

## Intel X710 10 GbE SFP+ Network Adapter Family Product Guide

The new Intel X710 family of 10 Gigabit Ethernet (GbE) server network adapters addresses the demanding needs of the next-generation data center. By providing unmatched features for server and network virtualization, small packet performance, and low power; the data center network is flexible, scalable, and resilient.

The X710 is available in three form factors: a standard PCIe low-profile card, a Mezzanine LOM (ML2) form factor for ThinkSystem and System x servers, and an AnyFabric form factor for ThinkServer systems.

The following figure shows the two-port PCIe adapter for System x.

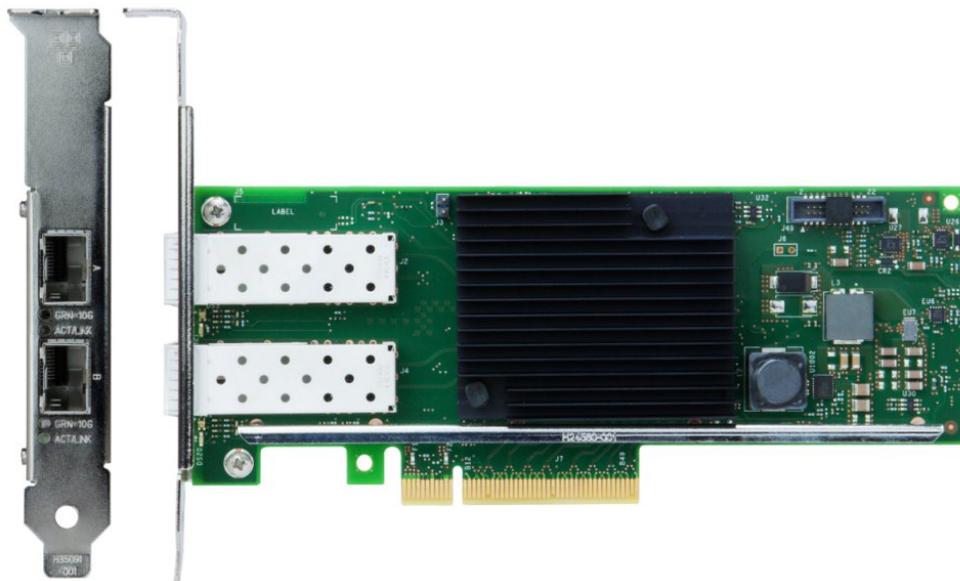


Figure 1. Intel X710 two-port PCIe adapter

### Did you know?

The Intel X710 adapters support Intel I/O Virtualization Technology, which helps accelerate data and improves application response times. For virtualized environments, the X710 adapters offer advanced features with VMDq that lower processor usage and increase I/O performance.

Mezzanine LAN-on-Motherboard Generation 2 (ML2) and AnyFabric adapters are cost-effective adapters that offers the flexibility advantages of a PCIe adapter while supporting integrated networking features, such as Wake-on-LAN and direct connectivity to the server's service processor for NCSI-compliant out-of-band systems management.

## Part number information

The following table provides the ordering part numbers and feature codes for the Intel X710 adapters.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
<b>ThinkSystem options</b>		
7ZT7A00537	AUKX	Lenovo ThinkSystem X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter
00JY940	ATRH	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter
<b>System x options</b>		
01DA900	AU2Y	Intel X710-DA2 2x10GbE SFP+ Adapter
81Y3520*	AS73	Intel X710 2x10GbE SFP+ Adapter
00JY940	ATRH	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter
94Y5200	AS74	Intel X710 ML2 4x10GbE SFP+ Adapter
<b>ThinkServer options</b>		
4XC0G88848	Not applicable	Lenovo ThinkServer X710-DA4 AnyFabric 10Gb 4 port Ethernet Adapter by Intel
4XC0G88847	Not applicable	Lenovo ThinkServer X710-DA2 AnyFabric 10Gb 2 port Ethernet Adapter by Intel
4XC0G88852	Not applicable	Lenovo ThinkServer X710-DA2 PCIe 10Gb 2 port Ethernet Adapter by Intel
4XC0G88854	Not applicable	Lenovo ThinkServer X710-DA4 PCIe 10Gb 4 port Ethernet Adapter by Intel

