

White Paper

Driving Home Convergence

By Bob Laliberte

June, 2010

This ESG White Paper was commissioned by Emulex and is distributed under license from ESG.

Contents

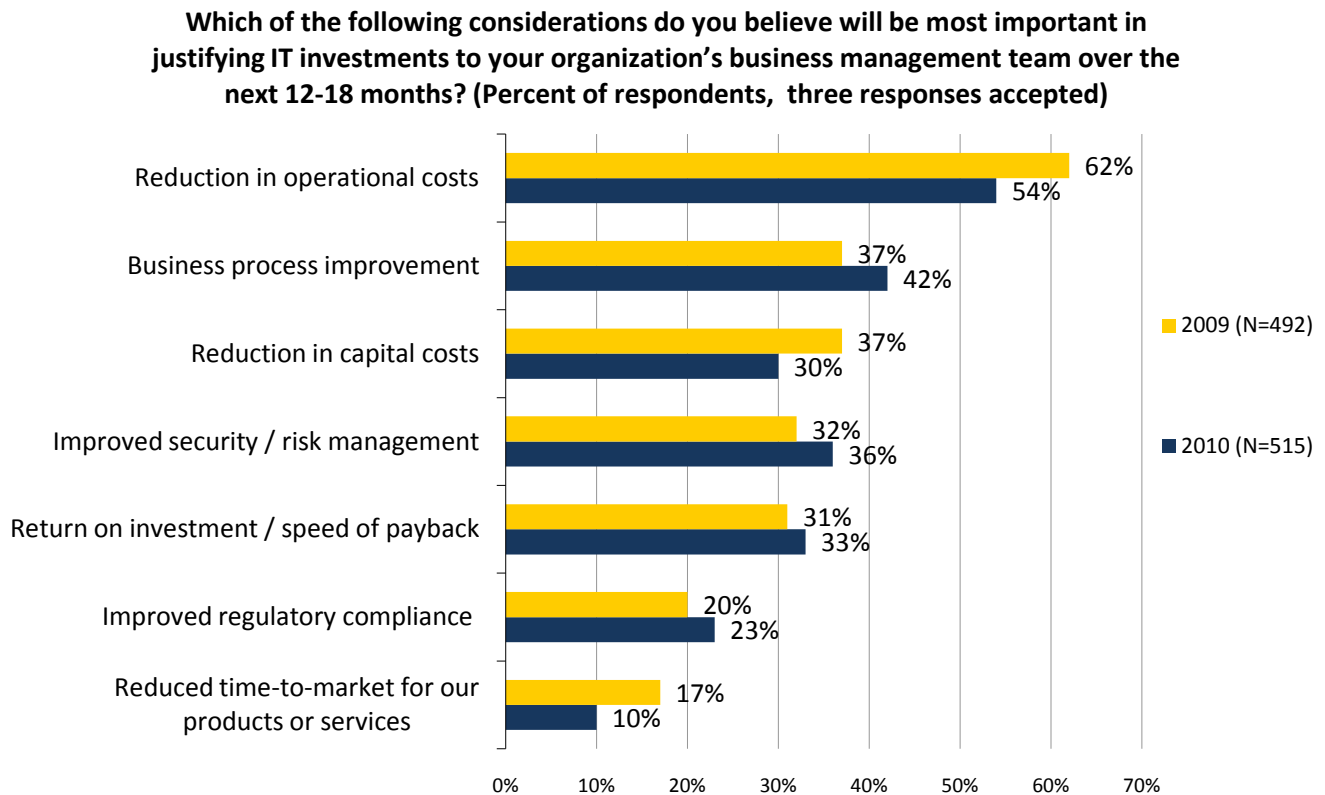
Businesses are Investing in IT Again	3
A Need for Consolidated, Flexible Environments	4
A New Network.....	5
Changing the Way Networks Evolve.....	5
Convergence Must Extend to the Motherboard	6
How to Proceed	7
Convergence Case Study.....	7
The Bigger Truth	9

All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of the Enterprise Strategy Group, Inc., is in violation of U.S. copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at (508) 482-0188.

