

Realize an Autonomous SAN with Brocade/IBM GEN7 Fibre Channel

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New Technologies Accelerate the Delivery of Data and Services

The SAN needs to evolve to keep pace with innovations and modern day demands

Critical Applications

ORACLE®



Microsoft SQL Server

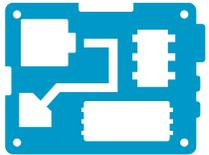


SUSE

vmware®



Next-Gen Servers (2021-2021)



Intel - Ice Lake
AMD - Milan



PCIe 4
FC-NVMe

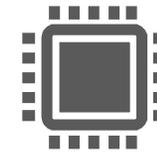
Drastically improves server performance and doubles IO in the same footprint

Don't push the bottleneck to the SAN

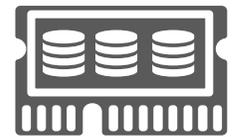
Enterprise Storage



All Flash



NVMe



SCM

Insanely fast storage with parallel, low-latency data paths

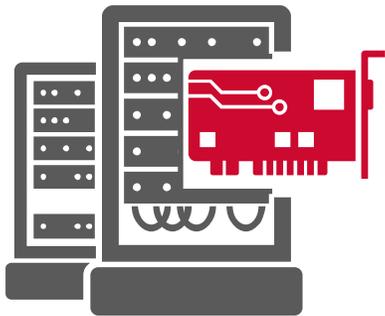
What About the SAN?

Matching Your Next-Generation Data Center Infrastructure

The industry's first 64G switches, adapters and transceivers

Servers

Emulex HBAs



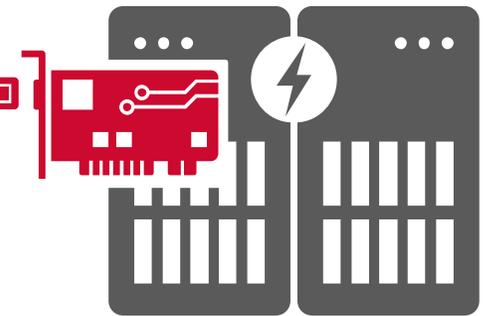
Storage Network

Brocade SAN switches, directors, and analytics



Storage

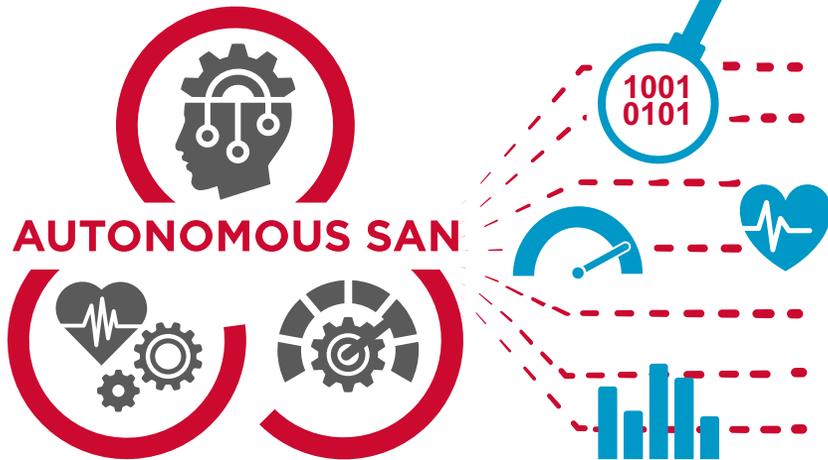
SAN storage components (Emulex HBAs, RAID and I/O controller chips)



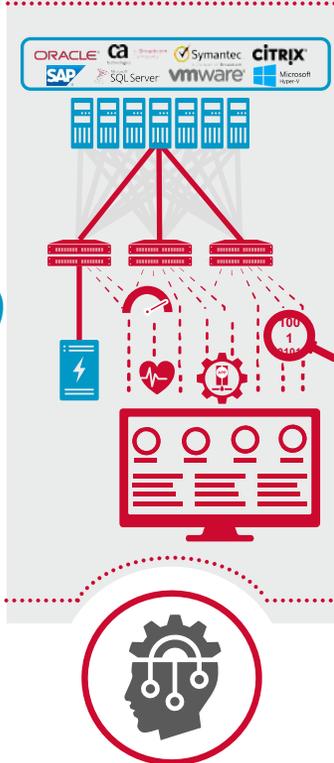
- 64G platforms: IBM SAN256B-7 & SAN512B-7 Directors and SAN64B-7 Switch
- 64G Fibre Channel optical transceiver
- 64G end-to-end solutions with IBM switches and Emulex adapters
- Expanding the ecosystem of autonomous SAN functionality

Transform Storage Networks with Autonomous SAN Capabilities

Analytics and automation capabilities to eliminate complexity and save money

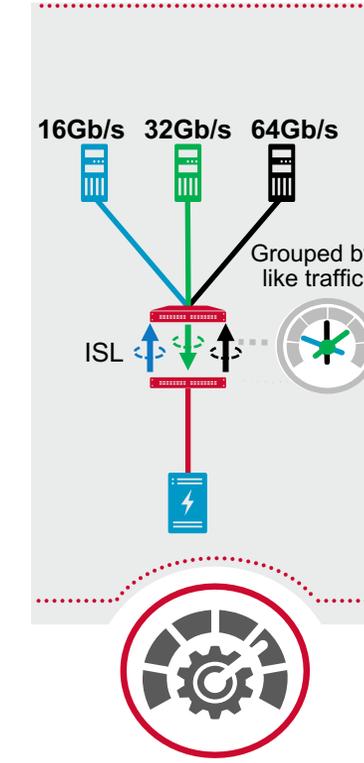


Self-Learning



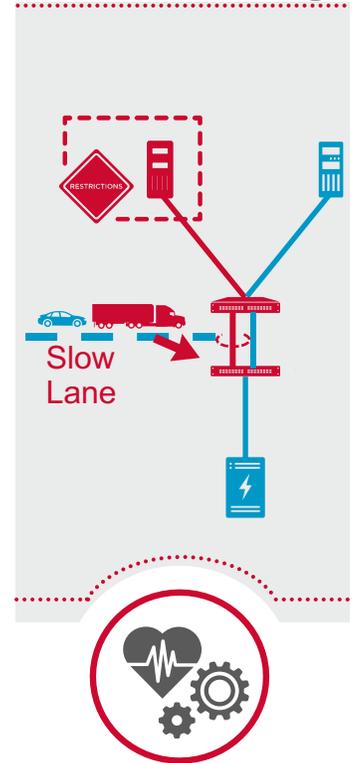
Instantly understand your SAN with actionable insights

Self-Optimizing



Optimize performance with automatic behavior-based actions

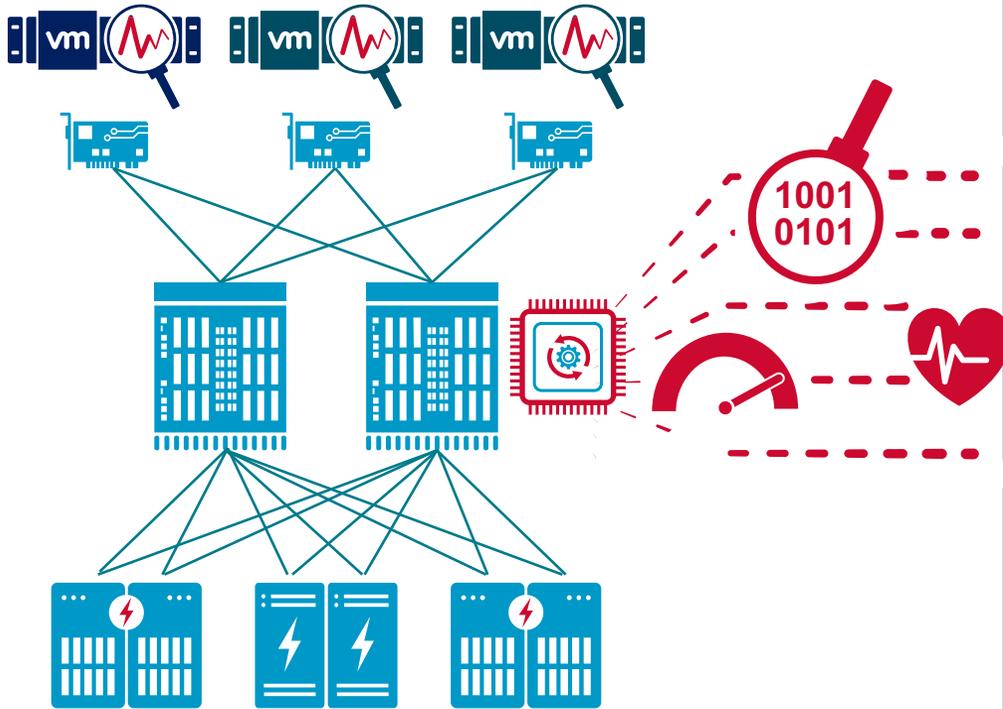
Self-Healing



Ensure reliability with automatic avoidance and recovery features

Self-Learning Transform Data into Actionable Intelligence

Quickly understand the impact of current or trending problems

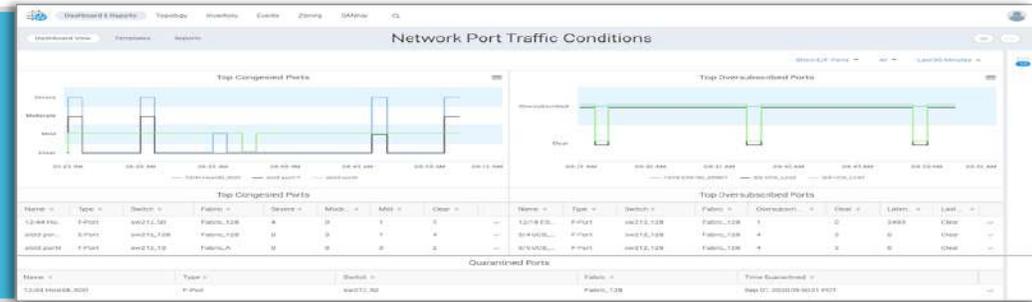


Automatic IO Insight Flow Learning and Integration with MAPS Policies

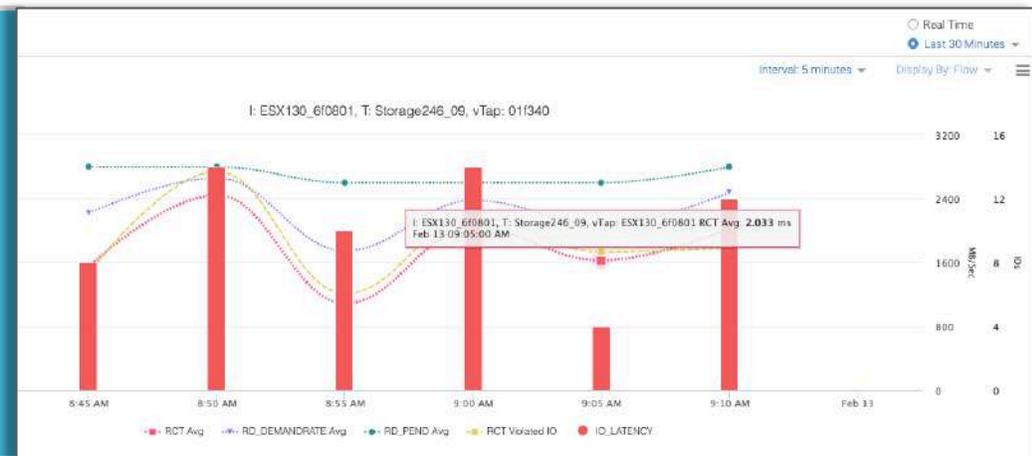
Instantly correlates data into health scores



