



# deploying Gigabit Ethernet on the desktop

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abstract: Ethernet has become the most commonly utilized LAN technology worldwide. Gigabit Ethernet (Gigabit), the latest version of the Ethernet standard, is a reaction to the explosive growth of network traffic and bandwidth-intensive applications. This growth has fueled the demand for even greater bandwidth inside and outside the enterprise.

As Gigabit technology has become mature and more affordable, the migration from 10/100 Fast Ethernet to Gigabit has gathered pace. Gigabit on the desktop is now affordable and easily deployed, enhancing user productivity and network performance.

This White Paper offers an overview of the migration to Gigabit and includes test results demonstrating significant performance gains of Gigabit over 10/100 Fast Ethernet. The White Paper outlines Gigabit solutions offered by HP and provides a methodology for migrating to Gigabit – one desktop at a time.

## notice

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## introduction

Today's LANs are primarily comprised of 10/100 Fast Ethernet technology; however, as Gigabit Ethernet (Gigabit) technology becomes mature and more affordable, the migration from Fast Ethernet to Gigabit has begun. Sophisticated applications and powerful PCs have continued to drive network traffic to new levels, with the result that there is often insufficient bandwidth for the customer's critical network connections.

HP offers Gigabit connectivity solutions for all areas of the network. Commercial desktops, HP ProLiant servers, HP ProCurve Networking, workstations and recently released HP portables support Gigabit technology today. As new HP servers, clients and networking devices are introduced, more will become fully Gigabit-enabled.

This White Paper provides information on:

- the importance and benefits of deploying Gigabit
- the migration of Gigabit to the desktop
- how deploying Gigabit-enabled desktops today gives an immediate performance improvement when the network transitions to Gigabit.

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Note: Gigabit deployments discussed in this White Paper are on copper rather than fiber.

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## network congestion and bottlenecks

In the past, desktop processing and connectivity were considered adequate if the user could simultaneously open a Microsoft Word document and a Microsoft Excel spreadsheet. As the Internet evolved and applications became more robust, users began to deal with a network environment where visually rich multi-tasking become routine. In the Internet age, the user can now simultaneously exchange graphic designs, view Web telecasts and surf for information.

This new era of desktop power has created network bottlenecks and congestion that impede user productivity and overall network performance. While processors, memory and hard drives have evolved with application needs, the network has become a limiting factor; clients at the edge of the network now require not only processing power but also communications bandwidth.

Advances in telephony, video streaming, e-mail and instant messaging typically involve the transfer of large files, placing a strain on the entire network. High-speed connectivity is required to support these applications.

## Ethernet evolution

Ethernet has become the most commonly utilized LAN technology worldwide. Its popularity as a networking solution is largely based on:

- ease of use and administration
- low cost
- scalable performance
- flexibility and interoperability

Today, more than 85% of LANs are Ethernet-based according<sup>1</sup> to [IDC](#). Central to the successful adoption of Ethernet is the advance of Ethernet IEEE standards in response to changing network requirements, always offering a clear migration path – from 10Mbps Ethernet to 100Mbps Fast Ethernet to Gigabit Ethernet (and, in the future, to 10Gbps Ethernet).

Gigabit Ethernet has evolved to support the explosive growth of network traffic and bandwidth-intense applications that is fueling the demand for even greater bandwidth inside and outside the enterprise.

## migration to Gigabit Ethernet

As applications began to require more bandwidth, 10Mbps Ethernet desktops migrated to 100Mbps Fast Ethernet. This migration gained pace as the cost of dual-speed 10/100Mbps technology approached that of 10Mbps technology. In the same way, HP expects the migration to Gigabit Ethernet to progress as the cost of that technology falls.

Based on data<sup>2</sup> from [In-Stat/MDR](#), Figure 1 shows how the average cost of Gigabit NICs is projected to fall.

