Enable a cyber-resilient, autonomous SAN with Lenovo Gen 7 Storage Networking

Lenovo | BROCADE A Broadcom Company

Take the guesswork out of protecting and managing your data

Data is moving faster in the data center than ever before, which makes it challenging to manage and protect your infrastructure. Managing data growth, combined with the need for rock-solid reliability, and the requirement to maintain high levels of security can be cumbersome. With the next generation of servers and storage, the complexity and scale of traffic will continue to grow, but throwing faster infrastructure at the problem will not be good enough.

Your SAN needs to be smarter. It needs to automate management tasks to simplify and enable non-stop operations while ensuring optimal performance and strengthening the level of security in your network.

Lenovo Gen 7 changes everything

Lenovo Gen 7 Fibre Channel SAN (based on Brocade® technology) delivers far more than just speed and latency improvements. It brings new levels of powerful analytics, advanced automation, and integrated security capabilities to enable a cyber-resilient SAN.

These capabilities safeguard your SAN against cyber attacks, IT disruptions, and disasters, while learning, optimizing, and healing on its own. Lenovo Gen 7 proactively monitors application and network performance and takes immediate action to dramatically improve application availability and the reliability of the network.

This document outlines seven ways you can benefit from upgrading to Lenovo Gen 7 capabilities that automate processes to ensure optimal performance and enable non-stop operations. At the same time, these capabilities strengthen the level of security in your network to protect against security threats around the clock.

First, we will review how the Self-Learning capabilities identify all devices on the network and set a baseline for application performance to identify potential issues that require remediation. Next, we'll cover how Self-Optimizing and Self-Healing actions mitigate issues caused by device speed mismatch and can mitigate common causes of network congestion.

Then we'll show how Lenovo Gen 7 technology reduces the risk of vulnerabilities and attacks by monitoring data and hardware across the SAN to identify malware and hijacking attempts as well as other performance issues. You'll also see how Gen 7 protects rather than replaces your existing investments – allowing you to run legacy infrastructure in tandem without sacrificing performance.

7 reasons why you won't want to delay upgrading to Lenovo Gen 7

1 Remove the guesswork: your SAN can tell you what's wrong

The challenge

Complexity is rising, with more applications and endpoints making it far more difficult to manage environments using CLIs. With so much information now coming your way, it's easy to drown in the sea of alerts. How do you identify issues that need immediate attention?

The answer lies in the infrastructure itself.

The solution

The Lenovo Gen 7 Autonomous SAN capabilities help you to take the guesswork out of managing the SAN and resolve important issues faster than ever before.

