Industry's Leading SmartNICs with intelligent network, security, and storage acceleration

Cavium LiquidIO® II CN23XX Intelligent Network Adapter Family

Product Brief

Cavium's LiquidIO® II server adapters with 10/25 Gigabit Ethernet connectivity, built using Cavium's market leading technology, provide the best-in-class performance for hyperscale, Telco, and enterprise/ private datacenters with intelligent network, storage and security acceleration.

Introduction

Cloud infrastructure requires optimizing equipment for performance, cost and power at scale. Intelligent adapters can achieve these goals by moving specific workloads onto highly optimized adapter hardware, leaving the host server to run more efficiently. Moving network virtualization, storage protocols, security, SDN and network overlay to the adapter can dramatically improve overall OpEx and CapEx.

LiquidIO adapters provide flexible IO capabilities, advanced network and security hardware accelerators, and software support to provide the best-in-class performance for various cloud data center models, including hyperscale, Telco, enterprise and hybrid clouds. Server and network virtualization put extra demands on server infrastructure and LiquidIO adapters provide an efficient solution.

LiquidIO Features and Benefits

DPI Accelerators -

The DPI hardware engine includes DPI HFA (Hyper Finite Automata) engines for generic packet analysis and a dedicated DPI HNA (Hyper Non-deterministic Finite Automata) block to accelerate complex regular expression rules. Data centers can enhance cybersecurity with a rich set of supported crypto acceleration.

Key Benefits

- Maximize east-west scalability on Compute nodes with virtual machine density
- Network Acceleration with maximum application performance
- Storage acceleration with NVMe
- Custom programmability for faster time to market with new features
- CPU offload of compute intensive applications and transport operations
- Workload optimized software for performance and compute scalability
- Reduces power, management and infrastructure costs

Key Features

- Flexible I/O for Cloud scale – 10/25 GigE
- Network & Security Acceleration
- NVMe Over Fabrics with L2 Transport
- NFV based Dynamic Intelligent Service Chaining
- Network and Security Offload
  - Virtual Switch
  - IPsec and SSL
  - Overlay Network
  - DPI Offload
  - Layer 3 - 7 classification
- QoS with Traffic Metering
- Header and Packet Parsing

Quality of Service (QoS)

Data center efficiency and scalability depends on the capabilities of a network adapter to manage, schedule, steer and prioritize traffic based on queue management, packet marking, congestion notification and priority based scheduling. LiquidIO supports various mechanisms to manage and shape traffic with dedicated independent queues in hardware. LiquidIO adapters support hierarchical levels with single or dual rate tri-color marking and per queue shaping and scheduling.

Open Virtual Switch (OVS) Offload

Virtualization has led to better CPU utilization for cloud infrastructure with a myriad of applications running on multiple VMs per compute node. The host based OVS typically manages the packet switching between the VMs and this comes with a cost of reduced scalability and higher CPU utilization as dedicated CPU cores manage packet inflow/outflow.

LiquidIO solves this by offloading the OVS stack from the host to the NIC, reducing CPU overhead and allowing more VMs on a compute node. This is done efficiently with multiple instances on a single node, each with their own isolated network domain over a shared network infrastructure.

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Overlay Network Offload

In a multi-tenant cloud data center, VM isolation in a shared network infrastructure is critical.

As more VMs get hosted on powerful compute nodes, efficiently managing traffic from each VM is done using overlay networks. Overlay networks carry traffic from each VM encapsulated in formats such as VXLAN, NVGRE, and GENEVE.

With LiquidIO hardware capabilities, overlay network traffic encapsulation/de-encapsulation is offloaded to the NIC while maintaining all the traditional offloads (transport and checksum).

LiquidIO integrated with OpenStack

Integrated natively with OpenStack Neutron (network), OVS with overlay network acceleration can be easily managed via standard APIs for cloud and datacenter management.

Security Offloads

LiquidIO utilizes Cavium's industry leading security architecture to deliver security acceleration with IPsec offload and inline processing with no CPU overhead, both as a standalone solution and as part of OVS offload (tunnel and transport mode). It supports advanced features such as packet classification and flow aggregation with encapsulation, while maintaining support for traditional offloads (inner and outer transport and checksum offload) in a virtual datacenter with end-to-end packet encryption. This ability to handle multiple offloads with high performance differentiates LiquidIO.

