Alone, exceptional.
Together, unrivalled.

Brocade's SAN networking portfolio and Hitachi Vantara's storage solutions combine to deliver the highest performing, lowest latency enterprise-class solution in the world.

Together, Hitachi Vantara and Brocade represent the global benchmark for future-proof integrated storage networking performance, availability, resilience, simplicity, and security for the evolving mid-market organization.

Integrating simpler automation architecture, the lowest power consumption, and the most advanced SAN monitoring and diagnostics in the industry, Hitachi and Brocade's joint vision and offering dramatically cuts both complexity and TCO to put ambitious mid-market businesses like yours on the path to the data-driven digital infrastructure of tomorrow.

Contents.

Introduction.

Hitachi and Brocade: reinventing what's possible.

Given today's need for enhanced infrastructure resilience – minimum downtime and risk, maximum application and analytics performance, and optimum security, operational efficiency, and TCO – enterprises need to 'do more with less'.

But how? By modernizing the data center to capitalize on new capabilities and insights. By simplifying with AI-driven automation to adapt, scale, and future-proof the business.

By amplifying productivity with technologies that rocketboost performance, protection, and efficiencies. And by doing all of this in the smartest most seamless way possible.

That is what Hitachi Vantara and Brocade deliver – the global benchmark for enterprise-class storage networking performance, availability, resilience, simplicity, security, and future-proofing. Data advantage without equal.

A 20-Year alliance; a shared vision.

Sharing a 20-year collaboration and a joint vision for supporting tomorrow's digital infrastructure, Brocade's SAN networking portfolio and Hitachi Vantara's storage solutions combine to deliver the highest performing, lowest latency enterprise-class solution in the world. The perfect alliance for the digital era.

It's tomorrow's data velocity and agility today. Enabling the organization to manage vast data volumes without extended storage spend, it drives an up to 4:1 total data efficiency guarantee ratio, the lowest cost per IOPS in the industry*, and lower power, space, and cooling costs.

It provides relentless application performance and protection; highly secure, scalable, resilient, low-latency storage networking; total capacity agility aligned with shifting operational demand. Faster, easier, lower TCO operations. All with automated provisioning and management, smarter data dissemination, and new levels of data compression.

In practical terms, that means:

Less compliance risk and downtime. Fewer multiple -vendor technical support headaches – all the technology, tools, and experience to run the data center in one place.

Effortless, ongoing service and security improvements as well as IT and business alignment via thousands of managed service professionals.

Up-to-the-moment **scalability** via unique financing models.

Perpetual risk mitigation with tools and accelerators to keep driving savings and improved service levels.

Faster automation with intuitive starter packs and predefined service templates.

Easy, automated multi-vendor orchestration driving cost and time savings without the need for rip and replace.

Better, faster ROI via improved storage utilization.

* Transactions per second

Clear, tangible benefits.

As evidenced by the fact that more than **80% of the Fortune 100 are under our wing,** the benefits are as tangible as they are clear:

Application delivery streamlined by up to	**90%***	
*Source: Hitachi		
Manual tasks reduced by up to	**70%***	
Provisioning time reduced by up to	**90%***	

Enabling you get to market faster, unlock maximum operational success, and deliver better customer experiences, Hitachi's 100% data availability guarantee coupled with Brocade's renowned networking resilience means you don't need to worry about outages.

Plus, as the fastest, simplest, most scalable, intelligent, future-proof storage networking solutions in the world today, they will grow and evolve as you do. With built-in NVMe, AI, and automation. No need to relearn anything. No disruption. No rip, no replace.

- Detailed IT insights, predictive analytics and built-in best practices.
- Intuitive user-interface tools with AI-centric automation.
- Intelligent dashboards with global views and quick provisioning.
- Improved end-user experience with global views and seamless integration across all systems and fabrics.
- Open, common API platforms (REST, Ansible, Python).

Hitachi for the enterprise.

Hitachi Virtual Storage Platform 5000 Series:

Fast-tracking your digital transformation

Built on Hitachi's legendary resiliency and performance, the Hitachi Virtual Storage Platform (VSP) 5000 Series is an ideal foundation for the modern data center. The enterprise NVMe data platform for any workload at any scale.

Innovate through better design

The VSP 5000 Series is a solution built to enable you to build yours. From edge to core to cloud. Block, file and object. Detached, converged, hyper-converged; and front-end virtualized capabilities for legacy systems. On-the-fly dedupe optimization. Self-protecting IO architecture. Quadruple redundant fabric and 100% data availability.