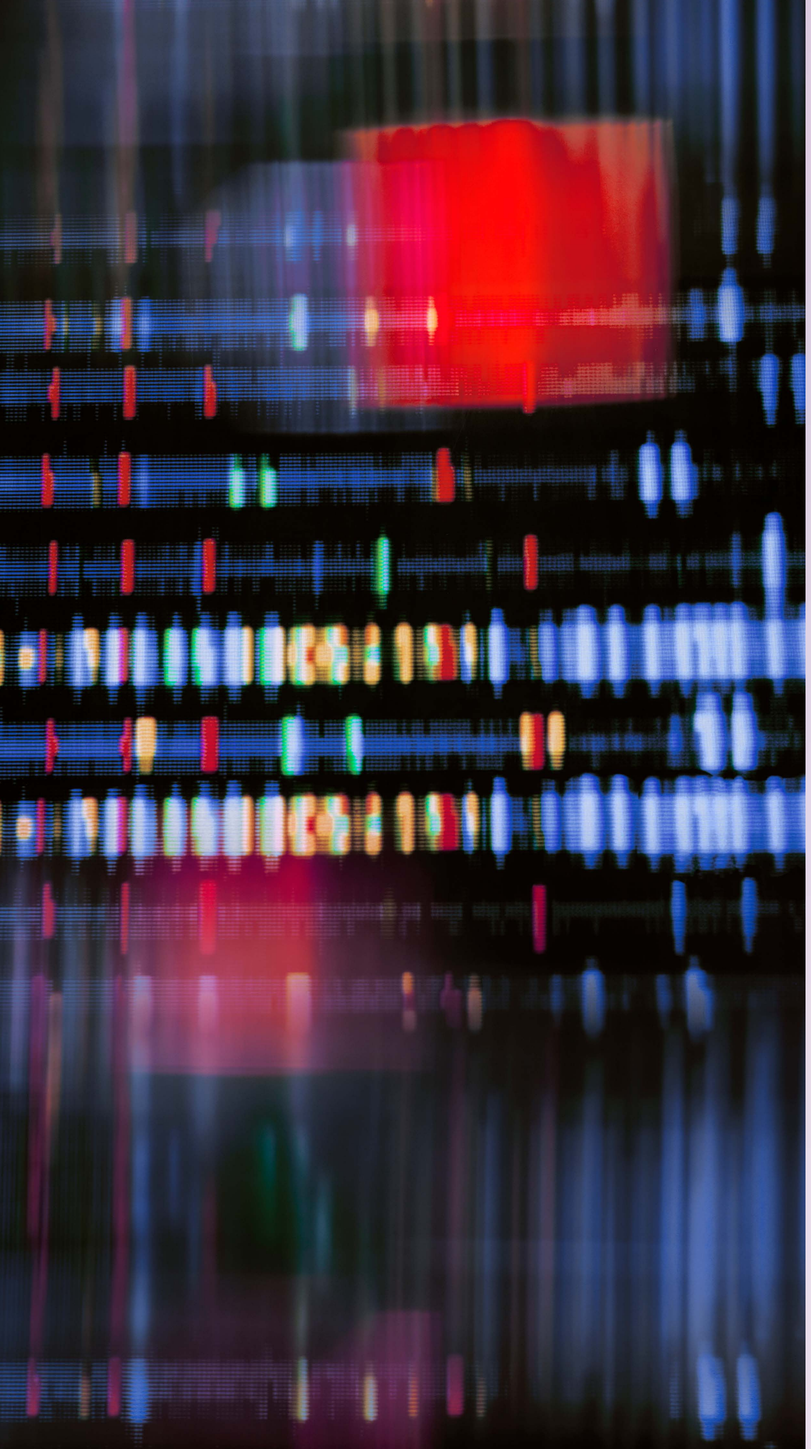
One key feature of the Autonomous SAN technology is Self-Learning. This is a collection of features that leverages Gen 7 ASIC capabilities to collect a comprehensive set of data. Millions of data points are transformed into actionable intelligence that can monitor and alert when there are any abnormal changes. And, best of all, it requires no special configuration on your part; it simply runs on Gen 7 platforms and collects the data.

With Self-Learning, you can identify and monitor applications and their performance across the fabric. It also tracks the performance of devices within the fabric – the switches, hosts, and storage arrays – allowing the Autonomous SAN to automatically learn data flows and then create health metrics for every component and application.

These are presented to you through clear and meaningful dashboards to automatically provide you with a baseline for your SAN. After all, if you don't know what 'normal' looks like in your infrastructure, how do you know the magnitude of a problem?

With insight into the fabric, Lenovo Gen 7 can automatically detect abnormal traffic patterns and areas where performance is degraded. Countless cycles of manual analysis are eliminated. But it's not just about automating existing tasks; Self-Learning capabilities are essential as the volume and complexity of data spiral far beyond the capabilities of humans to manage.

With Self-Learning, the SAN itself makes sure you are focused on reality, directing you instantly to the issues that matter and scaling as the demands of the business increase.



2 Mitigate issues caused by device speed mismatch

The challenge

SAN traffic is far from uniform. In fact, virtually every IT infrastructure deals with a mix of platform and application generations. And not all applications have the same business criticality. Traffic running on older technology can impact the delivery of traffic from newer generations.

Further, some applications and the hardware platforms they run on are more susceptible to issues, such as latency. Understanding this interaction takes significant time and resources, needing active intervention from busy admins to manage it properly.

Fibre Channel enables your SAN to support multiple generations of server and storage technologies throughout its lifecycle, yet the most common root cause for SAN congestion is the combination of new and old servers and storage. Now things are happening so fast in the SAN that it's impossible for humans to identify and mitigate the impact that speed mismatch may be having on other traffic. So how can you prioritize mission-critical traffic, or high-performing workloads, and separate them from non-mission-critical slower traffic?

The solution

Lenovo Gen 7 Fibre Channel SAN (based on Brocade® technology) understands traffic flows and automatically groups like traffic together, increasing the efficiency of your traffic management. It makes sure slower device traffic doesn't hinder the performance of higher-speed device traffic flows. Doing this automatically provides priority data paths to mission-critical traffic that shares similar or identical traffic characteristics.

