BROADCOM

Product Brief

Emulex® SAN Manager

Simplify HBA Management and Remediate Network Performance Problems

Key Benefits

Monitor

Simplifies storage area network (SAN) management by providing visibility into the configuration status of all host bus adapters (HBAs) across the SAN.

- Provides a dashboard highlighting critical SAN host data.
- Captures complete SAN HBA host inventory; host names; and OS, software, and firmware versions.
- Identifies multipath misconfiguration errors and firmware/driver version mismatches.
- Provides optics health warnings.
- Provides health warnings for physical layer issues.

Manage

Lowers operational costs and improves IT agility with exclusive new managed HBAs.

- Centralizes management of HBAs with in-band administration across the SAN.
- Configures the Adaptive Congestion Management feature.
- Supports Virtual Fabrics.
- Exports on-screen data to spreadsheets or databases.

Adapt

Collaborates with the fabric to automatically identify, minimize, or mitigate application performance problems through fabric notifications.

- Visualizes SAN congestion with a dashboard that presents congestion and bandwidth graphs.
- Integrates into modern data-center tools with a scriptable interface.
- Mitigates congestion automatically via the Adaptive Congestion Management feature.

Overview

Information technology departments continue to grapple with network management issues. The key challenges are: 1) the ability to enable IT administrators to manage complex networks, 2) the capability to continually improve operational efficiency, and 3) the tools that provide actionable insights.

Emulex works closely with its enterprise customers, developing tools aimed at lowering the cost of management. Emulex® SAN Manager was developed as a result of this effort. Emulex SAN Manager is an easy-to-use solution that dramatically reduces the operational cost and complexity of running a Fibre Channel SAN via the following:

- Visibility and access to endpoints across an A/B fabric.
- Centralized in-band access to managed HBAs.
- A solution to performance problems with direct communication between Emulex HBAs and Brocade® fabric switches and directors.

The Emulex SAN Manager tool provides centralized HBA management in-band through the SAN. No Ethernet connection to individual servers is required, no agents are required on hosts, and no dedicated server is required.

Emulex SAN Manager is designed for the data center with complete CLI support so that IT administrators can schedule activities and log data. This enables enterprises to integrate the tool into their standard data-center operations.

