

Broadcom® 10GbE High-Performance Adapters for Dell® PowerEdge® 12th Generation Servers

As the deployment of bandwidth-intensive applications such as public and private cloud computing continues to increase, IT administrators are turning to 10-Gigabit Ethernet (10GbE) technology for cost-effective and flexible methods of addressing growing network and storage traffic demands. A key component of the 10GbE network is the network adapter with network protocol processing offload capabilities for greater host processor utilization. Broadcom's 10GbE adapters for Dell's PowerEdge 12G platform allow servers to fully leverage the performance attributes of 10GbE, while also improving processor utilization, extending the life of existing switch investments and effectively using the 10GbE bandwidth. As a result, 10GbE end-to-end performance is comparable to more specialized and costlier cloud-based data center server to fabric interconnects. With 10GbE, organizations can expand application capabilities, consolidate network and storage traffic onto a common infrastructure, increase scalability, and improve responsiveness to address dynamic business environments.

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Highest Performance and Superior Flexibility

As a leading provider of high-performance Ethernet solutions, Broadcom is offering the world's fastest 10GbE networking solution for Dell PowerEdge Generation 12 platform blade, rack, and tower servers. Dell selected Broadcom as the default adapter for its 12G server platform. The Broadcom NetXtreme II® BCM57810S and BCM57800S controllers provide the highest throughput, lowest processor utilization, and the highest small packet performance for Ethernet connectivity. The Broadcom adapters for Dell PowerEdge Servers are listed in [Table 1](#).

Table 1: Broadcom NetXtreme 10GbE Adapters for Dell PowerEdge 12G Server Platforms

	<i>Adapter Photo</i>	<i>Adapter Description</i>	<i>Product Details</i>
Rack and Tower Servers (NICs)		Broadcom 57810S Dual-Port 10GbE SFP+ Converged Network Adapter	<ul style="list-style-type: none"> • 10GbE/2 Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 430-4421 (FH) or 430-4422 (LP)
		Broadcom 57810S Dual-Port 10GBASE-T Converged Network Adapter	<ul style="list-style-type: none"> • 10GbE/2 Ports • L2 Networking, iSCSI HBA, FCoE-ready • Dell P/N: 430-4419 (FH) or 430-4420 (LP)
Rack Servers (Rack NDC)		Broadcom 57800S Quad-Port SFP+ Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • Two 10GbE + Two 1GbE Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 430-4428
		Broadcom 57800S Quad-Port BASE-T Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • Two 10GbE + Two 1GbE Ports • L2 Networking, iSCSI HBA, FCoE-ready • Dell P/N: 430-4427
		Broadcom 57840S Quad-Port 10GbE SFP+ Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • 10GbE/4 SFP+ Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 540-BBCN
Blade Servers (Blade NDC and Mezzanine Cards)		Broadcom 57810S Dual-Port 10GbE KR Blade Converged Network Daughter Card	<ul style="list-style-type: none"> • 10GbE/2 Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 430-4398
		Broadcom 57810S Dual-Port 10GbE KR Blade Converged Mezzanine Card	<ul style="list-style-type: none"> • 10GbE/2 Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 430-4401
		Broadcom 57840S Quad-Port 10GbE KR Blade Converged Network Daughter Card	<ul style="list-style-type: none"> • 10GbE/4 Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 540-BBCQ

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Table 2 provides the key advantages of Broadcom 10GbE adapters.

Table 2: Broadcom 10GbE Adapters Key Advantages

Performance Criteria	Description	Benchmark	Benefit
Maximum Throughput	Line-rate throughput across both ports (up to 37,000 Mbps).	Linux® Chariot	Support for more data streams. Reduces content quality degradation.
CPU Utilization	Superior CPU utilization (less than 15%).	Linux Chariot	Increases asset utilization. Reduces energy costs. Improves business productivity.
Small Packet Performance	Simultaneously send and receive 5.7 million packets per second.	Linux Multi-Threaded Packet Routing	Support for more concurrent requests. Services more requests per second. Reduces network congestion.

