

## Benefits of ATTO XstreamCORE® connected SAN Based Storage

- Increase up-time. SAN storage is independent of servers so storage is not required to be taken offline during maintenance or server failure
- Scale storage without disruption: Administrators can add storage capacity to a storage area network (SAN) without server reboots and servers can be completely bypassed from storage.
- Greater ROI of storage solutions: SAN Storage provides load balancing and increases the backbone as a whole.
- Separate network dedicated to storage: SAN Storage is not affected by Ethernet traffic or local disk bottlenecks
- Longer distance storage connectivity: Extends the distance limits of direct attached SAS/SATA storage up to 200 kilometers
- Increased utilization of storage: SAN storage eliminates storage silos with partially utilized disks which waste power and generate additional heat
- Capitalize on the benefits of Fibre Channel SAN: higher throughput, lower latency and greater security because it's a purpose-built technology that is lossless and congestion-free

## SAN vs Direct-Attached Storage

### Why SAN is Better in a Virtualized Environment

The visibility of all storage to all hosts in a multi-host virtualized environment, combined with lower implementation costs, makes storage area networks a smart option for businesses of all sizes.

The debate over why a storage area network (SAN) is better than Serial Attached Storage (SAS) direct-attached storage in a virtualized environment has been going strong the past few years. Primarily, SAN has been used in the large enterprise market, while DAS has been used by small and medium-sized businesses (SMBs). There's been an impression that the perceived high cost of creating a SAN, coupled with the need for "specialized" administrators and equipment and high initial costs for setup, would price a Fibre Channel SAN out of the reach of SMBs. Instead, they opted for a "one host at a time" growth model, in which a company would install one virtual host, migrate physical machines to virtual machines until the host maximized its potential, and later purchase a second host with internal direct attached storage or external SAS connected RAID arrays, continuing the cycle as needed. Most SMBs don't know the cost of implementing a Fibre Channel SAN has dropped now that arrays can use SAS or SATA drives, and that the administration required for smaller environments has been vastly overstated.

There are significant differences between a direct-attached storage environment and a SAN. In simplest terms, when using direct attached storage, the hosts don't have direct connectivity to all the storage, causing live virtual machine (VM) migration to occur over the Ethernet network. Migration over the Ethernet network can cause additional congestion, host server resources strains and unneeded delays in the migration itself. Additionally, it prevents users from having equal access to storage resources and can create storage silos where storage is inefficiently used.

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## About ATTO

For over 30 years, ATTO Technology, has been a global leader across the IT and media & entertainment markets, specializing in network and storage connectivity and infrastructure solutions for the most data-intensive computing environments. ATTO works with partners to deliver end-to-end solutions to better store, manage and deliver data.

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## Direct-Attached Storage

In direct-attached storage (DAS), each host can only access the block-level storage directly attached to it.

Let's assume that all of these external RAID arrays (see Figure 1) are connected to a SAS host bus adapter (HBA). If Host 2 were to fail, the only way to recover its functionality would be to use a backup and restore to another host, as the array connected to Host 2 would be inaccessible. The array could possibly be attached to another host, but the likelihood that the server would have resources to properly run the VMs is very low.

VMware® vMotion™ can be used to migrate a VM between hosts to better balance physical compute resources for improved performance. vMotion uses the Ethernet network to transfer a VM to another host. If that host cannot communicate with the physical storage datastore containing the VM, that VM must then be moved to a datastore with which the new host can communicate. Due to the nature of Ethernet, this process can take several hours and is very ineffective, resulting in substantial downtime and network congestion.

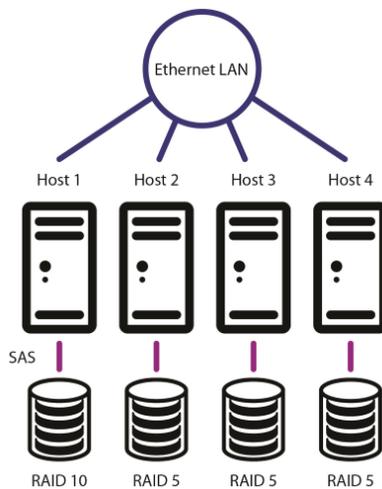


Figure 1—A typical direct attached storage installation using Ethernet for communication between hosts

## Remove the need to Migrate Data

In a SAN model, the biggest benefit is clear from the start: All hosts can connect to all storage available on the SAN. If one host fails in a SAN, the other virtual machines can be assigned to new hosts. This means that vMotion does not need to migrate the data of the VM, but only the system state and active commands because each host has visibility of all the storage. Time for migration in this scenario, as well as in a load-balancing environment, is measured in minutes instead of hours. Downtime is greatly reduced while options for load balancing become viable.

Converting SAS RAID arrays to a Fibre Channel SAN has never been easier to accomplish at a cost-effective price. A Fibre Channel SAN provides greater redundancy in virtualized environments by allowing rapid re-deployment of VMs in the event of a host or storage failure. In non-virtualized environments, there is a faster pool of storage for performance-demanding applications. The benefits of implementing Fibre Channel greatly outweigh any concerns over the feasibility of its implementation and related costs compared to other storage methods.

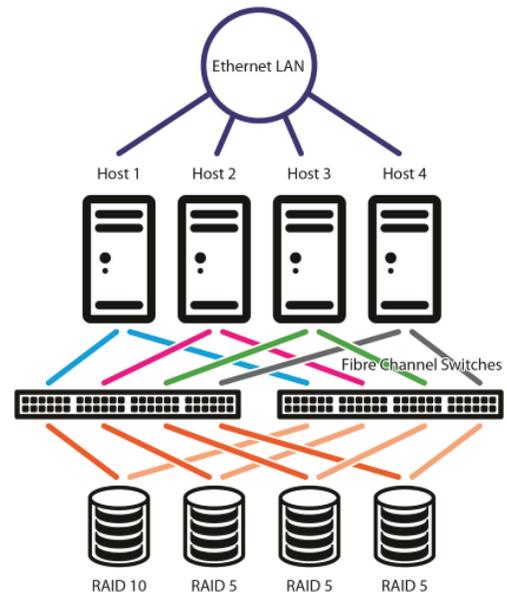


Figure 2—A storage area network using Fibre Channel connectivity for communication between hosts