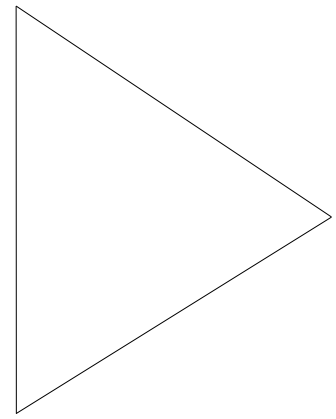


Gigabit Ethernet



Statement of Direction

As the leading provider of switched internetworking solutions, Cisco is committed to the development of technology and products that provide gigabit transmission speeds for enterprise networks. Cisco is investing in gigabit networking technology and products. This statement of direction describes the need for gigabit networking technology, Gigabit Ethernet as a natural migration path, the Gigabit Ethernet Alliance, and provides answers to frequently asked questions.

Network Users Require Higher Bandwidth with Smooth Migration

Growing numbers of users on the network, more current applications, faster desktop computers, and faster network servers create a demand for higher-performance LAN segment capacity and faster response times. Bandwidth enhancement beyond Fast Ethernet is needed to provide smooth network operation.

New users, new applications (such as multimedia, Internet access, and groupware), and new high-performance servers that are centralized all contribute to traffic congestion on the backbone. Gigabit bandwidth on the LAN backbone will provide the infrastructure to meet the needs of evolving enterprise networks.

Preservation of installed user applications, network operating systems, network equipment, and network management are highly desirable while increasing network bandwidth to gigabits per second.

Computing Products Increase Network Input/Output Performance

Desktop CPUs are increasing in speed at a rapid rate. The Peripheral Connection Interface (PCI) bus is becoming increasingly popular for implementing desktop computing platforms. This high-performance bus enables desktop CPUs to fully utilize the bandwidth of Fast Ethernet connections. Cisco anticipates that manufacturers of high-end desktop systems will offer 100-Mbps Ethernet connections on their motherboards. Workstation and server technology is advancing to enable CPUs to flood multiple Fast Ethernet links with network traffic. Each of these technology trends points to the need for gigabit networking technology that can be deployed for backbone, server, and eventually desktop connections.

Gigabit Ethernet Is a Natural Upgrade Path

The growing importance of LANs today and the increasing complexity of desktop computing applications are fueling the need for high-speed networks. The bandwidth provided by a 10-Mbps Ethernet connection may not be an adequate match for today's typical desktop computing applications.

Numerous high-speed LAN technologies have been proposed to provide greater bandwidth and improved client/server response times. Foremost among them is Fast Ethernet, or 100BaseT, a technology designed to provide a nondisruptive, smooth evolution from 10BaseT Ethernet to high-speed 100-Mbps performance. Given the trend toward 100BaseT connections to the desktop, the need for even higher speed connections at the server and backbone level is clear.

Gigabit Ethernet will be ideal for deployment as a backbone interconnect between 10/100BaseT switches and as a connection to high-performance servers. A natural upgrade path for future high-end desktop computers, Gigabit Ethernet will require more bandwidth than can be provided by 100BaseT.

Gigabit Ethernet Alliance Promotes Industry Cooperation

The Gigabit Ethernet Alliance is an open forum dedicated to promoting industry cooperation in the development of Gigabit Ethernet. The Alliance's primary objectives include:

- Fully support the Gigabit Ethernet standards activities being conducted in the IEEE 802.3 working group
- Contribute technical resources to facilitate convergence and consensus on technical specifications
- Provide resources to establish and demonstrate product interoperability
- Foster two-way communication between potential suppliers and consumers of Gigabit Ethernet products
- Recruit new members to participate in the Alliance

Alliance Activities and Membership

The Gigabit Ethernet Alliance builds on its members' past experience and success with the Fast Ethernet Alliance. The Gigabit Ethernet Alliance was founded by 3Com, Bay Networks, Cisco Systems, Compaq, Granite Systems, Intel, LSI Logic, Packet Engines, Sun Microsystems, UB Networks, and VLSI. It has the following organizational structure:

- A Steering Committee, which is responsible for oversight of all Alliance activities
- A Technical Subgroup
- A Marketing and Communications Subgroup

Membership in the Alliance and participation in Alliance activities are open to all interested parties. For more membership information, visit the www.gigabit-ethernet.org web page.

