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.

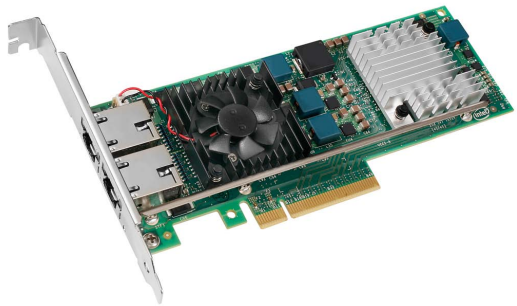
10GBASE-T is the most cost-effective deployment of 10GbE for connectivity and will be the primary media of choice for volume 10GbE deployments as datacenters continue to drive to reduce costs through network consolidation, convergence, storage over Ethernet and virtualization while still providing increased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

Next-Generation 10 Gigabit Performance

The drive to 10 Gigabit Ethernet comes from the latest 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 today's network infrastructure, 10 Gigabit Ethernet is the core of any virtualized 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.

The new Intel platforms drive an unprecedented need for additional I/O support. With the Intel® Xeon® 7500 quad-socket system there is up to a 15:1 server consolidation rate, a 20x performance leap, and support for over 100 Gb/s of Ethernet



bandwidth . What does all this mean? Customers will host more applications on a single, high-performing, virtualized server, driving more demand for network I/O. Simply put, GbE cannot scale up to meet the demands of these new servers. 10GbE is a must.

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 Queues (VMDq) and Single Root I/O

Virtualization (SR-IOV). VMDq improves data processing by offloading the sorting and queuing functionality to the I/O controller from the VMM. SR-IOV 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.

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	• 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*
iSCSI remote boot support	• Provides centralized Storage Area Network (SAN) management at a lower cost than competing iSCSI solutions
Support for most Network Operating Systems (NOS)	• Enables widespread deployment
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 Windows* Device Manager	• 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	• Allows each PCI Express* slot port to operate without interfering with the other
I/O Features for Multi-core Processor Servers	
MSI-X support	• Minimizes the overhead of interrupts • Allows load balancing of interrupt handling between different cores/CPUs
Low latency	• Based on the sensitivity of the incoming data, the adpater can bypass the automatic moderation of time intervals between the interrupts
Header Splits and Replication in Receive	• Helps the driver focus on the relevant part of the packet without the need to parse it
Multiple Queues: 16 queues per port	• Network packet handling without waiting or buffer overflow providing efficient packet prioritization
Tx/Rx IP, SCTP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities	• Lower processor usage • Checksum and segmentation capability extended to new standard packet type
Tx TCP segmentation offload (IPv4, IPv6)	• Increased throughput and lower processor usage • Compatible with large-send offload feature (in Microsoft Windows* Server operating systems)
IPsec Offload	• Offloads IPsec capability onto the adapter instead of the software to significantly improve throughput and CPU usage (for Windows* 7, Windows* 2008 Server R2, Windows* 2008 Server, and Vista*)
MacSec	• IEEE spec: 802.1ae • Layer 2 data protection with encryption/authentication ability between devices (e.g, routers, switches) • MacSec is designed into the network adapter hardware. These adapters are prepared to provide MacSec functionality when the ecosystem is ready to support this new technology
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
Receive and Transmit Side Scaling for Windows environment and Scalable I/O for Linux* environments (IPv4, IPv6, TCP/UDP)	• Enables the direction of the interrupts to the processor cores in order to improve the CPU utilization rate

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

Virtualization Features	Benefits
Virtual Machine Device queues (VMDq)	• 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

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)	• 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

Windows 7 (IA32 and X64)
Windows Server 2008 R2 (x64 and IPF)
Windows Server 2008 R2 Core (x64 and IPF)
Linux SLES 11 SP1
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

Technical Features

Data rate(s) supported per port	1 Gigabit and 10 Gigabit
Bus type	PCI Express 2.0 (5.0 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® 82599EB

10 Gb/s Power (PCIe edge)

	Watts	
Cable Length (m)	Typical	Maximum
2	18.31	20.15
30	18.62	20.40
80	20.17	22.33

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/go/ethernet .

To see the full line of Intel Network Adapters for PCI Express*, visit www.intel.com/go/ethernet

[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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