

# Emulex® Secure Fibre Channel HBAs

## LPe37100/LPe38100-Series 32G and 64G HBAs

### Overview

The Emulex® Secure Fibre Channel (FC) host bus adapters (HBAs) by Broadcom are designed to deliver the highest level of security, performance, and manageability for mission-critical infrastructures.

Cybersecurity is a focal point of enterprises and governments globally. The longstanding approach of protecting critical data via firewalls is no longer sufficient, and the combination of artificial intelligence (AI) and quantum computing magnifies the risk if data is not encrypted at all points in the data center including the network.

To address these concerns, governments have responded with new mandates—including the United States' Commercial National Security Algorithm (CNSA) 1.0/2.0 and the European Union's Network and Information Security (NIS) 2 and Digital Operational Resilience Act (DORA)—that require enterprises to modernize their IT infrastructures with more robust encryption requirements.

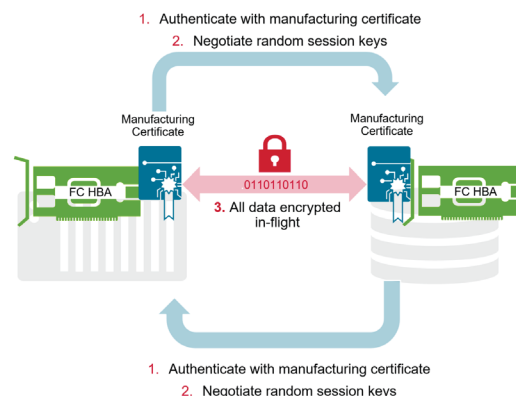
### Security

Today IT managers rely on Fibre Channel (FC) with field-proven security for the world's mission-critical data in banking, finance, health care, government, transportation, and military. FC offers *air gap* protection with no connectivity to vulnerable IP networks.

Emulex Secure HBAs introduce a cost-effective, easy-to-manage solution that encrypts all data in-flight (EDIF), protecting data as it moves across databases, applications, servers, and storage. Emulex Secure HBAs integrate post-quantum cryptography (PQC) algorithms to ensure that encrypted data remains encrypted even as quantum computing and AI put legacy encryption at risk.

The session-based key management solution, based on the emerging ANSI/INCITS FC-SP-3 standard, does not require complex and prohibitively expensive key management software. Compared to other encryption methods, such as application-based encryption, Emulex Secure HBAs can encrypt *all* applications, at a lower cost, and with no impact to storage array services such as compression, dedupe, and ransomware detection.

#### Session-Based Encryption



### Innovative Security Built on a Zero Trust, Quantum-Safe Platform

- Post-quantum cryptography algorithms to meet CNSA 2.0, DORA, and NIS 2 mandates.
- Secures data in-flight between host servers and target devices with EDIF support and simplified session-based key management.
- Zero Trust platform:
  - Security Protocol and Data Model (SPDM) cryptographic authentication of endpoints.
  - Silicon root-of-trust hardware-based firmware authentication. Compliance with the NIST 800-193 framework.
  - Secure boot, digitally signed drivers, TIO-DIF, and more.

### Cost-Effective Encryption

- Simple, session-based in-flight encryption:
  - No complex and expensive key management application needed.
  - No impact to storage array compression, dedupe, ransomware detection, or other advanced storage features.
- Runs on existing FC SAN infrastructure.

## Maximum Application Performance

- Crypto functions offloaded to hardware, enabling encryption without sacrificing system performance.
- Accelerate workloads with industry-leading 64G performance:
  - Over 20% better application response time vs. other manufacturers' 64G HBAs.
  - 2x better application performance and up to 3x better latency than the previous generation.
  - Over 10M IOPS—3x more than the previous generation HBA.
  - Supports NVMe over FC and SCSI FC concurrently.

## Easy to Manage and Deploy

- Simplified HBA management and network performance remediation via the optional in-band Emulex SAN Manager <sup>2</sup> application:
  - Visualizes SAN congestion with a dashboard that presents congestion and bandwidth graphs.
  - Remediates congestion automatically via the Adaptive Congestion Management feature.
  - Captures complete SAN HBA host inventory; host names; and OS, software, and firmware versions.
  - Provides transceiver health information to help detect optic degradation.
  - Identifies multipath misconfiguration errors via the multipath validation tool.
  - Provides a fabric-wide view of encryption capabilities and policies, as well as detailed port-level information on encrypted connections and deployment of post-quantum cryptography.

