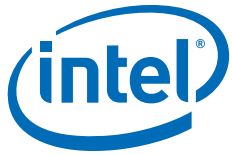
Third-party information brought to you courtesy of Dell.



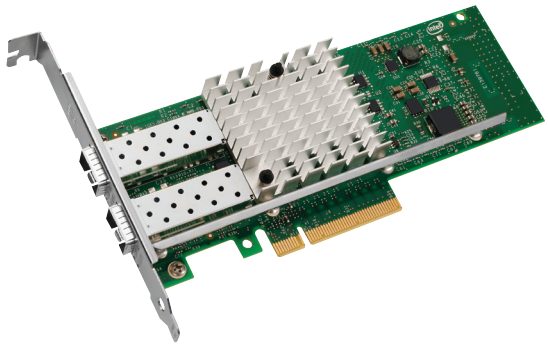
Product Brief

Intel® Ethernet X520 SFP+ Direct Attach Server Adapter for Dell PowerEdge Servers

Network Connectivity

Intel® Ethernet X520 SFP+ Direct Attach Server Adapter

10 Gigabit Ethernet Dual Port Server Adapter Provides Ultimate Flexibility and Scalability in Virtual and Unified Storage Environments



The Intel® Ethernet X520 SFP+ Direct Attach (DA) Server Adapter for Dell PowerEdge Rack and Tower servers is one of the most flexible and scalable Ethernet adapters for today's demanding data center environments. Data center networks are being pushed to their limits. 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. Customers require flexible and scalable I/O solutions to meet the rigorous requirements of running mission-critical applications in virtualized and unified storage environments.

Designed as a low-cost, low-power adapter, the Intel Ethernet X520 SFP+ DA Server Adapter provides direct attach copper twinaxial cable connections between servers and a top-of-rack switch. Two ports, coupled with a low-profile PCI Express* form factor, make this adapter ideal for slot-constrained environments. Using direct attach copper cables compliant with the SFP+ MSA SFF-8431 specification, the Intel x520 SFP+ DA Server Adapter is well-suited for customers who require low-cost "in-the-rack" connections of up to 7 meters between server and top-of-rack switch.

Powered by Intel's third-generation 10 GbE network controller, the Intel® Ethernet 82599 10 Gigabit Ethernet Controller, the X520 server adapter addresses the demanding needs of the next-generation data center by providing unmatched features for virtualization, flexibility for LAN and SAN networking, and proven, reliable performance.

Best Choice for Virtualization

The explosive growth in virtualization is leading to an increasing demand for network performance. With more Virtual Machines (VMs) running on each multi-core server, networking traffic is dramatically increased with each VM competing for available I/O bandwidth. Dell's new Intel Ethernet X520 Server Adapter addresses networking bottlenecks in virtualized environments. This new adapter enables network-intensive applications to achieve the performance expected in a virtualized environment.

The Intel Ethernet X520 SFP+ DA Server Adapter provides the best networking performance available in the industry, whether the physical port is configured in an emulation mode using the virtual switch in the Virtual Machine Monitor (VMM), or is directly assigned to a virtual machine. In the emulation mode,

Intel's I/O technology, Virtual Machine Device queues[1] (VMDq) optimizes network performance by offloading data sorting and copying from the software Virtual Switch in the VMM to the Intel Ethernet 82599 10 Gigabit Controller. This configuration is best suited for a large number of VMs running standard applications that have limited bandwidth and latency requirements.

For mission-critical applications, where dedicated I/O is required for maximum network performance, users can assign a dedicated virtual adapter port to a VM. The Intel Ethernet X520 Server Adapter provides direct VM connectivity and data protection across VMs using SR-IOV.[2] SR-IOV technology allows the data to bypass the software virtual switch and provides near-native performance. It assigns either physical or virtual I/O ports to individual VMs directly. This technology is best suited for applications that demand the highest I/O throughput and lowest latency performance such as database, storage, financial and other applications.

The PCI-SIG SR-IOV capability is a mechanism for devices to advertise their ability to be directly assigned to multiple virtual machines. This technology allows for the partitioning of a PCI function into many virtual interfaces for the purpose of sharing the resources of a PCI Express* (PCIe) device in a virtual environment. These virtual interfaces are called Virtual Functions. Each virtual function can support a unique and separate data path for I/O-related functions within the PCI Express hierarchy. Use of SR-IOV with a networking device, for example, allows the bandwidth of a single port (function) to be partitioned into smaller slices that may be allocated to specific VMs, or guests, via a standard interface.

The Intel Ethernet X520 Server Adapter delivers the same functionality and throughput as ten dual-port one-Gigabit adapters, saving cost, power, and complexity. For more information on virtualization please go to www.intel.com/go/vtc.

Unified Networking and Storage

The family of Intel Ethernet X520 server adapters lowers your data center total cost of ownership (TCO) by providing the ability to route LAN and SAN traffic over a single fabric.

Support for Fiber Channel over Ethernet (FCoE)[2]

FCoE encapsulates Fiber Channel frames over standard Ethernet networks, enabling Fiber Channel to take advantage of 10 GbE networks while preserving its native protocol. The X520 server adapter offers FCoE hardware acceleration to provide performance comparable to FC HBAs. The new server adapters support Data Center Bridging, also known as Converged Enhanced Ethernet (CEE), which allows customers to configure traffic classes and priorities to deliver a lossless Ethernet fabric. An Intel Ethernet X520 Server Adapter reduces TCO by eliminating redundant fabrics and saves the cost of expensive FC HBAs and FC switch ports.