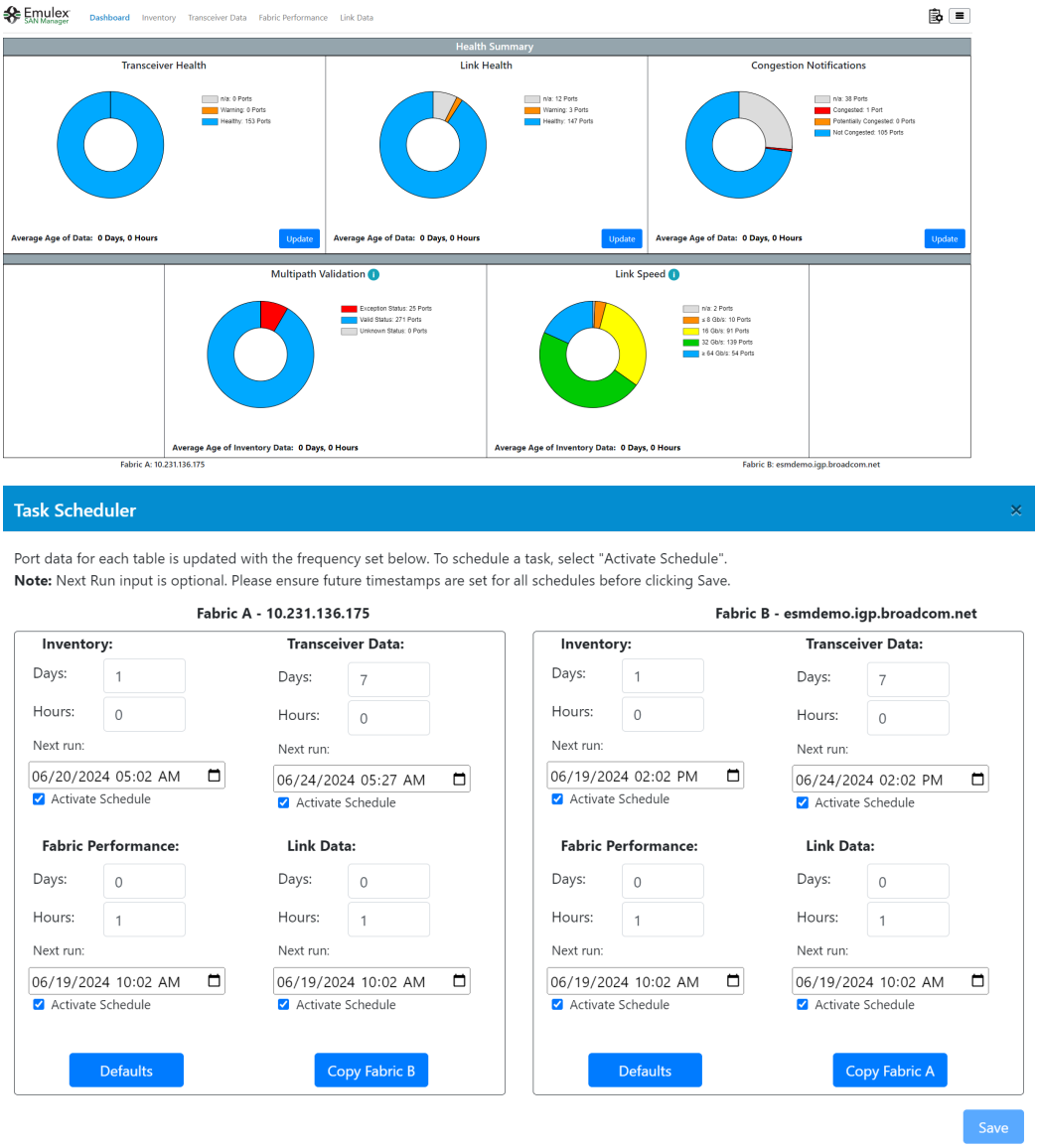
Monitor

Dashboard Feature

Emulex SAN Manager provides an overall view of Fabric Health enabling administrators to:

- Identify critical host issues on the fabric
- Click through to access detailed information
- Schedule updates for all critical data

Figure 1: Dashboard and Task Scheduler Tab



Inventory Feature

Emulex SAN Manager's centralized console provides visibility into all of the HBAs connected to the SAN so administrators can do the following:

