

Product Brief

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.
- Highlights encryption-capable ports with detailed connection status

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.
- 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.
- Mitigates congestion automatically via the Adaptive Congestion Management feature.

Emulex[®] SAN Manager

Simplify HBA Management and Remediate Network Performance Problems

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 e-mail alerts and reports to provide IT administrators with actionable insights.

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 and alerts for all critical data

Figure 1: Dashboard and Task Scheduler Tab

SAU Manager Dashboard Inventory Transceiver Data Fabric Performance Link Data Encryption In	nfo	
Health :	Summary	Inventory Summary
Transceiver Health	Link Health	Link Speed 🕕
as 27 Pers Wanter 5 Pers Heating: 177 Pers	I so 34 Perin Watery 0 Paris Heatly: (13 Paris	10 250 Pr/s € 0 0hx 7 Pr/s € 0 0hx 7 Pr/s ≥ 0 0hx 7 Pr/s ≥ 2 00x 10 Pr/s ≥ 2 00x 10 Pr/s ≥ 0 0hx 10 Pr/s
Average Age of Data: 0 Days, 0 Hours	Average Age of Data: 0 Days, 1 Hour	Average Age of Inventory Data: 0 Days, 0 Hours
Congestion Notifications	Encryption Policy	Multipath Validation
Couparies Films Couparies Films Net Couparies & Shrus	no. 10 Parts Or 4 Parts Regime: 2 Parts	Engloss Suba: 32 Paris Wolf State: 5 Paris Divineer State: 2 Paris
Average Age of Data: 0 Days, 3 Hours Update	Average Age of Data: 0 Days, 0 Hours Update	Average Age of Inventory Data: 0 Days, 0 Hours
Fabric A: 10.231.136.82		Fabric B: esmdemo.igp.broadcom.net

Task Scheduler

Next run: mm/dd/yyyy --:-- --Activate Schedule & Alert Defaults

Next Run input is optional. Please ensure future timestamps are set for all schedules before clicking Save.

Delete All Save

Note:

Port data for each table is updated with the frequency set below. To schedule a task, select "Activate Schedule".

Fabric A -	10.231.136.82			Fabric B -	esmdemo.igp.b	roadc	om.net		
Invente	ory:	Transce	iver Data:	Invento	ory:		Transce	iver Data:	
Days:	1	Days:	7	Days:	1		Days:	7	
Hours:	0	Hours:	0	Hours:	0		Hours:	0	
Next run		Next run:		Next run:			Next run:		
02/11/20	025 11:22 AM	02/17/20	25 05:02 AM	02/11/20	25 09:01 AM		02/17/20	25 09:01 AM	
🗹 Activa	ate Schedule	 🗹 Activa	te Schedule	 🗹 Activa	te Schedule		🗹 Activa	te Schedule	
🗹 Alert		🗹 Alert		🗹 Alert			🗹 Alert		
🗹 Full R	eport	🗹 Full Re	eport	🗆 Full Re	eport		🗆 Full Re	port	
Fabric	Performance:	Link Da	ta:	Fabric F	Performance:		Link Da	ta:	
Days:	0	Days:	0	Days:	0		Days:	0	
Hours:	1	Hours:	1	Hours:	4		Hours:	1	
Next run		Next run:		Next run:			Next run:		
02/10/20	025 12:06 PM	02/10/20	25 12:06 PM	02/10/20	25 12:03 PM		02/10/20	25 12:04 PM	
🗹 Activa	ate Schedule	🗹 Activa	te Schedule	🗹 Activa	te Schedule		🗹 Activa	te Schedule	
🗹 Alert		🗹 Alert		🗹 Alert			🗹 Alert		
Encryp	tion Info:	_		Encrypt	tion Info:				
Days:	0	D	efaults	Days:	0		D	efaults	
Hours:	1	Cop	/ Fabric B	Hours:	1		Сору	/ Fabric A	
Next run				Next run:					
02/10/20	025 12:06 PM			02/10/20	25 12:04 PM				
🗹 Activa	ate Schedule			🗹 Activa	te Schedule				
🗹 Alert				🗆 Alert					
Multipath	:			 					
Days:	7								
Hours:	0								

Emulex SAN Manager

Figure 2: Email Alert

ESM - 10.231.136.82 Inventory Mailing Lists/ESM-Mail ×

e	@broadcom.com	© 11:22 AM (42 minutes ago)	☆
	to me 🔻		

Task Name : Inventory Task Start Time (UTC) : 02/10/2025, 05:22:36 PM Seed Switch IP/DN : 10.231.136.82

Warning Notifications:

wwpn	name	pid	model	hostname	warning
10:00:00:10:9b:e7:64:42	-	0x1b1500	LPe36002-M64-D	WIN-9AVGPH3COOE	This port was no longer found in the fabric.
10:00:00:10:9b:e7:64:43	-	0x1b1400	LPe36002-M64-D	WIN-9AVGPH3COOE	This port was no longer found in the fabric.

