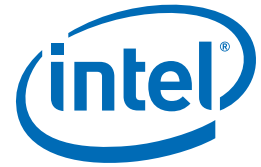


Product Brief

Intel® Ethernet Server Adapter X520-T2

Network Connectivity



Intel® Ethernet Server Adapter X520-T2

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

10 Gb Performance at the Low Cost of Copper

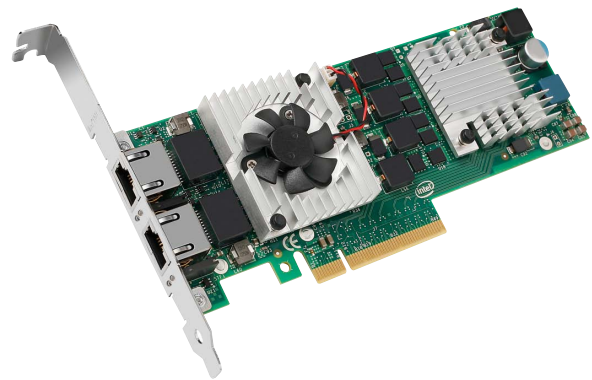
This 10 Gigabit X520-T2 Ethernet Server Adapter showcases Intel's third-generation standards-based 10GBASE-T adapter in a low-profile PCI Express* form factor. This new dual port adapter provides bandwidth-intensive applications highly affordable 10 Gigabit Ethernet (10GbE) network performance with cost-effective RJ-45 connections for distances up to 100 meters.

10GBASE-T is the most cost-effective deployment of 10GbE for connectivity and will be the primary media of choice for volume 10GbE deployments as datacenters continue to drive to reduce costs through network convergence and virtualization while still providing increased application performance and availability.

Next-Generation 10 Gigabit Performance

The drive to 10 Gigabit Ethernet comes from information technologies including virtualization, advances in storage architectures, network convergence, server clustering, new forms of information delivery using the Internet, and the next wave of digital and social media content.

At the heart of tomorrow's network infrastructure, 10 Gigabit Ethernet is the core of any next generation data center. Data centers are demanding flexible and scalable I/O solutions to meet the rigorous requirements of running mission-critical applications in virtualized and unified storage environments. With the latest server platform from Intel, customers can now realize the full potential of 10 Gigabit Ethernet networking and realize up to 2.5 times the bandwidth supported by earlier generation platforms.



Performance-Enhancing Features for Multi-Core Environments

When implemented within multi-core processor environments, the Intel® Ethernet Server Adapter X520-T2 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).

Best Choice for Virtualization

The Intel X520-T2 server adapter includes Intel® Virtualization Technology for Connectivity (Intel VT-c) to deliver outstanding performance in virtualized server environments. Intel VT-c includes hardware optimizations that help reduce I/O bottlenecks and improve the overall server performance. These technologies are Virtual Machine Device Queues² (VMDq) and Virtual Machine Direct Connect (VMDc). VMDq improves data processing by offloading the sorting and queuing functionality to the I/O controller from the VMM. VMDc provides direct connectivity to the VMs to deliver near-native performance and VM scalability. VMDc

also provides flexibility with mobility by enabling VM migration between physical servers. VMDc is based on the industry-standard PCI-SIG SR-IOV (Single Root I/O Virtualization).

Unified Networking

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, the Intel Ethernet Server Adapter X520-T2 supports iSCSI acceleration and provides 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. Intel's unified networking solutions enable cost-effective connectivity to the SAN; customers can use NAS or iSCSI to carry storage traffic over Ethernet.

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

Order Code

Single unit: E10G42BT

Features

Benefits

Intel® 82599 10 Gigabit Ethernet Controller	<ul style="list-style-type: none"> ▪ Industry-leading, energy-efficient design for next-generation 10 Gigabit performance and multi-core processors
Low-profile	<ul style="list-style-type: none"> ▪ Enables higher bandwidth and throughput from standard and low-profile PCIe slots and servers
Load balancing on multiple CPUs	<ul style="list-style-type: none"> ▪ 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*
iSCSI remote boot support	<ul style="list-style-type: none"> ▪ Provides centralized Storage Area Network (SAN) management at a lower cost than competing iSCSI solutions
Support for most Network Operating Systems (NOS)	<ul style="list-style-type: none"> ▪ Enables widespread deployment
RoHS compliant, ² lead-free, ³ technology	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Provides point-and-click management of individual adapters, advanced adapter features, connection teaming, and virtual local area network (VLAN) configuration
Compatible with x8 and x16 standard and low-profile PCI Express* slots	<ul style="list-style-type: none"> ▪ Allows each PCI Express* slot port to operate without interfering with the other