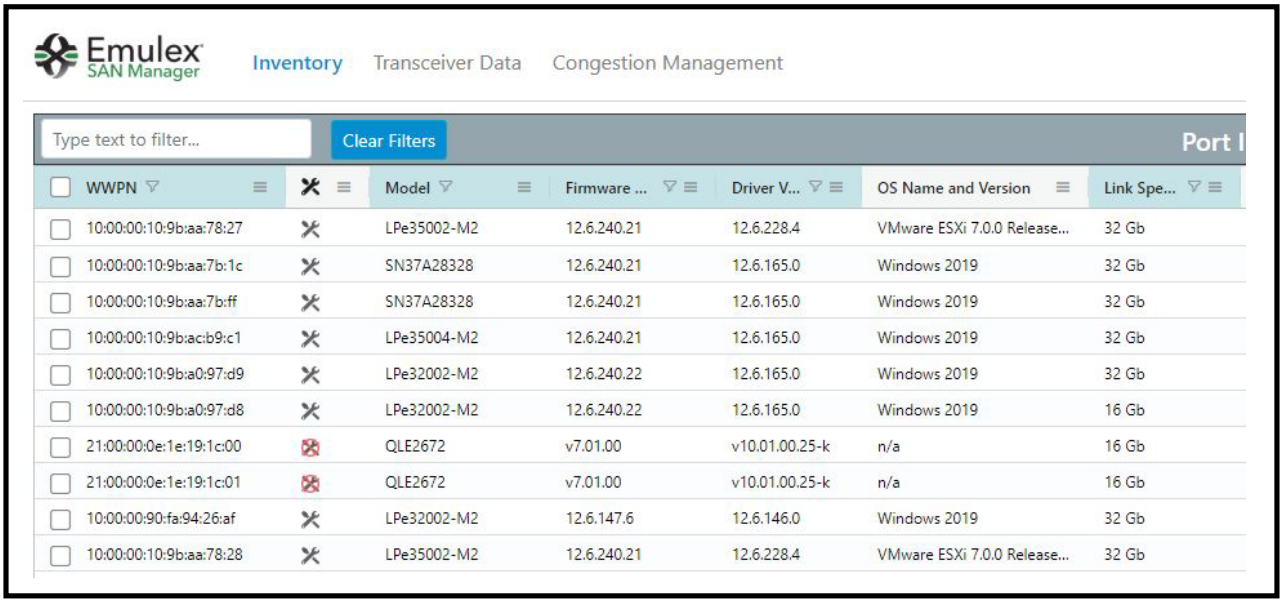
- Identify driver-firmware mismatches in a single click.
- View and sort host HBA inventory details.
- Export information to a spreadsheet with a single click.

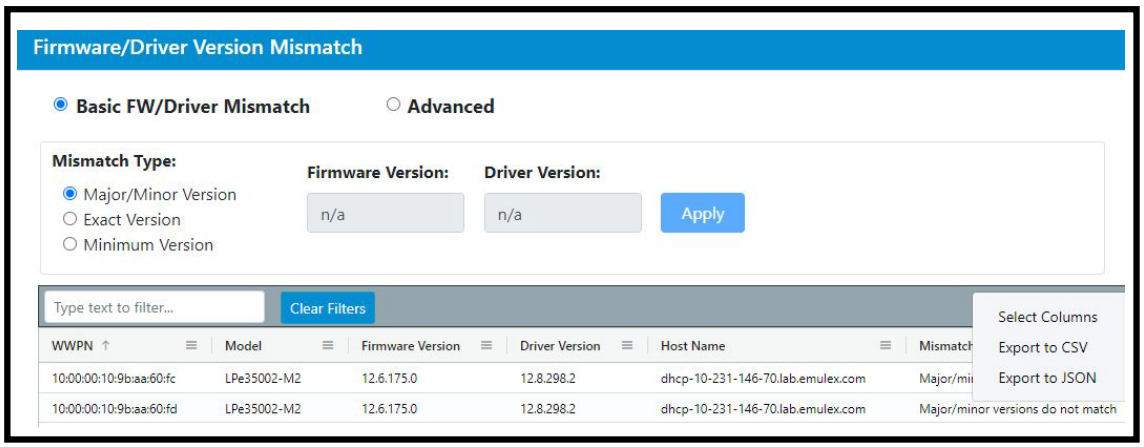
Emulex SAN Manager provides a complete inventory of the SAN including the following:

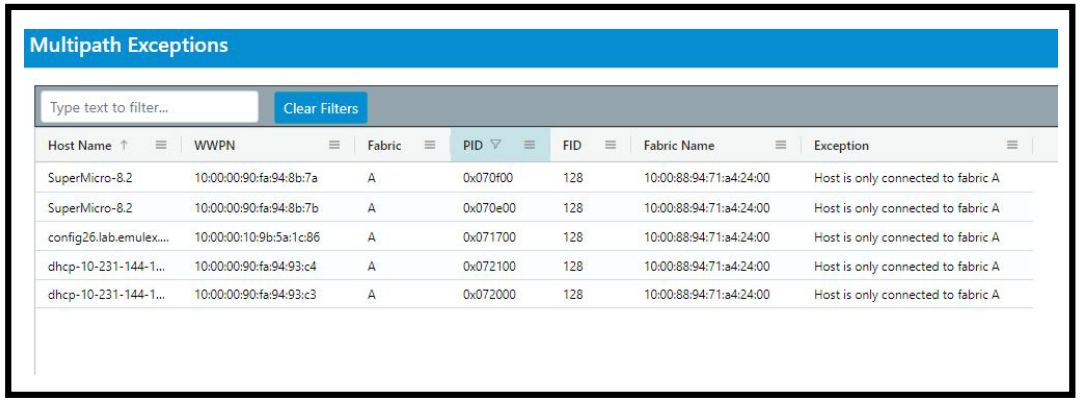
- Managed HBAs: Intelligent HBAs designed to reduce the complexity of managing enterprise-class storage networks.
- Unmanaged HBAs: Legacy HBAs including third-party HBAs.

