BROCADE
A Broadcom Company

Brocade® Gen 7
Makes a Cyber-Resilient, Autonomous SAN Possible

Unseen, yet Vital

The Things You Do Not See Make a Difference

In today's data center landscape where data moves at unprecedented speeds, managing and protecting your infrastructure has never been more complex. As data volumes surge and applications evolve, the demands on IT infrastructure are growing exponentially. Organizations are faced with the dual challenge of scaling their infrastructure to accommodate vast amounts of data while ensuring that it remains secure and reliable.

This complex balancing act often introduces a significant degree of guesswork and increased tasks as IT teams strive to manage, optimize and address the ever-changing needs of their systems. Amidst this complexity, the significance of the underlying infrastructure that supports and safeguards data cannot be overstated.

The visible aspects of data management—such as storage capacity and network bandwidth—are of course crucial. But the hidden storage infrastructure, working diligently behind the scenes, is pivotal in ensuring the seamless performance and security of your critical applications.

This unseen infrastructure plays a vital role in eliminating the guesswork associated with data management and protection. By leveraging advanced technologies and solutions that operate seamlessly in the background, organizations can achieve a higher level of reliability, efficiency, and security.

Hidden Hero

The Invisible Force Simplifying Your Data Protection and Management

Brocade® Gen 7 Fibre Channel delivers far more than just speed and latency improvements. It is the invisible engine that works to ensure seamless data access, security, and scalability.

Brocade Gen 7 combines integrated security and autonomous SAN technology to enable a cyber-resilient network that safeguards your SAN against cyber attacks, IT disruptions, and disasters, while learning, optimizing, and healing on its own. Brocade Gen 7 proactively monitors application and network performance, and it 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 Brocade 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 Brocade 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 will describe how self-optimizing and self-healing actions mitigate issues caused by device speed mismatch and can mitigate common causes of network congestion. Then we will show how Brocade 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.

Lastly, we will review how Brocade Gen 7 protects rather than replaces your existing investments; therefore, allowing you to run legacy infrastructure in tandem without sacrificing performance.

1 Remove the Guesswork: Your SAN Can Tell You What is Wrong

The Challenge

Complexity is rising in today's environments. The amount of applications and endpoints make it far more difficult to manage these environments using CLIs. With so much information now coming your way, it is 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

Brocade Gen 7 works to automatically detect WAN anomalies and monitor IP health and performance, resolving important issues faster than ever before.

One key feature of the autonomous SAN technology is Brocade self-learning. This is a collection of features that leverages Brocade 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. 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 (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 health metrics are presented to you through clear and meaningful dashboards to automatically provide you with a baseline for your SAN. After all, if you do not know what normal looks like in your infrastructure, how do you know the magnitude of a problem?

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

With Brocade self-learning, the SAN itself makes sure that you are focused on reality. It directs you instantly to the issues that matter and scales 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. 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 is 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

Brocade Gen 7 Fibre Channel uses invisible mechanisms to automatically prioritize and group traffic, increasing the efficiency of your traffic management and guaranteeing peak performance. It makes sure slower device traffic does not hinder the performance of higher-speed device traffic flows. Doing this work automatically provides priority data paths to mission-critical traffic that shares similar or identical traffic characteristics.

The Brocade 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 Caused by Congestion

The Challenge

The rising speed and complexity of traffic increases the impact of disruption and downtime. It is 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 is common for one misbehaving device to cause congestion across the fabric. The device becomes the theoretical bump in the road. The impact of the problem often shows up in a completely different place, such as on a healthy server that may not be the root cause. You can be misled into looking 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

Brocade Gen 7 provides the unseen assistance that 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 Brocade 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.

Brocade autonomous SAN's powerful self-healing capabilities mitigate potential performance issues by automatically identifying when a device or traffic is not behaving correctly, and it sets a course for recovering or avoiding issues. Monitoring and correlating traffic behavior enables the identification of congestion at the start. The identification determines a root cause and goes beyond by addressing the fabric congestion issue.

With this information, Brocade 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 Brocade 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 practice can cause an oversubscription problem. When this happens, the Brocade 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 Brocade 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. The degradation is 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

Brocade 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 or troublesome link possible and more effective. Brocade Monitoring and Alerting Policy Suite (MAPS) monitors all links. When a link-integrity or physical-layer issue is identified as causing sub-optimal or stalled application performance, the multipath stack is directed to decommission the sick or impaired path, moving all traffic to use only the healthy path.

Gen 7 guarantees always-on operations with seamless reliability by greatly improving the effectiveness and responsiveness to physical-layer issues. The end result is better application performance and the prevention of 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. These attacks can cause serious damage and risk to your environment.

The Solution

A Brocade Gen 7 cyber-resilient network is secure by design. Brocade Gen 7 has enhanced security features that silently shield your data from evolving threats and vulnerabilities to ensure business continuity and operational resilience within and across data centers. Brocade Gen 7 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.

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

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

Brocade 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 SANnav Management Portal to help administrators protect their network. With Brocade 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 is all about acceleration, server performance and storage performance. The SAN is the critical path that must evolve to keep pace with the next wave of innovation in the data center. An outdated SAN creates network congestion and imbalances in performance that can occur when legacy networks are connected to high-performing endpoints.

The Solution

Brocade 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 Gen 7 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 update in silicon, these measurements can be made at a line rate without the type of performance overhead impact seen in technologies such as Ethernet when a 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 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 are headed tomorrow.

The Solution

Brocade Gen 7 Fibre Channel protects your investments and eases migration to the latest technology. In addition to getting the higher speeds and scalability your organization needs today, you will be able to fast-track the addition of new technologies as you need them.

Migration should never equate to wasted investment. Brocade 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. Allowing you to 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.

By leveraging Brocade Gen 7, 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 is Time to Upgrade and 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 Brocade Gen 7, your SAN can now tell you where a problem came from when it matters most and when it has fixed the issue. 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 the Brocade Gen 7 built-in autonomous SAN capabilities, it not only monitors application and network performance, but works autonomously resolve issues and optimize application performance for the highest availability and reliability.

In addition, Brocade Gen 7 was designed with security in mind, and it implements many security measures to protect an organization against vulnerabilities. Brocade Gen 7 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 Brocade Gen 7, enabling a cyber-resilient network that acts autonomously in the background to quickly and efficiently maintain the highest levels of resiliency and security while maximizing performance.

Modernize Your SAN with Brocade Gen 7

Take a deeper look at the features, functionality and products of Brocade Gen 7
Explore the interactive guide here >

For more information on the value of upgrading today,
visit the Modernize Your SAN page>