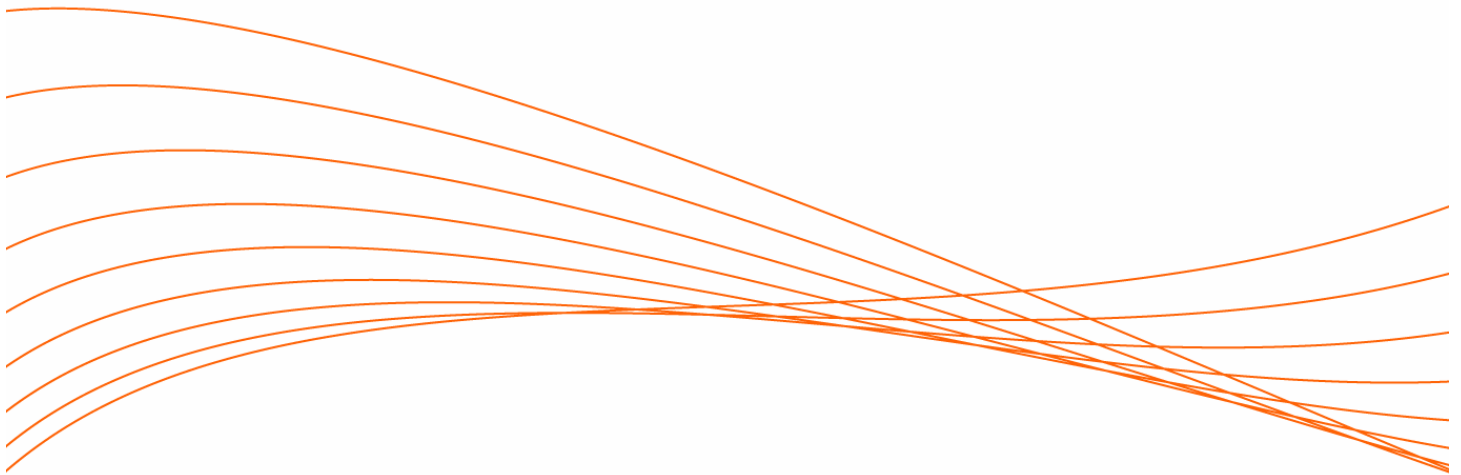


Delivering Gigabit Ethernet to the Network Edge for Improved Performance and Efficiency



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Introduction

Users have always desired speed and feature-rich applications from their computers. Complex, high-bandwidth applications and the proliferation of digital video, high-resolution images and other large data files have resulted in an ever-increasing need for faster networks.

Most networks connect users to the applications and data they need with Ethernet technology, such as 10Base-T and 100Base-TX. ProCurve Networking by HP has played an integral role in the creation of these technologies from its earliest days of 10Base-T development and continues to drive innovation in today's Gigabit speeds.

Although 100Mbit constitutes a large portion of today's Local Area Networks (LANs), with speeds that are 10 times faster than 10Base-T, Gigabit Ethernet has emerged as the preferred network technology. Due to the growing need for fast networking speeds and the availability and affordability of Gigabit Ethernet technologies, it has become feasible to implement a Gigabit solution from the center of the network all the way to the edge and achieve immense network performance gains.

This paper focuses on Gigabit Ethernet solutions and how implementing Gigabit to the edge benefits users and organizations by improving efficiency and profitability. An overview of strategies for easily and affordably bringing Gigabit speeds to users connected at the network edge is also included.

What is Gigabit to the Edge?

Personal computers (PCs), powerful desktop applications and the Internet have brought about a productivity revolution that has not slowed since the first PCs arrived in the enterprise. While PC processor speeds, memory and hard drives continue to improve every year, this computing power often lies dormant as users frustratingly work with networks too slow to efficiently connect them to the applications and information they need.

With the emergence of Gigabit Ethernet technologies, which have 10 times the speed of 100Mbit networks and 100 times the speed of standard Ethernet, access to blazing-fast network connectivity has become a reality – not only in the network infrastructure, but also on PC desktops and workstations (see Figure 1).

