N2225 and N2226 12Gb SAS External HBAs
Product Guide (withdrawn product)

The N2225 and N2226 SAS/SATA HBAs are low-cost, high-performance host bus adapters for high-performance connectivity between System x® servers and tapes drives and RAID storage systems. The N2225 provides two x4 external mini-SAS HD connectors with eight lanes of 12 Gbps SAS. The N2226 provides four x4 external mini-SAS HD connectors with 16 lanes of 12 Gbps SAS.

The following figure shows the N2225 and N2226 SAS/SATA HBAs.



Figure 1. N2225 (left) and N2226 (right) SAS/SATA HBAs

Did you know?

The N2225 and N2226 SAS/SATA HBAs provide high performance for storage connectivity for servers by integrating the latest enhancements in PCI Express and SAS technology, offering eight lanes (N2225) or 16 lanes (N2226) of 12 Gbps SAS matched with eight lanes of PCIe 3.0 to eliminate performance bottlenecks and provide high data transfer rates for medium-to-large capacity server storage applications.

The N2225 and N2226 SAS/SATA HBAs support SAS data transfer rates of 3, 6, and 12 Gbps per lane and SATA transfer rates of 3 and 6 Gbps per lane, and they enable maximum connectivity and performance in a low-profile (N2225) or full-height (N2226) form factor.

Rigorous testing of the N2225 and N2226 SAS/SATA HBAs by Lenovo through the ServerProven® program ensures a high degree of confidence in storage subsystem compatibility and reliability. Providing an additional peace of mind, these controllers are covered under Lenovo warranty.

Part number information

The following table provides the ordering part numbers and feature codes.

Withdrawn from marketing: The N2225 and N2226 SAS/SATA HBAs are now both withdrawn from marketing.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
N2225 SAS/SATA HBA	00AE912	A5M0
N2226 SAS/SATA HBA	00AE916	A5M1

The N2225 option part number includes the following items:

- One N2225 or N2226 adapter with a full-height (3U) bracket attached
- One low-profile (2U) bracket (N2225 only)
- Documentation package

Features and specifications

The N2225 and N2226 SAS/SATA HBAs have the following features and specifications:

- LSI SAS3008 12 Gbps I/O controller
- PCIe low profile (N2225) or full height (N2226), half-length form factor
- PCI Express 3.0 x8 host interface
- Eight (N2225) or 16 (N2226) external 12 Gbps SAS/SATA ports
- Supports 12, 6, and 3 Gbps SAS and 6 and 3 Gbps SATA data transfer rates
- Up to 12 Gbps throughput per port
- Two (N2225) or four (N2226) external x4 mini-SAS HD connectors (SFF-8644)
- Non-RAID SAS HBAs that support connectivity to the storage systems and tape drives
- High-performance IOPS LSI Fusion-MPT architecture
- Advanced power management support
- Support for SSP, SMP, STP, and SATA protocols
- Support for narrow and wide ports
- End-to-End CRC with Advanced Error Reporting
- T-10 Protection Model for early detection of and recovery from data corruption
- Spread Spectrum Clocking for EMI reductions

Server compatibility

The following tables list the compatibility information for the N2225 and N2226 SAS/SATA HBAs and System x®, iDataPlex®, and NeXtScale™ servers.

Table 2. Support for System x and dense servers with Xeon E5/E7 v4 and E3 v5 processors

Part number	Description	x3250 M6 (3943)	x3250 M6 (3633)	x3550 M5 (8869)	x3650 M5 (8871)	x3850 X6/x3950 X6 (6241, E7 v4)	nx360 M5 (5465, E5-2600 v4)	sd350 (5493)
00AE912	N2225 SAS/SATA HBA	Y	Y	Y	Y	Y	N	N
00AE916	N2226 SAS/SATA HBA	N	N	N	Y	Y	N	N

Table 3. Lenovo server compatibility: Intel Xeon processor E3 v3, E5 v3, and E7 v3 families

Part number	Description	x3100 M5 (5457)	x3250 M5 (5458)	x3500 M5 (5464)	x3550 M5 (5463)	x3650 M5 (5462)	x3850 X6/x3950 X6 (6241, E7 v3)	nx360 M5 (5465, E5 v3)
00AE912	N2225 SAS/SATA HBA	Y	Y	Y	Y	Y	Y	N
00AE916	N2226 SAS/SATA HBA	N	N	Y	Y	Y	Y	N

