intel®

Intel® Ethernet Network Adapter E810-CQDA1/CQDA2

Efficient workload-optimized performance at Ethernet speeds of 1 to 100Gbps

Key Features

- Single and Dual-Port QSFP28
- PCI Express (PCIe) 3.0 and 4.0, x16
- Ethernet Port Configuration Tool (EPCT)
- Application Device Queues (ADQ)
- Dynamic Device Personalization (DDP)
- Supports both RDMA iWARP and RoCEv2

Improve application efficiency and network performance with innovative and versatile capabilities that optimize high-performance server workloads such as NFV, storage, HPC-AI and hybrid cloud.

Performance for Cloud Applications

Delivers the bandwidth and increased application throughput required for demanding cloud workloads including edge services, web servers, database applications, caching servers, and storage targets.

- Application Device Queues (ADQ) improves application response times predictability using advanced traffic-steering technology
- Dynamic Device Personalization (DDP) enhances packet classification capabilities, to deliver up to 3x throughput improvement[1] for some cloud workloads
- Supports both RDMA iWARP and RoCEv2 for high-speed, low-latency connectivity to storage targets

Optimizations for Communications Workloads

Provides packet classification and sorting optimizations for high-bandwidth network and communications workloads, including mobile core, 5G RAN, and network appliances.

- Dynamic Device Personalization (DDP) supports existing and new communications-specific protocols improving packet-processing efficiency up to 3x for some Network Functions Virtualization (NFV) workloads
- IEEE 1588v2 Precision Time Protocol support enables precise clock synchronization across the 5G RAN deployments
- Enhanced Data Plane Development Kit (DPDK) support increases packet-processing speeds

Versatile Port Configurations with EPCT

E810-CQDA1 and -CQDA2 adapters support a wide range of system configurations to meet customer needs and workload requirements. The many port and speed combinations available simplify validation and deployment.

Connect to a wide range of switch speeds and media types

E810-CQDA1

E810-CQDA2

2x100Gb

1x100Gb

2x50Gb

4x25Gb

4x25Gb

2x2x25Gb

8x10Gb

Using EPCT, the Intel® Ethernet Network Adapter E810 (Dual or Single Port), can be programmed to act as many different physical network adapters, with a maximum throughput of 100Gbps

Intel® Ethernet 800 Series Network Adapters include these technologies:

Application Device Queues (ADQ) for Predictability at Scale

As modern data centers scale, a key challenge is to provide scalable, predictable application-level performance. ADQ technology improves performance scalability and predictability by dedicating queues to key workloads, delivering predictable high performance through dramatically reduced jitter.

Increasing the predictability of application response times by lowering jitter enables more compute servers to be assigned to a task and can allow more users to access the system, providing a better end-user experience. Even applications that are not large scale can benefit from higher consistency, enabling them to meet service-level agreements (SLAs) more easily.

INCREASES APPLICATION PREDICTABILITY

REDUCES APPLICATION LATENCY

IMPROVES APPLICATION THROUGHPUT

ADQ enables application-specific data steering, signaling, and rate limiting using an optimized application thread to device data path. This ability to dedicate queues and shape network traffic not only increases performance, it reduces latency and improves throughput.

Learn more at intel.com/ADQ

Improve Packet Processing Efficiency with Dynamic Device Personalization (DDP)

DDP customizable packet filtering, along with enhanced DPDK, support advanced packet forwarding and highly-efficient packet processing for both Cloud and NFV workloads.

DDP support was first introduced on the Intel Ethernet 700 Series with a few protocols that could be added to the default set defined in the firmware. The Intel Ethernet 800 Series firmware loads an enhanced DDP profile with many workload-specific protocols at driver initialization for greater flexibility. When multiple 800 Series adapters are present in a system, the pipeline on each adapter can be programmed independently with a different DDP profile.

IEEE 1588 Precision Time Protocol (PTP)

Intel Ethernet 800 Series supports both IEEE 1588 PTP v1 and v2 with two-step option. The products provide increased accuracy at single-digit nanosecond level, and can report the reception time for every packet. This level of timing accuracy can help ensure tight synchronization across network deployments ranging from 5G RAN to financial services, industrial automation, and energy monitoring.