Until recently, the cost of Gigabit Ethernet limited it to the network center, and its use was reserved for the highest priority applications. As the availability of Gigabit technologies in both desktop PCs and core networking equipment becomes standard and more affordable, the benefits of deploying Gigabit Ethernet – and even 10 Gigabit Ethernet (10GbE) – at the edge of the network are being fully realized.

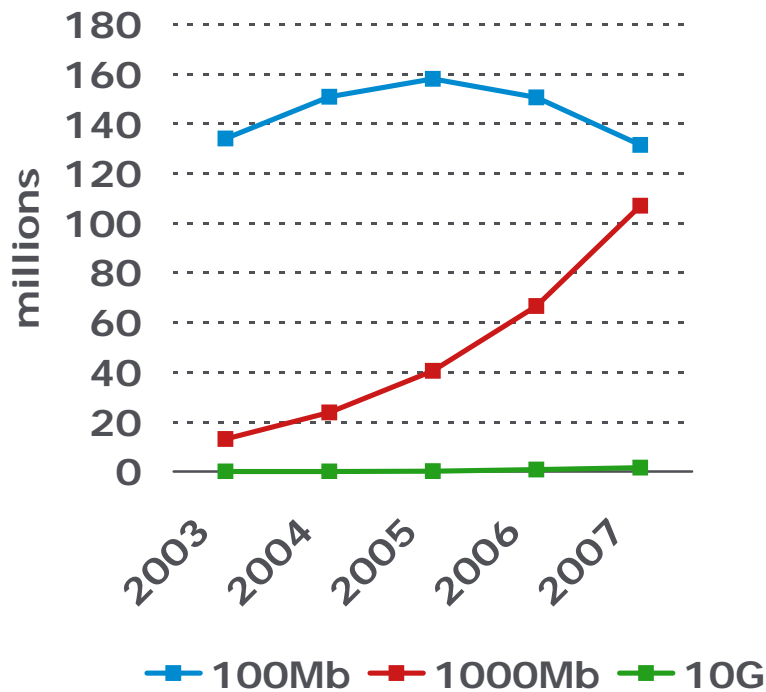


Figure 1. The advancement of Gigabit Ethernet in the LAN switch market. Source: Dell'Oro Group.

The Advantages of Deploying Gigabit to the Edge

Deploying Gigabit to the edge of an enterprise network is advantageous not only to desktop users hungry for more bandwidth and faster download speeds, but also to network administrators, who now enjoy powerful incentives for migrating to Gigabit Ethernet.

For users, Gigabit to the edge means:

- Reduced transfer times of large data files from minutes to seconds, increasing productivity with simplified workflow and decreasing time to market and product lifecycle development.
- Instant access to business assets and resources.
- Easy access to and sharing of bandwidth-intensive applications, such as computer-aided design (CAD), video editing, animation and high-resolution imaging.
- Improved ability to multitask within multiple applications. For example, one user might simultaneously use video conferencing software to watch a CEO telecast, check e-mail, surf the Internet and update a CAD file on the network.
- Enhanced access to mobile computing solutions, from wherever users are connecting.

For network administrators, Gigabit to the edge means:

- Higher network performance with less costly downtime and the elimination of frustrated users waiting for the network.
- Robust security at the network edge with secure transactions taking place at 10 times the speed of 100Base-TX.
- Increased flexibility to do more with the entire network.
- A seamless transition from 100Mbit and 10Mbit technologies to Gigabit Ethernet, leveraging existing investments in network infrastructure.
- Flexibility and an affordable price in upgrading to Gigabit Ethernet all at once or incrementally.

With the benefits that Gigabit to the edge provides both users and network administrators, the reasons for migrating to Gigabit Ethernet are clear (see Figure 2). With recent improvements in three key areas – ease of deployment, network performance and affordability – deploying Gigabit Ethernet to the network edge is no longer out of reach for most organizations. And by migrating, these organizations can experience improved profitability through a more productive workforce.

