sgi™

Gigabyte System Network™

SGI's Next Revolution in High-Performance
Networking and Clustering

Technology Overview

Gigabyte System Network, or GSN™, is the highest bandwidth and lowest latency
interconnect standard, providing full-duplex 6400Mb-per-second (800MB-per-
second) error-free, flow-controlled data transmission. The technology is ideal
wherever organizations require timely and efficient movement of large amounts
of information, including scientific and technical computing, HDTV, data mining,
transaction processing, video and film archiving, and storage management. The
GSN ANSI standard provides for interoperability with Ethernet, Fibre Channel,
ATM, HIPPI-800, and other standards.

Applications

SGI™ GSN is the ideal networking solution for applications that need huge bandwidth,
low latency, and extremely efficient CPU utilization. This includes technical computing
applications (such as clustering and system area networks) and enterprise computing
applications of big data client-server functions (such as data mining, HDTV, post-
production scanning and rendering, and medical imaging) and storage management
backbones. In fact, GSN is the only network capable of providing the bandwidth neces-
sary for the film and broadcast industries' migration to digital studios and HDTV.
Customers with large data warehouses can use the technology for ultrahigh-perform-
ance file servers and backup servers capable of moving terabytes of data each hour.
While every major computer vendor is developing GSN products, SGI has been the
technology leader and is the only major vendor to introduce GSN-enabled systems
before the end of the century.
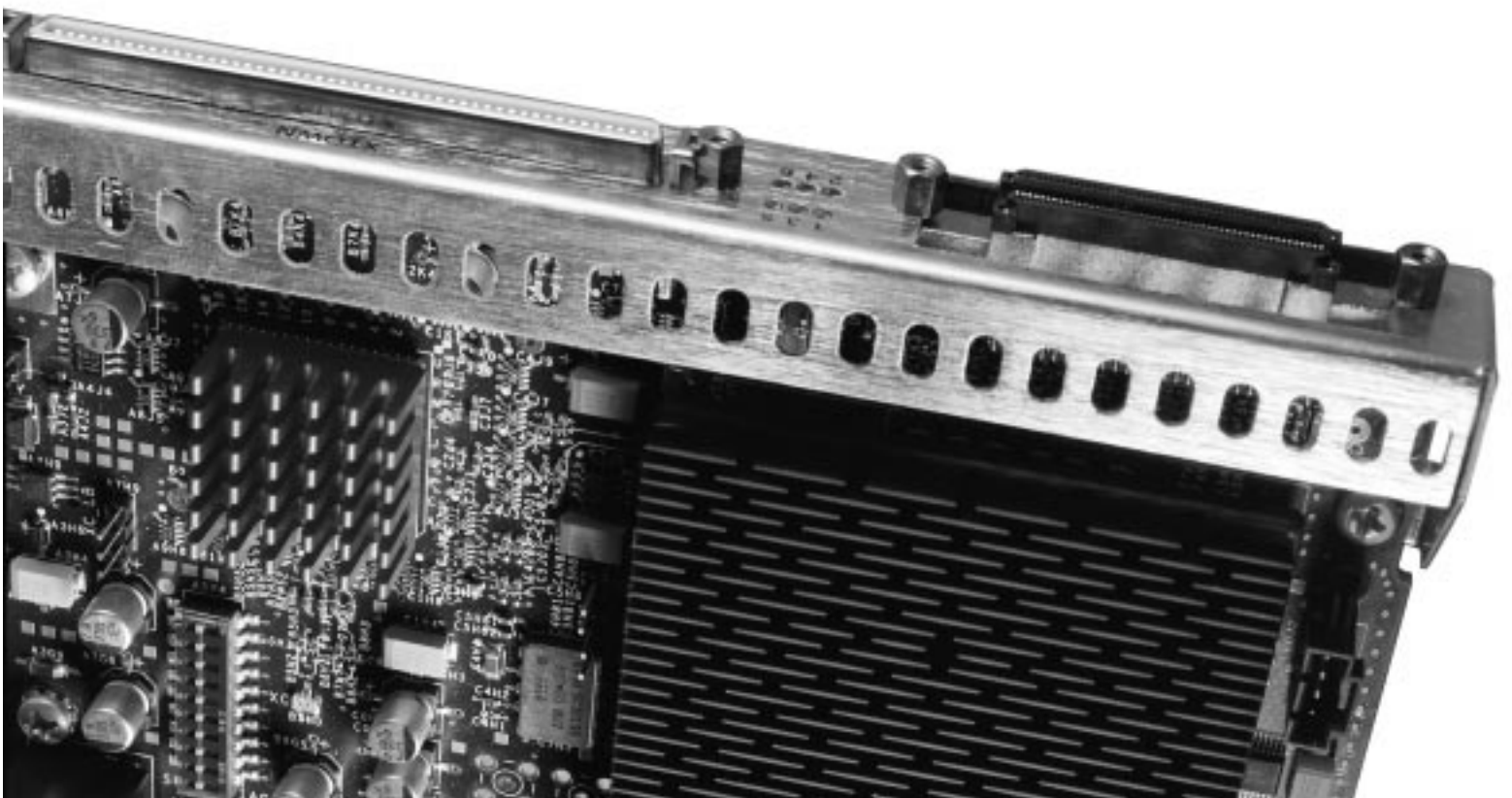
GSN has a critical place wherever your systems and networks have bandwidth or latency-related bottlenecks:

