SOLUTION SHOWCASE

EMC VNX and Connectrix: Delivering Transactional NAS for Enterprise Workloads

Date: February 2016 **Author:** Scott Sinclair, Analyst

Abstract: Over the past few years, new IT infrastructure options for enterprise transactional applications have arisen thanks to numerous improvements in storage processing power and the robustness of networking protocols. SAN protocols are no longer the only option for IT storage administrations. VMware, Hyper-V, SQL, and even SAP and Oracle deployments have taken advantage of the benefits offered by NFS, and more recently SMB 3, network-attached storage (NAS) protocols. However, support for NAS protocols alone is not enough. EMC and Brocade understand that supporting enterprise applications requires delivering enterprise storage and networking capabilities to maximize resiliency and performance.

Overview

As businesses increase their reliance on data, the demands placed on the infrastructure that serves that data also increase. In response, IT organizations often seek greater agility to adapt their infrastructure to the evolving needs of the business. Over the past decade, this desire for greater agility was answered in part by the dramatic rise in server virtualization adoption, namely VMware. While server virtualization offered workloads freedom from their hardware constraints, many existing infrastructure elements, such as storage and storage networking, were not originally designed to support this newfound flexibility.

As server virtualization deployments grew, the complexities of managing SAN storage resources led some organizations to investigate alternatives, such as the NAS protocols, NFS, and now SMB 3, thanks to some recent enhancements. Originally designed for file sharing, NAS protocols simplify the process of sharing the same digital content across multiple hosts. This design difference can not only simplify storage deployment and provisioning for enterprise virtualization environments, such as VMware or Hyper-V, but also provide similar benefits to database workloads, such as SQL, SAP, or Oracle.

It is critical to note, however, that protocol support is only one piece of the solution. Many NAS systems are not designed to offer the low latency performance or the resiliency required for transactional workloads. EMC, a leader in enterprise storage, has designed its VNX storage arrays for transactional applications and offers a wide variety of protocol support including SAN (Fibre Channel (FC) and iSCSI) and NAS (NFS and SMB 3) protocols. Additionally, through its partnership with Brocade, EMC couples its VNX systems with Connectrix B-series FC and IP storage network switches to provide a validated solution designed to serve the needs of transactional workloads regardless of the protocol.

Demand for Simplicity Is Driving Interest in NAS Protocols in Transactional Workloads

During a recent research study investigating IT spending intentions, ESG polled 601 IT professionals. When asked to identify their top IT priorities for the coming year, respondents cited "increasing the use of server virtualization" enough times to place it in the list of the top five most-cited overall IT priorities for 2015.[1] In a later ESG study that focused specifically on storage industry trends, 373 IT decision makers were asked to discuss the challenges in their existing storage infrastructure.[2] While the rapid rate of data growth was one of the most often cited challenges, one in five respondents identified the need to support growing virtual server environments. Additionally, when polled on IT initiatives that would impact storage spending over the next 12 months, supporting server virtualization was one of the top three most-cited responses, identified by 24% of respondents. The net takeaway is that server virtualization continues to be a critical element of the modern IT data center, and growth in the number of virtual machines is a challenge for storage ecosystems with increasing operations and management costs.

To ease the challenge of keeping pace with growing virtualization environments, some IT organizations have turned to NAS protocols. Several architectural benefits of NAS can help ease the deployment and configuration burden experienced when extending virtualization environments as well as other transactional workloads such as databases, including:

- Simplified storage provisioning: SAN protocols are designed to isolate a specific set of storage to a specific host server system. New capacity must be configured and assigned to each appropriate host system. In addition, the interconnect network must be configured to enable communication between the storage array and each application host. Any misconfiguration results in the capacity remaining unavailable. These configuration steps can become increasingly complex when different layers of infrastructure are separately owned and managed. With NAS protocols, configuration steps, such as LUN masking or switch zoning, are not necessary. NAS is designed to automatically handle the locking between multiple hosts that allows data to be shared.

- Simplified operations for growing virtualization environments: In virtualization environments, a virtual machine may migrate from one physical system to another. As a result, the added complexity of provisioning SAN storage is exacerbated. Storage systems need to be configured to see any hosts that may be allowed access to the data and the SAN network must be zoned appropriately. With NAS protocols, these steps are not necessary, making storage infrastructure configuration easier.