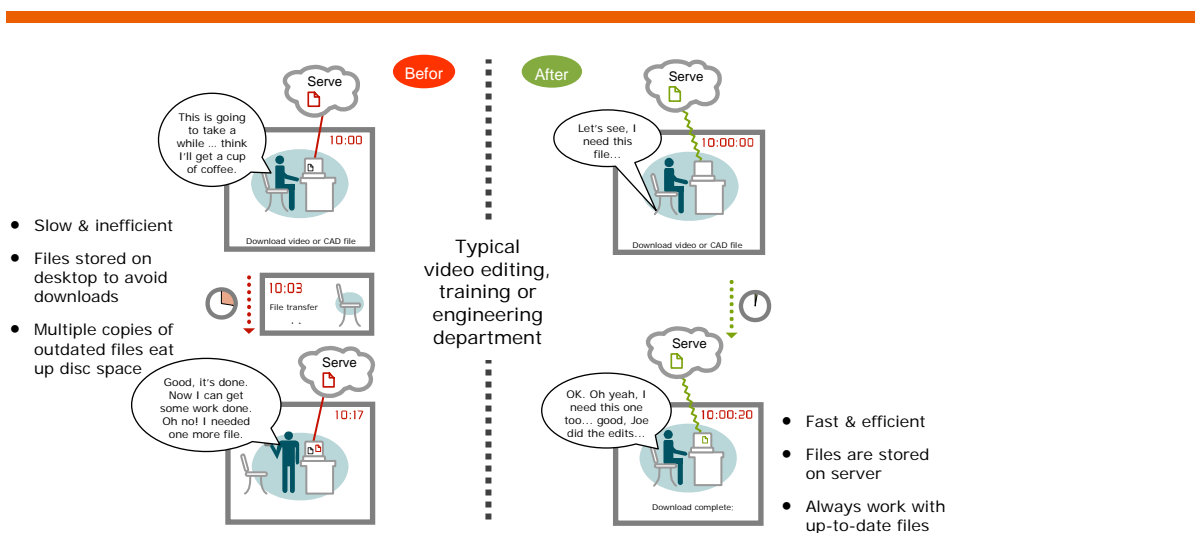


Figure 2. Gigabit to the edge user experience.

Ease of Deployment

Gigabit Ethernet technology is quickly becoming mainstream – at both the server and desktop. Today, all HP enterprise clients – desktops, notebooks and HP enterprise servers – ship standard with Gigabit Ethernet. With Gigabit technologies coming straight out of the box, the ubiquity of Gigabit Ethernet in new desktops and servers means minimal effort to upgrade the network edge.

The evolution and backward compatibility of Ethernet and Fast Ethernet standards to today's Gigabit speeds also means easy migration of existing network technologies. This backward compatibility renders Gigabit to the edge migrations extremely easy, with the ability to upgrade or replace clients by merely plugging the new Gigabit-ready device into a switch. Migrations can be conducted gradually if desired, one device at a time. For example, by installing a ProCurve Switch 3400cl series stackable in the wiring closet today, network administrators can still serve their 10 and 100Mbit clients with auto-negotiating ports, while being fully prepared to support Gigabit devices as they are added to the network. In addition, these new ProCurve switches provide optional 10 GbE uplinks to ensure future scalability and further protect the initial investment.

Improved Network Performance

Until recently, networks had to support the transfer of files only from one place to another. As networks and computers have evolved, so have the applications being utilized. Bandwidth needs have continued to expand, particularly with the convergence of media-rich applications, such as video and voice.

With this increase in bandwidth and network-based applications, administrators require more control and performance at the edge of the network. By deploying Gigabit to the edge, network administrators and information technology (IT) groups are able to support these and other applications, such as remote software installations, backups, e-mail and database management, at huge performance increases over 100Base-TX.

Network reliability also improves with deployment of Gigabit to the edge. Just as networks that migrated from 10Mbit to 100Mbit gained a 10-fold improvement, the same is true when moving from 100Mbit to Gigabit Ethernet. By alleviating congestion and removing bottlenecks, the network simply performs better.

Running Gigabit at the edge and all the way to the network center allows applications that require uninterrupted transmission, such as a streaming media video application, to get the bandwidth they need to perform as expected. As end users access multiple network applications on their computers at the same time, Gigabit to the edge prevents desktop clients from getting bogged down waiting for the network to catch up to the faster GHz processors of their desktop PCs.

Finally, the increase of mobile users has created a greater need for secure access to communications and services based on an individual's profile and business needs – no matter where a user connects to the network. These additional layers of security have often meant increased overhead costs. With Gigabit to the edge, clients can communicate with the server to perform secure transactions at 10 times the speed, which frees up the client and server to move on to other tasks, minimizing the need for additional investments in server upgrades.