Summarizes critical data into easy to read dashboards

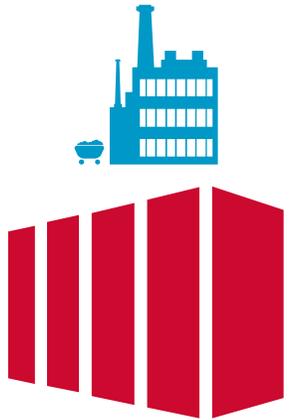
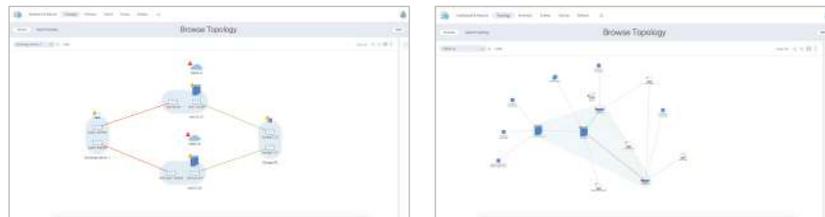
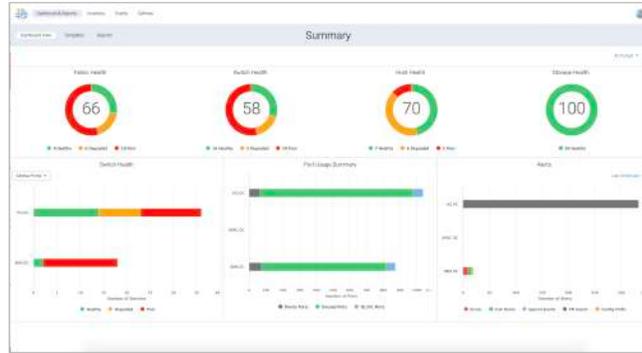


Powerful troubleshooting capabilities to identify the root cause of issues



Manage the Autonomous SAN with SANnav Management Portal

Increase visibility, actionable intelligence and simplified processes



SANnav Global View



Quickly visualize the health, performance, and inventory of all the fabrics across all SANnav Management Portals using a simple, intelligent dashboard

SANnav Management Portal



Next-generation SAN management application, architected from the ground up with a focus on streamlining common workflows, such as configuration, zoning, deployment, and troubleshooting.

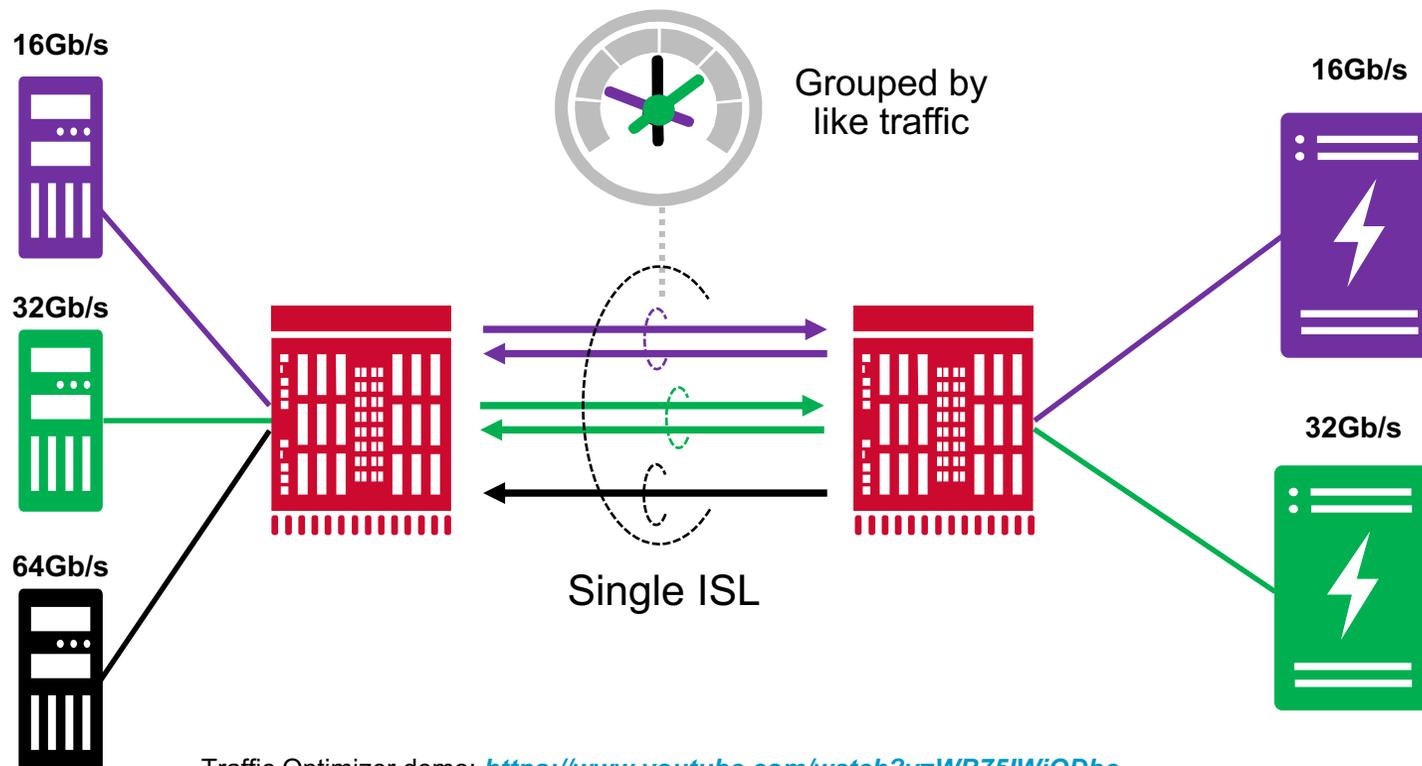
SANnav Management Portal and Global View Offering

- Full functional trial versions available for both license
- Deploy on VM or a bare-metal server running OS
 - Redhat Linux 7.8, 8.1 & 8.2
 - Centos 7.8, 8.1 & 8.2
- Deploy on OVA (SANnav Management Portal only)
 - CentOS 8.2 packaged
 - ESXi 6.7
- Single Node deployment only
 - Multi Node deployment has been removed

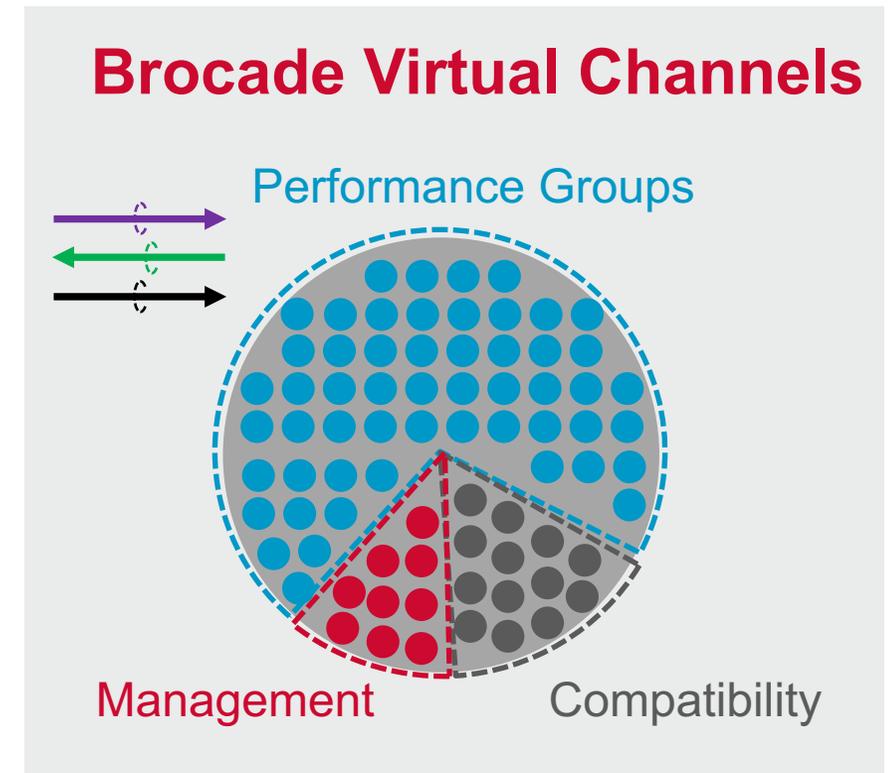
Description	License	Supported Instances/Ports
Brocade SANnav Management Portal		
	Base Edition	600 ports <i>(Only Switches)</i>
	Enterprise Edition	up to 15,000 ports
Brocade SANnav Global View		
	Brocade SANnav Global View	Up to 20 SANnav Management Portal instances

Self-Optimizing with Traffic Optimizer

- Optimize and guarantee application performance by prioritizing and grouping traffic
 - Automatic traffic classification to Performance Group by **destination port speed**
 - Eliminate common oversubscription and congestion issues caused by speed mismatch
 - Enabled by default on all GEN7 platforms (incl. FC32-X7-48 blade)
 - Backward compatible with GEN6 platforms in a mixed environment (PID2VC)
 - The net benefit of Traffic Optimizer is superior and more predictable performance

