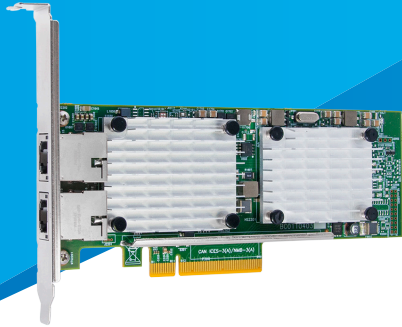


Cavium FastLinQ 10GbE Intelligent Ethernet Adapters vs. Mellanox 10GbE Adapters



Cavium FastLinQ 3400/8400 Series Adapters provide maximum performance and flexible bandwidth management to optimize virtualized servers and networks

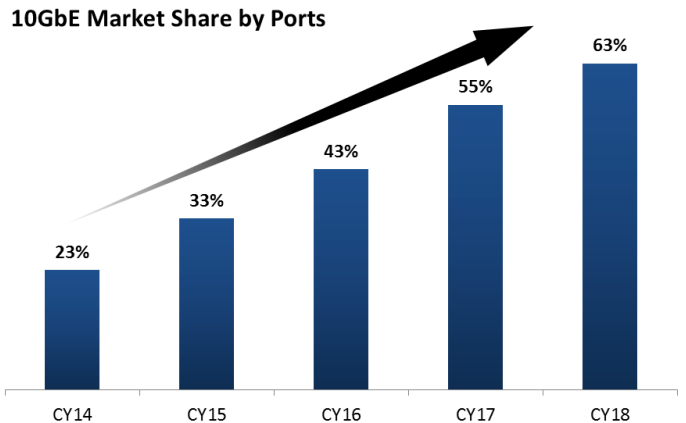
CAVIUM ADVANTAGES

- Buy with confidence – Cavium™ FastLinQ® 3400/8400 Series Adapters have three times the market share compared to Mellanox 10GbE adapters¹
- Switch-independent NPAR with concurrent SR-IOV – partition 10GbE links to reduce capital expenditures (CAPEX) for server and switch ports, and allocate network bandwidth to deliver QoS for virtual machines and applications
- Remote multi-adapter management – lower operating expenditures (OPEX) by simplifying adapter management
- Hardware-based storage offloads – reduce I/O processing and power consumption in server

INTRODUCTION

The evolution to new and more powerful servers continues and server virtualization is well established as the way to fully utilize CPU resources. As new servers support higher virtualization ratios, I/O capacity has become one of the critical resources and 10 Gigabit Ethernet (10GbE) is the high-performance standard for server connectivity. This is especially the case for data centers that are moving to private clouds.

As shown below, Dell'Oro Group is forecasting 10GbE will comprise more than 60% of Ethernet port shipments by 2018.



¹ Crehan Research, Server-class Adapter & LOM/Controller Market Shares up to Calendar 1Q16, June 2016

Source: Dell'Oro Group, Worldwide Ethernet Controller & Adapter Market Report, July 2015

In addition to increased bandwidth, 10GbE adapters can provide many key features that affect both server and network performance. This includes the capability to optimize I/O for applications and meet QoS requirements for applications that are running in VMs.

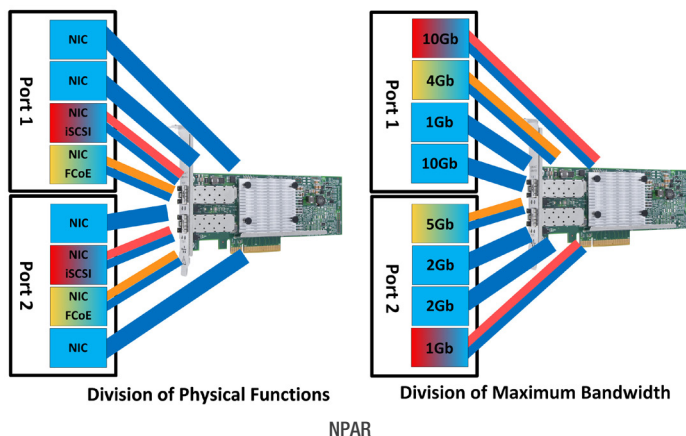
Cavium high-performance FastLinQ intelligent Ethernet adapters are ideally suited for virtualized and cloud data centers. This competitive brief highlights important benefits for Cavium FastLinQ 3400 Series 10GbE Adapters and FastLinQ 8400 Series 10GbE CNAs when compared to Mellanox® ConnectX-3 Pro EN 10GbE adapters.