DPI with L7 Application Recognition

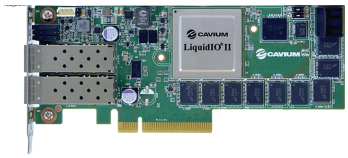
Cloud networks must support the increase in data size and availability with the right cybersecurity analysis tools and software. LiquidIO hardware acceleration supports dedicated security and crypto engines to allow data analysis of traffic from L3-L7 with deep packet inspection, packet filtering and application recognition features to enhance security in data centers.

Full Custom Programmability

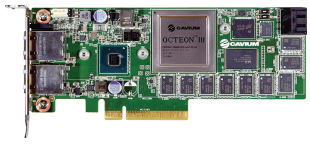
LiquidIO adapters are fully programmable making it the industry's most flexible and scalable with high performance, and low cost solution.

LiquidIO® II Adapters

25G adapters



10G adapters



10GBaseT adapters

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Benefits

- Flexible I/O for Cloud Compute
- Network & Security Acceleration for compute scalability
- Best in Class packet processing
- Open Virtual Switch (OVS) offload
- Overlay Network Offloads support
- NVMe Over L2 Transport fabric
- SDN/NFV Service Chaining
- Packet Parsing with Application Recognition
- Workload optimized software for efficiency & extensibility
- Fully custom programmable

Specifications, Compliance & Compatibility

PCI EXPRESS Interface

- PCIe Gen 3.0 compliant, 1.1 and 2.0 compatible
- 2.5, 5.0, or 8.0 GT/s link rate x8
- Auto-negotiate to x8, x4, x2, x1
- MSI/MSI-X support

Ethernet

- IEEE Std 802.3ae 10 Gigabit Ethernet
- IEEE 802.3ad Link Aggregation
- IEEE 802.1Q, .1P VLAN tags & priority
- IEEE 802.1Qbb (PFC)
- IEEE 802.1Qaz (ETS)
- DCBX support
- IEEE 1588v2
- Jumbo Frame Support
- 25GigE Standard: 25Gigabit Ethernet Consortium specification

Feature Summary

Overlay Networks

- Stateless offloads for overlay networks and tunneling protocols
- Hardware Offload of encapsulation, de-encapsulation of VXLAN, NVGRE, and GENEVE overlay networks

Protocol Support

- IPv4/IPv6, TCP, UDP
- iSCSI initiator offload
- IPsec, SSL, OpenSSL
- VxLAN, NVGRE, GRE, MPLS, GENEVE

Hardware based I/O Virtualization

- Single-Root IO Virtualization (SR-IOV)
- Multi-function support
- NVMe (Non-Volatile Memory express) with SR-IOV support
- Multiple queues per virtual machine
- Independent Queue management with enhanced QoS for vNICs

Virtualization

- SRIOV – Up to 128 Virtual Function for networking
- SRIOV – Up to 1024 Virtual Function for NVMe
- Virtual Switch support with SRIOV
- Live VM-Migration support

OpenFlow/ SDN

- OpenFlow 1.3 protocol
- OpenDaylight and FloodLight Controller

CPU Offloads

- Open Virtual Switch 2.3 offload

Network and Security Accelerations/Offloads

- TSO, LRO (IPv4, IPv6, TCP, UDP), checksum offload
- RSS, VLAN insertion / stripping and Tag Offload
- Intelligent Interrupt coalescence
- IPsec Offload (Transport , Tunnel)
- SSL Inline
- NVMe with SRIOV
- Deep Packet Inspection (DPI), Packet Filtering, Application Recognition

Remote Boot

- PXE and UEFI
- NVMe and UEFI

Comprehensive OS Support

- Red Hat Enterprise Linux
- CentOS
- Scientific Linux
- Ubuntu
- FreeBSD
- Windows Server

Operating Conditions

- Operating temperature: 0 to 45° C

Regulatory Certifications

- Safety – USA/Canada: cTUVus UL
- EMC – USA/Canada: FCC/ICES, Class A

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