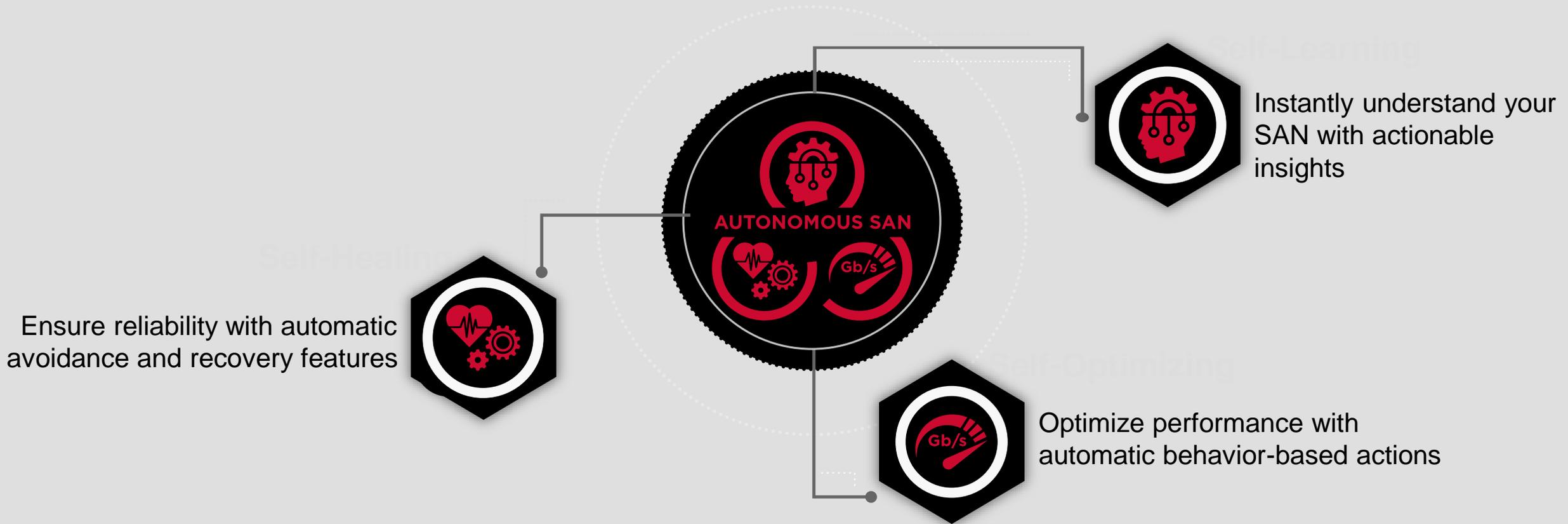


# Architecting Data Capturing Schemes for the IBM b-type Gen 7 Autonomous SAN

AJ Casamento  
Broadcom Principal R&D Engineer

IBM TechU

# The Autonomous SAN – Eliminate Complexity and Save Money



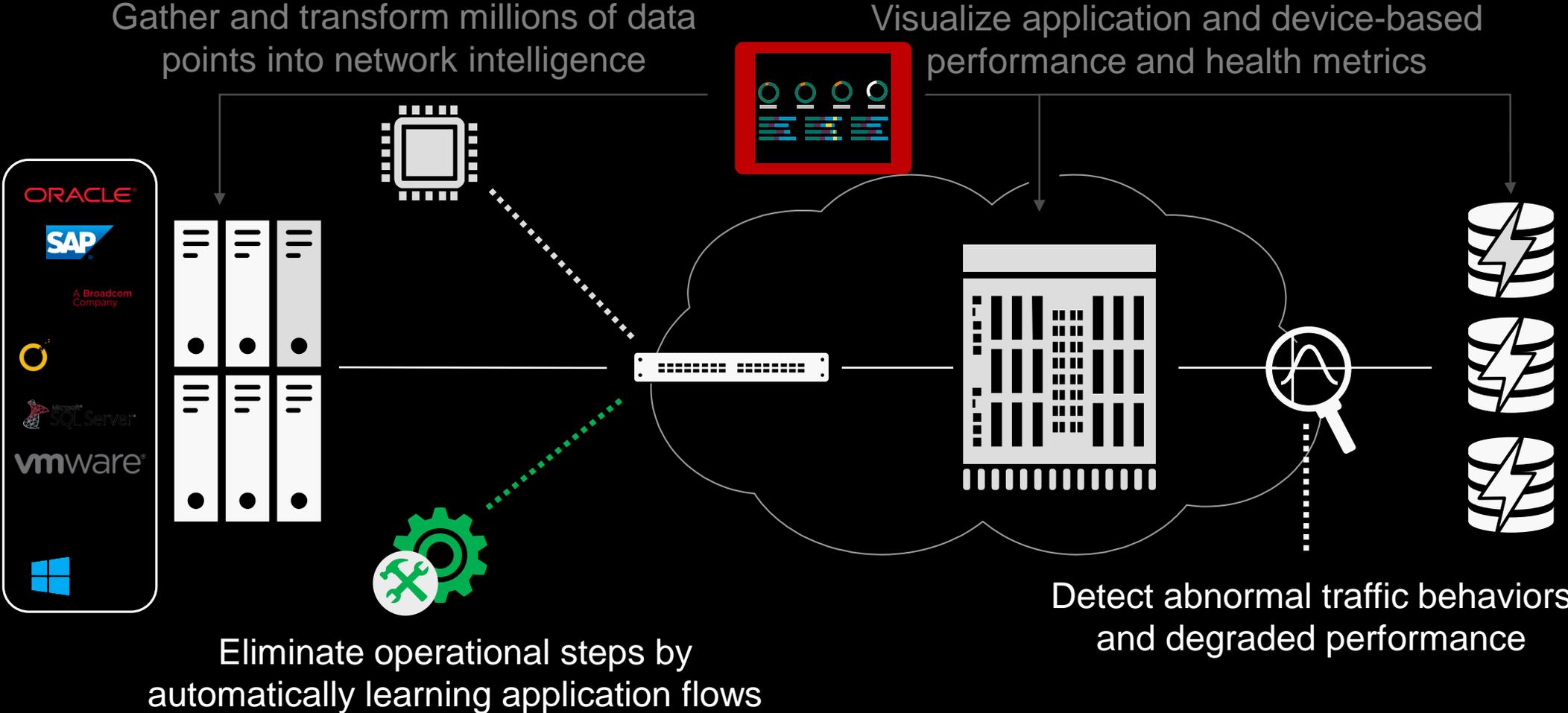


**Self-Learning**

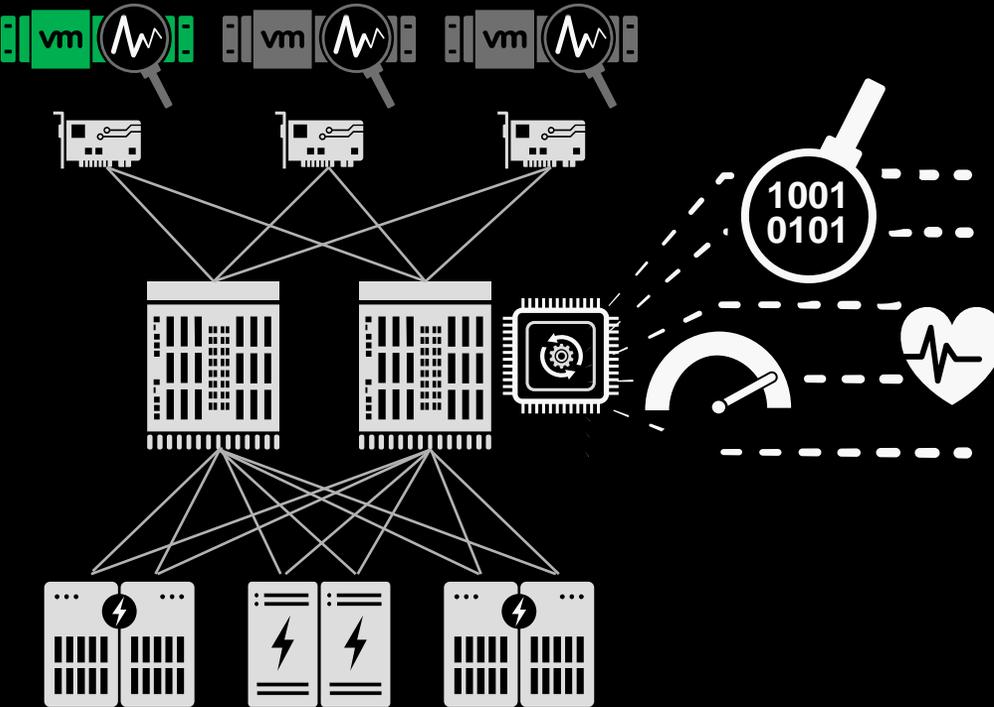


