ATTO Technology, Inc.

Corporate Overview

For over 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 creates 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, 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.

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 7550 16Gb Fibre Channel 4-port to 12Gb SAS 4 (x4) port storage controller
XstreamCORE 7600 32Gb 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 / 16 int ports PCIe 3.0 x8
ExpressSAS H1244 12Gb SAS/SATA 4 ext / 4 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 H608 6Gb SAS/SATA 0 ext / 8 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
ThunderLink SH 3128 Thunderbolt 3 - to - 12Gb SAS/SATA 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.
Free Your Servers from In-The-Box Storage
Reduce CapEx by adding storage without buying more compute

Background:
In today's datacenters, there are many options for virtualization and high-performance design, specifically hyper-converged infrastructure (HCI). These solution architectures rely on direct-attached storage (DAS) and robust multiport Ethernet infrastructures. These allow a non-shared file system such as VMware vSAN™ or other software HCI packages the ability to provide fast caching and storage while optimizing application performance. A full node, with all of its data, has enough copies and pieces existing on all other hosts so that a host or node failure will not overstress the environment. That is, provided non-shared file systems allow the HCI software to be light and not utilize more space than needed.

Problem:
A core characteristic of a hyper-converged infrastructure is the use of a non-shared file system such that replication occurs across the Ethernet network from node to node (host to host). Although this provides protection against multiple host/node failures it constrains the expansion of storage for a given node/host. If additional storage is required beyond what is available within the storage server an additional node is needed.

Solution:
ATTO has a line of Fibre Channel/SAS bridging products called XstreamCORE®, which can replicate a direct-attach environment while utilizing Fibre Channel (FC) as a transport protocol to allow for the addition of storage into an environment without having to add additional hosts or nodes.

ATTO XstreamCORE XC7550 and 7600 have a unique feature named Host Group Mapping (HGM). HGM allows FC initiators to bind directly with individual SAS drives so that the FC transport protocol is simply the mechanism for transporting the SCSI commands. By allowing this non-shared access to specific drives, or groups of drives, we are adding storage capacity to one or more nodes across a FC fabric without the need to add additional compute nodes.

<table>
<thead>
<tr>
<th>ATTO Storage Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
</tr>
<tr>
<td>XstreamCORE FC 7550</td>
</tr>
<tr>
<td>XstreamCORE FC 7600</td>
</tr>
</tbody>
</table>
Benefits:

- Plug and play appliance that installs in less than 5 minutes
- Works in multiple HCI software packages like vSAN and vFRC
- Allows storage and compute to scale independently of each other and disaggregates storage.
- Typically, additional licensing fees are not required.
- Only buy storage when needed, reducing CAPEX
- Low administrative costs reduce OPEX
- Creates a storage pool that maintains a direct-attached relationship between host and drives where drives can be assigned based on namespace to a specific server
- Reliable and robust fibre connection allows the storage pool to be remotely located
- Attached SAS LUNs are mapped and presented as Fibre Channel LUNs on a Fibre Channel fabric.
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.
- 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.

> “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 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 current Apple Mac Pro® or unexpandable 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, Abelionni
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 select 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 which 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.

Local Data Center | Remote Site
---|---
Backup Servers | \[Diagram showing Local Data Center and Remote Site connected through ATTO XstreamCORE 8200 with iSCSI / iSER and Ethernet connections to SAS/SATA and SAS Tape Libraries.\]
Reduce the Complexity of Managing and Monitoring All of Your Storage Connectivity

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

Background:
ATTO vConfig Tool™ 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 vConfig Tool, 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.

Uncover Hidden Storage Performance Problems

ATTO Latency Scout™ shines a light on your storage bottlenecks

Background:
vConfig Tool 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.

Latency Scout measures three levels of latency:

<table>
<thead>
<tr>
<th>Device Average Latency (DAVG)</th>
<th>Kernel Average Latency (KAVG)</th>
<th>Guest Average Latency (GAVG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backend storage performance</td>
<td>ESX kernel performance</td>
<td>Guest OS performance for all I/O requests sent to the virtual storage device</td>
</tr>
</tbody>
</table>

A Latency Scout histogram display indicating backend storage performance challenges occurring within the datacenter.
Technology Leadership
Technology at its fastest

ATTO Advanced Data Streaming (ADS™) Technology
ATTO ADS™ is proprietary latency management technology built into all ATTO network and storage connectivity solutions. ADS works transparently to smooth data transfers through controlled acceleration. Data moves more efficiently giving ATTO users an unmistakable edge in total system performance.

From high I/O transactions to large bandwidth real-time streaming, ADS reduces interruptions and maximizes the amount of data processed per CPU cycle.

Featured Products:
• ATTO Celerity™ Fibre Channel host bus adapters (HBAs)
• ATTO ExpressSAS® SAS/SATA HBAs
• ATTO FastFrame™ Ethernet adapters
• ATTO ThunderLink® Thunderbolt™ adapters

ATTO MultiPath Direct:
This specialized driver recognizes and takes advantage of all paths within a Fibre Channel storage network. When connected to enterprise-class storage systems, data is moved across multiple paths ensuring it is available for anyone who needs it, when they need it.

ATTO MultiPath Director enables failover and load balancing capabilities for high-availability storage. Load balancing across multiple paths increases overall system performance. It also can mix Windows®, Mac® and Linux® workstations in a heterogeneous environment.

Featured Products:
• ATTO Celerity™ Fibre Channel host bus adapters (HBAs)
• ATTO ThunderLink® Thunderbolt™ adapters

ATTO xCORE Hardware Acceleration Processor / eCORE Offload Processor
xCORE is hardware-based data acceleration technology that manages the data path and assures that all reads and writes are processed software-free with minimal overhead. Latency is limited to a consistent two to four microseconds.

eCORE provides software-based virtualization and management services. ATTO eCORE supplements xCORE to maintain deterministic latency by enabling software functionality only where and when needed.
Working together, xCORE and eCORE unleash the full potential of software defined storage, making it possible to add common, open storage services and industry standard API integration and maximize the gains of all-flash storage architectures.

**Featured Products:**
- ATTO XstreamCORE® SAN storage controller

**ATTO PowerCenter Pro™**
A software interface built into ATTO 12 Gb/s ExpressSAS® SAS/SATA HBAs and ATTO ThunderLink® Thunderbolt™ adapters. ATTO PowerCenter Pro adds RAID functionality, protection and performance without the need or cost of additional hardware RAID components.

Supports RAID 0, 1, 1e or 10 via integrated software and features a simple, fully scriptable “set it and forget it” CLI and EFI interface for RAID group creation, monitoring and management. Provides full boot support as well as support for hot spares.

Easy-to-use, powerful, yet lightweight, ATTO PowerCenter Pro software provides the protection, capacity expansion and performance improvements needed for today’s SSD storage platforms.

**Featured Products:**
- ATTO ExpressSAS® SAS/SATA host bus adapter

**ATTO SpeedWrite™**
Exclusive performance-enhancing capability that significantly boosts tape performance by efficiently managing read and write commands between host and tape, resulting in continuous operation, shorter back-up times and higher overall throughput.

SpeedWrite is a mode of operation in which SCSI Write commands are processed using ‘Write-Behind’ and ‘Deferred Error’ handling to return completion status back to the host prior to actual command completion.

**Featured Products:**
- ATTO XstreamCORE® storage controller
How to Buy

On the web:
www.atto.com/howtobuy
+1.716.691.1999

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

Be sure to follow us on social media

www.atto.com