After reviewing this competitive brief, it will be very clear why Cavium FastLinQ 3400/8400 Series Adapters have three times the market share compared to Mellanox for 10GbE adapters based on market share numbers from Crehan Research.¹

OPTIMIZE 10GBE PORTS WITH SWITCH-INDEPENDENT NPAR AND CONCURRENT SR-IOV

Data centers that use virtualized servers and support private clouds have obviously benefited with the transition for 1GbE to 10GbE. However, having more bandwidth is only part of the story. The key is to optimize bandwidth provided to VMs in a way that fully utilizes increased capacity while providing required QoS to critical applications and users. This allows data centers to save CAPEX and OPEX by reducing the number of servers, network adapters, and network ports.

Switch-independent NIC partitioning (NPAR) is a hardware-based method for partitioning a 10GbE port into multiple PCIe® physical functions (PFs). As shown in the following figure, each PF looks like a unique physical port to the host and bandwidth can be allocated to each one individually. A typical application would be assigning bandwidth for live VM migration using VMotion with a VMware® deployment. Bandwidth can also be assigned to individual VMs with high I/O requirements.



¹ Crehan Research, Server-class Adapter & LOM/Controller Market Shares up to Calendar 1Q16, June 2016

Cavium FastLinQ 3400/8400 Series Adapters enable switch-independent NIC partitioning that is OS agnostic. Many tier-1 server OEMs have also adopted Cavium's NPAR technology and added their own differentiation to create OEM-specific versions of NPAR that are tightly integrated with server management applications. This is a powerful endorsement of the value-added benefit that Cavium NPAR provides.

NPAR is configured for Cavium FastLinQ 3400/8400 Series Adapters during power-on initialization with support for minimum and maximum bandwidth settings per PF. Minimum settings insure that a PF will always get at least a baseline amount of bandwidth while maximum settings can be as high as 100% to ensure full bandwidth utilization.

The Cavium implementation of NIC partitioning can also be used concurrently with single root I/O virtualization (SR-IOV). This unique capability can reduce the number of adapter ports needed to support failover and load balancing on a virtualized host that is using SR-IOV.

In comparison, Mellanox 10GbE adapters do not support NIC partitioning.

REDUCE OPEX WITH MULTI-ADAPTER MANAGEMENT

It is well known that ongoing OPEX can be a much greater cost factor than the original CAPEX. With that in mind, data center and network managers want the option to manage adapters remotely from a centralized management console. This helps to reduce OPEX and is also critical to insure network consistency.

As a starting point, Cavium FastLinQ 3400/8400 Series Adapters are fully supported with baseline OS network management utilities. That capability is greatly enhanced with the powerful Cavium QConvergeConsole® (QCC) management tool that enables system administrators to manage all Cavium adapters throughout the data center from a single console locally or remotely. QCC has both a CLI and a GUI. Cavium also provides a fully integrated Cavium QCC vCenter® Plug-in (VCPI) module that is ideal for VMware deployments.

Mellanox adapters can only be managed with baseline OS utilities. There is no option for remote multi-adapter management.

HIGH PERFORMANCE STORAGE NETWORKS WITH HARDWARE-BASED STORAGE OFFLOADS

The 10X increase in bandwidth provided by 10GbE networks can also be used to support protocols for SANs. iSCSI and FCoE are the predominant storage protocols for Ethernet and both hardware and software based initiator solutions are available in the market.

Cavium is the industry leader for iSCSI and Fibre Channel connectivity and Cavium FastLinQ 8400 Series CNAs optimize server utilization with full hardware offload for iSCSI and FCoE protocols. By comparison, there is no support for iSCSI or FCoE with hardware offload with Mellanox 10GbE adapters. The only option is the use of software initiators that squander critical CPU resources for storage I/O.

CONCLUSION

As summarized in the table below, Cavium FastLinQ 3400/8400 Series Adapters deliver key benefits that insure maximum value with 10GbE deployments.

Feature	Cavium QLE3400/ QLE8400	Mellanox ConnectX-3 Pro
Switch-Independent NIC Partitioning	✓	✗
Remote Multi-adapter Management	✓	✗
Hardware-based Storage Offloads	✓	✗

ABOUT CAVIUM

Cavium, Inc. (NASDAQ: CAVM), offers a broad portfolio of infrastructure solutions for compute, security, storage, switching, connectivity and baseband processing. Cavium’s highly integrated multi-core SoC products deliver software compatible solutions across low to high performance points enabling secure and intelligent functionality in Enterprise, Data Center and Service Provider Equipment. Cavium processors and solutions are supported by an extensive ecosystem of operating systems, tools, application stacks, hardware reference designs and other products. Cavium is headquartered in San Jose, CA with design centers in California, Massachusetts, India, Israel, China and Taiwan.

The following white papers have additional information on key benefits that are provided with Cavium FastLinQ 3400/8400 Series Adapters:

- [SR-IOV Improves Server Virtualization Performance](#)
- [NIC Partitioning and Data Center Bridging](#)
- [Concurrent NIC Partitioning and SR-IOV](#)



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