Product Brief
Intel® Ethernet 800 Series Network Adapters

Intel® Ethernet Network Adapter E810-CQDA1/CQDA2 for OCP 3.0

Efficient workload-optimized performance at Ethernet speeds of 10 to 100Gbps

Key Features

- OCP NIC 3.0 Small Form Factor
- 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 server workloads such as Network Functions Virtualizations (NFV), storage, HPC-AI and hybrid cloud.

The OCP NIC 3.0 specification defines a standardized design for a new generation of network adapters. Simple and straightforward form factors, clear manageability requirements, and improved serviceability help simplify deployment for current and emerging capabilities.

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 NFV workloads
- IEEE 1588 Precision Time Protocol (PTP) v2 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

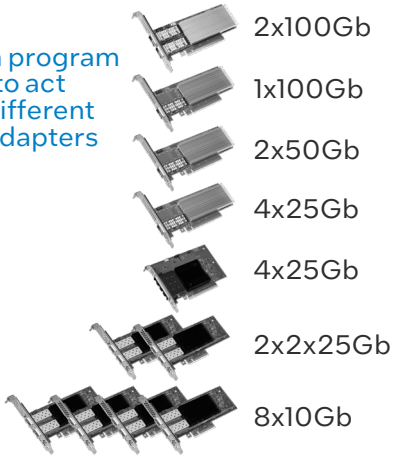
E810-CQDA1 and -CQDA2 adapters for OCP 3.0 support a wide range of system configurations to meet customer needs and workload requirements. The many port and speed combinations available simplify validation and deployment.

Connect to a wide range of switch speeds and media types

E810-CQDA1 for OCP 3.0

E810-CQDA2 for OCP 3.0

EPCT can program adapters to act as many different physical adapters



2x100Gb
1x100Gb
2x50Gb
4x25Gb
4x25Gb
2x2x25Gb
8x10Gb

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.

For more information about Intel® Ethernet Technologies, including videos and resource libraries, visit intel.com/ethernet

Intel® Ethernet 800 Series Network Adapters are designed with Intel® Ethernet Controller E810 and include these features[2].

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

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

Ethernet Port Configuration Tool (EPCT)
- Available for all 100Gb Intel® Ethernet 800 Series Network Adapters
- Offers system configuration options for high-density, port-constrained network environments
  - Up to six configurations to choose from
  - Validate once, reconfigure as often as needed
- Watch the video, or see the infographic

Adapter Features

Data Rate Supported	100/50/25/10GbE Per Port
Bus Type/Bus Width	PCIe 4.0 x16
Hardware Certifications	BSMI, CE, CMIM, FCC, ICES, KCC, RCM, UKCA, cURus, and VCCI
BMSI RoHS and RoHS-compliant	Product is compliant with Taiwan Bureau of Standards, Metrology and Inspection (BMSI), and 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)
Dimension	115 mm x 76 mm
Form Factor	OCP NIC 3.0 Small Form Factor
Manageability for OCP NIC 3.0	RBT and RBT + MCTP

Product Order Code

Configuration	Product Code
Single Port	E810CQDA1OCPV3
Dual Port	E810CQDA2OCPV3

Power Consumption

	Single Port	Single Port	Dual Port	Dual Port
DACs	Typical Power	Max Power	Typical Power	Max Power
100GbE Max	16.3 W	18.6 W	15.9 W	19.0 W
Idle (no traffic)	13.7 W	–	15.5 W	18.6 W
Optics				
100GbE Max	19.7 W	22.5 W	22.8 W	27[3] W
Idle (no traffic)	15.8 W	–	22.6 W	24.3[3] W
QSFP28 Max Power Per Port*		4.5 W		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.

Notes: Power consumption of transceivers varies. Optical Transceivers are included in the Active Cables device category in the OCP NIC 3.0 specification. Numbers are for dual port model only.

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 100Gb-SR/SR4/LR/LR4	IEEE 50GAUI-1 IEEE 50GAUI-2 IEEE LAUI-2	25GBASE-SR/LR	10GBASE-SR/LR

Technical Specifications

Airflow	Direct Attach Cable 70 °C case	Optical Transceiver (3.5W) 85 °C Case
Hot Aisle (5 - 65 °C)	Tier 3	Tier 7
Cold Aisle (5 - 45 °C)	Tier 2	Tier 4

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 65 °C (32 °F to 149 °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

Intel® Ethernet Optics

Combine high-density Ethernet connections with Intel® Ethernet 800 Series Network Adapters for dependable interoperability and consistent performance across the network. Intel Ethernet Optics have been extensively tested for compatibility with Intel Ethernet Network Adapters. Learn more at 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

Product Information

For information about Intel® Ethernet products and technologies visit: 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 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.

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