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# Self-Learning: Instantly Understand Your SAN with Actionable Insights



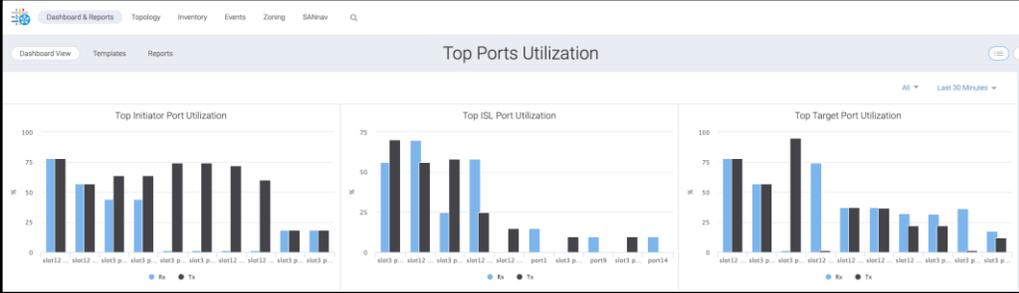
# Gather and Transform Millions of Data Points Into Network Intelligence



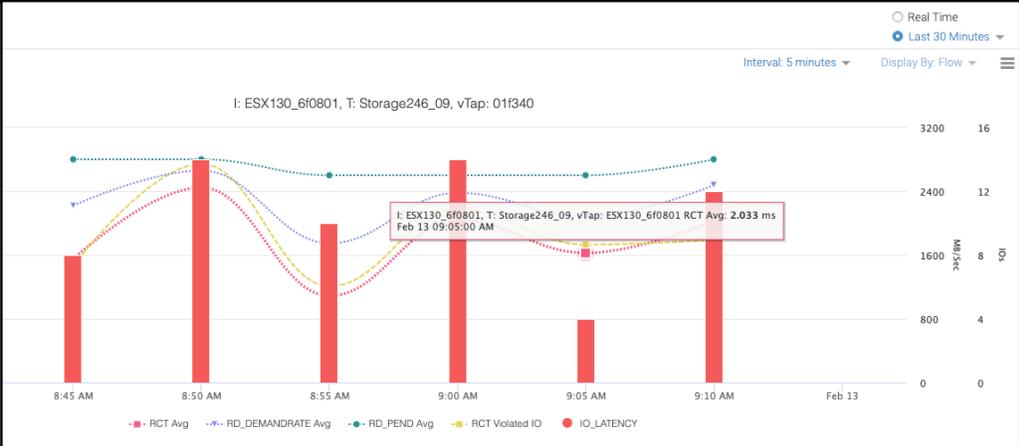
Instantly correlates data into health scores



