

# Intel® Ethernet Converged Network Adapter X710-DA2/DA4



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) 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)
- 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, flexibility 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 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.

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, enabling near-native performance and VM scalability. These offloads include 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). 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 virtual functions (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): Customers deploying mass-scale VMs or containers for their network infrastructure now have a common VF driver. This driver eases SR-IOV hardware upgrades or changes, preserves base-mode functionality in hardware and software, and supports an advanced set of features in 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 port's 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. New
  protocols can be added or modified on-demand and
  applied at runtime 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 Virtual Network Functions (VNFs)
  that process network traffic that is not included in the
  default firmware. <u>Download DDP Profiles</u>
- 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. Large numbers of flow affinity filters 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.

Adaptive X710-DA4 FH. Please cominar your intel experiencember for information about this adaptive.  Intel® Hithmem Converged between Adaptive X710-DA4 FH equies at all highly all for the Circ compliance.  Load balancing on multiple CPUs  Intel® Hithmem Converged between Adaptive X710-DA4 FH equies at all highly all for the Circ compliance.  Intel® Minimum Converged Between X410-DA4 FH equies at all highly all for the Circ compliance.  Intel® Converged CPUs CPUs CPUs CPUs CPUs CPUs CPUs CPUs	FEATURES	DESCRIPTION
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Adaptive X710-DA ER. Please contact your first expressmantaive for information about this adapter.  José balancing on multiple CPUS  Increases performance on multi-processor systems by efficiently balancing returned to the processor performance on multi-processor systems by efficiently balancing returned to a control of the processor performance on multi-processor systems by efficiently balancing returned to a control of the processor performance on multi-processor systems by efficiently balancing returned to a control of the processor performance on multi-processor systems by efficiently balancing returned to a control of the processor of the	SFP+ Connectivity	
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was dwith Receiver-Side Scaling (RSS) from Microsot for scalable (PO on Linkur).  Protect, Detect and Recover  The Inself Etherina 200 Speris implements a design philosophy or platform resiliency with 3 attributes supporting the INST Cybersecurity Framework: Protect, Detect and Recover. These attributes verify the firmwase and critical device settings with built-in corruption detection and automated device recovery to return the device to its originally programmed state.  Support for most network operating systems  Form Son (REE 1588, 802.1as)  **Compiles with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With the European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With European Union directive 2011/65/EU to reduce the use of hazardous materials.  **Compiles With European U	Full-Height	• Intel® Ethernet Converged Network Adapter X710-DA4 FH requires a full height slot for PCIe compliance.
the INST O/persecurity Framework Protect, Detect and Recover. These attributes welfy the firmware and critical device serings with built-in curroupline offection and automated device recovery to return the device to its originally programmed state.  Support for most network operating systems  entire of the programmed state.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Compiles with the European Usino directive 2011/05/EPU to reduce the use of hazardous materials.  - Moutpie Outers 1, 2011/05/EPU to reduce the use of hazardous materials.  - Network point of the European Usino Bear of Interrupts Load-balancing leave the materials of Interrupts Load-balancing leave the materials of Interrupts Checksum and segmentation capability extended to new standard packet type.  - Virtual Machine Load Balancing (VLMB)  - Provides an implementation of the PCI-SiG standard for I/O Variability from the Hypervisor to the retrival ports. East-virtual ports the scivil pain reduce the v	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.
RollS-compliant  Complies with the European Union directive 2011/65/EU to reduce the use of hazardous materials.  Enables networked Ethernet 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.  (Features for Multi-Core Processor Servers  Intel® Ethernet Flow Director  An advanced traffic sceering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached.  An advanced traffic sceering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached.  MINIX Jupport  An infinite site overhead of interrupts.  Intel® Ethernet Flow Director  An advanced traffic sceering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached.  Minimizes the overhead of interrupts.  Minimizes the overhead of interrupts.  An interrupt handling between multiple cores/CPUs.  Multiple Queues: 1,536 Tx and Rx queues  Per device  An extended traffic sceering capability extended to new standard packet prioritization.  An extended provided in the second sec	Protect, Detect and Recover	critical device settings with built-in corruption detection and automated device recovery to return the device to
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.  ### CFEATURES FOR Multi-Core Processor Servers  Intel® Ethernet FD  An advanced traffic steering capability increases the number of transactions per second and reduces latency for cloud applications like Mencached.  *### Military of the provides of interrupts Load-balancing of interrupt handling between multiple cores/CPUs.  ***Multiple Queues 1,336 Tx and Rx queues per device - Network packet handling without valuing for buffer overflow providing efficient packet prioritization Actual number of queues will vary depending upon software implementation Network packet handling without valuing for buffer overflow providing efficient packet prioritization Actual number of queues will vary depending upon software implementation Network packet handling without valuing for buffer overflow providing efficient packet prioritization Actual number of queues will vary depending upon software implementation Network packet handling without valuing for buffer overflow providing efficient packet prioritization Actual number of queues will vary depending upon software implementation Checksum and segmentation capability extended to new standard packet type.  **VITURALIZATION**  **VITURALIZATION**  **VITURALIZATION**  **Provides an implementation of the PCLSIG standard for I/O Vituralization. The physical configuration of each por school of the provided the data sorting based on NAC addresses and VLAN tags, functionally from the Hypervisor resulting in near-native performance Integrated with intelligible virtual ports, each virtual ports is adopted to an individual VM directly by bypassing the virtual vi	Support for most network operating systems	• Enables broad deployment for different applications.
