ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter

Product Guide

As applications continue to grow in size and scale, customers are using high performance storage solutions including low-latency NVMe, all-flash arrays (AFAs) to support them. A critical element for achieving maximum system-wide performance is high-performance storage networking. Lenovo's Emulex® 64 Gb LPe36002 2-port Fibre Channel host bus adapter is designed for such mission-critical workloads and emerging applications, meeting the requirements for high availability, scalability, predictable performance, and low latency.

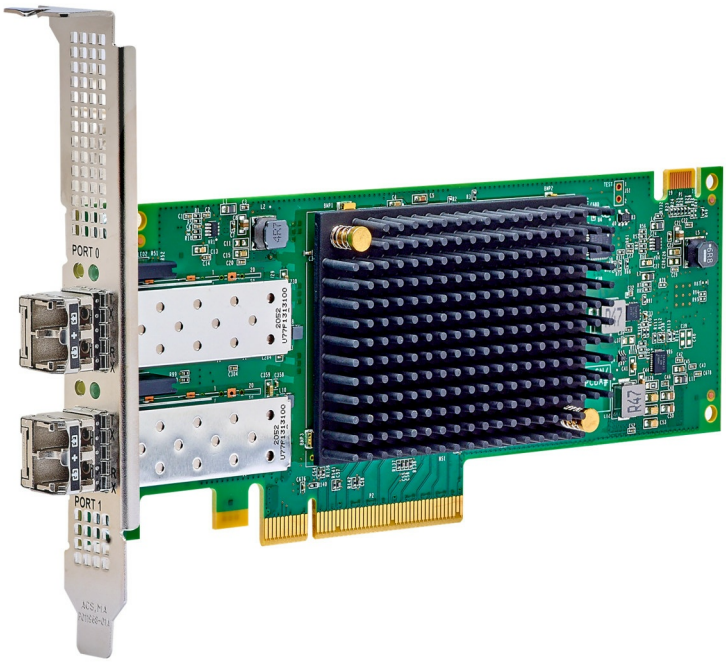

Figure 1. ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter

Did you know?

Emulex Gen 7 adapters including the LPe36002 HBA accelerate workload performance for NVMe data centers with up to 3x better latency than the previous Gen 6 generation. The adapter can handle peak workload I/O spikes with up to 10M IOPS, which is 6x more than the previous generation, and with a PCIe 4.0 host interface, delivers more than 2x more bandwidth per lane.

Emulex makes it easy to deploy, manage and upgrade SANs with no server reboots needed for firmware updates, queue depth changes, or optics replacements. The adapters implement the industry-standard INCITS/T11 specification, which includes full Fabric Performance Impact Notification (FPIN) and signaling support to collaborate with the fabric to identify and address performance problems.

Part number information

The following table lists the ordering information for the adapters.

Table 1. Part number information

Part number	Feature code	Description
4XC7A77485	BLC1	ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter

The part number includes the following items:

- An FC HBA adapter with two 64 Gb (64/32/16 Gbps speeds) FC SW SFP+ optical transceiver installed
- 3U (full-height) bracket attached and 2U (low-profile) bracket included in the box
- Publications flyer

Fiber optic cables

The following table lists the fiber optic cables that are available from Lenovo.

Table 2. Fiber optic cables

Part number	Feature code	Description
LC-LC OM3 MMF Fiber Optic Cables		
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable

Key features

Lenovo’s Emulex LPe36000 Gen 7 Fibre Channel (FC) Host Bus Adapters (HBAs) by Broadcom are designed for demanding mission-critical workloads and emerging applications. As applications continue to grow in size and scale, customers are using new server technologies to support them: servers with hundreds of processor cores, and high-performance storage solutions including low-latency NVMe, all-flash arrays (AFAs).

NVMe can significantly increase the performance of storage area networks (SANs), making the selection of high-speed networking technology the critical element for achieving maximum system-wide performance. Fibre Channel is purpose-built for storage networks, meeting the requirements for high availability, scalability, predictable performance and low latency.