Businesses are Investing in IT Again

Despite an uncertain economy, organizations are increasing their IT spending. According to ESG research’s 2010 IT spending survey, most organizations are transitioning from cost reduction to cost containment mode.¹ In many verticals, this means that capital budgets are being freed up and investments are once again being made in IT. What’s more, the lack of spend in the previous year has created pent up demand for new IT services. This doesn’t signal a return to the days of spending with reckless abandon, but rather a time of very controlled processes. In fact, ESG research polled users to determine their top criteria for justifying IT investment and the results (see Figure 1). The research, from both 2009 and 2010, indicates a continued focus on reducing operational expenses and driving business process improvement as “reducing capital costs” falls from second place to fifth. Moving up in the list is risk management and return on investment.

Figure 1. How Organizations Justify IT Purchases



Source: Enterprise Strategy Group, 2010.

Ultimately, this means organizations are going to have money to spend on IT, but they are going to be very selective about how they spend it. Businesses will be more likely to choose those projects that reduce operating costs and complexity and deliver higher levels of service to the business. Some of the more common IT initiatives that fit these criteria are server virtualization, data center consolidation, and network convergence.

The goal of this paper is to outline some of the factors driving the latter, network convergence, and identify some of the changes that need to occur in data center networks in order for this to happen. It will also provide recommendations to help organizations transform today’s complex, “stovepiped” collections of disparate network technologies into dynamic, converged networks. Finally, the paper will highlight technology being brought to market by [HP](#)—specifically it’s integrated FlexFabric Adapter, a converged networking LAN on Motherboard (LOM) utilizing [Emulex](#) OneConnect Universal Converged Network Adapter (UCNA) technology.

¹ Source: ESG Research Report, [2010 IT Spending Intentions Survey](#), January 2010.

A Need for Consolidated, Flexible Environments

Today’s business environment is more challenging than ever before. Market conditions are subject to rapid change, budgetary challenges, and compliance and regulation issues that continue to create a more demanding IT environment. It is clear that they can’t afford to keep investing in more of the same silo’ed technology infrastructures and multiple dedicated networks that result in higher deployment complexity and increased management and operational costs. Instead, IT needs to make strategic investments in new, highly flexible and consolidated environments that enable rapid response to dynamic business needs such as hosting composite applications, service oriented architectures, and cloud and Web 2.0 initiatives.

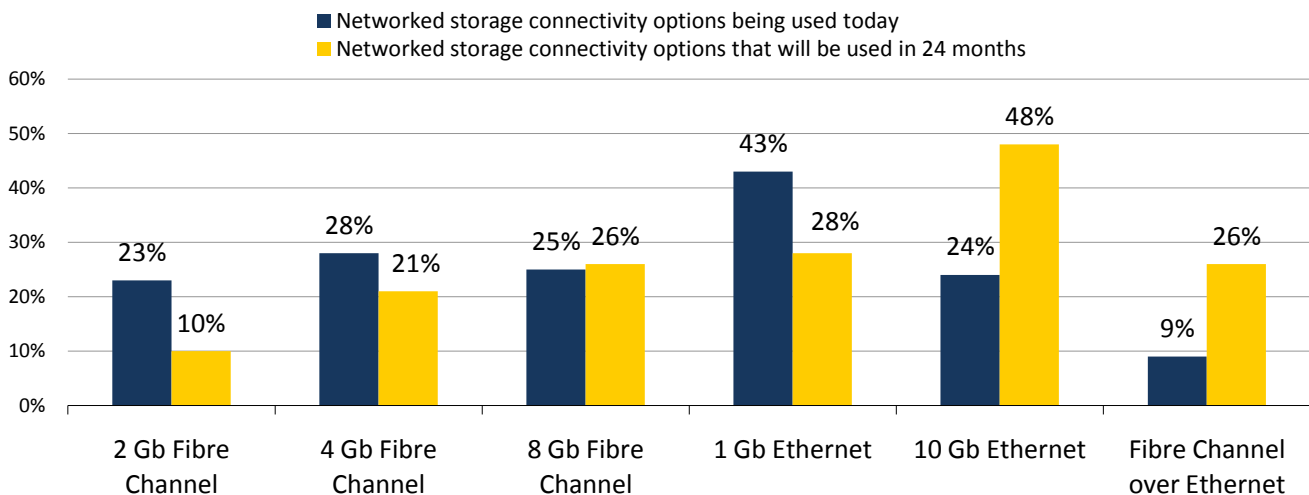
Given the current market dynamics and shifting business needs, IT organizations must be able to react to changing conditions and unpredictable demands for compute, network, and storage resources while maintaining unprecedented levels of availability and data accessibility. They don’t have the luxury of reconfiguring physical environments; in order to remain competitive, workload adjustments and service re-provisioning must be handled in real time. Ideally, IT organizations should be able to:

- Respond to business unit requests almost immediately.
- Provision compute, network, and storage capacity quickly and easily.
- Reduce operational expenses and overhead.
- Transparently scale infrastructure as needed.
- Create a greener data center by constantly adding space, power, and cooling efficiencies.
- Deliver the appropriate levels of service.

One of the keys to delivering the benefits of these ideals will be a dynamic and flexible network infrastructure capable of delivering multiple services between compute and storage resources. Keep in mind that those resources may reside within the data center, at a remote data center, or even in cloud infrastructure. According to ESG Research,² organizations are looking for a 10Gb/s converged Ethernet network to fulfill these needs (see Figure 2).

Figure 2. Data Center Connectivity

Please indicate which of the following front-end connectivity options are being utilized today to connect servers to networked storage systems. Please also indicate which connectivity options will be used in 24 months.
(Percent of respondents, N=447)



Source: Enterprise Strategy Group, 2008.

² Source: ESG Research Report, *Enterprise Storage Survey*, December 2008.

A New Network

IT organizations cannot afford to count on highly specialized legacy infrastructure that requires dedicated support and comes at a premium price, nor can they afford to keep manually provisioning and configuring these networks. What’s needed is a new network capable of supporting dynamic change and a wide range of applications, service levels, and workloads—without having to rewire, reconfigure, and learn new technologies. As Figure 2 pointed out, organizations are counting on Ethernet to provide the foundation; this is not standard Ethernet, but rather an enhanced version of Ethernet, commonly referred to as a Data Center Bridged Ethernet (also known as Converged Enhanced Ethernet). The requisite characteristics of this new network are highlighted in Table 1.

Table 1. Characteristics of Next Generation of Data Center Networking

Existing Network	Next Generation Network
Manual Control	Centralized Provisioning
Static Configuration	Virtual Resource Pools
Single purpose switches (IP, FC, IB)	Converged interconnect modules (IP, FCoE, NAS)
1 Gb NICs & 8 Gb FC	10 Gb Converged Network Adapters
LAN on Motherboard (LOM)	Enterprise Server Converged ULOM
Standard Ethernet (IP,iSCSI,NAS)	Enhanced Ethernet (iSCSI, IP, NAS, FCoE)
1 Gb Ethernet, 8 Gb FC	10, 40, & 100 GbE

Source: Enterprise Strategy Group, 2010.

As the table indicates, in addition to higher levels of automation and virtualization, convergence plays an increasingly important role. It needs to occur at every point in the network, from storage to the interconnect modules, the servers, adapter cards, and even the motherboard. It will also require a roadmap that will accommodate future growth.

Changing the Way Networks Evolve

It is difficult to rip and replace existing assets, especially when they haven’t been fully depreciated, so careful planning and consideration needs to be given to transforming these networks when the opportunity presents itself.

One of the most important considerations, and the most difficult to alter, is an IT staff’s ability to accept change. Deploying a converged network will require transitioning staff from their specialty networks into a single converged network. Fortunately for most organizations, the tools required to manage the converged network will appear remarkably similar to current resources. The real consideration here is policies: because multiple groups will be sharing the same infrastructure, organizations will need to reconsider how policies are deployed and ensure the proper processes are in place to mitigate risk.