Scale up and out rapidly

VSP 5000 Series is able to scale to 69PB of raw capacity while maintaining predictable service levels. Powered by Hitachi Storage Virtualization Operating System RF (SVOS RF) it means 24/7 application availability, and top-drawer NVMe, flash, and I/O traffic performance.

Consolidate workloads

Delivering 33 million IOPS of performance and best-inclass latency (as little as 39 microseconds), VSP 5000 consolidates diverse workloads and applications from a single footprint, helping you eliminate ineffective silos, reduce data center costs, and adapt to shifting capacity demands and service levels effortlessly.

Mix, match, and merge

Traditional, transactional, and mainframe workloads. Containerized applications, analytics and DevOps. The VSP 5000 Series accelerates it all – all while allowing you to intermix NVMe and SAS flash media at the most economic $/GB rates available, manage everything as a single entity,and ensure seamless upgrade paths to SCM.

- **100%** data availability
- **39µs** latency
- **33 Million** IOPS
- **4:1** effective capacity
- **69PB** scale
- **24/7** app availability
- **Best $/GB** rates available

Hitachi for the mid-range.

Hitachi Virtual Storage Platform E Series:

Do more with less

An agile hybrid, flash, and NVMe cloud offering that seamlessly mitigates both risks and costs, the Hitachi VSP E Series drives availability and non-stop data center operations. With rapid setup, Hitachi's 100% data-availability guarantee, simple yet powerful management and virtualization, and robust container support for DevOps acceleration, it's the ideal option for the mid-range.

It means optimum performance and uptime, simplified operations, and fewer outages – all reducing outlay, power, space, cooling, and therefore TCO.

Optimized resilience

Supporting the real-time data demands of mission critical new applications via latencies as low as 64 microseconds while ensuring maximum application uptime, VSP E Series helps you bounce back fast in the event of an outage and cut the risk of data theft and leakage with FIPS 140-2 encryption and industry-leading data erasure.

New realms of cloud-driven agility

VSP E Series means you can adapt and scale storage usage at a moment's notice, even across on-premises storage volumes. And with Hitachi's EverFlex financing delivering even greater flexibility via cloud-like pay-per-use agility, capacity and performance can be balanced exactly in line with changing needs. All while underpinning your wider infrastructure with easy storage integration and tiering for rapid disaster recovery and seamless business continuity.

Operational efficiency

With new levels of compression and deduplication delivering an up to 4:1 data efficiency guarantee, VSP E Series means that vast data volumes can be tackled, managed, and leveraged without extra storage spend. It also provides the lowest cost per IOPS (transactions per second) in the industry.

- **100%** data availability
- **4:1** data efficiency guarantee
- **Latencies as low** as **64 microseconds**
- **The lowest cost** per IOPS (transactions per second) in the industry

Brocade® Gen 7: The Fast, Intelligent and Secure Foundation for a Cyber Resilient Autonomous SAN.

Brocade® Gen 7: enabling a cyber resilient, autonomous SAN.

The pace of change in the data center is placing more demands on IT.

Next-generation servers and storage will move more data through your infrastructure than ever before. Flash and NVMe are processing things at unimaginable speeds, enabling new applications and capabilities such as advanced analytics, business intelligence, and data-intensive workloads that drive new levels of performance and capacity requirements.

These advancements, coupled with the ever-increasing demand for faster, more reliable data access, means the network will need to evolve. As delivery is accelerated, so too is the complexity to manage and make sense of the data. Humans are just not fast enough. The SAN needs to be smarter, and be able to manage itself. With Brocade Gen 7 you can realize an autonomous SAN that unleashes the performance and maximizes the ROI of your server and storage investments.

Gen 7

Why Brocade Gen 7?

Any issue, anywhere in the SAN, can cost millions of dollars in lost transactions and productivity. That's the bottom line.

Trouble is, with everything else in the data center moving extremely fast, your SAN may impede this performance and begin to struggle.

What's working now may not be good enough for much longer. If you don't upgrade your SAN, your ROI from new applications and new storage and server technology could be hanging by a thread.

Of course, you can play it safe, especially in uncertain times. But the business needs the performance now.

So, sure, you can wait. Everything's working fine. It makes no sense to risk something new until things have settled down.

But the truth is, things are never going to settle down. Now, you need a SAN that's ready for a world that works in a different way. You need to lay down the foundation now, rather than trying to catch up later.

You need Gen 7 Fibre Channel from Brocade.

Gen 7: The new dimension.

See how Brocade Gen 7 enables the autonomous SAN.

Digging a little deeper.

When we talk about lower latency, we literally mean half the latency of Gen 6. That's down to 460 nanoseconds.

