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

The 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 host connections: a standard PCIe host interface, a Mezzanine LOM (ML2) host interface for ThinkSystem and System x servers, and an AnyFabric host interface for ThinkServer systems (now withdrawn).

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

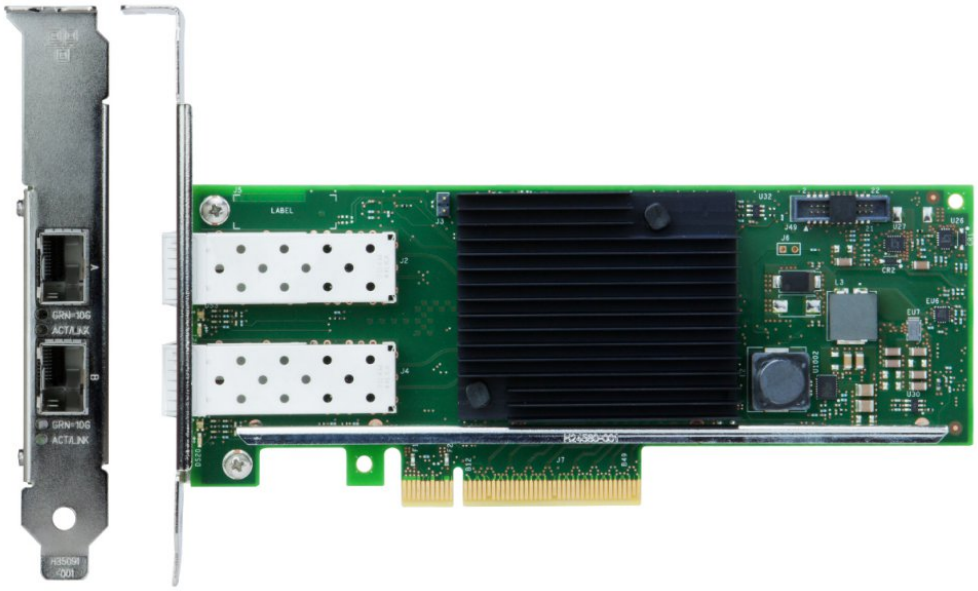

Figure 1. Intel X710 two-port PCIe adapter

## 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) 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 |
|---|---|---|
| **Adapters for ThinkSystem servers** | | |
| 7ZT7A00537 | AUKX | Lenovo ThinkSystem X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter |
| 00JY940 | ATRH | Intel X710-DA2 ML2 2x10GbE SFP+ Adapter |
| **Adapters for System x servers** | | |
| 01DA900 | AU2Y | Intel X710-DA2 2x10GbE SFP+ Adapter |
| 7XC7A05525 | B0YL | Intel X710-DA4 4x10Gb SFP+ Adapter |
| 00JY940 | ATRH | Intel X710-DA2 ML2 2x10GbE SFP+ Adapter |
| 94Y5200 | AS74 | Intel X710 ML2 4x10GbE SFP+ Adapter |
| 7XC7A05927 | B0X1 | Intel X710-T4 4x10Gb Base-T Adapter |

The PCIe and ML2 adapter option part numbers includes the following items:

- One Intel 10 Gb Ethernet adapter
- X710-DA4 adapter: Full-height (3U) bracket attached
- All other adapters: Full-height (3U) bracket attached with low-profile (2U) bracket included in the box
- Documentation

**Note:** The SFP+ 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). The T4 adapter does not use a transceiver.

## Supported transceivers and cables

The Intel X710 SFP+ adapters have empty SFP+ cages that support SFP+ SR or LR transceivers, and direct attached copper (DAC) cables.

The following table lists the supported SFP+ SR and LR transceivers.

Table 2. Supported SFP+ transceivers and fiber optic cables

| Part number | Feature code | Description |
|---|---|---|
| Optical Transceivers - System x and ThinkSystem adapters | | |
| 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 SFP+ LR Transceiver |
| 00FE333** | A5DL | Lenovo 1000BASE-T SFP Transceiver (does not support 10/100 Mbps) |
| Optical Transceivers - ThinkServer adapters only | | |
| 4XC0F28735 | Not applicable | Lenovo ThinkServer 10Gb Optical Module by Intel |

** Only supported by adapters Intel X710-DA2 ML2 2x10GbE SFP+ Adapter (00JY940) and ThinkSystem X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter (7ZT7A00537)

The following table lists the supported fiber optic cable supported by SFP+ adapters.

