

Broadcom® Adapters for Dell® PowerEdge® 12G Servers

The Dell PowerEdge 12G family of rack, tower, and blade servers offer a broad range of storage and networking options designed to address the challenging demands of today's data center.

The default networking solutions Dell selected for its PowerEdge 12G platforms are based on Broadcom's portfolio of NetXtreme 1Gb and 10Gb Ethernet solutions available in standard PCIe™, mezzanine, and network daughter card form factors. NetXtreme® technologies provide best-in-class server to fabric networking solutions and offer key value propositions that make Broadcom Ethernet adapters the solution of choice for PowerEdge 12G servers.

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Comprehensive Portfolio of 1GbE and 10GbE Adapters

IT administrators of large and small data centers continue to look for ways of improving management and deployment efficiency. This is justifiable because introducing such efficiencies helps reduce costs and extend ever shrinking IT budgets. By offering a wide range of Broadcom 1Gb and 10Gb Ethernet solutions, Dell PowerEdge 12G servers provide a consistent deployment and management experience throughout the data center. Therefore, regardless of the server form-factor or Ethernet connectivity speed, Broadcom offers a solution for your need. Additionally, Broadcom's NetXtreme II 10Gb solutions offer iSCSI and FCoE hardware offload to support a no-compromise Converged Network Adapter (CNA) solution. [Table 1](#) details the full breadth of Broadcom adapters designed specifically for Dell PowerEdge 12G servers.

Table 1: Broadcom NetXtreme 1Gb and 10Gb Ethernet Adapters for Dell PowerEdge 12G Server Platform

<i>Dell PowerEdge Select Network Adapters Powered by Broadcom NetXtreme II® Technology</i>		
<i>Adapter Photo</i>	<i>Description</i>	<i>Speed/Ports</i>
Rack and Tower Servers (NICs)		Broadcom 5720 Dual-Port 1GbE Network Interface Card <ul style="list-style-type: none"> • 1GbE/2 Ports • L2 Networking • Dell P/N: 430-4423 (FH) or 430-4424 (LP)
		Broadcom 5719 Quad-Port 1GbE Network Interface Card <ul style="list-style-type: none"> • 1GbE/4 Ports • L2 Networking • Dell P/N: 430-4425 (FH) or 430-4426 (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)
		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)

Table 1: Broadcom NetXtreme 1Gb and 10Gb Ethernet Adapters for Dell PowerEdge 12G Server Platform (Cont.)

<i>Dell PowerEdge Select Network Adapters Powered by Broadcom NetXtreme II® Technology</i>		
<i>Adapter Photo</i>	<i>Description</i>	<i>Speed/Ports</i>
Rack Servers (Rack NDC)	 Broadcom 5720 Quad-Port 1GbE Rack Network Daughter Card	<ul style="list-style-type: none"> • 1GbE/4 Ports • L2 Networking • Dell P/N: 430-4418
	 Broadcom 57800S Quad-Port BASE-T Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • Two 10GBASE-T and two 1000BASE-T Ports • L2 Networking, iSCSI HBA, FCoE-ready • Dell P/N: 430-4427
	 Broadcom 57800S Quad-Port SFP+ Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • Two 10GbE SFP+ and two 1000BASE-T Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 430-4428
	 Broadcom 57840S Quad-Port 10GbE SFP+ Rack Converged Network Daughter Card	<ul style="list-style-type: none"> • 10GbE SFP+/4 Ports • L2 Networking, iSCSI HBA, FCoE • Dell P/N: 540-BBCN
Blade Servers (Blade NDC and Mezzanine Cards)	 Broadcom 5719 Quad-Port 1GbE Blade Mezzanine Adapter Card	<ul style="list-style-type: none"> • 1GbE/4 Ports • L2 Networking • Dell P/N: 430-4730
	 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

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

Long-Standing Industry Leadership

Networks provide the communication backbone for which the data center is designed, and it is for this reason IT administrators seek solutions that deliver not only the highest levels of performance but, more importantly, provide a reliable, robust, and stable networking infrastructure. Performance is of little value when the network is not reliable or stable. With over 13 generations of Ethernet controller design and development experience, Broadcom's NetXtreme market-proven Ethernet technology enables the Dell's portfolio of Ethernet adapters to provide not only the highest levels of performance, efficiency, and scalability, but also the highest level of reliability and interoperability. The factors combine to deliver:



