ESG SHOWCASE

Broadcom: A Key to Data Center Consolidation Success

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ABSTRACT: The storage network plays a crucial, but often overlooked, role in achieving infrastructure consolidation goals. With costs always toward the forefront of IT decision making, Broadcom delivers integrated intelligence and automation that can maximize the value of data center infrastructure and help minimize IT risk, cost, and complexity.

Overview

Cost plays a dominant role in IT decisions and priorities—all in the context of the need to optimize, simplify, and consolidate the infrastructure as data keeps growing and business demands keep increasing. Adoption of flash storage and NVMe technology has helped deliver much of the performance required to consolidate a broad and often increasing application portfolio on less infrastructure, helping to reduce the overall cost and complexity of IT.

Often, however, the missing piece in these consolidation strategies is identifying the right storage network requirements and technologies. It's possible to successfully ensure sufficient bandwidth while neglecting other aspects of traffic—such as buffer credits and oversubscription—which can lead to congestion. Bandwidth in itself is not a guarantee of consistent, reliable, and high-performance storage transport, which applications rely on. Regardless of available bandwidth, momentary or sustained device congestion or oversubscription can have devastating impact on storage performance without exhausting network bandwidth.

Underestimating the importance of the network adds risk. It also limits the benefits of consolidation projects and can burden or even overwhelm IT teams; perceived SAN or storage performance issues can be difficult to diagnose, isolate, and resolve, especially when changes to virtual machine allocations quickly shift network demands.

Throughout the life cycle of the SAN environment, the demands placed upon the network's performance along with device behaviors can change. For example, as IT organizations add new and faster servers, they often keep the old ones online. They may upgrade the network and place older switches at the edge. As production environments evolve, balancing the old with the new, and the slow with the fast, consumes IT resources and can limit the benefits of higher-performing infrastructure. IT needs a network that "plans for them," with features such as traffic optimization to reduce the risk of congestion caused by common types of speed mismatches.

Fortunately, Brocade, a Broadcom company, with its traffic optimizer technology, is applying integrated intelligence to ensure that its networks are always optimized and that application performance remains consistently fast and efficient.

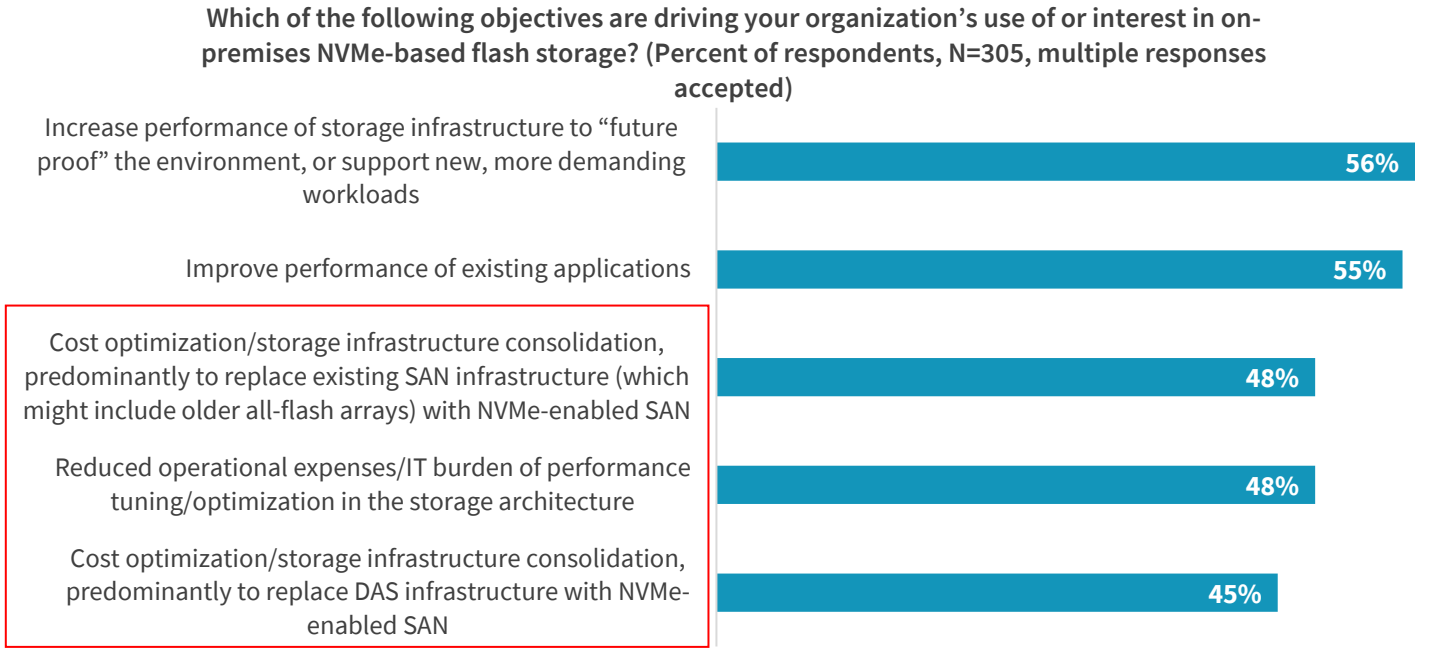
Infrastructure Consolidation

Reducing costs is a proactive initiative that drives many investment and design decisions. In a recent research study, ESG found that that 29% of IT decision makers identified cost reduction as one of the top business initiatives that will drive the most technology spending in their organizations in 2021.[1] In other words, they will spend money to save money.

