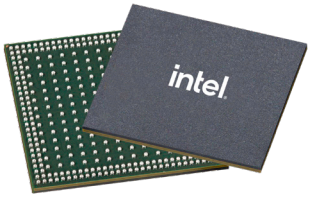
Product Brief
Intel® Ethernet 600 Series Controllers

Intel® Ethernet Controller E610 -XAT2/-XAT/-IAT2



Key Specifications

- Power optimized
- PCIe 4.0 x4, x2 and x1
- 10GBASE-T and 2.5GBASE-T
- Dual and single port 10GBASE-T
- Industrial temp (-40 °C to 85 °C)
- 20Gbps maximum throughput
- Secure firmware update
- Attestation SPDM 1.1.2
- Hardware Root of Trust (RoT)
- Secure boot
- Advanced virtualization
- Stateless offloads

Overview

Open standards-based Intel® Ethernet E610 Controllers leverage decades of Intel experience and expertise to deliver the latest advances in 10GBASE-T and 2.5GBASE-T connectivity, advanced security features, power-optimized architecture, and pin-compatible design.

Intel Ethernet E610 Controllers offer modern standards-based cryptographic security anchored by a hardware Root of Trust (RoT) and secure communications with management controllers to enhance Ethernet security with device attestation and secure firmware updates.

Power optimized for versatility across data center and edge use cases

E610 controllers deliver a highly optimized and significant generation-over-generation reduction in total power consumption to enable diverse use cases across servers, network appliances, embedded, and edge. At just 4.47 watts of total maximum power consumption at 2x10GBASE-T, the E610 controllers are designed for power and thermal-constrained devices and environments.

Simplify migration through software compatibility and broad operating system support

The Intel Ethernet 600 Series offers software compatibility for designs based on Intel Ethernet 500 Series architecture, maximizing existing application investments. Support for various client and server operating systems, including major hypervisors, make these controllers a consistent choice for data center and edge IoT applications.

Why Intel® Ethernet

Intel Ethernet E610 Controllers offer best-in-class compatibility, performance assurance, and world-class customer support. Key features and technologies deliver outstanding performance and support for servers, network appliances, embedded and edge IoT workloads.

Compatibility and interoperability

- Extensive conformance testing to IEEE and Ethernet Technology Consortium standards
- Comprehensive operating system and hypervisor support
- Broad network interoperability testing for best-in-class compatibility

Performance assurance

- Validated on all x86 architectures and optimized for Intel® architecture
- Security protocols and management to ensure data integrity
- Based on the Intel® Ethernet Controller 500 Series architecture for application compatibility

Worldwide product support

- Industry-leading warranty
- World-class customer pre- and post-product support
- Adherence to regulatory and environmental requirements

All Intel® Ethernet E610 Controllers Feature:

Pin Compatible Designs for Dual Port 10GBASE-T and 2.5GBASE-T Solutions

The dual and single port 10GBASE-T (E610-XAT2, E610-XAT) and the dual port 2.5GBASE-T (E610-IAT2) are pin-compatible and share the same bill of materials. This allows for near-complete design reuse; providing the ability to offer different link speed options without redesigning the Ethernet board logic.

Low Power Controller

With an absolute max power consumption of 4.47W, the E610-XAT2 controller represents a 53 percent reduction in max power compared to the Intel Ethernet Controller X710-AT2 and an incredible 61 percent reduction compared to the Intel Ethernet Controller X550-AT2.

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 (VF) 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 individual VMs. Traffic handling is offloaded to the network controller, delivering the benefits of port partitioning with little or no administrative overhead.

SR-IOV for Direct Assignment. Adapter-based isolation and switching enables optimal CPU usage in virtualized environments.

- Up to 64 VFs per port; each VF can support a unique and separate data path for I/O-related functions within the PCI Express hierarchy.
- SR-IOV, used with a networking device, 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.

Enhanced Network Virtualization Overlays (NVO)

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

The E610-XAT2 and E610-XAT preserve application performance for overlay networks, and the network traffic can be distributed across CPU cores, increasing network throughput.

Manageability

Broad system manageability capabilities using the latest DTMF (Distributed Management Task Force) protocols.

- NC-SI 1.2 protocol compliance. Transport options include NC-SI over RBT and NC-SI over MCTP.
- Secured messages using SPDM over MCTP.
- PLDM over RBT with an extended list of message types, including T4, T5, and T6 over RBT, and MCTP transport.