The Lenovo Gen 7 Traffic Optimizer feature proactively puts like traffic together over virtual channels, creating separate performance groups. It automates the segregation of traffic by characteristics such as speed, latency, or protocol, like NVMe or SCSI. Classifying and automatically segregating traffic by types optimizes application performance and eliminates the oversubscription and congestion issues caused by mismatched speeds. This capability avoids application performance impacts by automatically isolating traffic that is adversely impacting other flows. It means your network will automatically make smarter decisions on traffic prioritization and congestion management, providing efficiencies and performance improvements that could never be achieved manually.

3 Avoid performance degradation due to congestion

The challenge

The rising speed and complexity of traffic increase the impact of disruption and downtime. It's like driving through fog and hitting a bump in the road; the consequences are much worse at higher speed.

Similarly, a single issue in the modern SAN can cost millions of dollars in lost transactions and productivity. With so many devices connected, it's common for one misbehaving device to cause congestion across the fabric – to be that bump in the road. The impact of the problem often shows up in a completely different place, on a healthy server that may not be the root cause, leading you to look in the wrong place for the problem. So how do you identify which devices are misbehaving and mitigate their adverse impact on other healthy traffic flows?

The solution

Lenovo Gen 7 makes your network work more intelligently with end devices, resolving issues without human intervention to avoid adverse performance impact, network disruptions, and outages.

The SAN's position at the center of the data path makes it perfectly placed to identify issues as soon as the first warning signs occur.

Not only can Lenovo Gen 7 detect and identify the root cause of congestion issues at the earliest stages, but it can also take action to mitigate the issue before it impacts operations.

Lenovo Autonomous SAN's powerful Self-Healing capabilities mitigate potential performance issues by automatically identifying when a device or traffic is not behaving correctly and set a course for recovering or avoiding issues. Monitoring and correlating traffic behavior enables the identification of congestion at the start and goes beyond determining a root cause to addressing the fabric congestion issue.

With this information, Lenovo Autonomous SAN capabilities can detect congestion issues on a fabric, and then notify the affected devices (servers and storage) to take action. This real-time notification mitigates potential issues before they have an impact on the business. From here, the Lenovo Autonomous SAN sets automatic healing actions based on the characteristics of the issue. With a set of corrective actions for congestion events, it provides admins with trusted default congestion actions or customized fabric responses. Or for those customers who prefer to resolve these issues themselves, they have the option to take action on their own.

