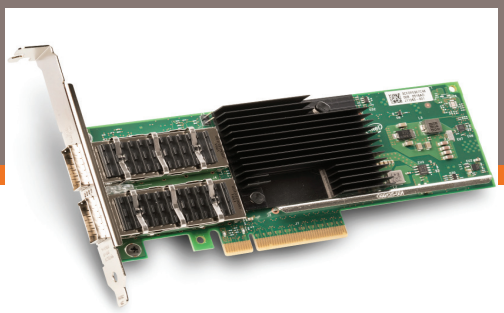
PRODUCT BRIEF

Intel® XL710 40 GbE Ethernet Adapter

Network Connectivity

Intel® XL710 40 GbE Ethernet Adapter

Extending Intel® Virtualization Technology beyond Server Virtualization to the Network with Hardware Optimizations and Offloads for the Rapid Provisioning of Networks in an Agile Data Center



Key Features

- Dual-port 40 GbE adapters.
- PCI Express* (PCIe) 3.0, x8 and higher.
- Exceptional low power adapters.
- Network Virtualization offloads including VXLAN, NVGRE, Geneve, and Network Service Headers (NSH).[2]
- Intel® Ethernet Flow Director for hardware based application traffic steering.
- Data Plane Developer Kit (DPDK) optimized for efficient packet processing.
- Excellent small packet performance for network appliances and Network Function Virtualization (NFV).
- Intelligent offloads to enable high performance with Intel® Xeon® processor-based servers.
- I/O virtualization innovations for maximum performance in a virtualized server.
- Unified networking providing a single wire support for LAN and storage: NAS (SMB, NFS) and SAN (iSCSI).

Overview

Intel continues its legacy of Ethernet leadership by introducing the latest 40 gigabit family of adapters powered by, the Intel® Ethernet Controller XL710, code-named Fortville.

The XL710 adapter family addresses the demanding needs of the next-generation agile data center by providing unmatched features for both server and network virtualization, flexibility for LAN networks, and proven, reliable performance.

Leading 40 GbE Performance

Optimized performance vectors (and key uses) include:

- Small Packet Performance: Achieves wire-rate throughput on smaller payload sizes (>128 Bytes at 40 GbE).
- Bulk Transfer Performance: Delivers line-rate performance with low CPU usage for large application buffers.
- Virtualized Performance: Alleviates hypervisor I/O bottlenecks by providing flow separation for Virtual Machines (VMs).
- Network Virtualization: Network virtualization overlay offloads including VXLAN, NVGRE Geneve, and NSH.[2]
- Storage Performance: Enables competitive performance with native OS drivers and intelligent offload for NAS (NFS, SMB), and SAN (iSCSI).

A Complete, Unified Networking Solution

Converging data and storage onto one fabric eliminates the need for multiple adapters, cables, and switches.

Furthermore 40 gigabit Ethernet provides the bandwidth to converge these multiple fabrics onto a single wire. A key capability that makes all this possible is traffic class separation provided by Data Center Bridging (DCB)[1]—providing a one-wire solution with virtual pipes for the different classes of traffic:

- Data: Best effort delivery of standard LAN traffic.
- Storage: Lossless network for iSCSI.
- Management: Guaranteed connectivity of data center IP management.

One Adapter, One Price

With the Intel adapters, iSCSI support is included in the price of an adapter. There is no need to purchase multiple adapters or additional licensing for an XL710 adapter. It's simple and easy. Everything you need to unify your networking is included in a single SKU. One adapter, one price.

Power Savings

Power efficiency is critical to IT specialists as energy consumption is a real OpEx concern.

- Lowest Power Consumption
  The new generation of XL710 adapters are power misers. They deliver double the throughput with only half the power[1] of the previous X520 generation.

Server Virtualization

With Intel® Virtualization Technology (Intel® VT), the XL710 family of adapters deliver outstanding I/O performance in virtualized server environments. They reduce I/O bottlenecks by providing intelligent offloads for networking traffic per virtual machine (VM), enabling near-native performance and VM scalability. The host-based virtualization technologies supported by Intel® VT include:

- VMDq for Emulated Path Adapter-based VM Queue sorting enabling efficient hypervisor- based switching.
- SR-IOV for Direct Assignment Adapter based isolation and switching for various virtual station instances enabling optimal CPU usage invirtualized environments.

Additionally, XL710 adapters provide Virtual Bridging[1] support that delivers both host-side and switch-side control and management of virtualized I/O as well as the following modes of virtualized operation:

- VEPA:[1] IEEE 802.1Qbg for Virtual Ethernet Port Aggregator.[1]
- VEB: Virtual Ethernet Bridge support via Intel VT.

