

ESG SHOWCASE

Boost Workload Performance with NVMe/TCP

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ABSTRACT: NVMe Express over TCP should be considered for any new infrastructure deployment, with organizations looking specifically for a vendor with a wealth of innovations and qualified solutions. Dell Technologies can help IT organizations simplify and accelerate their adoption of NVMe over TCP solutions with its broad NVMe flash storage and NVMe over Fabrics portfolio.

Overview

The rise of digital business is creating pressure on IT organizations to ensure that their fast-growing application environments continue to get the performance they require as they scale. Unfortunately, today's complex IT infrastructures are actually slowing IT operations and digital initiatives, including the work involved in properly sizing workloads to create optimal infrastructure environments. IT organizations need to both modernize their infrastructures and simplify management and operations—while also controlling costs.

For these organizations, deploying non-volatile memory express (NVMe) over TCP could be a great way to maximize the value of their high-performance, NVMe-based flash storage systems. This approach can extend the low-latency benefits of NVMe across the network to applications, leveraging the inherent simplicity of TCP for network management and helping to control costs by taking advantage of the existing Ethernet infrastructure.

It is good news, therefore, that [Dell Technologies](#) has been working to create a NVMe/TCP ecosystem, elevating TCP to a top-tier option when the goal is to leverage NVMe over Fabrics (NVMe-oF) capabilities.

Why Should You Consider NVMe/TCP?

ESG research validates the benefits that NVMe and NVMe over Fabrics deliver, especially in conjunction with the benefits offered by software-defined storage. The surveyed organizations told ESG that they expect their on-premises data environment capacity to grow on average 35% annually.¹ And these organizations are on pace to double their capacity in less than three years.

But silos are proliferating as those environments scale, which is creating more challenges. For example, some of the top storage-related challenges for block storage environments relate to the cost of the infrastructure (cited by 26% of respondents), meeting performance demands (25%), and keeping pace with the rapid growth of data (24%).

The rise of adoption of NVMe-based storage technology reflects a widespread effort to modernize storage environments to ensure they will keep pace with the growing need for high-performance data access. NVMe is an open logical device

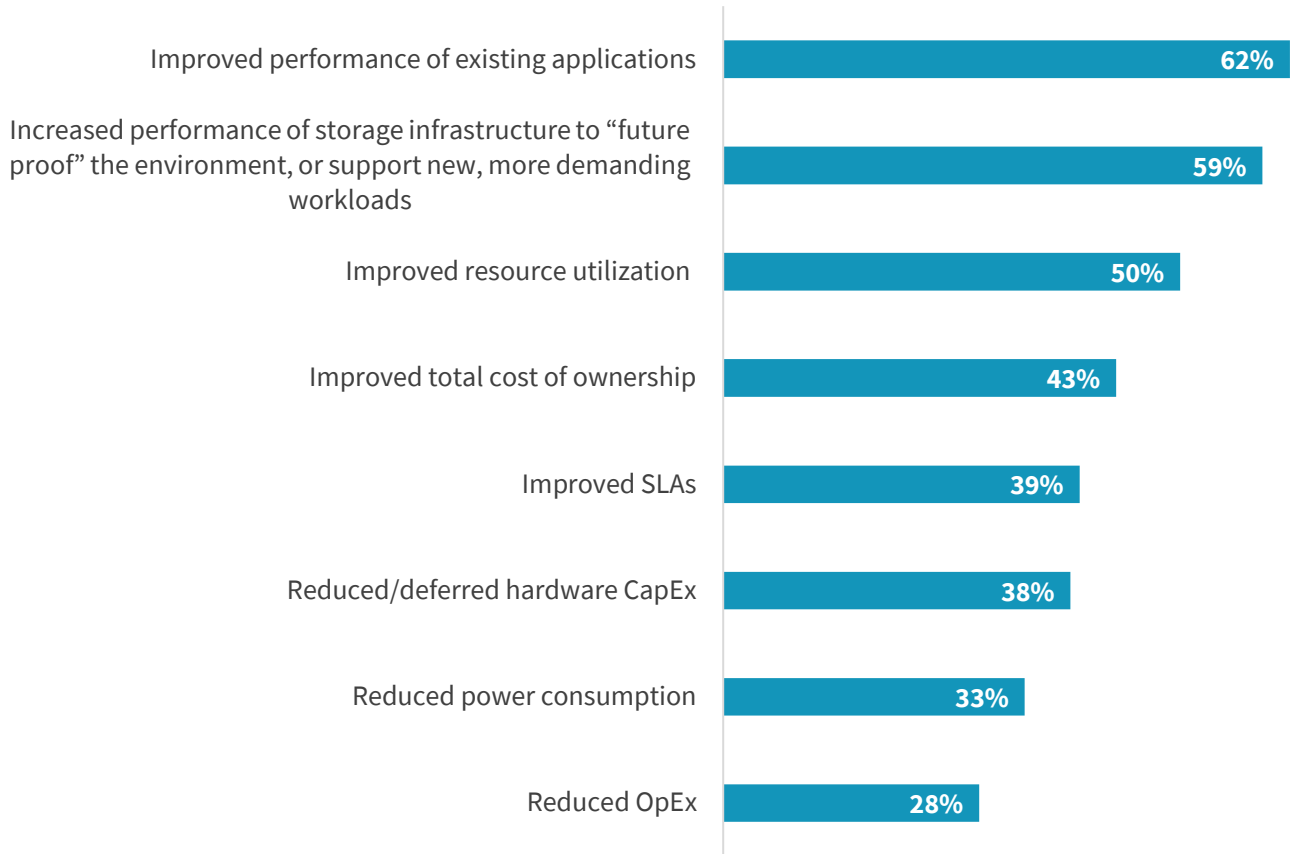
¹ Source: ESG Research Report, [Data Infrastructure Trends](#), November 2021. All ESG research references and charts in this showcase are from this research report.