Self-healing in action

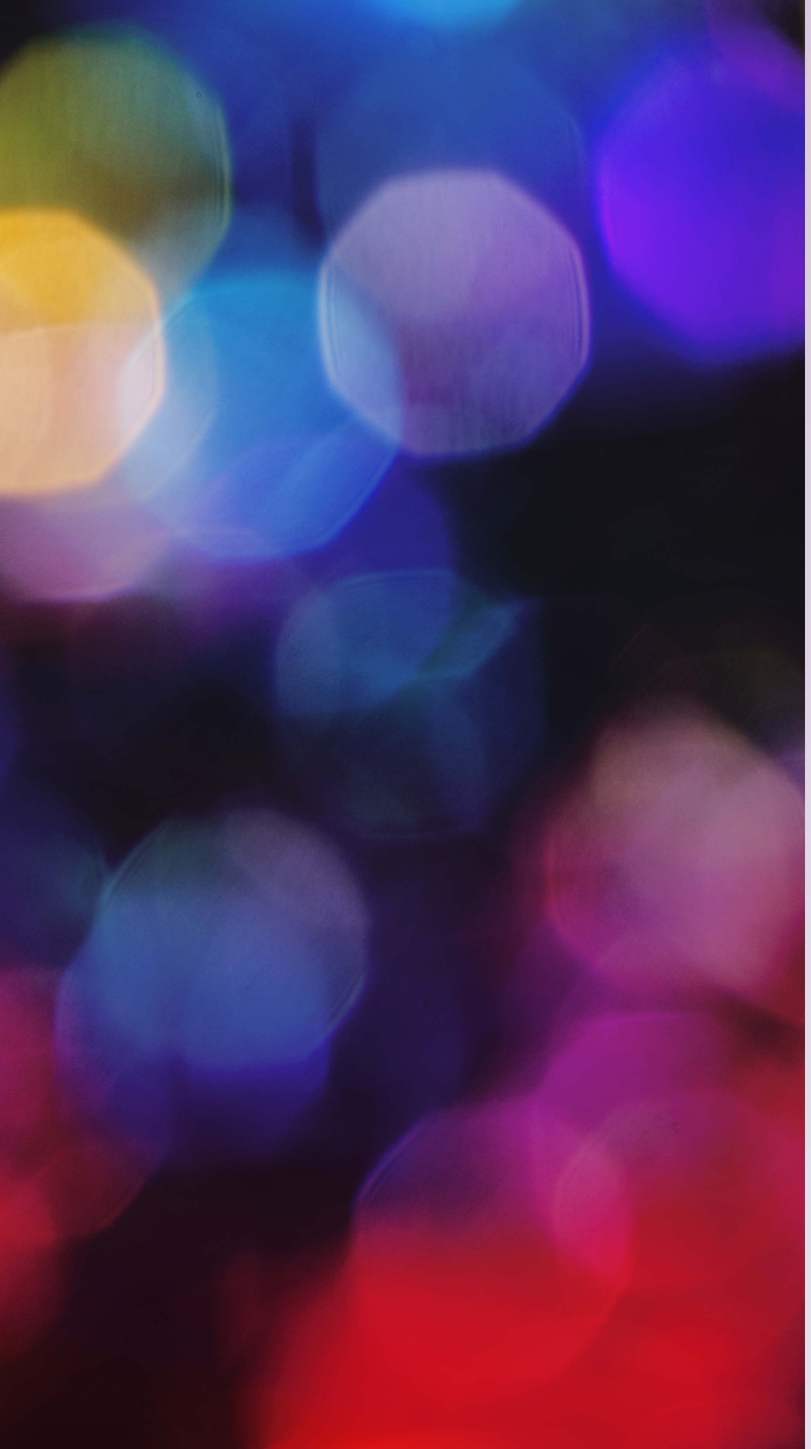
> Example #1: Notifying end devices when host port congestion problems arise

Over time, workloads grow and admins often add more virtual machines per server to meet new demands. This can cause an oversubscription problem. When this happens, the Fabric Performance Impact Notification (FPIN) capability sends a notification to the end device telling it that there is a host port congestion problem. The end device can take action to resolve the congestion by throttling down its I/O requests, which in turn removes the fabric latency that was affecting unrelated traffic flows. This reduction in oversubscription mitigates or removes congestion, automatically eliminating the impact on other applications and providing better performance.

> Example #2: Alerting the HBA

Since Fibre Channel is a buffer-to-buffer credit link service, if a server stops responding or an application freezes, it may be seen by Gen 7 as a credit-stall situation.

In this instance, FPIN would send a hardware signal in-band to the stalled HBA, while at the same time sending a 'Peer' notification to the devices currently zoned to that server. By engaging the ecosystem as a whole, the Autonomous SAN capabilities of Lenovo Gen 7 provide a faster, more comprehensive solution to SAN infrastructure problems.



4 Ensure data delivery: identify and resolve issues in the physical layer

The challenge

When a multipath driver balances traffic over several paths, including using an impaired path, it can result in degraded application performance, or even cause a complete outage.

A dead link is easy to spot. But a link that is unhealthy – that has a heartbeat but is sick – may appear to be functioning when in fact it can be causing significant application degradation. It's often the result of a physical-layer issue, such as a bad SFP or cable. Issues like this can linger for a long time and cause bigger problems later on.

The solution

Lenovo Gen 7 stops unhealthy links from affecting application performance. It identifies 'sick but not dead' links, which impact fabric performance and frame delivery as the result of physical-layer issues.

FPIN notifies devices and HBAs when a path is unhealthy, making multipath handling of a 'sick' link possible and more effective. Lenovo Monitoring and Alerting Policy Suite (MAPS) monitors all links. When a link-integrity or physical-layer issue is identified, causing sub-optimal or stalled application performance, the multipath stack is made aware and is directed to decommission the 'sick' or impaired path, moving all traffic to use only the healthy path.

This capability greatly improves the effectiveness and responsiveness to physical-layer issues, resulting in better application performance and avoiding potential application outages.

5 Protect your data from cybersecurity vulnerabilities

The challenge

The sophistication and volume of cybercriminal attacks have dramatically increased. Counterfeiting and tampering with hardware and software have become a lucrative illegal trade that leads to billions of dollars in losses across all industries and can cause serious damage and risk to your environment.

