intel. + cisco™

Intel® Ethernet Network Adapter E810-CQDA2

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

Key Features

- Dual-Port QSFP28
- PCI Express (PCIe) 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 time 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 1588 Precision Time Protocol (PTP) v2 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

100Gb Intel Ethernet 800 Series Network Adapters can reduce complexity for port-constrained network environments. Using the Ethernet Port Configuration Tool (EPCT), the physical port configurations and port speeds can be changed on demand, and as often as needed. The ability to configure and reconfigure these 100Gb adapters can also reduce validation processes and simplify deployments. A 2x100GbE network adapter, with maximum bandwidth of 100GbE, can be configured as 1x100GbE, 2x50GbE, 4x25GbE, 4x10GbE or 8x10GbE.

Connect to a wide range of switch speeds and media types
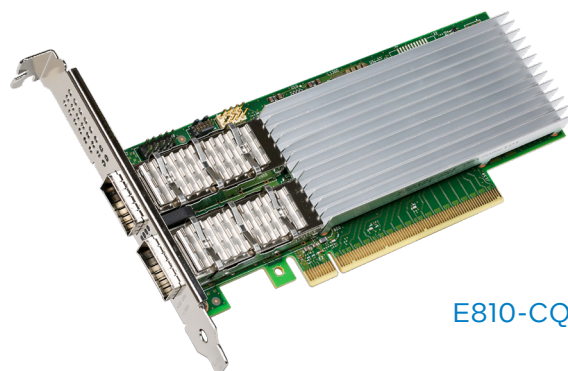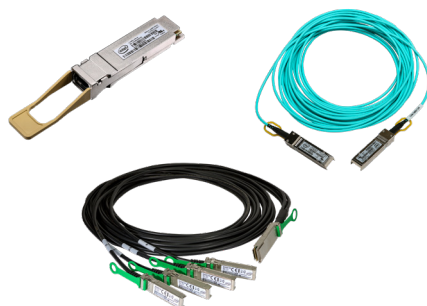
E810-CQDA2

All 800 Series products include these technologies

Greater Predictability at Scale

As modern data centers scale, a key challenge is to provide scalable, predictable application-level performance. Application Device Queues (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.

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.

Increase Throughput and Lower Latency

Remote Direct Memory Access (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 Ethernet-based storage transport, including iWARP, RoCEv2, and NVMe over Fabric.

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.

Improve Packet Processing Efficiency

Dynamic Device Personalization (DDP) customizable packet filtering, along with enhanced DPDK, supports advanced packet forwarding and highly-efficient packet processing for both Cloud and NFV workloads.

The 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.

Increase Timing Accuracy

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.

Protect, Detect, and Recover

Zero Trust is a security design strategy centered on the belief that organizations, by default, should not automatically trust any request for system access. This includes requests coming from outside, as well as inside its perimeters. Zero Trust demands that every access request be verified before granting access.

The 800 Series implements a design philosophy of platform resiliency with 3 attributes compliant with the NIST Cybersecurity Framework, including NIST 800-193 Platform Firmware Resiliency Guidelines: Protect, Detect and Recover. By design, the Hardware Root of Trust in the 800 Series protects the firmware and critical device settings with authentication for every access. Signed firmware updates and the Hardware Root of Trust protects and verifies critical device settings with built-in corruption detection and automated device recovery. Together these features ensure the device safely returns to its originally programmed state.

Intel® Ethernet 800 Series Network Adapters are designed with Intel® Ethernet Controller E810 and include these features².
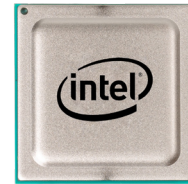
Host Interface
- Compliance with PCIe 4.0
- Concurrency for 256 non-posted requests

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
- 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

Time Synchronization
- Time stamp with each Rx packet
- Selective time stamps for Tx packets
- IEEE 1588 PTP v1 and v2 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[3] Per Port
Bus Type/Bus Width	PCIe 4.0 x16
Performance	Full line rate with either PCIe 5.0 x16, 4.0 x16 or 3.0 x16 active lanes; PCIe 4.0 x8 active lanes
Hardware Certifications	FCC B, UL, 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-CAM2
Bracket	Full-height bracket installed Low-profile bracket included in package (Lowest port number is at top of bracket)
Dimension	167 mm x 69 mm

Power Consumption

DACs	Typical Power	Max Power
100GbE Max	16.9 W	19.2 W
Idle (no traffic)	15.4 W	17.3 W
Optics (3.5W)		
100GbE Max	20.8 W	27.1[4] W
Idle (no traffic)	19.3 W	25.4[4] W
QSFP28 Max Power Per Port*		3.5 W

*The max power per port is not an additional power requirement, it is included in the optics maximum power figures listed in the Power Consumption table.