Higher Large Block I/O Performance (Throughput)

Applications that require maximum throughput for cloud computing include streaming video and audio, large data transfers between servers, load-balancing and failover, high resolution graphics, database, and backup. However, data centers designed using a traditional three-layer hierarchical structure are not well-suited for cloud environments. In a hierarchical structure, when performance improvements are required, more servers are added. Even though the inherent limitations of this architecture (scalability, cost, and complexity) are evident, organizations reluctantly continue to use this approach. Economics often dictate the level of performance optimization, which can be implemented using the traditional architecture, which translates into less than optimal performance and scalability enhancements. While the three-layer architecture may have been sufficient with past computing models, it can no longer effectively or efficiently support emerging public and private cloud computing models without creating operational, performance, and scaling challenges.

As a result, there has been an emerging shift in data center design, moving away from the traditional vertically oriented multitier architecture. Data center design is shifting from a north-south data traffic design toward a new, simpler, flatter, and meshed architecture model. This architecture is suited for server-to-server (east-west) communication within the data center itself. The result is the ratio of local traffic between servers within the data centers to incoming/outgoing traffic is projected to reach 4 to 1 by 2015 (reference: Cisco® Cloud Index). Simply put, with an east-west architecture (see [Figure 1](#)), the intra-data center (server-to-server) communication will significantly increase. Therefore, deployment of a high-performance network infrastructure is critical. For greater resource allocation agility and cost effectiveness, data centers will allocate resources dynamically across large server pools where any server could be assigned to any service at any time. A key requirement to enable deployment of this new data center architecture is network availability, bandwidth, and performance. Deploying the right hardware to provide sufficient network capacity on the server edge is critical. The greater the server's data throughput capability, the better the network will perform.

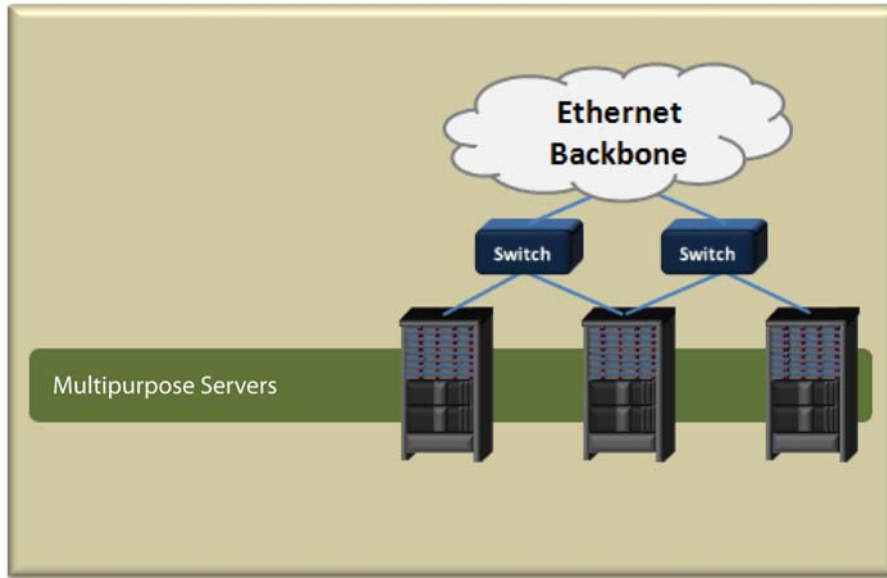


Figure 1: Flat (East/West) Architecture for the Public and Private Cloud Data Center

This is where Broadcom 10GbE adapters for Dell PowerEdge 12G servers come into play. The BCM57810S and BCM57800S have demonstrated greater large block I/O networking performance, delivering line-rate performance of up to 37,000 Mbps (see [Figure 2](#)).