One attachment • Scanned by Gmail (i)

1010799	Manapetrizes a	f war	WWW	PE	F0	Hot Marie	314.4
12/00/00 12 (40.4		No.	2010/10/10 10:08-0		128	#No.15.211.12	Usince
10.00.00 90 (with	Manageri	80	28.08.08.98 /# 0	0.052630	129	Acc. 10-217-13	3 apre
12-00-00 12-96-0		80	28-08-08-18-08-1			Aug. 10.211.22	
10.007017 e43		80	20.017117-042			degr 10 027-14	3 ages
12/02/22/24/1	Managed	84	2010/02/01/041	0-642832	128	horry	Ganes
13.0073.57+41		80	28.08 78 17 04 7			Aug 10-257-43	
10.00.00 10.00.0		80	28.05.05.75.58.0			But 15,217,12	
12.0072.07 e41	Manageri	No.	28.08 78 b7 e41	0×10110	129	serilg12	Unirer
13-00-03 13-06-4	Managed .	**	28-08-08-18-08-4	Carlet BIB	128	carilig 12	Games.
12 00 00 12 %		86	28.05.05.15.06.4			Aug. 10(221-12)	
12 00 00 12 06 0	Managed .	Siz .	28 05 08 18 68-6	0.000428	128	#NO-10201-18	Aspen
10.00.00.00.00.0	Managed	84	28.08.08.98 /w 9	0-80415	129	Aug. 10-251-13	diam'r.
10-00-00 80 %*		80	20-02-00-02-04-0			10/03/20	Aspes
12:00 72:07 e41		No.	20.00 70 b7 e41	C+043032		Telle	Uniren
10-00-00 80 (with	Managed .	-	28-08-08-98-74-9	ONTOPICS	128	mip.10.257.13	Acres
13 00 00 13 00 -	Managed	81.	28-08-08-18-08-4	0.0100	128	Aug. 10 (21), 12	O eres
	Inve	ento	ory_2	025	5_0		

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 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 3: Inventory and Firmware/Driver Versions Tabs

Тур	e text to filter	Cle	ear Filters				Port
	WWPN ♥ =	★ =	Model ♥ ≡	Firmware ⊽ ≡	Driver V ⊽ ≡	OS Name and Version ≡	Link Spe $\heartsuit \equiv$
	10:00:00:10:9b:aa:78:27	×	LPe35002-M2	12.6.240.21	12.6.228.4	VMware ESXi 7.0.0 Release	32 Gb
	10:00:00:10:9b:aa:7b:1c	×	SN37A28328	12.6.240.21	12.6.165.0	Windows 2019	32 Gb
	10:00:00:10:9b:aa:7b:ff	×	SN37A28328	12.6.240.21	12.6.165.0	Windows 2019	32 Gb
	10:00:00:10:9b:ac:b9:c1	×	LPe35004-M2	12.6.240. <mark>2</mark> 1	12.6.165.0	Windows 2019	32 Gb
	10:00:00:10:9b:a0:97:d9	×	LPe32002-M2	12.6.2 <mark>4</mark> 0.22	12.6.165.0	Windows 2019	32 Gb
	10:00:00:10:9b:a0:97:d8	×	LPe32002-M2	12.6.240.22	12.6.165.0	Windows 2019	16 Gb
	21:00:00:0e:1e:19:1c:00	8	QLE2672	v7.01.00	v10.01.00.25-k	n/a	16 Gb
	21:00:00:0e:1e:19:1c:01	8	QLE2672	v7.01.00	v10.01.00.25-k	n/a	16 Gb
	10:00:00:90:fa:94:26:af	×	LPe32002-M2	12.6.147.6	12.6.146.0	Windows 2019	32 Gb
П	10:00:00:10:9b:aa:78:28	×	LPe35002-M2	12.6.240.21	12.6.228.4	VMware ESXi 7.0.0 Release	32 Gb

Basic FW/Drive	r Misma	tch	○ Advand	ed						
Mismatch Type:		Firm	ware Version:	Dr	iver Version:					
Major/Minor Ver	sion									
O Exact Version		n/a		n	i/a		Apply			
O Minimum Version	ı									
Type text to filter		Clear Filt	ers						ſ	Select Columns
WWPN † =	Model	=	Firmware Version	=	Driver Version	=	Host Name	=	Mismatch	Export to CSV
		142	12.6.175.0		12.8.298.2		dhcp-10-231-146-70.lab.emulex.co	m	Major/mi	Export to JSON
10:00:00:10:9b:aa:60:fc	LPe35002	-IVI2	12.0.175.0							

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.