- Seamless integration with the Dell's management framework.
 - Broadcom's NetXtreme technology can be managed using the Integrated Dell Remote Access Card (iDRAC).
 - Ability to monitor and manage infrastructure with one simple, integrated interface.
- Seamless integration with Dell's technology initiatives.
 - Support for Switch Independent Partitioning.
 - Broadcom is the first to support Dell's Network Daughter Card (NDC) form factor.

Highest Performance for Networking Applications

With the exception of IT professionals, most people take networks for granted. Networks are like our freeways and roads - we drive on them without a second thought and take them for granted until they become congested or inaccessible. That is why IT administrators take great care in deploying solutions that provide the highest levels of performance to accommodate the vast growth in data traffic that data centers are experiencing. [Figure 1](#) provides a snapshot of the amount of data traffic on the Internet. Even though this represents the traffic over the entire Internet, some pieces of it are most likely generated within your organization and travel through your data center. Network performance impacts business productivity and business profitability, and both impact the bottom line. That is why performance is one of the key factors in design and deployment of data center networks.



Figure 1: A 60-Second Snapshot of Traffic on the Internet

As a leading provider of high performance computing solutions, Dell leverages Broadcom NetXtreme adapters to deliver the world's fastest networking performance for PowerEdge 12G rack, tower and blade servers. [Table 2](#) details the performance of Broadcom's 10GbE adapters and their impact within the data center.

Table 2: Broadcom 10GbE Adapters' Key Advantages

Criteria	Description	Note	Benefit
Maximum Throughput	Line-rate throughput across both ports (up to 37,000 Mbps)	Linux® Chariot	<ul style="list-style-type: none"> Support for more data streams Reduces content quality degradation
CPU Utilization			
<ul style="list-style-type: none"> Inbox Networking Driver 	Superior CPU utilization (less than 15%).	Linux Chariot	<ul style="list-style-type: none"> Increases asset utilization Reduces energy costs
<ul style="list-style-type: none"> Storage Offload 	Superior iSCSI and FCoE offload (as low as 10%)	IOmeter tool	<ul style="list-style-type: none"> Improves business productivity
Small Packet Performance	Simultaneously send and receive 5.7 million packets per second	Multithreaded Packet Routing	<ul style="list-style-type: none"> Support for more concurrent requests Services more requests per second Reduces network congestion
Bandwidth Allocation	Switch Independent Partitioning of up to four virtual ports per physical 10GbE port	Infrastructure Flexibility	<ul style="list-style-type: none"> Segment multiple data streams and bandwidths as needed Works with existing switch assets

Reduce Complexity and Cost

Organizations have managed separate, parallel networks in their data centers. One connects servers with each other as well as with the Internet via Ethernet (LAN). The other is a Storage Area Network (SAN) which is a dedicated network for connecting servers to the storage pool via a specialized high speed networking infrastructure.

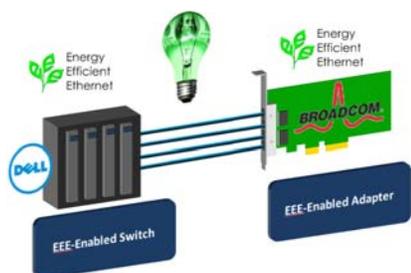


The availability of higher speed 10Gb Ethernet networks and high performance protocols such as Fibre Channel over Ethernet (FCoE) now enables companies to "converge" or consolidate their disparate networks into a single common network infrastructure. Through this convergence, IT organizations reduce capital costs by eliminating redundant switches, cables, as well as networking cards and adapters, and reduce operating costs by streamlining network administration.

Broadcom's 10GbE Converged Network Adapters (CNAs) for Dell's PowerEdge 12G server platform are an enabler of network consolidation. With the added hardware offload for network and storage traffic capability, not only is performance improved, but the server CPUs now have more cycles for application workload processing. Broadcom's converged network adapters are detailed in Table 1 and are available for Dell PowerEdge 12G, rack, tower, and blade server platforms.