Affordability

Today, implementing Gigabit speeds in a network is affordable for many enterprises. At a cost that is only slightly higher than that of Ethernet or Fast Ethernet technologies, Gigabit to the edge offers the best return on investment for new hardware purchases.

Previous migrations from 10Mbit networks to 100Mbit networks required costly and time-consuming cabling upgrades and additional training. Since Gigabit Ethernet runs perfectly on most CAT-5 cabling already in place, there is no rewiring expense, and administrators can spend their time focusing on other IT issues rather than learning a new technology.

With the standardization of Gigabit Ethernet adapters, the cost of Gigabit Ethernet on the desktop has been further reduced and the price of Gigabit chip sets is rapidly decreasing.

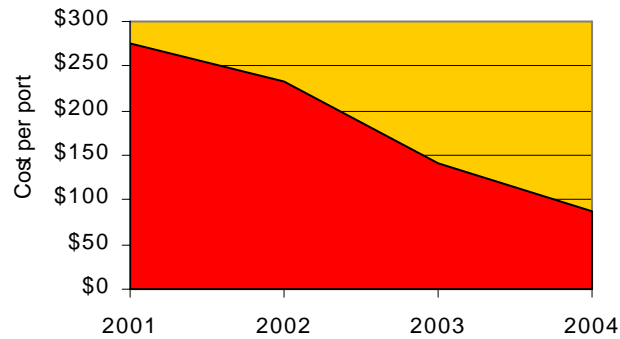


Figure 3. Gigabit port prices. Source: Dell'Oro Group.

In fact, HP desktops and workstations enable the addition of a Gigabit PCI adapter at no price premium over 100Base-TX adapters. The price drop of after-market Gigabit NICs makes it cost-effective to upgrade older computers in order to extend the life of these devices, delivering increased return on IT investment (RoIT).

How to Implement Gigabit to the Edge

When an enterprise is ready to migrate to Gigabit Ethernet, it can simply replace the switches that do not support Gigabit speeds with those that support auto-negotiation of 10Mbit, 100Mbit, Gigabit and 10GbE technology. Auto-negotiation allows both the new Gigabit devices and any legacy devices on the network, such as printers, to operate seamlessly in the new, faster infrastructure. To achieve all the benefits of Gigabit to the edge (see Figure 4), these switches are simply placed at the edge of the network where clients connect directly. As the network expands, an organization need only add Gigabit switches to maximize its IT investment in new hardware.

After support for Gigabit Ethernet to the network infrastructure is implemented, Gigabit-enabled devices can be added to the network. Clients without Gigabit connectivity can be easily upgraded with an HP Gigabit PCI card that has been tested on all HP desktop platforms. HP's Gigabit Ethernet NICs are priced competitively with Fast Ethernet NICs, enabling customers to realize the full potential of Gigabit to the edge at no price premium. By making this small investment, customers extend the life of these clients and thus save money by not having to completely replace the equipment. Any new desktop purchases should be evaluated on whether Gigabit Ethernet technologies are included. All HP enterprise clients, including all desktops and notebooks, ship standard with Gigabit Ethernet support.

