



Data Center Virtualization and ATTO Products

End to End Solutions Designed to Work Together

Overview

Virtualization technologies are rapidly becoming the foundation of modern data centers as IT managers seek dramatic improvements in resource and operational efficiencies as well as responsiveness to business needs. Three key technologies are significant: (i) Server Virtualization, (ii) Fabric Virtualization and (iii) Storage Virtualization. This paper describes how ATTO products serve as key building blocks for each of these virtualization solutions and offers an end-to-end approach that incorporates all three solutions.

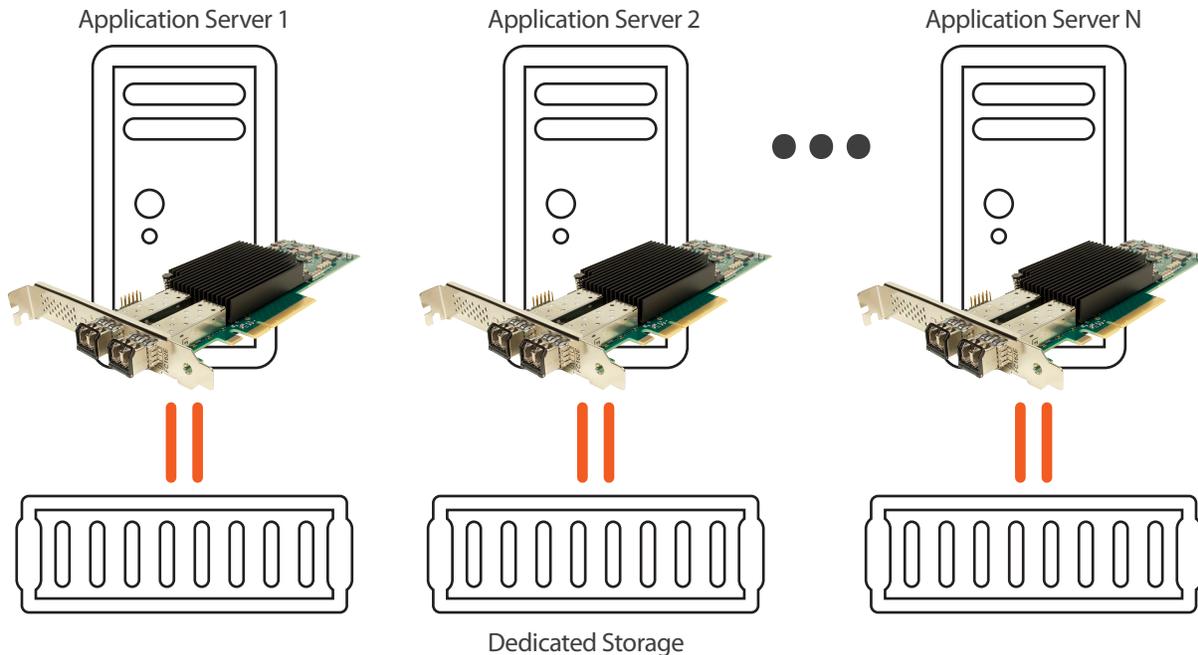
Challenge

The advent of open systems computing has promoted a rapid expansion in the number of deployed servers, often with each dedicated to a single application or business function. At the same time, IT managers have faced an explosion of online data with a corresponding proliferation of storage devices. The result is an infrastructure that is nearly unmanageable. Many of the servers and storage devices are underutilized; floor space, power, and cooling concerns have become real limitations to data center expansion; and the sheer number of deployed devices has become almost impossible to track.

Challenges include:

- Complexity of managing a growing infrastructure
- Underutilized server and storage devices
- Power and cooling constraints
- Limited IT budgets and resources – need to do more with less
- Access limitation to data and applications

Typical Data Center Without Virtualization



Solution

For 25 years ATTO has been a key supplier of storage and network connectivity solutions. With a broad deployment of Fibre Channel enabled host, infrastructure and storage products, ATTO is well positioned to power the data center's virtualized infrastructure. ATTO Fibre Channel technology contains key building blocks that enable customers to fully realize the benefits of server virtualization deployed in a SAN environment, and extends the value of Fabric virtualization. With end to end solutions, ATTO offers important enabling technology for partners building virtualized data centers.

Key Benefits

- Cost effective deployment of new applications
- Faster, flexible provisioning for new applications, dynamic resizing of servers for growing applications, and development and test platforms.
- Easier workload balancing, incident resumption and disaster recovery, as "virtual machines" are more readily portable to alternate hardware resources and offer tools to automate these operations.
- Improved scalability for large or rapidly growing server and virtual server environments
- Reduced management from the network edge to the center of the SAN
- Support for heterogeneous SAN configurations without reduced functionality for server connectivity

Data Center Virtualization

To keep pace with growing business demands, data centers are transitioning to highly virtualized data center environments. This approach enables organizations to consolidate and simplify their IT resources, resulting in increased business agility and lower capital and operating expenses. But virtualization is not without its challenges. Data centers must keep up with the explosive data growth and dynamic changes driven by virtualized workloads. Having a suite of products that are designed specifically to work together is key to realizing the full benefits of these virtualized architectures.