## Performance

Compared to alternative approaches to network encryption that significantly impact application performance or limit the ability to compress or dedupe data, the Emulex Secure HBA delivers network encryption with better performance and no impact to storage services. The Emulex Dynamic Multi-core architecture delivers unparalleled performance and the most efficient port utilization with 8 fully redundant data engines and 16 threads that dynamically apply ASIC resources to any port that requires them, ensuring that SLAs are met. Compared to Gen 6 HBAs, Emulex Gen 7 HBAs can support 64GFC to deliver up to 2x greater bandwidth. The Gen 7 HBAs deliver 12,800 MB/s (two 32GFC ports) or 25,600 MB/s (two 64GFC ports) full duplex; they deliver 3x better hardware latency; and the 64GFC LPe38100-series HBAs deliver industry-leading performance over 10 million IOPS.

LPe38100-series are available with single and dual 64GFC optics (installed) with backward compatibility to 32GFC and 16GFC networks. LPe37100-series are available with single and dual 32GFC optics (installed) with backward compatibility to 16GFC and 8GFC networks. The LPe37100-series can be upgraded with Broadcom-approved 64GFC optics kits.

## Operational Efficiency

Emulex Gen 7 HBAs offer enhanced reliability, availability, and serviceability (RAS), including port isolation and port-based error isolation that enable users to easily detect, isolate, and recover from errors.

Emulex HBAs fully support industry standards that enhance Broadcom® autonomous SAN <sup>1</sup> innovations to self-learn, self-optimize, and self-heal, proactively keeping the SAN running at maximum speed and avoiding downtime. The new industry standards supported by Emulex HBAs around Fabric Performance Impact Notifications (FPINs) include Link Integrity notification (FPIN-LI), Congestion notification (FPIN-CN), Peer Congestion notification (FPIN-PN), and Delivery notification (FPIN-DN). The Emulex SAN Manager <sup>2</sup> application is the first application in the industry to automatically identify, minimize, and mitigate application performance problems caused by SAN congestion by utilizing the FPIN-CN standard.

Emulex HBAs are easy to manage and save administrators time and operating costs with features such as no reboots for firmware updates, queue depth changes, or optics replacements. Emulex Gen 7 hot-plug (hot-swappable) optics enable optics to be removed and replaced without shutting down the system, allowing for uninterrupted service. The Emulex HBA Manager application provides centralized management of current and previous generations of Emulex FC HBAs. Emulex HBA troubleshooting is simplified with Emulex HBA Capture, an Emulex utility that gathers system, adapter, and device driver information. Data collected by HBA Capture is compressed into a single file and can be sent to Broadcom Technical Support for analysis when debugging system issues or for diagnostic purposes.

Emulex HBAs fully support the Brocade® Fabric Vision® suite of features, facilitating a solution from the switch to the server endpoints that have Emulex HBAs installed. Supported features include ClearLink™ (D\_Port), Link Cable Beacons, Host Name Registration, Read Diagnostic Parameters, VMID, BB Credit Recovery, FC Trace Route, FC Ping, REST APIs, and more. Visit [www.broadcom.com](http://www.broadcom.com) for additional information on supported Fabric Vision features.

1. [Broadcom Autonomous Self-healing SANs](#).

2. The [Emulex SAN Manager](#) application is available separately. Contact Broadcom sales for information.

## Emulex SAN Manager Application: Simplifies HBA Management and Remediates Network Performance Problems

All Emulex Gen 7 and Secure HBAs work with the Emulex SAN Manager *in-band* application to reduce operational cost and complexity via the following:

- Automatically identifies and mitigates application performance problems with direct communication between Emulex HBAs and Brocade fabric switches and directors:
  - Remediates congestion automatically via the Adaptive Congestion Management feature.
  - Visualizes SAN congestion with a dashboard that presents congestion and bandwidth graphs.
- Enables optical transceiver statistics to be downloaded for analysis to help detect optic degradation.
- Captures complete SAN HBA host inventory; host names; and OS, software, and firmware versions; and lists queue depths by port.
- Identifies multipath misconfiguration errors via the multipath validation tool.
- Provides a fabric-wide view of encryption capabilities and policies, as well as detailed port-level information on encrypted connections and deployment of post-quantum cryptography.

Learn more about Emulex SAN Manager [here](#).