Energy Efficient Ethernet™ (EEE) Reduces Energy Consumption

When data centers were originally designed, energy usage was not a big consideration. However, over the past decade, our data-hungry world has brought energy to the forefront of data center design. As data centers became larger and larger, energy consumption began to consume a larger portion of an organization's operating expenses (OPEX).



Broadcom EEE-Enabled Ethernet adapters conserve power in the server and at the switch.

Some data centers have reached a point where sourcing energy is the challenge - not enough power can be delivered to fully operate the computing and cooling resources within the data center. As a result, energy efficiency has become a factor in selecting the computing and networking building blocks needed for the data center. In addition, energy efficiency is not relegated to large power-hungry building blocks of the data center. IT administrators have come to expect some level of energy efficiency from every component used in the data center.

To further drive energy conservation within the data center, the EEE standard was developed to help IT administrators reduce the energy consumption of Ethernet-attached devices within their networks.

Examples of such devices would include Ethernet adapters and Ethernet switches. A key feature of the EEE standard is called low-power idle (LPI). As the name implies, when the Ethernet device is in an idle state (no data transmission activity), nonessential components of the Ethernet interface are placed in a low power state (sleep mode). A wake-up signal sent by the link partner allows the sleeping Ethernet device time to prepare for receipt of an incoming Ethernet data frame. EEE makes network energy conservation seamless and easy.

Table 3 quantifies the power savings potential of Broadcom EEE-enabled 1GbE and 10GbE Ethernet controllers.

Table 3: Realized Power Savings

Broadcom 5720 and 5719 Based 1GbE Ethernet Adapters	Power Consumption and Savings	
	2 Ports^a	4 Ports^a
NIC port idle without EEE (mW)	2,060	4,120
NIC port idle with EEE (mW)	1,205	2,410
NIC port power savings with EEE (mW)	855	1,710
NIC port with EEE Savings ^b (%)	42%	42%
Broadcom 57800S and 57810S 10GbE Based Ethernet Adapters	2 Ports^a	
NIC port idle without EEE (mW)	12.8	
NIC port idle with EEE (mW)	9.4	
NIC port power savings with EEE (mW)	3.4	
NIC port with EEE Savings* (%)	27%	

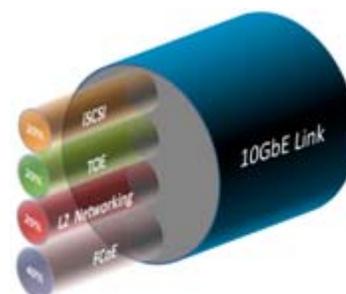
a. When used in conjunction with an EEE-enabled switch.

b. Includes PHY, processor, and other components on the adapter.

For more information about the Energy Efficient Ethernet technology of Broadcom 1GbE NetXtreme Ethernet technology, see <http://go.broadcom.com/Dell12G>.

Increase Asset Utilization

An increase in the number of applications, rich multimedia content, server virtualization, and the growth of cloud computing are all hampering existing network infrastructures. To handle increased workloads, many organizations have transitioned from 1GbE to 10GbE networks. This bandwidth increase can provide significant performance and cost benefits while supporting efforts to consolidate data centers. However, as organizations increasingly transition their networks, traffic flow for application workloads may not require the entire bandwidth that is available in a 10GbE link.



Broadcom's 10GbE adapters support Switch Independent Partitioning to allow segmentation of a 10GbE link into multiple virtual links. Each virtual link can then be allocated a certain percentage of the bandwidth and assigned to a specific application.

Many organizations have built their IT infrastructures by adding separate servers, networks, and storage capacity for each application workload. These silo application deployments helped simplify management in some ways but also left excessive pockets of unused server capacity and contributed to network sprawl. While network and storage convergence and server virtualization have helped address these problems, the challenge for 10GbE networks has been provisioning the appropriate bandwidth and data center resources to meet varying application demands in both physical and virtual environments.

