

LightPulse[®] LPe16000 vs. Brocade 1860

Introduction

As a dominant force in Fibre Channel adapter technology, Emulex has released the ultimate Fibre Channel HBA for virtualization, scalable cloud environments and mission critical database applications. Not only is the LightPulse[®] LPe16000 Fibre Channel HBA the fastest 16GFC adapter available today, it also is the most feature rich. It supports the most logins/open exchanges to support more VMs, and is the only adapter with BlockGuard™ data integrity offload, delivering high performance data integrity protection without CPU overhead.

While developing the LPe16000, Emulex focused on features and functionality that count the most to Fibre Channel SAN administrators, including:

- Supporting more VMs for large cloud and database deployments
- Time-saving management
- Bullet-proof reliability
- Investment protection for existing FC SAN with backward compatibility with 4 and 8GFC HBAs
- Interoperability with the broadest range of operating systems, servers and storage to ensure compatibility across data centers and remote offices

The World's Fastest Fibre Channel Adapter

Emulex has set the bar for Fibre Channel performance at an all time high, achieving a world record of more than a million IOPS per port for a single-channel 16GFC adapter.

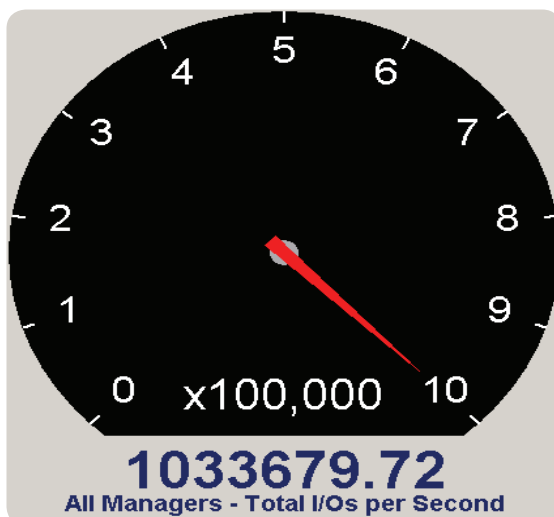


Figure 1 LightPulse LPe16000 Single Channel Max IOPS.

At a Glance

Emulex Advantages

- More than 1 million input/output operations per second (IOPS) on a single port
- Supports up to four times more logins/open exchanges to support more virtual machines (VMs)
- T10- PI Data Integrity offload with no performance impact to the central procession unit (CPU)
- Twice the management functionality, takes half the time to install and manage
 - Centrally manage all Emulex adapters from a single management application
 - Robust vCenter plug-in for VMware enabling management directly from the VMware vCenter console
- Trusted by data centers the world over with 11 million HBA ports shipped
- Broad OS and hardware support ensures Emulex Host Bus Adapters (HBAs) play well in your data center
- Bullet-proof reliability with 10 million hours MTBF*
- Chosen by more OEMs- awarded virtually every 16GFC design-in to date

* Based on LightPulse product family shipments.



LightPulse® LPe16000 vs. Brocade 1860



More Than 2x the IOPS on a Single Channel

Brocade's data sheet states 1 million IOPS - 500,000 IOPS per port or 1,000,000 maximum per dual-channel adapter. Emulex labs testing found the Brocade BR1860 and LPe16000 adapters achieved the following maximum IOPS:

Channels	Emulex LPe16000	Brocade 1860	Advantage
1 channel	1,033,679	450,000	> 2x the IOPS with LPe16000
2 channels	1,033,679	850,000	21% more IOPS with LPe16000

Figure 2 Maximum IOPS performance testing by Emulex Labs.

Up to Four Times More Logins/Open Exchanges to Support More VMs, Bigger Clouds and Databases

As shown in the table below, the Emulex LPe16000 delivers up to four times more logins/open exchanges than Brocade, enabling support for more virtual machines.

	Emulex LPe16000	Brocade 1860	Advantage
Logins	8192 concurrent	2048	4x more with LPe16000
Exchanges	8192 concurrent	4096	2x more with LPe16000

Figure 3 Logins/Exchanges comparison.

50 Percent More Efficient Management

Emulex leads the HBA industry in management functionality and efficiency. In testing, Emulex OneCommand™ Manager (OCM) provides twice the management functionality and takes half the time to manage when compared to Brocade's Host Connectivity Manager (HCM).

This kind of efficiency can save an administrator several days each year in adapter installation and management. For more information, see the [OneCommand Manager \(OCM\) report card](#).

For data centers running VMware, utilizing the OneCommand Manager vCenter plug-in further streamlines the management process by enabling adapters to be managed directly from the vCenter console.