with the content of the master time by compensating for link latency.  WO Features for Multi-Core Processor Servers  Intel® Ethernet Flow Director Intel® Et	RoHS-compliant	• Complies with the European Union directive 2011/65/EU to reduce the use of hazardous materials.
Intel® Ethernet Flow Director cloud applications like Memcached.  An advanced traffic steering capability increases the number of transactions per second and reduces latency for cloud applications like Memcached.  Milk Hermet FJ  Milk His Surport  Milk His Surport  Milk Lysupport  Milk	Time Sync (IEEE 1588, 802.1as)	
MSI-X support   Minimizes the overhead of interrupts	I/O Features for Multi-Core Processor S	Servers
Load-balancing of interrupt handling between multiple cores/CPUs.   Multiple Queues: 1,536 Tx and Rx queues   Network packet handling without waiting for buffer overflow providing efficient packet prioritization.	Intel® Ethernet Flow Director (Intel® Ethernet FD)	
Actual number of queues will vary depending upon software implementation.	MSI-X support	
Virtualization Features	Multiple Queues: 1,536 Tx and Rx queues per device	
Next-generation VMDq  Offloads the data-sorting based on MAC addresses and VLAN tags, functionality from the Hypervisor to the network sillion, improving data throughput and CPU usage.  PCI-SiG SR-IOV implementation  (128 per device)  PCI-SiG SR-IOV implementation  (128 per device)  PCI-SiG SR-IOV implementation  (128 per device)  PCI-SiG SR-IOV implementation  PCI-SiG Standard Physical Layer Interfaces  PCI-SiG SR-IOV Implementation  PCI-SiG Standard Physical Layer Interfaces  PCI-SiG SR-IOV Implementation  PCI-SiG Standard Physical Layer Interfaces  PCI-SiG SR-IOV Implementation of the PCI-Sig Sandard Pcipus and PCI-Sig Standard Pcipus and Pcipus a	Tx/Rx IP, SCTP, TCP, and UDP checksum offloading (IPv4, IPv6) capabilities	·
Officials 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 por is divided into multiple virtual ports. Each virtual port is assigned to an individual VM directly by bypassing the virtual was which in the Hypervisor, resulting in near-native performance.  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.  64/port for dual port.  Virtual Machine Load Balancing (VLMB)  Virtual Machine Load Balancing (VLMB)  Virtual Filtering  1536 exact matched packets (unicast or multicast).  1512 hash entries each for unicast and multicast).  1512 hash entries each for unicast and multicast.  10 per processor usage.  Promiscous (unicast and multicast) transfer mode support.  Optional filtering of invalid frames.  VXLAN, NVGRE, GENEVE, VXLAN-GPEENSH, MPLS  Preserves application performance in network virtualized environments.  Manageability Features  Preboot Execution Environment (PXE) Support  Enables system boot via the LAN (32-bit and 64-bit).  Flash interface for PXE image.  Unified Extensible Firmware Interface (UEFI)  Enables new technologies during the pre-O5 boot process and addresses legacy BIOS limitations on hardware. Simple Network Management Protocol (SNMP) and Remote Network Monitoring (RMON) Statistic Counters  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	Virtualization Features	
Is divided into multiple virtual ports. Each virtual ports as segment to an individual VM directly by bypassing the virtual switch in the Hypervisor, resulting in near-native performance.	Next-generation VMDq	• Offloads the data-sorting based on MAC addresses and VLAN tags, functionality from the Hypervisor to the
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 for invalid frames.  VLAN support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags  VXLAN, NVGRE, GENEVE, VXLAN-GPE+NSH, MPLS  Preserves application performance in network virtualized environments.  Manageability Features  Preboot Execution Environment (PXE) Support  Enables system boot 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.  Easy system monitoring with industry-standard consoles.  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	PCI-SIG SR-IOV Implementation (128 per device)	virtual switch in the Hypervisor, resulting in near-native performance.  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.
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Preboot Execution Environment (PXE) Support  Enables system boot 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  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	VxLAN, NVGRE, GENEVE, VxLAN-GPE+NSH, MPLS	Preserves application performance in network virtualized environments.
• 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.  • 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	Manageability Features	
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Network Standard Physical Layer Interfaces 10GBASE-SR and -LR optical transceivers	General	
	Connections	Dual or Quad SFP+ cages supporting Direct Attach Copper (DAC) Twinaxial cable and optical transceivers
	Network Standard Physical Layer Interfaces	

Technical Features	
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)
Airflow	150 LFM with 55 °C required for CR (DAC) 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) LINK SPEED (green = 10Gbps; yellow = 1Gbps)

Adapter Features	
Data Rate Supported Per Port	Optical: 1/10GbE Direct Attach: 10GbE
Bus Type	PCIe 3.0 (8 GT/s)
Bus Width	PCIe x8
Interrupt Levels	INTA, MSI, MSI-X
Hardware Certifications	FCC A, UL, CE, VCCI, BSMI, CTICK, KCC
Controller	Intel® Ethernet Controller X710-BM2

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

Product Order Code		
Configuration	Product Code	Adapter Height
Dual Port	X710DA2	Low profile
Quad Port	X710DA4FH	Full height
Quad Port	X710DA4G2P5	Low profile

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

### Warranty

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

### **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 and technologies, visit: intel.com/ethernetproducts

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