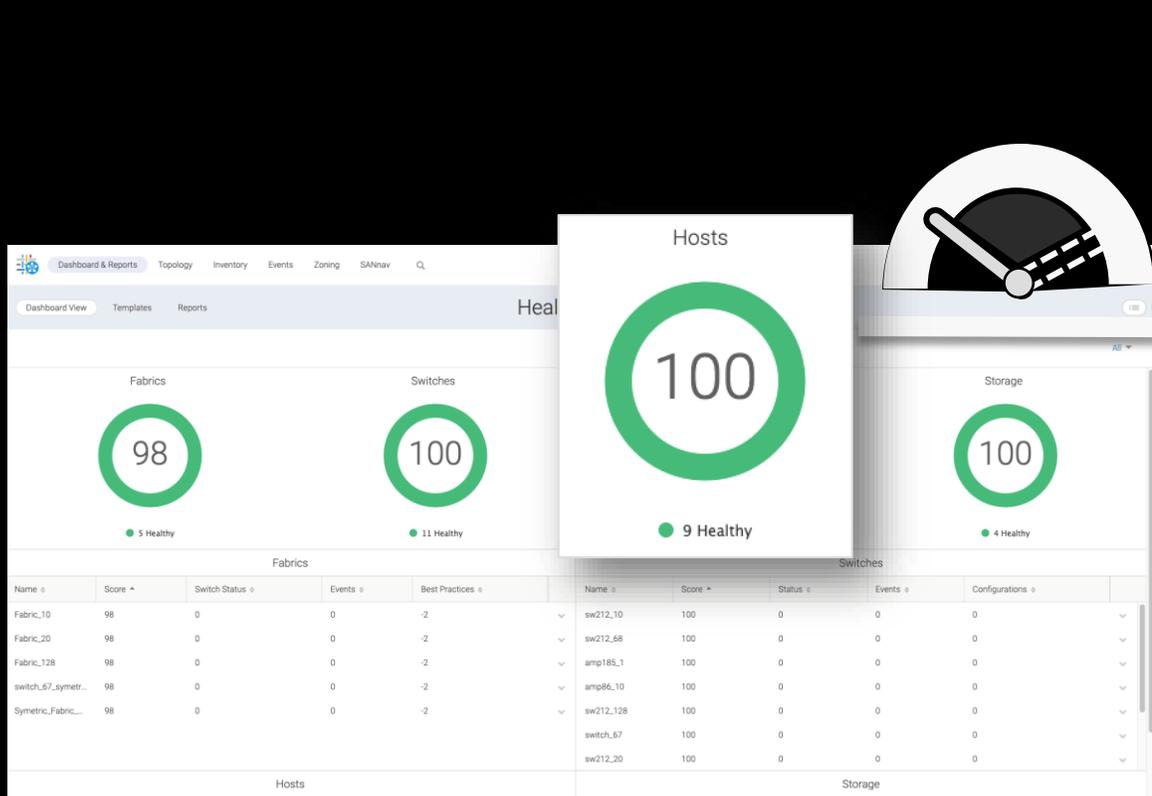
Summarizes critical data into easy to read dashboards



Powerful troubleshooting capabilities to identify the root cause of issues



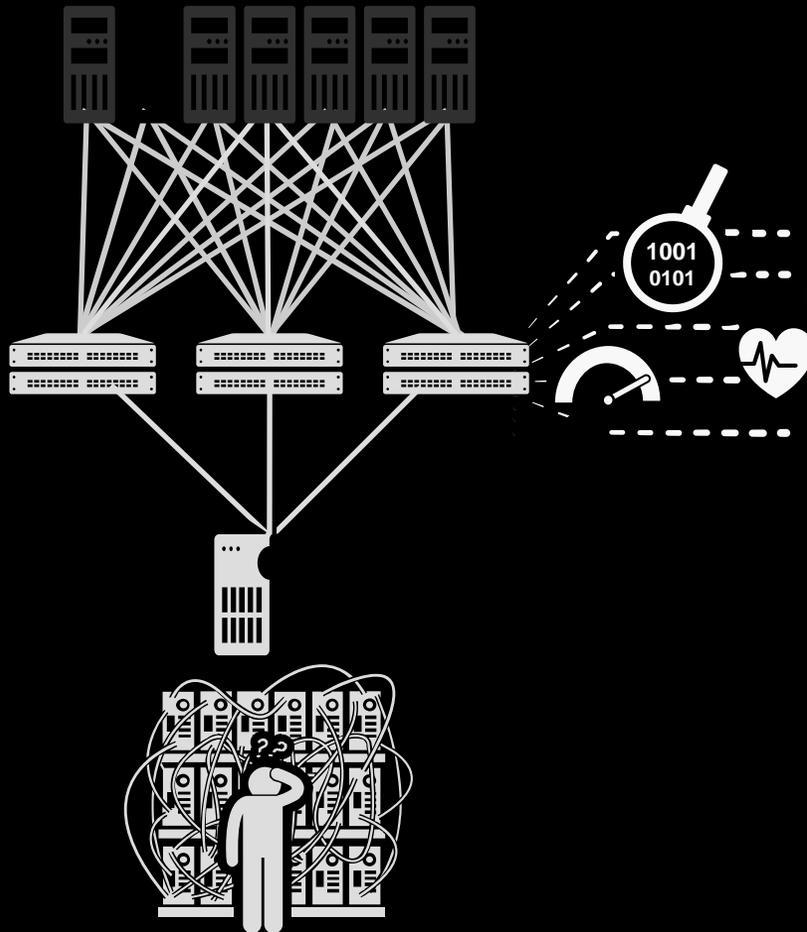
# Detect Abnormal Traffic Behaviors and Degraded Performance



**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

# Eliminate Operational Steps by Automatically Learning Application Flows



Switches ▾ Flows ISL Trunks ▾ Collections (8)

All ▾ Flow Collections ▾

Name ▾	Description ▾	Total Flows ▾	Active Flows ▾	RD ECT (ms) ▾	WR ECT (ms) ▾	RD FRT (ms) ▾	WR FRT (ms) ▾	RD IOPS ▾	WR IOPS ▾	RD Rate (MB/s) ▾	WR Rate (MB/... ▾
+ ESX87	-	48	48	0.309	0.466	0.186	0.174	35741	28312	1805.032	1341.013
+ ESX130	-	408	408	0.302	0.763	0.256	0.087	36186	36186	1133.974	1133.973
+ FID50	-	16	16	0.562	0.53	0.103	0.098	10029	10040	1254.191	1255.564
+ PIO	-	16	16	-	1.178	-	0.406	-	27636	-	1505.174
+ ROS	-	4	4	1.441	-	0.852	-	6476	-	490.149	-
+ SDD	-	8	8	0.173	-	0.043	-	8992	-	562.135	-
+ UCS	-	32	32	4.979	-	0.846	-	19072	-	1192.223	-
+ Z3031	-	8	8	0.305	0.365	0.126	0.086	11696	11696	1462.391	1462.332

