Lenovo ThinkSystem Gen 7 FC SAN

Сергей Целиков
Системный инженер SAN,
+7 916 860-2579, sergey.tselikov@broadcom.com
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Market Overview & Why Brocade

Lenovo

Businesses Require More From Their Infrastructure

>70% of enterprise storage arrays are all-flash

Analytics will enable non-stop data centers

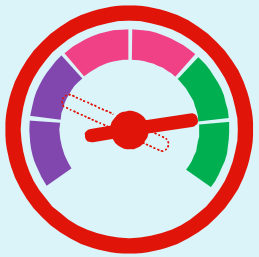
IT needs to be simpler to manage

NVMe is becoming mainstream for storage in 2020

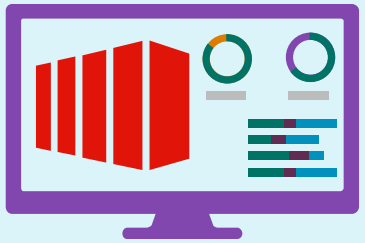
Infrastructures need to be more agile with automation

Source: Gartner Q2'19 YTD Storage Market Share, by revenue

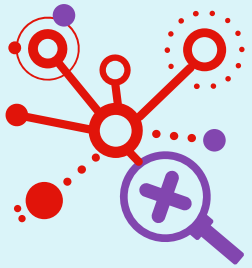
Requirements for the On-Demand Data Center



Drive New Levels of Performance

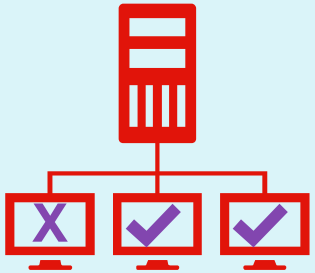


Monitor Application Performance



Identify Network Congestion

Prioritize Types of Traffic



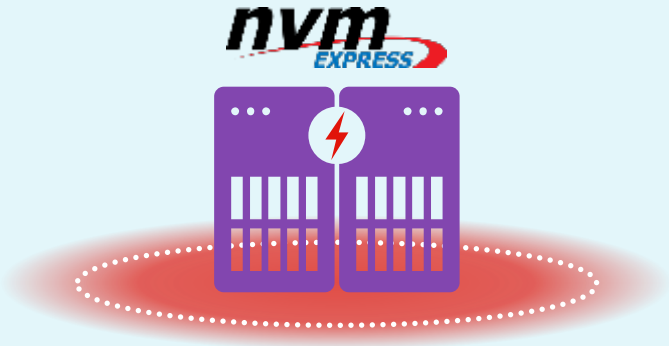
Isolate Configuration Errors

Identify Misbehaving Devices

Brocade Modernizes Fibre Channel

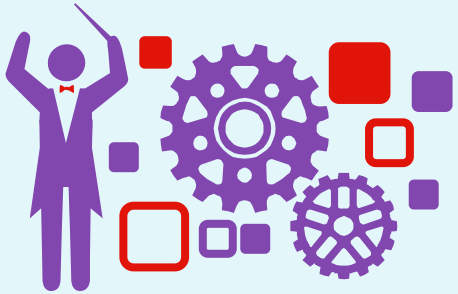
Accelerate business operations, respond to dynamic demands, eliminate complexity

Modernize Storage



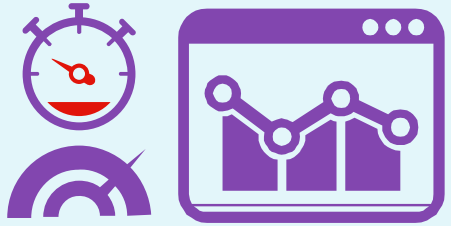
Optimize IT with NVMe-ready Fibre Channel to drive business innovation

Automate Operations



Power IT with simple and open automation to increase productivity

Manage and Analyze



Advanced SAN monitoring and diagnostics reducing operational costs

Lenovo

Lenovo DM & DE Storage Solutions need to include the SAN.

ThinkSystem DM SERIES

Lenovo Scalable NAS/SAN/Unified

- ONTAP Data Management OS
- AFA and Hybrid
- Leverage NVMe over FC protocols
- Cloud Tiering
- Unified multi-protocol file and block

ThinkSystem DE SERIES

Lenovo Performance Block

- AFA and Hybrid Block
- Asynch & Synch Replication
- Price Performance leadership
- Ease of use

ThinkSystem Fibre Channel HBA and SAN support 64 Gb/s, NVMe, and now Autonomous.

Lenovo Servers & Emulex FC HBAs

Brocade GEN6 FIBRE CHANNEL

DB610S

DB620S

DB630S

DB400D/DB800D

Brocade GEN7 FIBRE CHANNEL

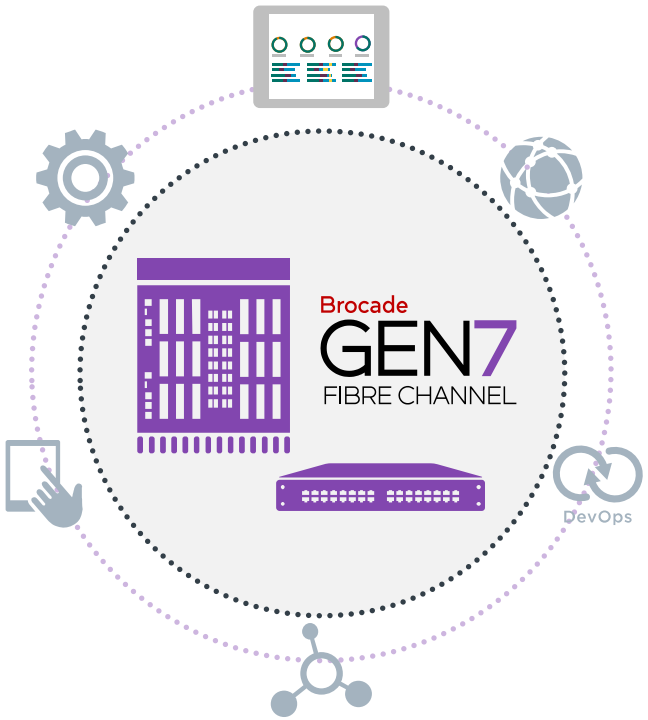
DB720S
NEW

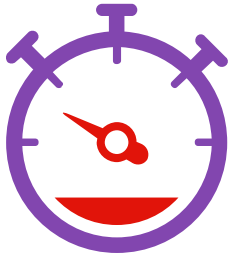
Lenovo

Gen 7 FC SAN Switch Product Overview

Lenovo

Purpose-Built for NVMe Storage



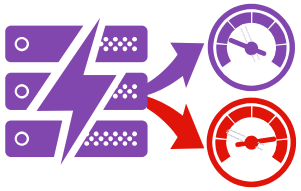


Performance

Enable significant performance gains for flash with low latency, NVMe-ready Fibre Channel

Seamless Integration

Deploy NVMe over Fibre Channel with no rip-and-replace



Concurrent Traffic

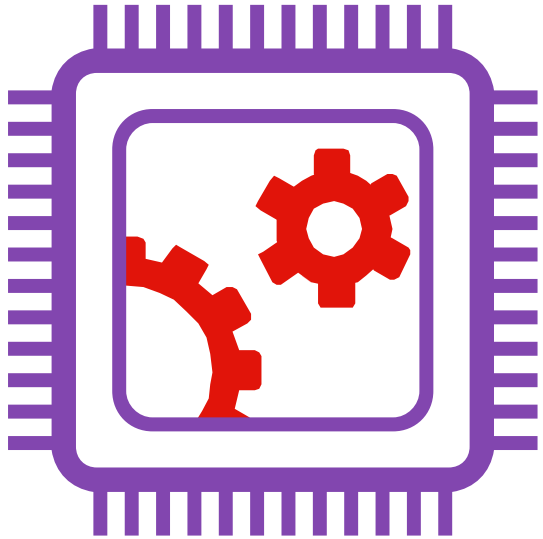
Run NVMe and SCSI concurrently on same network for gradual technology migration

Lenovo

The Industry's Most Advanced Switching ASIC

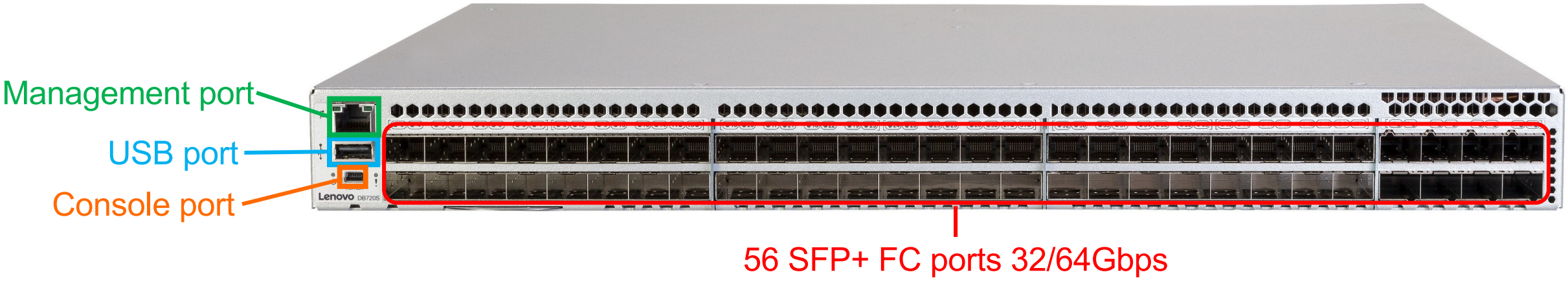
Gen 7 Fibre Channel platforms built on Condor 5 ASIC