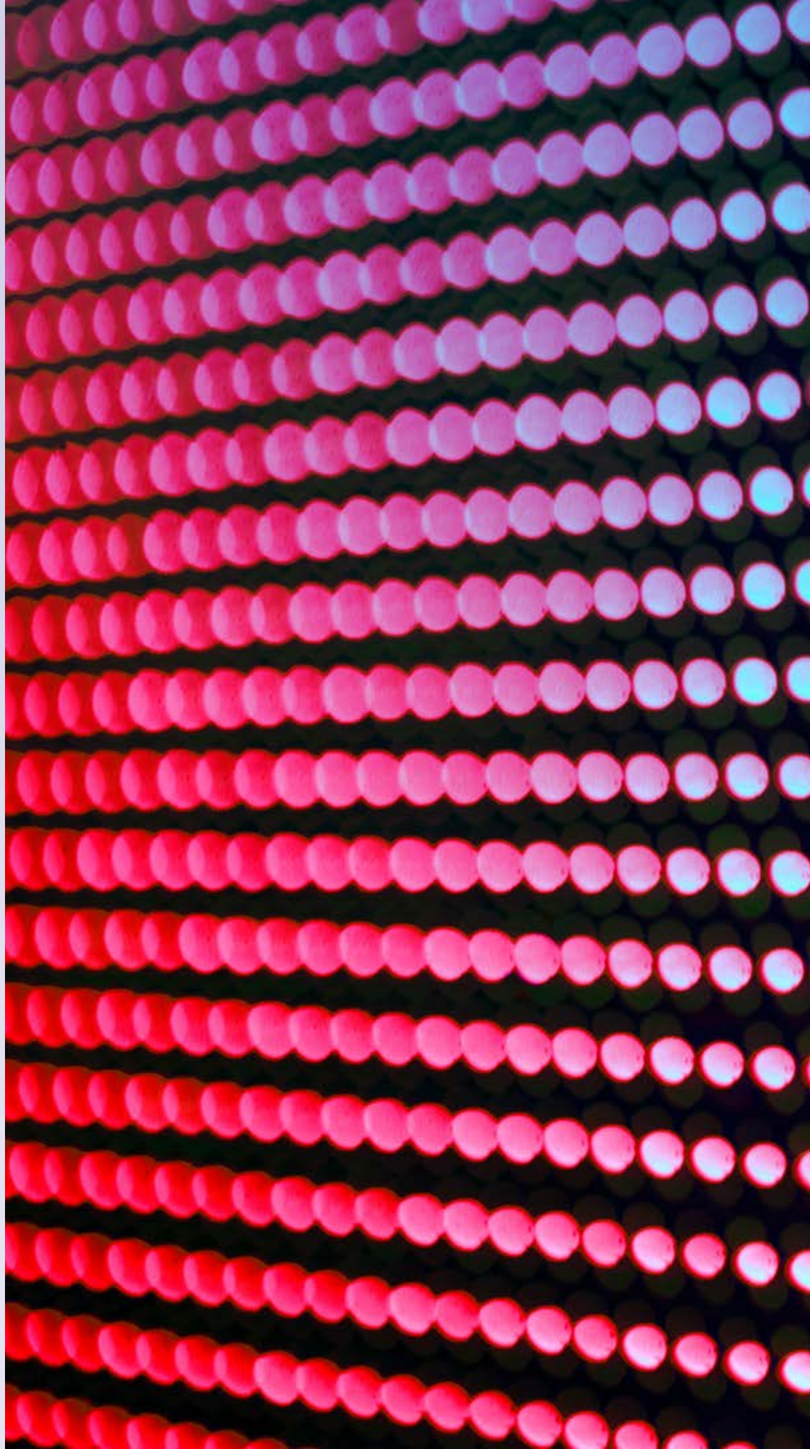
The solution

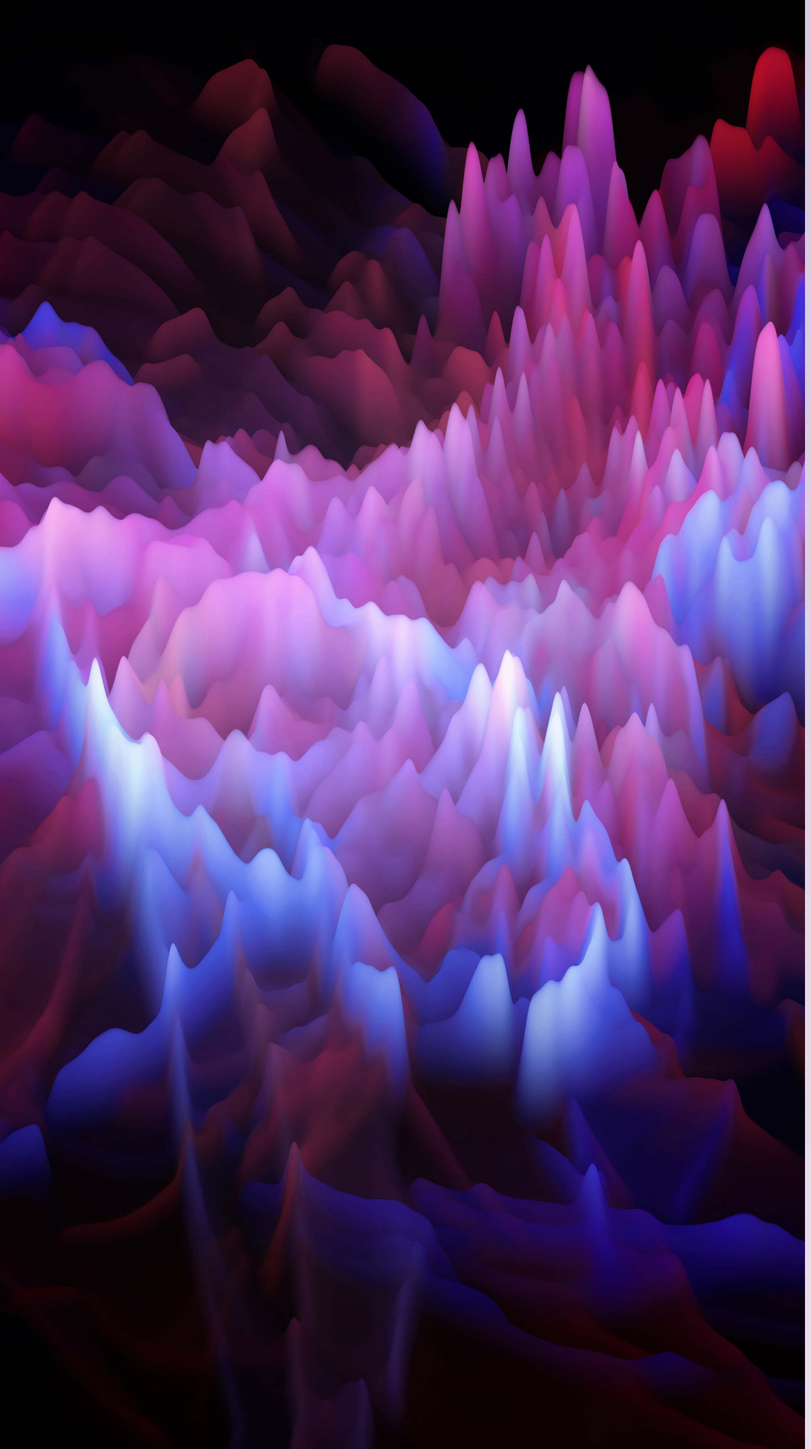
A Lenovo Gen 7 cyber-resilient network protects against security threats, enables non-stop operations, and automates management functions. Fibre Channel fabrics are secure by design based on controlled access between servers and storage and their isolation within the data center. Lenovo Gen 7 (based on Brocade® technology) further reduces the risk of vulnerabilities from malware and hijacking attacks by continuously validating the integrity of the switch operating system, security settings,and hardware.

The Fabric OS® (FOS) software adds enhancements to validate the integrity and security of Lenovo DB series hardware and software. Features including Secure Boot, Brocade® technology Trusted FOS (TruFOS) Certificates, and hardening of FOS itself protect the SAN against malware and hijacking attacks.

Brocade® technology TruFOS Certificates ensure that enterprises running Brocade® technology directors and switches are currently covered by support licenses and securely enabled to perform critical operations, so users no longer have to worry about whether the operating system has been tampered with.