- Simplify monitoring and management of application traffic by aggregating all of the traffic flows together
- Apply custom MAPS policies to the collection
- Display aggregated metrics for each flow collection
- Troubleshoot the collection made up of distributed flows and drill down to the individual flow of interest



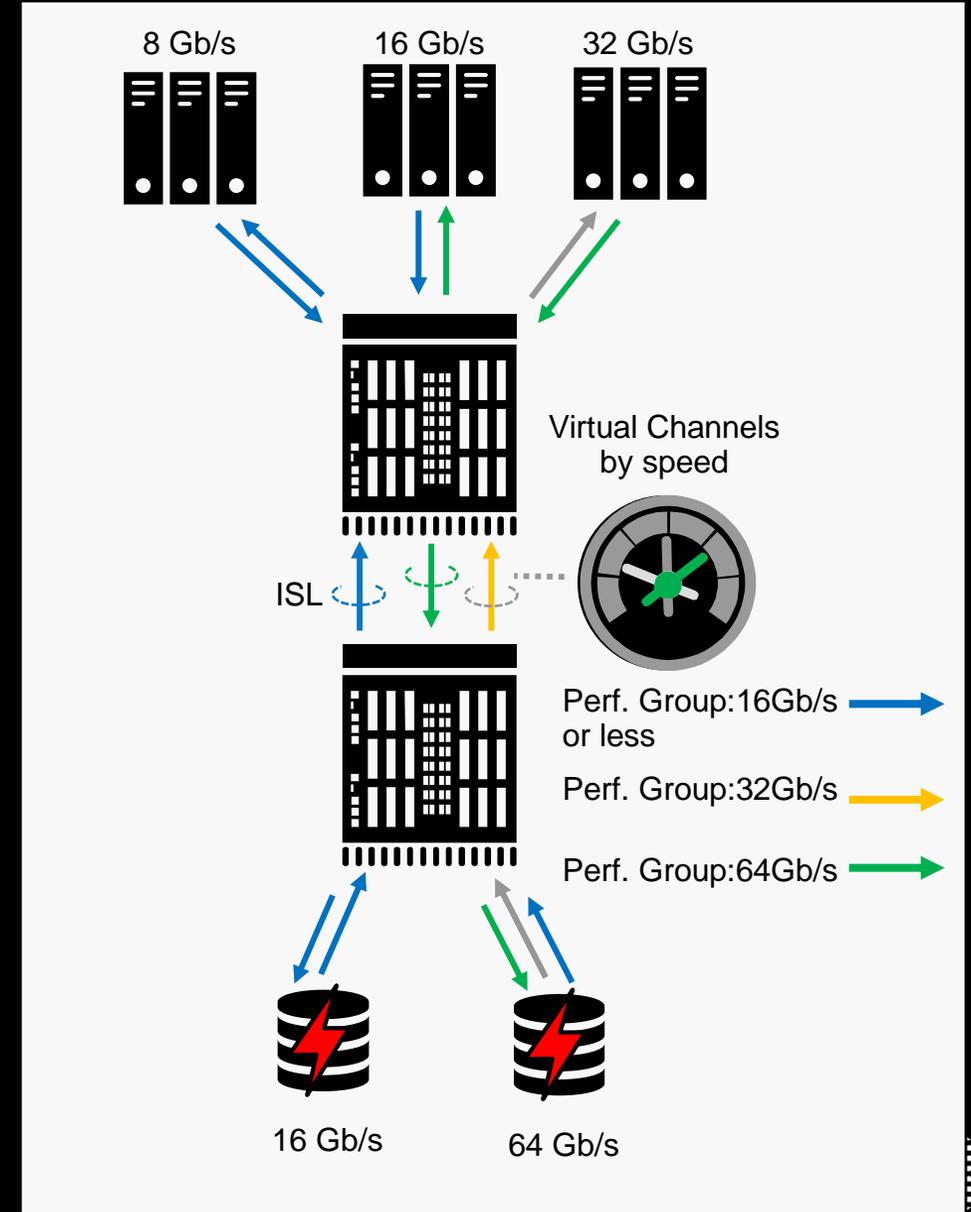
**Self-Optimizing**



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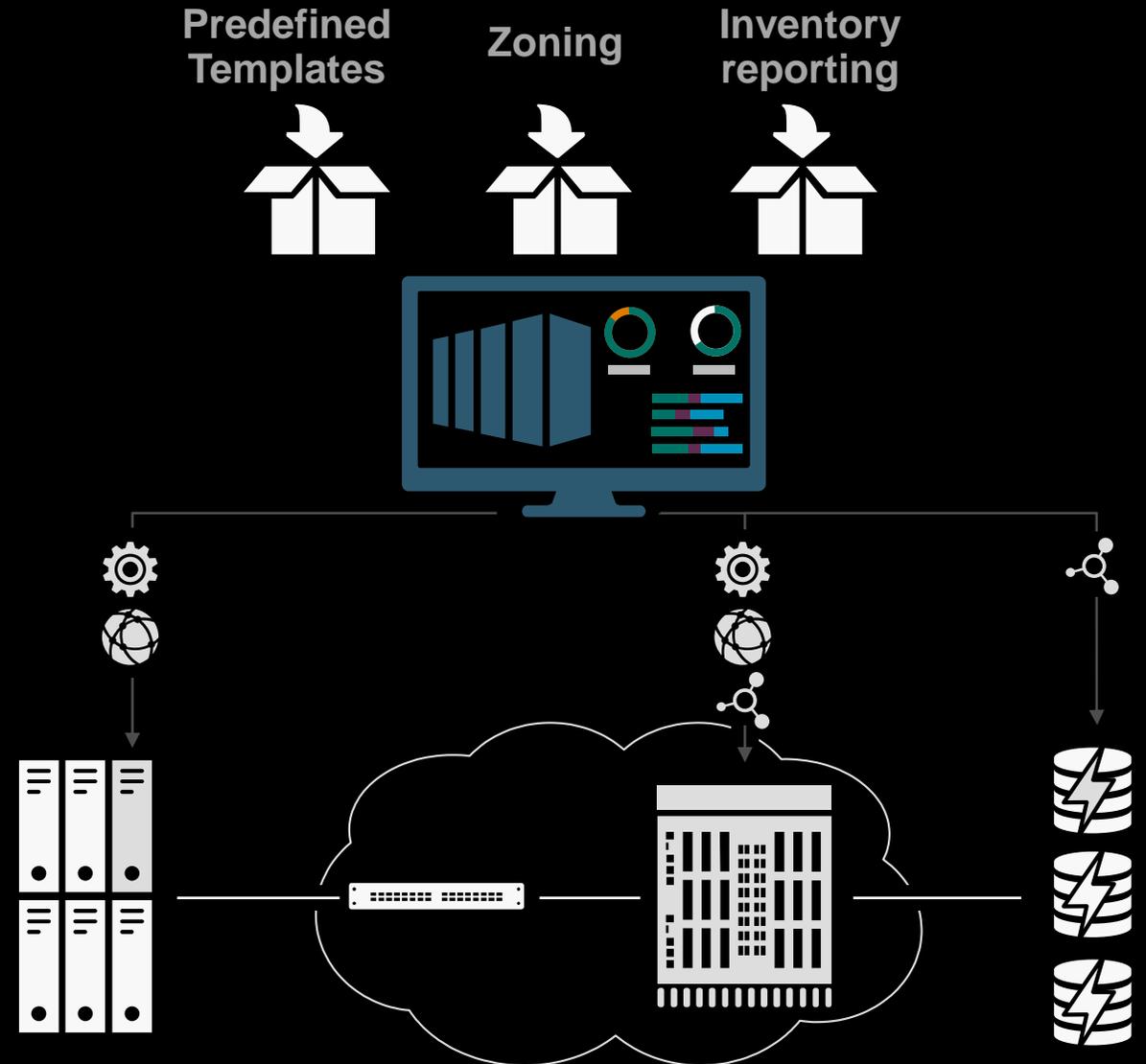
# Optimize Critical Application Performance by Automatically Grouping Traffic