- 50% lower latency for NVMe workloads 460ns latency
- Ability to learn, measure and monitor fabric wide latency of flows
- 50% more buffers per ASIC to support distance, burst workloads and congestion management
- 64, 32, 16, 10, 8 Gb/s Fibre Channel
- Double encryption and compression capacity



Lenovo

ThinkSystem DB720S



- 1U 56×32/64 Gbps Fibre Channel ports (supports speeds 8/10/16/32/64)
- Mini USB Port
- System Ethernet port (RJ45) for management
- USB port for firmware upgrades and system log downloads

Lenovo

Lenovo Gen 6 & Gen 7 Fibre Channel Switch Family

Brocade GEN6 FIBRE CHANNEL

ThinkSystem DB610S

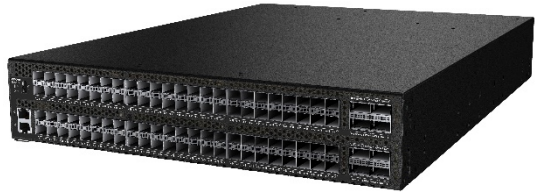
- 1U, 8 to 24 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN6 FIBRE CHANNEL

ThinkSystem DB620S

- 1U, 24 to 64 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN6 FIBRE CHANNEL



ThinkSystem DB630S

- 2U, 48 to 128 32Gb/s ports
- Enterprise bundle or individual features licensed separately

Brocade GEN7 FIBRE CHANNEL

ThinkSystem DB720S

- 1U, 24 to 56 64Gb/s ports
- 2x performance
- 50% lower latency
- **Enterprise bundle included**: Fabric Vision, ISL trunking, integrated routing, FICON CUP, extended fabric

Performance and Functionality

Lenovo

Introducing Emulex Gen 7 LPe35000-series HBAs

Performance Optimized for End-to-end NVMe Data Centers

- 32GFC, 64GFC, 128GFC
  - 128GFC with Emulex Port Aggregation (i.e. Trunking)
- Single, dual and quad-port
- 5M+ IOPS
- <10 us round trip latency

Easily Deploy, Manage & Upgrade

- No server reboots when upgrading firmware
- Network congestion isolation and removal
- Upgradeable with 64GFC optics
- PCIe 4.0 validated

Secure & Available Data

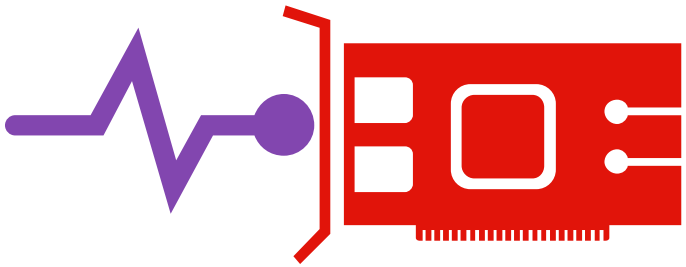
- Silicon root of trust- hardware verification of firmware
- Digitally signed firmware and drivers
- Secure boot guarantees UEFI boot code security
- Data Integrity Field (T10 DIF)

Availability

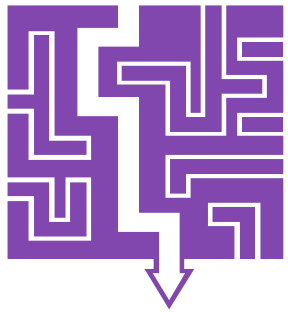
- Emulex LPe35000-series available today
  - **LPe35000-M2** (1-port 32GFC)
  - **LPe35002-M2** (2-port 32GFC)
  - **LPe35004-M2** (4-port 32GFC)

Lenovo

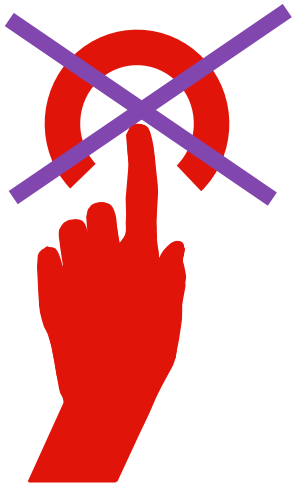
GEN 7 FC HBA– WHAT'S NEW?



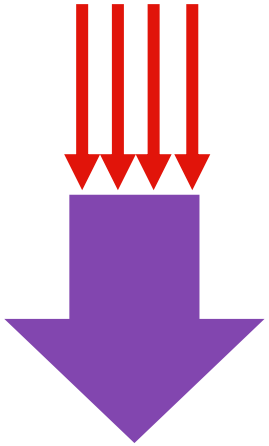
Dynamic Port Isolation



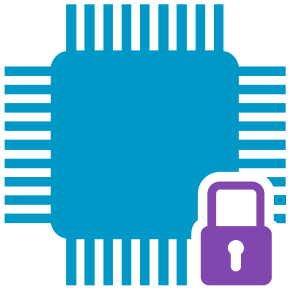
Fast Path



No-reboot Firmware Updates



Port aggregation (trunking)



Silicon Root of Trust

Lenovo

ThinkSystem DB720S Product Deep Dive

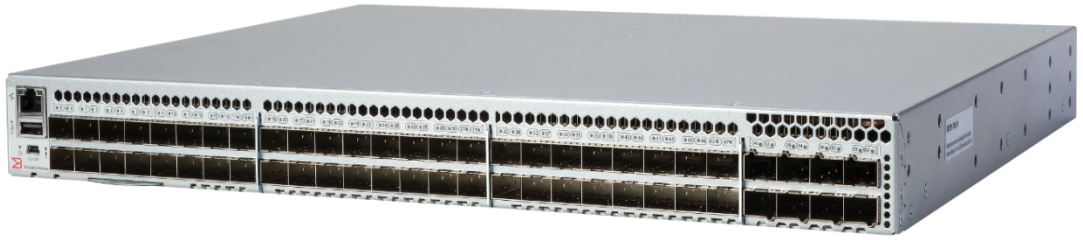
Understanding the innovations and advantages

Lenovo

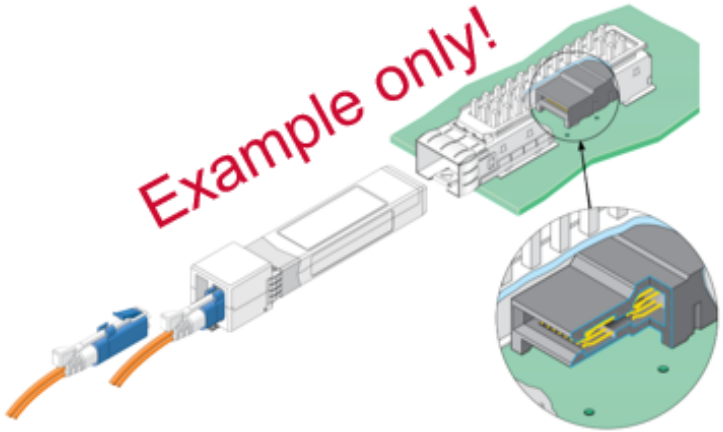
ThinkSystem DB720S Product Overview

Midrange Level 1U 56-port 64 Gbps Gen 7 FC Switch based on the Condor 5 Gen 7 ASIC

- 48 x 64G SFP+ ports + 8 x 64G SFP-DD ports
  - At Launch the 8 SFP-DD Ports are only SPF+ Ports
  - 24 Base Ports
  - Each SFP+ port supports 64/32/16/10/8G FC speeds
  - Only works with Secure Optics
    - 16G SFP+ optics not supported (No 4 Gbps FC are required)
  - 2 hot-swappable, redundant integrated power supply & Fan FRUs
  - Offers 3,584 Gbps total switching bandwidth
  - Rack mountable using universal 2-post or 4-post racks



- Dual air-flow directions
  - front to back (non port-side exhaust)
  - back to front (non port-side intake)



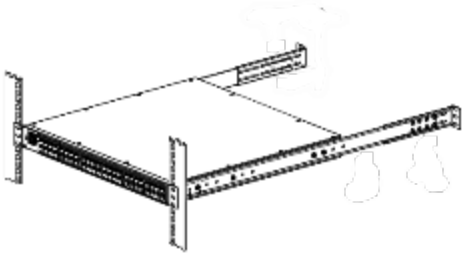
- AC power option only, no DC power option
- Switch - and Access Gateway Mode
- Requires Fabric OS v9.0.0 or later and SANnav 2.1 or later
- Integrated Routing & Enterprise Software Bundle (Trunking, Fabric Vision, Ext. Fabrics) included