Best of all, Emulex adapters ship with OneCommand Manager at no extra charge, whereas many of the advanced features promoted by Brocade require the purchase of the expensive Brocade Network Advisor application.

Estimated Annual Installation and Maintenance Time (HBA)

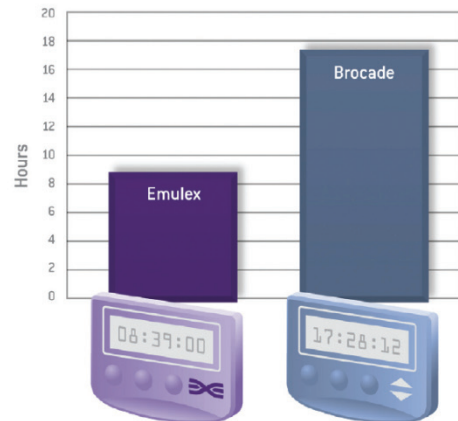


Figure 4 Annual installation and maintenance time.

Emulex also offers the OneCommand Vision application which provides intelligent, proactive I/O management within data center and cloud environments. OneCommand Vision gives IT and cloud administrators the ability to maximize I/O resource utilization and proactively enhance performance and availability by monitoring and analyzing various I/O performance metrics within the infrastructure. This includes the collection of end-to-end I/O latency, various protocol events and other critical performance metrics. OneCommand Vision's non-intrusive software architecture integrates easily into existing data center environments, shortening time-to-resolution from days to hours for even the most complex infrastructure problems.

OneCommand Vision is designed for use in heterogeneous network environments, providing broad operating system (OS) support and interoperability with Emulex and non-Emulex brand adapters. Its distributed deployment model delivers superior scalability and a comprehensive global view of I/O status, making it the solution of choice for IT administrators.

LightPulse® LPe16000 vs. Brocade 1860



From a management software perspective, Brocade focuses on Host Connectivity Manager (HCM) and Network Advisor. The Brocade management solution has the following drawbacks:

- While HCM is similar to OneCommand Manager (OCM) as an element manager, it is only for Fibre Channel HBAs. In comparison, OCM does everything that HCM can do and more. OCM provides centralized management for HBAs and UCNAs across FC, Fibre Channel over Ethernet (FCoE), Internet Small Computer System Interface (iSCSI) and Network Interface Card (NIC).
- Brocade focuses on its Network Advisor application, which is a broader network monitor that delivers other features including event management, performance monitoring, VM information and VM to LUN paths. These features are delivered in Emulex's VMware plug-in (VM paths and information) and OneCommand Vision (performance and events) products which collectively address these items.

In summary, OCM is a stronger element management solution than HCM. Holistically, the combination of OCM, OCM for VMware and OneCommand Vision provide a more robust solution than Brocade's HCM and Network Advisor.

Exclusive Support for the T10-PI Standard for Enhanced Protection Against Silent Data Corruption—With Hardware Offload!

Emulex LPe16000 adapters are the only HBAs that support the T10 Protection Information (T10-PI) standard with hardware offload. Known as Emulex BlockGuard,™ this feature ensures that data corruption events do not go undetected as data traverses the system from the OS and application all the way to the disk array storing your valuable data. It protects against costly and disruptive downtime. Some data corruption events may also result in data loss if silent data corruption goes unnoticed for an extended period of time. With BlockGuard hardware offload, you get the most robust protection against silent data corruption without the performance tax to your CPU that software T10-PI can inflict. Emulex has been a pioneer in the development of T10-PI; the LPe16000 series is Emulex's second-generation of adapters that feature BlockGuard support.



Figure 5 Application to disk data integrity with T10-PI.

Bullet-proof Reliability

Data centers trust Emulex to deliver industry-leading reliability. Emulex has shipped more than 11 million FC adapter ports worldwide and proudly publishes reliability data. Brocade, on the other hand, has not disclosed reliability information.

	Emulex	Brocade
Mean-time between failure (MTBF)	10 million hours*	No published data

Figure 6 Published reliability data.
(*Field reliability data on 2, 4, 8GFC adapters.)

Broadest OS, Server and Switch Support for Greater Interoperability

Significant, long-term investment in Emulex's host bus adapter R&D has yielded a solid, market-proven driver portfolio that supports a broad range of OS environments and system platforms:

- VMware, Solaris, Windows, HP-UX, AIX, NetWare and Linux

Conversely, the Brocade adapter portfolio has limited hardware and software qualifications that present a significant interoperability obstacle for data centers. Customers must check platform support carefully before purchasing, as there are many gaps in Brocade's interoperability.

Market share strength

Emulex is a leader in Fibre Channel adapter technology, with a massive install base and interoperability with the broadest range of operating systems and servers. LightPulse HBAs have been battle tested by the most demanding data centers since the inception of Fibre Channel technology.