Sector/Applications	GSN Advantages
High-Performance Computing	
· Clustering · High-performance file serving · System area network backbone · Big-data client-server applications (e.g., imaging)	· Lowest latency through Scheduled Transfer protocol implementation · Efficient bandwidth aggregation · Unmatched bandwidth · High availability · Excellent manageability
Entertainment	
· HDTV and film production and archiving · Scanning · High-performance file serving · Other post-production	· Unique capability for real-time/uncompressed HDTV streaming · Unmatched bandwidth
Enterprise/Commercial	
· Backup/restore · Storage area network · Data warehousing/high-performance file serving · Enterprise backbone · Medical imaging	· Strong interoperability · Excellent manageability · High availability · Excellent price/performance · Bandwidth to support multiterabyte-per-hour data movements · Gateway to the SAN fabric

SGI GSN solutions for the above applications are based on GSN implementations in our SGI™ Origin™ 200, SGI™ Origin™ 2000, and Silicon Graphics® Onyx2™ platforms. We offer a choice of configurations across a range of price points to match your performance needs with your budget.

The Benefits of GSN

SGI GSN solutions on Origin™ and Onyx2 systems offer unparalleled performance and outstanding value:

Unmatched Performance

· Payload bandwidth: up to 800MB-per-second full duplex (791MB per second has already been achieved), more than six times faster than Fibre Channel, ATM OCI2, Gigabit Ethernet, and HIPPI
· Latency: adapter latencies under 6 microseconds; MPI latencies under 30 microseconds
· First adapter with a parallel protocol stack (not just multithreaded)

Interoperability

GSN and Scheduled Transfer (ST) protocol standards provide for connectivity with your entire installed base through:

GSN Protocol Support
· TCP/IP over GSN
· ST over GSN
· ARP over GSN

ST Media Support
· ATM
· Fibre Channel
· GSN
· Gigabit Ethernet
· HIPPI

GSN Bridging
· ATM
· Fibre Channel
· Gigabit Ethernet
· HIPPI

GSN Link

GSN Li

PCI Server

PCI Server

Unmatched Value

Adapters are priced to provide an outstanding price/performance ratio, with both a high-performance single XIO bus version and a full-performance version that utilizes two XIO bus connections. Credit programs and recommended configurations have been created to offer easy, cost-effective migration paths from your current HIPPI, Fibre Channel, or other networking standard to GSN.
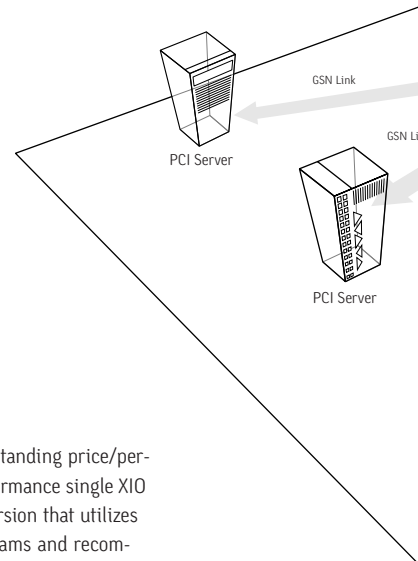
The GSN ANSI Standard