Server Virtualization

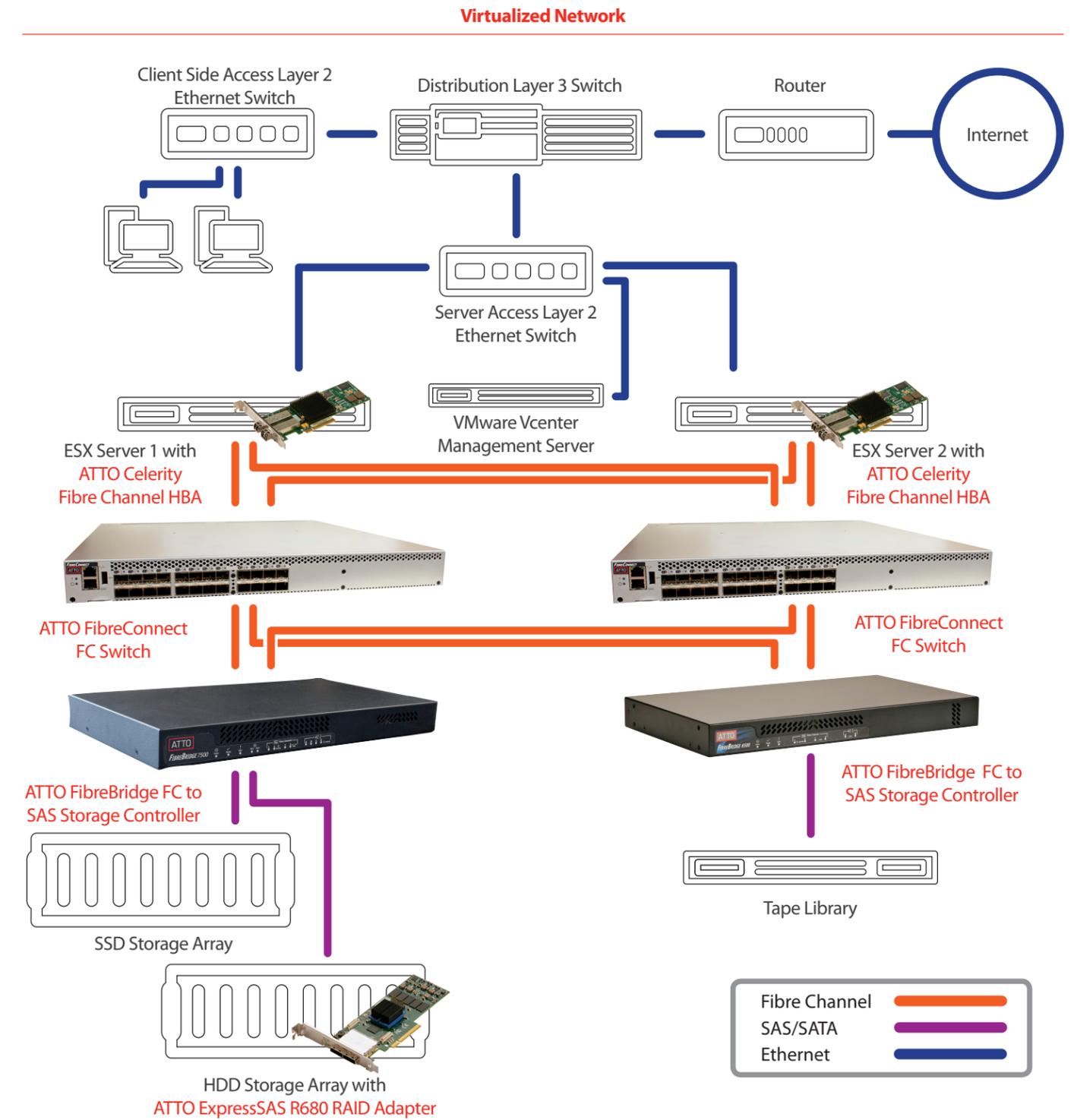
Server virtualization enables the deployment of multiple full-featured application environments called "virtual machines" (VM) across one or a few hardware platforms yielding a dramatic increase in server hardware utilization. Hardware resource scheduling and management is run behind the scenes by a "hypervisor," a user-invisible operating system. Users report going from 15-20% up to 75-80% usage, with a proportional increase in server return on investment and reduction in management and maintenance overhead. While environments certainly differ, virtualization provides a wide realm of benefits including greater agility and efficiency, cost reduction and even self-service application provisioning.

ATTO host bus adapters play an important role in data center virtualization. In order to take full advantage of the benefits, HBAs must support the ability to virtualize Fibre Channel ports, provide guaranteed response time, transparently support connection into virtual fabrics as well as enable co-hosted applications to be configured and operating within separate virtual fabrics. The latest generation of ATTO high performance Gen5 16Gb Fibre Channel HBAs bring virtual fabric integration to the next level by enabling a single adapter to connect into multiple virtual fabrics. N-Port ID Virtualization (NPIV), a key feature of ATTO's HBA technology, enables each Fibre Channel HBA to define multiple "virtual ports," identified by Worldwide Ports Names (WWPN). These virtual ports can then be assigned each virtual machine. NPIV lets administrators manage storage on behalf of the virtual machine in much the same way they manage storage attached to physical machines, leveraging familiar best practices and existing SAN management tools.