Emulex SAN Manager retrieves the following parameters from the SAN: WWPN, WWNN, PID, model, model description, vendor ID, serial number, firmware version, driver version, host name, OS name and version, fabric name, and link speed.

Figure 2: Inventory, Firmware/Driver Versions, and Multipath Exceptions Tabs







Note: Only a portion of the windows is shown due to size limitations of this document.

Emulex SAN Manager provides additional features that make it an ideal tool for managing large environments:

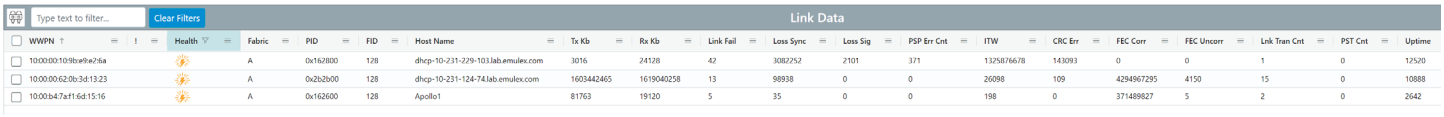
- Manage an A/B fabric in a single view.
- Multilevel filtering options allow administrators to quickly sift through the data and identify critical endpoints.
- The multipath validation tool allows SAN administrators to easily identify potential misconfiguration errors before taking a switch off-line for maintenance or upgrading. Supports A/B fabrics.

Manage

Centralized Link Health

Emulex SAN Manager enables administrators to easily identify links that have physical layer issues caused by faulty cabling or connectors.

Figure 3: ESM 2.0 Link Heatlh



Centralized Optical Transceiver Health

Emulex Fibre Channel HBAs are recognized for their extreme reliability; however one of the most common causes for HBA downtime is optical transceiver failure. When managed HBAs are detected in the environment, Emulex SAN Manager communicates with them in-band across the SAN to retrieve a complete set of real-time HBA transceiver data and provide health warnings that can signal potential optical transceiver failures. This enables administrators to track and identify optical transceiver problems and mitigate them before the optical transceivers fail, ensuring maximum uptime and performance.

Emulex SAN Manager uses the SAN Management Protocol to retrieve the following transceiver data: WWPN, part number, vendor, revision, OUI, ID, Ex ID, connector, wavelength, supported speeds, manufacturer date, temperature, current, Rx power, Tx power, and voltage.

Optical transceiver information can also be graphed to show historical trends for the key values including: temperature, current draw, voltage, and power levels.