With Gen 7, you can get the most out of the infrastructure you have now while easing your migration to new storage technologies.

Delivering 64G speeds and ultra-low-latency, Gen 7 provides an instant performance boost for data-intensive applications and high-performance storage – Storage Class Memory (SCM), All Flash Arrays (AFAs), or NVMe.

The intelligence built into Gen 7 allows it to monitor, learn, and measure how application data flows across the fabric. Gen 7 can find problems and fix them without intervention through automatic detection, repair, and optimization at speeds that barely register as incidents.

Brocade Gen 7 also gives you 50% more buffers per ASIC over Gen 6. It can handle more traffic, provide greater distance, cope with bursty workloads, and manage congestion, keeping traffic flowing reliably.

Modern storage fabrics need to be in place now to keep pace with ever-increasing demands of the business.

According to analyst ESG, a modern storage fabric must:

- **Deliver persistent essential low latency and bandwidth improvements** to accelerate new and existing applications.

- **Support end-to-end NVMe** protocol communication and diagnostics, allowing NVMe to coexist seamlessly with existing storage protocols. This capability ensures investment protection.

- **Improve the cybersecurity posture of the storage network** to reduce the risk to valuable data-sets and applications as the environment scales.

- **Offer integrated intelligence and automation** that is built on analytics and telemetry data to further simplify and optimize the environment.

Only Brocade Gen 7 switches and directors provide performance and efficiency gains that could never be achieved manually.

Brocade Traffic Optimizer, a key feature of Gen 7, proactively puts like traffic together over virtual channels, creating separate performance groups. It classifies and automatically segregates traffic by characteristics such as speed, latency, or protocol like NVMe or SCSI. This reconciles the over-subscription and congestion issues caused by mismatched speeds, allowing you to upgrade your infrastructure as your time and budget allows.

Cyber resiliency is at the core of Gen 7.

Security is top of mind for data center administrators as the sophistication and volume of cybercriminal activities have increased dramatically.

Businesses are under immense pressure to protect their enterprise users against disruptions or outages while eliminating cybersecurity vulnerabilities. Counterfeiting and tampering with hardware and software have become a lucrative illegal trade and can also cause serious damage and risk to your environment.

Security integrated by design.

Brocade Gen 7 is a cyber resilient network designed with security in mind to protect an organization against vulnerabilities, making it the top network choice for mission-critical storage.

- **Fibre Channel fabrics** are secure by design, based on controlled access between servers and storage and isolation within the data center.

- **Brocade Fabric OS® (FOS) software** provides integrated security features, such as Secure Boot, Brocade Trusted FOS (TruFOS) Certificates, and hardening of FOS itself, that further reduce vulnerabilities from malware and hijacking attacks by automatically validating the integrity of the switch operating system, security settings, and hardware.

- **Brocade TruFOS Certificates** ensure that enterprises running Brocade directors and switches are currently covered by support licenses and enabled to perform critical operations securely, so 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. Administrators can set up monitoring and alerts for security configuration changes, customize security thresholds, give proper access control to individual admins, and view switch security events.

Brocade Gen 7 Fibre Channel safeguards and modernizes your SAN against cybersecurity and business-continuity challenges that threaten to disrupt data center operations.

Integrated security.

Meet the autonomous SAN.

We've seen the hardware advantages of Gen 7. Now let's see how the software takes things to a whole different dimension of performance.

When things are happening at nanosecond speed, the smallest change can have a huge impact.

Imagine a premium sports car on a test track. The slightest flaw in the track or slowdown in the network might be manageable at cruising speed. But at full throttle, the impact can be disastrous. Picture driving at top speed in the fog.

Yet even this example is on a human scale. In the Gen 7 SAN, things are happening faster than we can imagine. They have to, because the complexity and scale of the traffic continues to grow.

The autonomous SAN uses the intelligence and telemetry built into Brocade Gen 7 Fibre Channel to safeguard the SAN, optimize the network, and resolve issues as fast as they happen. Because at these speeds, if a human had to intervene it would already be too late.

Autonomous SAN technology enables a cyber resilient network.

With self-learning, self-optimizing, and self-healing.

Cyber resiliency goes beyond safeguarding your SAN against cyber attacks.

Brocade Gen 7 also protects your SAN from IT disruptions and disasters with autonomous SAN technology that learns, optimizes, and heals on its own.

These capabilities automate processes to ensure optimal performance, enable non-stop operations, and maximize management automation.

Brocade Gen 7 products harness powerful analytics and advanced, built-in automation, transforming billions of data points into automated actions. This ensures the reliability and performance of critical applications, virtual infrastructure, and NVMe storage.