- Automatically isolate 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



# Optimize Administrative Resources with Cloud-Like SAN Orchestration

- Deploy applications faster, manage systems more easily, and eliminate complexity more quickly
- Eliminate repetitive tasks, simplify management, and orchestrate across all infrastructure
- Leverage REST APIs to build solutions, share best practices, and get to production faster





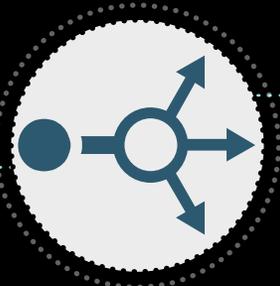
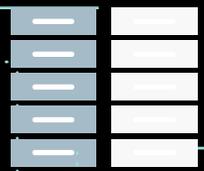
**Self-Healing**



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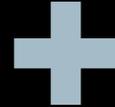
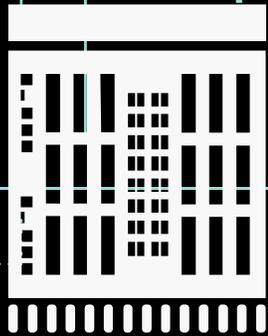
# Self-Healing: Ensure Reliability with Automatic Avoidance and Recovery Features

Instantly notify end-devices of congestion for automatic resolution



Ensure data delivery with automatic failover from physical or congestion issues

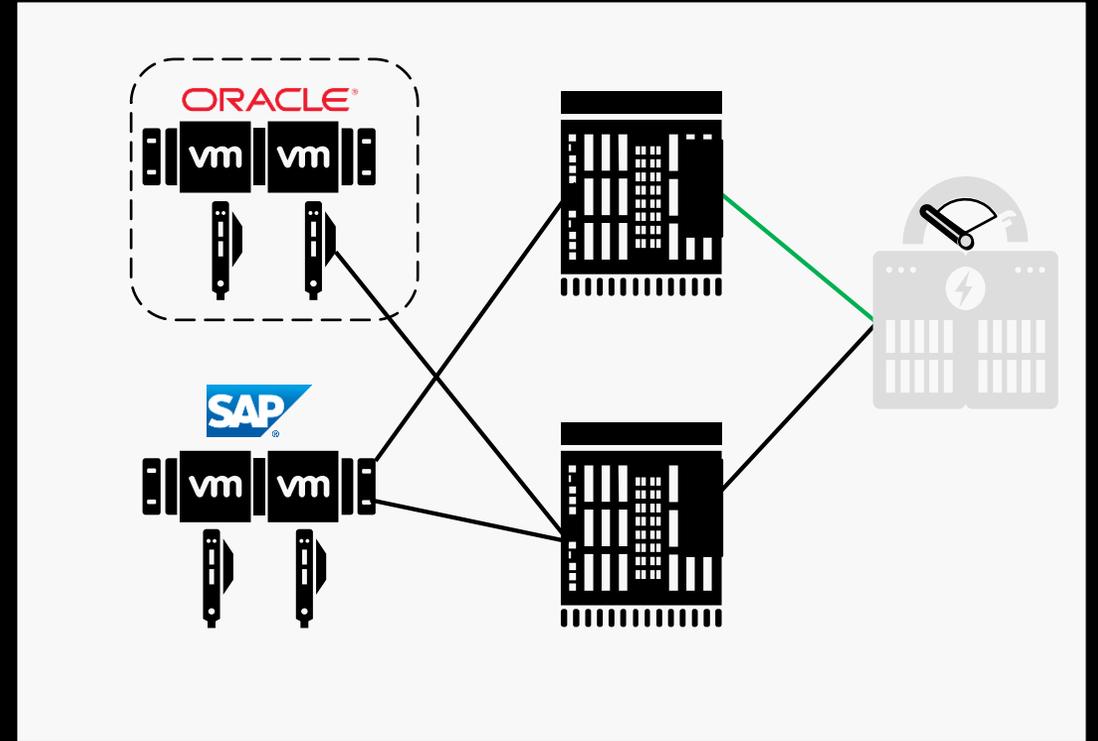
Eliminate performance impacts by automatically taking corrective action on misbehaving devices



Detect and automatically reconfigure out-of-compliance fabrics

# Instantly Notify End-Devices of Congestion for Automatic Resolution

- 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

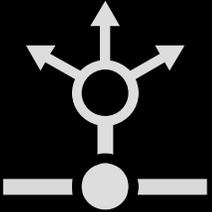
# Ensure data Delivery with Automatic Failover From Physical or Congestion Issues