Increase Throughput and Lower Latency with Remote Direct Memory Access (RDMA)

RDMA provides high throughput and low-latency performance for modern high-speed Ethernet by eliminating three major sources of networking overhead: TCP/IP stack process, memory copies, and application context switches. Intel Ethernet 800 Series Network Adapters support all major storage transport protocols, including iWARP, RocEv2, and NVMe over TCP.

RoCE (RDMA over Converged Ethernet): RoCEv2 substitutes the InfiniBand physical layer and data link layer with Ethernet, operates on top of UDP/IP, and is routable over IP networks.

iWARP, IETF standard protocols based: Delivers RDMA on top of the pervasive TCP/IP protocol. iWARP RDMA runs over standard network and transport layers and works with all Ethernet network infrastructure. TCP provides flow control and congestion management and does not require a lossless Ethernet network. iWARP is a highly routable and scalable RDMA implementation.

Protect, Detect, Recover

The Intel Ethernet 800 Series implements a design philosophy that you need to verify anything and everything that is trying to connect or gain admittance prior to granting access.

The 800 Series provides platform resiliency with three vectors of security: Protect, Detect, and Recover, with Hardware Root of Trust. By design, this protects the firmware and critical device settings with built-in corruption detection and automated device recovery to ensure the device is returned to its originally programmed state.

Intel® Ethernet 800 Series Network Adapters are designed with Intel® Ethernet Controller E810 and include these features².

Host Interface
- Compliance with PCIe 4.0 currently at draft 0.9
- Concurrency for 256 non-posted requests

Software Interface
- Base mode VF compatibility with Intel® Adaptive Virtual Functions Specification
- Tx/Rx Queues
  - 2048 Tx queues and 2048 Rx queues
  - Dynamic allocation of queues to functions and VSIs
- Interrupts
  - 2048 interrupts vectors, allocated in a flexible manner to queues and other causes
  - Multiple interrupt moderation schemes
  - 20M interrupts/sec
- Control Queues (a.k.a. Admin Queues)
  - Mailbox Queues for PF-VF and driver-driver
  - Admin Queues for Software-Firmware control flows
  - Sideband Queues for Software to access IPs inside the E810
- 256 Tx Doorbell (DB) Queues
- 512 Tx Completion Queues
- Quanta Descriptor (QD) Queue per Tx queue. Quanta information is also embedded in the Tx doorbell
- Programmable Rx descriptor fields

Packet Processing
- Enhanced Data Plane Development Kit (DPDK)
- General
  - Stages of parsing, switching, ACLs, classification, packet modification
  - Programmable packet processing pipeline
  - Profile based
  - Programmable actions
  - Propagation of priorities between stages
- Parser
  - Parses up to 504B from packet header
  - Parse Graph based
  - Session-based parsing
  - Programmable parse engine
- Binary Classifier (VEB Switch)
  - 768 switch ports (VSIs)
  - Programmable forwarding rules
  - Storm Control

- ACLs
  - 8K programmable TCAM entries
  - Tiling capability to n*40b width
- Classification Filters
  - Hash-based statistical distribution
  - Intel® Ethernet Flow Director (Intel® Ethernet FD) flow-based classification
  - Flow-based identification of iWARP and RoCE flows
  - Programmable rules
- Modifier
  - Insert (Tx), remove (Rx), and modify of packet VLANs
  - L3 and L4 checksums and CRC

Virtualization
- Host virtualization via VMDQ and SR-IOV
- Up to 256 SR-IOV Virtual Functions
- Stateless offloads for tunneled packets (network virtualization support)
- Malicious VF protection
- Virtual machine load balancing (VMLB)
- Advanced packet filtering
- VLAN support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags
- VXLAN, GENEVE, NVGRE, MPLS, VXLAN-GPE with Network Service Headers (NSH)
- Intel® Ethernet Adaptive Virtual Function drivers

RDMA
- iWARP and RoCEv2
- 256K Queue Pairs (QPs)
- Send Queue Push Mode

Note: RDMA is not supported when the E810 is configured for >4-port operation.