By understanding and analyzing network telemetry data in real-time, the SAN can automatically make intelligent decisions on traffic prioritization and congestion mitigation to ensure non-stop operations.With automated congestion detection and resolution, Brocade Gen 7 instantly mitigates impacts to applications and resolves issues much faster, freeing up valuable admin time.

Brocade Gen 7 can automatically identify and resolve most of the routine problems that occur in a modern high-speed storage network. Only when it can't resolve an issue itself – like a failing server – does it call for intervention. As a result, today's generalist admins can manage a Brocade Gen 7 SAN without needing to get involved in the granular details.

If and when it needs help, the autonomous SAN will tell the admin what happened, where it happened, and what needs to be done to fix the problem. It will also tell the admin what it has done to work around the issue.

The ability of Gen 7 to self-correct autonomously allows the modern business infrastructure to achieve the reliable performance it needs to reach the full potential of next-generation servers and storage. Now the infrastructure can scale and adapt that performance to its full potential.

Self-Healing

Self-Learning

Self-Optimizing

See what an autonomous SAN can do.
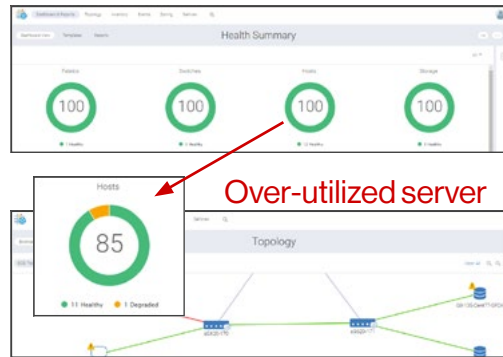
Realizing the autonomous SAN.

Innovative capabilities.

Use case 1:
Avoid performance degradation.

Instantly notify end devices of congestion: your SAN against cyber attacks.

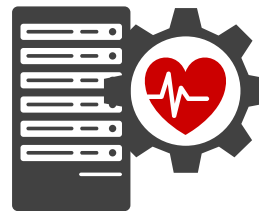## Brocade monitors millions of performance and health characteristics

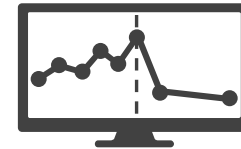Over-utilized server

Over time workloads grow and VMs are added per server

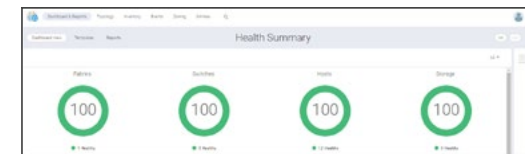## Brocade sends notification of congestion to end devices