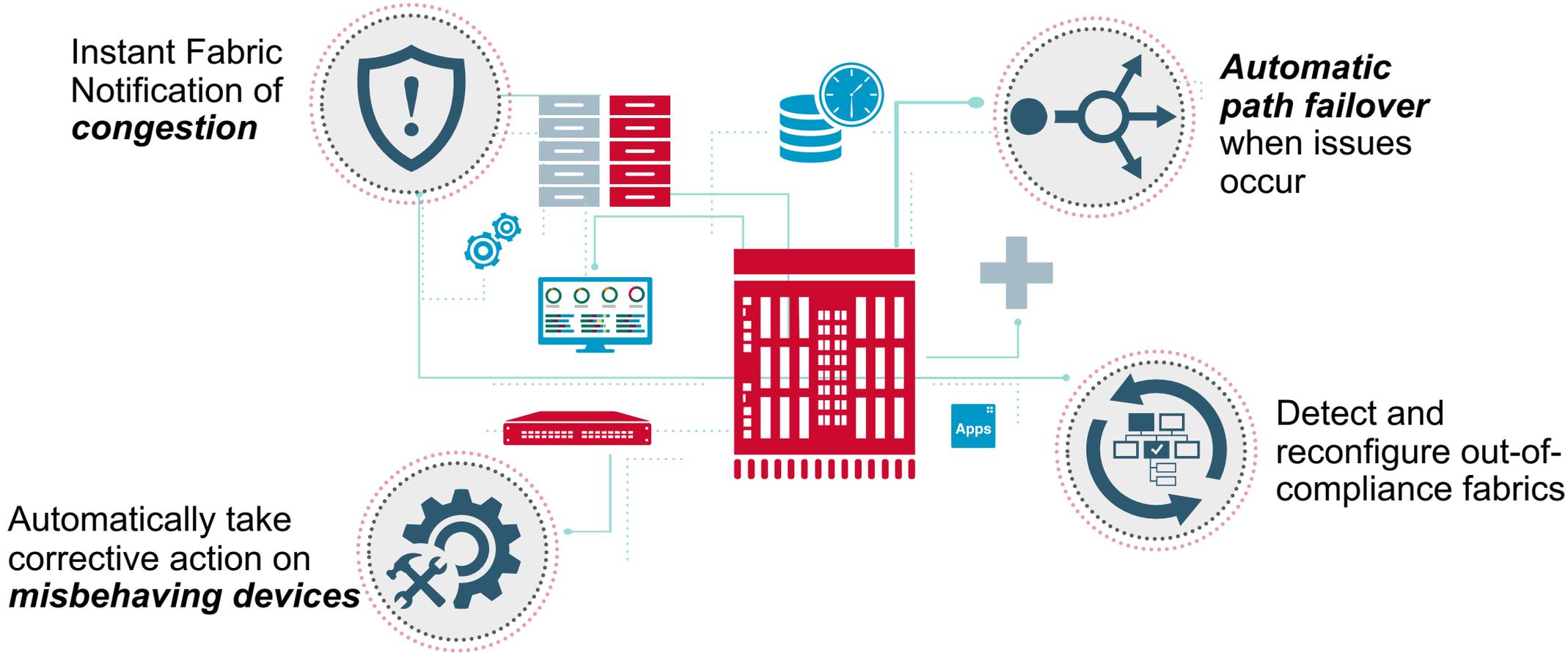


Traffic Optimizer demo: <https://www.youtube.com/watch?v=WB75lWiQDbc>



Self-Healing Mitigates and Resolves Issues Without Intervention

Automatic Avoidance and Recovery Features Ensure Reliability



Fabric Performance Impact Notification and Congestion Signals

FC Standard Congestion Management Service ensures fabric performance

Fabric Performance Impact Notification (ELS)

(FC-LS-5 standard)

- Link Integrity Notification
- Delivery Notification
- Congestion Notification
- Peer Congestion Notification

FOS 9.0

Congestion Signals (Primitives)

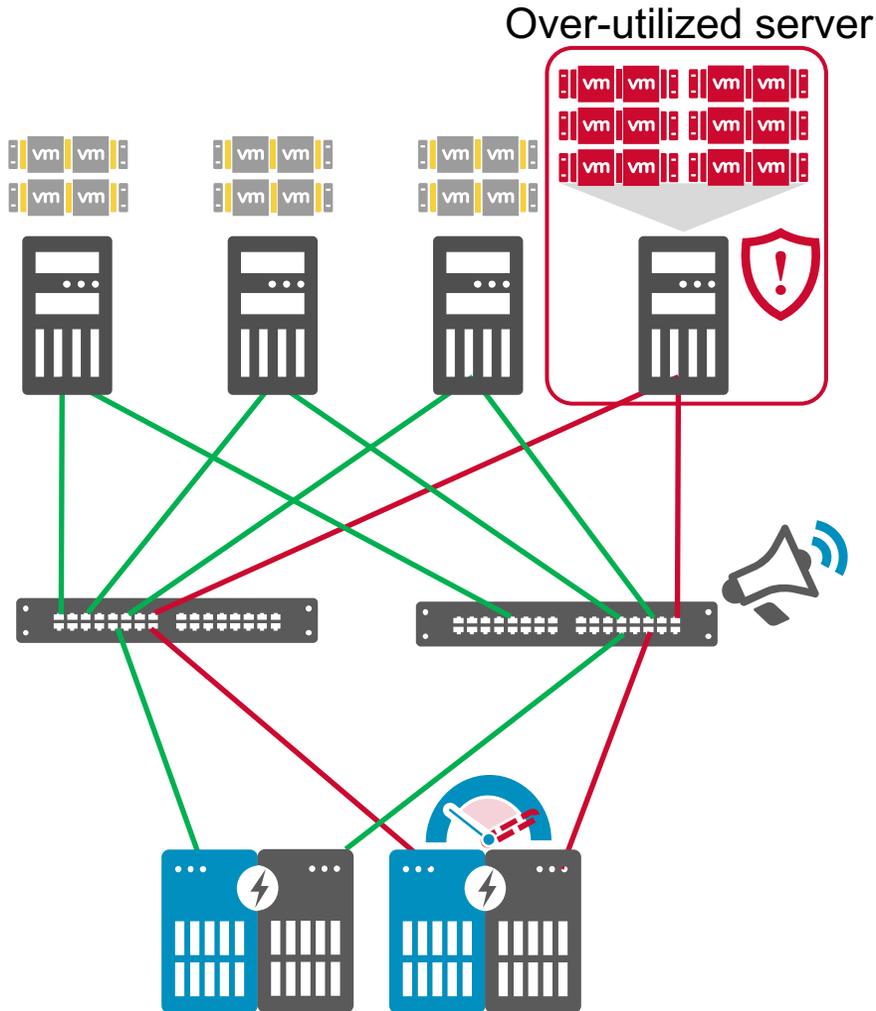
(FC-FS-6 standard)

- Warning Congestion Signal
- Alarm Congestion Signal

GEN7 HW

Self-Healing with Fabric Performance Impact Notification (FPIN)

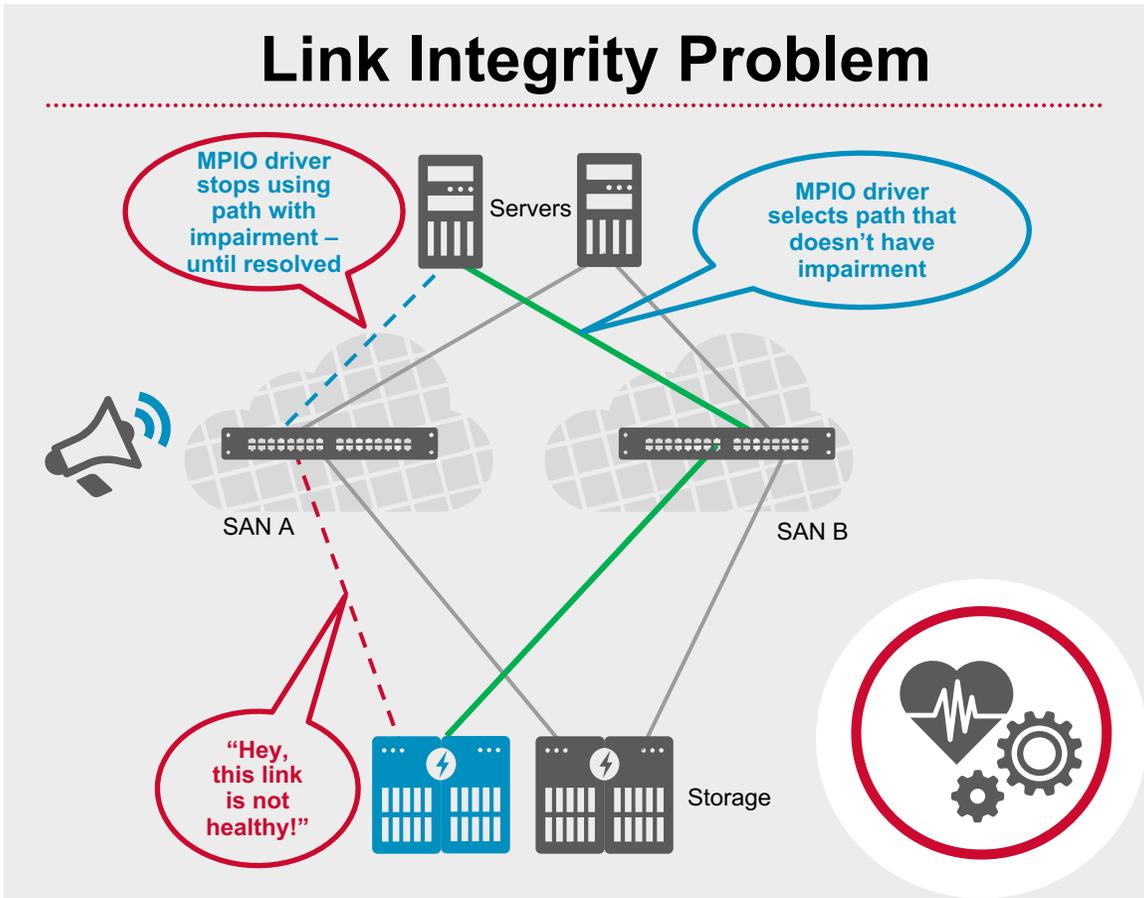
Congestion Signals and/or FPINs enables automatic mitigation and recovery