Table 4. Lenovo server compatibility: Intel Xeon processor E5 v2 and E7 v2 families

Part number	Description	x3500 M4 (7383, E5-2600 v2)	x3530 M4 (7160, E5-2400 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3650 M4 HD (5460)	x3750 M4 (8753)	x3850 X6/x3950 X6 (6241, E7 v2)	dx360 M4 (7912, E5-2600 v2)
00AE912	N2225 SAS/SATA HBA	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
00AE916	N2226 SAS/SATA HBA	Y	N	N	Y	Y	Y	Y	Y	Y	N

For more information about the System x servers, including older servers that support the N2225 and N2226 adapters, see the following ServerProven® website: www.lenovo.com/us/en/serverproven/

Drive enclosures

The N2225 and N2226 SAS HBAs support the following 12 Gbps SAS external drive enclosures:

- Lenovo Storage D1212
- Lenovo Storage D1224
- Lenovo Storage D3284

For details about the D1212 and D1224, see the product guide:
http://lenovopress.com/lp0512

For details about D3284, see the product guide:
http://lenovopress.com/lp0513

Storage systems

The N2225 and N2226 SAS HBAs support connectivity to the following 12 Gb and 6 Gb SAS storage systems:

- Lenovo ThinkSystem DS2200
- Lenovo ThinkSystem DS4200
- Lenovo ThinkSystem DS6200
- Lenovo Storage S2200
- Lenovo Storage S3200
- Lenovo Storage V3700 V2
- Lenovo Storage V5030
- IBM Storwize V3700 for Lenovo
- IBM Storwize V5000 for Lenovo
- IBM Storwize V7000 for Lenovo

For details about these storage systems, see the relevant product guide:
https://lenovopress.com/storage/san/lenovo?resource_type=product-guide

Tape backup units

The N2225 and N2226 SAS HBAs support connectivity to the following SAS tape backup units:

- IBM TS2250 Tape Drive for Lenovo
- IBM TS2260 Tape Drive for Lenovo
- IBM TS2270 Tape Drive for Lenovo
- IBM TS2900 Tape Autoloader for Lenovo
- IBM TS3100 Tape Library for Lenovo
- IBM TS3200 Tape Library for Lenovo

For details about these tape backup units, see the relevant product guide:
https://lenovopress.com/servers/options/backup?resource_type=product-guide

Operating system support

The adapters support the following operating systems:

Tip: These tables are automatically generated based on data from Lenovo ServerProven.

Table 5. Operating system support for N2225 SAS/SATA HBA, 00AE912

Operating systems	x3850/3950 X6 (3837)	x3850/3950 X6 (6241, E7 v2)	x3850/3950 X6 (6241, E7 v3)	x3850/3950 X6 (6241, E7 v4)	x3250 M6 (3633)	x3500 M5 (5464)	x3550 M5 (5463)	x3550 M5 (8869)	x3650 M5 (5462)	x3650 M5 (8871)	x3100 M5 (5457)	x3250 M5 (5458)
Microsoft Windows Server 2008 R2	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Microsoft Windows Server 2016	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	N	N	N	Y	Y	N	N	Y	N	Y	N	N
Microsoft Windows Server version 1709	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Microsoft Windows Server version 1803	N	N	N	N	N	N	N	Y	N	Y	N	N
Red Hat Enterprise Linux 6 Server Edition	N	N	N	N	N	N	N	N	N	N	Y	Y
Red Hat Enterprise Linux 6 Server x64 Edition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7	N	N	N	Y	N	N	N	N	N	N	N	N
Red Hat Enterprise Linux 8.0	N	N	N	Y [1]	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 11 for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
SUSE Linux Enterprise Server 11 for x86	N	N	N	N	N	N	N	N	N	N	Y	Y
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y
SUSE Linux Enterprise Server 12	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 with Xen	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
SUSE Linux Enterprise Server 15 with Xen	N	N	Y	Y	Y	N	N	Y	N	Y	N	N
VMware vSphere 5.1 (ESXi)	Y	Y	N	N	N	Y	Y	N	Y	N	Y	Y
VMware vSphere Hypervisor (ESXi) 5.5	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y
VMware vSphere Hypervisor (ESXi) 6.0	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.5	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	N
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	Y	Y	Y	N	Y	N	Y	N	N

[1] Please refere LSIC (interop site) for latest Lenovo External Storage support configuration. https://datacentersupport.lenovo.com/ca/en/lsic/