Modern Standards-based Security

Intel offers modern standards-based cryptographic security anchored by a hardware Root of Trust (RoT).

- Device attestation in compliance with SPDM 1.1.2 Security Protocol and Data Model.
- Compliant with NIST SP 800-193 platform firmware resiliency guidelines.
- Meets FIPS 140-3 level 1 requirements.
- Secure boot isolates sensitive parameters and keys used for boot and operation.
- Secure firmware update verifies digital signatures of new firmware binaries.
- Recovery mode/failsafe mode is activated upon detection of abnormal device operation.

Performance

Based on Intel® Ethernet 500 Series architecture

10Gb throughput wire-rate down to 128 bytes

Host Interface

PCI Express (PCIe) 4.0; x4, x2, x1

Network Interface

E610-XAT2, XAIT2, XAT
10GBASE-T: IEEE 802.3an
5/2.5GBASE-T: IEEE 802.3bz
1GBASE-T: IEEE 802.ab
100BASE-TX: IEEE 802.3u

E610-IAT2/IAIT2
2.5GBASE-T: IEEE 802.3bz
1GBASE-T: IEEE 802.ab
100BASE-TX: IEEE 802.3u

Virtualization Interface

Features	Implementation
Direct Assignment Support	Support for SR-IOV
Virtual Bridging Support	VEPA/802.1Qbg
Virtual Functions	Up to 64 per port
Network Virtualization	VXLAN, Geneve, NVGRE (Supported on 10GbE SKUs Only)

Traffic Steering

Receive Side Scaling (RSS)

Intel® Ethernet Flow Director

Stateless Offloads

TCP Segment Offload (TSO)

UDP Segment Offload (USO)

Large Segment Offload (LSO)

Checksum Offload (TCP/UDP/IP)

Large Receive Offload (LRO)

Transmit Side Scaling (TSS)

Receive Side Scaling (RSS)

Security

Latest in firmware resilience

RSA3K / SHA384 Signed Firmware

Device attestation in compliance with SPDM 1.1.2 security protocol and data model.

Silicon Root of Trust (RoT) compliant with NIST SP 800-193 platform firmware resiliency guidelines.

Meets FIPS 140-3 level 1 requirements.

Secure boot isolates sensitive parameters and keys used for boot and operation.

Secure firmware update verifies digital signatures of new firmware binaries.

Recovery mode/failsafe mode is activated upon detection of abnormal device operation.

Management Interface

IPMI & BMC pass through

MCTP over PCIe and SMBUS/I2C

Advanced Filtering Capabilities (IPv4, IPv6)

PXE FLASH Interface Support

SNMP

RMON Statistic Counters

NC-SI v1.2

NC-SI Pass-through modes: Network-BMC, Host-BMC

NC-SI over MCTP PCIe, MCTP SMBUS and RMII/RBT

OS2BMC

PLDM based firmware update

PLDM over MCTP, PLDM over NC-SI RMII/RBT

PLDM for Redfish Device Enablement Specification (RDE)

SPDM over MCTP and DOE

TCP/IP/L2

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

Package and Power

Package 14 mm x 16 mm FC-CSP

4.47 W max power for 2x10BASE-T

Environmental

Operating Temperature (Ambient): 0 °C to 70 °C (Commercial)

Operating Temperature (Ambient): -40 °C to 85 °C (Industrial)

Storage Temperature: -40 °C to 115 °C

Supported Operating Systems

For a complete list of supported network operating systems for Intel® Ethernet 600 Series Network Adapters visit:
intel.com/support/EthernetOS

Certifications

RoHS Compliant

FCC Class A, FCC Class B

Product Order Codes

Product Name	Configuration	Product Code
E610-XAT2	2-port, 10Gb, Commercial Temp	FUE610XAT2
E610-XAIT2	2-port, 10Gb, Industrial Temp	FUE610XAIT2
E610-XAT	1-port, 10Gb, Commercial Temp	FUE610XAT
E610-IAT2	1-port, 2.5Gb, Commercial Temp	FUE610IAT2
E610-IAIT2	1-port, 2.5Gb, Industrial Temp	FUE610IAIT2

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 information about Intel® Ethernet Products and technologies visit: intel.com/ethernet

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