- Fabric **congestion notifications** facilitate a self-mitigating, self-healing storage network that helps avoid/resolve congestion
- Switch HW and SW detects performance-impacting behaviors and triggers notifications
- Fabric sends notifications to registered end-devices, both end-devices of the congested or impaired flow
- End-devices receiving notifications may adopt one of the following actions:
 - Slow down requests/responses
 - Reset to recover
 - Failover to an alternate path

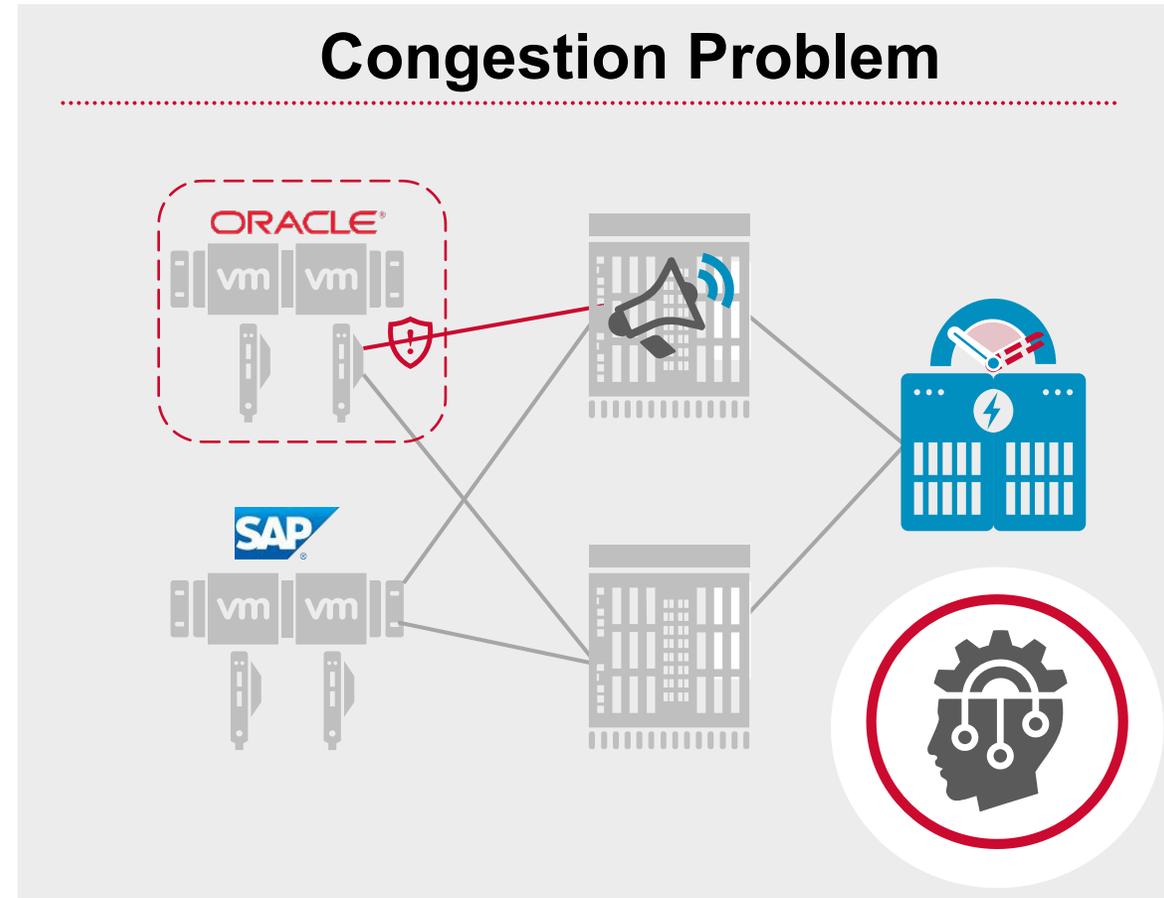
Fabric Notification Use Case Examples

Link Integrity Problem



Brocade instantly sends FPINs of **impairment** (sick-but-not-dead) to the host HBA which forwards it to MPIO driver that decides to failover to a healthy path

Congestion Problem



Brocade sends Fabric Notification of **congestion** to the host adapter port and the peer storage port for potential optimization and remediation actions

SDDQ to Eliminate Performance Impacts from slow-drain devices

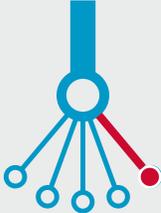
Automatically taking corrective action on misbehaving devices



Monitoring detects the slow drain device



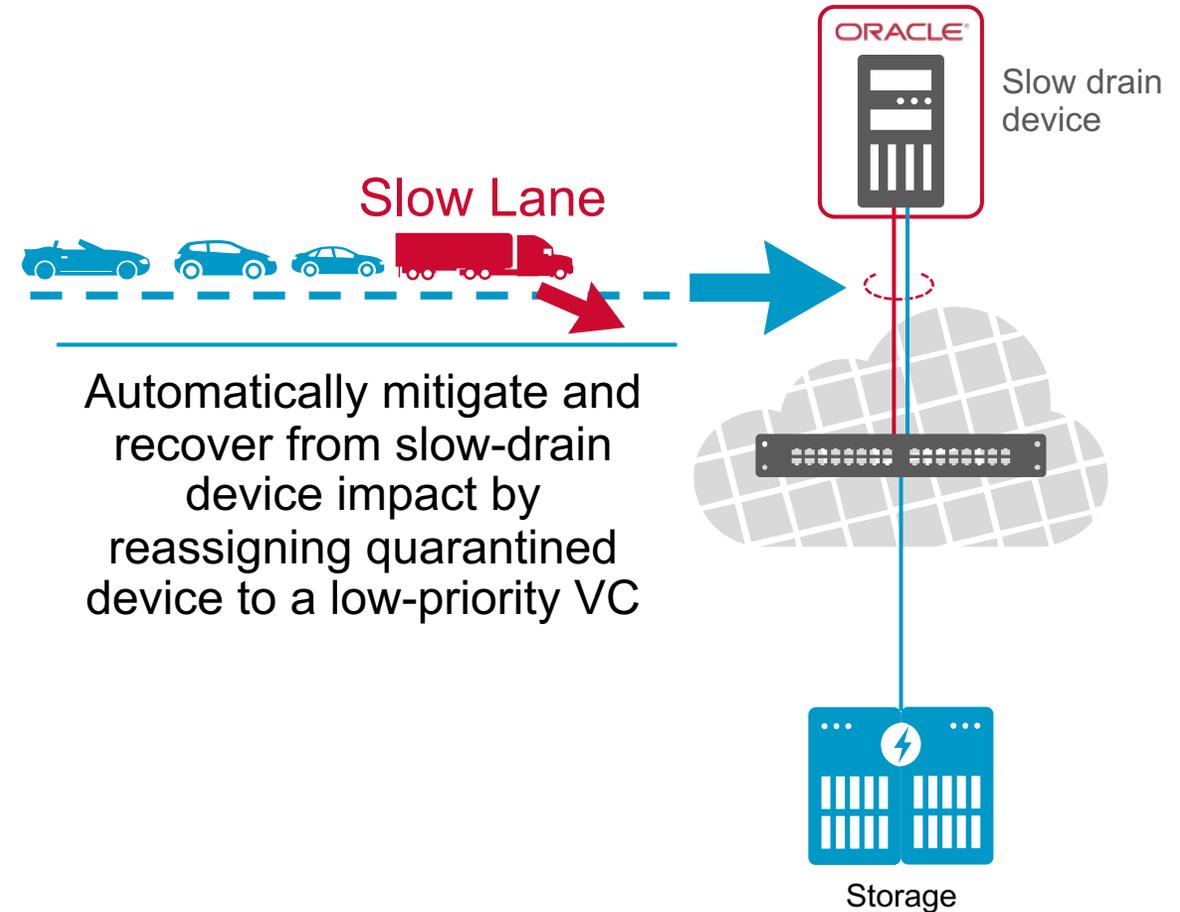
All switches in a fabric informed of the slow drain device



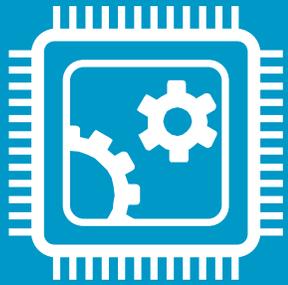
Flows designated to the slow drain device reassigned to low priority VCs



Buffer credits free up for regular flows sharing the same path



Benefits of IBM GEN7 Summary



2X

Performance

Double the speed and
50% of the latency



New

Traffic Optimizer

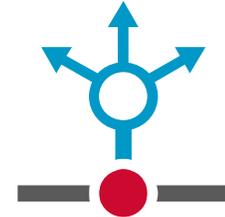
Optimize traffic performance
across the network



New

Congestion Notification

Hardware and software
signaling to end devices



New

Multipathing

Monitor and notify MPIO
layer of link health



Better

SAN Telemetry Data

190+ more IO, NVMe
and flow metrics



Better

Flow Learning

Automatically learn and
monitor application traffic path



Better

Security

Tamper proof
hardware

Ready for the Future, Today

Run FC-NVMe and SCSI concurrently without disruption as the business requires

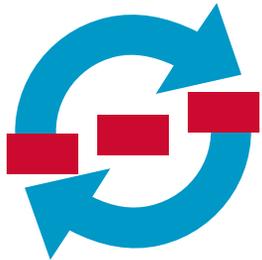


Download

the 2nd Edition NVMe over Fibre Channel for Dummies book here!

<https://docs.broadcom.com/docs/12395299>

Concurrent Traffic



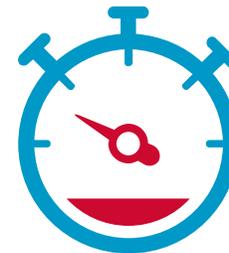
Run FC-NVMe and SCSI concurrently on same network to meet the needs of the business

Seamless Integration



Deploy FC-NVMe with no rip-and-replace when desired

Unleash Performance



Enable faster application response times and harness the full performance of flash

Increase Visibility



Gain granular visibility into SCSI and NVMe IO performance and health

Optimizing VMware applications with IBM FlashSystem NVMe

Test	Transactions Per Minute (TPM)	Throughput	Transactions per CPU %
32G SCSI/FC	328,672	111,045	12,590
32G NVMe/FC	582,374	196,067	16,484
NVMe Benefits	83% More TPM	79% More MB/sec	31% Improved CPU Efficiency



Additional benefits of NVMe/FC include:

- **Leverage existing FC infrastructure**
 - processes, tools, expertise, and vendor relationships
- **Reduce capital equipment and licensing costs**
 - future-proof upgrade path from SCSI/FC to NVMe/FC
- **Increase consolidation and utilization of hardware**
 - storage and server infrastructure
- **Lower data center costs**
 - power, cooling, and floor space
- **Reduce the number of server CPU cores**
 - software licensing costs that are tied to CPU core counts (e.g., Oracle database licenses).