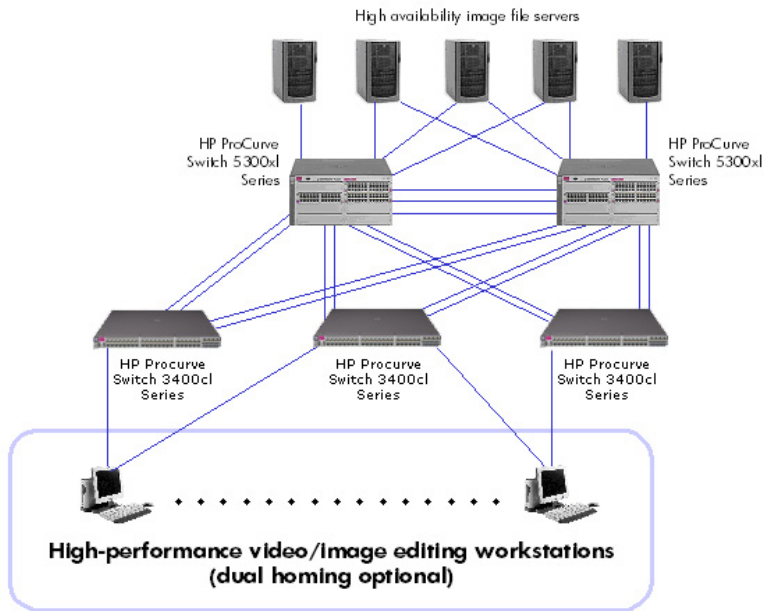


Figure 4. Gigabit to the edge: Mid-size Digital Image Processing Application Example

ProCurve's Approach to Delivering Maximum Value

ProCurve's intelligent switches and Adaptive EDGE Architecture™ meet both business and IT needs, providing maximum value to organizations seeking Gigabit Ethernet at the network edge.

Deploying ProCurve Gigabit solutions to the network edge meets business needs by delivering:

- Improved productivity. With Gigabit speeds, bandwidth-hungry applications can deliver critical information with extremely fast response times. Employees don't have to wait for results, and efficiency is improved. Also, by providing optional 10GbE uplinks, ProCurve not only gives customers 10 times the bandwidth capability over 100Mb, but also more bandwidth in the future with 10GbE. This enables customers to future-proof their networks and be able to support advanced applications for years to come.
- Investment protection. Since most 100Mb switch legacy sites will support Gigabit capabilities, there is minimal or no re-wiring of current wiring closets. Therefore, customers can have the bandwidth increases afforded by Gigabit technologies without overhauling the entire network. ProCurve solutions adhere to IEEE network standards and are interoperable with legacy and third-party equipment, which further protects existing and future investments. And since ProCurve switches come with a lifetime warranty and offer free phone support and software updates, customers are protected as long as they own the switches.
- New business opportunities. Customers that have Gigabit Ethernet capabilities at the network edge can affordably deploy new high-performance applications that come to market without sacrificing response time. Also, Gigabit-ready, high-performance servers and workstations can easily be added to the network and perform proficiently.
- Affordable performance and power. With Gigabit and 10GbE, customers can add 100 times more network capacity at today's more affordable prices. And with ProCurve's commitment to delivering solutions that are flexible and able to adapt to changing technology and business needs, customers are assured of value in both the short and long term.

Deploying ProCurve Gigabit solutions to the network edge meets IT needs by delivering:

- Superior return on investment. ProCurve customers can add Gigabit and 10GbE capabilities over time if desired, starting with the data center and then upgrading wiring closets. And since ProCurve solutions support all IEEE LAN standards, customers will always be able to use ProCurve switches as their networks expand or age.
- Improved network efficiency. With edge intelligence in ProCurve switches, customers have exceptional management controls that provide instant network reaction to malicious traffic and security breaches.
- Multi-service networks. With the best security features, ProCurve switches can provide robust access capabilities that meet customers' specific needs. ProCurve solutions also offer instant discovery and network priority access for mobile connectivity. And with video, voice conferencing and other interactive network features, ProCurve switches can provide priority bandwidth and priority queuing throughout the network.
- Reduced costs and reliance on fiber. With affordable copper connectivity, customer reliance on costly fiber implementations is kept to a minimum. 10GbE copper was created to be cost efficient and easily implemented without having to contract expensive fiber links through specialized cable providers.

ProCurve Networking Gigabit Solutions

ProCurve is responding to the need for Gigabit to the edge with the ProCurve Networking Adaptive EDGE Architecture, designed to create easier-to-use networks while bringing greater functionality, performance, power and intelligence to the network edge at affordable prices.

ProCurve intelligent switches – including the ProCurve Switch 3400cl series, 2800 series, 4100gl series and 5300xl series – can automatically bring Gigabit speeds to the network edge without added complexity and are priced to meet the needs of virtually any enterprise (see Figure 5).

ProCurve solutions offer several additional products for enterprises of all sizes considering deploying Gigabit speeds to the network edge, including the ProCurve Switch 6108, the unmanaged ProCurve Switch 2700 series and the ProCurve Routing Switch 9300m series.

