

Intel® Infrastructure Processing Unit Adapter E2100-CCQDA2

Enables rapid innovation for the modern data center

Key Features

- Intel® IPU SoC E2100 with 200Gb Ethernet bandwidth
- Full-height, three-quarter length, PCIe form factor
- 16-lane PCIe 4.0
- 2x QSFP56 ports
- Supports 2x 100GbE, or 4x 25GbE, or 1x 200GbE interfaces
- USB and 1GbE out-of-band RJ45 management
- Total 48GB on board LPDDR4x memory
- Single-width, passive heatsink

The Intel® Infrastructure Processing Unit (Intel® IPU) Adapter E2100-CCQDA2 delivers infrastructure acceleration, virtual storage enablement and enhanced security features in the data center. The adapter features a rich packet-processing pipeline, 200Gb Ethernet bandwidth, and includes NVMe, compression and crypto accelerators. The Arm Neoverse N1 compute complex allows customer-provided software to execute features, ranging from complex packet-processing pipelines to storage transport, device management, and telemetry. By utilizing a combination of acceleration hardware and software running in the compute complex, this IPU adapter enables rapid innovation necessary for the modern data center.

Agile Platform for Flexible Deployments

The E2100-CCQDA2 offers three main advantages to data center infrastructure managers and the workloads run in the Cloud, Enterprise and Telco Cloud data centers.

Separation and isolation of infrastructure workloads.

Whether tenants in a cloud environment or application workloads in an edge or enterprise environment, IPU's optimize host CPU applications by removing the infrastructure overhead from traditional host-based network and storage infrastructure applications.

Offload virtualized networks to the IPU where the accelerators can process tasks more efficiently. For an IaaS, host CPUs can be used for more workload-intensive tasks and greater revenue.

Replace previously necessary local disk storage with detached virtualized storage. This architecture enables flexible allocation of disk storage lowering overall costs.

Network Data Processing

The E2100-CCQDA2 network subsystem supports 200Gb/s of throughput. The programmable packet processor delivers leadership support for switch offload, firewalls, and telemetry functions while supporting up to 200Mpps performing in real-world implementations. The NVMe offload engine exposes high-performance NVMe devices to the host processor, enabling infrastructure providers to use the IPU to implement their storage protocol of choice (e.g. hardware accelerated, NVMe over fabric or custom software backend compute system). Additionally, the E2100 adapter provides inline IPsec which can secure every packet sent across the network.



Improved Packet Processing Efficiency

The flexible packet processor enables data-plane use cases such as network virtualization, microservices, physical networking, and telemetry, and several legacy and advanced use cases for Cloud, Enterprise, and Telco.

The packet processing engine consists of the packet processor and traffic shaper, which support up to 200Mpps. Additionally, the packet processor supports P4 Programmable Pipeline with Inline IPsec, Hardware Connection Tracking, and Stateful ACLs, providing flexibility for defining and customizing the behavior of network data planes.

Dedicated Compute for Infrastructure Processing

The adapter compute complex is equipped with 16 Arm Neoverse N1 cores. These cores run up to 2.5GHz and are backed by a large 32MB system level cache. Three channels of LPDDR4x memory are supported for high-bandwidth usage. Together, these features give this IPU the bandwidth and horsepower to take on large infrastructure workloads.

The compute complex is tightly coupled with the network subsystem allowing accelerators to access the system-level cache as a last-level cache providing high-bandwidth and low-latency connections. This architecture enables a combination of hardware and software packet processing allowing for custom configurations. The Lookaside Crypto and Compression Engine is derived from Intel® Quick Assist Technology. Storage applications benefit from the compression engine while securely transmitting the data.

Programmable Port Configuration

The port speed and the number of ports for this adapter can be configured on demand, reducing network adapter validation and simplifying deployment. Port configurations available: single-port 200GbE, dual-port 100GbE (2 lanes of 50Gb PAM4 or 4 lanes 25Gb NRZ), and 4x25GbE breakout.

Use Cases

Intel® Infrastructure Processing Unit Software Development Kit (Intel® IPU SDK) is a software stack that runs on the compute complex and the attached host. Developers can use the Intel® IPU SDK on the SoC to create targeted customer solutions.

