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Product Brief

Intel® 10 Gigabit XF Server Adapters

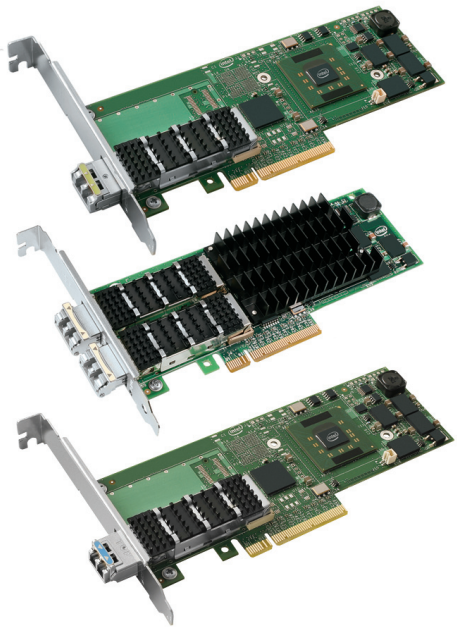
Network Connectivity

Intel® 10 Gigabit XF Server Adapters

Dual- and Single-Port 10 Gigabit Ethernet Server Adapters designed for multi-core processors and optimized for virtualization

Energy-Efficient, Next-Generation 10 Gigabit Performance

10 Gigabit Ethernet has moved past the early adoption stage and is rapidly becoming mainstay for backbones within enterprise and service provider networks. The escalating deployments of servers with multi-core processors and demanding applications such as High Performance Computing (HPC), database clusters, and video-on-demand are driving the need for 10 Gigabit connections. Based on the Intel® 82598EB 10 Gigabit Ethernet controller, the next-generation Intel® 10 Gigabit XF Server Adapters are designed to meet the throughput and latency requirements of bandwidth-hungry applications, while offering a very low power envelope for energy efficiency. Ideal for slot-constrained environments, the Intel® 10 Gigabit XF Dual Port Server Adapter provides a simplified alternative to multiple 1 Gbps server adapters.



Performance-Enhancing Features for Multi-Core Environments

When implemented within multi-core processor environments, Intel 10 Gigabit XF Server Adapters offer advanced networking features for efficient distribution of Ethernet workloads across CPU cores. Load balancing of interrupts using MSI-X enables more efficient response times and application performance. CPU utilization can be lowered further through stateless offloads such as TCP segmentation offload, header replications/splitting, and Direct Cache Access (DCA).

Intel 10 Gigabit XF Server Adapters are optimized for virtualized environments, supporting multiple queues, alleviating I/O bottlenecks between virtual machines. Virtual Machine Device queue[1] (VMDq) technology offloads data sorting and data copying from the virtual machine monitor (VMM) software layer to the hardware, improving overall throughput and CPU utilization on virtualized servers. Additionally, Intel 10 Gigabit XF Server Adapters enable Intel® I/O Acceleration Technology[3] (Intel® I/OAT) with support for Intel® QuickData for faster I/O processing on the new Quad-Core and Dual-Core Intel® Xeon® processor-based servers.

Conserve valuable PCI Express* (PCIe*) server slots while adding 10 Gigabit Ethernet capability with Intel 10 Gigabit XF Server Adapters. The dedicated input/output (I/O) bandwidth of PCIe ensures priority performance on each port for 10 Gigabit Ethernet connectivity, as well as a low-profile design, which improves server throughput and rack density at the same time. In addition, eight-lane PCIe enables maximum bandwidth for fast and efficient data transfer. The low power, efficient design allows for two 10 Gigabit Ethernet ports in a single low-profile PCIe adapter.

Advances for Storage Over Ethernet

The fast growth in storage capacity coupled with server virtualization has brought the need for Storage Area Network (SAN) to the forefront. To satisfy this growing demand, Intel 10 Gigabit XF Server Adapters support iSCSI acceleration and provide advanced features for unified storage connectivity. Fast and reliable networked storage can be achieved via native iSCSI support with Microsoft, Linux,* and VMware operating systems as well as support for iSCSI remote boot.

