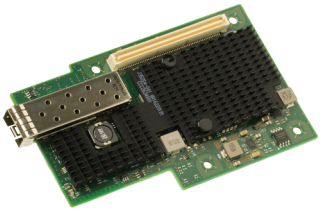
Product Brief
Intel® Ethernet Network Adapter XXV710
For OCP
Network Connectivity

Intel® Ethernet Network Adapter XXV710 For Open Compute Project (OCP)

10/25GbE adapters provide ultimate flexibility and scalability for cloud deployments and agile data centers



Key Features

- Single 1/10/25GbE port
- PCI Express* (PCIe*) v3.0, x8
- OCP Type 1 form factor
- OCP Specification v2.0
- Supports 1x1, 1x10 and 1x25GbE configurations
- IEEE 802.3by spec and 25GEthernet.org specification compliance
- Network Virtualization offloads including VXLAN, NVGRE, GENEVE, VXLAN-GPE with Network Service Headers (NSH) and MPLS
- 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 in servers with Intel® Xeon® processors
- I/O virtualization innovations for maximum performance in a virtualized server
- Adaptive link establishment enables increased interoperability with other 25GbE capable switches and host controllers

Overview

The Intel® Ethernet Network Adapter XXV710 for OCP is a new addition to Intel's 700 Series network adapters.

As a founding member of OCP, Intel strives to make increasing OCP specifications based solutions available on the market. The Intel Ethernet Network Adapter XXV710 for OCP addresses the demanding needs of the next-generation agile data center by providing unmatched features for both server and network virtualization, flexibility for LAN and SAN networks, and proven, reliable performance in an OCP form factor.

Leading 10/25GbE Performance

The Intel Ethernet Network Adapter XXV710 for OCP delivers excellent performance with a theoretical throughput of 50Gb/s (25Gb/s single-port bi-directional), in a PCI Express v3.0 x8 slot. Optimized performance vectors and key uses include:

- **Small Packet Performance:** Achieves wire-rate throughput on smaller payload sizes (>69 bytes for 25GbE and 64 bytes for 10GbE).
- **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, MPLS, VXLAN-GPE with NSH.

Agility

The Intel Ethernet Network Adapter XXV710 for OCP's innovative new architecture, with its ability to auto-negotiate for 1/10/25GbE, is designed to meet the needs of customers who have multiple speeds deployed in their environment.

Network Virtualization

Network virtualization has changed the way networking is done in the data center. The Intel Ethernet Network Adapter XXV710 for OCP adds 25GbE support to the 700 Series delivering accelerations across a wide range of tunneling methods.

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

The Intel Ethernet Network Adapter XXV710 for OCP offloads LSO, GSO, and checksum from the host software reducing CPU overhead.

Server Virtualization

With Intel® Virtualization Technology (Intel® VT), the Intel Ethernet Network Adapter XXV710 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:

- **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 in virtualized environments.

Additionally, the Intel Ethernet Network Adapter XXV710 for OCP delivers Virtual Bridging (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:

- **VEPA:** IEEE 802.1Qbg support for Virtual Ethernet Port Aggregator.
- **VEB:** Virtual Ethernet Bridge support via Intel® VT.

Intel® Ethernet Flow Director (Intel® Ethernet FD)

Intel® Ethernet FD is an advanced traffic steering capability built into the Intel Ethernet Network Adapter XXV710 for OCP. 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 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 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 offloads include checksum, TSO, VMDq, and RSS.
- **Host iSCSI Initiator:** Provides exceptional performance without the need for full-offload Host Bus Adapter 2 (HBA2) methods.
- **Flow Classification:** Trafficking data flows across multiple consumers and connections.

Manageability

The Intel Ethernet Network Adapter XXV710 for OCP also incorporates the manageability support by providing native, MCTP over SMBus, and BMC pass-through NC-SI manageability via OCP connector pins, respectively as defined in OCP specification.

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.