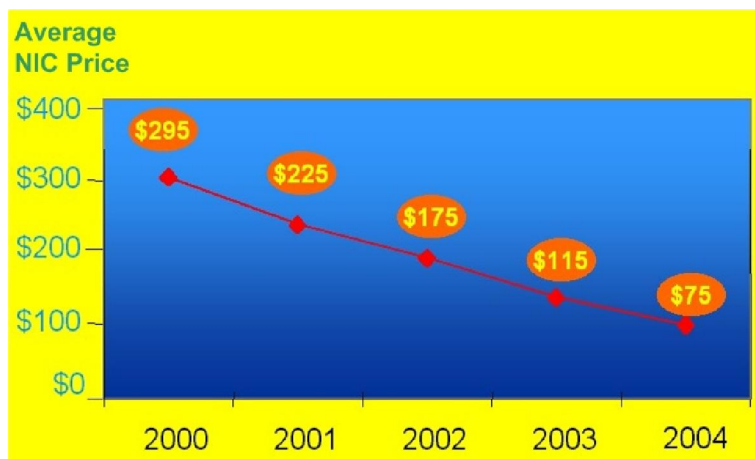


Figure 1: Falling cost of Gigabit Ethernet NICs (Source: In-Stat, September, 2000)

<sup>1</sup> 2000

<sup>2</sup> September, 2002

Based on cost projections from [IDC](#), Figure 2 shows falling deployment costs from another perspective – the cost per Ethernet port.

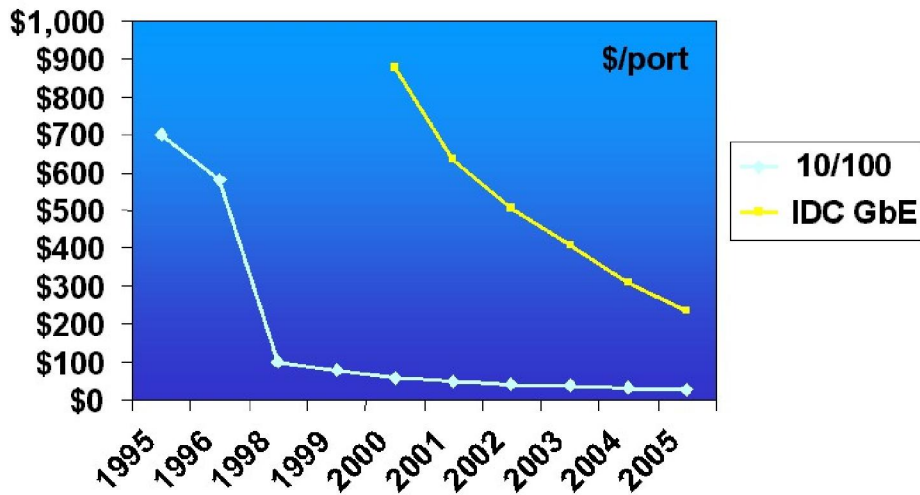


Figure 2: Falling cost of Gigabit Ethernet ports

Figure 3 shows how the migration from Ethernet to Fast Ethernet increased in pace after deployment costs began to fall. Based on information from IDC and In-Stat/MDR, Figure 3 also projects the rate of the migration to Gigabit and even 10Gbps Ethernet.

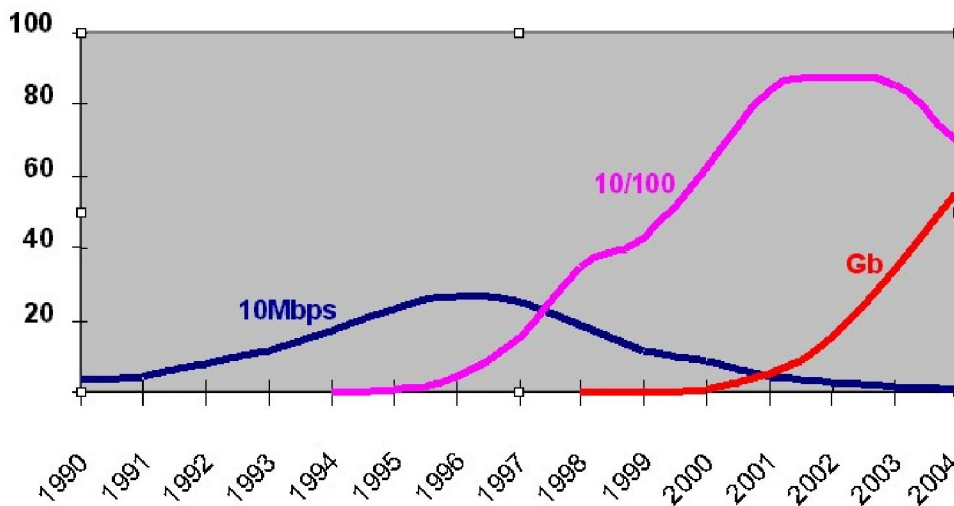


Figure 3: Migrations (in millions of units) to faster Ethernet solutions

Note that the product life of desktops and notebooks purchased in Spring, 2003 extends into 2007 when Gigabit is expected to be fully deployed. IDC estimates<sup>3</sup> that, by the end of 2004, over 50% of Ethernet networks worldwide will deploy Gigabit on the desktop. Network managers should build Gigabit capability into their new desktops at the time of purchase, avoiding additional upgrade costs in the future.

