

Product Brief

Intel® Ethernet Server Adapter XL710 for OCP
Network Connectivity



Intel® Ethernet Server Adapter XL710 for OCP

10/40GbE adapters providing ultimate flexibility and scalability for cloud deployments and agile data centers



Key Features

- Single- and dual-port 40GbE OCP adapters
- OCP Specification 2.0
- Supports 4x10GbE, 1x40GbE or 2x40GbE configurations
- PCI Express* (PCIe*) 3.0, x8
- Exceptional low power adapters
- Network Virtualization offloads including VXLAN, GRE and Geneve¹
- Intel® Ethernet Flow Director (Intel® Ethernet FD) for hardware-based application traffic steering
- Data Plane Development Kit (DPDK) optimized for efficient packet processing
- Excellent small packet performance for network appliances and Network Functions 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)

Product Overview

Intel continues its legacy of Ethernet leadership by introducing the Intel® Ethernet Server Adapter XL710 for the Open Compute Project (OCP). Powered by the Intel® Ethernet Controller XL710, these adapters extend Intel® Virtualization Technology (Intel® VT) beyond server virtualization to the network with hardware optimizations and offloads for rapid provisioning of networks in an agile data center.

As a founding member of OCP, Intel strives to continue increasing the number of open solutions based on OCP specifications available on the market. The Intel® Ethernet Server Adapter XL710 for OCP addresses the demanding needs of the next-generation data center by providing unmatched features for both server and network virtualization, flexibility for LAN and SAN networks, and proven, reliable performance.

Leading 10/40 GbE Performance

Optimized performance vectors (and key uses) include:

- **Small Packet Performance:** Maintains wire-rate throughput on smaller payload sizes (>128 bytes for 40GbE and 4x10GbE mode)
- **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, and Geneve¹
- **Storage Performance:** Enables competitive performance with native OS drivers and intelligent offload for NAS (NFS, SMB), and SAN (iSCSI)

Agility

The Intel® Ethernet Server Adapter XL710 for OCP delivers an innovative new architecture that has been designed to meet the needs of customers who require flexible 40GbE and 10GbE interfaces. With the unique ability to be configured for 4 x 10GbE, 1 x 40GbE, or 2 x 40GbE, this family of adapters offers the agility needed in today's data centers.

Network Virtualization

Network virtualization is the next big trend in creating an agile data center. The Intel® Ethernet Server Adapter XL710 for OCP is ready to help you take that next step.

- **VXLAN, GRE and Geneve¹:** 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 the Intel® Ethernet Server Adapter XL710 for OCP offloads from the host software reducing CPU overhead.

Server Virtualization

With Intel® Virtualization Technology (Intel® VT), the Intel® Ethernet Server Adapter XL710 for OCP delivers 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:

- **SR-IOV for Direct Assignment:** Adapter-based isolation and switching for various virtual station instances enabling optimal CPU usage in virtualized environments

Additionally, the Intel® Ethernet Server Adapter XL710 for OCP provides Virtual Bridging² (VB) 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:

- **VEPA²:** IEEE 802.1Qbg support for Virtual Ethernet Port Aggregator²
- **VEB:** Virtual Ethernet Bridge support via Intel VT

Intel® Ethernet Flow Director

Intel® Ethernet FD is an advanced traffic steering capability built into the Intel® Ethernet Server Adapter XL710 for OCP. It consists of a large number of flow affinity filters that direct received 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 FD significantly increases 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 implement 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 offloads.
- **Host iSCSI Initiator:** Provides exceptional performance without the need for full-offload HBA methods.
- **Flow Classification:** Routing data flows across multiple consumers and connections.

Power Savings

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

- **Lowest Power Consumption:** The Intel® Ethernet Controller XL710 is a power miser. It delivers double the throughput with only half the power of the previous Intel® Ethernet Converged Network Adapter X520 generation.

LAN/SAN for Today's Data Centers

Converging data and storage onto one fabric eliminates the need for multiple adapters, cables, and switches. Furthermore both 10GbE and 40GbE provides the bandwidth to converge these multiple fabrics. A key capability that makes all this possible is traffic class separation provided by Data Center Bridging (DCB)—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

Manageability

The Intel® Ethernet Server Adapter XL710 for OCP also incorporates the manageability required by IT personnel for remote control and alerting. Communication to the Board Management Controller (BMC) is available through an on-board SMBus port, providing a variety of management protocols, including IPMI, BMC Pass-thru, OS2BMC, and MCTP/SMBus.

World-Class Intel Support

Intel Customer Support Services offers a broad selection of technical and customer support programs. For more information, contact your local Intel representative. Service and availability may vary by country.