Contrast this with Brocade's adapter history. Brocade has no published installation numbers. In fact, installed product over the past four years in the industry is so low it is not tracked by industry analysts. BMO Capital Markets reported in its 11-20-09 Flash that "Brocade's HBA efforts have consistently disappointed." In addition, recent press reports regarding a potential sale of Brocade Corporation should be considered. *The Wall Street Journal* published an article on a possible Brocade selloff as recently as 10-28-11, which casts additional uncertainty over the future of the Brocade HBA business. In the event this does happen, will the acquiring company continue to fund a poorly performing business unit?

LightPulse® LPe16000 vs. Brocade 1860



Focused on Delivering the Best 16GFC Functionality Today

Multi-protocol functionality

With the release of the 1860 adapter, Brocade has focused primarily on multiprotocol functionality with the Brocade AnyIO feature, whereas Emulex and OEMs have focused on what customers are demanding today - a feature rich, highly reliable 16G Fibre Channel product with backward compatibility to preserve their investment in Fibre Channel SANs. Emulex and OEMs will release multiprotocol adapters in 2012 to align with industry demand.

The Brocade AnyIO feature combines 16GFC, 10GbE Converged Network Adapter (CNA) and Network Interface Card (NIC), to support Fibre Channel, Data Center Bridging (DCB), Fibre Channel over Ethernet (FCoE), and Internet Small Computer System Interface (iSCSI).

The LPe16000 is built upon the XE201 ASIC which offers the same multiprotocol functionality, however it can also support quad channel configurations. The Brocade 1860 adapter does not have quad channel functionality.

Reconfigurability

The Brocade 1860 has a reconfigurability option that enables FC ports to be reconfigured into NIC ports that can run iSCSI, FCoE or Data Center Bridging DCB. However, this feature has some shortcomings that make changing protocols clumsy:

1. Hot plug of optics works, but replacing with a different optic without changing the port mode results in a message that states "unsupported optic". Brocade does not automatically reconfigure based on SFP detection. Host software (HCM) commands are required to change the "mode" for each port (or all ports) to either FC, NIC or CNA—which is only allowed if the correct SFPs are installed.
2. Cannot change port mode in GUI, you must use CLI.
3. You can change only one port at a time.
4. Not only does it need a reboot, but a power cycle!
5. If the driver for that function has not been installed previously, it will need to be installed after the reboot.

Conclusion

Emulex LightPulse LPe16000 16G Fibre Channel HBAs have better performance than the Brocade 1860 adapters, with over 1 million IOPS on a single channel and up to 4x more logins/open exchanges to support more virtual machines and larger scalable cloud environments. Additionally, LightPulse adapters have the following advantages:

- The only adapter with BlockGuard™ T10-PI data integrity offload, delivering high performance data integrity protection without the CPU overhead
- Industry-leading adapter management with OneCommand Manager—provides 2x management functionality and takes half the time to configure and manage compared to Brocade's HCM tool
 - Full featured vCenter plug in for VMware for streamlined management within the vCenter console
 - Common driver stack and management tools across FC, FCoE, iSCSI and NIC adapters
- Bullet-proof reliability—industry leading 10 Million hours MTBF on the LightPulse family of adapters, whereas Brocade's reliability data is unknown
- Interoperability with the broadest range of operating systems, servers, switches and storage to ensure compatibility across data centers and remote offices, whereas Brocade has many interoperability gaps
- Market share strength, huge adapter install base and investment protection for existing FC SANs with backward compatibility with 4 and 8GFC adapters.



www.emulex.com

World Headquarters 3333 Susan Street, Costa Mesa, CA 92626 +1 714 662 5600
Wokingham, UK +44 (0) 118 977 2929 | **Munich, Germany** +49 (0) 89 97007 177
Paris, France +33 (0) 158 580 022 | **Beijing, China** +86 10 68499547
Tokyo, Japan +81 3 5325 3261 | **Bangalore, India** +91 80 40156789

Connect with Emulex

twitter.com/emulex [friendfeed.com/emulex](https://www.facebook.com/emulex) bit.ly/emulexlinks [bit.ly/emulexlb](https://www.facebook.com/emulex)

©2011 Emulex, Inc. All rights reserved. This document refers to various companies and products by their trade names. In most, if not all cases, their respective companies claim these designations as trademarks or registered trademarks. This information is provided for reference only. Although this information is believed to be accurate and reliable at the time of publication, Emulex assumes no responsibility for errors or omissions. Emulex reserves the right to make changes or corrections without notice. This report is the property of Emulex and may not be duplicated without permission from the Company.