Performance

The Emulex Dynamic Multi-core Architecture delivers unparalleled performance and the most efficient port utilization with eight processing cores and 16 threads that dynamically apply ASIC resources to either port that requires them, ensuring SLAs are met. Compared to Gen 6 HBAs, Emulex Gen 7 HBAs can support 64GFC to deliver up to 2x greater bandwidth. The LPe36000 HBA delivers 25,600 MB/s full duplex, 3x better hardware latency, and industry-leading performance of up to 10 million IOPS.

The fastpath design provides hardware acceleration for Emulex's Dynamic Multi-core architecture, reducing latency for each transaction by processing I/O requests in hardware, thereby operating significantly faster than software-based solutions. These performance advances enable Emulex Gen 7 HBAs to handle demanding workloads and I/O spikes experienced under peak workload conditions like no other Fibre Channel HBA in the industry.

Emulex Gen 7 HBAs support NVMe over Fibre Channel (NVMe/FC), providing significantly lower latency versus the traditional Fibre Channel SCSI protocol (SCSI FCP). Testing by independent performance labs has shown that NVMe/FC can deliver up to 50% more IOPS, 30% lower latency (Emulex labs/Demartek, 2018) and up to 3.4x higher online transaction processing (OLTP) transactions per minute (Tolly Test Report # 220122, 2020) than traditional SCSI FCP. Emulex Gen 7 HBAs also support NVMe/FC and SCSI FCP concurrently, providing investment protection and allowing data centers to transition to end-to-end NVMe over FC SANs at their own pace.

Emulex Gen 7 HBA port aggregation capability (also known as trunking) provides a method to aggregate physical ports together to form a single logical port. Aggregating physical ports to make a single high-bandwidth datapath increases the logical connection bandwidth for applications that need it, such as data warehousing and virtual machine migration.

Operational Efficiency

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

Emulex Gen 7 HBAs are managed HBAs—intelligent adapters designed to work with Emulex SAN Manager to reduce the complexity of managing enterprise-class SANs. Unlike other adapters, managed HBAs are designed to perform many operational tasks without the intervention of the host on which they reside. Managed HBAs differ from other adapters because they:

- Communicate to the Emulex SAN Manager application and register as a managed HBA.
- Implement the industry-standard INCITS/T11 specification, which includes full Fabric Performance Impact Notification (FPIN) and signaling support to collaborate with the fabric to identify and address performance problems.
- Monitor and record performance data and fabric notifications for analysis.

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 enables optics to be removed and replaced without shutting down the system, allowing for uninterrupted service.

The Emulex HBA Manager application (formerly named Emulex OneCommand Manager) 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/Lenovo 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 end-points that have Emulex HBAs installed. Supported features include ClearLink (D_port), Link Cable Beaconing, Host Name Registration, Read Diagnostic Parameters, VMID, BB_Credit Recovery, Fabric-assigned Boot LUN, Fabric-assigned PWWN, FC Trace Route, FC Ping, Rest APIs, and more.

Security

One of the key initiatives for enterprises is to safeguard their infrastructure from network attacks. Fibre Channel has field proven security in protecting the world's most sensitive data in banking, finance, healthcare, government, and military for over 20 years. Fibre Channel is protected from threats coming from IP networks because there is no direct connectivity for an attack from the IP network. This makes Fibre Channel a very strong link in the security chain and is why many IT managers continue to rely on FC for their most sensitive data.

Emulex Gen 7 HBAs provide unmatched security features for Fibre Channel environments. They were the first Fibre Channel HBAs with Silicon Root of Trust security embedded into the hardware itself. Firmware digital signatures are verified each time the system is booted as well as before installing any new firmware, providing a tamper proof solution.

Emulex's digitally signed drivers are integrated with all the major enterprise operating systems. Drivers are digitally signed and are verified to be authentic code written by Broadcom before they can be installed.