Optimizing Real Applications with IBM FlashSystem 9200

Benefits of using **32G FC vs 16G FC**

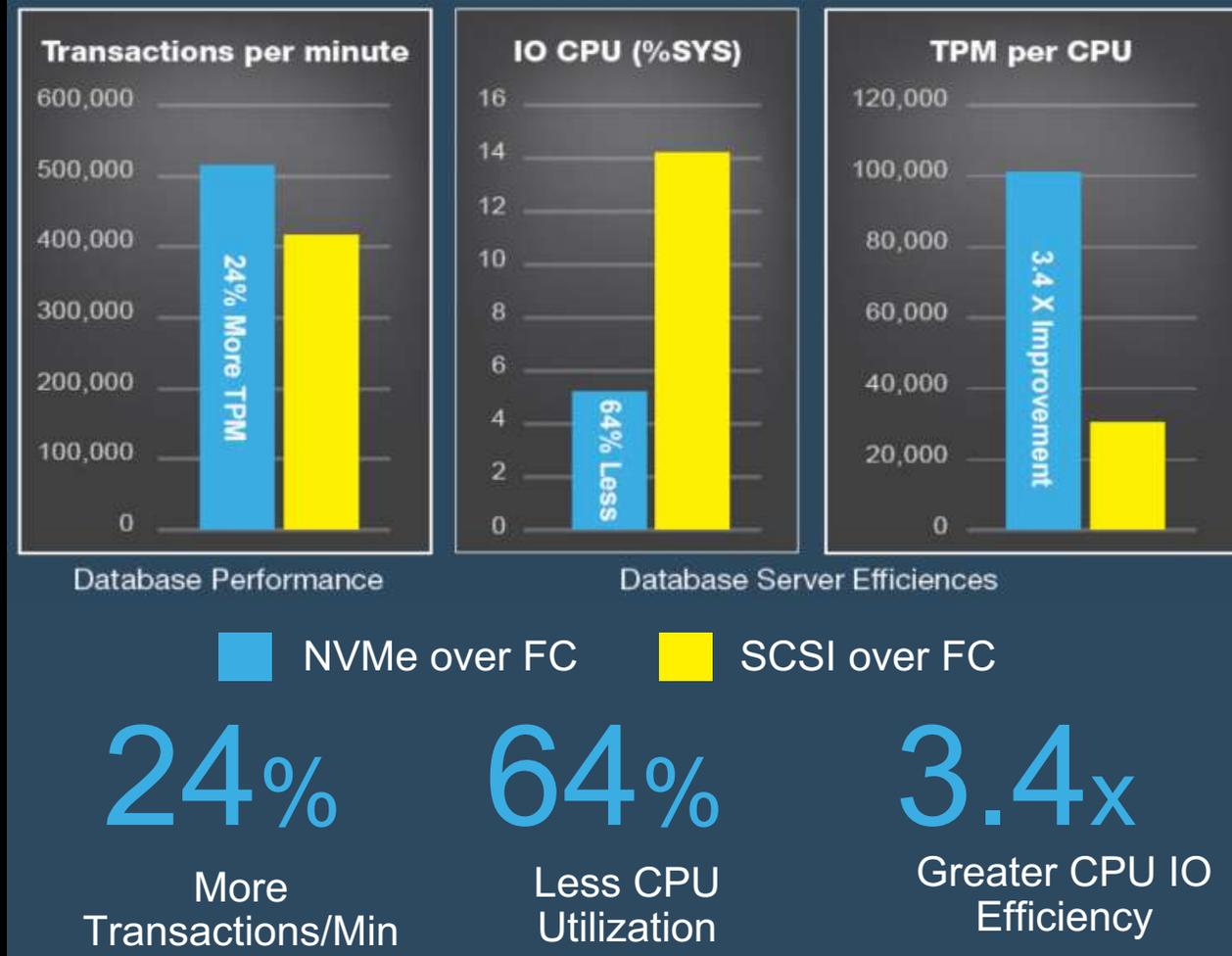
Benefits of **NVMe vs SCSI**



“The IBM FlashSystem solution with the 32G IBM b-type storage networking and Emulex 32G FC technology accelerated decision support query time by 46% and increased throughput by 96%”

46%

Faster Query Completion



NVMe Over Fibre Channel OS Support (May 2021)

For Emulex adapters

Item	Version	Notes
	SLES12 SP4 In-Box and later SLES15 In-box with the latest update SLES15 SP1 In-Box and later	NVMe native MPIO (ANA & AEN) support in SLES 15 SP1 and later
	RHEL 7.6 In-Box	No MPIO Support
	RHEL 7.8 In-Box	DM MPIO Support
	RHEL 8.0 In-Box	No MPIO support
	RHEL 8.1 In-Box	NVMe Native MPIO (ANA & AEN)
	UEK 5 R2 Errata 4	NVMe native MPIO (ANA & AEN) support for UEK
	Windows 2021 In-Box Windows 2012 and 2016 OOB* Logo Certified: Completed Oct 2017	MPIO support (multi-path I/O) NVMe to SCSI Translation by Emulex
	Support in ESXi 7.0 In-Box and IOVP	vSphere MPIO Production support
	AIX 7.2 TL5	IBM MPIO with AIX PCM

* Emulex recommends that customers move to the latest OOB driver for the best performance.

Flash Array Support for NVMe over Fibre Channel (May 2021)

Supported Systems



PowerMax 2000, 8000



Hitachi Vantara Virtual Storage Platform 5000 Series



OceanStor Dorado V6 18000/8000/6000/5000/3000



FlashSystems A5000 Series, A9200 Series, A9000/9100 Series, 900 Series, A7000 series
Storwize V5000, 7000



ThinkSystem DE Series DE2000H/DE4000H/DE6000H, DE4000F, DE6000F
ThinkSystem DM Series DM7100H, DM7000H, DM3000H, DM5000F, DM7000F, DM7100F



AFF Series A220, A400, A700, A800
EF Series EF600, EF570, EF280
E Series 18F, 32F



FlashArray//X, FlashArray//C



VX-100F

IBM GEN7 Overview



IBM Provides A Simplified Modern All Flash Storage Family

<p>FS5000</p>  <p>Cost efficient Entry Enterprise</p>	<p>FS5200</p> <p>Certified NVMe end-to-end</p> <p>32 Gb</p>  <p>NVMe for Entry Enterprise</p>	<p>FS7200</p> <p>Certified NVMe end-to-end</p> <p>32 Gb</p>  <p>Mid-range Enterprise NVMe</p>	<p>FS9200</p> <p>Certified NVMe end-to-end</p> <p>32 Gb</p>  <p>High-end Enterprise NVMe</p>	<p>FS9200R</p> <p>Certified NVMe end-to-end</p> <p>32 Gb</p> 	<p>IBM Spectrum Virtualize</p>	<p>SAN Volume Controller</p> <p>Certified NVMe end-to-end</p> <p>32 Gb</p>  <p>High Performance Heterogeneous Virtualization</p>
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IBM b-type Storage Networking supports 32 & 64 Gb/s, NVMe, FICON, and Extension

<p>Storage/Tape Extension Solutions</p>  <p>SAN18B-6</p>  <p>SAN42B-R</p>	<p>32 Gb/s</p> <p>Certified NVMe TODAY</p>	 <p>SAN24B-6</p>	 <p>SAN64B-6</p>	 <p>SAN128B-6</p>	 <p>SAN256B-6</p>	 <p>SAN512B-6</p>	<p>GEN6 FIBRE CHANNEL</p>
<p>Fibre Channel Adapters & Storage</p>  	<p>Autonomous SAN, Even Lower Latency</p> <p>32/64 Gb/s</p> <p>Certified NVMe TODAY</p>	 <p>SAN64B-7</p>	 <p>SAN256B-7</p>	 <p>SAN512B-7</p>	<p>GEN7 FIBRE CHANNEL</p>		
<p>IBM SANnav Management</p>  <p>Global View</p>  <p>Management Portal</p>							

Industry Leading GEN7 64G Solutions

NEW!
APRIL
27



new
Products
switches, blades, optics

64G SAN64B-7 switch bundles
64G 48-port SWL director blade
32G Extended LW optics up to 25km

up to
2X
higher bandwidth

GEN7 64G bandwidth increases workload scalability, ideal for growing both legacy and next-gen applications.

up to
50%
lower latency

With latency as 460ns, GEN7 is ideal for high-performance transactional workloads and NVMe.

full set of Gen 7
Autonomous
SAN feature set

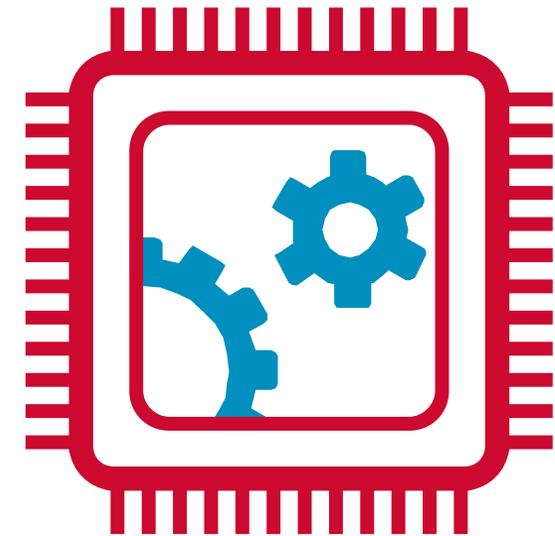
GEN7 captures deep analytics to enable automation capabilities that eliminate complexity and save money

For more information on IBM b-type solutions, download the [IBM SAN Sales Reference Manual](#)