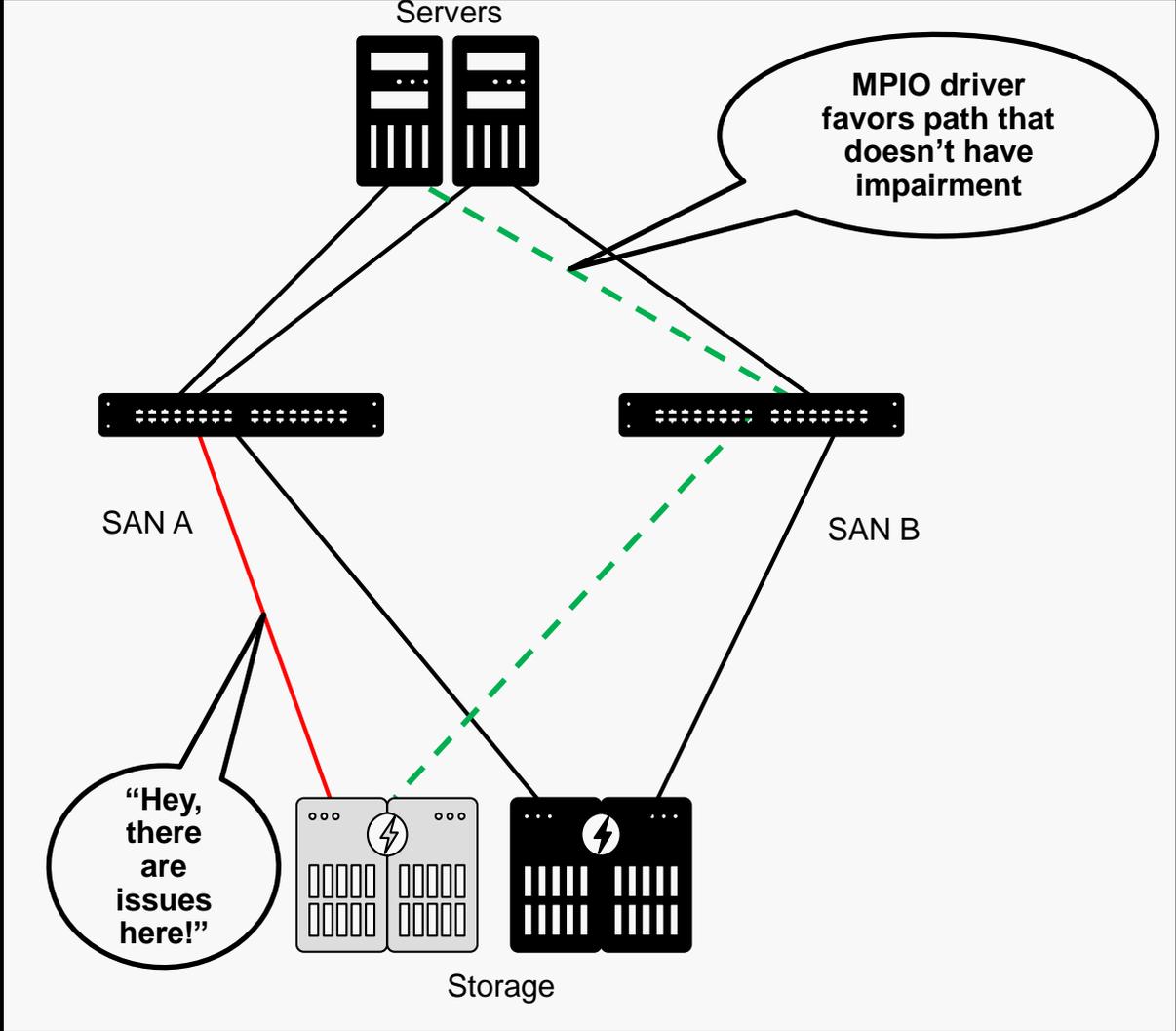
Brocade monitors fabric paths



Brocade sends notifications of impairment

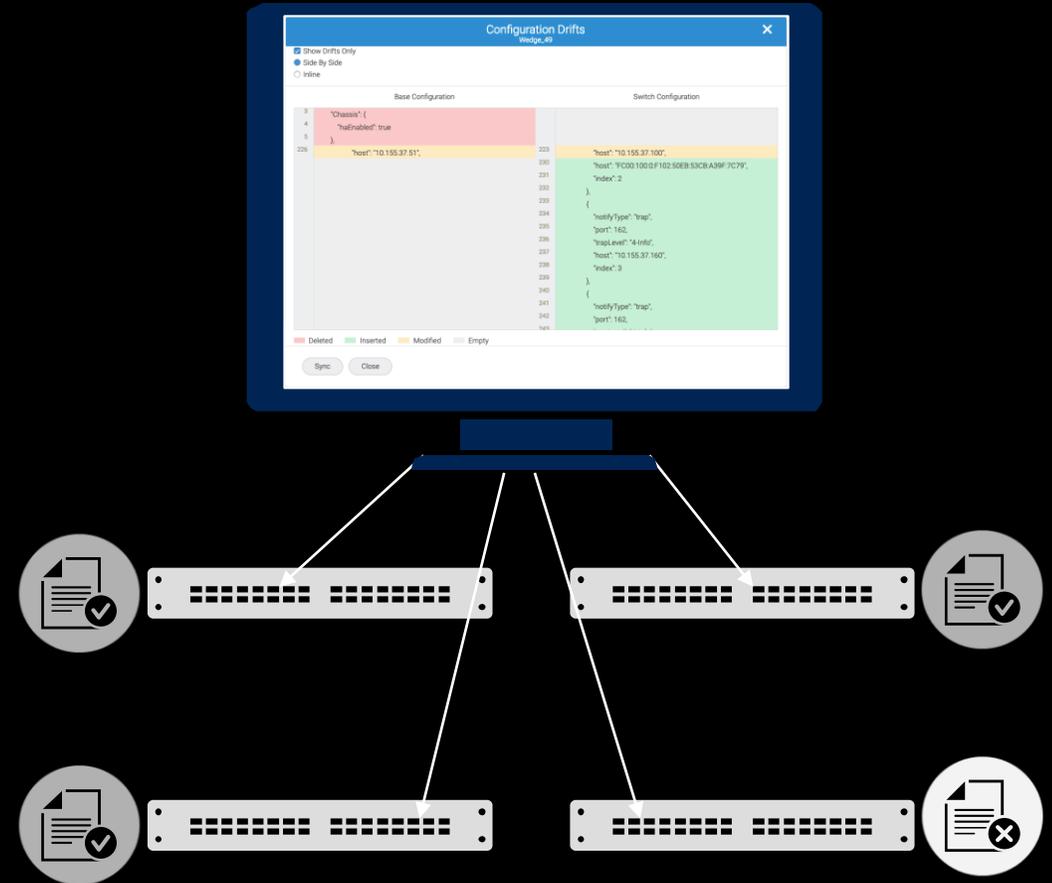


MPIO avoids impaired path



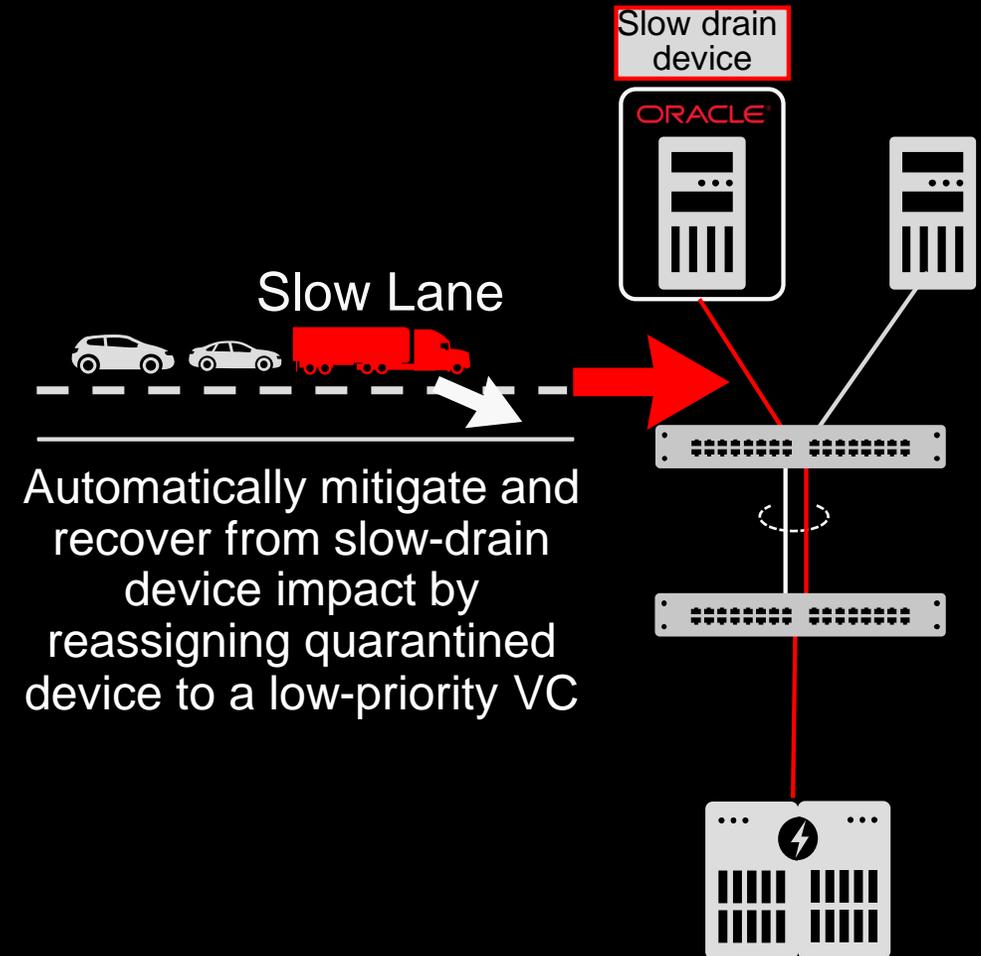
# Detect and Automatically Reconfigure Out-of-Compliance Fabrics

- 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

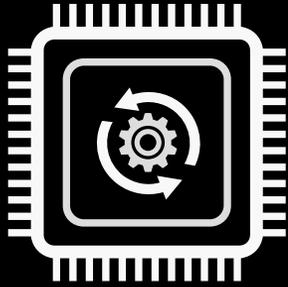


# Eliminate Performance Impacts by Automatically Taking Corrective Action on Misbehaving Devices

- 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



# Actionable Insights



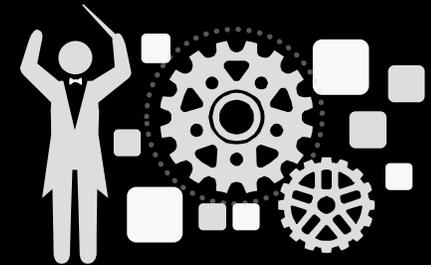
## Integrated Network Sensors

- Allows for granular tracking of NVMe/SCSI IO metrics
- Integrate seamlessly with Fabric Vision technology
- Gen 7 telemetry streaming of analytics meta data



## Data Visualization

- Real-time SAN health and performance across the entire fabric
- Investigate historical and real-time data for devices of interest
- Customizable dashboards to better fit monitoring needs



## Actionable Intelligence

- Automatic congestion mitigation
- Recommended actions providing guidance for faster problem resolution
- Save time with streamlined troubleshooting

Actionable Insights from the beginning!