Support for iSCSI

The server adapters provide complete support for proven native OS and VMM iSCSI initiators as well as iSCSI boot. Historically, CRC32C computation has degraded system performance, but now with the CRC instruction set included in the latest Intel® Xeon® processors, CRC validation is possible with minimal impact to network throughput while delivering superior data integrity.

The new Intel Ethernet X520 SFP+ DA Server Adapter for Dell PowerEdge servers does it all: 10 Gigabit LAN, FCoE, and iSCSI; truly delivering on the promise of unified networking.

Reliable Performance

The X520 server adapter includes a number of advanced features that allow it to provide industry-leading performance and reliability.

Security Optimizations

The adapter supports IPsec offload for Microsoft's Network Access Protection (NAP), Active Directory,* and future security capabilities in Windows* 7. An X520 server adapter allows customers to run a secure network environment without sacrificing performance.

PCIe v2.0 (5 GT/s)

PCIe v2.0 (5 GT/s) support enables customers to take full advantage of 10 GbE by providing a maximum of 20 Gbps bi-directional throughput per port on a single dual port card.

Designed For Multi-core Processors

Support for technologies such as Intel® QuickData, multiple MSI-X vectors, and Low Latency Interrupts allow the X520 server adapter to provide high-performance, 10 Gigabit connectivity in multi-core PowerEdge servers. These technologies distribute network processing across multiple CPU cores, improving overall performance.

For today's demanding virtualized data center environments, the new X520 server adapter delivers ultimate flexibility and scalability.

Features	Benefits
General	
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 (RSS) from Microsoft or Scalable I/O on Linux*
iSCSI remote boot support	• Provides centralized storage area network (SAN) management at a lower cost than other iSCSI solutions
Support for most network operating systems (NOS)	• Enables widespread deployment
RoHS-compliant[2]	• Complies with the European Union directive 2002/95/EC 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
Time Sync (IEEE 1588, 802.1as)	• Lets networked Ethernet equipment synchronize internal clocks according to a network master clock; endpoint can then acquire an accurate estimate of the master time by compensating for link latency
I/O Features for Multi-core Processor Servers	
Intel® QuickData Technology	• DMA Engine: enhances data acceleration across the platform (network, chipset, processor), lowering CPU usage • Direct Cache Access (DCA): enables the adapter to pre-fetch the data from memory, avoiding cache misses and improving application response time
MSI-X support	• Minimizes the overhead of interrupts • Allows load-balancing of interrupt handling between multiple cores/CPUs
Low latency interrupts	• 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	• 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 off-load feature (in Microsoft Windows* Server OSs)
Receive and Transmit Side Scaling for Windows environment and Scalable I/O for Linux* environments (IPv4, IPv6, TCP/UDP)	• This technology enables the direction of the interrupts to the processor cores in order to improve the CPU utilization rate
LinkSec	• IEEE spec: 802.1ae • Layer 2 data protection that provides encryption and authentication ability between two individual devices (routers, switches, etc.) • 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	
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

Features	Benefits
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	▪ Easy system monitoring with industry-standard consoles
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 Codes	430-3638	Intel® Ethernet Server Adapter X520-DA2
Connectors	330-8721	One or two LC fiber-optic connectors SFP+ Direct Attach cables
Network Standards Physical Layer Interface		IEEE 802.3: SFF-8431: 10GSFP+Cu (a.k.a. Direct Attach)

Adapter Product Features

Intel® PROSet Utility	For easy configuration and management
Plug and play specification support	Standard
Receive Side Scaling	Multiple Rx queues enable the efficient distribution of network receive processing across multiple CPUs in multiprocessor systems
Direct Cache Access (DCA)	The I/O device activates a prefetch 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 Operating Systems (NOS) Software Support

Operating System	IA32	X64
Windows Server 2008 R2	▪	▪
Windows Server* 2003 SP2	▪	▪
Windows Server 2008 SP2	▪	▪
Windows Server 2008 SP2 Core	▪	▪
FreeBSD* 7.0		N/A
Linux* RHEL 4.8	▪	▪
Linux RHEL 5.4	▪	▪
Linux SLES 10 SP3	▪	▪
Linux SLES 11	▪	▪
Solaris* 10	▪	▪
UEFI* 2.1		▪

Advanced Software Features

Adapter fault tolerance (AFT)	▪
Switch fault tolerance (SFT)	▪
Adaptive load balancing (ALB)	▪
Teaming support	▪
IEEE 802.3ad (link aggregation control protocol)	▪
Test switch configuration	▪
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 supported per port:	▪ Optical: 1 GbE/10 GbE ▪ Direct Attach: 10 GbE	
Bus type	PCI Express 2.0 (5 GT/s)	
Bus width	8-lane PCI Express	
Interrupt levels	INTA, MSI, MSI-X	
Hardware certifications	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC	
Controller-processor	Intel® 82599	
Typical power consumption		
SKU	**Maximum Power**	**Typical Power**
Dual-port 10GBASE-SR/1000BASE-SX	10.7 W	10.0 W
Dual-port Direct Attached	8.6 W	7.9 W
Operating temperature	0° C to 55° C (32° F to 131° F)	
Air Flow	Minimum of 100 LFM required	
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) LINK SPEED (green = 10G / yellow = 1G)	

Physical Dimensions

Low-profile PCI Express	5.73 inches long, measured without PCI bracket

To see the full line of Intel Network Adapters, visit www.intel.com/go/ethernet or contact your Dell sales representative.

---

[1] VMDq requires a virtualization operating system that supports VMDq.

[2] Available in 2H 2010.

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

0210/MBR/PMSI/PDF Please Recycle 323472-001US

Third-party information brought to you courtesy of Dell.