\* Withdrawn from marketing

The ThinkSystem and System x adapter option part numbers includes the following items:

- One Intel 10 Gb Ethernet adapter
- Full-height (3U) bracket attached with low-profile (2U) bracket included in the box
- Documentation

The ThinkServer adapter options include the following items:

- One Intel 10 Gb Ethernet adapter
- Documentation

**Note:** The adapters ship without any SFP+ transceivers or direct attach cables. These items must be ordered separately (for more information, see Table 2 and Table 3).

## Supported transceivers and direct-attach cables

The Intel X710 adapters have empty SFP+ cages that support SFP+ SR transceivers and direct attached copper (DAC) cables, as listed in the following tables.

Table 2. Supported SFP+ transceivers

Part number	Feature code	Description
Optical Transceivers - System x and ThinkSystem		
49Y4216	0069	Brocade 10Gb SFP+ SR Optical Transceiver
46C3447	5053	SFP+ SR Transceiver (10Gb)
49Y4218	0064	QLogic 10Gb SFP+ SR Optical Transceiver
00FE331	B0RJ	Lenovo 10GBASE-LR SFP+Transceiver
90Y9412	A1PM	Lenovo 10Gb/s LR SFP+ XCVR
Optical Transceivers - ThinkServer		
4XC0F28735	Not applicable	Lenovo ThinkServer 10Gb Optical Module by Intel

The following table lists the supported DAC cables.

Table 3. Supported direct attach cables

Part number	Feature code	Description
Active DAC/Twinax cables		
00VX111	AT2R	Lenovo 1m Active DAC SFP+ Cables
00VX114	AT2S	Lenovo 3m Active DAC SFP+ Cables
00VX117	AT2T	Lenovo 5m Active DAC SFP+ Cables
95Y0323*	A25A	1 m Active DAC SFP+ Cable
95Y0326*	A25B	3 m Active DAC SFP+ Cable
95Y0329*	A25C	5 m Active DAC SFP+ Cable
Passive DAC/Twinax cables		
00D6288	A3RG	.5 m Passive DAC SFP+ Cable
90Y9427	A1PH	1 m Passive DAC SFP+ Cable
00AY764	A51N	1.5m Passive DAC SFP+ Cable
00AY765	A51P	2m Passive DAC SFP+ Cable
90Y9430	A1PJ	3m Passive DAC SFP+ Cable
90Y9433	A1PK	5m Passive DAC SFP+ Cable
00D6151	A3RH	7 m Passive DAC SFP+ Cable

