

SGI™ GSN™ Hardware
Owner's Guide

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About This Guide

This guide, *SGI GSN Hardware Owner's Guide*, describes the hardware for the SGI Gigabyte System Network (GSN) products. The following information is covered:

- panel plates for the SGI GSN boards, Chapter 1
- cables for SGI GSN products, Chapter 2
- troubleshooting procedures, Chapter 3

Intended Audience

The information provided in this document is written for users and system administrators of SGI GSN products.

About the SGI GSN Products

The SGI GSN products are hardware and software implementations of the set of ANSI standards related to Gigabyte System Network (GSN, which is also known as HIPPI-6400) and Scheduled Transfer.

Brief Hardware Description

The hardware portion of SGI GSN products provides a single bidirectional GSN port that supports a copper-medium connection to the GSN fabric. With appropriate installation and configuration, the bandwidth can be as high as 6.4 gigabits per second of user data in each direction simultaneously; for applications that can operate with lower maximum bandwidth, less expensive and less restrictive installations/configurations are possible.

Two products are offered: a single-board solution (XT-GSN-C-1XIO) and a two-board solution (XT-GSN-C-2XIO). To obtain full GSN bandwidth, the two-board solution is required. The hardware can be installed into any SGI Origin-family system, the SGI 2100 platform, or the Silicon Graphics Onyx2 platform (deskside or rackmount). The single-board product requires one XIO slot; the two-board product occupies two XIO slots.

Software Description

The SGI GSN product ships with a compact disc (CD). The CD includes the IRIX GSN software (network layer modules and the driver for the hardware), as well as system administration utilities and product documentation (books, release notes, and man pages). After installing the software onto the system's hard disk, store this CD in a safe and convenient place so you can find it when you need to reinstall the software, or in case of a system failure.

SGI GSN Compliance With Standards

SGI GSN products comply with the following globally accepted standards:

- Gigabyte System Network (GSN)
 - *Information Technology - High-performance Parallel Interface - 6400 Mbit/s Physical Layer (HIPPI-6400-PH)*, T11.1, Project 1213-D, NCITS (ANSI) standard.
 - *Information Technology - High-performance Parallel Interface - 6400 Mbit/s Switch Control (HIPPI-6400-SC)*, T11.1, Project 1231-D, Rev. 2.5, January 1999, working draft for NCITS (ANSI). Only those functions that apply to GSN endpoints.
- ST
 - *Information Technology - Scheduled Transfer Protocol (ST)*, T11.1, Project 1245-D, Rev. 3.3, August 1999, working draft for NCITS (ANSI).
- IP-over-GSN
 - RFC 2067, IP over HIPPI.
 - Other standard protocols provided with IRIX (IP versions 4 and 6, NFS versions 2 and 3, TCP, UDP, ICMP, and so on).

- Address Resolution-over-GSN (HARP)
 - RFC Internet Draft, *IP and ARP over HIPPI-6400*, December 1998.
 - RFC Internet Draft, *ARP and IP Broadcast over HIPPI-800*, December 1998.

Note: To obtain copies of the GSN and ST documents, see the Web site <http://www.hippi.org/cDOCS.html>, or contact the American National Standards Institute (ANSI) at 11 West 42nd Street, New York, New York 10036; telephone: 212-642-4900. For RFCs, see the Web site <http://info.internet.isi.edu/in-notes/rfc>.

Where to Find More Information

Figure i illustrates additional sources of information about the SGI GSN products.