Brocade® technology SANnav™ Management Portal gives enterprise users the ability to automatically distribute SSL certificates across the SAN to ensure authenticity and encryption settings. In addition, security features are built into Brocade® technology SANnav Management Portal to help administrators protect their network. With Brocade® technology SANnav software, administrators can set up monitoring and alerting for security configuration changes, customize security thresholds, give proper access control to individual admins, and view switch security events.





6 Keep legacy infrastructures from hindering performance

The challenge

Modernization is speeding ahead in the data center. It's all about acceleration: server performance with PCIe Gen4 and storage performance with NVMe. The SAN is the critical path to bringing everything together. It must evolve to keep pace with the next wave of innovation in the data center. An outdated SAN creates the congestion and imbalances in performance that can occur when legacy networks are connected to high-performing endpoints.

The solution

Lenovo Gen 7 meets the requirements of the most demanding applications today while offering the performance, intelligence, and agility to accommodate future requirements throughout the lifecycle of the SAN.

Latency matters in all-flash data centers, especially with the ramp-up of NVMe-based storage and future developments in storage-class and persistent memory.

Brocade, a Broadcom company, took several key steps in designing the ASIC at the core of the Lenovo Gen 7 DB Series SAN architectures.

First, the latency of the ASIC was reduced by 50% when compared to Gen 6. Second, significant functionality to support data collection on fabric-wide latency and I/O statistics has been added at both a device and protocol level. By implementing this in silicon, these measurements can be made at a line rate without the type of performance overhead/impact that can be seen in technologies like Ethernet when similar inspection is done. Third, significant capacity was added in support of the 64 input and 64 output virtual channels per port in the ASIC in order to provide the automated Traffic Optimizer functionality.

Gen 7 doubles the performance with 64G speed, providing new levels of scalability. More throughput allows organizations to increase compute density and scale more devices, adding more applications and more workloads.

7 Protect your investments and get the most out of your infrastructure

The challenge

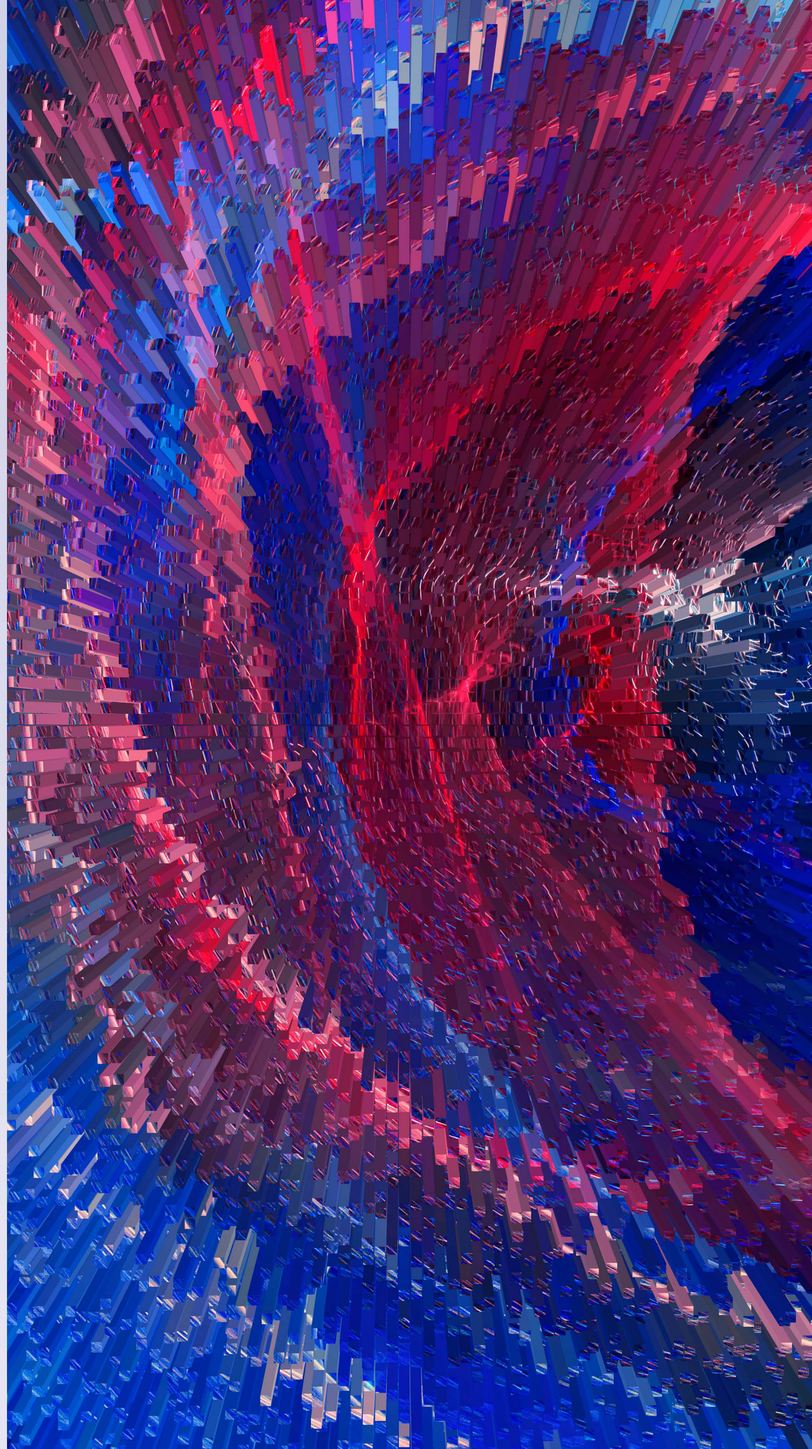
With the advent of all-flash arrays, Moore's Law applies to enterprise storage for the first time in history. This means that technology cycle times are now falling within an 18-month period. A SAN environment will be dealing with at least two generations of new storage technology within a five-year capital depreciation schedule. To unlock more value from your core business and stay ahead of the competition, you need to be able to transition seamlessly from where you are today to where you're headed tomorrow.