<sup>3</sup> 2001

HP is helping customers face the challenges of a migration to Gigabit technology.

- Servers from HP are standardizing on Gigabit for increased performance.
- Gigabit desktop solutions are available.

## Gigabit on the desktop

Until recently, the cost of Gigabit technology was prohibitive, restricting deployments primarily to server and server backbone applications where its use was reserved for only the highest priority applications. However, the customer can realize significant benefits by bringing Gigabit to the desktop; demand is being driven by business needs such as

- creating a collaborative work environment
- routinely sharing of large files
- converging media-rich applications
- multi-tasking multiple applications simultaneously

Gigabit to the desktop is affordable and easily deployed, enhancing user productivity and network performance.

## future proofing

As Gigabit technology has matured – now offering stability with high performance – and the associated cost premium has declined, the number of mass Gigabit deployments is accelerating.

Using solutions offered by HP, the customer can future proof current desktop investments.

- HP Compaq d330 and d530 business desktops with integrated [Broadcom NetXtreme](#) Gigabit technology lower the cost of ownership; no additional resources are required to upgrade these systems when the network migrates to Gigabit at a later date.
- HP offers [Broadcom NetXtreme Gigabit NICs](#) at almost no price premium over 10/100Mbps NICs.

With these HP solutions, the customer can standardize on Gigabit technology without a cost penalty while at the same time future proofing their network interface.

The remaining network infrastructure is not far behind. Gigabit switches offered by HP Networking have already seen amazing price declines over the last year, with switches available for less than \$100 a port. As larger volumes of Gigabit products are sold, HP expects prices to fall even lower.

## application performance

Tests conducted by [VeriTest](#) demonstrated up to 341% performance enhancement when using Gigabit rather than Fast Ethernet in real-world applications such as e-mail, web browsing, database and disk backup. This leads to significant productivity increases in daily work and tangible value for clients.

Note: For more information, refer to the VeriTest White Paper, *Increased Productivity with Gigabit to the Desktop*. [http://www.veritest.com/clients/reports/broadcom/broadcom\\_multiapp.pdf](http://www.veritest.com/clients/reports/broadcom/broadcom_multiapp.pdf)

Common business applications are network-intensive and benefit immediately from the instant bandwidth increases that Broadcom NetXtreme Gigabit technology offers. The following sections show results from two of the tests carried out by Veritest.

### performance example #1: e-mail test

To test e-mail performance, VeriTest ran custom test scripts simulating clients opening and reading e-mail messages at both Fast Ethernet and Gigabit speeds. The messages ranged in size from 25KB to 1MB.

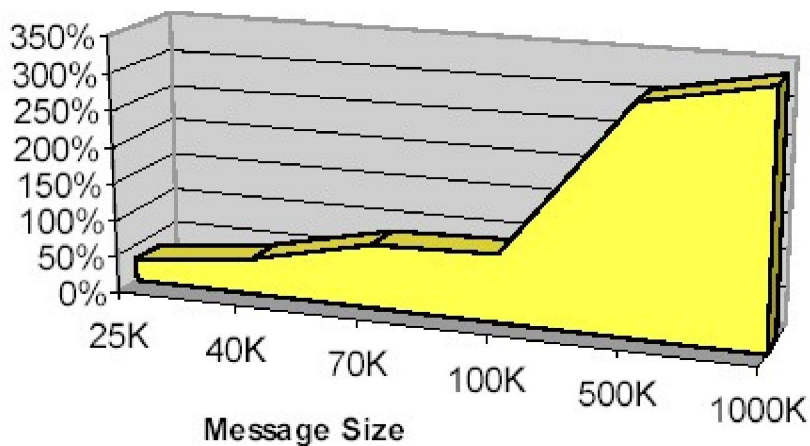


Figure 4: E-mail test results

Figure 4 shows that performance improves after migrating from Fast Ethernet to Gigabit technology – as much as 341% for 1MB messages.

## performance example #2: database test

The database test simulated transactions between a database server and 10 concurrent users, with clients initiating bulk database transactions and the server returning the resulting datasets. VeriTest tested record sizes from 2KB to 10KB.

