

Visibility in the Modern Data Center with Brocade SLX Switches and Routers

HIGHLIGHTS

- Improve network operations and reduce operational costs through pervasive, granular, real-time network monitoring and troubleshooting with dynamic flow identification, intelligent pre-processing and flexible data streaming via the Brocade SLX Insight Architecture embedded in every Brocade SLX device
- Brocade SLX Insight Architecture helps improve operational efficiency and troubleshooting by providing an open guest VM in a KVM environment to run third-party monitoring and analytics applications on the switch or router coupled with an internal analytics path and high-performance data streaming options
- Brocade SLX Visibility Services enables organizations to collect physical and virtual network traffic data from multiple network layers to provide overlay and workload visibility across the network
- Gain visibility into highly distributed multi-tier applications with Brocade SLX Visibility Services and its support for rich classification and workload matching with network-wide scale
- Apply rule-based actions automatically to incoming network traffic while delivering context-rich data to Brocade Insight Architecture, Brocade Workflow Composer, or third-party analytics and monitoring applications with Brocade SLX Visibility Services

Embedded Network Visibility for Pervasive Real-Time Monitoring and Automated Actions

As organizations continue to transform their business and adapt to new digital workloads, IT operations teams struggle to keep pace with the volume and variety of data going across their networks. In order to meet customer and end-user service and application expectations and remain competitive, organizations need to provide service and application assurance, improve operational efficiencies, and in some cases, enable new monetization opportunities. To accomplish this, they need comprehensive visibility into the operational state of the network and into the traffic that is transiting the network.

The Visibility Challenge

Network devices such as routers and switches that are not designed to provide clear and comprehensive network visibility can limit the ability to quickly, flexibly, and cost-effectively extract the data organizations require to meet SLAs, improve monetization, and increase operational efficiency as they digitally transform and need to support increasingly diverse applications and services and streamline operations.

Existing approaches to network visibility often suffer from limited comprehensiveness, which in turn limits the ability of operators of modern data centers to effectively address application and service requirements and in an operationally efficient manner. Key challenges include:

- **Limited in scope:** Addresses only device state and without providing a comprehensive, real-time, and holistic understanding of underlying network traffic nor the ability to take an action on it, making it challenging to easily address diverse operational needs
- **Inadequate ability:** Does not support increasingly complex workloads, distributed application architectures, scale or virtual network overlays, creating blind spots where organizations cannot glean context
- **Static:** Lacks the ability to be dynamically and programmatically controlled via software based on a given policy, environment or network situation, thus limiting the overall IT agility of the organization

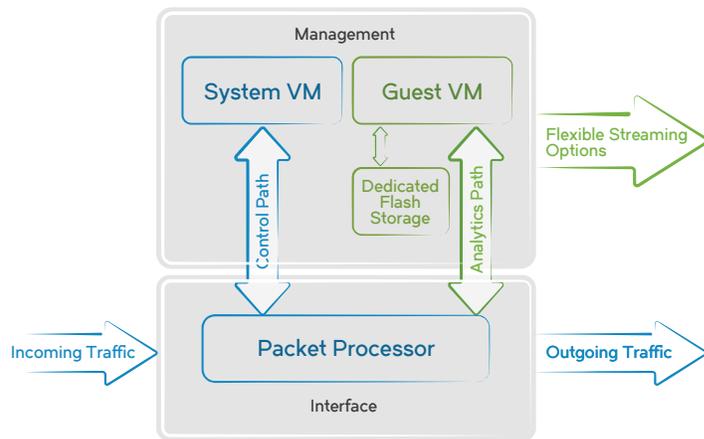


Figure 1. The Brocade SLX Insight Architecture in Brocade SLX Switches and Brocade SLX Routers delivers open visibility capability in every device for customized pervasive insight into network traffic.

- **Finite capabilities:** Constrained to only the capabilities of the switch or router vendor and embedded in the device, limiting the ability to tailor visibility to a specific environment or operational model while also potentially causing a tradeoff between visibility and day-to-day forwarding requirements of the network
- **Complex and costly:** Requires separate devices connected via physical taps or span ports to monitor the router or switch via software tools deployed on devices that are manually connected to a router or switch being monitored, increasing cost and operational complexity while limiting ability to gain real-time insight

Comprehensive Visibility in the Digital Era

In the digital era, the expanded environment of the modern infrastructure demands greater visibility. This includes dynamic, rich, and scalable classification and actions at multiple layers from network to workloads as well as highly flexible, granular real-time visibility of specific flows. Additionally, this visibility approach must be able to be deployed on an organization's own terms with capabilities tuned to the needs of their business. The visibility solution must also provide this capability pervasively and in real-time to deliver the pertinent

data where and when it is needed. And finally, the visibility solution must do so with minimal additional cost, operational complexity, or impact to the performance and primary function of the network. Embedding a purpose-built, dedicated visibility services and architecture within the switch or router that combines both software and hardware innovation produces a superior solution to these needs.