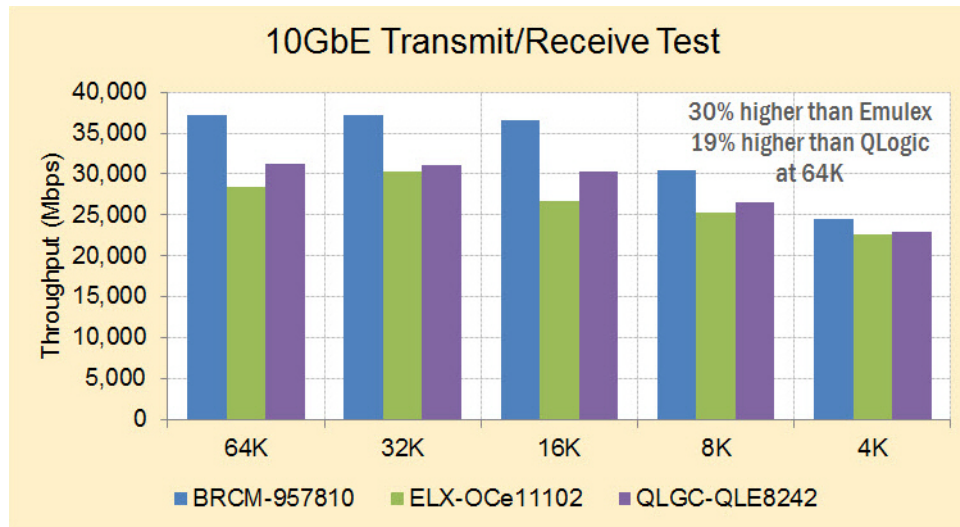


Figure 2: Standard Linux Throughput (Mbps) vs. I/O Size (Bytes)
Demartek® Labs

Lower CPU Utilization for Processing Networking Load

Data center operational costs have a significant impact on businesses. IT administrators are consistently tasked to reduce costs and increase asset utilization. Traditionally, data center servers were dedicated, which meant they were overprovisioned and underutilized.

Broadcom 10GbE adapters for Dell PowerEdge 12G servers improve processor utilization (less than 15%) through a combination of hardware and stateless offloads features (see [Figure 3](#)).

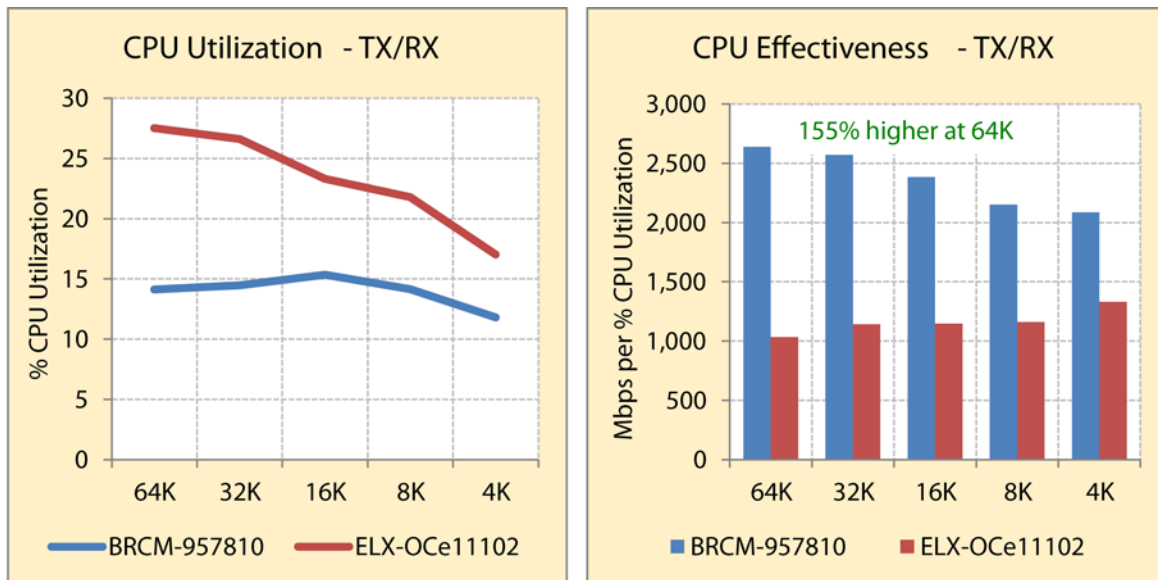


Figure 3: Linux L2 Processor Utilization (%) vs. I/O Size (Bytes)
Demartek Labs

However, the benefits of Broadcom's offload features go beyond just improving performance and workload processing. These features also help reduce energy consumption.