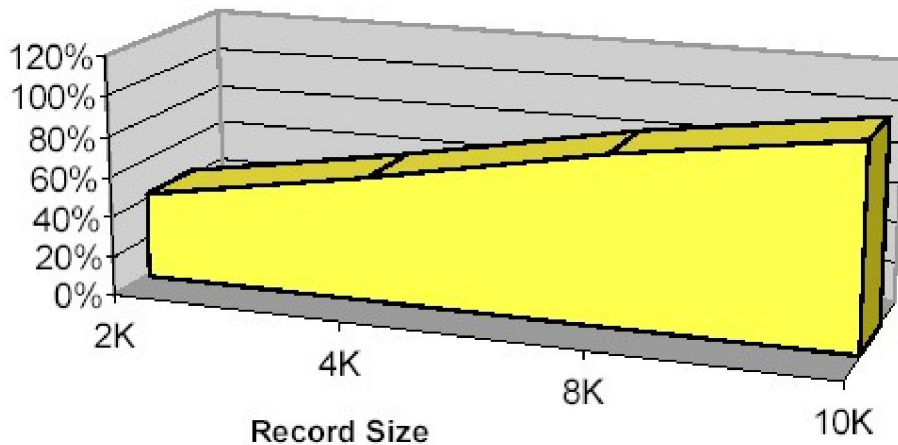


Figure 5: Database test results

Figure 5 shows that performance improves after migrating from Fast Ethernet to Gigabit – by 42% for a 2KB transaction, for example. As with the e-mail test results, performance improvements are larger as the transaction size increases. With more data on the network, the increased bandwidth delivered by Gigabit technology becomes more significant.

## deploying Gigabit on the desktop

One of the key benefits of Gigabit technology is backwards-compatibility, making it easy to deploy Gigabit Ethernet gradually on the desktop.

Gigabit runs on standard Category 5 (CAT 5) unshielded twisted-pair cables – the same cables in use at an overwhelming majority of today's corporations. An entire network can be upgraded to Gigabit speed one device at a time.

1. The customer begins to add Gigabit-enabled devices to the network.

Complementing the Broadcom NetXtreme solutions offered by HP for the desktop, most HP ProLiant servers are shipping with Gigabit connectivity standard; a broad family of Gigabit server NICs is available.



2. The customer upgrades or replaces existing 10/100 Fast Ethernet switches with switches that support 10/100/1000 auto-negotiation. New Gigabit devices operate seamlessly with the legacy 10/100 devices.

HP Networking offers the [ProCurve](#) line of switches – both rack-ready or stackable – with various levels of manageability.

3. Desktops without Gigabit connectivity are upgraded or replaced. As the network grows, the customer simply continues to add Gigabit-enabled devices to maximize performance and other benefits.

HP offers Broadcom NetXtreme solutions for the desktop – integrated Gigabit connectivity or Gigabit NICs.

## network benefits

Until recently networks were only required to support the transfer of files from one device to another but as networks and computers evolved, so have the applications in use. Administrators now require more control and performance at the edge of the network; bandwidth needs are continually growing, particularly with the convergence of media-rich applications such as video and voice.

By deploying Gigabit on the desktop the customer can support applications such as remote software installation, backup, e-mail and database management at huge performance increases over Fast Ethernet. In addition, an end-to-end Gigabit solution allows applications requiring uninterrupted transmissions, such as streaming media video applications, to perform at the highest possible levels.

Gigabit on the desktop eliminates the time wasted waiting for a network response; clients can take full advantage of the new, faster processors.

## manageability

Manageability continues to be a key requirement in today's sophisticated networking environments, with resources required for support making up a large part of the Total Cost of Ownership. Support costs can be reduced significantly by using Broadcom's comprehensive diagnostics for NIC and cabling, making HP Gigabit connectivity solutions even more cost-effective.

Using the integrated cable analyzer, IT professionals can easily address annoying and otherwise time-consuming cable problems and connectivity issues. The analyzer tests for signal strength and distortion, using these data to determine the length, quality and integrity of the connection.

On-board diagnostics allow IT professionals to determine if the NIC is faulty rather than the cable, expediting troubleshooting and minimizing downtime.

## for more information

To learn more about HP Gigabit solutions, contact your local HP sales representative or visit the [HP website](#).

To learn more about Broadcom NetXtreme, visit the [Broadcom website](#).