# Brocade Fabric Vision Technology Features



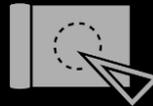
## VM Insight

Seamlessly monitors VM performance throughout a storage fabric with standards-based, end-to-end VM tagging



## IO Insight

Automatically detect degraded storage IO performance with integrated device latency and IOPS monitoring



## MAPS

Automation that simplifies policy-based monitoring and alerting



## Dashboards

Customizable health and performance dashboard, with all critical information on one screen



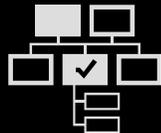
## Fabric Performance Impact Monitoring

Quickly detects and clearly alerts admins to high levels of latency, helping to identify slow-drain devices



## Flow Vision

Identifies, monitors, and analyzes the performance of specific flows or frame types



## COMPASS

Simplifies SAN configuration and maintains consistency in operational behavior



## Buffer Credit Recovery

Automatically recovers flow control buffer credit loss at the VC level, improving availability



## ClearLink Diagnostics

Cable and optic diagnostics that simplify the deployment and support of large fabrics



## Forward Error Correction

Automatically detects and recovers from bit errors, negating the need for retransmission

Fabric Vision



# Commonly Experienced Congestion Problems

Fibre Channel congestion has **three causes**:

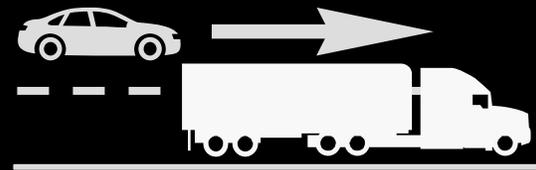
- **Lost Credits** occur when the link experiences errors
- **Credit Stall** occurs when frame processing slows or stops
- **Oversubscription** occurs when the IO demand exceeds the available resources



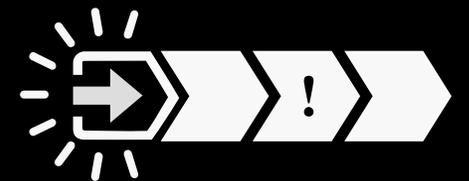
**Monitoring and Alerting  
Policy Suite**



**Fabric Performance  
Impact Monitor**



**Slow Drain Device  
Quarantine/Unquarantine**



**Credit Recovery**

# Take The Guessing Game Out



Get alerted when your environment is changing



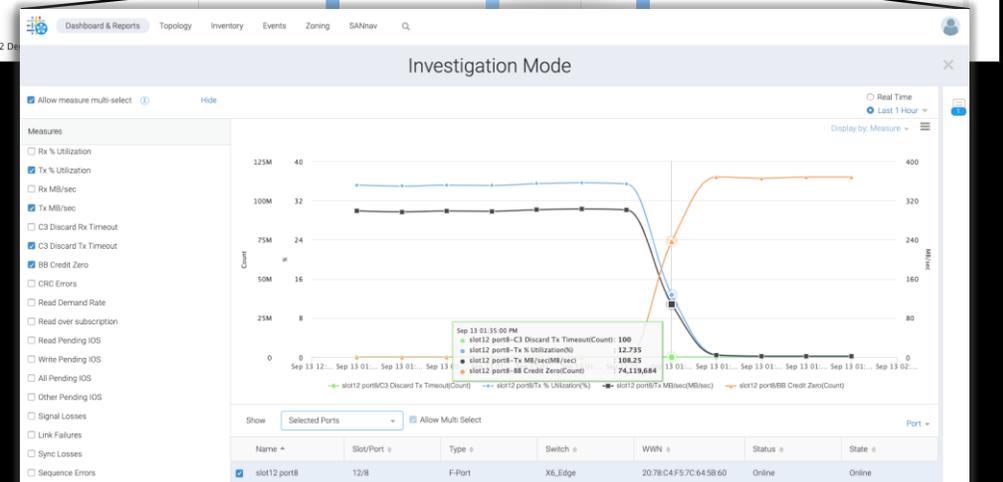
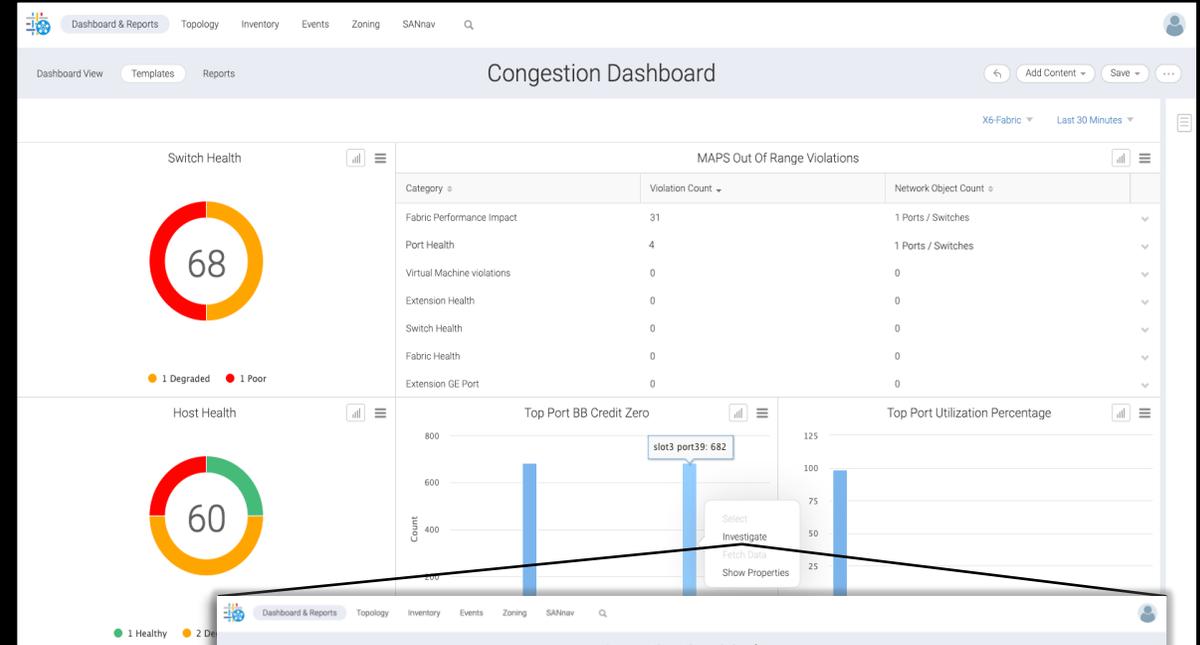
Monitor live dashboards and go back in time to identify exactly when problems occur



View devices automatically quarantined due to exceeded thresholds



Compare metrics across multiple ports to identify root causes of congestion (queue depth, mismatched speeds, link issues, etc)





**Thank You**

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