BROADCOM

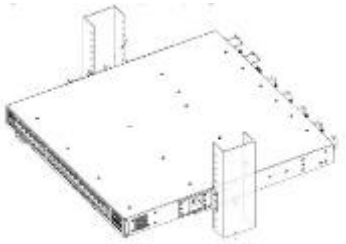
ThinkSystem DB720S

AirFlow	Back-to-front Module = Typical Data Center 98% of Sales (Non port-side air intake & port-side exhaust) airflow		Front-to-Back Module = Telco Environments (Port-side air intake & non port-side exhaust) airflow	
Models	**32Gbps model: Part # 7D5JCTO1WW**	**64Gbps model: Part # 7D5JCTO2WW**	**32Gbps model: Part # 7D5JCTO3WW**	**64Gbps model: Part # 7D5JCTO4WW**
Ports & SFP's:	• 24 active ports • 24 x 32Gbps SWL SFP's	• 24 active ports • 24 x 64Gbps SWL SFP	• 24 active ports • 24 x 32Gbps SWL SFP	• 24 active ports • 24 x 64Gbps SWL SFP
All models include	• Redundant power supplies • Universal 4-post rack mount kit			
Port-on-Demand Upgrade	• 8-Port SW License Pack (PN 4M27A65819) includes 8 x 32Gbps SWL SFP's • 8-Port SW License Pack (PN 4M27A65820) includes 8 x 64Gbps SWL SFP's			
Transceivers	32/64Gbps SWL Transceivers come standard with switch. Other Transceivers are available as options: 10Gbps SWL/LWL; 32/64Gbps LWL (10km) or 32Gbps ELWL (25km)			
Power	Power cords tend to very by country make sure to select what is appropriate.			
All Software License Included	• Enterprise Software Bundle (Trunking, Fabric Vision, Ext. Fabrics) • Integrated Routing			

Universal 4-Post Rack mount Kit to install devices in EIA racks that are between 13.7 to 81.28 cm deep (L-5.0 to 32.0 in.).



Optional: Mid-mount rack kit (Part # 01KN770) to install 1U and 2U devices in a two-post telecommunications (Telco) rack.



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Transceivers Supported

SWL Transceivers come standard with switch/POD's (the following are also supported)

- New optics ensure that only genuine optics are used with our Gen 7 products
  - Benefit to customers: Maximum performance, support and customer satisfaction
- Also backward compatible with Lenovo/Brocade Gen 6* and Gen 5** products

Transceivers supported	Part Number	Description
64Gb SFP+ Transceiver (also support speeds of 32/16Gbps)		
Brocade Secure 64Gb SWL SFP+ Transceiver	4M27A65425 (1-pack) 4M27A65426 (8-pack)	Comes standard on 64Gb Models or POD Kits (customer might buy spares)
32Gb SFP+ Transceiver (also support speeds of 8/16Gbps)*		
Brocade Secure 32GB SWL SFP+ Transceiver	4M27A65416 (1-pack) 4M27A65417 (8-pack)	Comes standard on 64Gb Models or POD Kits (customer might buy spares)
Brocade Secure 32GB LWL SFP+ Transceiver	4M27A65418 (1-pack) 4M27A65419 (8-pack)	Use a couple for longer distances, up to 10KM
Brocade Secure 32GB ELWL SFP+ Transceiver	4M27A65424 (1-pack)	Use a couple for extended longer distances, up to 25KM
10Gb FC SFP+ Transceiver */**		
Brocade Secure 10Gb FC SWL SFP+ Transceiver	4M27A65420 (1-pack)	Dense wavelength division multiplexing (DWDM) / Dark Fibre (Shorter distances)
Brocade Secure 10Gb FC LWL SFP+ Transceiver	4M27A65421 (1-pack)	Dense wavelength division multiplexing (DWDM) / Dark Fibre (Longer distances)

Be aware older Brocade optics are not supported in Gen 7 switches.

Lenovo

Switch Portfolio Comparison

Feature	ThinkSystem DB620S Brocade GEN6 FIBRE CHANNEL	ThinkSystem DB720S Brocade GEN7 FIBRE CHANNEL
Maximum supported speed	32Gb/s	64Gb/s
Latency (local switching)	780 ns	460 ns
Port count	64 optical ports	56 optical ports
Brocade SAN Automation	Available	Available
Fabric-based analytics	N/A	Available
IO Insight latency monitoring	Available, includes NVMe metrics	Available, includes NVMe metrics
VM Insight	Requires host and target support	Only requires host support
Flow-level monitoring	Frame and I/O-level	Frame and I/O-level
Product lifecycle status	Currently available	Currently available
Traffic optimizer	N/A	Available
Congestion management	N/A	Available
Enterprise Software: Trunking, Fabric Vision, Ext. Fabrics	Optional	Standard
Integrated Routing	Optional	Standard
Warranty Standard	1 Year	3 Years

Lenovo

ThinkSystem FC Director Product Overview

Lenovo

Flash Forward with Gen 6

Data center modernization starts with the new Lenovo ThinkSystem FC Directors

Industry-first Gen 6 Fibre Channel director family

- Two Director chassis: 4 slot and 8 slot

High-speed device and ICL connectivity

- 48×32 Gbps port blade providing 384 ports per chassis
- 64×32 Gbps port blade providing 512 ports per chassis
- Up to 32×128 Gbps UltraScale ICL ports

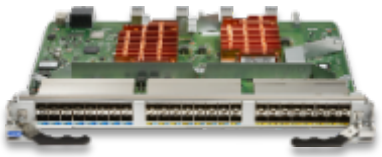
Fibre Channel and IP storage replication solution

- SX6 Extension Blade

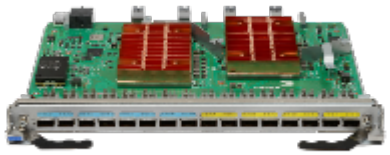
New Fabric Vision capabilities

- Industry's only integrated monitoring for storage IO and VM performance: IO Insight and VM Insight

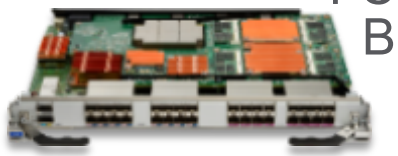
ThinkSystem FC Directors
DB400D and DB800D



FC32-48 Blade



FC32-64 Blade



SX6 Extension Blade

ThinkSystem FC Director Family

Purpose-built for enterprise storage network deployments

GEN6 FIBRE CHANNEL

Two Director Models

DB800D Director for Large Enterprise

- 14U, eight vertical blade slots
- Up to 512 32 Gbps Fibre Channel ports
- 32 additional 128 Gbps Brocade UltraScale ICL ports
- 20.5 Tbps aggregate chassis bandwidth (port bandwidth + UltraScale ICL bandwidth)

DB400D Director for Midsize Enterprise

- 9U with exhaust shelf, four horizontal blade slots
- Up to 256 32 Gbps Fibre Channel ports
- 16 additional 128 Gbps UltraScale ICL ports
- 10.2 Tbps aggregate chassis bandwidth (port bandwidth + UltraScale ICL bandwidth)

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Why you might choose one vs another

- Switch
  - Ideal for small SAN's
  - Fixed number of ports & Limited scalability 8-96 ports
  - Limited redundancy – potentially power & cooling
  - Potential for lots of ports dedicated to Inter Switch Links
  - Good performance

- Director
  - Ideal for larger SAN's
  - More scalability – leverage blades up to 100's of ports
  - Maximum redundancy – high availability in each component
  - Lower percentage of ports dedicated to Inter Switch Links
  - Best performance – less hops and more bandwidth

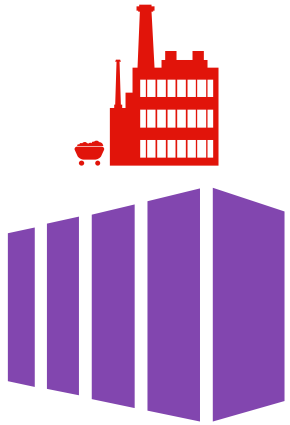
Lenovo

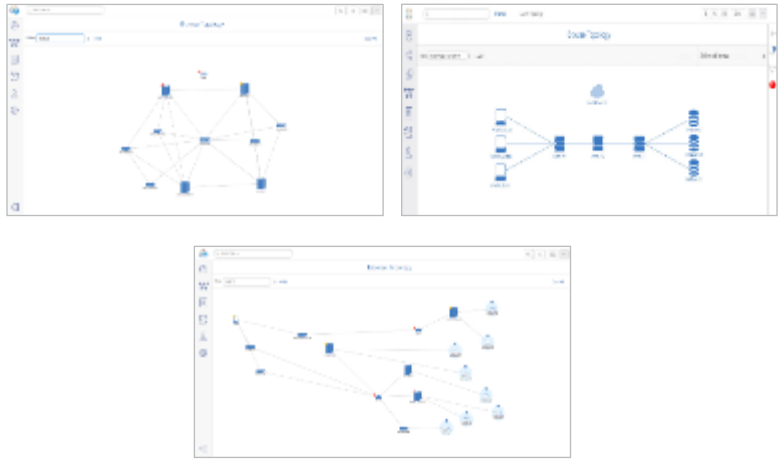
SANnav

Optional Management Software

Manage the Autonomous SAN with SANnav Mgmt 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