QoS
- WFQ Transmit scheduler with nine programmable layers
- Pipeline sharing and starvation avoidance
- QoS via 802.1p PCP or Differentiated Services Code Point (DSCP) value
- Packet shaping

Manageability
- SMBus operating at up to 1Mb/s
- DMTF-compliant NC-SI 1.1 Interface at 100Mb/s
- MCTP over PCIe and SMBus
- Enterprise-level management schemes via local BMC
- SNMP and RMON statistic counters
- Watchdog timer
- PLDM over MCTP; PLDM Monitoring; PLDM firmware update; PLDM for RDE
- Firmware Management Protocol support

Power Management
- Supports PCI power management states D0, D3hot, D3cold
- APM WoL support in D0, D3hot and D3cold

Time Synchronization
- Time stamp with each Rx packet
- Selective time stamps for Tx packets
- IEEE PTP 1588v1/2 support
- Time synchronization signaling with other local platform ingredients

Pre-Boot
- Signed UEFI option ROM compatible with HTTPS boot

Security
- Hardware-based Root of Trust
- Authentication on NVM Read and Power On
- Built-in detection of firmware/critical setting corruption with automated device recovery

ADAPTER FEATURES

Data Rate Supported	100/50/25/10/1GbE Per Port
Bus Type	PCI Express 3.0 (8GT/s) and PCI Express 4.0 (16GT/s)
Bus Width	PCI Express x16
Interrupt Levels	MSI-X
Hardware Certifications	FCC A, $_c$UL$_{US}$, CE, VCCI, BSMI, RCM, KCC
RoHS-compliant	Product is compliant with EU RoHS Directive 2 2011/65/EU (Directive 2011/65/EU) and its amendments (e.g. 2015/863/EU)
Controller	Intel® Ethernet Controller E810-CAM1 (Single Port) Intel® Ethernet Controller E810-CAM2 (Dual Port)
Bracket	Full-height bracket installed Low-profile bracket included in package
Dimension	167mm x 69mm

PRODUCT ORDER CODE

Configuration	Product Code
Single Port	E810CQDA1, E810CQDA1BLK
Dual Port	E810CQDA2, E810CQDA2BLK

POWER CONSUMPTION

DACs	Typical Power	Max Power
100GbE Max	18.1 W	16.3 W
Idle (no traffic)	16.5 W	15.1 W
Optics (3.5W)		
100GbE Max	20.1 W	26.3[3] W
Idle (no traffic)	18.8 W	24.6 W

SUPPORTED PHYSICAL LAYER INTERFACES

	100Gbps	50Gbps	25Gbps	10Gbps
DACs	IEEE 100GBASE-CR2 100GBASE-CR4	IEEE 50GBASE-CR 25G/50G Consortium 50GBASE-CR2	25GBASE-CR (CA-N, CA-S, CA-L)	SFP+ 10GbE DAC
Optics and AOCs	CAUI-4 100GAUI-2 100GAUI-4	IEEE 50GAUI-1 IEEE 50GAUI-2 IEEE LAUI-2	25GBASE-SR/LR	10GBASE-SR/LR

TECHNICAL SPECIFICATIONS

Air Flow	Commercial Temp DAC Dual Port 250 LFM at 55 °C ambient Meets PCIe thermal level 4	Extended Temp Optics (3.5 W) Dual Port 300 LFM at 55 °C ambient Meets PCIe thermal level 4	Industrial-Temp* 100G Optics (3.5 W) 50 °C @ 210 LFM 55 °C @ 300 LFM 60 °C @ 450 LFM *85 °C max case Using 100GbE DAC: 52 °C @ 200 LFM 55 °C @ 250 LFM 60 °C @ 300 LFM
Storage Humidity	Maximum: 90% non-condensing relative humidity at 35 °C		
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)		
Operating Temperature	0 °C to 55 °C (32 °F to 131 °F)		
LED Indicators	ACTIVITY (blinking) NO ACTIVITY (off)	LINK SPEED (green = 100GbE; amber = less than 100GbE; off = no link)	

SUPPORTED OPERATING SYSTEMS

For a complete list of supported network operating systems for Intel® Ethernet 800 Series Network Adapters visit: intel.com/support/EthernetOS

Warranty

Intel limited lifetime hardware warranty, 90-day money-back guarantee (US 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

INTEL® ETHERNET ACCESSORIES

Intel® Ethernet Optics and Cables are proven, reliable solutions for high-density Ethernet connections. Combine these accessories with Intel® Ethernet 800 Series Network Adapters for dependable interoperability and consistent performance across the network. Learn more at intel.com/ethernetproducts

Product Information

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