

Product Brief

Highlights

- Provides powerful, integrated monitoring, management, and diagnostic tools to simplify administration, increase operational stability, and reduce costs.
- Deploys 25 years of storage networking best practices in one click with predefined, threshold-based rules, actions, and policies.
- Automatically detects degraded application or device performance with IO Insight, the industry's first integrated network sensors to monitor device latency and IOPS performance.
- Enables virtual machine (VM) visibility in a storage fabric with VM Insight, an integrated tool for monitoring VM performance, identifying VM anomalies, and optimizing VM performance.
- Eliminates nearly 50% of maintenance costs and common network problems with proactive monitoring and advanced diagnostic tools.
- Helps save up to millions of dollars on CapEx costs by eliminating the need for expensive third-party tools through integrated monitoring and diagnostics.

Brocade[®] Fabric Vision[®] Technology

Gain Control and Insight across Storage Networks

Overview

Technology is evolving, and IT organizations are being held to a new set of standards. Not only are they responsible for delivering nonstop reliable service, but they are now judged on how quickly they can deploy new services to the business. The only way to accelerate IT delivery and keep pace with ever-increasing demands on existing infrastructure is to automate. They need their infrastructure to be able to monitor application performance, identify network congestion, and prioritize bandwidth. They also need their infrastructure to isolate configuration errors or malfunctioning devices automatically, regardless of who made the device in the data center.

Brocade[®] Fabric Vision[®] technology is a collection of features that leverages comprehensive data collection capabilities with powerful analytics to quickly understand the health and performance of the environment and identify any potential impacts or trending problems. These features are the foundation for realizing a self-learning, self-optimizing, and self-healing autonomous SAN. Brocade Fabric Vision technology provides unprecedented visibility and actionable intelligence across the storage network. The information captured is displayed in Brocade SANnav[™] Management Portal to quickly identify and isolate problems before they impact application availability. Combining these elements delivers a massive step forward in achieving an autonomous infrastructure.

Brocade Fabric Vision technology with IO Insight and VM Insight provides unprecedented visibility and actionable intelligence across the storage network. Its powerful, integrated monitoring, management, and diagnostic tools enable organizations to do the following:

Simplify monitoring:

- Deploy more than 25 years of storage networking best practices in predefined, threshold-based rules, actions, and policies with a single click.
- Take advantage of nonintrusive, self-learning, real-time monitoring and alerting of SCSI or NVMe storage I/O health and performance with key latency and performance metrics.

- Leverage integrated network sensors to gain visibility into VM and storage I/O health and performance metrics to maintain SLA compliance.
- Gain comprehensive visibility into the fabric through browser-accessible dashboards with drill-down capabilities to easily identify network health, performance, latency, and congestion issues.

Increase operational stability:

- Avoid 50% of common network problems with proactive monitoring and advanced diagnostic tools that address problems before they impact operations.

Gen 7 Fibre Channel

Gen 7 Fibre Channel enables organizations to realize a self-learning, self-optimizing, and self-healing autonomous SAN. This modern Fibre Channel infrastructure combines powerful analytics and advanced automation capabilities to maximize network performance and availability.

- Identify hot spots and automatically mitigate network problems—before they impact application performance—through intuitive reporting, trend analysis, and integrated actions.
- Monitor and set baselines on I/O latency for each VM, and identify performance anomalies to facilitate fault isolation and troubleshooting.
- Pinpoint resource contention, congestion, and errant devices to resolve application performance problems.

Dramatically reduce costs:

- Eliminate nearly 50% of maintenance costs through automated testing and diagnostic tools that validate the health, reliability, and performance of the network prior to deployment.
- Save up to millions of dollars on CapEx costs by eliminating the need for expensive third-party tools through integrated network sensors, monitoring, and diagnostics.
- Leverage specialized tools for pretesting and validating IT infrastructure to accelerate deployment, simplify support, and reduce operational costs.
- Tune device configurations with integrated I/O metrics to optimize storage performance and increase ROI.