Table 3. Optical cables

| Part number | Feature code | Description |
|---|---|---|
| LC-LC 0M3 Fiber Optic Cables (require transceivers) | | |
| 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 |

The following table lists the supported direct-attach copper (DAC) cables and active optical cables (AOC).

Table 4. Copper cables

| Part number | Feature code | Description |
|---|---|---|
| SFP+ Passive DAC Cables | | |
| 00D6288 | A3RG | 0.5m Passive DAC SFP+ Cable |
| 90Y9427 | A1PH | 1m 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 | 7m Passive DAC SFP+ Cable |
| SFP+ Active DAC Cables | | |
| 95Y0323* | A25A | 1m Active DAC SFP+ Cable |
| 95Y0326* | A25B | 3m Active DAC SFP+ Cable |
| 95Y0329* | A25C | 5m Active DAC SFP+ Cable |
| 00VX111 | AT2R | Lenovo 1m Active DAC SFP+ Cables |
| 00VX114 | AT2S | Lenovo 3m Active DAC SFP+ Cables |
| 00VX117 | AT2T | Lenovo 5m Active DAC SFP+ Cables |
| SFP28 25Gb Passive DAC Cables | | |
| 7Z57A03557 | AV1W | Lenovo 1m Passive 25G SFP28 DAC Cable |
| 7Z57A03558 | AV1X | Lenovo 3m Passive 25G SFP28 DAC Cable |
| 7Z57A03559 | AV1Y | Lenovo 5m Passive 25G SFP28 DAC Cable |

* Withdrawn from marketing

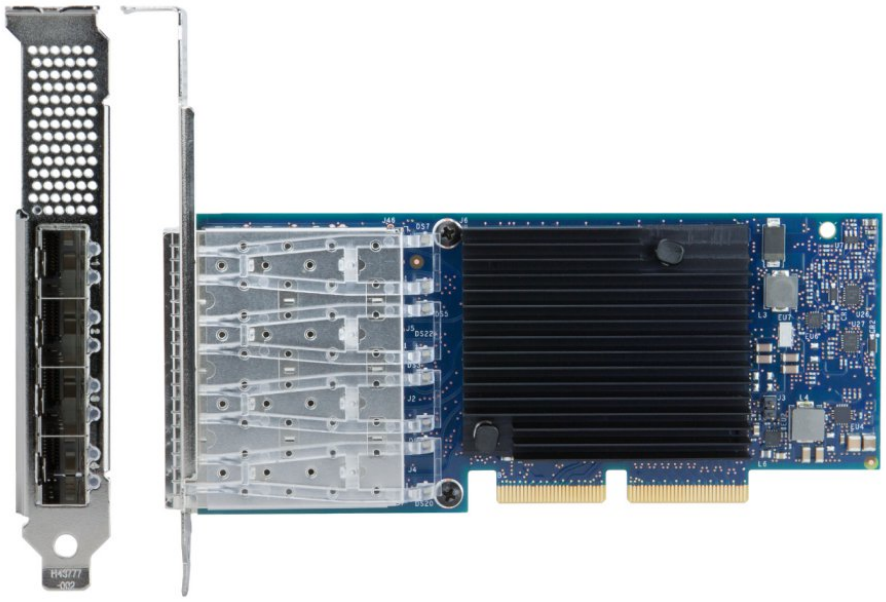

Figure 2. Intel X710 ML2 4x10GbE SFP+ Adapter

## 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 Plan 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.

## Specifications

The Intel X710 adapters have the following specifications:

- Empty SFP+ cages for 10GbE connection supporting SFP+ transceivers or DAC cables (except the T4 adapter which has RJ45 ports)
- Form factor:
  - X710-DA4: Full-height half-length adapter
  - All other standard PCIe adapters: Low profile adapter
  - All ML2 adapters: Low profile adapter
- 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 µs
  - Kernel- Bypass Latency: ~3 µs
  - 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
  - VMware NetQueue and Microsoft VMQ support
  - 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.
- RoHS compliance that is based on latest 2014 standards.

The following figure shows the Intel X710-DA4 4x10Gb SFP+ Adapter (full-height half-length form factor).

Figure 4. Intel X710-DA4 4x10Gb SFP+ Adapter

## 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

## Server support - ThinkSystem

The following table lists the ThinkSystem servers that are compatible.