Figure 4: Multipath Exceptions Tab

Type text to filter	Clear Filter	s				
Host Name ↑ 🛛 🗏 🗌	WWPN =	Fabric 🛛 🗏	PID ♡ ≡	FID ≡	Fabric Name 🛛 🗮	Exception =
SuperMicro-8.2	10:00:00:90:fa:94:8b:7a	А	0x070f00	128	10:00:88:94:71:a4:24:00	Host is only connected to fabric A
SuperMicro-8.2	10:00:00:90:fa:94:8b:7b	A	0x070e00	128	10:00:88:94:71:a4:24:00	Host is only connected to fabric A
config26.lab.emulex	10:00:00:10:9b:5a:1c:86	A	0x071700	128	10:00:88:94:71:a4:24:00	Host is only connected to fabric A
dhcp-10-231-144-1	10:00:00:90:fa:94:93:c4	A	0x072100	128	10:00:88:94:71:a4:24:00	Host is only connected to fabric A
dhcp-10-231-144-1	10:00:00:90:fa:94:93:c3	A	0x072000	128	10:00:88:94:71:a4:24:00	Host is only connected to fabric A

×

Manage

Encryption Feature

Emulex SAN Manager can identify all of the hosts with in-flight encryption capabilities. For those hosts, it will also identify all of the encrypted connections.

Figure 5: Encrypted Connection

SAN Manager	Dashboard	Inventory	Transceive	er Data Fabric Perform	ance Link Data	Encryption Info
Type text to filter.	. Clea	ar Filters				
WWPN	≡ ! ≡	PID \uparrow \equiv	FID \equiv	Host Name		\equiv Key Int \equiv
10:00:70:b7:e4:13:bc:b8		0x089c00	128	localhost.localdomain	Capable	7
10:00:70:b7:e4:24:60:bd		0x0f1700	128	dhcp-10-231-133-235	Capable	7
10:00:70:b7:e4:2f:0c:42		0x0f2c00	128	dhcp-10-231-135-122	Capable	7

Encrypted Connections

WWPN: 10:00:70:b7:	e4:13:bc:b8		
Encrypted Connection	n Count: 1	Unencrypted Connection Count: 2	
Type text to filter	Clear Filters	Encrypted Connections	
Peer WWPN 1		Post-Quantum Cryptography	Ξ
10:00:70:b7:e4:13:bc:b7		Yes	

Centralized Link Health

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

Figure 6: ESM 2.0 Link Health

Type text to filter	Clear	r Filters												Link Da	ta													
□ wwpn ↑	=	Health ∇ =	Fabric =	PID =	FID =	Host Name	=	Tx Kb	=	Rx Kb	=	Link Fail =		Loss Sync 🛛 🗏	Loss Sig	=	PSP Err Cnt =		itw ≡	CRC Err	=	FEC Corr	FEC Uncorr	=	Lnk Tran Cnt	=	PST Cnt =	Uptime
10:00:00:10:9b:e9:e2:6a		*	A	0x162800	128	dhcp-10-231-229-103.lab.emulex.com		3016		24128		42	2	3082252	2101		371	1	1325876678	143093		0	0		1		0	12520
10:00:00:62:0b:3d:13:23		*	A	0x2b2b00	128	dhcp-10-231-124-74.lab.emulex.com		1603442465		1619040258		13	5	98938	0		0	Z	26098	109		4294967295	4150		15		0	10888
10:00:b4:7a:f1:6d:15:16		*	A	0x162600	128	Apollo1		81763		19120		5		35	0		0	1	198	0		371489827	5		2		0	2642

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.

Figure 7: Optical Transceiver Health Alerts



Figure 8: 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. 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 and other servers in the fabric, which can see their performance cut by half or more. The Congestion Management Dashboard identifies those congested host ports on the SAN. Adaptive Congestion Management, explained in the next section, addresses how these performance problems are mitigated. As seen in Figure 10, port congestion settings enable you to choose how to address congestion when it arises.

Managed HBAs can track bandwidth and I/O latency. As seen in Figure 9, Emulex SAN Manager displays the bandwidth and average response time for various time intervals. These graphs enable SAN administrators to track performance over time.

The 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 9: Bandwidth/Average Response Time History

Figure 10: Port Congestion Settings

Selected Ports ↑	Current Mode	Update Result
10:00:00:10:9b:60:3d:9a	Tier 2	Success
	1 to 1 of 1	I< < Page 1 of 1 > ⇒I
Select New M	Node:	
○ Off		
○ Tier 1		
Tier 2		
○ Tier 3		
O Monitor	Only	
		Save
New mode setting h	nas been applied	

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 11. These graphs show the congestion state of each port and the associated bandwidth. Table 1 lists the policy options available and provides guidance for policy selection.

Figure 11: Port Congestion History



Emulex SAN Manager

Product Brief

Specifications

System Requirements for Emulex SAN Manager 2.1

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.
- Processor: Multicore.

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	Full support of all advanced features requires 14.2 or later	Oracle UEKRedHatSUSE	30,000	Brocade switch with FOS 9.0	Full support of all advanced features requires 14.2 or later
• Gen 7 LPe38100-series Secure HBAs LPe37100-series Secure HBAs LPe35000-series LPe36000-series		VMwareWindows			
 OEM equivalent HBAs are also supported 					

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

For support, go to <u>www.broadcom.com/support/emulex</u>.

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



For more product information: broadcom.com

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