Table 6. Operating system support for N2226 SAS/SATA HBA, 00AE916

Operating systems	x3850/3950 X6 (3837)	x3850/3950 X6 (6241, E7 v2)	x3850/3950 X6 (6241, E7 v3)	x3850/3950 X6 (6241, E7 v4)	x3500 M5 (5464)	x3550 M5 (5463)	x3550 M5 (8869)	x3650 M5 (5462)	x3650 M5 (8871)
Microsoft Windows Server 2008 R2	Y	Y	Y	N	Y	Y	Y	Y	Y
Microsoft Windows Server 2012	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2012 R2	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2016	N	Y	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	N	N	N	Y	N	N	Y	N	Y
Microsoft Windows Server version 1709	N	N	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server version 1803	N	N	N	N	N	N	Y	N	Y
Red Hat Enterprise Linux 6 Server x64 Edition	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7	Y	Y	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.0	N	N	N	Y [1]	N	N	N	N	N
SUSE Linux Enterprise Server 11 for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T	Y	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12	N	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 with Xen	N	Y	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15	N	N	Y	Y	N	N	Y	N	Y
SUSE Linux Enterprise Server 15 with Xen	N	N	Y	Y	N	N	Y	N	Y
VMware vSphere 5.1 (ESXi)	Y	Y	N	N	Y	Y	N	Y	N
VMware vSphere Hypervisor (ESXi) 5.5	Y	Y	Y	N	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.0	N	Y	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.5	Y	N	N	Y	N	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7	N	N	N	Y	Y	N	Y	N	Y

[1] Please refere LSIC (interop site) for latest Lenovo External Storage support configuration. https://datacentersupport.lenovo.com/ca/en/lsic/

Warranty

The N2225 and N2226 SAS/SATA HBAs carry a one-year limited warranty. When installed in a supported System x server, the adapters assume your system's base warranty and any Lenovo warranty upgrade.

Physical specifications

The N2225 SAS/SATA HBA has the following physical specifications.

Dimensions and weight (approximate):

- Height: 69 mm (2.7 in.)
- Width: 17 mm (0.7 in.)
- Depth: 170 mm (6.7 in.)
- Weight: 100 g (0.2 lb)

Shipping dimensions and weight (approximate):

- Height: 51 mm (2.0 in.)
- Width: 143 mm (5.6 in.)
- Depth: 238 mm (9.4 in.)
- Weight: 205 g (0.45 lb)

The N2226 SAS/SATA HBA has the following physical specifications.

Dimensions and weight (approximate):

- Height: 111 mm (4.4 in.)
- Width: 18 mm (0.7 in.)
- Depth: 170 mm (6.7 in.)
- Weight: 222 g (0.5 lb)

Shipping dimensions and weight (approximate):

- Height: 51 mm (2.0 in.)
- Width: 143 mm (5.6 in.)
- Depth: 238 mm (9.4 in.)
- Weight: 327 g (0.7 lb)

Operating environment

The N2225 and N2226 SAS/SATA HBAs are supported in the following environment:

- Temperature (operational): 5 - 40 °C (41 - 104 °F) at 0 - 5,000 m (0 - 16,404 ft)
- Temperature (non-operational): -40 - 60 °C (-40 - 140 °F) at 10,700 m (35,105 ft)
- Relative humidity: 8% - 93% (non-condensing)
- Maximum altitude: 10,700 m (35,105 ft)

Agency approvals

The N2225 and N2226 SAS/SATA HBAs conform to the following regulations:

- UL
- cUL
- IEC60950
- EMC
- FCC
- CE
- VCCI
- BSMI
- C-tick
- KC

Related publications and links

For more information, see the following documents:

- US Announcement Letter
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-075
- N2225 and N2226 Quick Intallation Guide
  https://support.lenovo.com/docs/UM920924
- N2225 and N2226 Users Guide
  https://support.lenovo.com/docs/UM920923
- N2225 support and downloads
  http://www.ibm.com/support/entry/myportal/product/system_x_hardware_options/sas~sata_controller/host_bus_adapter/00ae912_-_n2225_sas~sata_host_bus_adapter
- N2226 support and downloads
  http://www.ibm.com/support/entry/myportal/product/system_x_hardware_options/sas~sata_controller/host_bus_adapter/00ae916_-_n2226_sas~sata_hot_bus_adapter
- ServerProven
  http://www.lenovo.com/us/en/serverproven/

Related product families

Product families related to this document are the following:

- Host Bus Adapters

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