Frequently Asked Questions about Gigabit Ethernet

Q Why did Cisco cofound the Gigabit Ethernet Alliance?

A Cisco believes there is a need for gigabit network technology that leverages existing technology for high-speed networks. Ethernet is the world's most popular network installed today. As the installations of Fast Ethernet grow rapidly over the next few years, a higher-speed version of Ethernet will be needed for aggregation of Fast Ethernet-connected devices. Industry plans for extending Ethernet technology to gigabit performance are promising.

Q Are end users demanding gigabit networking technologies?

A With the acceptance and deployment of Fast Ethernet by end users for backbone and server connections, Cisco customers are now thinking about future needs for higher-speed backbone and server connections. Gigabit Ethernet offers an opportunity to leverage the installed base of applications, network operating systems, installed network equipment, and network management while providing 10 times the throughput of Fast Ethernet.

Q When will Cisco offer Gigabit Ethernet products?

A Cisco is presently investing in gigabit networking technology. Cisco is a founding member of the Gigabit Ethernet Alliance, actively participating in the Alliance activities and actively contributing in the IEEE 802.3z committee, which is working toward the standardization of Gigabit Ethernet. At this time we are not making any product announcements.

Q What gigabit networking products is Cisco developing?

A Cisco believes there will be a need for a variety of products that will enable gigabit networking technology to be deployed in user networks. These include, but are not limited to, switches, router interfaces, repeaters, network interface cards (NICs), and network management tools.

Q What is the Gigabit Ethernet technology? How does it relate to 10/100-Mbps Ethernet?

A Gigabit Ethernet is an extension to the enormously successful 10- and 100-Mbps 802.3 Ethernet standards. Gigabit Ethernet will provide a raw data bandwidth of 1000 Mbps while maintaining full compatibility with the installed base of over 70 million Ethernet nodes. Gigabit Ethernet will include both full- and half-duplex operating modes. In the case of half duplex, Gigabit Ethernet will retain the CSMA/CD access method. Initial products will be based on the Fiber Channel physical signaling technology, appropriately adapted for a data rate of 1000 Mbps running over fiber-optic cabling. Advances in silicon technology and digital signal processing will eventually enable cost effective support for gigabit Ethernet operation over Category 5 unshielded twisted-pair (UTP) wiring.

Q Why is Gigabit Ethernet necessary? Isn't Fast Ethernet good enough?

A Gigabit Ethernet is imperative for two reasons: faster systems and faster backbones. As Fast Ethernet makes its transition to a widespread desktop technology, a faster backbone network is necessary, and Gigabit Ethernet technology fills that need perfectly. As systems get even faster, and technology improves, Gigabit Ethernet will migrate to the desktop. Simply put, faster systems require faster networking, input/output (I/O), memory throughput, and access to larger memory and storage in order to remain balanced. Fast Ethernet is a good match for today's midrange and high-end systems, but systems over the next several years will be able to utilize an order of magnitude more bandwidth.

Q What is the current standard effort and time line?

A IEEE has approved the Gigabit Ethernet project as the IEEE 802.3z Task Force. The standard is expected to be completed in 1998. More than 200 individuals representing more than 50 companies have been involved in the standards activities to date.

Q What are the end-user benefits?