Gigabyte System Network has been developed and pursued as an industry-wide standard through the ANSI process, and major platform vendors have announced plans to develop GSN connectivity and support. The standard effort has effectively combined many of the best properties of HIPPI, ATM, and Ethernet in a new approach to networking. This new technology provides for switched networks with a reliable, flow-controlled transmission of user data at 800MB per second or 6.4Gb per second per direction. This is roughly equivalent to a link three times the speed of an ATM OC48c circuit or eight times the speed of a Gigabit Ethernet link. GSN evolved out of the ANSI T11.1 HIPPI task group as a next-generation HIPPI, or HIPPI-6400. The GSN standard was approved as ANSI standard ANSI NCITS 323-1998 in November 1998.
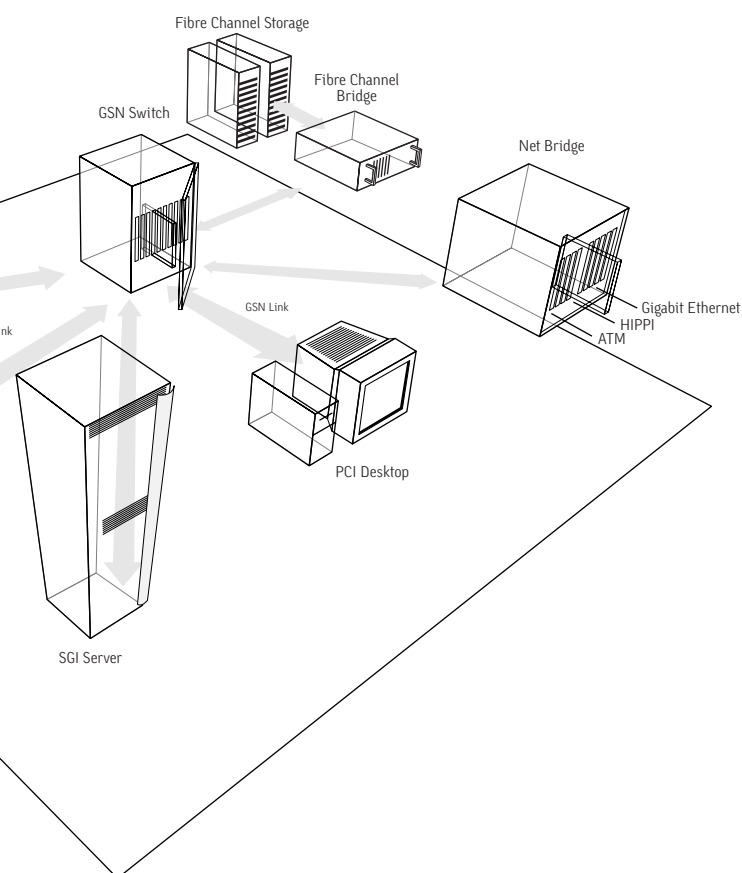
Traffic Control

GSN uses four multiplexed channels called the virtual channels. These virtual channels are allocated to control traffic, low-latency traffic, and bulk traffic to avoid the issues HIPPI users saw with only a single channel when attempting to mix both bulk and interactive traffic. Data is transferred in micropackets of 32 bytes plus an out-of-band control word. The use of small packets and the virtual channels means that very large file transfers cannot lock out a host or switch port for interactive traffic. Link control and look-ahead flow control are done with admin-micropackets that are the same size as data micropackets.

Connectors/Cables

The GSN standard provides for two physical media that will meet all of your distance and configuration needs. A copper cable is currently available and has a maximum link length of 40m. A version using parallel fiber cable is planned to provide for connections up to 300m.

Switching

Switches are available for 32x32 ports and less. Part of the switch specification is a translational bridge that allows HIPPI-800 to interoperate with a single GSN node. GSN also uses a standard MAC address format that will allow bridging between GSN and other media such as Ethernet and Fibre Channel.

The ST Protocol

The Scheduled Transfer specification brilliantly provides for transparent memory-to-memory transfers—essentially DMA over the network. While ST provides the essential driver performance in the GSN revolution, it is technology-independent and thus offers the possibility of combining the performance of GSN easily with other network technologies such as Fibre Channel, ATM, and Gigabit Ethernet. SGI and other partners will offer ST in addition to other standard protocols such as IP, thus allowing true interoperability across the fabric of your network.

GSN Network Sample

Fibre Channel Storage

Fibre Channel Bridge

GSN Switch

Net Bridge

GSN Link

Gigabit Ethernet
HIPPI
ATM

PCI Desktop

SGI Server

The History of GSN and SGI's Leadership Role

SGI joined the High-Performance Networking Forum in January 1995 and has aggressively developed GSN as today's highest bandwidth networking solution. SGI has provided much of the technical leadership in the ANSI workgroup standardizing HIPPI-6400 and the Scheduled Transfer protocol. As a result of its leadership role, SGI is the only major platform vendor expected to offer GSN products before the year 2000.

SGI has developed key technology used to develop GSN products. The SGI SuMAC™ chip implements the media access control protocol for GSN. Major computer manufacturers, including Compaq and IBM, and network equipment manufacturers, including ODS/Essential and Genroco, have licensed SuMAC technology from SGI.

GSN Products Available from SGI

Single GSN Port, single XIO adapter for Origin 200, Origin 2000, and Onyx2
Single GSN Port, dual XIO adapter for Origin 2000, Onyx2 rack

5-Meter Copper GSN cable
10-Meter Copper GSN cable
25-Meter Copper GSN cable
40-Meter Copper GSN cable

32-Port GSN switch with 1 to 16 two-port line cards

For More Information

For more information on SGI GSN solutions, including product datasheets, recommended configurations, and current promotional programs, please see your sales representative or reseller or visit us at *www.sgi.com*.