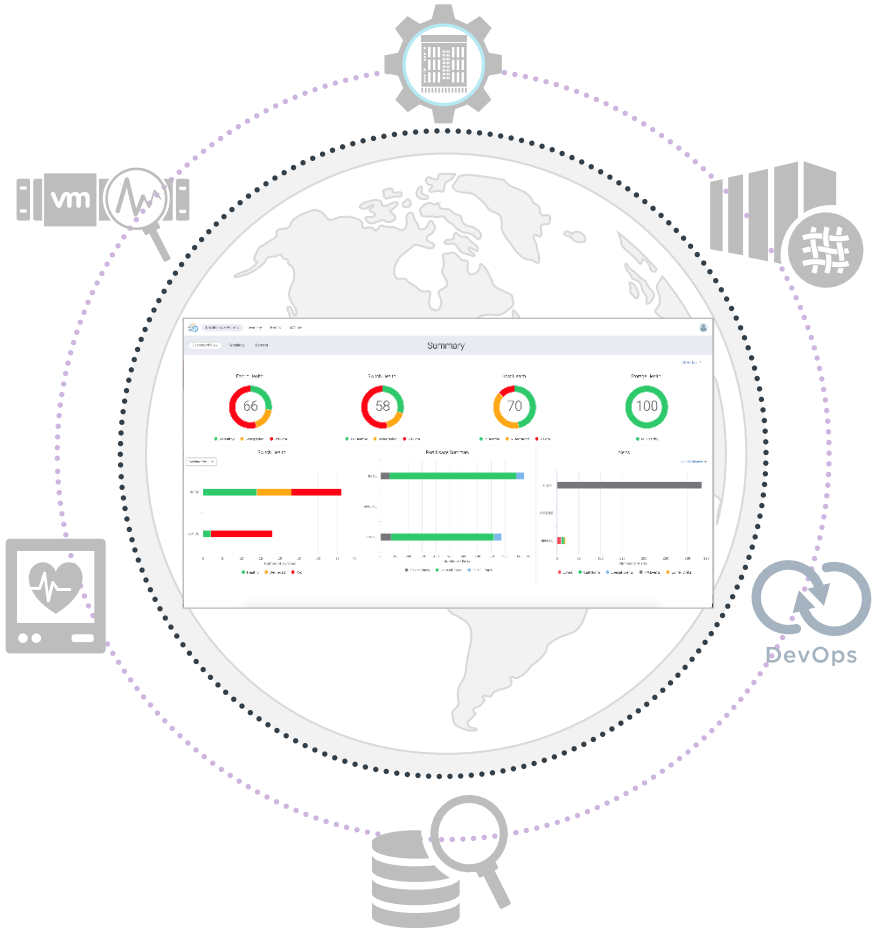
SANnav Management Portal

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

Lenovo

Manage the Autonomous SAN with SANnav Mgmt Portal 2.1

Increase visibility, actionable intelligence and simplified processes



Modernize

- Enable comprehensive SAN visibility to provide operational clarity
- Accelerate IT performance with powerful search and topology capabilities

Analyze

- Transform SAN behavior and performance data into actionable insights
- Optimize resources with fast and efficient workflows for common tasks

Automate

- Accelerate and reduce administrative tasks by automating processes
- Automate troubleshooting with best practice recommendations

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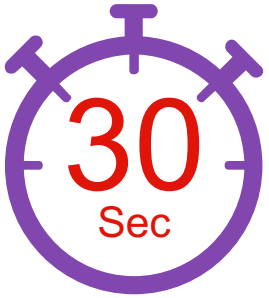
SANnav Management Portal and Global View

Global View

100% greater visibility across all fabrics compared to 1 fabric at a time

Health Summary

Understand health state and identify potential issues in seconds compared to hours



Investigation Mode

Troubleshoot across the fabric in as little as 30 seconds compared to minutes or hours

Reporting

Inventory and performance reporting easily done across user defined scope

Part Number (License)	License	Supported Instances/Ports
Brocade SANnav Management Portal		
7S0C0010WW (1 Year) / 7S0C0013WW (3 Year) / 7S0C001KWW (5 Year)	Base Edition	600 ports *(Only Switches)*
7S0C0011WW (1 Year) / 7S0C0014WW (3 Year) / 7S0C001LWW (5 Year)	Enterprise Edition	15,000 ports
Brocade SANnav Global View		
7S0C0012WW (1 Year) / 7S0C0015WW (3 Year) / 7S0C001JWW (5 Year)	Brocade SANnav Global View	Up to 6 SANnav Management Portal instances

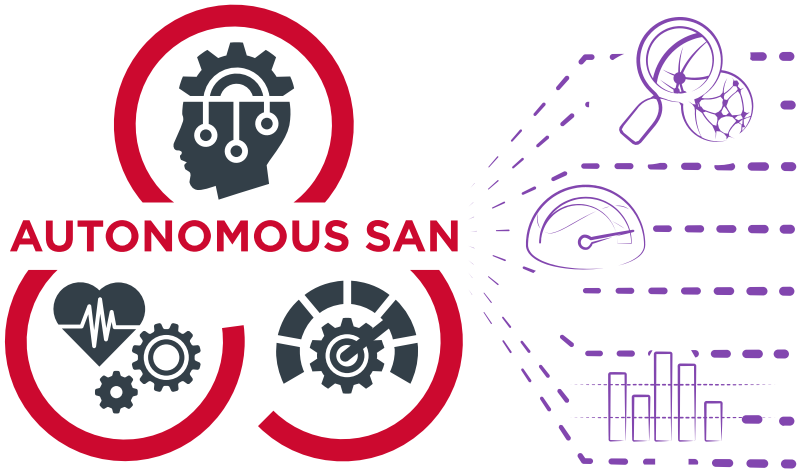
- Testing performed within Broadcom solutions Lab

Building an Autonomous SAN

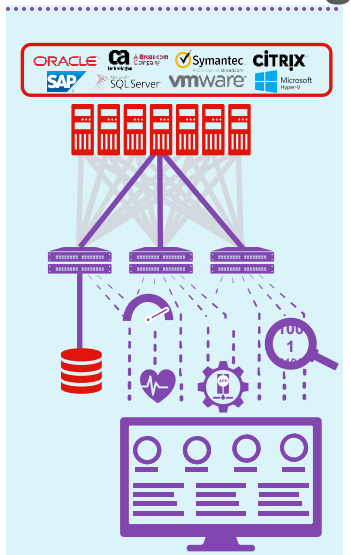
Lenovo

Autonomous SAN Technology

Analytics and automation capabilities to eliminate complexity and save money

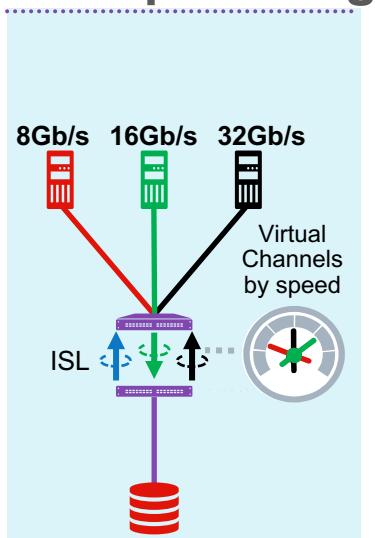


Self-Learning



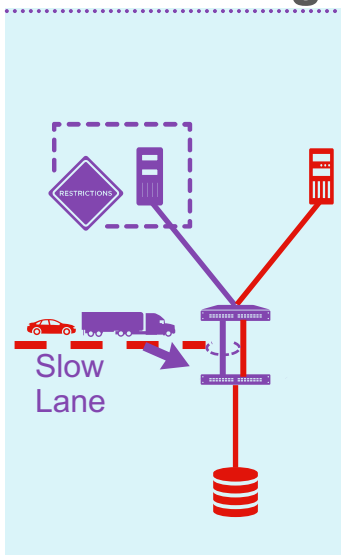
Instantly understand your SAN with actionable insights

Self-Optimizing



Optimize performance with automatic behavior-based actions

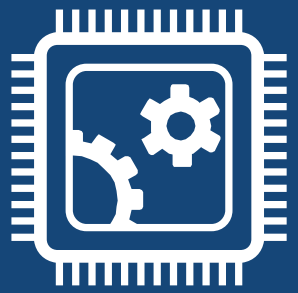
Self-Healing



Ensure reliability with automatic avoidance and recovery features

Lenovo

New and Improved SAN Features with Gen 7



2X

Performance

Double the speed and 50% of the latency

New

Traffic Optimizer

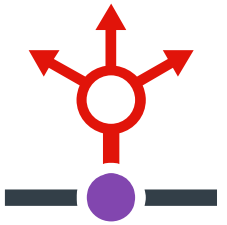
Optimize traffic performance across the network

