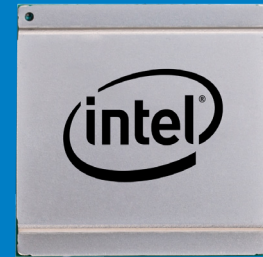**intel.**

Intel® Ethernet Controller X710-AT2 and -TM4

Multiple speeds and energy-efficient design for 10GBE, 10GBASE-T, and NBASE-T networks

Key Features

- Supports 2x10GbE or 4x10GbE configurations
- Support for NBASE-T and 802.3bz (2.5G/5GBASE-T)
- PCI Express (PCIe) 3.0, x8
- Energy Efficient Ethernet (EEE) 802.3az enabled for reduced power consumption[1]
- 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

Simplify technology transitions with the Intel® Ethernet Controller X710-AT2 and X710-TM4. These low-power controllers offer design flexibility through support for mixed media – quad port with two ports of BASE-T, and two ports of KR/SFI.

The X710-AT2 and -TM4 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.

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 Controllers 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 (VF)s, 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 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. 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.

Performance

10Gb throughput	Wire-rate down to 64 bytes
Standard Linux Stack Latency	~8 μs

Host Interface Features

PCIe 3.0; x8, x4, x1

PCI Power Management/ ACPI Extensions

TLP Processing Hint (TPH) Support

MSI-X Support

Network Interface Features

X710-AT2	10GBASE-T, NBASE-T, 1000BASE-T, 100BASE-TX
X710-TM4	10GBASE-T, NBASE-T, 1000BASE-T, 100BASE-TX, KR, SFI, KX, SGMII

Virtualization Interface Features

Features	Implementation
Emulated Support	Driver Optimizations and VMDQ enablement
Direct Assignment Support	PF and VF assignment with SR-IOV
Virtual Bridging Support	VEPA/802.1Qbg
Virtual Functions	Up to 128 per device
Network Virtualization	VxLAN, MACinUDP, NVGRE, IPinGRE

Management Interface Features

IPMI and BMC pass through

OS2BMC

MCTP (SMBus and PCIe)

DMTF NC-SI Pass-Through

SMBus Pass-Through

Advanced Filtering Capabilities (IPv4, IPv6)

PXE FLASH Interface Support

SNMP

RMON Statistic Counters

Signed UEFI option ROM compatible with HTTPS boot

Storage Interface Features

iSCSI Acceleration

Protect, Detect and Recover

The Intel Ethernet 700 Series implements a design philosophy of platform resiliency with 3 attributes supporting the NIST Cybersecurity Framework: Protect, Detect and Recover. These attributes verify the firmware and critical device settings with built-in corruption detection and automated device recovery to return the device to its originally programmed state.

TCP/IP/L2 Features

Receive Side Scaling (RSS) for TCP and UDP traffic

Large Send Off-load (LSO) / Generic Send Off-load (GSO) including encapsulated traffic

TCP/UDP/IP/SCTP Checksum Off-load including encapsulated traffic

IPv4, IPv6

Additional Features

Energy Efficient Ethernet (EEE) 802.3az enabled for reduced power consumption[1]

Enhanced Transmission Selection (draft IEEE 802.1Qaz)

Priority Flow Control (draft IEEE 802.1Qbb)

Data Center Bridging (DCB/DCB-X) Support; up to eight traffic classes

Jumbo Frame Support—Up to 9.5 KB (9728 Bytes)

VLAN Support

Package	22 mm x 22 mm FCBGA
Power	9.5 W max for X710-AT2 9.75 W max for X710-TM4
External Power Supply Voltages	3.3, 1.88, 1.0, and 0.92 Vdc
Safety and Regulatory	FCC B, UL, CE, VCCI, BSMI, CTICK, KCC, CSA

Environmental

Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)

Certifications

RoHS Compliant

FCC Class B

Supported Operating Systems

The Feature Support Matrix for Intel® Ethernet Controllers includes a complete list of supported network operating systems.

Product Order Code

Product Name	Product Code
Intel® Ethernet Controller X710-AT2	EZX710AT2
Intel® Ethernet Controller X710-TM4	EZX710TM4

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

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

Product Information
For more information about other Intel® Ethernet Products and technologies visit: intel.com/ethernetproducts

1. EEE 802.3az enabled for 10/5/2.5/1G, and 1GBASE-T, but not for 100BASE-TX

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