The Industry's Most Advanced Switching ASIC

Fibre Channel platforms built on a **Condor 5 ASIC**

- 50% lower latency for NVMe workloads 460ns
 - Learn, measure and monitor fabric wide latency of flows
- 50% more buffers per ASIC
 - To support distance, burst workloads and congestion management
- Double encryption and compression capacity
- Two variant's are used
 - Condor 5 Gen 7: 8, 10, 16, 32, **64Gb/s** Fibre Channel in **Gen 7 version**
 - G720, X7, FC64-48
 - Condor 5 Gen 6: **4***, 8, 16, 10, 32 Gbps Fibre Channel in **Gen 6 Version**
 - FC32-X7-48
 - G620v2 and G630v2
 - BB_Credit and Latency numbers may vary
- Products with both C5 versions, require SANnav and FOS v9



* May not be supported on all devices or port types, pls. check documentation

Build a Foundation for the Autonomous SAN with IBM GEN7 Directors

Modular design provides scale on-demand

Brocade
GEN7
FIBRE CHANNEL

Two Director Models

Purpose-built to power
large-scale storage
environments



SAN512B-7 Director for Large Enterprise

- 14U, eight vertical blade slots
- Scale up to 384 x 64Gb/s ports or 512 x 32Gb/s ports
- 32 additional GEN7 UltraScale ICL ports
- Up to 31Tb/s of aggregate chassis bandwidth
- Dual air-flow directions
 - Back-to-front (non port-side intake, NPI)
 - Front-to-back (non port-side exhaust, NPE)



SAN256B-7 Director for Midsize Enterprise

- 9U with exhaust shelf, four horizontal blade slots
- Scale up to 192 x 64Gb/s ports or 256 x 32Gb/s ports
- 16 additional GEN7 UltraScale ICL ports
- Up to 15.5Tb/s aggregate chassis bandwidth
- Dual air-flow directions
 - Back-to-front (non port-side intake, NPI)
 - Front-to-back (non port-side exhaust, NPE)

Port Blade Overview

Speed & Feeds

Brocade
GEN6
Condor 4
32Gb/s

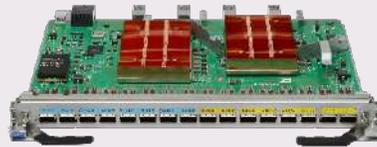
SX6

- 16FC/18IP port Gen 6 Extension blade
- DR & long distances
- 16x 4,8,10,16,32G FC
16x 1/10GbE
2x 40GbE
- 15K Buffer Credits
- FC+IP SFP



FC32-64

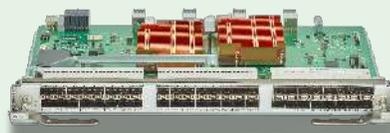
- 64-port Gen 6 high density blade
- Increase scalability
- 4,8,10,16,32Gb/s FC
- 15K Buffer Credits
- 16/32 Gb/s QSFP



Brocade
GEN6
Condor 5
32Gb/s

FC32-X7-48

- 48-port Gen 6 port blade
- 32Gb/s line rate
- 4*,8,10,16,32Gb/s FC
- 15K Buffer Credits
- 16/32 Gb/s secure optics
- ISL Enc/Comp
 - 128Gb/s (8 ports) per blade



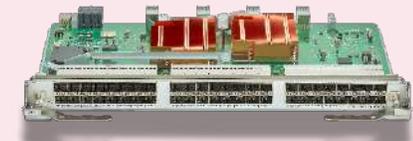
* F-Port only, no ISL (E-Port) support

Brocade
GEN7
Condor 5
64Gb/s

AUTONOMOUS SAN

FC64-48

- 48-port Gen 7 port blade
- 64Gb/s line rate
- 8,10,16,32,64Gb/s FC
- 24K Buffer Credits
- 32/64 Gb/s secure optics
 - 256Gb/s (8 ports) per blade



Port Blade Overview

Feature comparison

Brocade
GEN6
Condor 4

32Gb/s

SX6

- IO Insight
 - SCSI metrics
 - GEN6 metrics scale
- Fabric performance impact notification in software (FPIN)

FC32-64

- IO Insight
 - SCSI + NVMe metrics
 - GEN6 metrics scale
- Fabric performance impact notification in software (FPIN)

Brocade
GEN6
Condor 5

32Gb/s

FC32-X7-48



- IO Insight
 - SCSI + NVMe metrics
 - GEN6 metrics scale
- Traffic Optimizer
- Fabric performance impact notification in software (FPIN)

Brocade
GEN7
Condor 5



64Gb/s

FC64-48



- IO Insight
 - SCSI + NVMe metrics
 - GEN7 metrics scale
 - Fabric latency monitoring*
 - Read oversubscription monitoring*
 - Protocol error metrics*
 - Enhanced VM Insight (tag-less)*
 - Multipath topology discovery*
- Traffic Optimizer
- Fabric performance impact notification in software (FPIN)
- Hardware congestion signal

- HW enabled but functions in future FOS releases, subject to change

Scale Out the Autonomous SAN with the IBM SAN64B-7 Switch

Built to maximize performance and simplify daily tasks

Brocade
GEN7
FIBRE CHANNEL



SAN64B-7 Switch

Fixed-port building block,
designed to scale-out
storage environments

- Efficient 1U switch that delivers high port density and space utilization
- Scales from 24 to 56 x 64Gb/s ports
 - 8 port-on-demand increments (POD)
- **All software licenses are included**
 - Fabric Vision, ISL Trunking, Integrated Routing, FICON CUP, Extended Fabrics
- Simplifies deployment, configuration and management of SAN resources with a collection of easy-to-use tools
 - Reduces the number of steps to deploy and configure a switch with EZSwitchSetup
 - Easier to manage with Brocade Web Tools simplified user interface

IBM SAN64B-7 Product Overview

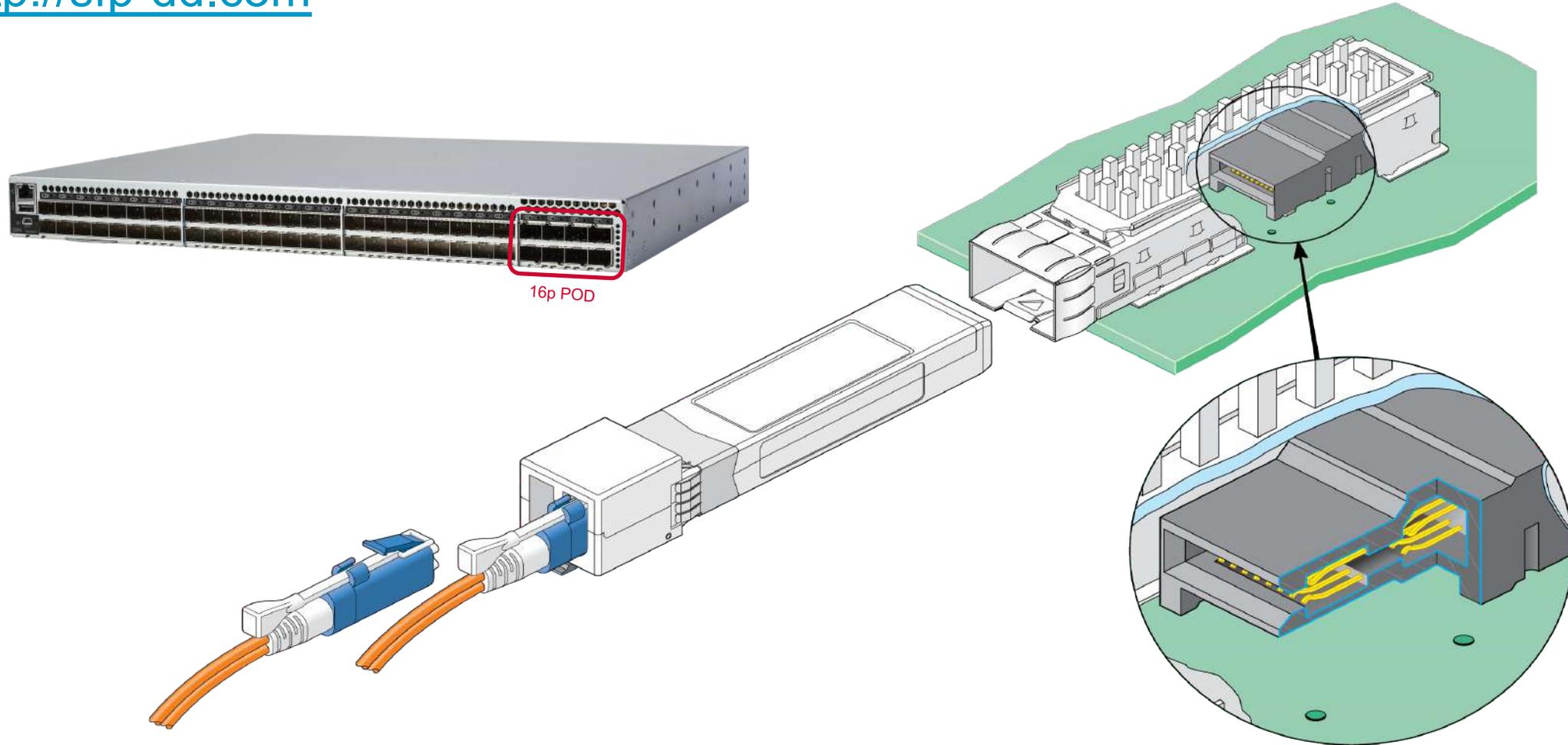
Midrange Level 1U 56-port 64 Gbps GEN7 FC Switch

- 56 x 64G SFP+ ports
 - Base Model with 24 ports
 - Each SFP+ port supports 64/32/16/10/8G FC speeds
 - 16G SFP+ optics not supported (No 4Gb/s support)
 - Only works with new Secure Optics
 - 2 hot-swappable, redundant integrated power supply & Fan FRUs
 - ISL Encryption & Compression, 256Gb/s (4 ports)
 - Rack mountable using universal 2-post or 4-post racks
- Dual air-flow directions
 - Back-to-front (non port-side intake, NPI)
 - Front-to-back (non port-side exhaust, NPE)
- AC and DC power options
- Switch and Access Gateway Mode support
- Requires Fabric OS v9.0.0 or later and SANnav 2.1 or later



SFP-DD Example (SN-Dual)

