

# 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) 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<sup>1</sup> 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



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.



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](https://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.

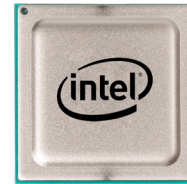
**iWARP, IETF standard protocols based:** Delivers RDMA on top of the pervasive TCP/IP protocol. iWARP RDMA runs over standard network and transport layers and works with all Ethernet network infrastructure. TCP provides flow control and congestion management and does not require a lossless Ethernet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

### Protect, Detect, and Recover

Zero Trust is a security design strategy centered on the belief that organizations, by default, should not automatically trust anything or anybody inside or outside its perimeters and instead must verify anything and everything trying to connect and gain admittance to its systems before granting access.

Intel Ethernet 800 Series implements a design philosophy of platform resiliency with 3 vectors of security: Protect, Detect and Recover, with Hardware Root of Trust to protect the firmware and critical device settings with built-in detection of corruption and automated device recovery to ensure returning the device to its originally programmed state.

# Intel® Ethernet 800 Series Network Adapters are designed with Intel® Ethernet Controller E810 and include these features<sup>2</sup>.



## 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/Bus Width      | PCIe 4.0 x16  |
| Hardware Certifications | FCC B, c UL <sub>1551</sub> , CE, VCCI, BSMI, RCM, KCC  |
| RoHS-compliant          | Product is compliant with EU RoHS Directive 2011/65/EU (Directive 2011/65/EU) and its amendments (e.g. 2015/863/EU) |
| Controller              | Intel® Ethernet Controller E810-CAM1 (Single Port)<br>Intel® Ethernet Controller E810-CAM2 (Dual Port)              |
| Bracket                 | Full-height bracket installed<br>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           | 16.9 W        | 19.2 W              |
| Idle (no traffic)    | 15.4 W        | 17.3 W              |
| <b>Optics (3.5W)</b> |               |                     |
| 100GbE Max           | 20.8 W        | 27.1 <sup>3</sup> W |
| Idle (no traffic)    | 19.3 W        | 25.4 <sup>3</sup> W |

## SUPPORTED PHYSICAL LAYER INTERFACES

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

## TECHNICAL SPECIFICATIONS

|                       |   |   |   |
|-----------------------|---|---|---|
| Airflow               | <b>Commercial Temp DAC</b><br>Dual Port 450 LFM @ 60 °C ambient<br>Dual Port 350 LFM @ 55 °C ambient<br>Dual Port 200 LFM @ 45 °C ambient | <b>Commercial Temp Optics (3.5 W)</b><br>Dual Port 500 LFM at 45 °C ambient | <b>Extended Temp* Optics (3.5 W)</b><br>Dual Port 500 LFM @ 60 °C ambient<br>Dual Port 400 LFM @ 55 °C ambient<br>Dual Port 250 LFM @ 45 °C ambient<br><i>*85 °C max case</i> |
| 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 60 °C (32 °F to 140 °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](https://www.intel.com/support/EthernetOS)

## 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](https://www.intel.com/ethernetproducts)

## 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](https://www.intel.com/content/www/us/en/support/contact-support.html)

## Product Information

For information about Intel® Ethernet Products and technologies visit: [intel.com/ethernet](https://www.intel.com/ethernet)

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. Edge Power Consumption on dual-port adapters, using power class 2 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.

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