New

Congestion Notification

Hardware and software signaling to end devices

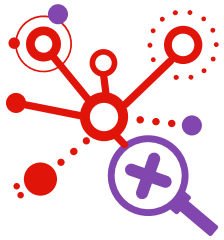
New



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

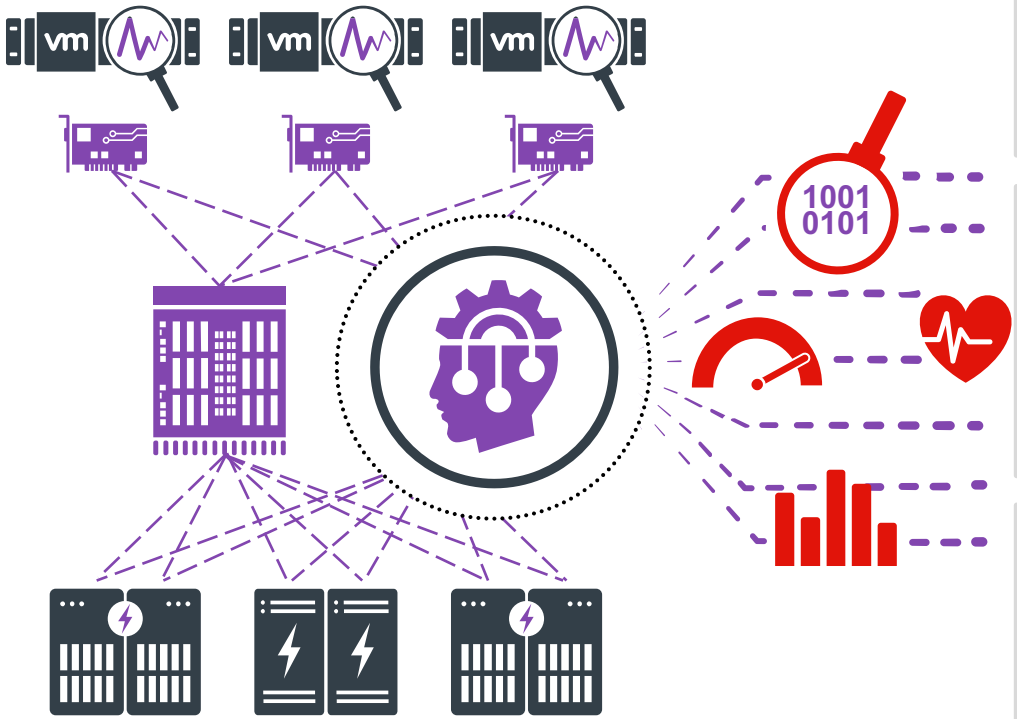
Security

Tamper proof hardware

Lenovo

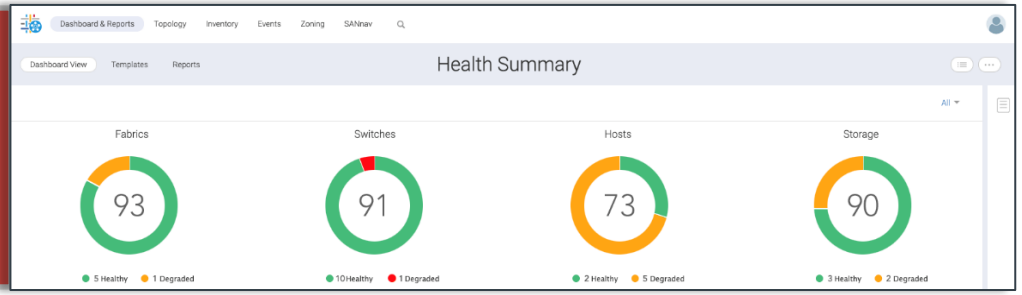
Self-Learning Transforms Data into Actionable Intelligence

Self Learning

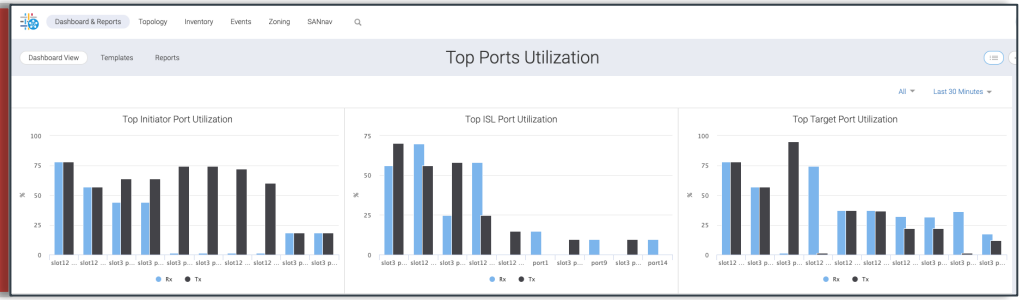


Quickly understand the impact of current or trending problems

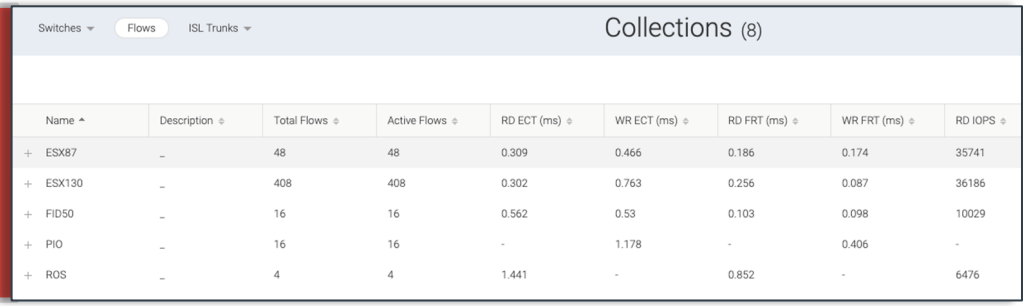
Instantly correlates data into health scores