Technical specifications

The Emulex 64 Gb Gen 7 FC HBAs have the following specifications:

- Based on the Emulex LPe36002 dual-port adapter
- I/O controller: Emulex Engine 601 (XE601) I/O Controller (IOC)
- Host interface: PCIe 4.0 x8 (compatible with PCIe 3.0)
- Ports: Dual-port SFP+ based adapter
- Link speed: Support for 64 Gb, 32 Gb, and 16 Gb FC link speeds, which are automatically negotiated
- Data rate, autosensing (per port), with full duplex:
  - 57.8Gbps effective rate (28.9 Gbps with PAM4 modulation) (6400 MBps)
  - 28.05 Gbps (3200 MBps)
  - 14.025 Gbps (1600 MBps)
- Performance: Up to 10,000,000 IOPS per adapter
- Support for N_Port ID Virtualization (NPIV) and SR-IOV
- Industry standards:
  - Current ANSI/INCITS standards: FC-PI-7; FC-FS-5 (Class 3); FC-LS-5 INCITS 569-202x rev 5.0; FC-LS-4; FC-GS-8; FCP-4; FC-SP-2; SPC-4; SBC-3; SSC-4; FC-NVMe-2.
  - Legacy ANSI/INCITS standards: FC-PI-1/2/3/4/5/6; FC-FS-1/2/3/4; FC-LS-1/2/3; FC-GS-1/2/3/4/5/6/7; FC-PH-1/2/3; FC-DA-1/2; FCP-2/3; FC-HBA; FC-TAPE; FC-MI; SPC-3; SBC-2; SSC-2/3; FC-NVMe with AM1.
  - PCIe base spec 4.0.
  - PCIe card electromechanical spec 4.0.
  - PCI Hot Plug (PHP).
  - UEFI 2.7
- Topology: Point-to-point and switched fabric
- Hot-pluggable 64 Gbps Fibre Channel SFP+ short wave optical transceivers (850 nm) with LC connectors (included with the adapters). Note: Other transceivers are not supported.

The transceivers support the following cable lengths:

Note: A minimum cable length of 0.5m is required.

- Operating at 64 Gbps:
  - Up to 70 m on 50/125 µm OM3 MMF
  - Up to 100 m on 50/125 µm OM4 MMF
  - Up to 100 m on 50/125 µm OM5 MMF

- Operating at 32 Gbps:
  - Up to 20 m on 50/125 µm OM2 Multi-Mode Fiber (MMF)
  - Up to 70 m on 50/125 µm OM3 MMF
  - Up to 100 m on 50/125 µm OM4 MMF
  - Up to 100 m on 50/125 µm OM5 MMF
- Operating at 16 Gbps:
  - Up to 15 m on 62.5/125 µm OM1 Multi-Mode Fiber (MMF)
  - Up to 35 m on 50/125 µm OM2 MMF
  - Up to 100 m on 50/125 µm OM3 MMF
  - Up to 125 m on 50/125 µm OM4 MMF

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 3. Server support (Part 1 of 4)

		Edge					1S V3		AMD V3					Intel V3							Multi Node	
Part Number	Description	SE350 (7Z46 / 7D1X)	SE350 V2 (7DA9)	SE360 V2 (7DAM)	SE450 (7D8T)	SE455 V3 (7DBY)	ST250 V3 (7DCF / 7DCE)	SR250 V3 (7DCM / 7DCL)	SR635 V3 (7D9H / 7D9G)	SR655 V3 (7D9F / 7D9E)	SR645 V3 (7D9D / 7D9C)	SR665 V3 (7D9B / 7D9A)	SR675 V3 (7D9Q / 7D9R)	ST650 V3 (7D7B / 7D7A)	SR630 V3 (7D72 / 7D73)	SR650 V3 (7D75 / 7D76)	SR850 V3 (7D97 / 7D96)	SR860 V3 (7D94 / 7D93)	SR950 V3 (7DC5 / 7DC4)	SD530 V3 (7DDA / 7DD3)	SD550 V3 (7DD9 / 7DD2)
4XC7A77485	ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	N

Table 4. Server support (Part 2 of 4)