## Standards

### General Specifications

- Emulex Secure FC HBAs are powered by the XE701 SEC controller and use an eight-lane (x8) PCIe 4.0 bus on the single-port and dual-port models (with backward compatibility to PCIe 3.0 supported). The architecture enables resources to be applied to any port that needs them, delivering up to 10M IOPS for Gen 7 64GFC HBAs.

### Industry Standards

- Current ANSI/INCITS standards:
  - FC-PI-8; FC-FS-6; FC-LS-5; FC-GS-9; FCP-5; FC-SP-2; FC-SP-3 INCITS 577-202x rev 3.04; SPC-5; SBC-4; SSC-5; FC-NVMe-2
- Legacy ANSI/INCITS standards:
  - FC-PI-1/2/3/4/5/6/7; FC-FS-1/2/3/4/5; FC-LS-1/2/3/4; FC-GS-1/2/3/4/5/6/7/8; FC-PH-1/2/3; FC-DA-1/2; FCP-2/3/4; FC-HBA; FC-TAPE; FC-MI; SPC-3/4; SBC-2/3; SSC-2/3/4; FC-NVMe with AM1
- DMTF management standards, specifications:
  - DSP0222 (NC-SI); DSP0261 (NCSI over MCTP Binding); DSP2037 (MCTP Packets and NC-SI over MCTP Overview); DSP0237 (MCTP SMBus/I2C Transport Binding); DSP0240 (PLDM Base Spec); DSP0248 (PLDM Platform Monitoring and Control); DSP0257 (PLDM for FRU Data); DSP0267 (PLDM for FW Update); DSP0274 (Security and Data Model, SPDm); DSP0275 (SPDM over MCTP Binding); DSP0266 (Redfish, RDE Spec)
- PCIe base spec 4.0
- PCIe card electromechanical spec 4.0
- PCI Hot Plug (PHP)
- UEFI 2.7
- OCP 3.0 (on OCP models)

### HBA Port Virtualization (NPIV)

- NPIV

### Logins, Exchanges

- Support for 2048 concurrent logins (RPIs) and 6000 active exchanges (XRIs) per port
- Boot from SAN (BFS)

### Zero Trust Security Features

- Secure boot and signed drivers
- Security Protocol and Data Model (SPDM)
- Post-Quantum Silicon Root of Trust (Leighton-Micali Signature, LMS)
- Data Encryption In-Flight (EDIF, AES-GCM-256)
- Support for Post-Quantum Digital Signature and Key Exchange Method (FIPS 203, 204)
- CNSA (Commercial National Security Algorithm Suite) Compliant

## Architecture

### LPe371xx

- Supports 32GFC, 16GFC, and 8GFC link speeds, automatically negotiated.

### LPe381xx

- Supports 64GFC, 32GFC, and 16GFC link speeds, automatically negotiated.

## Comprehensive OS and Hypervisor Support

- Microsoft Windows
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware® vSphere®
- Oracle Linux; Oracle Linux with the Unbreakable Enterprise Kernel (UEK)
- Citrix
- Ubuntu
- OpenEuler, Kylin, UniontechOS (UOS), FusionOS

For the latest operating system support, visit [www.broadcom.com/support](http://www.broadcom.com/support). Additional support is available from OEMs and partners.

## Hardware Environments

- AMD, Intel x64; AMD, Intel x86; ARMv8 64-bit; and PowerPC®

## Throughput

- 32GFC: 6,400 MB/s full-duplex line rate per port
- 64GFC: 12,800 MB/s full-duplex line rate per port

## Optical

- Data rates:
  - 64GFC (28.9 Gbaud PAM4), 32GFC (28.05 Gbaud NRZ), 16GFC (14.025 Gbaud NRZ), 8GFC (8.5 Gbaud NRZ), automatically detected (8GFC supported for LPe37100-series HBAs only)
- Optics: Short-wave lasers with LC-type connectors
- Cable:
  - 0.5m to 70m at 64GFC/32GFC on 50/125-μm OM3 MMF
  - 0.5m to 100m at 64GFC/32GFC on 50/125-μm OM4 MMF
  - 0.5m to 100m at 64GFC/32GFC on 50/125-μm OM5 MMF
  - 10 km at 64GFC/32GFC/16GFC on 9/125-μm single-mode fiber when long-wave transceivers approved by Broadcom for use in Emulex HBAs are used

## Physical Dimensions

- Short, low-profile PCIe card
- 167.64 mm x 68.91 mm (6.60 in. x 2.71 in.)
- Standard bracket (low-profile bracket ships in box)