It is well known that data center power and cooling costs are increasing rapidly. Even if cost is not an issue, sourcing of energy is becoming an issue as the data center's insatiable appetite for energy continues to grow. This is especially true for data centers of cloud computing providers. Therefore, businesses are looking into all avenues to mitigate and curb growing energy costs. The energy required by the server pools is the biggest component of the energy and cost equation. This is once again where the Broadcom's family of 10GbE adapters for Dell PowerEdge 12G servers can play an important role in helping to keep energy costs in check. By offloading network related processes from the CPU, the adapters enable additional server CPU cycles for other tasks. This, in turn, allows more applications to be supported by a fewer number of servers and processors.

Higher Small Packet Performance (Frames per Second)

Applications that require high small packet performance for cloud computing include internode messaging traffic, database with small fields and small packet updates, voice over IP (VoIP), routing application, financial services trading, game servers, and web servers with small messaging services.

Broadcom's portfolio of 10GbE adapters has demonstrated and delivered superior small packet performance of up to 5.7 million packets per second (see [Figure 4](#) and [Figure 5](#)). Dell PowerEdge 12G servers configured with Broadcom adapters enable IT administrators to optimize server small packet performance.

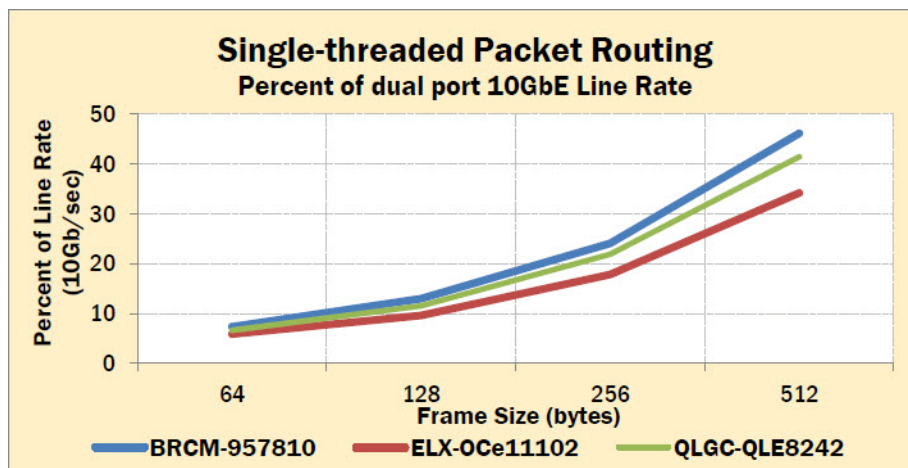
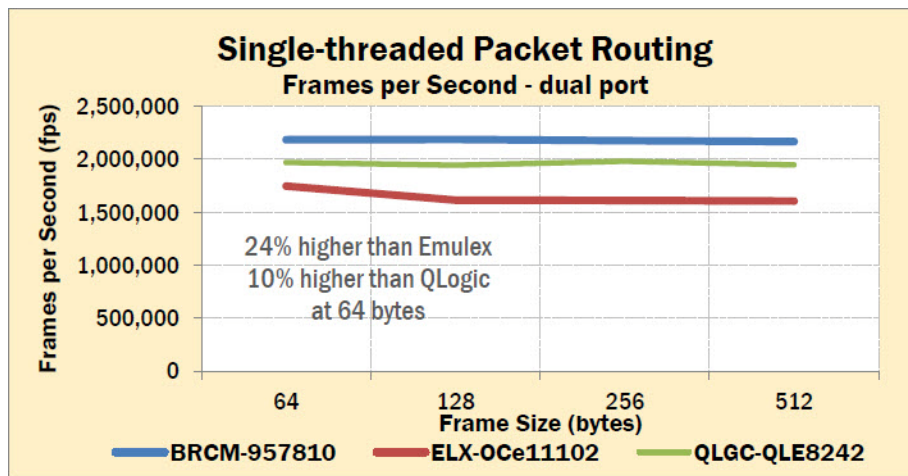