Simplify Monitoring of Mission-Critical Applications

Organizations face a constant struggle to both manage data growth and deliver actionable intelligence from raw data—all while meeting service-level agreements (SLAs). As a result, even well-managed IT organizations must often make difficult choices about resource allocation, weighing the benefits of focusing more resources on monitoring, for instance, and fewer resources on planning or optimizing. With Brocade Fabric Vision technology, organizations can achieve unprecedented insight and visibility across the storage network through critical monitoring and diagnostic capabilities, including:

- **Monitoring and Alerting Policy Suite (MAPS):** Provides an easy-to-use solution for policy-based threshold monitoring and alerting. MAPS proactively monitors the health and performance of any SCSI or NVMe storage infrastructure to ensure application uptime and availability. By leveraging prebuilt rule-based and policy-based templates, MAPS simplifies fabric-wide threshold configuration, monitoring, and alerting. Administrators can configure the entire fabric (or multiple fabrics) at one time using common rules and policies, or they can customize policies for specific ports or switch elements. With Flow Vision and VM Insight, administrators set thresholds for VM flow metrics in MAPS policies in order to be notified of VM performance degradation. Brocade MAPS offers policy-based monitoring, including:
 - Predefined monitoring groups and prevalidated monitoring policies that administrators can

leverage. Predefined monitoring groups include switch ports attached to servers, switch ports attached to storage, E_Ports, short-wavelength SFPs, long-wavelength SFPs, and more. Predefined monitoring policies include aggressive, moderate, and conservative policies based on monitoring thresholds and actions.

- Flexibility to create custom monitoring groups—such as one group of switch ports attached to high-priority applications and another group of switch ports attached to low-priority applications—and to monitor each group according to its own unique rules.
- Flexible monitoring rules to monitor a given counter for different threshold values and take different actions when each threshold value is crossed. For example, MAPS can monitor a CRC error counter at a switch port and generate a RASlog when the error rate reaches two per minute, send an e-mail notification when the error rate is at five per minute, and fence a port when the error rate exceeds ten per minute.
- Ability to monitor both sudden failures and gradually deteriorating conditions in the switch. For example, MAPS can detect and alert administrators if a CRC error counter suddenly increases to five per minute or gradually increases to five per day.
- Support for multiple monitoring categories, enabling monitoring of the overall switch status, switch ports, SFPs, port blades, core blades, switch power supplies, fans, temperature sensors, security policy violations,

fabric reconfigurations, CPU and memory utilization, traffic performance within and across data centers, scalability limits, and more.

- Support for multiple alerting mechanisms (RASlogs, SNMP traps, email notifications, and device FPIN notifications) and actions, such as port decommissioning and port fencing, port toggling, and slow-drain device quarantining, when errors exceed the specified threshold. Administrators can tailor the frequency of alert messages to reduce duplicate notifications.
- Ability to apply different notifications and actions based on the frequency of a violation with rule-on-rule monitoring. Administrators can define different actions as operational responses if a monitoring rule has been repeatedly violated.
- **Dashboards:** Provide at-a-glance views of switch status and various conditions that are contributing to performance issues, enabling administrators to get instant visibility into any hot spots at a switch level and take corrective actions. Dashboard views include:
 - Overall status of the switch health and the status of each monitoring category, including any out-of-range conditions and the rules that were triggered.
 - Historical information on the switch status for up to the last seven days; automatically provides raw counter information for a variety of error counters. This integrated dashboard view also provides a single collection point for all dashboard data from a fabric for a specific application flow.
- **IO Insight:** Proactively monitors I/O performance and behavior through integrated network sensors to gain deep insight into problems and ensure service levels. This capability automatically learns the traffic flows to a fabric nondisruptively and nonintrusively gathers I/O statistics for both SCSI and NVMe traffic from any device port on a Gen 7 and Gen 6 Fibre Channel platform; and then it applies this information within an intuitive, policy-based monitoring and alerting suite to configure thresholds and alarms. Integrated application-level and device-level I/O latency and IOPS monitoring provide the ability to baseline application performance and detect degraded performance. This enables administrators to proactively control performance and availability to ensure operational stability. Key capabilities include:
 - Monitors individual host or storage devices to gain deeper insight into the performance of the network to maintain SLA compliance.
 - Obtains total I/Os, first response time max/average, I/O latency (Exchange Completion Time, or ECT) max/ average, and outstanding I/Os total/ average performance metrics for a specific host or storage for a LUN or NSID in order to diagnose I/O operational issues.
 - Enables tuning of device configurations with integrated I/O metrics to optimize storage performance.
 - Through SANnav Management Portal, visualizes IO Insight metrics and enables the ability to investigate.