\* Withdrawn from marketing

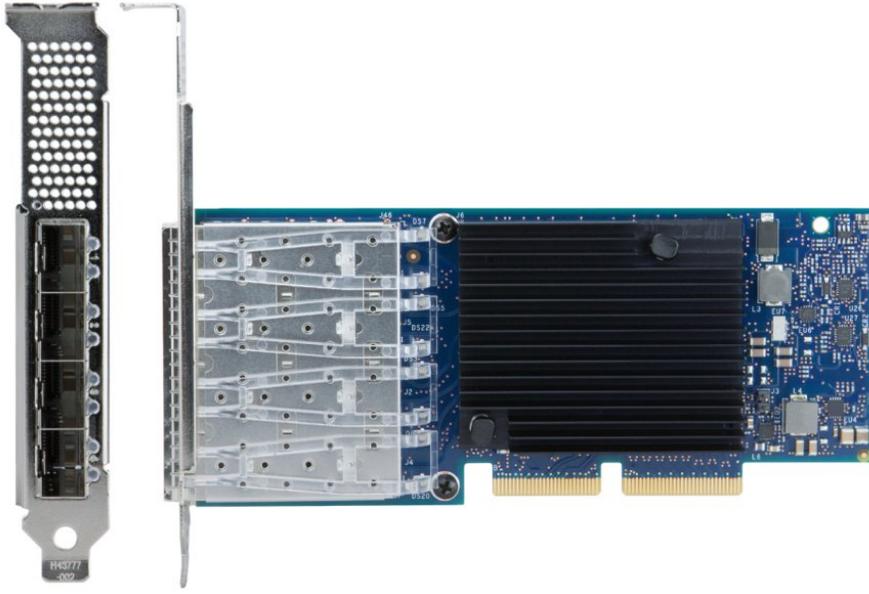


Figure 2. Intel X710 ML2 4x10GbE SFP+ Adapter

## Features

The Intel X710 adapters are optimized for data center, cloud, and mobile applications and include the following features:

- **VXLAN/NVGRE Hardware Offloads:** These stateless offloads preserve application performance for overlay networks. With these offloads, it is possible to distribute network traffic across CPU cores. At the same time, X710 offloads LSO, GSO, and checksum from the host software, which reduces CPU overhead.
- **Mobile and cloud application acceleration:** Intel's Data Plane Development Kit (DPDK) delivers an open driver where users can fine-tune small packet performance, which delivers line-rate at 128 byte, and near line-rate at 64 byte.
- **Low latency:** Intel Ethernet Flow Director delivers hardware-based application steering and Intel Data Direct I/O makes the processor cache the primary destination and source of I/O data rather than main memory. Combined, latency is reduced and Intel reports a three-fold improvement in RPS.
- **Virtualization performance:** With Intel Virtualization Technology (VT), the X710 family of adapters delivers outstanding I/O performance in virtualized server environments. These adapters reduce I/O bottlenecks by providing intelligent offloads for networking traffic per virtual machine (VM), which enables near-line rate speeds for small packets and supports almost an unlimited amount of isolated traffic flows so that you can scale your cloud environment.
- **Next-generation VMDq:** The X710 adapters support up to 256 VMDq VMs and offer enhanced Quality of Service (QoS) feature by providing weighted round-robin servicing for the Tx data. The adapters offload the data-sorting functionality from the hypervisor to the network silicon, which improves data throughput and CPU usage.
- **PCI-SIG SR-IOV implementation:** Provides an implementation of the PCI-SIG standard for I/O Virtualization. The physical configuration of each port is divided into multiple virtual ports. Each virtual port is assigned to an individual VM directly by bypassing the virtual switch in the Hypervisor, which results in near-native performance.
- **VM load balancing:** Provides traffic load balancing (Tx and Rx) across VMs that are bound to the team interface. It also provides fault tolerance if a switch, port, cable, or adapter fails.

The ThinkServer X710-DA2 AnyFabric 10Gb 2 port Ethernet Adapter is shown in the following figure.



Figure 3. ThinkServer X710-DA2 AnyFabric 10Gb 2 port Ethernet Adapter by Intel

## Specifications

The Intel X710 adapters have the following specifications:

- Empty SFP+ cages for 10GbE connection supporting SFP+ transceivers or DAC cables
- Host interface:
  - PCI Express 3.0; x8
  - PCI Power Management/ACPI Extensions
  - TLP Processing Hint (TPH) Support
  - MSI-X Support
  - Energy Efficient Ethernet
- Performance:
  - Achieves wire-rate throughput on smaller payload sizes (>64 bytes)
  - Standard stack Latency: ~7  $\mu$ s
  - Kernel- Bypass Latency: ~3  $\mu$ s
  - Small Packet Developers Tool Kit
- Virtualization features:
  - Microsoft Network Virtualization that uses Generic Routing Encapsulation (NVGRE)
  - VMware Virtual Extensible LAN (VXLAN)
  - Intel Virtual Technology (VT) with VMDq for virtualization
  - SR-IOV direct assignment support
  - Virtual Bridging Support: VEPA/802.1Qbg, BPE/802.1Qbh
  - Virtual Functions: Up to 128 per device
  - Hardware Queue Pairs: Up to 1.5K
- Management features:
  - Advanced filtering capabilities (IPv4, IPv6)
  - SNMP
  - RMON statistic counters
  - Wake on LAN support (WoL support is for ML2 and AnyFabric adapters only; first port only)
  - NC-SI for IMM shared management port connectivity through port 1 (NCSI support is for ML2 and AnyFabric adapters only)
- Additional features:
  - Jumbo Frame Support: 9728 bytes
  - VLAN support
  - Flow Control
  - 1588 Time Synchronization Support
- TCP/IP Layer 2 features:
  - Receive Side Scaling (RSS)
  - Large Send Offload (LSO)
  - TCP/UDP/IP/SCTP Checksum Offload
  - IPv4, IPv6
  - Supports iSCSI as an iSCSI software initiator
- IEEE 802.1Q VLAN support with VLAN tag insertion, with stripping and packet filtering for up to 4096 VLAN tags.
- IEEE 802.3x flow control support.
- IEEE 802.1p Class of Service (CoS)/QoS.
- Support for Advanced Packet Filtering.

- Teaming support:
  - Adapter Fault Tolerance (AFT)
  - Switch Fault Tolerance (SFT)
  - Adaptive Load Balancing (ALB)
  - VM Load Balancing (VMLB)
  - IEEE 802.3ad (link aggregation control protocol)
- Intel PROSet Utility for easy configuration and management.
- UEFI and legacy PXE boot
- Option ROM:
  - PCIe adapter: Disabled on both ports by default.
  - ML2 adapter: Enabled on all ports by default.
  - AnyFabric adapters: Enabled on all ports by default.
- RoHS compliance that is based on latest 2014 standards.

## Standards supported

The X710 adapters support the following IEEE standards:

- IEEE 802.1p CoS traffic prioritization
- IEEE 802.1Q VLAN tagging
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3x Full-duplex flow control
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- 10GSFP+Cu SFP+ Direct Attach copper
- IEEE 1588, 802.1as Time Sync

The ThinkServer X710-DA4 AnyFabric 10Gb 4 port Ethernet Adapter is shown in the following figure.



Figure 4. ThinkServer X710-DA4 AnyFabric 10Gb 4 port Ethernet Adapter by Intel

## Server support - ThinkSystem

The following table lists the ThinkSystem servers that are compatible.

Table 4. ThinkSystem server support

Part number	Description	2S Rack & Tower								4S Rack		Dense/ Blade		
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y03/7Y04)	SR590 (7X98/7X99)	SR630 (7X01/7X02)	SR650 (7X05/7X06)	SR850 (7X18/7X19)	SR860 (7X69/7X70)	SR950 (7X11/12/13)	SD530 (7X21)	SN550 (7X16)	SN850 (7X15)
7ZT7A00537	Lenovo ThinkSystem X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter	Y	Y	Y	Y*	Y*	Y	Y	Y	Y*	Y	Y	N	N
00JY940	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter	N	Y	Y	Y*	Y*	Y	Y	Y	Y*	Y	N	N	N

\* Support is planned for 4Q/2017

## Server support - System x

The following tables list the System x servers that are compatible.

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

Table 5. 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)
01DA900	Intel X710-DA2 2x10GbE SFP+ Adapter	N	N	Y	Y	Y	Y	Y
81Y3520	Intel X710 2x10GbE SFP+ Adapter	N	N	N	N	N	N	N
00JY940	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter	N	N	Y	Y	Y	Y	N
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	N	N	Y	N	N

## Support for System x and dense servers with Intel Xeon v3 processors

Table 6. Support for servers with Intel Xeon v3 processors

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)
01DA900	Intel X710-DA2 2x10GbE SFP+ Adapter	N	Y	Y	Y	Y	Y	Y
81Y3520	Intel X710 2x10GbE SFP+ Adapter	N	N	N	N	N	N	N
00JY940	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter	N	N	N	Y	Y	Y	Y
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	N	N	N	Y	N