Figure 4: Optical Transceiver Health Alerts

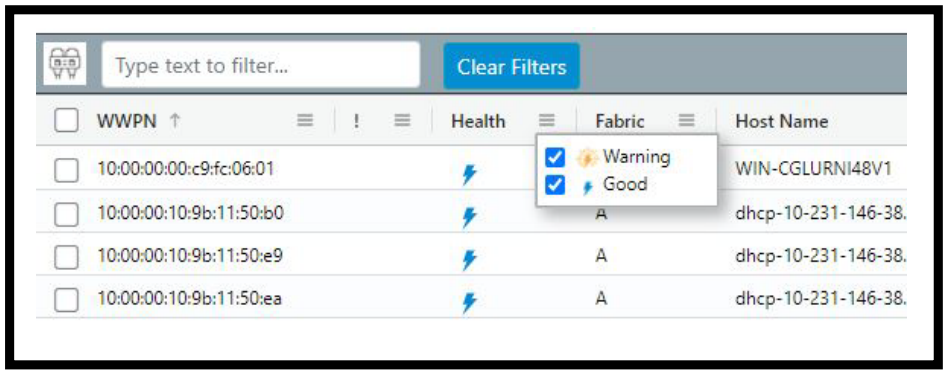


Figure 5: Transceiver History Graph

Centralized Fabric Performance Data

When new data-center infrastructure is deployed, administrators do a great job in right-sizing the server, HBA, Fibre Channel network, and storage to deliver the performance expected. Over time, some workloads outgrow the server that they are running on. The server will run out of CPU cycles, memory, PCIe bandwidth, and/or HBA bandwidth. This can be due several issues, such as somebody moving too many VMs to a virtualized server or an application that outgrew the hardware footprint that it is running on. This causes the server to ask for too much data from the storage system, more data than the server can ingest, which causes slow-drain or congestion problems in the fabric. This impacts both the overutilized server, which causes I/O latency to increase by 10x or more, and other servers in the fabric, which can see their performance cut by half or more. Since Fibre Channel is a lossless network, the overwhelmed server creates a situation where the hardware resources of the fabric are consumed, creating a performance problem across the fabric. The Congestion Management Dashboard identifies those congested host ports on the SAN.

Managed HBAs can track bandwidth and I/O latency for the last hour, the last 24 hours, and the last 10 days. Managed HBAs store performance data on the HBA, and Emulex SAN Manager uses the SAN Management Protocol to retrieve SAN performance statistics. As seen in Figure 6, Emulex SAN Manager displays the bandwidth and average response time for various time intervals. These graphs enable SAN administrators to track performance over time.

To address performance problems, the server needs to know when it is causing congestion and be able to mitigate it. Adaptive Congestion Management, explained in the next section, addresses how these performance problems are mitigated. As seen in Figure 7, port congestion settings enable you to choose how to address congestion when it arises.

Emulex SAN Manager also displays HBA queue depth settings, allowing SAN administrators to identify when HBAs may be misconfigured. HBA queue depths have historically been used to help mitigate congestion. Adaptive Congestion Management is an advanced method that uses real-time performance data.