- **VM Insight:** Seamlessly monitors VM performance throughout a storage fabric with standards-based, end-to-end VM tagging. Administrators can quickly determine the source of VM/ application performance anomalies, as well as provision and fine-tune the infrastructure based on VM/application requirements to meet service-level objectives.

Dramatically Streamline SAN Administration

IT organizations with large, complex, or highly virtualized data center environments often require advanced tools to help them more effectively manage their storage infrastructures. Developed specifically with these IT organizations in mind, Fabric Vision technology also includes several breakthrough management capabilities that dramatically simplify day-to-day SAN administration and provide unprecedented visibility across the storage network. These management capabilities include:

- **Configuration and Operational Monitoring Policy Automation Services Suite (COMPASS):** Simplifies deployment, safeguards consistency, and increases operational efficiencies of larger environments with automated switch and fabric configuration services. Administrators can configure a template or adopt an existing configuration as a template and seamlessly deploy the configuration across the fabric. In addition, they can ensure that settings do not drift over time with COMPASS configuration and policy violation monitoring within SANnav dashboards.

- **Fabric Performance Impact (FPI) Monitoring:** Leverages predefined MAPS policies to automatically detect and alert administrators to different congestion severity levels and to identify credit-stalled devices (also known as slow-drain devices) or oversubscribed ports that could impact network performance. This feature pinpoints exactly which devices are causing or are impacted by congested ports, and it automatically quarantines credit-stalled devices to prevent buffer credit starvation.

Increase Fabric Resiliency

Fabric Vision technology includes several critical troubleshooting and diagnostic capabilities that help increase fabric resiliency, reduce downtime, and optimize application performance. They include:

Flow Vision: Enables administrators to identify, monitor, and analyze specific application flows in order to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes:

- **Flow Monitor:** Provides comprehensive visibility, automatic learning, and nondisruptive monitoring of a flow's performance. Administrators can monitor all flows from a specific host to multiple targets or volumes, from multiple hosts to a specific target/volume, or across a specific ISL. Additionally, they can perform volume-level monitoring of specific frame types to identify resource contention or congestion that is impacting application performance. With the IO Insight capability, administrators can monitor first I/O response time, I/O completion time, the number of pending I/Os, and IOPS metrics for a flow from

a specific host to a target or volume running SCSI or NVMe over Fibre Channel traffic. With VM Insight, administrators can monitor network throughput and I/O statistics for each VM. Flow Monitor provides the following capabilities:

- Comprehensive visibility into application flows in the fabric, including the ability to learn (discover) flows automatically.
- Monitoring of application flows within a fabric at a given port.
- Predefined flows to discover all application flows going through all device ports on a switch for network provisioning and planning.
- Statistics associated with the specified flows to gain insights into application performance, such as transmit frame count, receive frame count, transmit throughput, receive throughput, SCSI Read frame count, SCSI Write frame count, number of SCSI Reads and Writes per second (IOPS), and more.
- IO Insight to monitor device ports, capturing first I/O response time, I/O completion time, number of pending I/Os, and IOPS metrics for a flow from a specific host to a target or LUN or NSID.
- VM Insight to monitor per virtual machine (VM) the network transmit and receive throughput metrics and IO Insight metrics for a VM flow.
- Monitoring of various frame types at a switch port to provide deeper insight into the storage I/O access pattern at the LUN level, reservation conflicts, and I/O errors.
- Integration with Brocade MAPS to enable threshold-based real-time monitoring and alerting of flow metrics for individual flow or collections of flows to provide SLA monitoring.

