

Intel[®] Ethernet Network Adapter X520-DA2

Delivers proven 10GbE performance, flexibility,
and scalability for virtual network environments



Key Features

- Dual-port 10GbE SFP+ connectivity
- Data Plane Development Kit (DPDK) Optimized
- Intel[®] Ethernet Flow Director for hardware based application traffic steering
- Excellent small packet performance for Network Functions Virtualization (NFV)
- Intelligent offloads to enable high performance on servers with Intel[®] Xeon[®] Processors
- I/O virtualization innovations for maximum performance in a virtualized server

Overview

The Intel[®] Ethernet Network Adapter X520-DA2 for Dell PowerEdge Rack and Tower servers enables data center transformation by delivering a reliable, 10GbE network connectivity. Advanced network packet processing features include: DPDK PMD support, Intel Ethernet Flow Director, and intelligent offloads. Board OS driver support delivers industry-leading I/O virtualization capabilities, including support for Single Route I/O virtualization (SR-IOV) and Virtual Machine Device Queues (VMDq). The Intel Ethernet Network Adapter X520-DA2 facilitates greater network infrastructure consolidation and is the best choice for 10GbE I/O virtualization.

Designed as a low-cost, low-power adapter, the dual-port Intel Ethernet Network Adapter X520-DA2, coupled with a low-profile PCI Express form factor, make this adapter ideal for slot-constrained environments.

Intel Ethernet Network Adapter X520-DA2 supports both SR and LR optic modules and direct attach copper cables compliant with the SFP+ MSA SFF-8431 specification, that are well-suited for customers who require low-cost "in-the-rack" connections of up to 7 meters between server and top-of-rack switch.

The Intel® Ethernet Network Adapter X520-DA2 includes these featured technologies:

I/O 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. The Intel Ethernet Network Adapter X520-DA2 addresses networking bottlenecks in virtualized environments. This adapter enables network-intensive applications to achieve the performance expected in a virtualized environment.

Virtual Machine Device Queues (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 Network Adapter X520-DA2 provides direct VM connectivity and data protection across VMs using SR-IOV. 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.

PCI-SIG Single Root I/O Virtualization (SR-IOV): 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 PCIe 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 Network Adapter X520-DA2 delivers the same functionality and throughput as ten dual-port one-Gigabit adapters, saving cost, power, and complexity.

PCIe v2.0 (5 GT/s)

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

Support for iSCSI

Supports 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.

Security Optimizations

The adapter supports IPsec offload for Microsoft's Network Access Protection (NAP), Active Directory, and future security capabilities in Windows 7. Customers can run a secure network environment without sacrificing performance.

Designed for Multi-core Processors

Support for technologies such as multiple MSI-X vectors, and Low Latency Interrupts allow the 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 Intel Ethernet Network Adapter X520-DA2 delivers ultimate flexibility and scalability.

Software Tools and Management

Intel Ethernet server and converged network adapters support Dell's Lifecycle Controller. The Lifecycle Controller is coupled with the Dell DRAC service processor to provide embedded system management. The Lifecycle Controller enables both local and remote access to manage initial setup and configuration of the BIOS settings on the platform, setup and configuration of Intel Ethernet adapters, update of all the platform firmware, and the deployment of the operating systems.

Intel® Advanced Network Services (Intel® ANS) include new teaming technologies and techniques such as Virtual Machine Load-Balancing (VMLB) for Hyper-V environments. Intel ANS also provides a variety of teaming configurations for up to eight ports, and support for teaming mixed vendors' server adapters. Intel ANS includes support for 802.1Q VLANs, making Intel ANS one of the most capable and comprehensive tools for supporting server adapter teaming.

Features	Description
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 from Microsoft or Scalable I/O on Linux.
RoHS-compliant, lead-free technology	Complies with the European Union directive 2002/95/EC to reduce the use of hazardous materials.
Time Sync (IEEE 1588, 802.1as)	Enabled 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. - Load-balancing of interrupt handling between multiple cores/CPU's.
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: 4 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).
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.
MACSec	- IEEE spec: 802.1AE. - Layer 2 data protection that provides encryption and authentication ability between two individual devices (routers, switches, etc.). - 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.
Virtualization Features	
Virtual Machine Device queues (VMDq) ¹	- 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 VMDq ¹ (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.
PCI-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® Virtualization Technology for Directed I/O (Intel® 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 addresses (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	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

Connections	Dual SFP+ cages supporting Direct Attach Copper (DAC) Twinaxial cable and optical transceivers
Network Standard Physical Layer Interfaces	IEEE 802.3 SFF-8431 10GbE SFP+ DAC

Technical Features

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	Maximum: 90% non-condensing relative humidity at 35 °C
LED Indicators	LINK (solid) and ACTIVITY (blinking) LINK SPEED (green = 10Gbps; yellow = 1Gbps)

Adapter Features

Data Rate Supported Per Port	• Optical: 1GbE/10GbE • Direct Attach: 10GbE
Bus Type	PCI Express 2.0 (5 GT/s)
Bus Width	x8 lane PCI Express
Interrupt Levels	INTA, MSI, MSI-X
Hardware Certifications	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Controller	Intel® 82599ES 10 Gigabit Ethernet Controller
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

Power Consumption

SKU	Typical Power	Maximum Power
Dual-port 10GBASE-SR/1000BASE-SX	10 W	10.7 W
Dual-port Direct Attached	7.9 W	8.6 W

Physical Dimensions

Dimension	5.73 inches long, measured without PCI bracket
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Product Order Codes for PowerEdge

Description	SKU	Dell Tech	Intel MM#
X520-DA2, FH	Factory installed: 540-BBCT Customer kit: 540-BBDR	XYT17	924282
X520-DA2, LP	Factory installed: 540-BBDG Customer kit: 540-BBDW	942V6	924282

Supported Operating Systems (X86-64)

Windows Server 2016

Windows Server 2012 R2

SLES 12 SP3

VMware vSphere 2016 U1

VMware ESXi 6.0 U3

Intel® Ethernet Optics and Cables

Intel® Ethernet SFP+ Optics and Cables provide unmatched flexibility for LAN and SAN networking. Intel Ethernet Optics undergo extensive compatibility testing for trouble-free interoperability, and deliver proven, reliable performance.

Dell EMC SKU	Intel MM#	Description
407-BBVK	942697	SFP+ Optic SR, 1x 10GbE
407-BBZV	952748	SFP+ Optic LR, 1x 10GbE
XDACBL1M	918500	SFP+ Twinaxial Cable - 1 m
XDACBL3M	918501	SFP+ Twinaxial Cable - 3 m
XDACBL5M	918502	SFP+ Twinaxial Cable - 5 m

Dell Tech Backing Information

Standard one-year warranty.

To see the full line of Intel Ethernet Network Adapters visit www.dell.com or contact your Dell EMC sales representative.

¹Requires a system that supports VMDq.

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