For certain applications and workloads, performance is paramount. For those organizations leveraging InfiniBand networks, significant improvements will need to be made and proved out before they switch to Ethernet. That, however, is a relatively small group; the majority of organizations leverage Fibre Channel networks for their mission critical applications. Now that Ethernet is being modified (via Data Center Bridging) to eliminate dropped packets and congestion, it should be on par with other low latency, deterministic networks—albeit with a much more aggressive roadmap. The key to a dynamic network is not performance; it is about the flexibility to offer multiple services without replacing or deploying additional equipment or requiring any manual intervention. The ability to dynamically reconfigure a network to support business needs will even more important to an IT organization as it can quickly respond to changing market demands. Ultimately, this is about virtualizing the IO path for greater flexibility, appropriately matched SLAs, and reduced overhead.

Organizations will also need to protect existing investments; if you just spent millions deploying a new SAN infrastructure, you will need to leverage new technology that will preserve and extend that investment until it has been fully depreciated and can be gracefully migrated to an enhanced Ethernet network.

One of the best ways to evolve is to protect the core, but begin by providing converged networks from the server layer. In many cases, this evolution is facilitated by server virtualization initiatives because networked storage (either NAS or SAN) is required in order to take advantage of the advanced mobility features these technologies offer. Next generation networks will be able to support any of the protocols required—Ethernet, iSCSI, or FCoE—to enable connectivity to storage resources and adapt to a changing storage environment. Fortunately, all major vendors have tested, “certified,” and offer support for a variety of solutions—mostly converged network adapters, interconnects, and blades—as first steps in the process of converging the network.

Convergence Must Extend to the Motherboard

If you want widespread adoption of a technology, make it a standard feature of the server. For networking, this means putting it in the integrated networking ASIC, the ubiquitous LOM. HP has taken this one step further by creating the HP FlexFabric Adapter, which has Emulex’s OneConnect UCNA technology. As a technology migrates to its most efficient form, silicon on the motherboard, adoption will dramatically accelerate as the technology will simply come with the compute resource. Numerous benefits could be achieved by deploying converged LOMs including:

- **Universal storage connectivity.** The implications go beyond server connectivity, extending to storage connectivity as well. With converged silicon deployed in the storage array, vendors could offer dynamic connectivity, potentially replacing FC HBAs, NIC cards, and iSCSI adapters.
- **Reduced costs.** As with most technologies, having greater volume results in lower price points. Eventually, a new technology achieves commodity pricing and becomes an industry standard offering—and customers realize the benefits.
- **Greater flexibility.** Universal connectivity provides tremendous flexibility as servers can be wired once and services can be changed without manual reconfiguration and testing. The same could be true if deployed on a storage array. It will also provide the foundation for automation and dynamic service delivery.
- **Greater consolidation.** The additional ports enabled by deploying a converged network LOM will allow delivery of even higher VM ratios per physical server. This is accomplished by filling the additional ports with 10 GbE CNAs. Now that multi-core Nehalem processors are available, most organizations are not worried about CPU utilization—this consolidation helps to relieve concerns about the network becoming a bottleneck.

Although initial technology development and the ability to deliver that technology on the motherboard are typically separated by large periods of time, HP and Emulex are making converged adapters a reality today. The HP FlexFabric networking layer is a core tenet of HP’s Converged Infrastructure strategy and where Emulex’s convergence technology clearly aligns—it will enable HP to deliver unmatched convergence, cost savings, and flexibility on a wide range of its compute platforms. The FlexFabric adapter will be initially deployed on the motherboard as the HP NC551i Dual Port FlexFabric 10Gb Converged Network Adapter on AMD G7 blade servers. The entire family of products will be managed through a single management console.

How to Proceed

Now that there are multiple layers of convergence technology available, IT needs to understand what steps need to be taken in order to actually benefit from a next generation converged network. Specifically, they should take the following steps to ensure success:

1. **Educate the appropriate members of the IT team.** Show the current disparate teams how they can share a common physical infrastructure with appropriate levels of security and management. It will be imperative that all teams are well trained and comfortable with the technology.
2. **Start by enabling servers with converged network capability.** As stated earlier, in many cases, it is easier if convergence begins during a server virtualization initiative or server refresh. This would include 10GbE virtual IO capability that can link to current IP and FC networks.
3. **Optimize consolidation efforts by adding servers with converged network LOMs,** like HP blade servers with the integrated FlexFabric Adapter that will allow for maximum virtual machine consolidation and retain the desired service levels.
4. **Plan the transition to fit within an organization's amortization or equipment refresh schedule.** Keep in mind that this may take place over a period three to four years. Fortunately, this will provide ample time to plan and select the appropriate technology. It does, however, increase the importance of vendor roadmaps.
5. **Ensure that any new networking technology/infrastructure's roadmap fits with the vision of a converged next generation network.** This would include discussions with vendors regarding server, storage, switch, and management software roadmaps.
6. **Invest in quality management software.** Ultimately, the success of a next generation network may ride on the quality of the chosen management software. A unified management solution should help deliver higher levels of automation and unify policies between network, security, and storage to address internal, regulatory, and departmental issues.

Next generation converged networks are available today, as evidenced by HP's release of the HP NC551i Dual Port FlexFabric 10Gb Converged Network Adapter (convergence on the motherboard), and the HP StorageWorks CN1000E Converged Network Adapter for rack-mount servers.³ Following the steps outlined above and investing in the right technology can deliver significant cost and operational efficiencies, so now is the time to act.

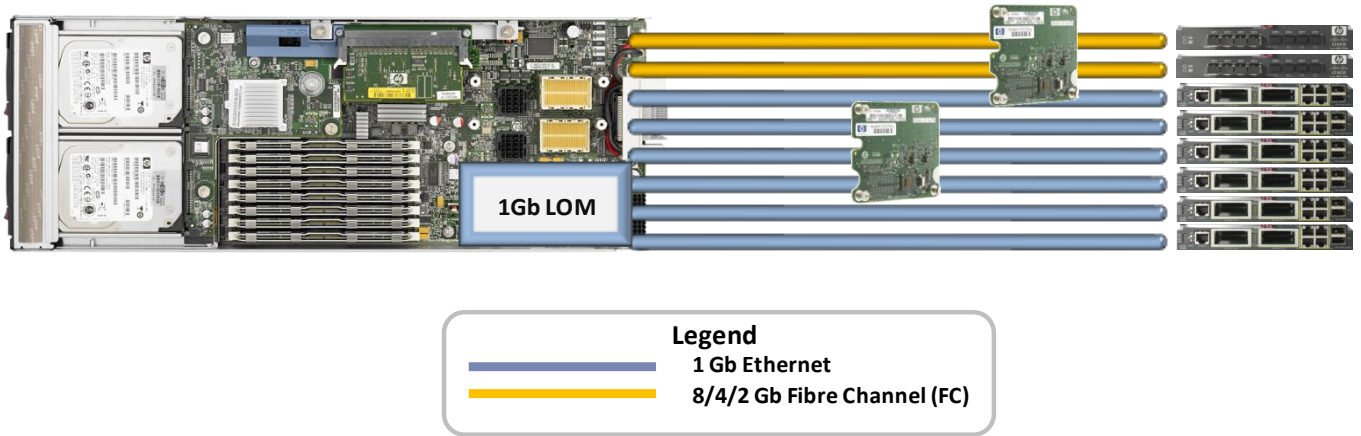
Convergence Case Study

To illustrate the potential value of convergence, ESG has created an example scenario. Figure 3, shows a typical deployment of an HP blade server without an integrated FlexFabric Adapter. There are two LOM IP ports and four IP ports from a quad-port mezzanine NIC going into six 1GbE switch modules, and two Fibre Channel ports from a mezzanine HBA card going into two Fibre Channel switch modules. Although the cost of the switch modules is amortized across all the blades in the chassis, you still have to buy eight switches that use extra real estate and consume power and cooling resources.

³ See ESG Lab Validation Report, [HP CN1000E CNA: Seamlessly Enabling Universal Network Convergence](#), April 2010.