Figure 6: Bandwidth/Average Response Time History

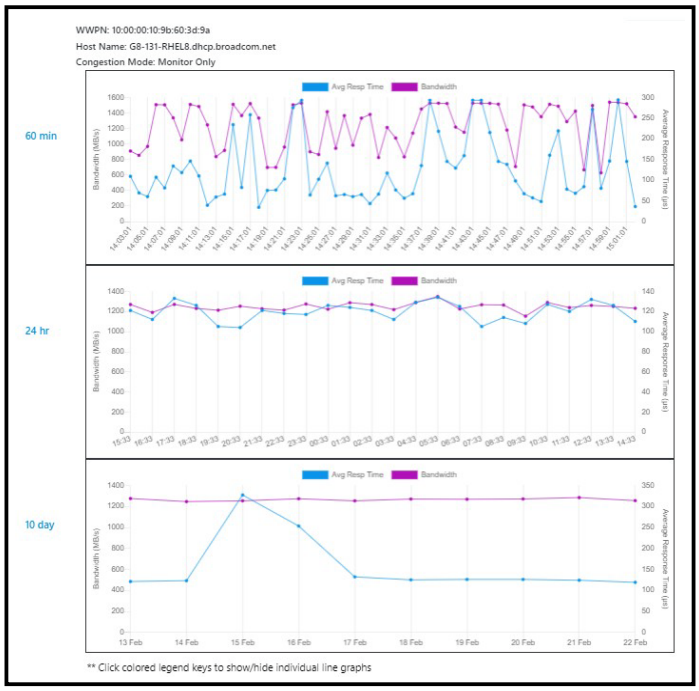


Figure 7: Port Congestion Settings

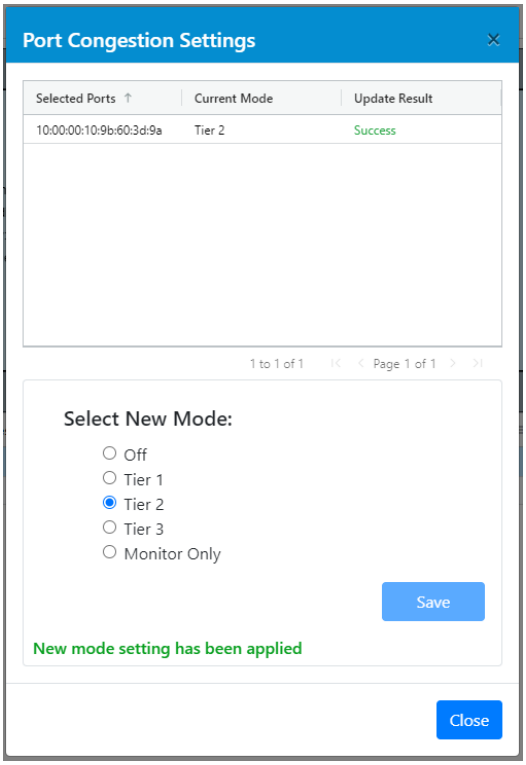


Table 1: Port Congestion Settings

Policy	Targeted Purpose
Monitor-only	Records HBA performance and congestion history for review.
Tier 1	Used for high-priority workloads; minimally impacts port performance to limit congestion.
Tier 2	Used for medium-priority workloads; moderately impacts port performance to balance congestion.
Tier 3	Used for low-priority workloads; aggressively impacts port performance to relieve congestion (minimize FPINs).

Adapt

Adaptive Congestion Management

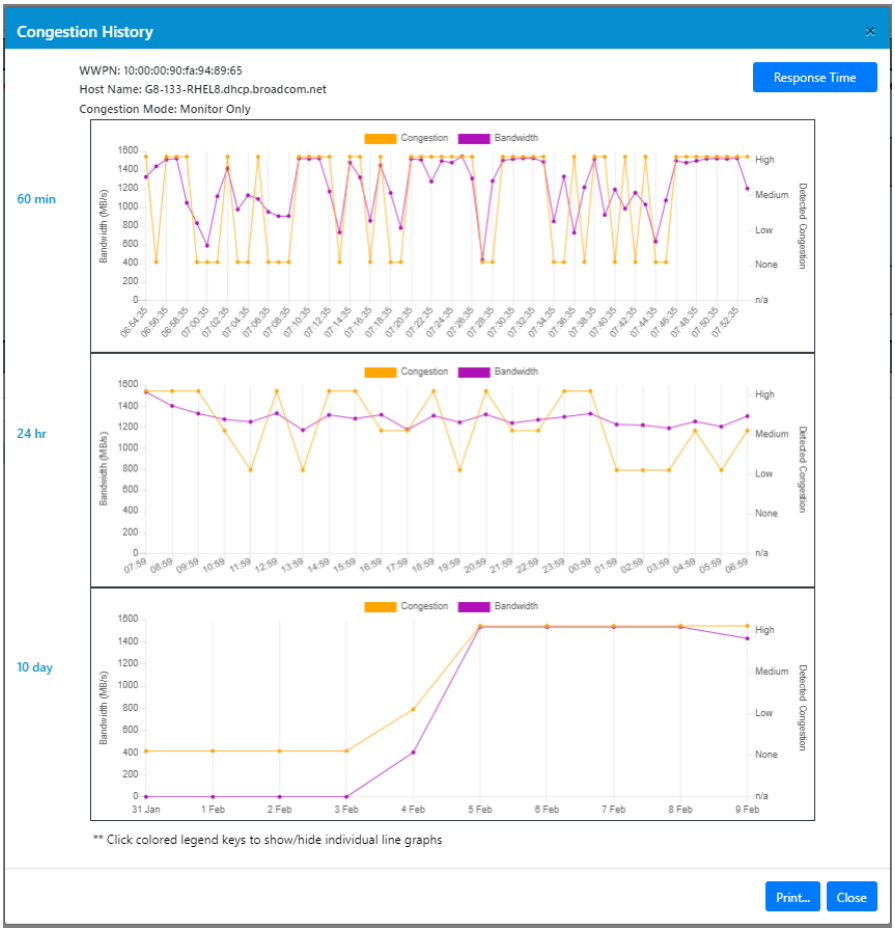
Emulex SAN Manager provides a unique capability that automatically addresses congestion monitoring, management, and remediation. The Adaptive Congestion Management feature enables the HBA to manage traffic in real time, matching the capabilities of the host. Emulex now supports Fabric Notifications, a new standard that enables the Brocade fabric and Emulex HBAs to collaborate and resolve performance issues in real time. Brocade fabrics notify the HBA in-band when a server is creating performance issues, and Emulex managed HBAs are able to resolve performance problems via Emulex Adaptive Congestion Management. The Emulex managed HBAs can be set to monitor and report the congestion, or they can be set by policy to remediate the congestion using a real-time adaptive algorithm.