I/O Features for Multi-core Processor Servers

Intel® QuickData Technology ¹	<ul style="list-style-type: none"> ▪ 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
MSI-X support	<ul style="list-style-type: none"> ▪ Minimizes the overhead of interrupts ▪ Allows load balancing of interrupt handling between different cores/CPU
Low latency	<ul style="list-style-type: none"> ▪ Based on the sensitivity of the incoming data, the adapter can bypass the automatic moderation of time intervals between the interrupts
Header Splits and Replication in Receive	<ul style="list-style-type: none"> ▪ Helps the driver focus on the relevant part of the packet without the need to parse it
Multiple Queues: 16 queues per port	<ul style="list-style-type: none"> ▪ Network packet handling without waiting or buffer overflow providing efficient packet prioritization
Tx/Rx IP, SCTP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities	<ul style="list-style-type: none"> ▪ Lower processor usage ▪ Checksum and segmentation capability extended to new standard packet type
Tx TCP segmentation offload (IPv4, IPv6)	<ul style="list-style-type: none"> ▪ Increased throughput and lower processor usage ▪ Compatible with large-send offload feature (in Microsoft Windows* Server operating systems)
Receive and Transmit Side Scaling for Windows environment and Scalable I/O for Linux* environments (IPv4, IPv6, TCP/UDP)	<ul style="list-style-type: none"> ▪ Enables the direction of the interrupts to the processor cores in order to improve the CPU utilization rate
IPsec Offload	<ul style="list-style-type: none"> ▪ Offloads IPsec capability onto the adapter instead of the software to significantly improve throughput and CPU usage (for Windows* 2008 Server and Vista*)
LinkSec	<ul style="list-style-type: none"> ▪ IEEE spec: 802.1ae ▪ Layer 2 data protection with encryption/authentication ability between devices (e.g. routers, switches) ▪ LinkSec is designed into the network adapter hardware. These adapters are prepared to provide LinkSec functionality when the ecosystem is ready to support this new technology

Virtualization Features

Virtual Machine Device queues (VMDq)

Benefits

- Offloads the data-sorting functionality from the Hypervisor to the network silicon, improving data throughput and CPU usage
- Provides QoS feature on the Tx data by providing round-robin servicing and preventing head-of-line blocking
- Sorting based on MAC addresses and VLAN tags

Next-Generation VMDq1 (64 queues per port)

- Enhanced QoS feature by providing weighted round-robin servicing for the Tx data
- Provides loopback functionality, where data transfer between the virtual machines within the same physical server need not go out to the wire and come back in, improving throughput and CPU usage
- Supports replication of multicast and broadcast data

PC-SIG SR-IOV Implementation (64 virtual functions per port)

- 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 virtual machine directly by bypassing the virtual switch in the Hypervisor, resulting in near-native performance
- Integrated with Intel® VTI for Directed I/O (VT-d) to provide data protection between virtual machines by assigning separate physical addresses in the memory to each virtual machine

IPv6 Offloading

- Checksum and segmentation capability extended to the new standard packet type

Advanced Packet Filtering

- 24 exact-matched packets (unicast or multicast)
- 4096-bit hash filter for unicast and multicast frames
- Lower processor usage
- Promiscuous (unicast and multicast) transfer mode support
- Optional filtering of invalid frames

VLAN support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags

- Ability to create multiple VLAN segments

Manageability Features

Preboot eXecution Environment (PXE) Support

- Enables system boot up via the LAN (32-bit and 64-bit)
- Flash interface for PXE image

Simple Network Management Protocol (SNMP) and Remote Network Monitoring (RMON) Statistic Counters

- Minimizes the overhead of interrupts
- Allows load balancing of interrupt handling between different cores/CPU's

iSCSI Boot

- Enables system boot up via iSCSI
- Provides additional network management capability

Watchdog Timer

- Gives an indication to the manageability firmware or external devices that the chip or the driver is not functioning

Specifications

General

Product code	E10G42BT
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)	<ul style="list-style-type: none"> ▪ 16 exact-matched packets (unicast or multicast) ▪ 4096-bit hash filter for multicast frames ▪ Promiscuous (unicast and multicast) ▪ 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)

Interrupt levels INTA, MSI, MSI-X

Hardware certifications FCC B, UL, CE, VCCI, BSMI, CTICK, KCC

Controller-processor Intel® 82599EB

Maximum power consumption 25.0 W Maximum

Advanced Software Features

Adapter Fault Tolerance (AFT)

Switch Fault Tolerance (SFT)

Adaptive Load Balancing (ALB)

Teaming support

IEEE 802.3ad⁵ (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 (5.0 Gbps)

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® 82599EB

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/go/ethernet

¹Intel® QuickData Technology requires operating system support.

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

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

⁴Intel® VMDq requires operating system support.

⁵Available only when used with a capable switch.

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