

# Intel® Ethernet Network Adapter

## E810-2CQDA2

Up to 200Gbps for bandwidth-intensive workloads

### 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

Meet the demanding bandwidth needs of advanced Communications, Cloud, and Storage deployments and improve application efficiency and network performance with innovative and versatile capabilities that optimize high-performance server workloads.

The Intel® Ethernet Network Adapter E810-2CQDA2 delivers up to 200Gbps of total bandwidth in PCIe 4.0-compliant systems<sup>1</sup>. Each QSFP28 port supports up to 100Gbps, providing the functionality and throughput of two 100Gbps adapters in a single bifurcated PCIe 4.0 x16 slot.

### 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<sup>2</sup> for some cloud workloads
- Supports both RDMA iWARP and RoCEv2 for high-speed, low-latency connectivity to storage targets, hybrid cloud, and HPC

### 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

Connect to a wide range of switch speeds and media types



E810-2CQDA2

Versatile Port Configurations with EPCT  
Using EPCT, each port supports up to 100Gbps and can be programmed to act as different physical adapters.

The E810-2CQDA2 supports these configurations:

- 2x10Gb
- 2x50Gb
- 8x25Gb

## 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.

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.

### 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.

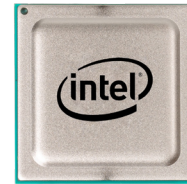
**iWARP, IETF standard protocols based:** Delivers RDMA on top of the pervasive TCP/IP protocol. iWARP RDMA runs over standard network and transport layers and works with all Ethernet network infrastructure. TCP provides flow control and congestion management and does not require a lossless Ethernet 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 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 features<sup>3</sup>.



## 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
  - 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

## 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

\*Intel Ethernet Network Adapter E810-2CQDA2 has two E810 controllers that deliver the values listed per port for these features.

## Adapter Features

Data Rate Supported	100/50/25/10/1GbE per port
Bus Type/Bus Width	PCIe 4.0 x16 Note: full 200Gbps performance requires PCIe slot bifurcation enabled in the system BIOS
Hardware Certifications	FCC B, UL, 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 (two controllers per adapter)
Bracket	Full height
Dimension	167 mm x 111 mm

## Product Order Code

Configuration	Product Code
Dual Port	E8102CQDA2G1P5

## Power Consumption

DACs	Typical Power	Max Power
100GbE Max	21.8 W	29.6 W
Idle (no traffic)	19.2 W	N/A
Optics (2 W)		
100GbE Max	25.3 W	33.5 W
Idle (no traffic)	22.8 W	N/A

## 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

Airflow	<b>Commercial Temp DAC</b> Dual Port 250 LFM @ 55 °C ambient Dual Port 150 LFM @ 45 °C ambient	<b>Commercial Temp Optics (2 W)</b> Dual Port 600 LFM @ 55 °C ambient Dual Port 300 LFM @ 45 °C ambient	<b>Extended Temp* Optics (2 W)</b> Dual Port 250 LFM @ 55 °C ambient Dual Port 200 LFM @ 45 °C ambient <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)  
Note: Windows Server support will be available in an upcoming software release.

## 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)

1. Requires x16 slot bifurcation.
2. Dynamic Device Personalization (DDP) enables protocol-specific traffic acceleration, to deliver throughput improvement and latency reduction for some cloud workloads
3. See the [Intel® Ethernet Controller E810 Datasheet](#) for the full list of product features.

## Product Information

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

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