End device (HBA) automatically takes action to address congestion

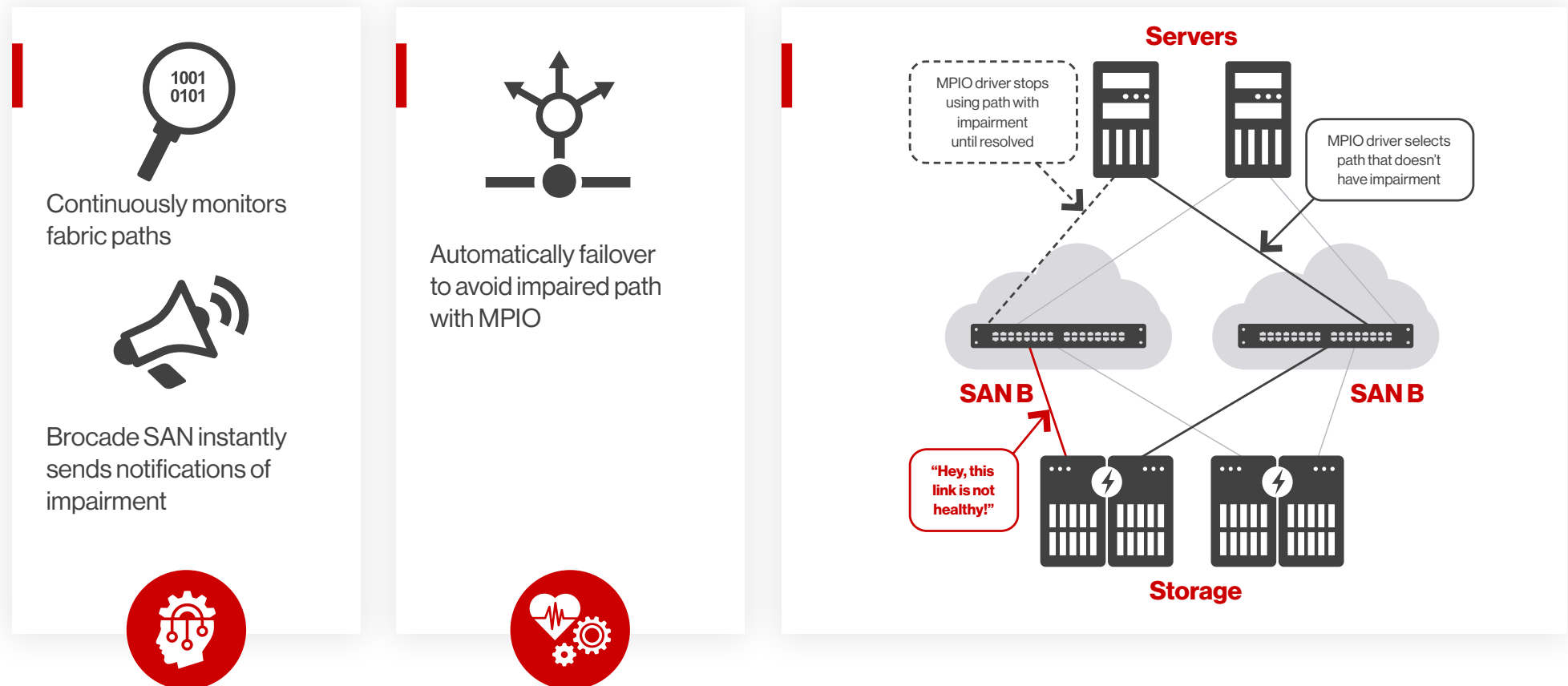## Server causing the issue is paced to optimize resource utilization
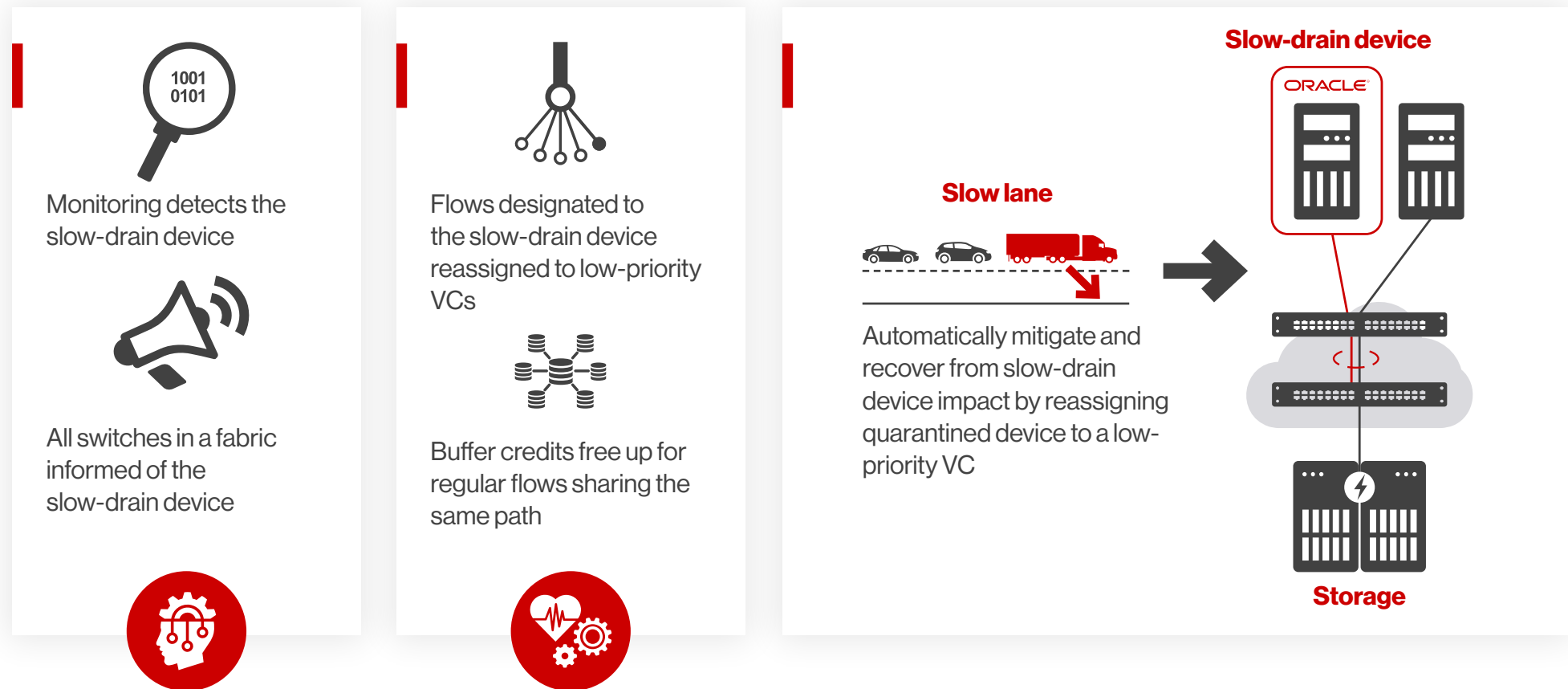
Everything is back to normal