Network Virtualization

Network virtualization is the next big trend in creating an agile data center. The family of XL710 adapters are ready to help you take that next step.

- VXLAN, NVGRE, GENEVE, and NSH Offloads:[3] These stateless offloads preserve application performance for overlay networks. With these offloads it is possible to distribute network traffic across CPU cores.

  At the same time XL710 offloads LSO, GSO, and checksum from the host software reducing CPU overhead..

Intel® Ethernet Flow Director

Intel® Ethernet Flow Director is an advanced traffic steering capability built into the XL710 controller. It consists of a large number of flow affinity filters that direct receive packets by their flows to queues for classification, load balancing, and matching between flows and CPU cores. It eliminates context switching required within the CPU. As a result, Intel Ethernet Flow Director significantly increasing the number of transactions per second and reduces latency for cloud applications like MemcacheD.

Intelligent Offloads

The Intel® Xeon® processor family has demonstrated increased computing performance and increased integration of key server subsystems generation after generation. To offload is to leverage the ever-escalating computing power of the Intel Xeon processor where appropriate and implementing complementary accelerations in the network controller—this is what Intel refers to as "intelligent offloads." By employing a balanced hybrid of compute and offload, intelligent offloads are able to achieve the optimized point of performance and efficiency. This is most notably observed in the following usage models:

- TCP Stateless Offloads: Demonstrates leading performance vs. TOE solutions without restricting feature usage (TOE usage usually requires that key features be disabled). Supported stateless off-loads include Checksum, TSO, VMDq, and RSS.
- Host iSCSI Initiator: Provides exceptional performance without the need for full-offload HBA methods.
- Flow Classification: Trafficking data flows across multiple consumers and connections.

Manageability

The XL710 family of adapters also incorporate the manageability required by IT personnel for remote control and alerting. Communication to the Board Management Controller (BMC) is available either through an on-board SMBus port or the DMTF-defined NC-SI, providing a variety of management protocols, including IPMI, BMC Pass-thru, OS2BMC, and MCTP/SMBus and MCTP/PCIe.

Software Tools and Management

Intel® XL710 40 GbE Ethernet Adapter (CNAs) support Dell's Lifecycle Controller*. The Lifecycle Controller is coupled with the Dell Remote Access Card* (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.

Additionally, Intel® PROSet for Windows* Device Manager (DMIX) and PROsetCL extend driver functionality to provide additional reliability and Quality of Service features and configuration.

FEATURES	BENEFITS
GENERAL	
40 Gigabit Intel® Ethernet Controller XL710	• Industry-leading, energy-efficient design for next-generation 40 gigabit performance and multi-core processors
QSFP+ Connectivity	• XL710 adapters with QSFP+ connections support 40GBASE-SR4 and QSFP+ CR4 Direct Attach Copper (DAC) physical media
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 • No additional cost for iSCSI support, included in the standard adapter
Support for most network operating systems	• Enables widespread deployment
RoHS-compliant	• Complies with the European Union directive 2011/65/EU 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)	• Enables networked Ethernet equipment to 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® Ethernet Flow Director	• An advanced traffic steering capability increases the number of transactions per second and reduces latency for cloud applications like MemcacheD
MSI-X support	• Minimizes the overhead of interrupts • Load-balancing of interrupt handling between multiple cores/CPUs
Multiple Queues: 1,536 Tx and Rx queues per port	• Network packet handling without waiting or buffer overflow providing efficient packet prioritization • Actual number of queues will vary depending upon software implementation
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

FEATURES	BENEFITS
VIRTUALIZATION FEATURES	
Next-Generation VMDq	• Up to 256 maximum VMDq VMs supported • Enhanced QoS feature by providing weighted round-robin servicing for the Tx data • 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 • 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
PCI-SIG SR-IOV Implementation (128 per device)	• 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® VT 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 • 64/port for dual port • 32/port for quad port
Network Partitioning (NPAR)	• Network Partitioning allows for administrators to split up the 40 GbE pipes on the NDC into 8 to 16 separate partitions or physical functions and allocate bandwidth and resources as needed
Virtual Machine Load Balancing (VLMB)	• Virtual Machines Load Balancing (VMLB) provides traffic load balancing (Tx and Rx) across Virtual Machines bound to the team interface, as well as fault tolerance in the event of switch, port, cable, or adapter failure
Advanced Packet Filtering	• 1,536 exact matched packets (unicast or multicast) • 512 hash entries each for unicast and multicast • 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
VXLAN and NVGRE Support	• Preserves application performance in network virtualized environments
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[1]	• Easy system boot up via iSCSI • Provides additional ntework management capability
Watchdog Timer	• Gives an indication to the manageability firmware or external devices that the chip or the driver is not functioning
Lifecycle Controller	• Local and remote access to BIOS setup and configuration on the platform and adapter