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Features	Benefits
Intel® 82598EB 10 Gigabit Ethernet Controller	• Industry-leading, energy-efficient design for next-generation 10 Gigabit performance and multi-core processors
Low-profile	• Enables higher bandwidth and throughput from standard and low-profile PCIe slots and servers
Load balancing on multiple CPUs	• Increases performance on multi-processor systems by efficiently balancing network loads across CPU cores when used with Receive-Side Scaling from Microsoft or Scalable I/O on Linux*
Intel® I/O Acceleration Technology[a] (Intel® I/OAT)	• Accelerates I/O with higher throughput and lower CPU utilization by offloading processing overhead
iSCSI remote boot support	• Provides centralized storage area network (SAN) management at a lower cost than competing iSCSI solutions
MSI-X support	• Minimizes the overhead of interrupts • Allows load balancing of interrupt handling between different cores/CPUs
Virtual Machine Device queues[1] (VMDq)	• Allows the efficient routing of packets to the correct target machine in a virtualized environment using multiple hardware queues • Ensures transmit fairness and prevents head-of-line blocking
Low latency	• Ability to toggle between the interrupt aggregation and non-aggregation mode based on the type of data being transferred
Optimized queues: 32 transmit (Tx) and 64 receive (Rx) per port	• Network packet handling without waiting or buffer overflow • Efficient packet prioritization
Compatible with x4,[5] x8, and x16 standard and low-profile PCI Express* slots	• Allows dual-port operation in almost any PCI Express server slot, except x1 slots, and allows each PCI Express slot port to operate without interfering with the other
Support for most network operating systems (NOS)	• Enables widespread deployment
Remote management support	• Reduces support costs with remote management based on industry-wide standards
10GBASE-LR on single-mode fiber (LR version)	• Ensures compatibility with fiber-optic cable lengths up to 10 km
10GBASE-SR on multi-mode fiber (SR versions)	• Ensures compatibility with fiber-optic cable lengths up to 300 meters
RoHS compliant,[3] lead-free[2] technology	• Compliant with the European Union directive (effective as of July 2006) to reduce the use of hazardous materials
Intel® PROSet Utility for Windows* Device Manager	• Provides point-and-click power over individual adapters, advanced adapter features, connection teaming, and virtual local area network (VLAN) configuration
Intel backing	• Backed by an Intel® limited lifetime warranty, 90-day money-back guarantee (U.S. and Canada), and worldwide support

Order Codes

EXPX9501AFXSR (Single-Port SR)
EXPX9502AFXSR (Dual-Port SR)
EXPX9501AFXLR (Single-Port LR)

Companion Products

Consider these Intel® products in your server and network planning:

- Intel® PRO/1000 Server Adapters
  - Copper or fiber-optic network connectivity, up to four ports per card
  - Solutions for PCI Express, PCI-X,* and PCI interfaces
- Intel® PRO/10GbE Server Adapters
  - CX4 offering for cost-effective 10 Gigabit-over-copper connections
  - Short-range and long-range connectivity solutions for fiber-optic cabling
- Intel® PRO/1000 Desktop Adapters for PCI Express and PCI interfaces
- Other Intel® PRO Desktop and Server Adapters
- Intel® Xeon® processors
- Intel® Server Boards

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Specifications

General

Product codes	EXPX9502AFXSR (Dual-Port 10GBASE-SR); EXPX9501AFXSR (Single-Port 10GBASE-SR); EXPX9501AFXLR (Single-Port 10GBASE-LR)
Connectors	One or two LC fiber-optic connectors
Cabling	SR version: Multi-mode fiber (62.5 µm or 50 µm); LR version: Single-mode fiber

Adapter Product Features

Intel PROSet Utility for easy configuration and management	▪
Intel® lead-free[2] technology	▪
Plug and play specification support	Standard
Intel® I/OAT[3] including QuickData	▪
Ships with full-height bracket installed, low-profile bracket added in package	▪
RoHs[3]	▪

Cabling Distance

Fiber type	*Minimum modal bandwidth @ 850 nm (MHz x km)*	*Operating range (meters)*
SMF (LR version)	N/A	2 to 10,000
62.5 µm MMF (SR versions)	160 200	2 to 26 2 to 33
50 µm MMF (SR versions)	400 500 2000	2 to 66 2 to 82 2 to 300