interface for accessing non-volatile storage media attached via a PCI Express (PCIe) bus or switch. Designed for flash storage rather than spinning hard drives, the NVMe protocol is both streamlined and parallel in its design to achieve low-latency performance. NVMe is more efficient than traditional protocols such as SATA or SAS, and it delivers flash latency improvements more effectively.

According to ESG research, 33% of IT organizations already use NVMe-based flash storage, and another 41% are poised to deploy NVMe technology in the next 12 months so they, too, can capitalize on the benefits of NVMe technology: improved performance of existing and future workloads, improved resource utilization, and reduced capital and operational costs (see Figure 1).

Figure 1. Top Benefits of NVMe Adoption

Which of the following benefits has your organization realized as the result of deploying on-premises NVMe-based flash storage technology? (Percent of respondents, N=119, multiple responses accepted)



Source: ESG, a division of TechTarget, Inc.

Several differentiators exist between NVMe over TCP versus the other NVMe over Fabrics options. Specifically, NVMe/TCP:

- Leverages an existing Ethernet network for a lower cost per port.
- Doesn't require special RDMA Ethernet controllers.
- Is fast. Contrary to myth, NVMe/TCP is *not* inferior to FC in performance. For example, Dell Technologies PowerStore supports 100GbE speeds.

Boiled down, these differentiators give an IT organization a cost-effective, simple way to ensure the low-latency benefits of NVMe are delivered to an application environment. And given the importance of low-latency performance to quickly scaling applications, every IT team engaged in a new deployment should be considering NVMe flash technology and NVMe over Fabrics—knowing that NVMe over TCP is a cost-efficient way to deliver the performance and other capabilities they need.

The Dell Technologies NVMe over TCP Ecosystem

Dell Technologies is a leader in data storage and IT infrastructure, and it has been busy developing an ecosystem to support NVMe over TCP. In the early years of NVMe storage, NVMe/TCP didn't have the operating system or hypervisor support of other transport options, but it is time to take another look.

Dell is doing the upfront validation work now, so its customers don't have to. And with the help of Dell Technologies' SmartFabric Storage Software (SFSS), new levels of automation make NVMe/TCP easier to deploy. Dell also has plans to support more and more Linux KVM-based operating systems going forward.

Dell is already a member of the NVMe standards body, and it has been working with many of its partners to ensure the delivery of this ecosystem is done properly. VMware, for instance, has expanded its support for NVMe across PCIe storage, Fibre Channel, and RDMA to now include NVMe over TCP as well.

Dell's innovations in the area of NVMe/TCP center on components tied to SFSS, servers, and storage:

- **SmartFabric Storage Software**—SFSS is a standards-based, centralized discovery controller for NVMe/TCP servers and storage. The standalone software is packaged as a containerized application supporting an end-to-end, automated, integrated NVMe-oF solution running TCP over an Ethernet fabric. The key functions of SFSS are policy-driven, helping to automate NVMe/TCP endpoint discovery, registration, connectivity, and zoning.
- **PowerEdge servers and VxRail solutions**—To add choice and flexibility, Dell Technologies expands the NVMe/TCP validation to VxRail solutions and PowerEdge servers—running VMware ESXi 7.0U3 or later, or SUSE Linux Enterprise Server 15 SP4—to enable the transfer of data and commands between a host server and a target storage device.
- **PowerStore and PowerMax storage**—To boost workload performance with faster, more cost-effective networks, PowerStore and PowerMax support NVMe/TCP, allowing hosts to access storage systems across a network fabric using the NVMe protocol.

The Bigger Truth

Dell Technologies is well known for being able to provide a comprehensive set of deployment and support options covering the entire lifecycle of an enterprise IT investment. And right now, Dell Technologies is focused on reducing the risk of adopting NVMe/TCP and is trying to make NVMe/TCP as robust and as easy to use as possible for everyone. Dell is dedicating itself to offering components of an NVMe IP SAN that have been fully qualified by the Dell E-Lab, thus allowing its customers to deploy an end-to-end validated solution with confidence.

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