Technical Specifications

Airflow	Commercial Temp DAC 450 LFM @ 60 ºC ambient 350 LFM @ 55 ºC ambient 200 LFM @ 45 ºC ambient	Commercial Temp Optics (3.5 W) 500 LFM at 45 ºC ambient	Extended Temp* Optics (3.5 W) 500 LFM @ 60 ºC ambient 400 LFM @ 55 ºC ambient 250 LFM @ 45 ºC ambient *85 ºC max case
Storage Humidity	Maximum: 90% non-condensing relative humidity at 35 ºC		
Storage Temperature	-40 ºC to 70 ºC (-40 ºF to 158 ºF)		
Operating Temperature	0 ºC to 60 ºC (32 ºF to 140 ºF)		
LED Indicators	ACTIVITY (blinking) NO ACTIVITY (off) LINK SPEED (green = 100GbE; amber = less than 100GbE; off = no link)		

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

Supported Cisco Optics and Cables

These optics and cables have been tested for compatibility and are approved for use with Intel® Ethernet Network Adapter E810-CQDA2 (as of the time of this publication). For the latest update, check the UCS Technical Specs, and consult Cisco Compatibility Matrix: https://tmgmatrix.cisco.com

Cisco Product ID	Description
QSFP-100G-AOC7M	Cisco 100GBase QSFP Active Optical Cable, 7-meter
QSFP-100G-AOC10M	Cisco 100GBase QSFP Active Optical Cable, 10-meter
QSFP-100G-CU1M	Cisco 100GBASE-CR4 QSFP Passive Copper Cable, 1-meter
QSFP-100G-CU2M	Cisco 100GBASE-CR4 QSFP Passive Copper Cable, 2-meter
QSFP-100G-CU3M	Cisco 100GBASE-CR4 QSFP Passive Copper Cable, 3-meter
QSFP-100G-CU5M	Cisco 100GBASE-CR4 QSFP Passive Copper Cable, 5-meter
QSFP-4SFP25G-CU1M	Cisco 100GBASE QSFP to 4xSFP25G Passive Copper Splitter Cable, 1-meter
QSFP-4SFP25G-CU2M*	Cisco 100GBASE QSFP to 4xSFP25G Passive Copper Splitter Cable, 2-meter
QSFP-4SFP25G-CU3M*	Cisco 100GBASE QSFP to 4xSFP25G Passive Copper Splitter Cable, 3-meter
QSFP-100G-SR4-S	Cisco 100GBASE-SR4 QSFP Transceiver, MPO-12, 100m over OM4 MMF, S-Class
QSFP-40/100-SRBD	Cisco 100G and 40GBASE SR-BiDi QSFP Transceiver, LC, 100m OM4 MMF
QSFP-100G-SR1.2	Cisco 100G SR-BiDi QSFP Transceiver, LC, 100m OM4 MMF

*RS-FEC enablement is required for 2M and 3M DACs.

Interoperable Optics

This optic has been tested by Intel for use with Intel® Ethernet Network Adapter E810-CQDA2 (as of the time of this publication).

Vendor	Part Number	Description
Finisar	FTLC1154RDPL	10km 100GBASE-LR4 QSFP28 Optical Transceiver Module*

*Minimum thermal requirement: 500 LFM at 45 ºC ambient

Intel® Ethernet Optics

Intel® Ethernet Optics 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

Supported Operating Systems

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

Product Order Codes

Dual Port	Cisco Product ID
Server Installed	UCSC-P-I8D100GF
Spare adapter	UCSC-P-I8D100GF=

Cisco servers supported*: C220 M6, C240 M6, C225 M6, C245 M6, C220 M7, C240 M7

*Server compatibility indicated as of the date of this publication.
For up-to-date server compatibility, please check:
https://ucshcltool.cloudapps.cisco.com/public/

1. Dynamic Device Personalization (DDP) enables protocol-specific traffic acceleration, to deliver throughput improvement and latency reduction for some cloud workloads
2. See the Intel® Ethernet Controller E810 Datasheet for the full list of product features.
3. For 100GbE adapters, 1GbE will be supported in a future release.
4. Edge Power Consumption on dual-port adapters, using power class 4 optics drawing the maximum allowed power of 3.5 W each has been shown to exceed the 25 W limit dictated by PCIe CEM specification for products that do not request/configure for high power at the 75 W level. Intel® drivers do not currently support this configuration request. As such the card is not in compliance with the *PCI Express Card Electromechanical Specification Revision 4.0, Version 1.0* as written.