Product Brief
Intel® Ethernet Converged Network Adapter X710-T4
Network Connectivity

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Quad-port 10GBASE-T Converged Network Adapter (CNA)

Simplifies migration to 10 Gigabit Ethernet (GbE) with hardware optimizations for networks in today's Agile Data Center



Key Features

- Low cost 10 GbE performance throughout the entire data center
- Standard CAT 6a cabling with four RJ45 connectors for maximum system density
- Backward compatibility with existing 100BASE-T and 1000BASE-T networks simplifies the transition to 10 GbE
- PCI Express* (PCIe*) 3.0 with up to 8.0 GT/s
- Network Virtualization offloads including VXLAN, NVGRE, and Geneve[1]
- Intel® Ethernet Flow Director (Intel® Ethernet FD) for hardware-based application traffic steering
- Intelligent offloads to enable high performance with Intel® Xeon® processor-based servers
- I/O virtualization innovations for maximum performance in a virtualized server

10 GbE for the Broad Market

The Intel® Ethernet Converged Network Adapter X710-T4 is the newest innovation in Intel's leadership to drive 10 GbE into the broad server market. For maximum flexibility, this adapter uniquely offers four 10GBASE-T ports in a low-profile form factor. Powered by the Intel® Ethernet Controller XL710, The Intel® Ethernet CNA X710-T4 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.

Simplify the Transition to 10 GbE

With 10GBASE-T, migration to 10 GbE is dramatically simplified with backward compatibility for existing network infrastructure. Install an X710-T4 adapter into a server and the auto-negotiation between 100 Mb/s, 1 GbE, and 10 GbE provides the necessary backwards compatibility that most customers require for a smooth transition and easy migration to 10 GbE. 10GBASE-T switches can now be affordably added at any time to experience the full benefits of 10 GbE.

10GBASE-T uses copper twisted-pair cables that are very familiar to IT professionals today. 10GBASE-T is the easiest and most versatile 10 GbE interface that can be deployed anywhere in the data center. Its flexible reach from 1 meter to 100 meters support the latest network architectures including Top of Rack (ToR), Middle of Row (MoR), and End of Row (EoR).

Network Virtualization

Network virtualization is the next big trend in creating an agile data center. The Intel® Ethernet CNA X710-T4 is ready to help you take that next step.

- **VXLAN, NVGRE, and Geneve[1]:** 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 CNA X710-T4 offloads LSO, GSO, and checksum from the host software reducing CPU overhead.

Server Virtualization

With Intel® Virtualization Technology (Intel® VT), the Intel® Ethernet CNA X710-T4 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 CNA X710-T4 provides Virtual Bridging[2] (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[2]:** IEEE 802.1Qbg support for Virtual Ethernet Port Aggregator[2]
- **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 CNA X710-T4. 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 include Checksum, TSO, VMDq, and RSS.
- **Host iSCSI Initiator:** Provides exceptional performance without the need for full-offload HBA methods.
- **Flow Classification:** Routing data flows across multiple consumers and connections.

LAN/SAN for Today's Data Centers

Converging data and storage onto one fabric eliminates the need for multiple adapters, cables, and switches. Furthermore, 10GbE 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 CNA X710-T4 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 Converged Network Adapter X710-T4	• Intel's first quad-port 10GBASE-T solution
Low-profile solution	• Enables higher bandwidth and throughput from standard and low-profile PCIe slots and servers
RJ45 connections over CAT 6a cabling	• Ensures compatibility with cable lengths up to 100 meters
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*
iSCSI remote boot support	• 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 Intel® Ethernet CNA X710-T4
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
Support for most Network Operating Systems (NOS)	• Enables widespread deployment
RoHS-compliant, lead-free technology	• Complies with the European Union (EU) directives to reduce the use of hazardous materials
Intel Backing	• Backed by an Intel limited lifetime warranty, 90-day money-back guarantee (U.S. and Canada) and worldwide support

I/O FEATURES FOR MULTI-CORE PROCESSOR SERVERS	
FEATURES	**BENEFITS**
Intel® Ethernet Flow Director	• 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	
FEATURES	**BENEFITS**
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 virtual machines within the same physical server need not go out to the wire and come back in, improving throughput and CPU usage
PCI-SIG Single Root I/O Virtualization (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 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 • 32/port for quad 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 and Geneve[1] Support	• Preserves application performance in network virtualized environments

MANAGEABILITY FEATURES	
FEATURES	**BENEFITS**
Preboot eXecution Environment (PXE) Support	• 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	• 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 chip or the driver is not functioning

SPECIFICATIONS

GENERAL

Connector	• RJ45 copper
Cable distances	10GBASE-T: • 100 m using CAT 6a • 55 m using CAT 6 100BASE-T and 1000BASE-T: • 100 m using CAT 5e, CAT 6 or CAT 6a

ADVANCED SOFTWARE FEATURES – ALL ADAPTERS

Adapter fault tolerance (AFT)[3]
Switch fault tolerance (SFT)[3]
Adaptive load balancing (ALB)[3]
Teaming Support[3]
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

TECHNICAL FEATURES

Operating temperature	0 °C to 55 °C (32 °F to 131 °F)
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/ACTIVE: • Off: no link • Steady: link up • Flashing: link active (passing traffic) LINK SPEED: • Green: 10 Gb/s • Yellow: 1 Gb/s • Off: 100 Mb/s
Physical Dimensions	
Board	2.703 in. x 6.578 in.
Data rate supported per port	100Mb/s, 1GbE and 10GbE
Bus type	PCIe 3.0 (8 GT/s)
Bus width	8-lane PCIe
Interrupt levels	INTA, MSI, MSI-X
Hardware certifications	Class A: USA-FCC; Canada – ICES-003/ NMB-003, European Union – CE, Japan – VCCI, Taiwan – BSMI, Korea – MSIP, Australia/New Zealand – RCM, Safety EN/UL and CSA C22.2 60950-1
Controller/processor	Intel® Ethernet Controller XL710
Bracket	Full-height bracket installed. Low-profile bracket included in package

AIR FLOW

CABLE LENGTH	TEMPERATURE (°C)	RECOMMENDED (LFM)
100 m	35 40	350 400
30 m	35 40 45 50 55	200 250 300 350 425+
10 m	50 55	350 425+

POWER CONSUMPTION

LINK SPEED/ TRAFFIC	MEAN POWER (W)	MAX POWER (W)
100 Mb/s	9.21	14.92
1 GbE	12.04	18.08
10 GbE	24.69	28.95

Note: At voltage and temperature corners, the adapter might exceed 25 W total power and/or 2.1 A on the 12 V main rail.

NETWORK OPERATION SYSTEM (NOS) SUPPORT – ALL ADAPTERS

OPERATING SYSTEM	IA-32	X86-64	IA-64
Windows Server* 2016	N/A	X	N/A
Windows Server 2012 R2	N/A	X	N/A
Windows Server 2012	N/A	X	N/A
Windows Server 2008 8R2	N/A	X	N
Linux* Stable Kernel version 2.6/3x/4x	N/A	X	X
Linux RHEL 6.8, Linux RHEL 7.3	N/A	X	X
Linux SLES 11 SP4 and Linux SLES 12 SP1	N/A	X	X
FreeBSD* 11.0	N/A	X	X
UEFI* 2.1, UEFI 2.3 and UEFI 2.4	N/A	X	X
VMware* ESXi 5.5 and VMware ESXi 6.0	N/A	X	X

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

[1] The Intel® Ethernet CNA X710-T4 is Geneve ready.
[2] Feature to be enabled in post-launch release.
[3] Windows Server 2008 support only .

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