Summarizes critical data into easy to read dashboards



Learn how application traffic flows through the network



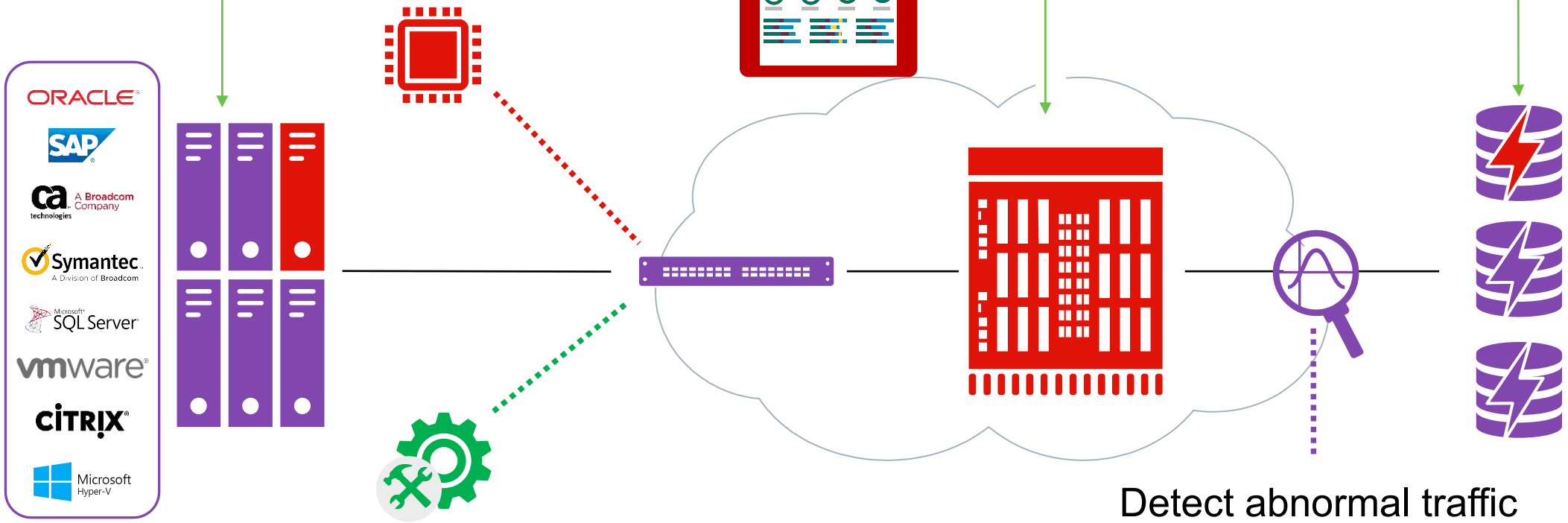
Lenovo

Instantly Understand Your SAN with Actionable Insights

Self Learning

Gather and transform millions of data points into network intelligence

Visualize application and device-based performance and health metrics



Eliminate operational steps by automatically learning application flows

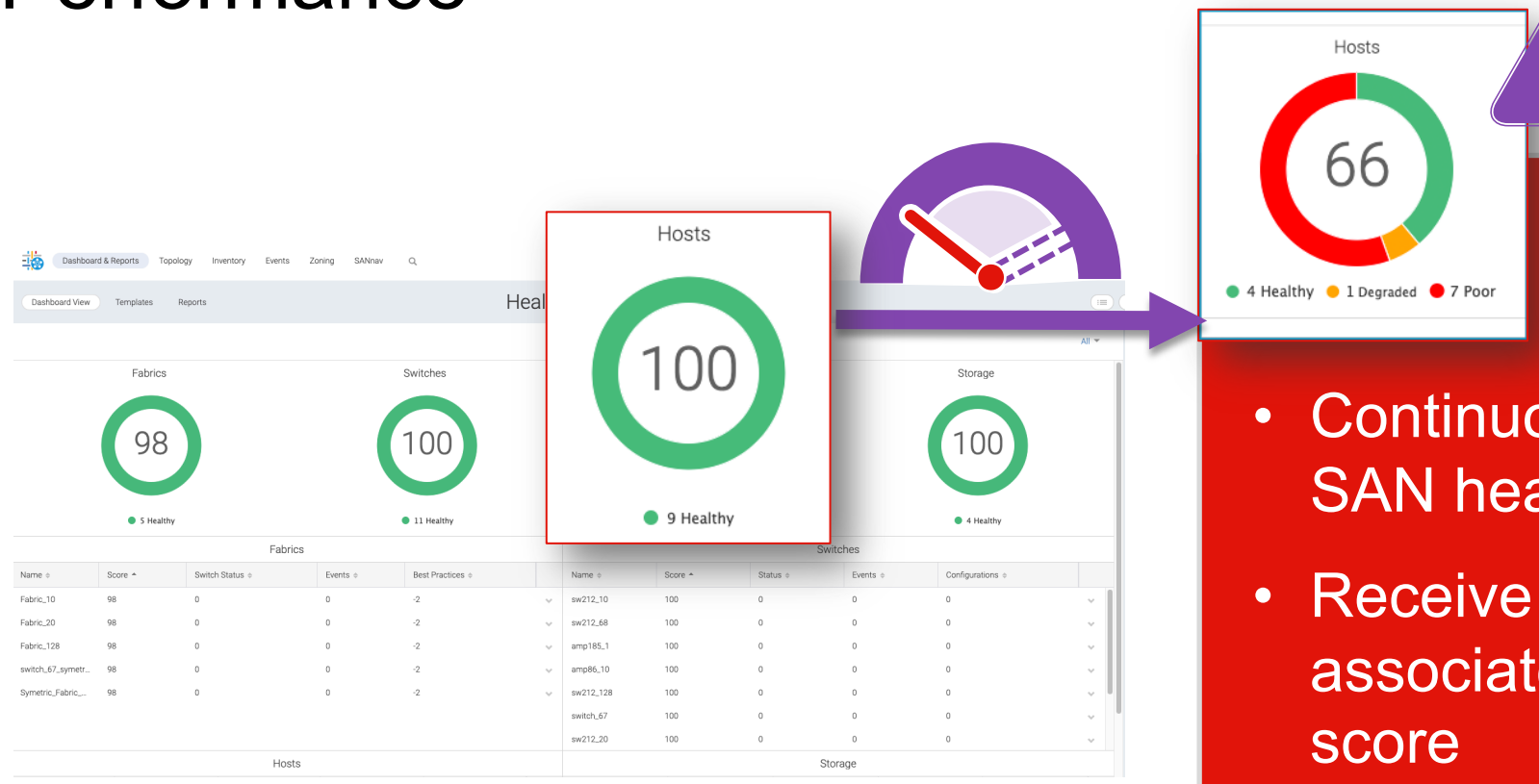
Detect abnormal traffic behaviors and degraded performance

Lenovo

Detect Abnormal Traffic Behaviors & Degraded Performance

Self Learning

Get Alerted Instantly



- Continuously monitoring your SAN health status
- Receive violation alerts associated with an impacted score
- Click to identify the issue in Investigation Mode

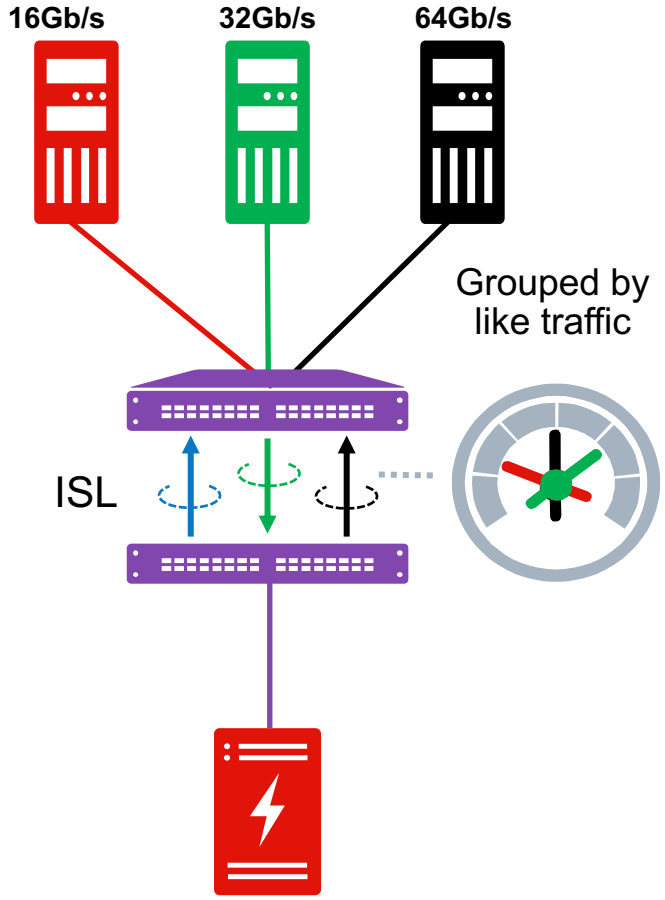
Lenovo

Self-Optimizing Maximizes Performance Based on Behavior

Self-Optimizing

Traffic Optimizer automatically isolates traffic by speed to optimize performance

- Mixing workloads can cause slow downs and congestion
- Eliminate common oversubscription and congestion issues caused by mismatched speed
- Optimize and guarantee application performance by prioritizing and grouping traffic based on like characteristics

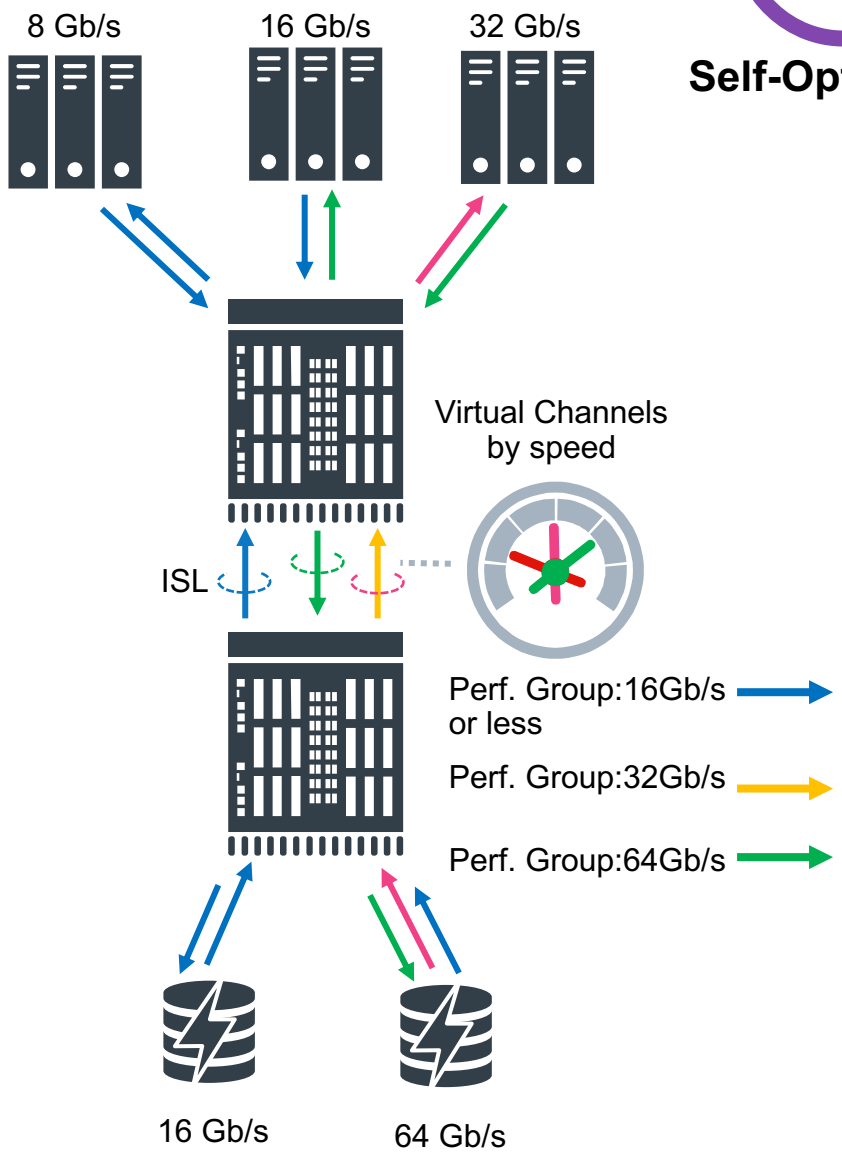


Lenovo

Optimize Critical Application Performance by Automatically Grouping Traffic

Self-Optimizing

- Automatically isolation traffic by speed to optimize performance
  - Automatic traffic classification to Performance Group (PG) by destination port speed and link impairment
  - Eliminate common congestion caused by speed mismatch
  - Enabled by default on all Gen 7 platforms and backward compatible with Gen 6 platforms



