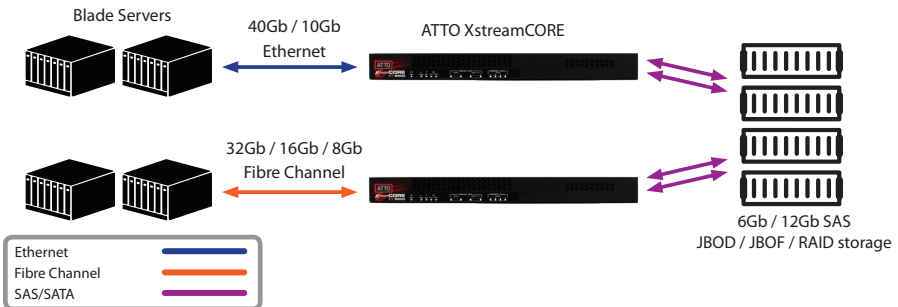
Although blade servers provide dense compute power in a small footprint there are very limited options to expand outside the box. Each blade typically comes with only one or two local SSD or HDD drives. If more storage is necessary either an additional blade needs to be deployed or a PCIe or mezzanine card is required to connect to external storage most often dedicated to that server.

Solution:

ATTO XstreamCORE® presents SAS storage on iSCSI or Fibre Channel networks allowing blade servers to connect to highly efficient block storage. It provides shared connectivity for up to 64 individual blades to up to 960 total SAS/SATA SSDs or HDDs housed in commodity JBODs/JBOFs. These drives can be totally isolated from other servers or shared across many using ATTO Host Group Mapping or CHAP and ACLs. The drives can also be easily remapped in case of a server failure or scheduled maintenance.

Benefits:

- Easily connect efficient shared block SSD storage to blade servers.
- Eliminate the need for proprietary, expensive storage and licensing fees by using commodity storage and Software Defined Storage solutions to manage data.
- XstreamCORE features ATTO xCORE processor which accelerates all I/O in hardware driving total performance up to 1.2M 4K IOPS & 6.4GB/s throughput per controller.



Backup Data Off Site Quickly and Privately

ATTO XstreamCORE® protects critical business data by remotely connecting to SAS tape

Background:

Remote backup is a key operation for businesses that have mission critical data which needs to be preserved in the event of disaster, system outages or corporate sabotage that damages or deletes local data copies. Backups can be located across a metropolitan area or across the world separated from the original data location.

Problem:

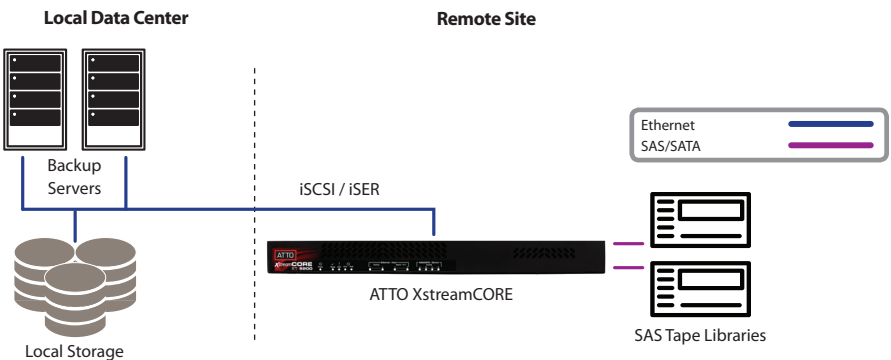
SAS tape libraries directly attached to backup servers can limit the feasibility of using these technologies for remote backups. Direct-attached tape devices can not achieve optimum performance behind a backup server and their physical location doesn't support the goal of backing up mission critical data for disaster recovery.

Solution:

ATTO XstreamCORE® ET 8200 connects SAS tape devices to a high-speed Ethernet network using 40GbE with either hardware accelerated iSCSI or iSCSI over RDMA (iSER).

Benefits:

- XstreamCORE features the ATTO xCORE processor that accelerates all I/O in hardware ensuring a deterministic, latency of less than two microseconds.
- Extremely low latency with simultaneous acceleration for TCP, IP and iSCSI performed in hardware.
- ATTO SpeedWrite™ keeps paths between hosts and XstreamCORE filled with data eliminating the slow down near the end of writes common to tape drives and, instead, significantly boosting tape write performance.
- Multiple backup servers can share a remote tape library. Patented ATTO Drive Map Director™ feature allows mapping servers to specific tape drives.



Uncover Hidden Storage Performance Problems

ATTO Latency Scout™ shines a light on your storage bottle necks

Background:

vConfigTool includes ATTO Latency Scout™ an exclusive diagnostic tool that enables IT administrators to quickly make adjustments to maximize performance. Real-time histograms allow administrators to monitor storage I/O latency and isolate bottlenecks.

Benefits:

- Customize utility settings to optimize performance.
- Integrates with VMware vCenter Server®.
- Provides advanced monitoring and troubleshooting.

Reduce the Complexity of Managing and Monitoring All of Your Storage Connectivity

ATTO vConfig Tool™ management plug-in tool for VMware vCenter®

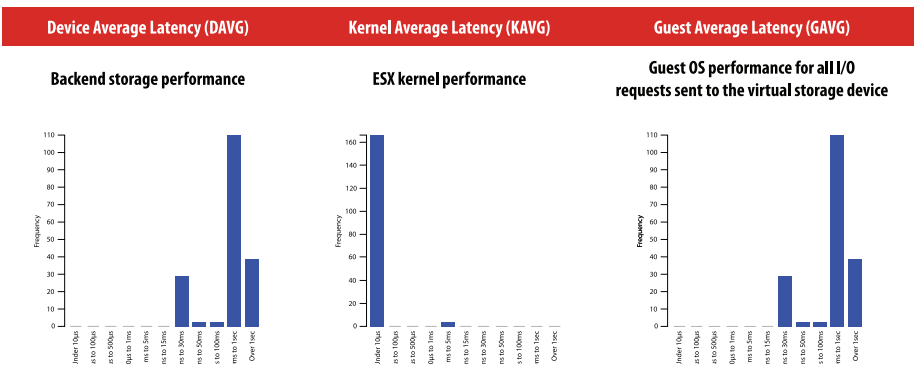
Background:

ATTO vConfigTool™ for VMware vCenter Server® is a software plug-in that integrates simplified, centralized management and monitoring of ATTO Celerity™ Fibre Channel HBAs and ATTO ExpressSAS® 12Gb HBAs into VMware virtual environments. With vConfigTool, IT administrators using vSphere® 5.5 and later web clients optimize configurations, improve system availability and reduce the cost of VMware host infrastructures.

Benefits:

- Manage multiple ATTO products from one convenient location.
- Customize the settings to maximize the performance of your storage connection.

Latency Scout measures three levels of latency:



A Latency Scout histogram display indicating backend storage performance challenges occurring within the datacenter.



The Power Behind the Storage

How to Buy

On the web:

www.atto.com/howtobuy

Main Number:

+1.716.691.1999

Channel Sales:

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International Sales:

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OEM Sales:

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Direct Sales:

www.atto.com

VARs and System Integrators can also purchase
ATTO products from the "How To Buy" page

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