ProCurve switches come with lifetime hardware warranties, lifetime phone support and next-business-day advance replacement. ProCurve also offers a range of premium services, including installation, configuration and verification.

Products:	ProCurve Switch 6400cl series	ProCurve Switch 6108	ProCurve Switch 3400cl series	ProCurve Switch 2800 series	ProCurve Switch 2700 series
Ports:	6 CX4 or 6 copper 10GbE ports; Supports a maximum of 8 10GbE ports	6 10/100/1000 ports with 2 dual-personality ports for mini-GBIC or 10/100/1000 connectivity	20 and 44 10/100/1000 port versions with 4 dual-personality ports for mini-GBIC or 10/100/1000 and optional 10 Gigabit uplinks	20 and 44 10/100/1000 port versions with 4 dual-personality ports for mini-GBIC or 10/100/1000 connectivity	8 and 24 10/100/1000 port versions
Routing capabilities:	Full Layer 3	Layer 2 and 3 (basic IP routing)	Full Layer 3 and 4	Layer 2 and 3 (basic IP routing)	Layer 2
Ideal for networks that need:	Low-cost 10GbE for high-performance aggregation of clusters of Gigabit switches	Low-cost Gigabit aggregation	Robust security features and EDGE intelligence and high-bandwidth capability with optional 10 Gigabit uplinks	Low-cost Gigabit connectivity with comprehensive functionality	Low-cost, unmanaged Gigabit
High availability features:	Optional external RPS; Dual flash images	Dual flash images	Optional external RPS; Dual flash images	Optional external RPS; Dual flash images	

Figure 5. ProCurve Networking has the right stackable Gigabit solution for you

Chassis				
Products:	ProCurve Routing Switch 9408sl	ProCurve Routing Switch 9300m series	ProCurve Switch 5300xl series	ProCurve Switch 4100gl series
Ports:	8 slots support a maximum of 32 10GbE ports or 480 Gigabit ports or 320 mini-GBIC ports	4-, 8- or 15-slot versions with capability for up to 28 10GbE ports or 232 Gigabit ports or a combination	4- or 8-slot versions with capability for up to 112 10/100/1000 ports and up to 16 dual personality ports for mini-GBIC or 10/100/1000 connectivity	4- or 8-slot versions with capability for up to 160 10/100/1000 ports and up to 16 mini-GBIC ports
Routing capabilities:	Layer 3 and 4+	Layer 3 and 4+	Layer 2, 3 and 4	Layer 2 and 3
Ideal for networks that need:	High performance, high density, high availability and advanced functionality for the core of the network; Optimized for 10GbE aggregation and IPv6 deployments	High performance, high availability and advanced functionality from the core of the network all the way to the edge	Robust security, mobility and convergence features and EDGE intelligence in a modular, high-density form factor	Low-cost modular alternative to stackables
High availability features:	Optional internal redundant power supply; Hot-swappable modules; Dual flash images	Optional internal redundant power supply; Hot-swappable modules; Dual flash images	Optional internal redundant power supply; Hot-swappable modules; Dual flash images	Optional internal redundant power supply; Hot-swappable modules; Dual flash images

Figure 6. ProCurve Networking has the right Chassis Gigabit solution for you

Summary

With the growing availability and affordability of Gigabit-enabled desktops and networking products, Gigabit to the edge is no longer a matter of how or if, but rather a matter of when. The innumerable performance benefits to users and network administrators, as well as the ease and affordability of migration from standard Ethernet technologies, make deploying Gigabit at the network edge a priority for any enterprise.

ProCurve Networking has a full line of solutions that deliver Gigabit Ethernet to the network edge, allowing enterprises to easily scale their networks for increased performance and productivity. This means instant accessibility to business assets and resources. In addition, ProCurve's affordable solutions enable companies to take full advantage of the already-present Gigabit connection capabilities of desktop and notebook clients. What is more, Gigabit to the edge addresses the growing performance needs in imaging, CAD, video and film production, animation and many more existing and emerging applications. Increased performance helps meet current and future requirements for a secure, mobile, multi-service network.

For More Information

To learn more about ProCurve solutions, contact your local ProCurve sales representative or visit: www.procurve.com.

To find out more about
ProCurve Networking
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