FEATURES	BENEFITS
General	
SFP28 Connectivity	• Supports SFP28 Direct Attach Copper (DAC), 25GBASE-SR, and 25GBASE-LR physical media as well as SFP+ DAC, 10GBASE-SR and 10GBASE-LR physical media.
OCP Form Factor Type 1	• Supports the OCP Form Factor for Server Specifications revision 2.
Interoperability with other 10/25GbE switches and network adapters	• Delivers wide interoperability with SFP+, SFP28, and QSFP28 switches and network adapters in the market, enabling smooth adoption and upgrade to 25GbE within a customers' network infrastructure.
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*
Support for most network operating systems	• Enables broad deployment for different applications.
RoHS-compliant	• Complies with the European Union directive 2011/65/EU to reduce the use of hazardous materials.
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 (Intel® Ethernet FD)	• 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 device	• Network packet handling without waiting for 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.
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 VMs 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 VM 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 VMs by assigning separate physical addresses in the memory to each VM. • 128/port for single port
Virtual Machine Load Balancing (VLMB)	• VMLB provides traffic load balancing (Tx and Rx) across VMs bound to the team interface, as well as fault tolerance in the event of switch, port, cable, or adapter failure.
Advanced Packet Filtering	• 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	• Ability to create multiple VLAN segments.
VXLAN, NVGRE, GENEVE, VXLAN-GPE with NSH, MPLS	• 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.
Unified Extensible Firmware Interface (UEFI)	• Enables new technologies during the pre-OS boot process and addresses legacy BIOS limitations on hardware.
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 controller or the software device driver is not functioning.

SPECIFICATIONS

General

SFP28 Connections	Single SFP28 cage supporting SFP28 DAC, 25GBASE-SR, and 25GBASE-LR physical media, SFP28 to QSFP28 Direct Attach Breakout Cable, and SFP+ DAC, 10GBASE-SR and 10GBASE-LR physical media.
Network Standard Physical Layer Interfaces	25GBASE-SR/LR (optical transceivers). 25GBASE-CR (DAC). • Automatically enables no-FEC, BASE-R FEC and RS-FEC to support CA-N, CA-S and CA-L cables. 10GBASE-SR/LR (optical transceivers) 10GbE SFP+ DAC

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
RSS

NETWORK OPERATION SYSTEM (NOS) SUPPORT (ALL ADAPTERS)

Operating System (X86-64)

Linux* Stable Kernel version 2.6/4x
Linux RHEL 6.9
Linux RHEL RHEL 7.3
Linux SLES 11 SP4
Linux SLES 12 SP1
Ubuntu* 14.04.x LTS and 16.04.x LTS (available in a future software release)
UEFI* 2.1
UEFI 2.3
UEFI 2.4

TECHNICAL FEATURES	
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
Air Flow	0 LFM with 55 °C required for CR (DAC) 350 LFM with 55 °C required for SR[1] optics (airflow direction: from optics to heat sink)
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 = 25 Gbps; yellow = 10 Gbps)

POWER CONSUMPTION		
SKU	Typical Power	Maximum Power
Single-port 25BASE-CR	5.3 W	7.4 W
Single-port 25GBASE-SR	6.4 W	9.3 W

ADAPTER FEATURES	
Data Rate Supported Per Port	• Optical: 1/10/25GbE • Direct Attach: 10/25GbE
Bus Type	PCI Express 3.0 (8 GT/s)
Bus Width	PCI Express x8
Interrupt Levels	INTA, MSI, MSI-X
Hardware Certifications	FCC A, UL, CE, VCCI, BSMI, CTICK, KCC
Manageability	Pass-through sideband support via DMTF NC-SI
Physical Dimension	Standard OCP Form Factor Type 1
Controller-processor	Intel® Ethernet Controller XL710-BM2

[1]The Intel Ethernet Network Adapter XXV710 for OCP with SFP28 Open Optics support is designed to support Power Level III modules as defined in the SFF-8419 specification. When Intel® Ethernet SFP28 SR 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 permanently reduces the performance of the optical module over time.

Intel® Ethernet Network Adapter XXV710 Product Codes	
Configuration	Product Code
Single Port	XXV710DA1OCP
Intel® Ethernet SFP28 Twinaxial Cables	
Cable Length (m)	Product Code
1	XXVDACBL1M
2	XXVDACBL2M
3	XXVDACBL3M
Intel® Ethernet QSFP28 to SFP28 Twinaxial Breakout Cables	
Cable Length (m)	Product Code
1	XXV4DACBL1M
2	XXV4DACBL2M
3	XXV4DACBL3M
Intel® Ethernet SFP28 SR Optic	
Optic	Product Code
SR Optic	E25GSFP28SR

For Product Information

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

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.

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*.

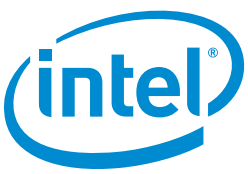
(Service and availability may vary by country.)

Warranty

Limited lifetime hardware warranty within 90 days of purchase. See the support document for complete warranty information at *www.intel.com/support/network/sb/cs-009721.htm*.

Platform Validation

Architected and validated with Intel® Xeon® processor E5 v3 platform to deliver a balanced platform for data center and cloud infrastructures.



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