PRODUCT BRIEF

# Intel® Ethernet Converged Network Adapter X710 DA-2/DA-4



## Dual and Quad-port 10GbE adapters with Hardware Optimization and Offloads for the Rapid Provisioning of Networks in an Agile Data Center

### Key Features

- PCI Express* (PCIe) v3.0, 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
- 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 on servers with Intel® Xeon® Processors
- I/O virtualization innovations for maximum performance in a virtualized server

### Overview

The Intel® Ethernet Converged Network Adapter X710 addresses the demanding needs of an agile data center by providing unmatched features for both server and network virtualization, flexibilty for LAN and SAN networks, and proven, reliable performance.

The Intel® Ethernet 700 Series Network Adapters. These adapters are the foundation for server connectivity, providing broad interoperability, critical performance optimizations, and increased agility for Telecommunications, 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.

Built on more than 35 years of continuous Ethernet innovations, 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

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

- DDP enables a method to change the packet processing pipeline by applying a profile package to the Intel® Ethernet 700 Series Network Adapter at runtime—resulting in improvements in throughput, latency and reduced CPU loads.
- 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 | • X710 adapters with SFP+ connections support 10GBASE-SR, 10GBASE-LR and SFP+ Direct Attach Copper (DAC) physical media. |
| Low-Profile (non-compliance) | • Intel does offer a 4x10 SFP+, low profile, non-PCI compliant version of the Intel® Ethernet Converged Network Adapter X710-DA4 FH. Please contact your Intel representitive for information about this adapter. |
| Full-Height | • Intel® Ethernet Converged Network Adapter X710-DA4 FH requires a full height slot for PCIe compliance |
| 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 | • 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.<br>• 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.<br>• 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.<br>• Checksum and segmentation capability extended to new standard packet type. |
| **VIRTUALIZATION FEATURES** | |
| Next-Generation VMDq | • Up to 256 maximum VMDq VMs supported.<br>• 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 (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.<br>• 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.<br>• 64/port for dual 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).<br>• 512 hash entries each for unicast and multicast.<br>• Lower processor usage.<br>• Promiscuous (unicast and multicast) transfer mode support.<br>• 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).<br>• 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.<br>• 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** | |
| Connections | Dual or Quad SFP+ cages supporting Direct Attach Copper (DAC) Twinaxial cable and optical transceivers |
| Network Standard Physical Layer Interfaces | 10GBASE-SR and -LR optical transceivers<br>10GbE SFP+ DAC |

## TECHNICAL FEATURES

| | |
|---|---|
| Operating Temperature | 0 °C to 55 °C (32 °F to 131 °F) |
| Air Flow | 150 LFM with 55 °C required for CR (DAC)<br>150 LFM with 55 °C or 500 LFM with 65 °C required with extended temp SR optics |
| 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)<br>LINK SPEED (green = 10Gbps; yellow = 1Gbps) |

## ADAPTER FEATURES

| | |
|---|---|
| Data Rate Supported Per Port | • Optical: 1/10GbE<br>• 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 X710-AM2 |

## POWER CONSUMPTION

| SKU | Typical Power | Maximum Power |
|---|---|---|
| Dual-port 10GBASE-SR | 4.3 W | 4.8 W |
| Dual-port 1000GBASE-SX | 4.0 W | 4.3 W |
| Dual-port 10GBASE-LR | 4.5 W | 5.1 W |
| Dual-port Direct Attach (Twinax) | 3.3 W | 3.7 W |
| Quad-port 10GBASE-SR | 6.2 W | 6.6 W |
| Quad-port 1000GBASE-SX | 5.5 W | 6.0 W |
| Quad-port 10GBASE-LR | 6.9 W | 7.4 W |
| Quad-port Direct Attach (Twinax) | 3.6 W | 3.8 W |

## PHYSICAL DIMENSIONS

| | |
|---|---|
| X710-DA2 Low profile | 167mm x 69mm |
| X710-DA4 Full height | 167mm x 111mm |
| X710-DA4 Low profile | 167mm x 69mm |

## PRODUCT ORDER CODE

| Configuration | Product Code | Adapter Height |
|---|---|---|
| Dual Port | X710DA2 | Low profile |
| Quad Port | X710DA4FH | Full height |
| Quad Port | X710DA4G1P5 | Low profile |

## SUPPORTED OPERATING SYSTEMS

For a complete list of supported network operating systems for Intel® Ethernet 700 Series Adapters visit:
intel.com/content/www/us/en/support/contact-support.html

## 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 and 500 Series Network Adapters for dependable interoperability and consistent performance across the network. Learn more at intel.com/ethernet

## Warranty

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

## Product Information

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

## Customer Support

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

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