		Super Computing					1S Intel V2			2S Intel V2				AMD V1				
Part Number	Description	SD665 V3 (7D9P)	SD665-N V3 (7DAZ)	SD650 V3 (7D7M)	SD650-I V3 (7D7L)	SD650-N V3 (7D7N)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)	SR670 V2 (7Z22 / 7Z23)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR655 Client OS	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)
4XC7A77485	ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter	N	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	N	N	Y

Table 5. Server support (Part 3 of 4)

Part Number	Description	Dense V2				4S V2		8S	4S V1			1S Intel V1			
		SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)	ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)
4XC7A77485	ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N

Table 6. Server support (Part 4 of 4)

Part Number	Description	2S Intel V1								Dense V1			
		ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X58)	SN550 (7X16)	SN850 (7X15)
4XC7A77485	ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter	N	N	N	N	N	Y	Y	N	N	N	N	N

Operating system support

The following table lists the supported operating systems for the adapters.

Table 7. Operating system support for ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter, 4XC7A77485 (Part 1 of 2)

Operating systems	SR630 V3 (4th Gen Xeon)	SR630 V3 (5th Gen Xeon)	SR635 V3	SR645 V3	SR650 V3 (4th Gen Xeon)	SR650 V3 (5th Gen Xeon)	SR655 V3	SR665 V3	SR850 V3	SR860 V3	SR630 V2	SR650 V2	SR850 V2	SR860 V2	SR655	SR665
Microsoft Windows Server 2016	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y [2]	Y [2]
Red Hat Enterprise Linux 7.9	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y [2]	Y [2]
Red Hat Enterprise Linux 8.3	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.7	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.1	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y [2]	N
SUSE Linux Enterprise Server 12 SP4 with Xen	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y [2]	N
SUSE Linux Enterprise Server 12 SP5	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3 with Xen	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 22.04 LTS	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Operating systems	SR630 V3 (4th Gen Xeon)	SR630 V3 (5th Gen Xeon)	SR635 V3	SR645 V3	SR650 V3 (4th Gen Xeon)	SR650 V3 (5th Gen Xeon)	SR655 V3	SR665 V3	SR850 V3	SR860 V3	SR630 V2	SR650 V2	SR850 V2	SR860 V2	SR655	SR665
VMware vSphere Hypervisor (ESXi) 6.5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.5 U1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.5 U2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.5 U3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y [2]	N
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.7 U1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.7 U2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
VMware vSphere Hypervisor (ESXi) 6.7 U3	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y [2]	Y [2]
VMware vSphere Hypervisor (ESXi) 7.0 U1	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y [2]	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	N	Y	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0 U1	Y [1]	N	Y	Y	Y [1]	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

[1] For limitation, please refer Support Tip 104278

[2] The OS is not supported with EPYC 7003 processors.

Table 8. Operating system support for ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter, 4XC7A77485 (Part 2 of 2)

Operating systems	SR630 (Xeon Gen 2)	SR650 (Xeon Gen 2)	SR850 (Xeon Gen 2)	SR850P (Xeon Gen 2)	SR860 (Xeon Gen 2)	SR950 (Xeon Gen 2)	SR630 (Xeon Gen 1)	SR650 (Xeon Gen 1)	SR850 (Xeon Gen 1)	SR860 (Xeon Gen 1)	SR950 (Xeon Gen 1)
Microsoft Windows Server 2016	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Operating systems	SR630 (Xeon Gen 2)	SR650 (Xeon Gen 2)	SR850 (Xeon Gen 2)	SR850P (Xeon Gen 2)	SR860 (Xeon Gen 2)	SR950 (Xeon Gen 2)	SR630 (Xeon Gen 1)	SR650 (Xeon Gen 1)	SR850 (Xeon Gen 1)	SR860 (Xeon Gen 1)	SR950 (Xeon Gen 1)
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.7	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.9	Y	Y	Y	Y	Y	Y	N	N	N	N	N
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.3	Y	Y	Y	Y	Y	Y	N	N	N	N	N
SUSE Linux Enterprise Server 12 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP5 with Xen	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ubuntu 22.04 LTS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.5	N	N	N	N	N	N	Y	Y	Y	N	Y
VMware vSphere Hypervisor (ESXi) 6.5 U1	N	N	N	N	N	N	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.5 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.5 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	N	N	N	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0 U1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Operating systems	SR630 (Xeon Gen 2)	SR650 (Xeon Gen 2)	SR850 (Xeon Gen 2)	SR850P (Xeon Gen 2)	SR860 (Xeon Gen 2)	SR950 (Xeon Gen 2)	SR630 (Xeon Gen 1)	SR650 (Xeon Gen 1)	SR850 (Xeon Gen 1)	SR860 (Xeon Gen 1)	SR950 (Xeon Gen 1)
VMware vSphere Hypervisor (ESXi) 8.0 U2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

