Intel X550 10 Gb Ethernet 10GBASE-T Adapters
Product Guide

The Intel X550 10GBASE-T Adapter is a low cost, low power 10 GbE performance adapter suitable for all data center applications. With support for standard CAT 6a cabling with RJ45 connectors, the X550 offers a low barrier of entry to 10 Gb Ethernet networking.

The following figure shows the Intel X550-T2 Dual Port 10GBase-T Adapter.

Figure 1. Intel X550-T2 Dual Port 10GBase-T Adapter

Did you know?

The Intel X550 is the newest innovation in Intel's adapter family to drive 10 GbE into the broad server market. This adapter hosts Intel's latest Ethernet ASIC, the Intel Ethernet Controller X550, a low-cost single-chip 10GBASE-T solution for today's server platforms.

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Part number information

The following table provides the ordering part numbers and feature codes for the Intel X550 adapter.

Table 1. Ordering part numbers and feature codes

Part number	Feature code	Description
System x and ThinkSystem adapters		
00MM850	ATRY	Intel X550-T1 Single Port 10GBase-T Adapter
00MM860	ATPX	Intel X550-T2 Dual Port 10GBase-T Adapter
ThinkServer adapters		
4XC0G88855	Not applicable	Lenovo ThinkServer X550-T1 PCIe 10Gb 1 Port Base-T Ethernet Adapter by Intel
4XC0G88856	Not applicable	Lenovo ThinkServer X550-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel

The adapter option part numbers includes the following items:

- One Intel 10 Gb Ethernet adapter with a full-height (3U) bracket attached
- Low-profile (2U) bracket included in the box
- Quick Install Guide
- Other documentation

The following figure shows the single-port X550-T1 adapter.

Figure 2. Intel X550-T1 single-port adapter

Features

The Intel X550 adapter has the following features:

- Supports Intel Virtualization Technology for connectivity (VT-c), I/O virtualization advances network connectivity used in today's servers to more efficient models by providing Flexible Port Partitioning (FPP), multiple Tx/Rx queues, Tx queue rate-limiting, and on-controller QoS functionality that is useful for both virtual and non-virtual server deployments.
- Supports Virtual Machine Device Queues (VMDq) for NIC-based VM queue sorting, enabling efficient hypervisor-based switching. VMDq reduces I/O impact on the hypervisor in a virtualized server by performing data sorting and coalescing in the network adapter.
- Supports SR-IOV for direct assignment - NIC-based isolation and switching for various virtual station instances enabling optimal CPU usage in virtualized environment.
- Provides virtual bridging support that delivers both host-side and switch-side control and management of virtualized I/O as well as the following modes of virtualized operation:
    - VEPA: IEEE 802.1Qbg support for Virtual Ethernet Port Aggregator.
    - VEB: Virtual Ethernet Bridge support with Intel VT.
- Supports VXLAN/NVGRE Hardware Offloads, stateless offloads that preserve application performance for overlay networks. With these offloads, it is possible to distribute network traffic across CPU cores. At the same time, the X550 offloads LSO, GSO, and checksum from the host software, which reduces CPU overhead.
- Flexible Port Partitioning (FPP), based on the SR-IOV specification, enables virtual Ethernet controllers that can be used by a Linux host directly or assigned directly to virtual machines for hypervisor virtual switch bypass. FPP enables the assignment of up to 64 Linux host processes or virtual machines per port to virtual functions. FPP can be used to control the partitioning of the bandwidth across multiple virtual functions. FPP can also provide balanced QoS by giving each assigned virtual function equal access to 10 Gb/s of bandwidth.
- MSI-X interrupts support minimizes the impact of I/O interrupts by load balancing interrupts across multiple processor cores.
- Low-Latency Interrupts: Allows the adapter to bypass the automatic moderation of time intervals between the interrupts (based on the sensitivity of the incoming data).
- Load balancing on multiple processors, which increases performance on multiprocessor systems by efficiently balancing network loads across processor cores when used with Receive Side Scaling (RSS) from Microsoft or Scalable I/O on Linux.
- Header Splits and Replication in Receive helps the driver focus on the relevant part of the packet without needing to parse it.
- Multiple queues allow packet handling without the waiting/buffer overflow, which provides efficient packet prioritization.
- Offload features:
    - IP, TCP, and UDP checksum offload (IPv4 and IPv6)
    - TCP and UDP segmentation/large send offload (IPv4 and IPv6)
    - IPsec offload
    - Receive Side Scaling for Windows and Scalable I/O for Linux (IPv4, IPv6, and TCP/ UDP)
- 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/Quality of Service.
- Support for Advanced Packet Filtering.
- Jumbo frames support (up to 9,500 bytes).
- Teaming support:

    - Adapter Fault Tolerance (AFT)
    - Switch Fault Tolerance (SFT)
    - Adaptive Load Balancing (ALB)
    - Virtual Machine Load Balancing (VMLB)
    - IEEE 802.3ad (link aggregation control protocol)
- Support for both UEFI and PXE boot.

Technical specifications

The Intel X550 adapter has the following specifications:

- One or Two 10GBASE-T RJ-45 ports
- Supports 100 Mbps, 1 Gbps, and 10 Gbps speeds
- Standard PCIe low-profile card form factor
- PCIe 3.0 x4 host interface
- Power consumption (10GBASE-T): 13.0 W (maximum), 11.2 (typical)

Standards supported

The Intel X550 adapter supports the following standards:

- IEEE 802.1p Class of Service (CoS) traffic prioritization
- IEEE 802.1Q VLAN tagging
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3x Full-duplex flow control
- IEEE 802.3u 100BASE-TX Fast Ethernet
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet
- IEEE 802.3an 10GBASE-T copper twisted pair 10 Gb Ethernet
- IEEE 802.1Qbg Virtual Ethernet Port Aggregator
- IEEE 802.3az Energy Efficient Ethernet (EEE) support
- IEEE 1588 Precision clock synchronization protocol

Server support - ThinkSystem

The following table lists the ThinkSystem servers that are compatible.

Table 2. ThinkSystem server support

Part number	Description	2S Rack & Tower							4S Rack			Dense/ Blade		
		ST550 (7X09/7X10)	SR530 (7X07/7X08)	SR550 (7X03/7X04)	SR570 (7Y02/7Y03)	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)
00MM850	Intel X550-T1 Single Port 10GBase-T Adapter	Y	N	N	N	N	N	N	N	N	N	N	N	N
00MM860	Intel X550-T2 Dual Port 10GBase-T Adapter	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N

Server support - System x

The following tables list the System x servers that are compatible with the Intel X550 adapter.

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

Table 3. Support for System x and dense servers with Xeon E5/E7 v4 and E5 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)
00MM850	Intel X550-T1 Single Port 10GBase-T Adapter	N	N	Y	Y	Y	Y	Y
00MM860	Intel X550-T2 Dual Port 10GBase-T Adapter	Y	Y	Y	Y	Y	Y	Y

Support for System x and dense servers with Intel E5 v3 and E3 v3 processors

Table 4. 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)
00MM850	Intel X550-T1 Single Port 10GBase-T Adapter	N	N	N	N	N	N	N
00MM860	Intel X550-T2 Dual Port 10GBase-T Adapter	N	N	N	Y	Y	Y	Y

Support for servers with Intel Xeon v2 processors

Table 5. 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)
00MM850	Intel X550-T1 Single Port 10GBase-T Adapter	N	N	N	N	N	N	N	N
00MM860	Intel X550-T2 Dual Port 10GBase-T Adapter	N	N	N	N	N	N	N	Y

Server support - ThinkServer

The following tables list the ThinkServer systems that are compatible.

Support for ThinkServer Gen 5 servers

Table 6. Support for ThinkServer Generation 5 servers

Part number	Description	TS150	TS450	TS460	RS160	TD350	RD350	RD450	RD550	RD650
4XC0G88855	Lenovo ThinkServer X550-T1 PCIe 10Gb 1 Port Base-T Ethernet Adapter by Intel	N	N	Y	N	Y	Y	Y	Y	Y
4XC0G88856	Lenovo ThinkServer X550-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	N	N	Y	N	Y	Y	Y	Y	Y