Receive-side scaling	▪
VMDq[1]	In a virtualized environment, packets dedicated to different virtual machines can be routed to different queues, thus easing the routing of these packets to the target machine
Advanced packet filtering (per port)	▪ 16 exact-matched packets (unicast or multicast) ▪ 4096-bit hash filter for multicast frames ▪ Promiscuous (unicast and multicast) transfer mode support ▪ Optional filtering of invalid frames
Direct Cache Access (DCA)	The I/O device activates a pre-fetch engine in the CPU that loads the data into the CPU cache ahead of time, before use, eliminating cache misses and reducing CPU load

Network Management

Wired for Management (WfM) baseline v2.0 enabled for servers	▪
DMI 2.0 support, Windows* Management	▪
Instrumentation (WMI) and SNMP-Remote Installation Services (RIS)	▪
PXE 2.0 enabled through boot read-only memory (ROM)	▪

Network Operating Systems (NOS) Software Support

Microsoft Windows* 2003 Server	▪
Microsoft Vista*	▪
Windows Virtual Server 2005	▪
Red Hat Enterprise Linux* 4 or later	▪
SUSE SLES* 10 or later, Professional 9.2 or later	▪
FreeBSD 5.x or later	▪

Network Operating Systems Software Support (continued)

ESX 3.x support (for VMware)	▪
Fedora	▪
EFI 1.1	▪

Intel Backing

Limited lifetime warranty	▪
90-day, money-back guarantee (U.S. and Canada)	▪

Advanced Software Features

Adapter fault tolerance (AFT)	▪
Switch fault tolerance (SFT)	▪
Adaptive load balancing (ALB)	▪
Teaming support	▪
IEEE 802.3ad[4]	Link aggregation control protocol
Test switch configuration	Tested with major switch original equipment manufacturers (OEMs)
PCIe Hot Plug*/Active peripheral component interconnect (PCI)	▪
IEEE 802.1Q* VLANs	▪
IEEE 802.3 2005* flow control support IPv6, IPv4	▪
Tx/Rx IP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities control protocol (TCP), user datagram protocol (UDP), Internet protocol (IP)	▪
IEEE 802.1p*	▪
TCP segmentation/large send offload	▪
MSI -X supports Multiple Independent Queues	▪
Interrupt moderation	▪
IPv6 offloading	Checksum and segmentation capability extended to new standard packet type

Technical Features

Data rate(s) supported per port	10 Gigabit
Bus type	PCI Express 2.0 (2.5 GT/s)
Bus width	x8 lane PCI Express, operable in x4[5], x8 x16 slots
Bus speed (x8, encoded rate)	20 Gbps uni-directional; 40 Gbps bi-directional
Interrupt levels	INTA, MSI, MSI-X
Hardware certifications	FCC B, UL, CE, VCCI, BSMI, CTICK, MIC
Controller-processor	Intel® 82598EB
Typical power consumption	Single-Port SR 10.4W (0.87A @ 12V); Dual-Port SR 14W (1.17A @ 12V); Single-Port LR 11.5W (0.96A @ 12V)
Operating temperature	0° C to 55° C (32° F to 131° F) Single Port with 100 LFM forced-air flow (linear feet per minute), Dual Port with 150 LFM forced-air flow.
Storage temperature	-40° C to 70° C (-40° F to 158° F)
Storage humidity	90% non-condensing relative humidity at 35° C
LEDs	2 (on dual port), 1 (on single port), LINK (solid), and ACTIVITY (blinking)

Physical Dimensions

Length	16.74 cm (6.59 in)
Width	6.89 cm (2.71 in)
Height of end bracket	PCI Express standard, 12 cm (4.725 in); PCI Express low-profile, 7.92 cm (3.12 in)

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To see the full line of Intel Network Adapters for PCI Express, visit www.intel.com/network/connectivity

[∂] Intel® I/O Acceleration Technology (Intel® I/OAT) requires an operating system that supports Intel I/OAT.

[1] Intel® VMDq requires an operating system that supports VMDq.

[2] Lead has not been intentionally added, but lead may still exist as an impurity below 1000 ppm, or an approved RoHS exemption applies.

[3] Lead and other materials banned in RoHS Directive are either (1) below all applicable substance thresholds the EU or (2) an approved/pending exemption applies.

[4] Available only when used with a capable switch.

[5] Only x4 connections implemented with an x8 connector are supported.

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