Table 5. ThinkSystem server support

| | | 1S Rack & Tower | | | | 2S Rack & Tower | | | | | | | | 4S Rack | | | Dense/ Blade | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Part number** | **Description** | **ST50 (7Y48/7Y50)** | **ST250 (7Y45/7Y46)** | **SR150 (7Y54)** | **SR250 (7Y51/7Y52)** | **ST550 (7X09/7X10)** | **SR530 (7X07/7X08)** | **SR550 (7X03/7X04)** | **SR570 (7Y02/7Y03)** | **SR590 (7X98/7X99)** | **SR630 (7X01/7X02)** | **SR650 (7X05/7X06)** | **SR670 (7Y36/7Y37/7Y38)** | **SR850 (7X18/7X19)** | **SR860 (7X69/7X70)** | **SR950 (7X11/12/13)** | **SD530 (7X21)** | **SD650 (7X58)** | **SN550 (7X16)** | **SN850 (7X15)** |
| 7ZT7A00537 | ThinkSystem Intel X710-DA2 PCIe 10Gb 2-Port SFP+ Ethernet Adapter | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| 00JY940 | Intel X710-DA2 ML2 2x10GbE SFP+ Adapter | N | N | N | N | N | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | N | Y | N | N |

## 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 6. 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 | Y | Y | Y | Y | Y | Y | Y |
| 7XC7A05525 | Intel X710-DA4 4x10Gb SFP+ Adapter | N | N | Y | Y | N | N | N |
| 00JY940 | Intel X710-DA2 ML2 2x10GbE SFP+ Adapter | N | N | Y | Y | N | Y | N |
| 94Y5200 | Intel X710 ML2 4x10GbE SFP+ Adapter | N | N | N | N | Y | N | N |
| 7XC7A05927 | Intel X710-T4 4x10Gb Base-T Adapter | Y | Y | N | N | N | N | N |

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

Table 7. 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 |
| 7XC7A05525 | Intel X710-DA4 4x10Gb 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 |
| 7XC7A05927 | Intel X710-T4 4x10Gb Base-T Adapter | N | N | N | N | N | N | N |

### Support for servers with Intel Xeon v2 processors

Table 8. 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 |
| 7XC7A05525 | Intel X710-DA4 4x10Gb SFP+ Adapter | N | N | N | N | N | N | N | N |
| 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 |
| 7XC7A05927 | Intel X710-T4 4x10Gb Base-T Adapter | N | N | N | N | N | N | N | N |

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

The following figure shows the Intel X710-T4 4x10Gb Base-T Adapter.

Figure 6. Intel X710-T4 4x10Gb Base-T Adapter

## Operating system support

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

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server version 1709
- Microsoft Windows Server version 1803
- Red Hat Enterprise Linux 6.9
- Red Hat Enterprise Linux 6.10
- Red Hat Enterprise Linux 7.3
- Red Hat Enterprise Linux 7.4
- Red Hat Enterprise Linux 7.5
- SUSE Linux Enterprise Server 11 SP4 with Xen
- SUSE Linux Enterprise Server 12 SP2
- SUSE Linux Enterprise Server 12 SP3
- SUSE Linux Enterprise Server 15
- SUSE Linux Enterprise Server 15 with XEN
- VMware vSphere Hypervisor (ESXi) 6.0 U3
- VMware vSphere Hypervisor (ESXi) 6.5
- VMware vSphere Hypervisor (ESXi) 6.5 U1
- VMware vSphere Hypervisor (ESXi) 6.5 U2
- VMware vSphere Hypervisor (ESXi) 6.7

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, DA2 and T4 adapters have the following dimensions:

- Length: 167 mm (6.6 in.)
- Height: 69 mm (2.7 in.) (low profile)
- Width: 15 mm (0.6 in.)

The Intel X710-DA4 adapter has the following dimensions:

- Length: 167 mm (6.6 in.)
- Height: 111 mm (4.4 in.) (full height)
- Width: 15 mm (0.6 in.)

The Intel X710 ML2 adapters have the following dimensions:

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

## 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 ThinkSystem networking options product web page
  https://lenovopress.com/lp0765-networking-options-for-thinksystem-servers
- Lenovo System x networking options product web page
  https://www3.lenovo.com/us/en/data-center/servers/server-options/system-x-options/networking-adapters/system-x-adapters/c/system-x-adapters
- 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:

- 10 Gb Ethernet Connectivity
- Ethernet Adapters

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