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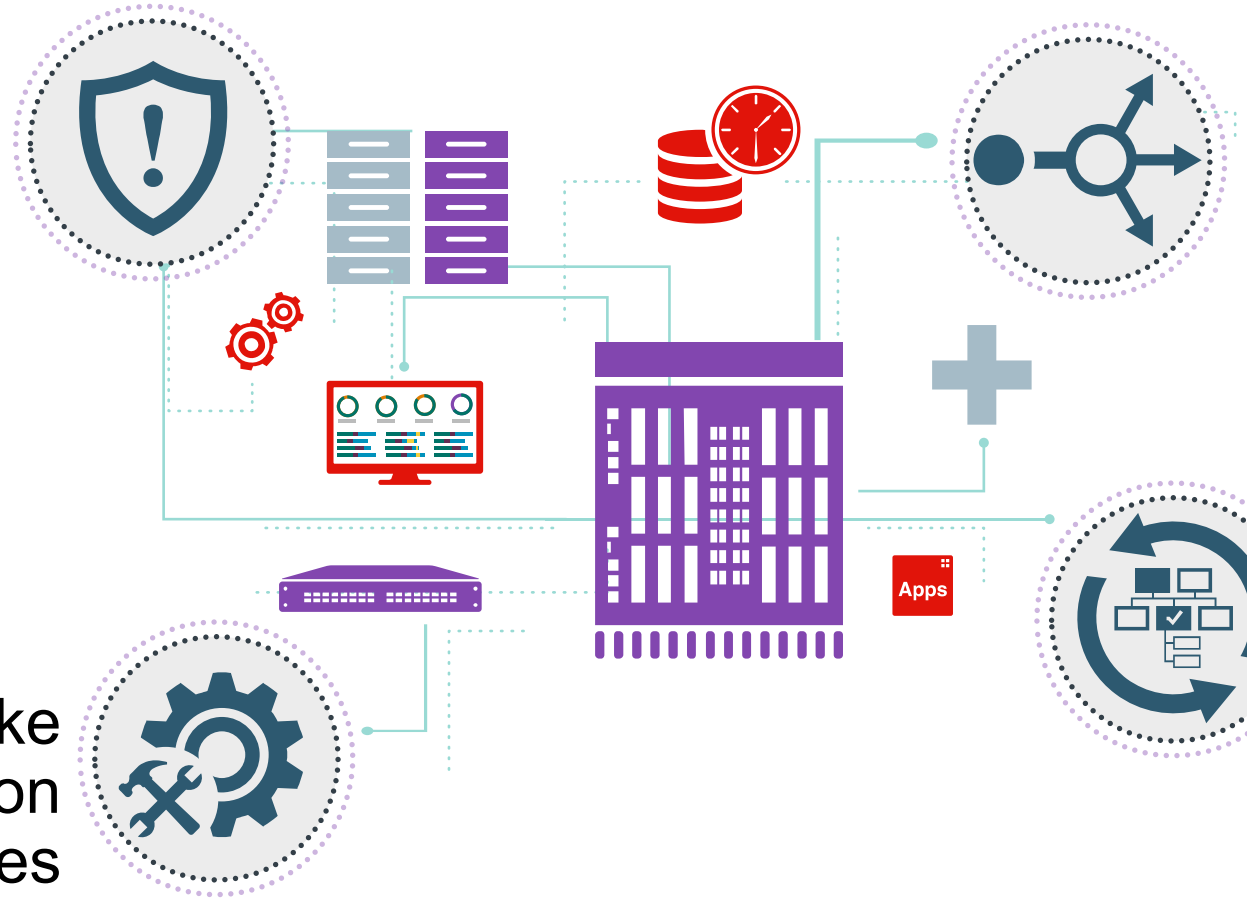
Self-Healing Mitigates and Resolves Issues Without Intervention

Self-Healing

Automatic Avoidance and Recovery Features Ensure Reliability

Instant notification of congestion



Automatic failover when issues occur

Automatically take corrective action on misbehaving devices

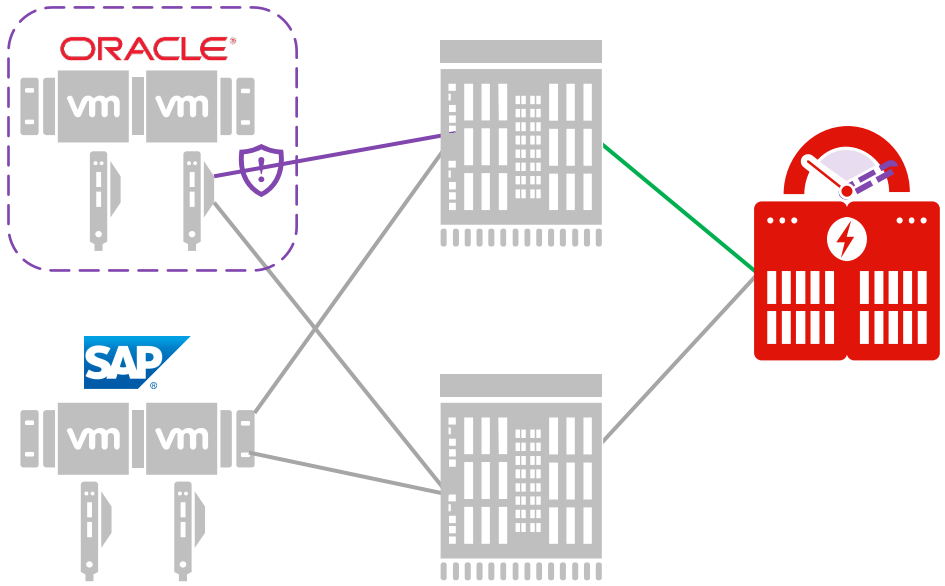
Detect and reconfigure out-of-compliance fabrics

Lenovo

Instantly Notify End-Devices of Congestion for Automatic Resolution

Self-Healing

- Brocade continuously monitors your SAN health and performance
- MAPS monitoring detects a flow causing SAN congestion and triggers the notification action
- Fabric sends notifications to both end devices of the congested flow so they can take action
- Devices receiving notification may adopt one of the actions
  - Pinpoint congestion point
  - Slow down requests
  - Reset to recover
  - Failover to alternate path