The solution

Lenovo Fibre Channel SAN (based on Brocade® technology) protects your investments and eases migration to the latest technology. In addition to getting the higher speeds and scalability your organization needs today, you'll be able to fast-track the addition of new technologies as you need them.

Migration should never equate to wasted investment. Lenovo Gen 7 makes it easy to run NVMe and SCSI data traffic concurrently on the same network. Traffic Optimizer allows you to seamlessly integrate next-generation hardware with new levels of speed. It isolates traffic according to speed, giving the SAN unprecedented ability to handle devices with different performance capabilities, without adversely impacting the highest performing workloads. In addition, the mixed blade flexibility of the Brocade X7 Director allows you to utilize both Gen 7 and Gen 6 blades within a single chassis, so you can migrate on your terms. If you already have a Gen 6 director, you can extend the life of your chassis with an upgrade and gain the full value of Gen 7 technology.

This means you can maximize your return on investment on both new and existing solutions while delivering efficiencies and performance improvements to get the most out of your infrastructure.



It’s time to upgrade to realize the benefits of a cyber-resilient, Autonomous SAN

Complexity and high-performing endpoints will soon make it impossible to really know where and why problems are occurring in your SAN. With Lenovo Gen 7, your SAN can now tell you where a problem came from when it matters most and when it has fixed the issue. Or for those customers who prefer to take corrective action manually, the SAN will send alerts about any misbehaving devices so that corrective action can be taken quickly and efficiently. Thanks to its built-in Autonomous SAN capabilities, Lenovo Gen 7 not only monitors application and network performance, it can also take action to resolve issues and optimize application performance for the highest availability and reliability.

In addition, Lenovo Gen 7 was designed with security in mind and implements many security measures to protect an organization against vulnerabilities.

It hardens your SAN against cybersecurity and other business-continuity challenges that threaten to disrupt data center operations.

Upgrade your infrastructure to transform your current storage network into a cyber-resilient, Autonomous SAN. Automate administrative routines and processes, and remove the risks of legacy technology exposing you to unwanted vulnerabilities and disruptions. Take advantage of dramatic savings in time typically spent troubleshooting issues, optimizing application performance, and maintaining high levels of security.

Now is the time to take control of your data center with Lenovo Gen 7 (based on Brocade® technology), enabling a cyber-resilient network that acts autonomously to quickly and efficiently maintain the highest levels of resiliency and security while maximizing performance.

Modernize your SAN with Lenovo Gen 7

Hear from the Brocade experts about the importance of Gen 7 and how it works

Watch now

Visit Lenovo Gen 7 Product Guides on Lenovo Press

DB720S | DB730S | X7 Directors

Set up a call today to discuss your specific needs with our data experts

Schedule now

Lenovo | BROCADE A Broadcom Company