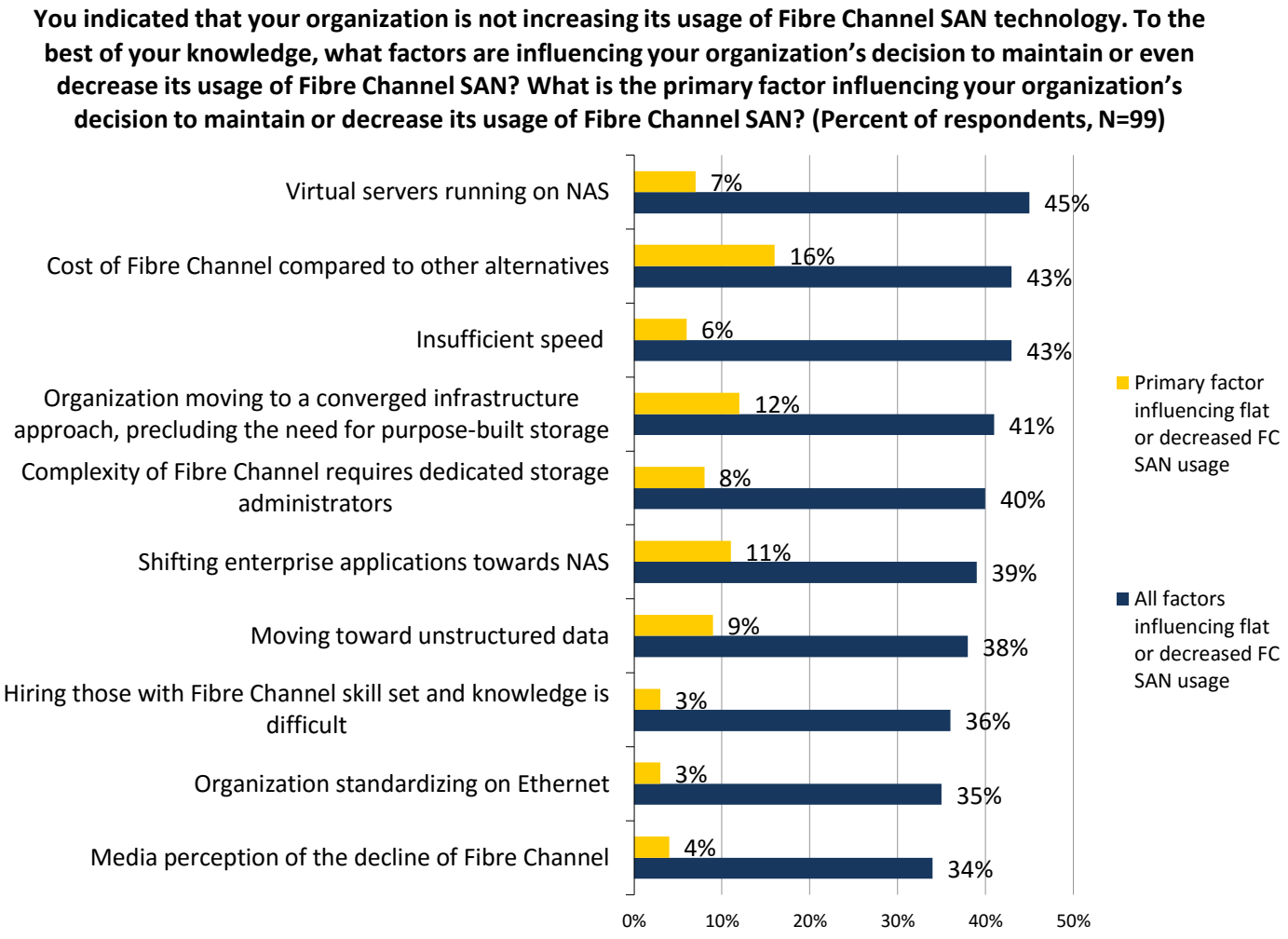
- Network simplification and standardization with Ethernet: Infrastructure standardization can help to reduce capital and operational expenditures by helping to consolidate skills and reduce the amount of time required to train on new equipment. Additionally, by minimizing the amount of specialization, personnel can be deployed in a more flexible manner to support a variety of different IT initiatives. The net result allows IT organizations to more effectively leverage in-house talent and ultimately helps keep operational costs under control. Infrastructure simplification helps to reduce operating expenditures by leveraging automated networking tasks like network health, network scaling, virtual machine motioning, and performance monitoring. The Connectrix VDX-6740B uses VCS Ethernet fabric technology to greatly automate these previously complicated networking tasks.

Signs of the advantages of NAS protocols for transactional workloads are being seen in the industry. During ESG's research study into storage industry trends, storage experts were also asked to identify whether the use of FC SAN was increasing, maintaining, or decreasing. Of the respondents, 48% indicated that their FC environments were either maintaining their current capacity footprint (42%) or decreasing it (6%). When polled on all drivers for either maintaining or decreasing, as

[1] Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.
[2] Source: ESG Research Report, *2015 Data Storage Market Trends*, October 2015. All ESG research references and charts in this solution showcase have been taken from this research report unless otherwise noted.

opposed to increasing, their FC environment, the most-cited factor identified was virtualization servers running on NAS protocols (45%). Additionally, 39% of respondents identified the fact that they were shifting enterprise applications towards NAS protocols as a factor. Finally, over one-third of respondents also indicated that their organizations were standardizing on Ethernet for their networking infrastructure. This standardization is expected to apply to both network communication and storage interconnect purposes.