<http://sfp-dd.com>

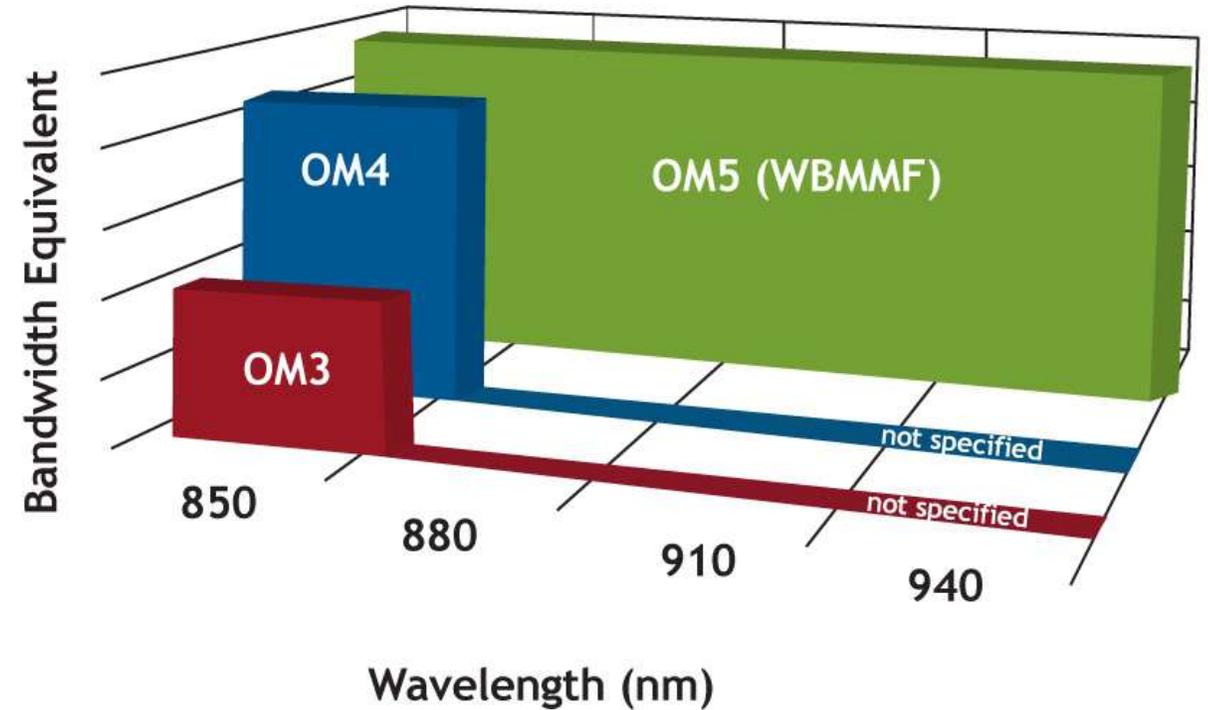


Secure Optics for GEN7 Products

- Brocade introduced Secure Optics for all Condor 5 based GEN7 platforms with FOS v9.0 release
- What are Secure Optics?
 - Brocade introduced Secure Optics with FOS v9.0 to ensure only genuine qualified optics are used with Brocade GEN7 products
 - The security measures are implemented on a system level involving the optics, FOS and platform hardware
 - Sophisticated authentication and software algorithms are used to detect the use of Brocade Secure Optics from third-party counterfeit versions
 - For GEN7 platforms, Secure Optics use an encrypted challenge-response scheme
- Secure Optics are backwards compatible with GEN5 and GEN6 platforms
 - Refer to the latest Brocade Transceiver Support Matrix

Distances ...

- OM5 is OM4 with higher Bandwidth
 - allow to have four wavelength in one fiber to transmit 4 signals
 - Existing 850nm
 - Additionally 880nm, 910nm, 940nm
- **Fibre Channel still using 850nm (SWL)**
- No distance changes
 - 4 Gbps OM4: 400m
 - 8 Gbps OM4/5: 190m
 - 16 Gbps OM4/5: 125m
 - 32 Gbps OM4/5: 100m
 - **64 Gbps OM4/5: 100m**



Source: <https://capital-electric.com/wp-content/uploads/2019/04/OM5-Graphic-1200x627.jpg>

IBM b-type GEN6 and GEN7 Fibre Channel Switch Family

Brocade
GEN6
FIBRE CHANNEL



IBM SAN24B-6 Switch

- 1U, 8 to 24 32Gb/s ports
- Enterprise Bundle option
- If FOS v9 is used, no BNA support

Brocade
GEN6
FIBRE CHANNEL



IBM SAN64B-6 Switch

- 1U, 24 to 64 32Gb/s ports
- Enterprise Bundle and MF option (IR licensed separately)
- v2 C5 GEN6 version requires FOS v9 (no BNA support)
- 4Gb/s support (end-device)

Brocade
GEN6
FIBRE CHANNEL



IBM SAN128B-6 Switch

- 2U, 48 to 128 32Gb/s ports
- Enterprise Bundle option (IR licensed separately)
- v2 C5 GEN6 version requires FOS v9 (no BNA support)
- 4Gb/s support (end-device)

Brocade
GEN7
FIBRE CHANNEL



IBM SAN64B-7 Switch

- 1U, 24 to 56 64Gb/s ports
- 2x performance
- 50% lower latency
- All software licenses included
- Autonomous SAN support
 - Traffic Optimizer
 - Fabric Notification
- Requires FOS v9 (no BNA support)
- No 4Gb/s support

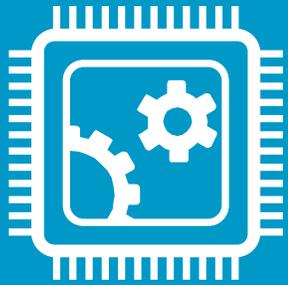
Performance and Functionality

FOS v9.0.1 WebTools

- Modern HTML-based WebTools
 - **No Java!!** – avoids many compatibility and security vulnerability issue
 - Operating systems: Windows 10 Pro, Window 2019, RedHat 8.0 & 8.1
 - Browsers: **Chrome, FireFox** (Note: **Use English U.S. language settings**)
- Modern HTML5 UI technologies same as SANnav provide clean and consistent look and feel
 - Dashboard view provide health and performance summary
- Supports launching from SANnav UI
- FOS v9.x supports most existing WebTools features:
 - Hardware and logical switch view
 - Switch overview and settings
 - Extension performance statistics (SX6 & 7810 with FOS 9.0.1)
 - Port settings and zone admin
 - Access Gateway settings
- Some legacy WebTools features are deprecated
 - SSH Client



Benefits of IBM b-type GEN7 Summary



2X

Performance

Double the speed and
50% of the latency



New

Traffic Optimizer

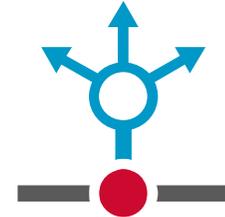
Optimize traffic performance
across the network



New

Congestion Notification

Hardware and software
signaling to end devices



New

Multipathing

Monitor and notify MPIO
layer of link health



Better

SAN Telemetry Data

190+ more IO, NVMe
and flow metrics



Better

Flow Learning

Automatically learn and
monitor application traffic path



Better

Security

Tamper proof
hardware

BSN IBM Market Leadership Initiatives



Maximize Database Efficiency and Performance in a VMware Environment

IBM FlashSystem with Brocade Gen 7 Storage Networking and Emulex Fibre Channel Technology



Cyber Resiliency with Enterprise Solutions Executive Summary & Validation

IBM FlashSystem Family with b-type Storage Networking and Emulex Fibre Channel Technology

Upcoming papers:



IBM b-Type Gen7 SAN Redbook

IBM Expert Series Videos & Podcasts

IBM SANav Introduction

- Integration with Storage Insights
- Discusses the benefits of the Autonomous SAN



Moor Insight & Strategy

- DataCentric Podcast
- Cyber Resiliency Solutions



theCube Panel Discussion

- Modernizing Data Centers



Upcoming videos:

IBM b-Type Gen7 Storage Solutions Video Series

Accessing Free 24x7 Brocade Education



Free Comprehensive Online Education Courses (e-Learning)

Advance Your Skills With Free On-Demand Brocade SAN Training

- On-demand courses for Brocade SAN products and Fibre Channel technologies
- Predefined training paths or individual courses available
- Develop the skills needed to install, configure, administrate and maintain SAN environments
- Registration instructions:
<https://youtu.be/UGKfzyeToK4>

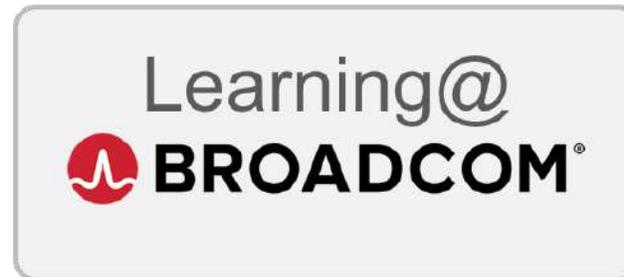
<https://www.broadcom.com/support/fibre-channel-networking/education>

Brocade Classes

Hardware and software courses available, new playlist feature

Hardware & FOS

- Brocade Fibre Channel SAN Foundations Playlist
- Brocade Gen 7 Power Pack Playlist
- Brocade Congestion Monitoring Playlist
- Brocade Troubleshooting Playlist



Learning@Broadcom

SANnav

- SANnav v2.1.1 Product Update Training (PUT-238)
- Brocade SANnav Playlist
- Brocade SANnav Advanced Features Playlist

New Brocade Education Exam (100% free, e-Learning)

Brocade Education Exams

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The Brocade SAN Administrator exam is a free core competency exam covering a broad range of Brocade SAN administration skills and topics. It validates the test-taker's knowledge of Fibre Channel, Brocade products and Fabric OS features. The exam delivers the same high-quality test questions found in industry certification exams, without the requirement of a proctored environment.

The exam was prepared using standard certification exam procedures and the test is available in the Brocade Learning Portal once prerequisites are completed. The exam and playlists replace the BASA multi-topic course and course assessment test in the Brocade Learning Portal.