Support for ThinkServer Gen 4 servers

Table 7. Support for ThinkServer Generation 4 servers

Part number	Description	TS140	TS440	TD340	RS140	RD340	RD440	RD540	RD640
4XC0G88855	Lenovo ThinkServer X550-T1 PCIe 10Gb 1 Port Base-T Ethernet Adapter by Intel	N	N	N	N	N	N	N	N
4XC0G88856	Lenovo ThinkServer X550-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	N	N	N	N	N	N	N	N

Network cabling requirements

The network cables that can be used with the X550 are as follows:

- 10GBASE-T
  - UTP Category 7 (100 m maximum)
  - UTP Category 6a (100 m maximum)
  - UTP Category 6 (55 m maximum)
- 1000BASE-T and 100BASE-TX
  - UTP Category 7 (100 m maximum)
  - UTP Category 6a (100 m maximum)
  - UTP Category 6 (100 m maximum)
  - UTP Category 5e (100 m maximum)

The following table lists the supported Category 6 (CAT 6) cables.

Table 8. CAT6 cables

Part number	Feature code	Description
CAT6 Green Cables		
00WE123	AVFW	0.75m CAT6 Green Cable
00WE127	AVFX	1.0m CAT6 Green Cable
00WE131	AVFY	1.25m CAT6 Green Cable
00WE135	AVFZ	1.5m CAT6 Green Cable
00WE139	AVG0	3m CAT6 Green Cable
90Y3718	A1MT	10m CAT6 Green Cable
90Y3727	A1MW	25m CAT6 Green Cable
CAT6 Blue Cables		
90Y3721	A1MU	10m CAT6 Blue Cable
90Y3730	A1MX	25m CAT6 Blue Cable
CAT6 Yellow Cables		
90Y3724	A1MV	25m CAT6 Yellow Cable

Operating system support

The Intel X550 10 Gb Ethernet adapter supports the following operating systems:

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

For the latest support information, see the ServerProven web site. Select **LAN** from the Part Family pulldown menu.
https://static.lenovo.com/us/en/serverproven/options.shtml

Physical specifications

The adapter has the following physical specifications:

- Length: 134 mm (5.3 in.)
- Width: 16 mm (0.6 in.)
- Height: 69 mm (2.7 in.)

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: 5 - 55 °C (41 - 131 °F)
- Storage temperature: -40 - 85 °C (-40 - 185 °F)
- Air flow requirement:
  - 40 LFM at 5 °C
  - 150 LFM at 55 °C
- Maximum operating altitude: 10,000 feet (3,048 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 System x server, these cards assume the system’s base warranty and any warranty upgrade.

Agency approvals

The X550 conforms to the following standards:

- UL/CSA 60950-1-07, 2nd Edition + amendment 1, dated 2011/12/19
- EN60950-1: 2006+A11:2009+A1:2010+A12:2010+A2:2013
- USA: FCC, 47 CFR Part 15, Class A digital device (USA)
- Canada: ICES-003, class A (CAN)
- EN 55032: 2013 Class A Radiated and Conducted Emissions requirements for European Union
- EN 55024: 2010 Immunity requirements for European Union (EU)
- EN-55022: Class A, 2010 Radiated and Conducted Emissions requirements for European Union (EU)
- Korea: KN32 Radiated and Conducted Emissions, KN35 Immunity
- Australia/New Zealand: AS/NZS CISPR 22:2009 + A1:2010 Class A and CISPR 32:2012 for Radiated and Conducted Emissions requirements
- CE: Passes CE specification and receives the CE Mark
- Japan: VCCI:2014-04 Class A Radiated and Conducted Emissions requirements
- Taiwan: BSMI CNS13438: 2006 (complete) Class A Radiated and Conducted Emissions requirements
- EU REACH: Complies with European REACH directive
- EU WEEE: Complies with European WEEE directive
- EU RoHS: Complies with European RoHS directive
- China: RoHS Complies with China RoHS directive

Related publications

For more information, see the following documents:

- Lenovo Ethernet adapters home page
  http://shop.lenovo.com/us/en/systems/servers/options/systemx/networking/adapters/
- Intel X550 product page
  http://www.intel.com/content/www/us/en/ethernet-products/converged-network-adapters/ethernet-x550.html
- Lenovo ServerProven compatibility information for options:
  https://static.lenovo.com/us/en/serverproven/options.shtml

Related product families

Product families related to this document are the following:

- Ethernet Adapters

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