SAN switches

Lenovo offers the ThinkSystem DB Series of Fibre Channel SAN switches for high-performance storage expansion. See the DB Series product guides for models and configuration options:

- ThinkSystem DB Series SAN Switches:
  https://lenovopress.com/storage/switches/rack#rt=product-guide

For information about interoperability with storage servers, see the Lenovo Storage Interoperability Links article, available from:
https://lenovopress.com/lp0584-lenovo-storage-interoperability-links

Warranty

The adapters carry a one-year limited warranty. When installed in a supported server, the adapters assume the server's base warranty and any Lenovo Services warranty upgrade.

Physical specifications

The adapters have the following dimensions (approximate):

- Low profile PCIe form factor card
- 168 mm x 69 mm (6.60 in. x 2.7 in.)
- Standard (3U) and low-profile (2U) brackets included

Operating environment

The adapters are supported in the following environment:

- Temperature:
  - Operating: 0 to 55 °C (32 to 131 °F)
  - Storage: -20 to 85 °C (-4 to 185 °F)
- Relative humidity: 5 - 95% (non-condensing)

Agency approvals

The adapters conform to the following regulations:

- AS/NZS CISPR22:2009+A1, Class A
- Australian EMC Framework (RCM)
- China RoHS compliant
- cUR recognized to CSA 22.2, No. 60950-1-07
- EN55022:2010, Class A
- EN55024:2010
- EN55032:2012
- EU (CE Mark)
- EU Low Voltage Directive
- UKCA Mark
- FCC Rules, Part 15, Class A
- Industry Canada, ICES-003, Class A
- Japan VCCI, Class A
- Korea KCC, Class A
- RoHS Compliant (Directive 2011/65/EU)
- TUV certified to EN60950-1+A11+A1+A12+A2
- Taiwan BSMI, Class A
- Taiwan BSMI RoHS Compliant
- UL recognized to UL60950-1 2nd Edition

Related publications and links

For more information, see the following resources:

- Analyst report: "64 Gb Fibre Channel Performance with Lenovo ThinkSystem Emulex LPe36002 Gen 7 FC HBA"
  https://www.lenovo.com/us/en/resources/data-center-solutions/analyst-reports/64-gb-fibre-channel-performance-with-lenovo-thinksystem-emulex-lpe36002-gen-7-test-report/
- Lenovo Press paper, "Benefits of an End-to-End NVMe over FC Solution with Lenovo ThinkSystem"
  https://lenovopress.com/lp0955
- Lenovo ThinkSystem networking options product page
  https://lenovopress.com/lp0765-networking-options-for-thinksystem-servers
- Lenovo Storage Interoperability Links
  https://lenovopress.com/lp0584-lenovo-storage-interoperability-links
- Broadcom product page for the LPe35000 Series adapters:
  https://www.broadcom.com/products/storage/fibre-channel-host-bus-adapters/lpe35000-m2
- Lenovo support
  http://support.lenovo.com
- Lenovo ServerProven
  http://static.lenovo.com/us/en/serverproven/xseries/sharedstorage/samatrix.shtml
- Emulex HBA Manager (formerly Emulex OneCommand Manager)
  https://www.broadcom.com/products/storage/fibre-channel-host-bus-adapters/emulex-hba-manager

Related product families

Product families related to this document are the following:

- Host Bus Adapters

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