For more details about the Brocade SAN Administrator exam:



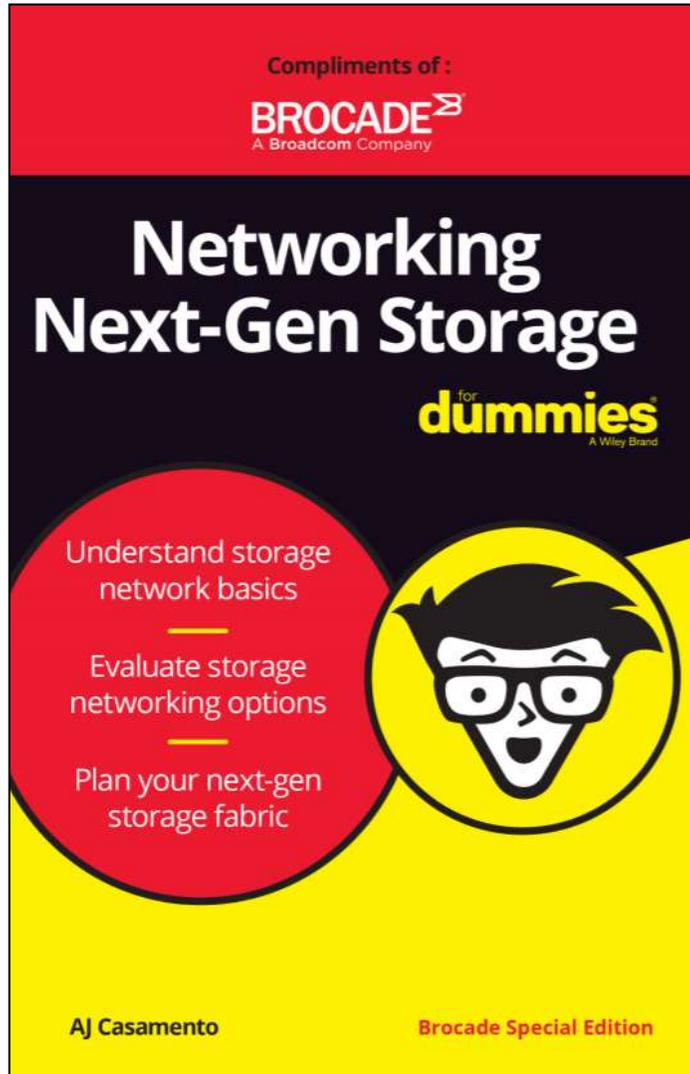
[SAN Administration exam FAQ](#)

We invite you to view a short [video](#) on how to enroll in the Brocade SAN Administrator playlist, which contains the required courses and the exam.

Additional Resources



Get Your Networking Next-Gen Storage eBook Instantly!



An easy-to-understand introduction to storage fabrics for the non-technical person, this eBook explains what **next-generation storage fabrics** are, how they are commonly implemented, and what advantages they offer compared to less modern and less robust technologies.

Armed with this information, you'll be able to make smart decisions about how storage fabrics fit into your business's IT plan.

Scan the QR code below to get this eBook instantly!

Inside...

- Learn about data, storage, and networks
- Explore storage network types
- Increase customer satisfaction
- Balance measurement and performance
- Understand how Non-Volatile Memory Express (NVMe) improves performance
- Plan your next-gen storage fabric



Fibre Channel Never Dies

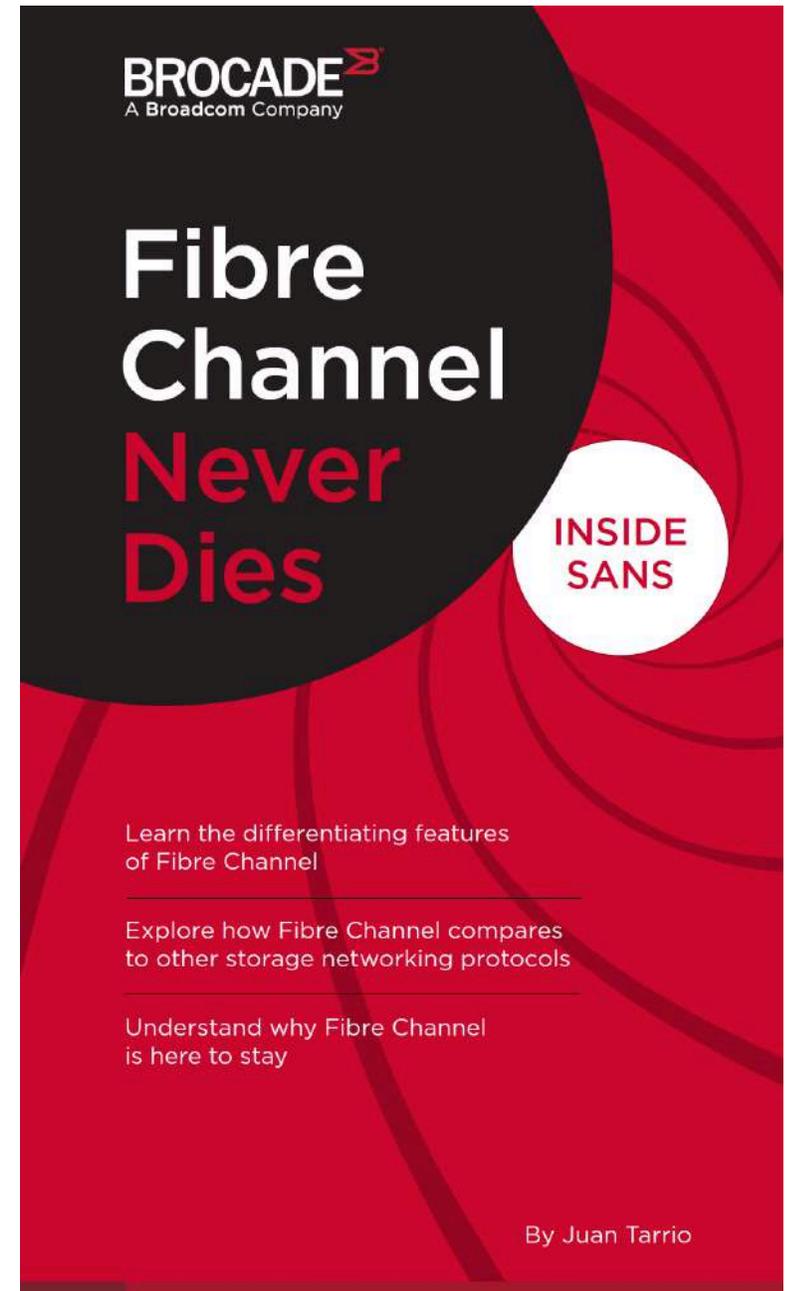
Dispel the myths and half-truths about Fibre Channel and its alternative technologies with the new “Fibre Channel Never Dies” Inside SANs ebook.

This book was written by Juan Tarrío and discusses the key characteristics that make Fibre Channel the gold standard for storage connectivity to mission-critical applications in the most demanding data centers in the world.

- Learn the differentiating features of Fibre Channel
- Explore how Fibre Channel compares to other storage networking protocols
- Understand why Fibre Channel is here to stay

eBook Link:

<https://docs.broadcom.com/doc/fibre-channel-never-dies-inside-sans>



New IDC Report about NVMe/FC & VMware

- vSphere 7 natively supports NVMe over Fibre Channel (NVMe/FC)
- NVMe/FC Support Provides a Performance Growth Path for Virtual Infrastructure
- Allowing end-to-end NVMe-based all-flash arrays (NAFAs) connected to servers across NVMe-oF the ability to consistently deliver high performance and low latency at scale
- NVMe/FC uses the same storage tools, does not require new user guides and is plug and play, it is very easy for a VMware administrator to manage

Links:

<https://docs.broadcom.com/docs/12398990>

<https://www.youtube.com/watch?v=8yYQo5tZ8y0>



IDC ANALYST CONNECTION

Sponsored by: Broadcom and VMware

With the release of vSphere 7, VMware natively supports NVMe over Fibre Channel (NVMe/FC). This storage networking protocol is a key enabler for enterprises undergoing digital transformation that need higher storage performance for their mission-critical workloads.

Native NVMe/FC Support Provides a Performance Growth Path for Virtual Infrastructure

September 2020

Questions posed by: Broadcom and VMware

Answers by: Eric Burgener, Research Vice President, Infrastructure Systems, Platforms, and Technologies

Q. What is NVMe over Fibre Channel (NVMe/FC), what are its primary business benefits, and what type of customers use it?

A. Nonvolatile memory express (NVMe) is a new storage protocol that transcends the capabilities of the legacy SCSI protocol. Relative to SCSI, NVMe supports at least an order of magnitude lower latencies, much higher throughput and bandwidth, and three to four orders of magnitude higher parallelism (a critical concern with the preponderance of multicore processors in today's servers). It was developed specifically for solid state media and is a much more efficient protocol for storage than SCSI. As enterprises deploy more applications that are real time in nature and work with large data sets (e.g., artificial intelligence, machine learning, and big data analytics workloads), NVMe brings needed performance, scalability, and efficiency capabilities to storage.

The NVMe protocol has been used in direct-attached storage for a long time and is rapidly replacing SCSI in external storage. Although it started out being used primarily for performance-sensitive, mission-critical workloads, it is quickly becoming the mainstream storage protocol for general-purpose mixed enterprise workloads. NVMe storage prices have been dropping, and because the cost has become sufficiently low, we have already seen several systems targeted for secondary storage workloads based on NVMe. With many servers, storage devices, and storage systems already supporting NVMe, there is a need for a network storage platform that also supports it.

The NVMe over Fabrics (NVMe-oF) standard is that platform. It provides all of NVMe's performance and efficiency benefits across switched networks, allowing end-to-end NVMe-based all-flash arrays (NAFAs) connected to servers across NVMe-oF the ability to consistently deliver low latency at scale (from the application's point of view). (As a comparison point, an NVMe-based NAFA is 100 times faster than traditional hard disk drive [HDD]-based systems.) Many of the next-generation application workloads that are being deployed by enterprises as part of digital transformation are demanding this kind of performance. Those workloads include big data analytics (e.g., Splunk, Spark, Apache, Cassandra, MongoDB), ecommerce (e.g., Booking.com, Travelocity), and latency-sensitive transactional applications (e.g., Oracle, SQL Server).

YouTube Videos

- How Traffic Optimizer Works
 - <https://www.youtube.com/watch?v=WB75IWiQDbc&t=10s>
- What is Fabric Performance Impact Notification and RHEL & AIX Support
 - <https://www.youtube.com/watch?v=EM9PGryDekE>
 - <https://www.youtube.com/watch?v=phkxfcETRso>
 - <https://www.youtube.com/watch?v=RNoMMfviJ-Q>
- Brocade Experts Discuss the Importance of GEN7 and How it Works
 - <https://www.youtube.com/watch?v=zpnZ3TbHz8I>
- Managing SAN Congestion in Brocade GEN7 Fabrics
 - <https://youtu.be/XK5xRrg6xNw>

Thank You





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