- **Tenant Hosting:** Virtualized Network and Storage functionality; abstraction interface for tenants to access cloud services; hosts customer control-plane; provides custom device support.
- **Accelerators as a Service:** Enables network-to-device memory data path; provides service abstraction for access to devices while implementing functions like QoS.
- **Appliance:** Performs packet processing either on a per-packet or per-flow basis; can soft terminate packets.
- **Smart Switch:** Multiple IPUs perform packet processing for select top-of-rack (ToR) packets.
- **Kubernetes Acceleration:** Kubernetes platform solution for Enterprise customers using container-based SW development models; offloads container networking and optionally container storage to the IPU.

Intel IPU Adapter E2100-CCQDA2 is designed with Intel IPU SoC E2100 and includes these features:

Ethernet

- 2x QSFP56 ports
- Can support 2x 100GbE, or 4x 25GbE with breakout cable, or 1x 200GbE interfaces
- Network Controller Sideband Interface (NC-SI) on-board header

PCIe

- PCIe 4.0 x16, SMBus
- Supports PCIe CEM 4.0 (electrical) and PCIe CEM 5.1 (mechanical) specifications
- Up to 150W 12V Auxiliary power input

Management Interface

- 1000BASE-T front panel RJ45 port to E2100 manageability
- NC-SI supported through onboard header and cable
- NC-SI is supported in any state where 3.3V Aux and +12V CEM are present
- USB front panel debug port
- 1x RJ45 Connector to Data Center Management Network Specification

Packet Processing Engine

- P4 Programmable Pipeline with Inline IPsec, Hardware Connection Tracking and Stateful ACLs
- Up to 1M LPM Routes, up to 16M Exact Match Entries, 1M Meters/Policers/Shapers, TCAM and range tables
- Programmable Parsing, Multi-stage Match-Action, Mirroring, Multicast, Modification and Recirculation

Compute Complex

- Up to 16 Arm Neoverse N1 cores at up to 2.5GHz with 64 KB L1 cache and 512 KB L2 cache per core
- Coherent Mesh Network Interconnect with 32MB System Level Cache (SLC)
- 3 channels of 16GB LPDDR4x memory totaling 48GB

Storage Features

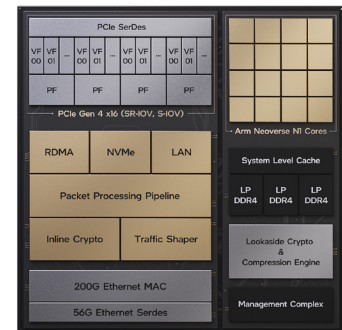
- NVMe: NVMe Initiator Offload
- Customized Storage Protocols with AES-XTS and CRC offloads on the Compute Complex
- Nonvolatile memory express (NVMe) storage device, total of 64GB

NVMe Performance

- Up to 200Gbps line rate bi-directional throughput
- Hardware paths support up to 6M 4KB R/W IOPS simultaneously

Security and Crypto

- Inline IPsec engine supports PSP AES-GCM 128/256
- Lookaside Cryptography and Compression Engine (LCE)
 - Support for chained operations
 - 200Gb Bulk Crypto per direction including TLS offload
- Internal/External RoT, Secure Boot, Secure Debug, TRNG via management complex
- Meets Security Standard SP800-193



Adapter Features	
Data Rate Supported	200/100/25GbE
Bus Type/Bus Width	PCIe 4.0 x16
Controller	Intel IPU SoC E2100
Dimensions	256mm x111mm; full-height, three-quarter length, single-width card, compliant with CEM 5.1 mechanical specification.

Certifications and Compliance	
Hardware Certifications	cURus, CE, FCC, ICES, CB, UKCA, VCCI, ACMA, KCC, BSMI and Morocco
RoHS Compliance	EU RoHS, BSMI RoHS, EU WEEE, EU REACH, China RoHS

Supported Physical Layer Interfaces			
	1x200GbE	2x100GbE	4x25GbE
DACs	200GBASE-CR4 (Port 0 only) DAC Cables	100GBASE-CR4 DAC Cables	25GBASE-CR (Port 0 only)
Optics and AOCs	N/A	Up to Class 6 (3.5W) SR4 extended temp AOCs Up to Class 6 (3.5W) SR4 extended temp optics transceivers	Up to Class 6 (3.5W) SR AOC breakouts

Technical Specifications	
Storage Humidity	Maximum: 85% relative humidity at 25 °C
Storage Temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Operating Temperature	0 °C to 45 °C (32 °F to 113 °F)

Product Order Code	
Configuration	Product Code
Dual Port	E2100CCQDA2RJG1

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® Infrastructure Processing Units, visit: intel.com/ipu

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