- **Flow Learning:** Enables administrators to nondisruptively discover all flows that go to or come from a specific host port or storage port or to traverse ISLs/IFLs or FCIP tunnels to monitor fabric-wide application performance. In addition, administrators can discover top and bottom bandwidth-consuming devices and manage capacity planning.
- **Flow Generator:** Provides a built-in traffic generator for pretesting and validating the data center infrastructure for robustness—including route verification and integrity of optics, cables, ports, back-end connections, and ISLs—before deploying applications. Flow Generator allows users to:
 - Configure a Gen 7 and Gen 6 Fibre Channel-capable port as a simulated device that can transmit frames at 16G or 32G line rate.
 - Emulate a Gen 7 and Gen 6 Fibre Channel SAN without actually having any hosts or targets or SAN testers, and pretest the entire SAN fabric.
- **Flow Mirroring:** Enables administrators to nondisruptively create copies of specific application and data flows or frame types that can be captured for in-depth analysis.

Brocade ClearLink® Diagnostics:

Helps ensure optical and signal integrity for Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. ClearLink® Diagnostic Port (D_Port) is an advanced capability of Fibre Channel platforms. Non-Brocade devices require the Fabric Vision technology license.

Forward Error Correction (FEC):

Enables recovery from bit errors in Fibre Channel links, enhancing transmission reliability and performance. FEC is mandatory in

Gen 6 and Gen 7 links with more robust error recovery to support 32G performance.

Credit Loss Recovery:

Automatically detects and recovers buffer credit loss at the virtual channel (VC) level, providing protection against performance degradation and enhancing application availability.

Improve Efficiency with Fabric Automation

IT organizations spend nearly half of their time performing repetitive daily management tasks, such as zoning, inventory reporting, and operational validation checks. By automating these repetitive tasks, IT organizations can significantly improve their efficiency and dramatically decrease the risk of operational mistakes. Automation in large-scale IT environments integrates diverse infrastructure components with consistency and predictability to deliver greater operational efficiency and agility. With more than 25 years of storage networking experience, Brocade, a Broadcom company, understands the nuances that go into infrastructure management and the tasks that can benefit from automation. By introducing REST APIs directly into its switch and management products, Broadcom offers a broad range of choices to enable any SAN management solution. IT organizations that couple Broadcom's robust data

collecting capabilities with automation and orchestration tools (such as Ansible) gain the ability to automate configuration tasks and the visibility to monitor and detect any performance or health changes.

Brocade automation solutions are based on the following pillars:

- Make standard REST APIs available directly from the switch in order to automate repetitive daily tasks, such as fabric inventory, provisioning, and operational state monitoring.
- Leverage Ansible to easily scale automation and orchestration across the entire infrastructure.

Simplify Management and Reporting

SANnav simplifies Gen 7 and Gen 6 Fibre Channel management and helps organizations dramatically reduce deployment and configuration times by allowing fabrics, switches, and ports to be managed as groups. Customizable dashboards graphically display performance and health indicators out of the box. To accelerate troubleshooting, administrators can use dashboards to quickly review past events and identify problems in the fabric. Dashboards and reports can be configured to show only the most relevant data, enabling administrators to more efficiently prioritize their actions and maintain network performance.

Global Support

Global Support has the expertise to help organizations build resilient, efficient SAN infrastructures. Leveraging 25+ years of expertise in storage networking, Global Support delivers world-class technical support, implementation, and migration services to enable organizations to maximize their hardware and software investments, accelerate new technology deployments, and optimize the performance of their overall network.

Maximizing Investments

To help optimize technology investments, Brocade, a Broadcom company, and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.broadcom.com/brocade.