Embedded Visibility Solution

Brocade® SLX™ Insight Architecture™ and Brocade SLX Visibility Services deliver a new approach to network monitoring and troubleshooting that makes it faster, easier, and more cost-effective to get the comprehensive, real-time visibility needed for network operations and automation. This innovative approach provides comprehensive visibility from the network to the workload including the ability to address end-user application or service needs, analyze, automate, and generate reports on context-rich data, and provide the fine-grain targeted visibility needed to tune the network for specific device or service needs.

Brocade SLX Insight Architecture

Brocade Insight Architecture provides a unique pervasive visibility architecture designed from the ground up and leveraging an innovative combination of Brocade SLX-OS software and Brocade SLX platform hardware features to provide organizations unparalleled network visibility without impacting normal network operation or performance. This flexible and open solution enables organizations to deploy their choice of third-party or custom monitoring and troubleshooting applications, tools, and utilities directly in the network, providing real-time visibility and tuned to meet their specific business and operational needs pervasively across the network. With tools that better enable them to monitor and troubleshoot the network, organizations can improve service and application assurance, as well as dramatically reduce operational impact and cost.

The Brocade SLX Insight Architecture is designed to enable organizations to deploy high-performance and flexible visibility applications pervasively throughout their network for improved monitoring and troubleshooting. By providing dedicated resources on the router or switch, organizations can gain unparalleled insight into the network through pervasive low-latency capture of real-time visibility traffic without impacting the normal control and forwarding of the network (see Figure 1).

INSIGHT WITHOUT COMPROMISE

Gain unparalleled insight into the network through pervasive low-latency capture of real-time visibility traffic with no impact to performance or reliability of the network data plane or control plane.

Brocade SLX Insight Architecture Benefits

A key benefit of the Brocade SLX Insight Architecture is to enable organizations to deploy high-performance and flexible visibility applications via dedicated resources on the platform, including:

- *Dedicated internal and external bandwidth that allows applications running in the open KVM environment to extract data without disrupting forwarding or control plane traffic and to deliver the captured data to analytics applications off the platform*
 - *Industry-standard x86 CPUs with open KVM environment*
 - *Dedicated flash memory*
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Flexible Packet Filtering

The Brocade SLX Insight Architecture begins with flexible packet filtering in the packet processors for each interface. This provides a rich set of filters to select the exact type of traffic an organization wants to capture for visibility processing.

Open Guest VM

The architecture supports an open kernel-based virtual machine (KVM) environment to accommodate third-party and customer-specific applications that can consume the network traffic captured from the router or switch interfaces. Enabled by the Brocade SLX-OS, this pre-configured KVM environment leverages high performance x86 CPUs to host these applications on every router or switch, extending visibility customized to the business and operational needs of the organization across the entire network. While the KVM environment is open and can host any application, it is designed and ideally suited for networking applications, tools, and utilities.

The Brocade SLX Insight Architecture open KVM environment supports several pretested and well-known packet capture applications, including Wireshark and tcpdump, and can be accessed via pretested RESTful utilities such as Chrome and Curl. There are a wide variety of additional applications, tools, and utilities that organizations are able to run in this environment, such as data analytics applications, packet generators, monitoring tools, troubleshooting utilities, and many others.

Internal Analytics Path

The architecture provides an innovative internal analytics path for the transport of captured data packets between the packet processors on the Brocade SLX interfaces and the Brocade SLX Insight Architecture guest VM open KVM environment. This link provides applications running in the guest VM a dedicated resource for high-performance packet capture without disrupting normal forwarding or control plane traffic of the network device.

Flexible Streaming

The Brocade SLX Insight Architecture provides flexible streaming options, enabling captured data to be delivered to applications off the platform for additional analysis, visualization, and reporting, or logging and archiving.