Use case 2:
Ensure data delivery and failover faster.

Failover from physical issues.

Continuously monitors fabric paths

Brocade SAN instantly sends notifications of impairment

Automatically failover to avoid impaired path with MPIO

Servers

MPIO driver stops using path with impairment until resolved

MPIO driver selects path that doesn't have impairment

SAN B

SAN B

"Hey, this link is not healthy!"

Storage

Use case 3:
Eliminate performance impacts.

Automatically take corrective action on misbehaving devices.

Monitoring detects the slow-drain device

All switches in a fabric informed of the slow-drain device

Flows designated to the slow-drain device reassigned to low-priority VCs

Buffer credits free up for regular flows sharing the same path

Slow-drain device

Slow lane

Automatically mitigate and recover from slow-drain device impact by reassigning quarantined device to a low-priority VC

Storage

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Build your foundation for the autonomous SAN.

With Brocade X7 Directors.

Meeting the demands of continuous data growth and critical applications, the Brocade X7 Director is ideal for large-scale storage environments that require increased capacity, greater throughput, and higher levels of resiliency and operational efficiency. With a 50% latency reduction compared to Gen 6, Brocade X7 Directors maximize the performance of NVMe storage and high-transaction workloads, eliminating I/O bottlenecks and unleashing the full performance of next-generation storage.

In addition, the Brocade X7 Director lays the foundation for the autonomous SAN by harnessing the power of analytics and the simplicity of automation to optimize performance, ensure reliability, and simplify management.

AUTONOMOUS SAN
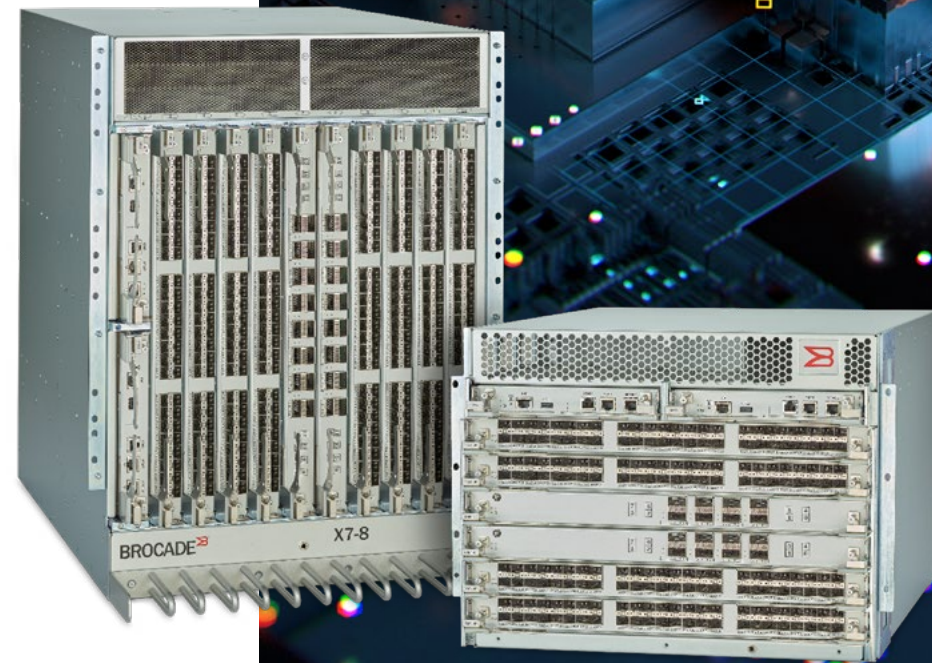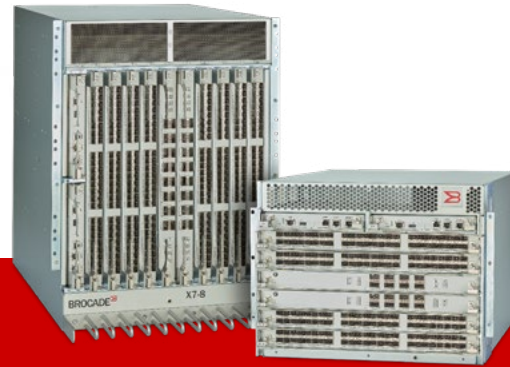
Brocade X7 Directors provide up to 384 64G line rate ports or up to 512 32G line rate ports, enabling organizations to scale more devices, applications, and workloads.