Key features and benefits include the following:

- Performance monitoring: Provides real-time monitoring of the congestion state of a port.
- Port congestion settings: Provide policy-based settings to allow users to apply policies to endpoints to monitor or remediate congestion. By implementing policies, the hosts that are causing the performance issues can be managed, restoring optimal performance to the rest of the hosts across the SAN.

Emulex managed HBAs can be configured to monitor congestion, generating the graphs shown in Figure 8. These graphs show the congestion state of each port and the associated bandwidth. SAN administrators use the data provided by Emulex managed HBAs to decide if and when to turn on congestion management and which policy to apply. Table 1 lists the policy options available and provides guidance for policy selection.

Figure 8: Port Congestion Settings



Specifications

System Requirements for Emulex SAN Manager 2.0

Emulex SAN Manager is a light-weight tool that can be installed on a bare-metal server or a VM. It does not require a dedicated server. The installation requirements include the following:

Server requirements:

- A bare-metal server, or
- A VMware® virtual machine, or
- A VM running on an Oracle VM VirtualBox version 6.0 or later

Minimum hardware requirements for a bare-metal system or a VM installation:

- Memory: 4 GB for the first 1000 ports (to run the operating system and the Emulex SAN Manager application) and 50 MB per additional 1000 ports.
- Hard drive: 16 GB for the first 1000 ports (for the operating system and the Emulex SAN Manager installation) and 1.5 MB per additional 1000 ports.
- A NIC installed in the host server on which the Emulex SAN Manager will be connected to a TCP/IP network.

Table 2: Managed HBA Support

Emulex Server HBA Model Number	Emulex HBA Firmware Version*	Operating System	Max # Servers/Ports Under Management	Seed Switch (One Required)	Emulex HBA Driver Version*
• **Gen 6** LPe31000-series LPe32000-series • **Gen 7** LPe35000-series LPe36000-series • OEM equivalent HBAs are also supported	Full support of all advanced features requires 14.2 or later	Oracle UEK RedHat SUSE VMware Windows	30,000	Brocade switch with FOS 9.0	Full support of all advanced features requires 14.2 or later

**Refer to the ESM user guide for more details on firmware and driver version support by OS.*

For support, go here.

Software Licensing

To order an Emulex SAN Manager license, contact the Broadcom sales team and reference the following part number.

Part Number	Version	Number of Ports Supported	Details
ECD-ESM-EN1Y	Enterprise Edition	30,000	Emulex SAN Manager, Enterprise Product, 1 YR

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For more product information: broadcom.com

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