A Benefits of Gigabit Ethernet include the potential for low-cost products, freedom of choice in selecting the products, interoperability, and backward compatibility. The Gigabit Ethernet technology is an extension of the 10/100-Mbps Ethernet standard. Gigabit Ethernet will support existing applications, network operating systems, and network management; it requires a minimal learning curve for Ethernet network administrators and users. These investment preservation and risk minimization aspects are what make Gigabit Ethernet so attractive.

Q How does Gigabit Ethernet fit into existing networks?

A Gigabit Ethernet will be fully compatible with existing networks and preserve user investments in applications, network operating systems, protocols, and network management. Gigabit Ethernet will preserve the 802.3 and Ethernet frame format, and the 802.3 managed object specifications. Therefore, users can migrate easily to gigabit speeds with existing applications, network operating systems, protocols, and network management. Gigabit Ethernet will provide increased bandwidth in those portions of the network where it is needed, while exhibiting seamless integration with a customer's existing Ethernet infrastructure.

Q What are the distance characteristics of Gigabit Ethernet?

A In principle, there is no limit to the size of a Gigabit Ethernet network, in terms of either physical extent or number of nodes. Like Fast Ethernet and the original 10-Mbps Ethernet, Gigabit Ethernet will support a variety of physical media, with different capabilities in terms of maximum link distance. The IEEE 802.3 Higher-Speed Study Group has identified three specific objectives for link distance: A multimode fiber-optic link with a maximum length of 500 meters; a single-mode fiber-optic link with a maximum length of 2 kilometers; and a copper-based link with a maximum length of at least 25 meters. The IEEE is also actively investigating technology that would support link distances of at least 100 meters over Category 5 UTP wiring.

Q Will Gigabit Ethernet be required on the desktop?

A Over the long term Gigabit Ethernet may be required on the desktop. The Alliance is actively supporting the IEEE task of scaling the Ethernet access methods and system parameters up so that 1000-Mbps CSMA/CD networks that support desktop connections can be built. It is important to recognize that, when Ethernet was first invented, there were few computers that could saturate a 10-Mbps network. The operating speed was set at 10 Mbps in a deliberate effort to “push the limits of the technology.” With Gigabit Ethernet, we are once again pushing the envelope, with the knowledge that we are creating a standard that will have many years of useful life.

Q Why do the Alliance members believe in Gigabit Ethernet?

A Ethernet has demonstrated itself to be the world’s favorite network, and for all the right reasons. Ethernet’s installed base is approaching 100 million, and according to IDC, its shipment rate is 30 million nodes per year; both of these figures are higher by an order of magnitude than the next closest, Token Ring. It is simple, cost effective, widely implemented, and it works. Fast Ethernet maintained this model of simplicity and ease of use, and Gigabit Ethernet will follow this tradition.

Q When will products emerge?

A We anticipate initial products will be LAN switches with gigabit uplinks and gigabit adapters for servers, followed by gigabit switching and routing.

Q How does the Gigabit Ethernet technology compare with Asynchronous Transfer Mode (ATM)?

A Ethernet and ATM are often depicted as competing technologies. This dichotomy is false. The two can be combined to create very effective corporate intranets.

Q How does the Gigabit Ethernet technology compare with higher-speed 100VG AnyLAN?

A The objectives of the proposed higher-speed extension to the IEEE 802.12 standard is to continue to support both Ethernet and Token Ring frame formats and to standardize transmission rates of 531 and 850 Mbps.

Q How does Gigabit Ethernet compare to Fibre Channel?

A Gigabit Ethernet seeks to leverage existing solid technologies, and therefore leverages Fibre Channel’s physical layer. The difference is that Gigabit Ethernet is a general-purpose networking technology useful for small to large LANs, whereas Fibre Channel is used primarily in more specialized applications like high-speed I/O (storage), clustering, and so on, where a general-purpose LAN is not needed. Fibre Channel is an excellent technology for these applications, but tends to be more expensive per port and is optimized for these types of connections. Gigabit Ethernet will leverage the Ethernet/Fast Ethernet cost models and be optimized for general-purpose networking.



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