Product Brief

Intel® 10 Gigabit AT2 Server Adapter

Network Connectivity

Intel® 10 Gigabit AT2 Server Adapter

10 Gigabit BASE-T Ethernet Server Adapters Designed for Multi-Core Processors and Optimized for Virtualization

10 Gigabit Performance at the Low Cost of Copper

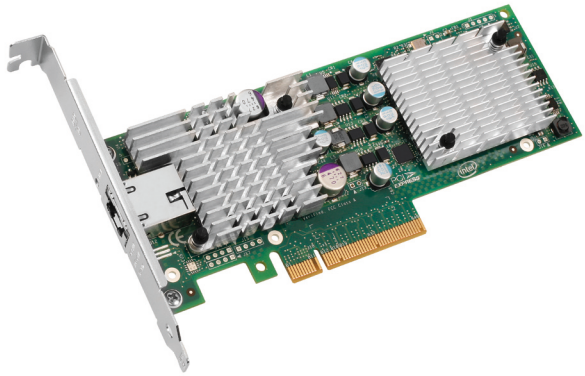
This 10 Gigabit AT2 Ethernet Server Adapter showcases Intel's second-generation standards-based 10GBASE-T adapter in a low-profile PCI Express* form factor. It provides bandwidth-intensive applications highly affordable 10 Gigabit Ethernet (GbE) network performance with cost-effective RJ-45 connections for distances up to 100 meters. High-speed server connectivity – once reserved for costly, proprietary technologies such as High Performance Computing (HPC) clusters and grid-based computing – can now be achieved with the standardized connectivity of the Intel® 10 Gigabit AT2 Server Adapter. Intel's adapter also provides 1000BASE-T support for gigabit connections to legacy switches.

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 HPC, database clusters, and video on demand are driving the need for 10 Gigabit connections. Based on the Intel® 82598EB 10 Gigabit Ethernet Controller, this next-generation Intel 10 Gigabit AT2 Server Adapter is designed to meet the throughput requirements of bandwidth-hungry applications.

Performance-Enhancing Features for Multi-Core Environments

When implemented within multi-core processor environments, the Intel 10 Gigabit AT2 Server Adapter offers advanced networking features, Intel® I/O Acceleration Technology (Intel® I/OAT), 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).

The Intel 10 Gigabit AT2 Server Adapter is optimized for virtualized environments, supporting multiple queues, alleviating I/O bottlenecks between virtual machines. Virtual Machine Device Queue (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, the Intel 10 Gigabit AT2 Server Adapter enables Intel® QuickData Technology[1] for faster I/O processing on Quad-Core and Dual-Core Intel® Xeon® processor-based servers.

Conserve valuable PCI Express (PCIe*) server slots while adding 10 Gigabit Ethernet capability with the Intel 10 Gigabit AT2 Server Adapter. The dedicated input/output (I/O) bandwidth of PCIe ensures priority performance on each port – without bus sharing – 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.

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 AT2 Server Adapters support iSCSI acceleration through Intel I/OAT and provide advanced features for unified networking. 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.

Order Code

Single unit: E10G41AT2

Companion Products

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

- Intel® Ethernet Server Adapter X520 Series for 10GbE SFP+ PCIe v2.0 (5 GT/s) performance
- 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/1000 Desktop Adapters for PCI Express and PCI interfaces
- Other Intel® PRO Desktop and Server Adapters
- Intel® Xeon® Processors
- Intel® Server Boards

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® QuickData Technology[1]	• DMA Engine: enhances data acceleration across the platform (network, chipset, processor), thereby lowering CPU utilization • Direct Cache Access (DCA): allows the processor to pre-fetch the data from memory, thereby avoiding cache misses and improving service level agreements (SLA) of the applications
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 (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	• Enhances network performance and reduces CPU utilization in the virtualized environment • Reduces I/O overhead on the hypervisor in a virtualized server by performing data sorting and coalescing in the network silicon
Network packet handling without waiting or buffer overflow	• Efficient packet prioritization
Support for most Network Operating Systems (NOS)	• Enables widespread deployment
Compatible with x8 and x16 standard and low-profile PCI Express* slots	• Allows each PCI Express* slot port to operate without interfering with the other
Remote management support	• Reduces support costs with remote management based on industry-wide standards
RJ-45 connections over category-6A cabling	• Ensures compatibility with cable lengths up to 100 meters
RoHS-compliant,[2] lead-free[3] technology	• Compliant with the European Union directive (effective as of July 2006) to reduce the use of hazardous materials
Intel® PROSet Utility for Microsoft 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

Specifications

General

Product code	E10G41AT2
Connector	RJ-45 Copper
Cabling	Category-6A

Adapter Product Features

Intel® PROSet Utility for easy configuration and management	▪
Intel® lead-free[3] technology	▪
Plug and play specification support	Standard
Intel® I/OAT including QuickData	▪
Includes a full-height bracket	▪
RoHS[2]	▪
Cabling Distance	
10GBASE-T	100 m on Cat-6A, 55 m on Cat-6
1000BASE-T	100 m on Cat-5e, Cat-6 or Cat-6A
Receive-side scaling	▪
VMDq[4]	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 Server 2003*	▪
Microsoft Vista*	▪
Microsoft Windows Virtual Server 2005*	▪
Red Hat Enterprise 4* or later	▪
SUSE SLES 10* or later, Professional 9.2 or later	▪
FreeBSD 5.x* or later	▪
VMware ESX 3.x* support	▪
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[5] (link aggregation control protocol)	▪
PCIe Hot Plug/Active Peripheral Component Interconnect (PCI)	▪
IEEE 802.1Q VLANs	▪
IEEE 802.3 2005 flow control support	▪
Tx/Rx IP, TCP, & UDP checksum offloading (IPv4, IPv6) capabilities (Transmission 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	1 Gigabit and 10 Gigabit
Bus type	PCI Express 2.0 (2.5 Gtps)
Bus width	x8 lane PCI Express, operable in x8 and 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, KCC
Controller-processor	Intel® 82598EB
Typical power consumption	15.5 W Typical
Air flow	150 LFM
Operating temperature	0° C to 55° C (32° F to 131° F)
Storage temperature	-40° C to 70° C (-40° F to 158° F)
Storage humidity	90% non-condensing relative humidity at 35° C
LED indicators	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)

Network-Ready Servers

Top PC and server manufacturers offer Intel® adapters in their new products. Specify or ask for Intel® Network Connections with your next PC, server, or mobile PC purchase. For a list of preferred suppliers, visit us at www.intel.com/buy/networking/adapters.htm.

Customer Support

Intel® Customer Support Services offers a broad selection of programs including phone support and warranty service. For more information, contact us at support.intel.com/support/go/network/adapter/home.htm. Service and availability may vary by country.

For Product Information

To speak to a customer service representative regarding Intel products, please call 1-800-538-3373 (U.S. and Canada) or visit support.intel.com/support/go/network/contact.htm for the telephone number in your area. For additional product information on Intel Networking Connectivity products, visit www.intel.com/network/connectivity.

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

[1]Intel® QuickData Technology requires operating system support.

[2]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.

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

[4]Intel® VMDq requires operating system support.

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

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