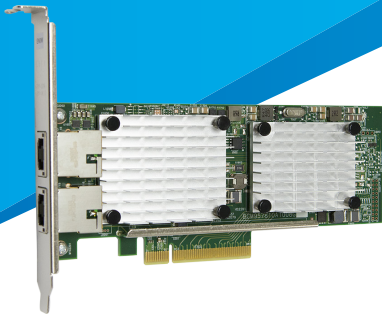


10GbE Networking Made Simple with the Cavium FastLinQ QLE3442-RJ 10GBASE-T

Cavium FastLinQ QLE3442-RJ 10GBASE-T Breaks Through Cost Barriers



Cavium FastLinQ QLE3442-RJ 10GBASE-T adapters support the higher bandwidth needed for virtual environments while providing investment protection via backward compatibility with 1GbE networks.

ABSTRACT

Deploying server virtualization in today's data centers drives data demand that challenges traditional 1 Gbps throughput capabilities. These consolidated virtual servers are typically configured with multiple 1 Gbps ports in order to keep up with I/O demands. Deploying a 10Gbps network eliminates these 1 Gbps bandwidth bottlenecks, while dramatically simplifying cabling and management requirements and reducing power and cooling demands. 10GBASE-T over common CAT6a unshielded twisted pair (UTP)—priced less than optical media solutions—enables rapid, large-scale adoption of 10GbE throughout the data center.

This paper describes the Cavium™ FastLinQ® QLE3442-RJ 10GBASE-T networking solutions, their benefits, and why they open the door for broad deployment of 10Gb Ethernet (10GbE).

10GbE SOLUTION

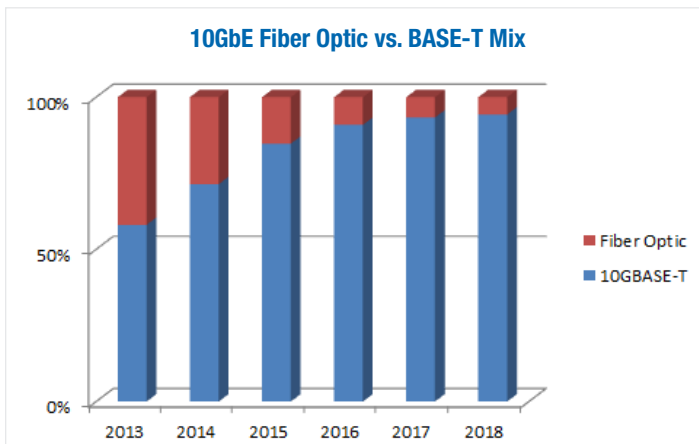
With new servers, users can increase the number of virtualized servers (and therefore, the number of applications) running on a single server, which leads to a significantly increased demand for I/O. This accelerated adoption of server virtualization and convergence technologies supports multiple workloads to consolidate physical servers, which often increases the I/O demands well beyond the capabilities of 1 Gbps Ethernet ports.

Migrating to 10GbE fully addresses this I/O bandwidth bottleneck issue. In recent years, data center managers have started migrating portions of their data center to 10GbE networks using a combination of Direct Attach Copper (DAC) cables for short distances (up to 7 meters for Top-of-Rack connections) and fiber-optic cabling for longer distances (for End-of-Row connections). The connectivity from the 10GbE port on the server often involves a Top-of-Rack switch used to aggregate the DAC connectivity to the servers, with fiber-optic connectivity to the End-of-Row switch.

This deployment of 10GbE—using SFP+ connections to accommodate either fiber optics or DAC connectivity—improved the I/O capabilities for virtualized servers, but the costs associated with a Top-of-Rack switch and expensive cabling and optics limited the widespread adoption, especially in data centers where 1GbE is already broadly deployed.

“With Cavium’s latest generation of 10GBASE-T solutions using familiar CAT6a UTP cabling, the costs for power and equipment have been dramatically reduced, paving the way for 10GbE deployment throughout the data center. These 10GBASE-T solutions are available today for rack and tower server offerings.”

– Greg Scherer, CTO Office,
Product Strategy,
Cavium, Inc.



Source: Dell’Oro Group July 2014

10GbE PROVIDES ECONOMIC RELIEF

Using 10GBASE-T with structured UTP cabling addresses the cost and cabling issues associated with 10GbE networks, making 10GbE available to a much broader market. 10GBASE-T with CAT6a UTP cabling is the most flexible solution for most data center 10GbE networking applications. The raw cost of the cable itself is far less than either optical fiber or SFP+DAC cables.

ADDITIONAL BENEFITS

1. Longer Reach than SFP+ DAC

While twinaxial Direct Attach Copper (DAC) cables have been successful over very short distances, the more familiar UTP cabling—which has become so ubiquitous in today’s data centers—affords an even lower cost solution with much longer reach, up to 100 meters. This makes CAT6a UTP cabling the best universal solution for 10GbE requirements in today’s data centers.