GENERAL	
FEATURES	BENEFITS
Intel® Ethernet Server Adapter XL710 for OCP	<ul style="list-style-type: none"> • Industry-leading, energy-efficient design for next-generation 10/40GbE performance and multi-core processors
OCP form factor	<ul style="list-style-type: none"> • Supports the OCP Form Factor for Server Specification revision 2
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 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 other iSCSI solutions • No additional cost for iSCSI support, included in the standard
Support for most network operating systems	<ul style="list-style-type: none"> • Enables widespread deployment
RoHS-compliant	<ul style="list-style-type: none"> • Complies with the European Union directive 2011/65/EU to reduce the use of hazardous materials
Time Sync (IEEE 1588*, 802.1as) - per flow not per packet	<ul style="list-style-type: none"> • 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	
FEATURES	BENEFITS
Intel® Ethernet Flow Director	<ul style="list-style-type: none"> • An advanced traffic steering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached
MSI-X support	<ul style="list-style-type: none"> • Minimizes the overhead of interrupts • Load-balancing of interrupt handling between multiple cores/CPU's
Multiple Queues: 1,536 Tx and Rx queues per device	<ul style="list-style-type: none"> • Network packet handling without waiting for buffer overflow providing efficient packet prioritization • Actual number of queues will vary depending upon software implementation
Offloads	<ul style="list-style-type: none"> • Large Segment Offload (LSO). The technique is also called TCP segmentation offload (TSO) when applied to TCP or generic segmentation offload (GSO). • The Linux kernel supports Large Receive Offload (LRO) for TCP in software only. • Checksum offloading eliminates host-side checksumming overheads by performing checksum computation with hardware assist in the device.
VIRTUALIZATION FEATURES	
FEATURES	BENEFITS
PCI-SIG Single Root I/O Virtualization (SR-IOV) Implementation (128 per device)	<ul style="list-style-type: none"> • 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 (Intel® VT) 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
Advanced Packet Filtering	<ul style="list-style-type: none"> • 1536 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	<ul style="list-style-type: none"> • Ability to create multiple VLAN segments
VXLAN, GRE and Geneve ¹ Support	<ul style="list-style-type: none"> • Preserves application performance in network virtualized environments
MANAGEABILITY FEATURES	
FEATURES	BENEFITS
Preboot eXecution Environment (PXE) Support	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Easy system monitoring with industry-standard consoles
iSCSI Boot	<ul style="list-style-type: none"> • Enables system boot up via iSCSI • Provides additional network management capability
Watchdog Timer	<ul style="list-style-type: none"> • Gives an indication to the manageability firmware or external devices that the chip or the driver is not functioning

SPECIFICATIONS

GENERAL

Connections	Single or Dual QSFP+ cages compliant with SFF-8436: <ul style="list-style-type: none"> • Optical transceivers • Direct attach copper • QSFP+ to 4x SFP+ (breakout cable)
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Network Standards	IEEE 802.3:
Physical Layer Interface	<ul style="list-style-type: none"> • 40GBASE-SR4 (optical transceiver) • 40BASE-CR4 (direct attach copper) SFF-8431: <ul style="list-style-type: none"> • SFI linear (10GbE with breakout cable)

ADVANCED SOFTWARE FEATURES – ALL ADAPTERS

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
IEEE 802.1p*
MSI-X supports Multiple Independent Queues
Interrupt moderation

TECHNICAL FEATURES

Operating temperature	0 °C to 55 °C (32 °F to 131 °F)
Air flow	Minimum of 170 LFM required for CR4. Additionally, for SR4, the following is required: <ul style="list-style-type: none"> • 45 °C @ 400 LFM • 40 °C @ 300 LFM • 35 °C @ 170 LFM SR4 high temp optics: <ul style="list-style-type: none"> • 45 °C @ 150 LFM • 50 °C @ 250 LFM • 55 °C @ 300 LFM
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 Gbps; yellow=10 Gbps)
Bus type	PCIe 3.0 (8 GT/s)
Bus width	8-lane PCIe
Interrupt levels	INTA, MSI, MSI-X
Hardware certifications	FCC A, UL, CE, VCCI, BSMI, CTICK, KCC
Controller-processor	Intel® Ethernet Controller XL710-BM2

Power Consumption

SKU	TYPICAL POWER	MAX POWER
Single-port 40GBASE-SR4	4.1 W	4.5 W
Single-port 40GBASE-CR4	3.2 W	3.4 W
Dual-port 40GBASE-SR4	4.8 W	5.6 W
Dual-port 40GBASE-CR4	3.9 W	4.6 W

NETWORK OPERATING SYSTEM (NOS) SUPPORT – ALL ADAPTERS

OPERATING SYSTEM	IA-32	X86-64	IA-64
Linux* kernel version 4.4 or later	N/A	X	X
Linux RHEL* 7.3 and later	N/A	X	X
Linux SLES* 11 and SLES 12	N/A	X	X
UEFI* 2.1 and 2.3	N/A	X	X

INTEL® ETHERNET SERVER ADAPTER XL710 FOR OCP PRODUCT CODES

Single Port	XL710QDA1OCP
Dual Port	XL710QDA2OCP ³

INTEL® ETHERNET QSFP+ TWINAXIAL CABLES

CABLE LENGTH (M)	PRODUCT CODE
1	XLDACBL1
3	XLDACBL3
5	XLDACBL5

INTEL® ETHERNET QSFP+ BREAKOUT CABLES²

CABLE LENGTH (M)	PRODUCT CODE
1	X4DACBL1
3	X4DACBL3
5	X4DACBL5

INTEL® ETHERNET QSFP+ OPTIC PRODUCT CODES

OPTIC	PRODUCT CODE
SR4 Optic	E40GQSFP5R

INTEL® BACKING INFORMATION

Backed by an Intel limited lifetime warranty, 90-day money-back guarantee (U.S. and Canada), and worldwide support.

For Product Information

To speak to a customer service representative, 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/ethernet

Customer Support

Intel® Customer Support Services offers a broad selection of programs including phone support and warranty service (service and availability may vary by country). For more information, contact us at support.intel.com/support/go/network/adapter/home.htm

Intel® Ethernet Server Adapters with QSFP+ 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 server adapter for the supported Power Class. When Intel® Ethernet QSFP+ 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.

¹ The Intel® Ethernet Server Adapter is Geneve-ready.

² Feature to be enabled in post-launch release.

³ Intel® Ethernet Server Adapter XL710 for OCP only supports ONE QSFP+ breakout cable.

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