Congestion signals and notifications enables automatic mitigation and recovery

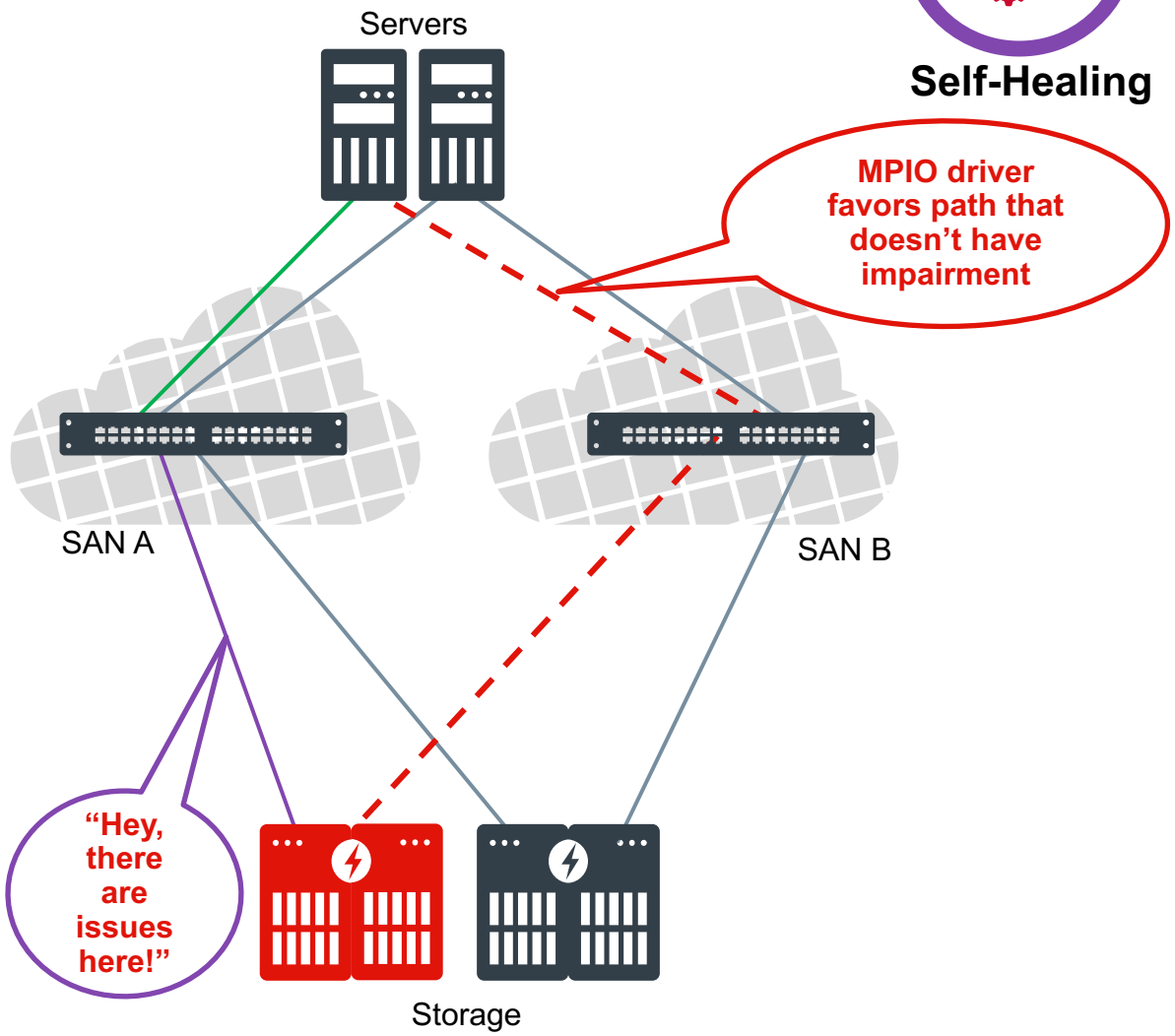
Lenovo

Ensure data Delivery with Automatic Failover From Physical or Congestion Issues

Monitors fabric paths

Sends notifications of impairment

MPIO avoids impaired path



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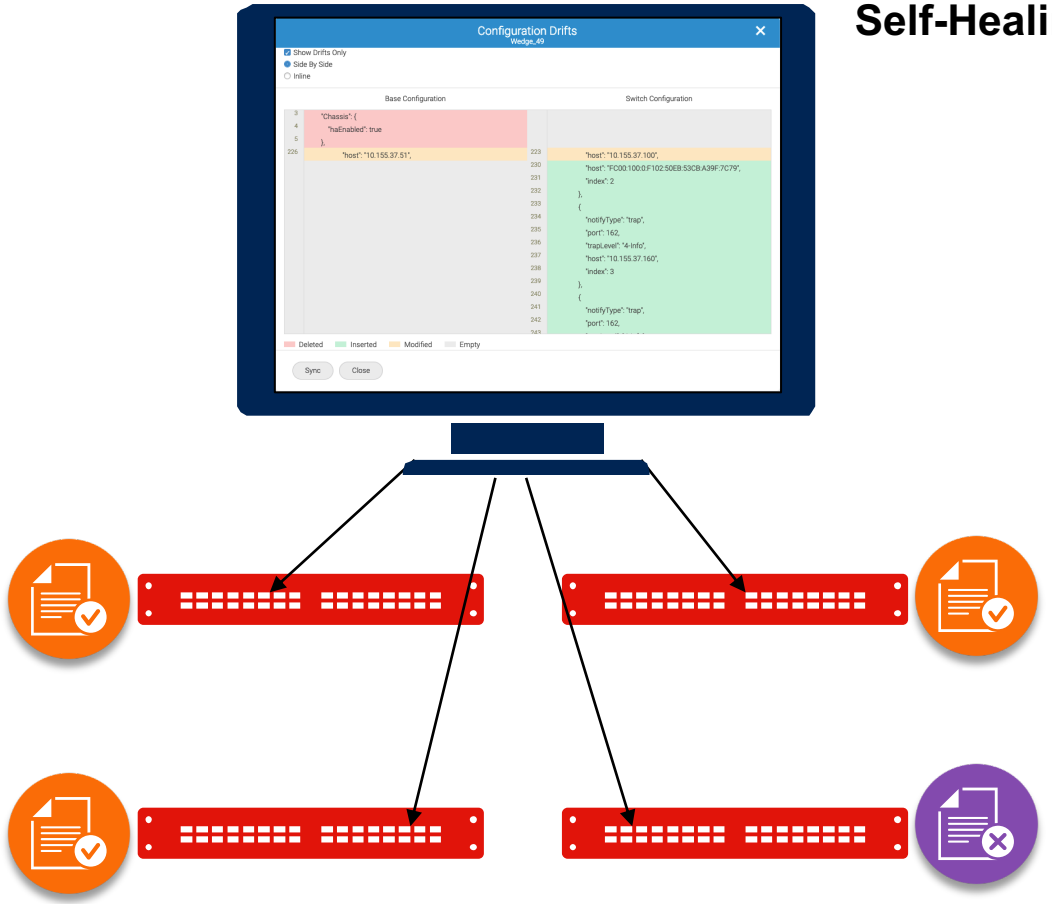
Detect and Automatically Reconfigure Out-of-Compliance Fabrics

Self-Healing

- Apply common configuration easily across multiple switches and monitor for configuration drifts
- Drifts are visible in Configuration Monitoring page of Brocade SANnav Management Portal
- Configuration policies use JSON schema



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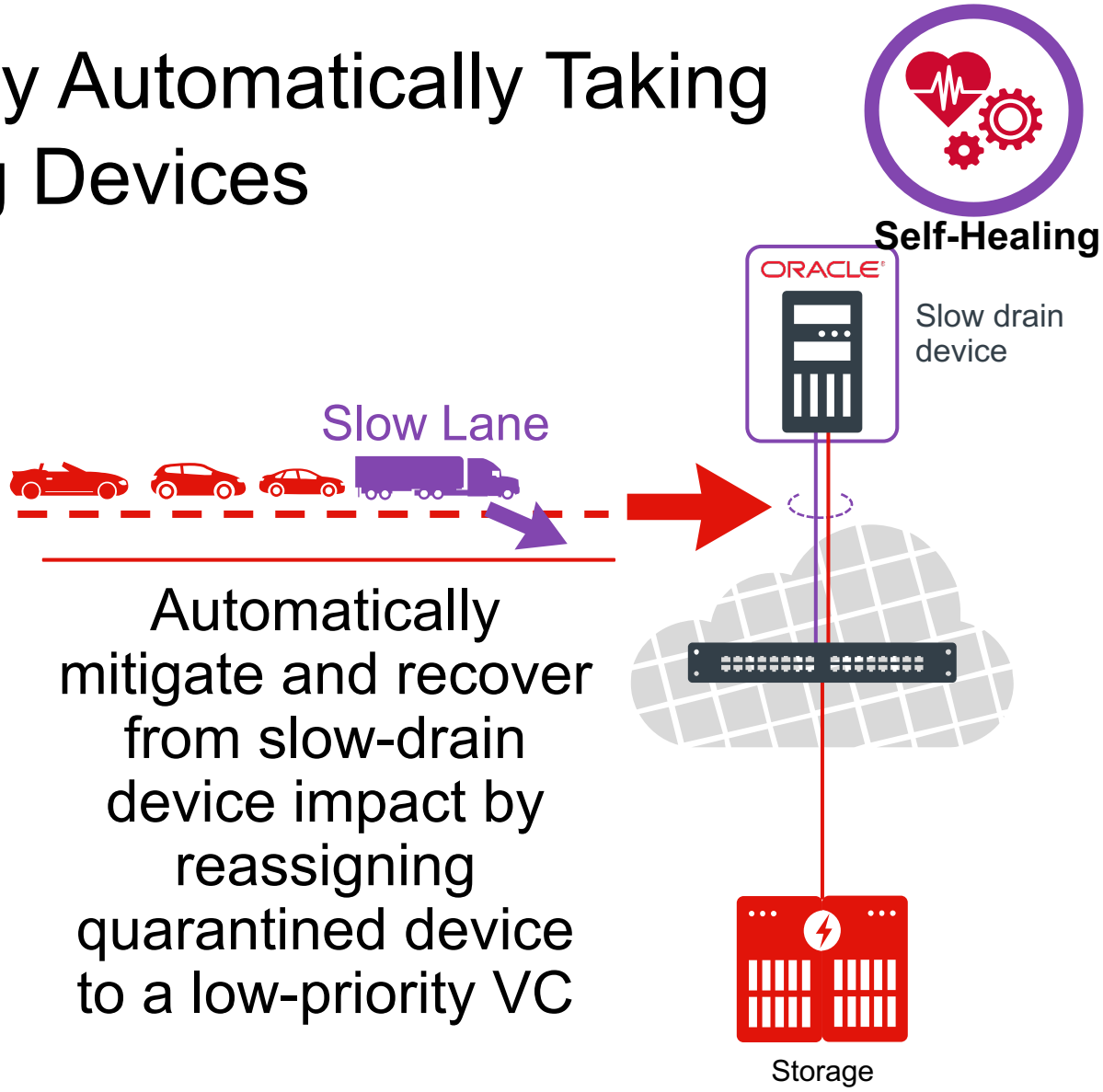
Eliminate Performance Impacts by Automatically Taking Corrective Action on Misbehaving Devices

- FPI Monitoring detects the slow drain device identity
- All switches in a fabric informed of the slow drain device identity
- Flows destined to the slow drain device reassigned to low priority VCs
- Buffer credits free up for regular flows sharing the same path



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www.broadcom.com/brocade
http://www.linkedin.com/groups?gid=4246353
https://t.me/BrocadeRussiaSAN

thanks.

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Different is better