One powerful approach to help eliminate these problems is Switch Independent Partitioning in both physical and virtual environments. This approach enables administrators to split up the pipe to divide and reallocate bandwidth and resources as needed. In collaboration with Broadcom, this Dell capability provides IT organizations enhanced flexibility, capacity and asset utilization as they migrate to 10GbE networks.

The fact that the partitioning feature of Broadcom's adapters is "switch independent" is of great significance, as it allows IT administrators leverage their existing switch assets. The net result is that IT administrators can leverage this capability without having to make new switch investments. The ability to also segment a 10GbE link into multiple virtual links is also an important feature, as it improves overall utilization of the 10GbE links. The net result of Switch Independent Partitioning is not only greater network flexibility, but also greater asset utilization and investment protection.

IEEE 1588™ Precision Time Protocol (PTP)

The old adage "Time is money" can best describe IEEE 1588. For some organization environments, such as financial institutions and brokerage firms, the accuracy in which they can timestamp network traffic data determines the number of zeros they can add to their profits — the greater the accuracy, the greater the profits. As network computing becomes more complex and the world more interconnected, the need for greater granularity of time synchronization is increasing. The Precision Time Protocol standard was developed to address this need.



Support for Precision Time Protocol (PTP) provides more granular level of time synchronization between the constituents of an Ethernet network for greater accuracy in data packet delivery. The recently developed IEEE 1588 PTP now promises to revolutionize time synchronization by improving accuracy and reducing cost. While certain other precise synchronizing protocols require significant investment in hardware and cabling, PTP makes highly precise timekeeping possible using the most widely deployed medium for network connectivity — Ethernet. By synchronizing multiple clocks over networks such as Ethernet, IEEE 1588 provides high precision synchronization over long distances with standard cabling.

100% Broadcom IP for Controllers and PHY

There is always a greater level of comfort knowing that the key components of an architecture are designed by a single, trusted partner. Broadcom is one such partner. The Ethernet controller and PHY are the key hardware components of Ethernet server to fabric connectivity solutions, such as NICs, LOMs, Network Daughter Cards (NDCs), and mezzanine cards. While most IT and network administrators associate Broadcom with high performance 1Gb and 10Gb Ethernet controllers, it is important to also note that Broadcom is a leading designer and supplier of 1GbE and 10GbE PHYs. The PHY plays a key role in Ethernet server to fabric connectivity solutions, and although it may receive less of a spotlight relative to an Ethernet controller, it plays a key role in how well an Ethernet solution performs.



In summary, the portfolio of Broadcom solutions for Dell PowerEdge 12G servers delivers the highest levels of performance, reliability, and interoperability within the data center.

Conclusion

Broadcom offers a broad portfolio of NetXtreme 1GbE and 10GbE and Converged Networking Adapters for Dell's PowerEdge 12G server platform. These offerings are available in mezzanine, standard PCIe and Network Daughter Card (NDC) form factors. They deliver maximum network and storage performance for demanding workload environments and superior flexibility for management and deployment.

Broadcom's adapters extend Ethernet's proven value set and economics to IT managers deploying Dell PowerEdge 12G servers.

Broadcom has a comprehensive portfolio of 1Gb and 10Gb standard PCIe, as well as mezzanine and NDC Ethernet and Converged Network adapters for Dell 12G rack, tower, and blade servers. The portfolio includes:

- Leveraging Broadcom's long-standing industry leadership in Ethernet technology.
- Highest performance for networking and storage applications.
- Energy Efficient Ethernet (EEE) to reduce energy consumption.
- Switch Independent Partitioning to enable greater utilization of 10GbE links and existing switch investments.
- IEEE 1588 to provide high precision synchronization with standard Ethernet cabling.
- In-house 100% Broadcom IP ownership for Ethernet controller and PHY enables greater performance, reliability, and interoperability.

For more information, see <http://go.broadcom.com/Dell12G>.



For more information about Broadcom Networking Performance, visit [http://www.demartek.com/Demartek Broadcom BCM57810 10GbE Evaluation 2012-03.html](http://www.demartek.com/Demartek_Broadcom_BCM57810_10GbE_Evaluation_2012-03.html).