Figure 1. Top Ten Factors Influencing Organizations' Decision to Maintain or Decrease Usage of Fibre Channel SAN



Source: Enterprise Strategy Group, 2016

Until recently, NFS was the NAS protocol of choice for virtualization as well as other enterprise application deployments. With Microsoft's enhancements in its SMB 3 protocol, however, that has changed. With increased security, flexibility, and robustness, Microsoft now supports both Hyper-V and SQL environments over the SMB protocol.

Despite the research data indicating a shift away from traditional SAN protocols, it is important to highlight that SAN protocols continue to be the predominant protocol of choice for transactional workloads. There are likely many reasons behind this current state of affairs. One of those, however, may be that many NAS solutions are architected for unstructured content or file-based workloads, rather than transactional workloads. These architectures tend to emphasize capacity scaling over performance and may not provide the high levels of resiliency required by tier-1, or even tier-2, applications. In addition, traditional FC SAN storage administrators are used to FC SAN fabric technology that is purpose-built for storage. With the EMC Connectrix VDX-6740B Ethernet network, many of the same fabric storage features that

SAN administrators leverage in the FC SAN environments are available in Ethernet-based NAS environments. EMC's VNX unified storage arrays support both SAN and NAS protocols for flexibility while providing an architecture and feature set designed for transactional workloads. Through its partnership with Brocade, EMC is able to extend the benefits of NAS with its Connectrix IP storage networking products.

EMC VNX and Connectrix Deliver NAS for Transactional Workloads

Designed for transactional workloads, EMC's VNX offers a number of capabilities designed to serve a wide variety of transitional workloads beyond protocol flexibility, including:

- **Performance to meet low-latency demands:** VNX delivers hybrid storage leveraging solid-state as well as spinning media, offering sub 10 millisecond (ms) response times. Unlike some other NAS-based solutions, VNX is also designed to handle small block random input and output (I/O) requests efficiently. VNX also offers a variety of solid-state deployment options ranging from an option where only 3% of total capacity is solid-state storage to more performance-optimized options where the percentage of solid-state storage increases to 10% or 25%. VNX also offers an online mobility feature that offers data load balancing and migration between other VNX arrays and VMAX to help IT organizations better distribute and optimize storage workloads as IT environments evolve.

VNX Feature Summary

- Five 9s availability
- Sub 10ms response time
- Deduplication
- Thin provisioning
- Space reclamation
- Replication
- Load balancing and data mobility
- Controller-based encryption
- File-based retention

- **A broad range of storage efficiency capabilities**: VNX offers block deduplication, which, when coupled with solid-state storage, can help ensure that a greater level of capacity can be served from the higher performing tier. VNX also offers thin provisioning along with space reclamation to help further improve efficiency.

- **Enterprise-level resiliency**: VNX offers five 9s availability coupled with a spectrum of data resiliency features including both asynchronous and synchronous replication. EMC has recently even taken these technologies a step further by offering synchronous replication at the virtual data mover (VDM) level to provide greater resiliency and flexibility for virtualization environments. VNX also offers controller-based encryption along with file-based retention for compliance environments.

With the Connectrix IP storage portfolio, EMC extends its VNX storage with a variety of networking features designed to allow organizations to keep pace with growing server virtualization and enterprise application environments. For example, from a performance perspective, the Connectrix VDX-6740B offers low latency (850 ns) to meet the demands of Transactional NAS workloads as well as deep port buffers that double the on-chip buffering of competitive products. The Connectrix VDX-6740B also offers plug and play inter-switch links (ISLs) designed to simplify core-edge architectures, and supports tight integration with vRealize Operations and vRealize LogInsight to help better manage performance and events. Connectrix also offers integrated and validated designs for virtualization environments that are validated to work with VMware's NSX networking virtualization technology, improving manageability as workload demands change. Finally, both VNX and Connectrix are rigorously tested and validated by EMC's E-Lab and are supported by EMC with three years of service/support standard to ensure greater reliability.

The Bigger Truth

With today's rapid pace of IT, even small manual steps or complexities can add up and become unwieldy. The days of having weeks to provision, allocate, and zone new storage are all but a distant memory. Technologies, such as NAS protocols, that may have historically been perceived as slow are now bolstered by higher performing hardware as well as enhancements that offer greater robustness. The result allows more IT organizations to take advantage of the simplicity

and the operational advantages NAS provides for their transactional application environments. Enterprise applications, however, still require the performance and resiliency of mission-critical storage architectures, and all NAS options are not created equal. EMC and Brocade have joined forces to offer a transactional storage ecosystem providing the agility and simplicity of NAS with the resiliency and performance enterprise applications such as VMware, Hyper-V, SQL, SAP, and even Oracle demand.