PRODUCT BRIEF

Intel® Ethernet Network Adapter X710-DA2/-DA4 for OCP 3.0



Dual and quad-port 10 Gigabit Ethernet adapters for OCP NIC 3.0

Key Features

- OCP NIC 3.0 Small Form Factor adapter
- Quad-port and Dual-port 10GbE SFP+
- PCI Express (PCIe) 3.0 x8
- Network Virtualization offloads including VXLAN, GENEVE, NVGRE, MPLS, and VXLAN-GPE with Network Service Headers (NSH)
- Intel® Ethernet Flow Director for hardware based application traffic steering
- Dynamic Device Personalization (DDP) enables increased packet processing efficiency for NFV and Cloud deployments
- Data Plane Development Kit (DPDK) optimized for efficient packet processing
- Excellent small packet performance for network appliances and Network Functions Virtualization (NFV)
- I/O virtualization innovations for maximum performance in a virtualized server

Overview

The Intel® Ethernet Network Adapter X710-DA2 and -DA4 for OCP 3.0 are part of the Intel® Ethernet 700 Series, the foundation for server connectivity; providing broad interoperability, critical performance optimizations, and increased agility for Communications, Cloud, and Enterprise IT network solutions.

- **Interoperability** - Multiple speeds and media types for broad compatibility backed by extensive testing and validation.
- **Optimization** - Intelligent offloads and accelerators to unlock network performance in servers with Intel® Xeon® processors.
- **Agility** - Both Kernel and Data Plane Development Kit (DPDK) drivers for scalable packet processing.

The OCP NIC 3.0 specification defines a standardized design for a new generation of network adapters. Simple and straightforward form factors, clear manageability requirements, and improved serviceability help simplify deployment for current and emerging capabilities.

The Intel® Ethernet 700 Series delivers networking performance across a wide range of network port speeds through intelligent offloads, sophisticated packet processing, and quality open source drivers.

All Intel® Ethernet 700 Series Network Adapters include these feature-rich technologies:

Flexible and Scalable I/O for Virtualized Infrastructures

Intel® Virtualization Technology (Intel® VT) delivers outstanding I/O performance in virtualized server environments.

I/O bottlenecks are reduced through intelligent offloads such as Virtual Machine Device Queues (VMDq) and Flexible Port Partitioning, using SR-IOV with a common Virtual Function driver for networking traffic per Virtual Machine (VM), enabling near-native performance and VM scalability. Host-based features supported include:

VMDq for Emulated Path: VMDq enables a hypervisor to represent a single network port as multiple network ports that can be assigned to the individual VMs. Traffic handling is offloaded to the network controller, delivering the benefits of port partitioning with little to no administrative overhead by the IT staff.

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

- Up to 128 VFs, each VF 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 can be allocated to specific VMs or guests, via a standard interface.

Intel® Ethernet Adaptive Virtual Function (Intel® Ethernet AVF): A virtual function driver that eases SR-IOV hardware upgrades or changes, and preserves base mode functionality in hardware and software. Customers deploying mass-scale VMs or containers for their network infrastructure now have a common Virtual Function (VF) driver. This driver supports a Base Mode and advanced set of features on the Intel® Ethernet 700 Series.

Enhanced Network Virtualization Overlays (NVO)

Network virtualization has changed the way networking is done in the data center, delivering accelerations across a wide range of tunneling methods.

VXLAN, GENEVE, NVGRE, MPLS, and VXLAN-GPE with NSH Offloads: These stateless offloads preserve application performance for overlay networks, and the network traffic can be distributed across CPU cores, increasing network throughput.

Flexible Port Partitioning (FPP)

FPP leverages the PCI-SIG SR-IOV specification. Virtual controllers can be used by the Linux host directly and/ or assigned to virtual machines.

- Assign up to 63 Linux host processes or virtual machines per port to virtual functions.
- Control the partitioning of per port bandwidth across multiple dedicated network resources, ensuring balanced QoS by giving each assigned virtual controller equal access to the ports bandwidth.

Network administrators can also rate limit each of these services to control how much of the pipe is available to each process.

Greater Intelligence and Performance for NFV and Cloud deployments

Dynamic Device Personalization (DDP) customizable packet filtering, along with enhanced Data Plane Development Kit (DPDK), support advanced packet forwarding and highly-efficient packet processing for both Cloud and Network Functions Virtualization (NFV) workloads.

- DDP enables workload-specific optimizations, using the programmable packet-processing pipeline. Additional protocols can be added to the default set to improve packet processing efficiency that results in higher throughput and reduced latency. With the Intel Ethernet 700 Series, new protocols can be added or modified on-demand, and applied at run-time using Software Defined Firmware or APIs, eliminating the need to reset or reboot the server. This not only keeps the server and VMs up, running, and computing, it also increases performance for VNFs that process network traffic that is not included in the default firmware. Download DDP Profiles
- DPDK provides a programming framework for Intel® processors and enables faster development of high-speed data packet networking applications.

Advanced Traffic Steering

Intel® Ethernet Flow Director (Intel® Ethernet FD) is an advanced traffic steering capability built into the adapter. 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.

Steering traffic into specific queues can eliminate 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.