As IT professionals implement virtualization, administrators can minimize bottlenecks by installing Fibre Channel ecosystems that support required performance levels, growth plans and economic challenges. To address these challenges, ATTO products deliver scalable, high-performance advantages that correlate to a reduction in the number of physical server resources required to meet the demands of virtualized application workloads.

Fabric Virtualization

The simple SAN has often grown into multiple complex SANs spread across multiple sites. Instead of building one large Fabric or multiple disparate Fabrics, Fibre Channel has standardized techniques to break up large Fabrics and selectively put them back together. Virtual Fabrics provide the ability to segment a SAN into many logical SANs, each with its own set of Fabric services. This allows SAN infrastructures to be more efficiently utilized, while the costs are spread over more applications or users.



* Solution available in Gen5 16Gb or 8Gb Fibre Channel.



Fabric Virtualization (continued)

ATTO FibreConnect switches provide a critical building block for today's highly virtualized data center environments and offer low-cost access to industry-leading Storage Area Network (SAN) technology while providing non-stop operation with consistent delivery of more than five-nines availability to evolving storage environments. They support multi-tenancy in virtual environments through Virtual Fabrics, Quality of Service (QoS), and Fabric-based zoning features. FibreConnect switches meet the demands of data center environments by delivering market-leading Gen 5 Fibre Channel technology with additional capabilities that support highly virtualized environments and fabric virtualization. Designed to maximize application uptime and performance while reducing overall operational expenses, these high-performance, mid-range switches provide flexible and scalable configurability with 8, 12 and 24 port options and support for 2, 4, 8, or 16 Gbps speeds in an efficiently designed 1U package. A simplified deployment process and a point-and-click user interface make the ATTO FibreConnect Switch both powerful and easy to use.

Storage Virtualization

Storage systems may use virtualization concepts as a tool to enable better functionality and more advanced features. Storage virtualization is the pooling of physical storage from multiple network storage devices into what appears to be a single storage device that is managed from a central console. It helps the storage administrator perform the tasks in less time by disguising the actual complexity of a storage area network (SAN).

One change brought about by virtualization has been the advent of flexible, software-defined system architectures that avoid vendor lock-in. Software Defined Storage extends the virtualization concept by enabling a modular approach that fully separates software from hardware. The main benefit here is that IT managers now have the freedom to configure cost-effective, scalable solutions incorporating off-the-shelf storage based on performance requirements for a particular application.

ATTO FibreBridge Storage Controllers provide a high performance, modular platform where SSD, HDD or hybrid SSD/HDD storage pools can be utilized with VMware, Hyper-V or Citrix applications. They provide 12Gb and 6Gb SAS/SATA devices with up to 16Gb Fibre Channel SAN connectivity and replace servers used primarily for storage. Features include a hardware-based acceleration engine that prioritizes data transfers to provide up to a 200x latency reduction over previous generation Storage Controller products. Applications benefitting from this include virtual machine migration, where quick, efficient data transfer is required to avoid downtime, and the Stretch Cluster installations used for data center load balancing and data recovery. For these to be effective, latency needs to be limited to 5 ms, and ATTO storage controllers provide the necessary low-latency connection at distances up to 100 kilometers.

Another embedded feature found in ATTO Storage Controllers is Virtual Device Manager, which allows virtual devices within the bridge to accomplish individual tasks without performance degradation. This also enables ATTO's Virtual Drive Response (VDR), a technology that reduces the number of failed or incomplete backups by giving devices the capability to queue commands on behalf of busy or unresponsive tape storage. This is especially important when backing up data from a large number of virtual machines. The FibreBridge also features ATTO's patented Drive Map Director™, which drastically reduces maintenance, overhead and cost when using disk based storage by providing a logical, static topology, and Advanced Data Streaming (ADS™), a technology that efficiently accommodates a large number of virtual machines when accessing the same storage pool.

Conclusion

While virtualization technologies offer the benefit of consolidating data center hardware resources for reduced TCO, it's also the case that hardware has a critical impact on the performance of software-defined elements. By providing managed, ultra-low latency and best-in-industry aggregate bandwidth, ATTO Technology's storage and network connectivity solutions enable more virtual machines to run on existing physical hardware and give them faster access to data. ATTO's portfolio of high-performance products are designed to work together to optimize data movement throughout your entire infrastructure. When incorporated at each connection point, they ensure maximum productivity and resource efficiency in data center environments that depend on virtualization.

ATTO Products for Virtualized Data Centers

- Celerity 16Gb/s and 8Gb/s Fibre Channel Host Bus Adapters
- FibreConnect 16Gb/s and 8Gb/s Fibre Channel Switches
- FibreBridge 16Gb and 8Gb Fibre Channel to 12Gb and 6Gb SAS/SATA Storage Controllers