Figure 4: Single-Threaded Packet Routing Demartek Labs

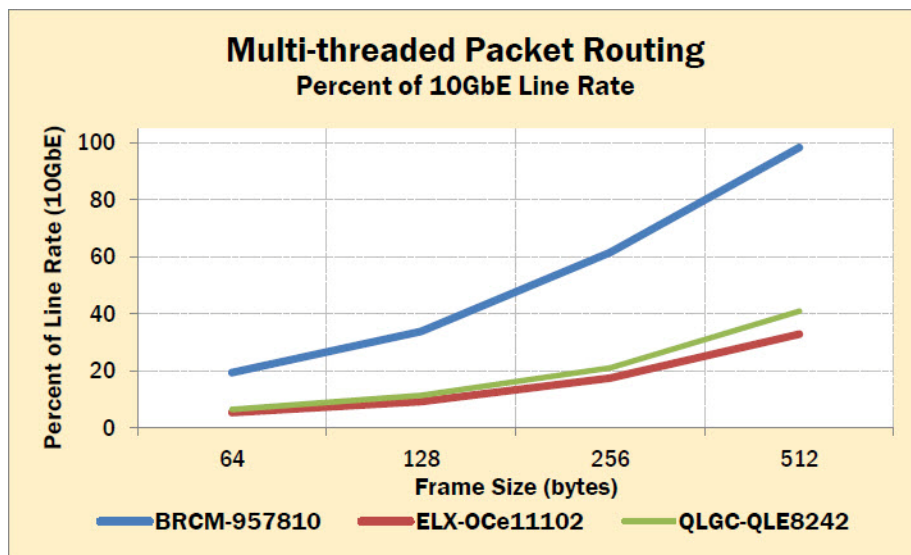
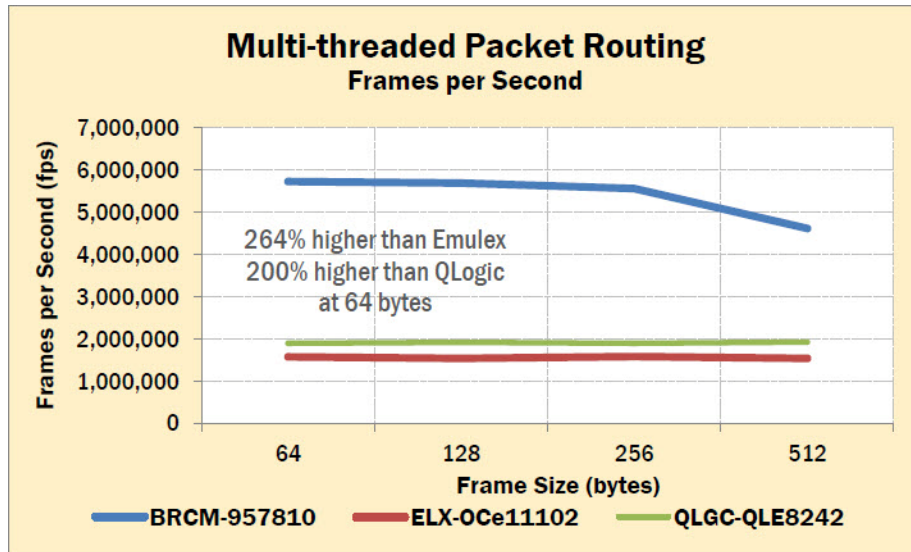


Figure 5: Multithreaded Packet Routing
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Conclusion

As cloud services transform long-standing business models and global economies, Ethernet's usage will dramatically increase as it is the most ubiquitous, time-tested networking technology with the broadest adoption and deployment. Much of the world's data transfer begins and ends with an Ethernet connection. Today, IT professionals who are deploying public and private cloud infrastructure and are looking for higher capacity and higher performance solutions can rely on Dell PowerEdge 12th generation servers with Broadcom 10GbE adapters to deliver the highest level of performance.

The portfolio of Broadcom 10GbE converged network adapters extends Ethernet's proven value set and economics to public and private cloud-based data centers providing:

- The highest performance combined with lowest processor utilization.
- Consolidation of traditional network and storage traffic over common infrastructure.
- The lowest total cost of ownership (infrastructure/operational/human capital).
- A seamless migration from 1GbE to higher performance 10GbE server to fabric connectivity.
- Streamlined network management.
- Market-proven Ethernet architecture.

For more information on Broadcom adapters for Dell PowerEdge 12G servers, visit <http://go.broadcom.com/Dell12G>

For more information about Demartek reports, visit http://www.demartek.com/Demartek_Broadcom_BCM57810_10GbE_Evaluation_2012-03.html

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