Saving money has been a particularly urgent need this year. ESG found that the COVID-19 pandemic is having a real impact on IT spending—77% of surveyed IT decision makers already have invested in or expect to invest in technologies that deliver an improved ROI as part of their organization's IT cost containment strategies for the remainder of 2020.[2]

All-flash storage has and continues to play a role in delivering that optimized ROI. Forty-seven percent of surveyed flash users identify improved TCO as a benefit they are realizing by using this technology. Additionally, 37% reported that they are seeing reduced or deferred capital expenditures from using flash storage. As Figure 1 shows, nearly half of the storage decision makers who are familiar with NVMe identified cost optimization—in part via consolidation—as a top driver of their interest in the technology.[3]

Figure 1. Objectives Driving Interest in On-premises NVMe Flash Storage



Source: Enterprise Strategy Group

The reality of consolidation, however, is that typically not all infrastructure is refreshed simultaneously. In most cases, that would be impractical. As faster devices are added, it is often the laggards and the resulting performance mismatches that can cause performance issues across the environment. Without the right storage network capabilities, the older and slower devices that have not been refreshed yet can hinder the consolidation and cost optimization benefits of the newer hardware.

[1] Source: ESG Research Report, *2021 Technology Spending Intentions Survey*, December 2020.
[2] Source: ESG Research Report, *The Impact of the COVID-19 Pandemic on Remote Work, 2020 IT Spending, and Future Tech Strategies*, June 2020.
[3] Source: ESG Master Survey Results, *2019 Data Storage Trends*, November 2019.

The Cost of Network Congestion

As mentioned, it's important to find ways to reduce the causes of congestion that generate several cost-related ramifications, including:

- Congestion limits the value of consolidation activities, often generating intermittent performance issues. Think of it like driving a sportscar that randomly drops down to second gear. In the data center, this kind of congestion potentially negatively impacts mission-critical applications. The impacts of congestion are not isolated to the slower devices; rather, the performance impacts can spread across the network to other, higher-value devices and applications.

- Congestion also wastes IT admins' time, especially because issues related to storage network congestion are notoriously difficult to diagnose, isolate, and resolve. Consider that congestion sometimes affects different applications across different environments, at different times, in different scenarios, and the devices impacted may be the culprit chiefly responsible for generating the congestion, or they might not be. Then, the problem vanishes just as quickly … before reappearing again. That's a difficult issue to fix.

Some common causes of storage network congestion include:

- Oversubscription—This congestion problem occurs when the destination port is physically slower than the sender's port or slower than the aggregate speed of multiple sending ports.

- Credit starvation—This problem occurs when the destination device cannot accept data as quickly as it arrives and does not return credits to the fabric in a timely manner.

Broadcom Traffic Optimizer and the Autonomous SAN

For robust operation, Fibre Channel storage environments (and the mission-critical applications they serve) require incredibly high bandwidth and reliability, extremely low latency, and a lossless network.

Thanks to Traffic Optimizer, on a Brocade Gen 7 SAN, traffic with "like characteristics" (e.g., the destination ports' speed) are automatically placed in performance groups based on these characteristics. As data transactions increase across the SAN, those transactions are allocated across virtual channels based on the performance group.

In this manner, traffic destined to go to ports of the same speed (e.g., 16Gb or 32Gb) can access SAN devices at equal rates without impeding other devices on the SAN and while minimizing the risk of congestion happening.

The Business Benefits of Traffic Optimizer

The net benefit of Traffic Optimizer is superior—and more predictable—performance. That benefit in turn helps:

- Enhance the advantage that the organization receives from its flash and NVMe consolidation investments by ensuring that the storage fabric keeps pace with next-generation all-flash systems.

- Automatically manage and balance network performance without creating an extra burden for administrators. This automatic management capability is actually another piece of Broadcom's autonomous SAN technology, available in its Brocade Gen 7 Fibre Channel switch portfolio.

- Prevent erratic storage performance hiccups that can impair mission-critical workloads and consume the time of personnel in lengthy attempts to diagnose, isolate, and resolve issues.

With new high-performing, low-latency storage media on the horizon—such as persistent memory and storage-class memory—it's easy to see how this type of optimization technology could deliver even greater value in the future.

The Bigger Truth

IT resources these days are limited. And because of that limited personnel resource allocation (along with the rising importance of the data to the business), the SAN and the network supporting it must get smarter. The alternative is a potential outage, which is not acceptable to any organization today that relies on digital economy or data driven tools to enable their business.

You need a storage fabric that will support your consolidation plans for storage. It's an appealing idea to consolidate many workloads onto all-flash arrays, but if the network can't keep up because it is not intelligent enough to manage bandwidth properly, then you're going to have issues.

However, if you deploy an infrastructure that is able to do this type of diagnostic optimization automatically—to isolate like-characteristic traffic—you solve both problems; your IT teams can operate more efficiently as your storage is able to run faster and more smoothly to the benefit of your end users, your customers, and your business.

As new types of storage arise, latency sensitivity will become an even more important factor for IT to consider. Brocade understands this reality, which is why it is focusing so much on helping organizations reduce congestion problems. ESG believes there is a tremendous opportunity for this technology to evolve even further and provide more value in the form of bandwidth congestion relief in the years to come.

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