## Support for servers with Intel Xeon v2 processors

Table 7. Support for servers with Intel Xeon v2 processors

Part number	Description	x3300 M4 (7382)	x3500 M4 (7383, E5-2600 v2)	x3550 M4 (7914, E5-2600 v2)	x3630 M4 (7158, E5-2400 v2)	x3650 M4 (7915, E5-2600 v2)	x3650 M4 BD (5466)	x3750 M4 (8753)	x3850 X6/x3950 X6 (6241, E7 v2)
01DA900	Intel X710-DA2 2x10GbE SFP+ Adapter	N	N	N	N	N	N	N	N
81Y3520	Intel X710 2x10GbE SFP+ Adapter	N	Y	Y	Y	Y	Y	Y	Y
00JY940	Intel X710-DA2 ML2 2x10GbE SFP+ Adapter	N	N	N	N	N	N	N	Y
94Y5200	Intel X710 ML2 4x10GbE SFP+ Adapter	N	N	N	N	N	N	Y	Y

For more information about the System x servers that support this adapter (including support for older servers), see ServerProven at this website:

<http://www.lenovo.com/us/en/serverproven/xseries/lan/matrix.shtml>

## Server support - ThinkServer

The Intel X710 adapters are supported in the servers that are listed in the following tables.

### Support for ThinkServer Generation 5 rack & tower servers

This table includes both servers with E5-2600 v3 processors and E5-2600 v4 processors.

Table 8. Support for ThinkServer Generation 5 rack & tower servers

Part number	Description	TS150	TS450	TS460	RS160	TD350	RD350	RD450	RD550	RD650
4XC0G88848	ThinkServer X710-DA4 AnyFabric 10Gb 4 port Ethernet Adapter	N	N	N	N	N	N	N	Y	Y
4XC0G88847	ThinkServer X710-DA2 AnyFabric 10Gb 2 port Ethernet Adapter	N	N	N	N	N	N	N	Y	Y
4XC0G88852	ThinkServer X710-DA2 PCIe 10Gb 2 port Ethernet Adapter	N	N	N	Y	Y	Y	Y	Y	Y
4XC0G88854	ThinkServer X710-DA4 PCIe 10Gb 4 port Ethernet Adapter	N	N	N	N	Y	N	Y	N	Y

For more information about ThinkServer support, see the ThinkServer Options Compatibility Matrix available from <http://www.lenovo.com/accessoriesguide>

### Cabling requirements

The network cables that can be used with the adapters are described in the following sections.

- 10GBASE-SR (supported with the optional 10 GbE SFP+ SR transceivers listed in Table 2)  
850 nm communication that uses multimode fiber cable (50 μ or 62.5 μ) up to 300 m that uses an LC duplex connector
- 10GSFP+Cu (supported with the optional SFP+ DAC cables listed in Table 3)  
Up to 5 m SFP+ copper direct attach cables, as listed in Table 3

## Operating system support

The Intel X710 10 Gb Ethernet adapters support the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 7
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 12
- SUSE Linux Enterprise Server 12 with XEN
- VMware vSphere 5.5 (ESXi)
- VMware vSphere 6.0 (ESXi)
- VMware vSphere 6.5 (ESXi)

For more information about the specific supported versions and service packs, see the following ServerProven web page:

<http://www.lenovo.com/us/en/serverproven/xseries/lan/matrix.shtml>

Select the check mark that is associated with the server in question to see the operating system support information.

## Physical specifications

The physical specifications of the adapters are described in this section.

The Intel X710 2x10GbE SFP+ Adapter has the following dimensions:

- Length: 168 mm (6.6 in.)
- Width: 69 mm (2.7 in.)
- Height: 15 mm (0.6 in.)

The Intel X710 ML2 4x10GbE SFP+ Adapter has the following dimensions:

- Height: 69 mm (2.7 in.)
- Length: 168 mm (6.6 in.)
- Width: 17 mm (0.7 in.)