INTEL® XL710 40 GBE ETHERNET ADAPTER		
CONFIGURATION	PRODUCT CODE	SKU
XL710-QD2 PCIe	KF46X	Full Height Bracket/ 540-BBRF
XL710-QD2 PCIe	8DKFV	Low Profile Bracket / 540-BBRM

SPECIFICATIONS

GENERAL

Connections Intel® Ethernet QSFP+ Optics required for a fiber configuration ‡	Dual QSFP+ cages for: • QSFP+ SR4 fiber-optic transceivers • QSFP+ CR4 Direct Attach cables
Network Standards Physical Layer Interface	IEEE 802.3: • 40GBASE-SR4 SFF-8431: • 40GSFP+ CR4 (Direct Attach Copper)

ADVANCED SOFTWARE FEATURES – ALL ADAPTERS

Adapter fault tolerance (AFT)
Switch fault tolerance (SFT)
Adaptive load balancing (ALB)
Teaming Support
IEEE 802.3ad (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 supported per port	• Optical: 10 GbE/40 GbE • Direct Attach: 40 GbE
Bus type	• PCI Express 3.0* (8 GT/s)
Interrupt levels	• INTA, MSI, MSI-X
Hardware certifications	• FCC B, UL, CE, VCCI, BSMI, CTICK, KCC
Controller-processor	• Intel® Ethernet Controller XL710-AM2

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

POWER CONSUMPTION

SKU	Typical Power	Maximum Power
Dual-port 40GBASE-SR4	4.9 W	5.6 W
Dual-port 40GBASE-CR4	3.6 W	4.0 W
Air Flow	Minimum of 150 LFM required	
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	Maximum: 90% non-condensing relative humidity at 35 °C	

LED INDICATORS

LINK (solid) and ACTIVITY (blinking)
LINK SPEED (green=40 Gb/s; yellow=1 Gb/s)

NETWORK OPERATION SYSTEM (NOS) SUPPORT – ALL ADAPTERS

OPERATING SYSTEM	IA-32	X86-64	IA-64
Windows Server* 2008 R2	N/A	•	N/A
Windows Server 2012	N/A	•	N/A
Windows Server 2012 R2	N/A	•	N/A
Windows PE 3.0 (2008 R2 Pe)	N/A	•	N/A
Windows PE 4.0 (2012 PE)	N/A	•	N/A
Windows PE 5.0 (2012 R2 PE)	N/A	•	N/A
Linux* Stable Kernel version 2.6/3x/4x	•	•	•
Linux RHEL 6.7, 7.1, Linux SHELS 11 SP4, and Linux SLES 12	•	•	•
FreeBSD* 10.2	•	•	•
UEFI* 2.1 and 2.3	N/A	•	•
UEFI* 2.4	N/A	•	N/A
VMware ESXi 5.5 and ESXI 6.0	N/A	•	N/A
Windows 7* SP1, Windows 8, Windows 8.1, and Windows 10	N/A	•	N/A

DELL BACKING INFORMATION

Dell offers a standard one year warranty.

‡ Optical Module Requirements for Intel® Ethernet Converged Network Adapters QSFP+ Open Optics Support

Intel® XL710 40 GbE Ethernet Adapter + Open Optics Support are designed to support either Power Class 1 modules or Power Class 4 modules as defined in the SFF-8679 specification. Consult the Intel documentation for the recommended Intel Ethernet Converged Network adapter for the supported Power Class. When Intel® QSFP+ Ethernet Optics modules are used, adapter use conditions for ambient temperature and airflow have been verified to meet the Standard Temperature Class of Operation as defined in the SFF-8679 specification. For use of other optics modules, it is the system integrator's responsibility to determine the necessary ambient temperature and airflow necessary for the third party optical modules to operate within the Temperature Class of Operation at all times. Operating optical modules outside the supplier specified Temperature Class of Operation range will permanently reduce the performance of the optical module over time.

INFORMATION PROVIDED BY:

Third-party information brought to you courtesy of Dell.

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

1. Feature to be enabled in Post-launch Release.
2. Network Virtualization Offload availability may vary please check both Intel® Ethernet XL710 10 GbE/40 GbE Controller Feature Software Support Matrix https://www-ssl.intel.com/content/dam/www/public/us/en/documents/release-notes/xl710-ethernet-controller-feature-matrix.pdf and Operating System Vendor enablement schedules.

Please contact your Dell sales representative for availability.

05/16/DVA/JL/PDF