## Environmental Requirements

- Operating temperature: 0°C to 55°C (32°F to 131°F)
- Airflow requirements: PCIe Thermal Level 4 profile (minimum 150 LFM)
- Storage temperature: -20°C to 85°C (-4°F to 185°F)
- Relative humidity: 5% to 95% non-condensing

## Agency and Safety Approvals

### North America

- FCC/ICES Class A
- UL/CSA Recognized

### Europe

- CE Mark
- UKCA Mark
- EU RoHS Compliant
- EU Low Voltage Directive

### Australia

- RCM Class A

### Japan

- VCCI Class A

### Korea

- KCC Class A

### China

- China RoHS Compliant

### Taiwan

- BSMI Class A
- BSMI RoHS Compliant

## Ordering Information

### LPe37100 (Upgradeable to 64GFC)<sup>3</sup>

- 1-Port 32GFC Secure HBA, Short Wave Optical LC SFP+, low profile

### LPe37102 (Upgradeable to 64GFC)<sup>3</sup>

- 2-Port 32GFC Secure HBA, Short Wave Optical LC SFP+, low profile

### LPe38100

- 1-Port 64GFC Secure HBA, Short Wave Optical LC SFP+, low profile

### LPe38102

- 2-Port 64GFC Secure HBA, Short Wave Optical LC SFP+, low profile

### What's in the Box

- Quantity 1, low-profile host bus adapter with optical transceivers and standard bracket installed
- Quantity 1, low-profile bracket

The following models are available only for target mode. Contact Broadcom Sales for further information and specifications.

### LPe37102-S4-SEC

- 2-Port 32GFC Optical LC SFP+, low-profile

### LPe37104-S4-LP-SEC

- 4-Port 32GFC Optical LC SFP+, low-profile

### LPe38102-S4-SEC

- 2-Port 64GFC Optical LC SFP+, low-profile

### LPe38104-S4-LP-SEC

- 4-Port 64GFC Optical LC SFP+, low-profile

### LPm37104-S4-OCP-SEC

- 4-Port 32GFC Optical LC, OCP form factor

### LPm38104-S4-OCP-SEC

- 4-Port 64GFC Optical LC, OCP form factor

## Options

Only Broadcom options approved for use in Emulex HBAs are warranted and fully supported by Technical Support. Emulex HBA options are denoted by a -ELX(H), -EM, -EL1, -EL2, -EL5(H), -EL6, -5E1, or -3E1 in the transceiver part number.

### LP32-SW-OPT-1

- 32GFC Optic (short-wave laser with LC connector SFP+ transceiver): 1 piece

### LP32-SW-OPT-2

- 32GFC Optics (short-wave laser with LC connector SFP+ transceiver): 2 pieces

### LP32-LW-OPT-1

- 32GFC Optic (long-wave laser with LC connector SFP+ transceiver): 1 piece

### LP32-LW-OPT-2

- 32GFC Optics (long-wave laser with LC connector SFP+ transceiver): 2 pieces

### LP64-SW-OPT-1

- 64GFC Optic (short-wave laser with LC connector SFP+ transceiver): 1 piece

### LP64-SW-OPT-2

- 64GFC Optics (short-wave laser with LC connector SFP+ transceiver): 2 pieces

### LP64-LW-OPT-1

- 64GFC Optic (long-wave laser with LC connector SFP+ transceiver): 1 piece

## Additional Features

### Performance Features

- The LPe37100-series HBAs double the maximum FC link rate from 16GFC to 32GFC and again to 64GFC with a 64GFC optics upgrade.<sup>3</sup>
- Support for NVMe/FC for low-latency, high-performance, end-to-end NVMe/FC storage networks.
- Registration and support for FPINs and congestion signaling.
- Buffer-to-buffer credit recovery: automatic buffer credit loss detection and recovery for reliable performance.
- Frame-level multiplexing increases link efficiency and maximizes HBA performance.
- N\_Port ID Virtualization (NPIV) increases network scalability by enabling a single FC adapter port to provide multiple virtual ports.
- Enhanced data protection is provided by T10 PI with high-performance offload. T10 PI provides additional data protection in environments such as Oracle Unbreakable Linux.

3. Only Broadcom approved options for Emulex HBAs are warranted and fully supported by Technical Support.

For more product information: [broadcom.com](https://www.broadcom.com)

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