The AnyFabric adapters have the following dimensions:

- Width: 165 mm (6.5 in.)
- Depth: 73 mm (2.9 in.)
- Height: 16 mm (0.6 in.)

The adapters have the following shipping box dimensions (approximate):

- Length: 238 mm (9.4 in.)
- Width: 143 mm (5.6 in.)
- Height: 51 mm (2.0 in.)

## Operating environment

These adapters are supported in the following environment:

- Operating temperature: 0 - 55 °C (32 - 131 °F)
- Storage temperature: -20 - 65 °C (-4 - 149 °F)
- Shipping conditions: -20 - 70 °C (-4 - 158 °F)
- Air flow requirement (LFPM): 45 minimum
- Wet bulb (max): 27 °C (81 °F)
- Relative humidity (operating/nonoperating): 10% - 90%
- Relative humidity (shipping): 5% - 95%, no condensation
- Relative humidity (storage): 5% - 80%
- Maximum dew point (operating): 21 °C (70 °F)
- Maximum operating altitude: 7,000 feet (2,134 m)
- Vibration and shock: IEC 68, FCC Part 68.302, NATA, 1A
- Electrostatic/electromagnetic susceptibility: IEC 801-2, -3, -4, and -5

## Warranty

One-year limited warranty. When installed in a supported server, these adapters assume the system's base warranty and any warranty upgrade.

## Agency approvals

The System x and ThinkSystem adapters conform to the following standards:

- EN55022
- EN55024
- EN 61000-3-2
- EN 61000-3-3
- ICES-003, Issue-004
- FCC 47 CFR Part 15 Class A
- VCCI
- AS/NZS CISPR 22 / C-tick
- RRL for KC
- BSMI
- UL 94 V-1

The ThinkServer adapters conform to the following standards:

- EN55022
- EN55024
- EN 61000-3-2
- EN 61000-3-3
- ICES-003, Issue-004
- FCC 47 CFR Part 15 Class A
- AS/NZS CISPR 22 / C-tick
- UL 94 V-1

## Top-of-rack Ethernet switches

The following 10 Gb Ethernet top-of-rack switches are supported.

Table 9. 10Gb Ethernet Top-of-rack switches

Part number	Description
Switches mounted at the rear of the rack (rear-to-front airflow)	
7159A1X	Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)
7159B1X	Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)
7159C1X	Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)
7159BR6	Lenovo RackSwitch G8124E (Rear to Front)
7159G64	Lenovo RackSwitch G8264 (Rear to Front)
7159DRX	Lenovo RackSwitch G8264CS (Rear to Front)
7159CRW	Lenovo RackSwitch G8272 (Rear to Front)
7159GR6	Lenovo RackSwitch G8296 (Rear to Front)
Switches mounted at the front of the rack (front-to-rear airflow)	
7159BF7	Lenovo RackSwitch G8124E (Front to Rear)
715964F	Lenovo RackSwitch G8264 (Front to Rear)
7159DFX	Lenovo RackSwitch G8264CS (Front to Rear)
7159CFV	Lenovo RackSwitch G8272 (Front to Rear)
7159GR5	Lenovo RackSwitch G8296 (Front to Rear)

For more information, see the Lenovo Press Product Guides in the 10Gb top-of-rack switch category:  
<https://lenovopress.com/networking/tor/10gb>

## Related publications

For more information, see the following resources:

- Lenovo product page for System x network adapters  
<http://shop.lenovo.com/us/en/systems/servers/options/systemx/networking/adapters/>
- Lenovo product page for ThinkServer network adapters  
<http://shop.lenovo.com/us/en/systems/servers/options/thinkserver/>
- Lenovo ServerProven compatibility information for System x network adapters:  
<http://www.lenovo.com/us/en/serverproven/xseries/lan/matrix.shtml>
- ThinkServer Option Compatibility Matrix  
<http://www.lenovo.com/accessoriesguide>

## Related product families

Product families related to this document are the following:

- [Ethernet Adapters](#)

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