2. Lower Deployment Cost than Optical Cabling

CAT6a UTP cable is low cost and widely available. While optical fiber cable is a great solution for long distance (hundreds of meters or more) 10GbE network backbone requirements, for connections less than 100 meters—typical for data center installations—CAT6a cabling provides the optimum low-cost, easy-to-use solution.



CAT6a UTP Cabling with RJ-45 Connectors

3. Easier to Install than Optical or DAC Cabling

CAT6a cabling is inexpensive and easy to install with common wire-cutting and crimping tools. Familiar UTP wiring and RJ-45 connectors are compatible with existing 1GbE switches and NICs.

4. Ease of Migration

CAT6a UTP cabling is backward compatible with existing 1000BASE-T networks, allowing the cabling to be upgraded before upgrading the network switches and adapters. This allows a smooth transition path for data centers with an installed base of CAT5e cabling that they need to upgrade. Switches that support 10GBASE-T also support 1GbE, allowing for a controlled transition to 10GbE over time.

5. Lower Power

Energy Efficient Ethernet (EEE) lowers adapter power up to 27% by not toggling the I/O in the absence of a signal.

By solving these key technical, backward compatibility, and cost challenges with 10GbE deployment, 10GBASE-T has become the catalyst that finally makes 10GbE affordable and effective for use across the data center.

10GBASE-T ADAPTERS FOR RACK AND TOWER SERVERS

The Cavium FastLinQ QLE3442-RJ 10GBASE-T adapters include these benefits:

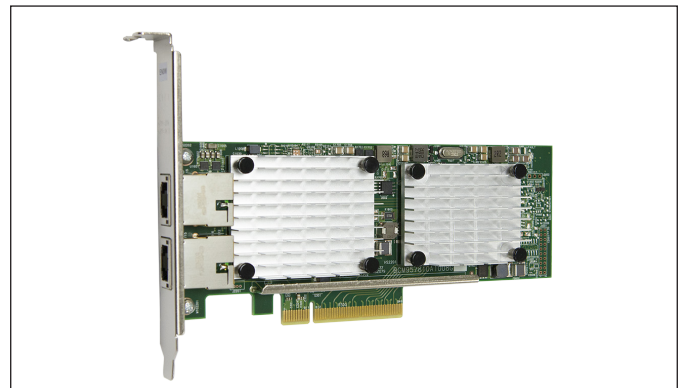
- Backward compatibility—the adapters can be deployed on existing 1GbE and 10GbE networks, providing easy migration to 10GbE
- Higher bandwidth and superior server virtualization than existing 1GbE
- Familiar use of CAT6a cabling in the data center
- Cable distance support up to 100 meters
- Cable and port consolidation vs. multiple 1GbE connections
- Eliminate the need for Top-of-Rack switches

CAVIUM FASTLINQ QLE3442-RJ 10GBASE-T ADAPTER KEY FEATURES

- x8 PCIe™ Gen 3 (8 GT/s) host bus interface
- Compatible with CAT6a/7 UTP cabling up to 100 meters and CAT6 cabling up to 40 meters
- Extensive Virtualization Support
 - Single Root IO Virtualization (SR-IOV), Microsoft® VMQ, and VMware® NetQueue™
 - Network Virtualization using Generic Routing Encapsulation (NVGRE) packet task offloads, Virtual Extensible LAN (VXLAN) packet task offloads, and Message Signaled Interrupt (MSI-X)
- Switch-Independent Partitioning, with up to four partition assignments per 10GbE link, gives the appearance of multiple adapter ports to the operating system, and each can be customized to allocate bandwidth as needed
- VLAN support with VLAN tagging
- Full suite of Stateless Offloads
 - Large Send/Segment Offload (LSO)
 - Large Receive Offload (LRO)
 - Giant Send Offload/Generic Segmentation Offload (GSO)
 - Receive Segment Coalescing (RSC)
 - Interrupt Coalescing
 - TCP Segmentation Offload (TSO)
 - Receive Side Scaling (RSS)
 - Transmit Side Scaling (TSS)
 - IPv4 and IPv6 TCP/UDP
 - Checksum Offloads (CO)
- Transparent Packet Aggregation (TPA)
- Jumbo frame support for frames larger than 1500 bytes (up to 9600 bytes)
- Superior small packet performance

THE TIME FOR 10GbE IS NOW

The industry has embraced 10GbE as mature, reliable, and well understood. The availability of 10GBASE-T breaks through important cost and cable installation barriers associated with 10GbE deployment and provides investment protection via backward compatibility with 1GbE networks. 10GBASE-T simplifies data center networking deployments by providing an easier path to migrate servers to 10GbE infrastructure, which supports the higher bandwidth needed for virtualized servers. With simplified cabling and powerful management support, the Cavium-powered 10GBASE-T adapters are the right solution for data center managers considering the migration to 10GbE networks, and they are available today!



10GBASE-T Two-port Network Adapter

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.



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