Local Analytics Storage

The Brocade SLX Insight Architecture includes a provision for on-device storage dedicated to visibility applications running in the guest VM environment, providing real-time local capture for easy and fast access.

Brocade SLX Visibility Services

Brocade SLX Visibility Services delivers a unique highly scalable, dynamic, API-controlled visibility at the entry and exit points to the data center network as close to the source and destination of the service as possible. This approach provides multilayer visibility including overlay and workload visibility across the network and leverages programmable ASIC-based capabilities for rich classification and diverse actions including the ability to drop, shape, or mirror context-rich traffic for additional analysis.

Brocade SLX Visibility Services is designed to help simplify network operations with embedded visibility from physical network to application workload. As network complexity increases, isolated data points at the physical or virtual network layer give little guidance as to the criticality of an issue. For example, bursty storage backup traffic slowing down an internal Web site is a lower priority than a slowdown for a revenue-generating application. Network administrators need

BROCADE SLX INSIGHT ARCHITECTURE USE CASES

Key use cases for the Brocade SLX Insight Architecture fall into the general areas of monitoring and troubleshooting the network, and analyzing data.

Monitoring the Network

- *SLA monitoring for network parameters*

Troubleshooting the Network

- *Customized tools, apps, and scripts for troubleshooting*
- *Debugging for congestion, latency, and network performance issues*
- *Faster time-to-recovery*

Analyzing Data

- *All Packets (sniffer), for example, Splunk, Wireshark, Tcpdump*
 - *Sampled Packets, for example, sFlow-RT*
 - *DDoS attack detection and debugging*
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¹The dedicated services port and in-band streaming are not supported in the current Brocade SLX-OS release.

VISIBILITY FROM WIRE TO WORKLOAD

Gain essential workload context across the network, ensuring appropriate actions are taken, by combining physical and virtual network traffic data with overlay and workload information across multiple network layers.

Brocade SLX Visibility Services

- A key benefit of Brocade SLX Visibility Services is to empower network administrators to easily enable diverse, rule-based actions to maintain application or service performance while reducing operational complexity and risk, including:
- Pervasive visibility at scale across the network for seamless support of highly distributed multi-tier application workloads
- Rich multilayer classification capabilities including network parameter filters such as IP and MAC addresses, port numbers, VNIs, and workload matching
- Diverse automated rule-based actions such as count, drop, and mirror for incoming network traffic with push of context-rich data to Brocade Insight Architecture, Brocade Workflow Composer, or third-party analytics and monitoring applications

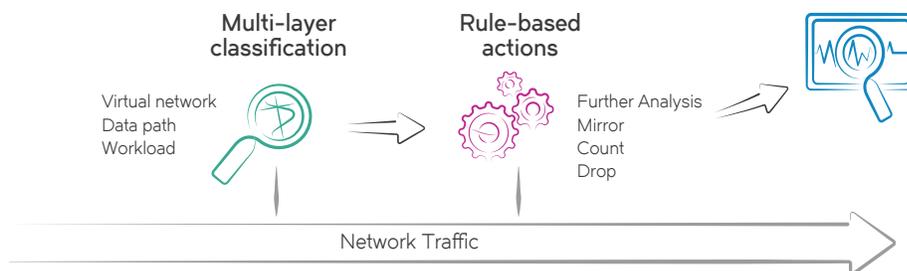


Figure 2. Brocade SLX Visibility Services in Brocade SLX Switches enables automated, rule-based actions across multiple layers of the network.

workload context across the network to ensure the appropriate action is taken in each case. By combining physical and virtual network traffic data with overlay and workload information across multiple network layers, Brocade SLX Visibility Services enables diverse, rule-based actions to maintain performance and mitigate risk.

- Rich classification (e.g. IP and MAC addresses, port numbers, VNIs) and Workload matching with network-wide scale
- Automated application of rule-based actions (e.g. count, drop, mirror, sFlow) to incoming network traffic

- Further actions outside the switch including push of context-rich data to Brocade Insight Architecture, Brocade Workflow Composer, or to third-party analytics and monitoring applications

Brocade SLX Visibility Services are embedded into Brocade SLX Switches, reducing the operational complexity of managing network visibility at scale (see Figure 2).

For more information, see the Brocade SLX product page on www.brocade.com and the product data sheets for the Brocade SLX 9850 Router, the Brocade SLX 9540 Switch, the Brocade SLX 9240 Switch, and the Brocade SLX 9140 Switch.

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