With diverse deployment options, multiprotocol flexibility, and mixed blade capability, organizations can adapt and optimize their businesses to meet next-generation storage and server requirements.

For investment protection, Brocade X7 Directors offer three generations of backward-compatibility support for connectivity to 8, 16, and 32G Fibre Channel products. The Brocade X7 also supports mix-and-match blades, allowing Gen 6 and Gen 7 blades to be installed in the same chassis.

Scale up to 384 64G line rate ports or up to 512 32G line rate ports

2x performance and scale compared to Gen 6

50% lower latency

Integrated analytics and advanced automation

Traffic Optimizer and congestion management

Mix and match Gen 6 and Gen 7 blades

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Connect more devices and build larger fabrics with Brocade Gen 7 switches.

Brocade
GEN7
FIBRE CHANNEL

Build high-performance fabrics with powerful, ultra-dense 64G switches.

Brocade Gen 7 switches create high-scale fabrics in less rack space with the industry's highest-density 64G switch portfolio. These switches simplify deployment, configuration, and management of SAN resources with a collection of easy-to-use tools – Brocade SANnav and Brocade Web Tools. Beyond being inherently secure, Gen 7 switches come bundled with secure optics, secure boot, and secure licensing.

The Brocade G730 enterprise switch also ships with Trusted FOS certificates. Unlike previous generations where you had to purchase separate software licenses, now Brocade Gen 7 switches include all software feature licenses for Fabric Vision, ISL Trunking, Integrated Routing, and Extended Fabrics, and the Brocade G720 also includes the FICON CUP license.

Brocade G720 Switch

Fixed-port building block designed to maximize performance of flash and NVMe environments.

- Up to 64 64G ports in a 1U switch.

- 48 SFP+ ports + 8 SFP-DD ports for a total of 64 ports.

- Scales from a 24-port base configuration to 64 ports with three 8-port SFP+ PODs, plus a 16-port SFP-DD POD using eight 2x64G SFP-DD transceivers.

- Encrypts and compresses traffic between sites.

Brocade G730 Switch

High-density building block designed for increased scalability to support growth and large fabrics in dense rackmount environments.

- Up to 128 ports in a 2U switch.

- 96 SFP+ ports + 16 SFP-DD ports for a total of 128 ports.

- Scales from a 48-port base configuration to 128 ports with two 24-port SFP+ PODs, plus a 32-port SFP-DD POD using 16 2x64G SFP-DD transceivers.

Brocade Gen 7 optical transceivers.

Industry's first 64G optical transceivers.

Broadcom provides the industry's first 64G optical transceivers. Brocade optical transceivers are optimized and certified for high-performance data-center network connectivity. With guaranteed compatibility with Brocade switches and directors, compliance with industry standards, and Brocade support, Brocade transceivers satisfy a wide range of speed, form-factor, and distance requirements.

Brocade 64G SWL SFP+ optical transceiver

Accelerate data access with 64G links to unleash the full performance of next-generation storage networks.

Brocade Gen 7 ICL QSFP optical transceiver

Provide scalable connectivity for Brocade X7 Director chassis-to-chassis interconnect. Two Gen 7 ICL QSFP transceiver options available:

Brocade 64G SFP-DD optical transceiver

Connect more servers, storage, or switches in the same footprint with the industry's first double density optical transceiver.

- Backward-compatibility support for connectivity to **16/32G Fibre** Channel devices.
- **OM3/OM4/OM4+/OM5** operating distances across 16/32/64G.
- **Supported in Gen 7** products only.

- Supports a link **length up to 2 km over** single-mode fiber using an industry-standard LC connector.
- **Supports up to 100m on OM4/OM5** multimode fiber or 70m on OM3 multimode fiber using an industry-standard MPO-12 UPC connector.

- **Increases port count** within the same footprint.
- Provides **two ports for device** or ISL connectivity.
- Accommodates either **SFP or SFP-DD optics** in each SFP-DD port.
- Can be **installed in any order** and any combination.

Conclusion.