FEATURES	DESCRIPTION
GENERAL	
SFP+ Connectivity	• Supports SFP+ Direct Attach Copper Twinaxial, 10GBASE-SR, or 10GBASE-LR physical media.
Load balancing on multiple CPUs	• Increases performance on multi-processor systems by efficiently balancing network loads across CPU core 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	• Product is compliant with EU RoHS Directive 2 2011/65/EU (Directive 2011/65/EU) and its amendments (e.g. 2015/863/EU).
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.
OCP NIC 3.0 adapter	• Compatible with systems that support OCP NIC 3.0 Small Form Factor adapters.
LED indicators	• LINK: green=10Gbps; amber=1Gbps; not illuminated=no link ACT: blinking=activity; off=no activity
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	
VMDq	• Up to 256 maximum VMDq VMs supported. • Offloads the data-sorting based on MAC addresses and VLAN tags, functionality from the Hypervisor to the network silicon, improving data throughput and CPU usage.
PCI-SIG SR-IOV Implementation	• Integrated with Intel® VT for Directed I/O (Intel® VT-d) to provide data protection between VMs by assigning separate physical addresses in the memory to each VM. • 128 per device (64 per port for Dual Port adapter, 32 per port for Quad Port adapter).
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+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.
Supported Management Implementations	• RBT • MCTP • RBT+MCTP
NC-SI (DSP0222)	• Supports NC-SI 1.1 for Pass-Through and Control traffic.
MCTP (DSP0236)	• Supports MCTP 1.2.
MAC address provisioning	• Provisions one or more MAC addresses per NC-SI capable device that can be used for out of band management. (To be supported in an upcoming software update.)
Temperature reporting (ASIC)	• Reports temperature of Intel® Ethernet Controller. (To be supported in an upcoming software update.)
Temperature reporting (modules)	• Reports temperature of optical modules installed in adapter. (To be supported in an upcoming software update.)
Estimated power consumption reporting	• Reports estimated power consumption of the adapter, excluding transceiver modules. (To be supported in an upcoming software update.)

FEATURES	DESCRIPTION
MANAGEABILITY FEATURES (CONTINUED)	
Firmware inventory and update	• Allows firmware updates prior to OS boot. (To be supported in an upcoming software update.)
Secure firmware	• Prevents the execution and update of unsigned and unauthenticated firmware components.
NC-SI package addressing	• Assigns a unique ID to each Ethernet controller sharing a single NC-SI physical connection to prevent addressing conflicts.

SPECIFICATIONS

GENERAL

Connections	Quad and Dual SFP+ cages
Network Standard Physical Layer Interfaces	10GBASE-SR and -LR optical transceivers 10GbE SFP+ DAC

THERMALS AND AIRFLOW

Dual Port	Heat sink to Port (0 - 65 °C) Minimum LFM	Heat sink to Port (0 - 55 °C) Minimum LFM	Port to heat sink (0 - 35 °C) Minimum LFM
Direct Attach cable 70 °C case	0 LFM	0 LFM	0 LFM
Optical Transceiver (1.5W) 70 °C Case	150 LFM	150 LFM	50 LFM
Optical Transceiver (1.5W) 85 °C Case	100 LFM	50 LFM	50 LFM
Quad Port	**Heat sink to Port (0 - 65 °C) Minimum LFM**	**Heat sink to Port (0 - 55 °C) Minimum LFM**	**Port to heat sink (0 - 35 °C) Minimum LFM**
Direct Attach cable 70 °C case	50 LFM	0 LFM	0 LFM
Optical Transceiver (1.5W) 70 °C Case	550 LFM	400 LFM	50 LFM
Optical Transceiver (1.5W) 85 °C Case	300 LFM	150 LFM	50 LFM

Notes: Data represents the maximum measured values across all voltage and temperature corners and not theoretical maximums. Power consumption of transceivers varies.

TECHNICAL FEATURES

Storage Temperature	40 °C to 70 °C (-40 °F to 158 °F)
Storage Humidity	Maximum: 90% non-condensing relative humidity at 35 °C

ADAPTER FEATURES

Data Rate Supported Per Port	Optical: 1/10GbE Direct Attach: 10GbE
Bus Type	PCI Express v3.0 (8 GT/s)
Bus Width	PCI Express x8
Interrupt Levels	INTA, MSI, MSI-X
Hardware Certifications	FCC A, UL, CE, VCCI, BSMI, CTICK, KCC
Controller	Intel® Ethernet Controller XL710-BM1 (Quad Port) Intel® Ethernet Controller X710-BM2 (Dual Port)

POWER CONSUMPTION

SKU and Media Type	Typical Power	Maximum Power
Dual Port Direct Attach	2.86 W	4.58 W
Dual Port 10GBASE-SR	4.29 W	5.52 W
Dual Port 10GBASE-LR	4.59 W	6.23 W
Quad Port Direct Attach	3.92 W	4.71 W
Quad Port 10GBASE-SR	5.66 W	6.95 W
Quad Port 10GBASE-LR	7.04 W	8.64 W

PHYSICAL DIMENSIONS

115mm x 76mm (OCP NIC 3.0 Small Form Factor)

PRODUCT ORDER CODES

Configuration	Product Code
Dual port	X710DA2OCPV3
Quad port	X710DA4OCPV3

SUPPORTED OPERATING SYSTEMS

For a complete list of supported network operating systems for Intel® Ethernet 700 Series Adapters visit:
intel.com/support/EthernetOS

INTEL® ETHERNET ACCESSORIES

Intel® Ethernet Optics and Cables are proven, reliable solutions for high-density Ethernet connections. Combine these accessories with Intel® Ethernet 700 Series Network Adapters for dependable interoperability and consistent performance across the network. Learn more at intel.com/ethernetproducts

Customer Support

For customer support options in North America visit:
intel.com/content/www/us/en/support/contact-support.html

Product Information

For information about Intel® Ethernet Products, visit:
intel.com/ethernetproducts

Warranty

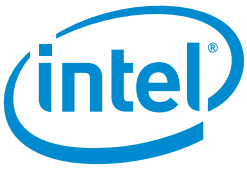
Standard Intel limited warranty, one year. See Intel terms and conditions of sale for more details.

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