Figure 3. Traditional Deployment Environment

Deploying 6 NICs and 2 FC Ports

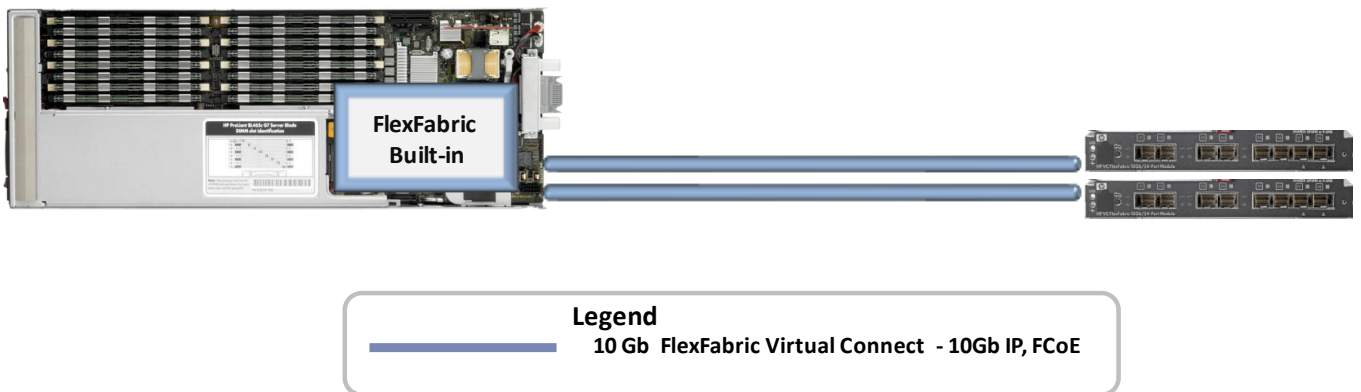


Source: HP, 2010.

These environments are precisely the reason why HP and Emulex have developed next generation converged network solutions to reduce complexity and costs. It is more than just reducing cost and complexity, though; it is also the ability to drive greater flexibility and higher service levels. Figure 4 illustrates how a converged environment leveraging HP’s FlexFabric Adapter on an HP Blade server can eliminate the need for the Fibre Channel HBA, the quad-port NIC, and two of six interconnect modules to dramatically reduce complexity and cost while increasing flexibility.

Figure 4. Converged Environment with HP FlexFabric Adapter

Deploying 6 NICs and 2 FC Ports



Source: HP, 2010.

The HP FlexFabric solution shown above provide 10Gb/s Ethernet pipes that can be virtualized into IP, iSCSI, and FCoE connections to meet the specific needs of each application and virtual machine. This means IT managers can deploy their servers with the same policies they have used in the past, but leverage a new networking model where the HP integrated FlexFabric Adapter, embedded on the blade motherboard, can be virtualized to support IP, NAS, iSCSI, and now FCoE all on a single network. Provisioning and virtualization is done through HP's BladeSystem management system, which is the key to managing this new deployment model. This converged network is ideal for driving greater consolidation in virtualized environments by providing big pipes and reducing the number of switches required in the blade chassis, enabling organizations drive greater consolidation and scale faster.

The Bigger Truth

Next generation converged networks are available now. They deliver significant benefits—most notably, lower costs, greater flexibility, and higher service levels. So why continue to deploy multiple separate networks when all that is needed is one? Organizations have benefited tremendously from consolidation of data centers, servers, and storage, so it only makes sense to consolidate networks as well. Ethernet has already successfully consolidated voice and data—now, an enhanced Ethernet is poised to consolidate networks once again.

The technology to drive convergence has been tested, certified, and is supported by all major vendors; now it is just a matter of working it into server virtualization initiatives or standard server refresh cycles. Now that converged network technology has made its way to the motherboard, adoption should accelerate and pricing should decrease dramatically as increased HP integrated FlexFabric Adapter volumes drive greater efficiencies. This does have the potential to cannibalize existing CNAs, but organizations looking to optimize consolidation will leverage it to drive higher VM ratios. It will also help define the leaders in the convergence space as converged network LOMs will rapidly gain market share and, intuitively, should lead to additional share as organizations deploy converged network adapter cards and management software from the same vendor.

HP is in a great position to deliver next generation converged networking technologies. Not only can it draw on a comprehensive family of converged networking products that ranges from an integrated FlexFabric adapter and converged modules, but HP has also made significant investments around consolidating data centers and infrastructure. The fact that HP is the first to market with a converged technology on the motherboard demonstrates its commitment to deliver innovative, compelling solutions and should ultimately accelerate converged networking's time to value.



Enterprise Strategy Group | **Getting to the bigger truth.**