The business always wants faster, more reliable, and more secure data access. To meet those ever-increasing demands, you need a modernized infrastructure that maximizes performance, simplifies management, ensures continuous availability, and strengthens the level of security. The solution you need is Brocade Gen 7 Fibre Channel.

Brocade Gen 7 brings all these capabilities together. Our Gen 7 hardware platforms, combined with software and integrated security features, will maximize the performance, efficiency, and resiliency of your storage investments and resources.

Brocade Gen 7 is the intelligent, scalable foundation you need to create an infrastructure ready to deliver your modern, on-demand data center.
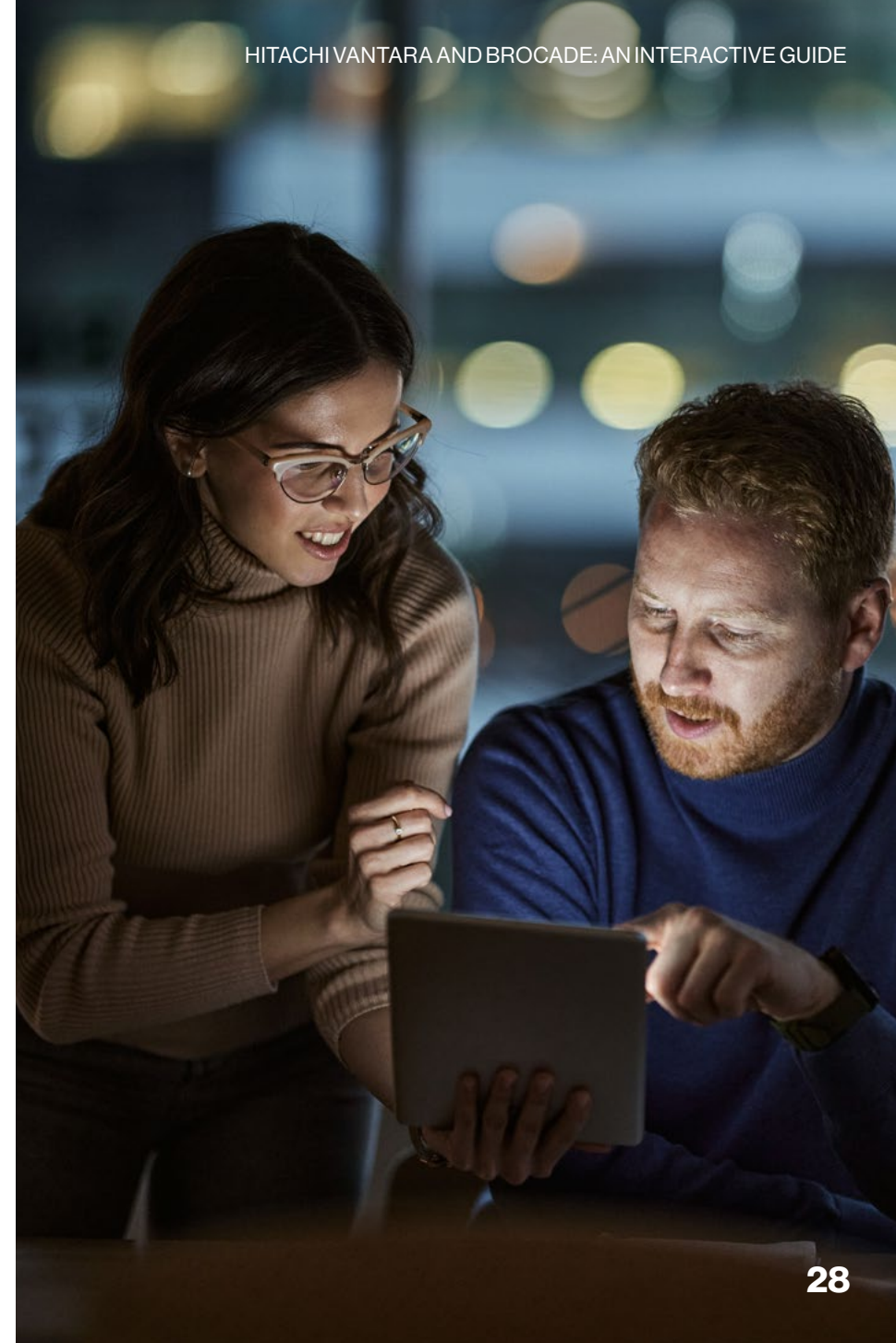
Speak to one of our specialists about how you can benefit from Brocade Gen 7 today.

Want to find out more?

Brocade Gen 7