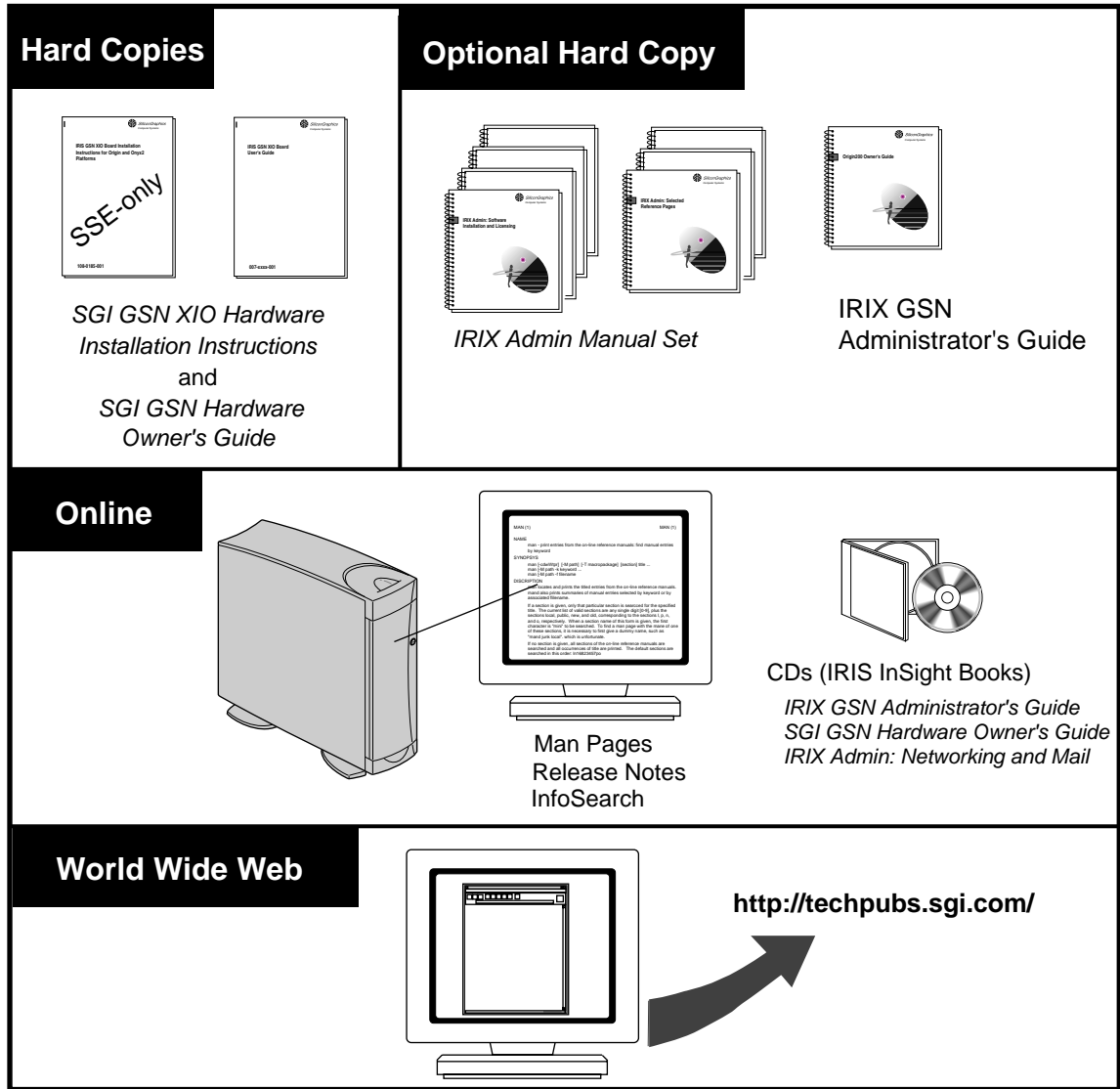


Figure i Sources of Additional Information

Installation Instructions

The *SGI GSN XIO Hardware Installation Instructions* provides instructions for System Service Engineers (SSEs) who have been trained by SGI. This document is for SSEs only.

Hardware Owner's Guide

The *SGI GSN Hardware Owner's Guide* (this document) describes the SGI GSN hardware: the panel plates, the LED behavior, the connectors, and cable specifications. A printed copy of this guide is shipped with the product.

Administrator's Guide

The *IRIX GSN Administrator's Guide* describes procedures for setting up, configuring, verifying, monitoring, and troubleshooting the SGI GSN connection, including suspected hardware problems. IRIX GSN is designed so that you can maintain most of the components of the system without the help of a trained technician. Hardware installation/removal is the only part of the product that requires an SSE.

The administrator's guide can be viewed by the following methods:

- Use IRIS InSight. The digital format for this document (that is, the installable image) is included with the IRIX GSN software.
- Use a Web browser to view the HTML version at <http://techpubs.sgi.com>.
- Order a printed manual from <http://www1.fatbrain.com/partners/sgi> or from the local Silicon Graphics sales representative.
- Use a Web browser to download PostScript or PDF files from the <http://techpubs.sgi.com> Web site.

Optional Documentation

The *Networking and Mail* volume of the *IRIX Admin* manual set is recommended as a reference for system administration tasks.

This document can be viewed by the following methods:

- Use IRIS InSight. The image is included with IRIX, either preinstalled on the system disk or available on CD-ROM. You can display this book from a graphics workstation using the IRIS InSight viewer.
- Use a Web browser to view the HTML version at the Silicon Graphics Technical Publications Library on the World Wide Web: <http://techpubs.sgi.com>.
- Order a printed copy from the local SGI sales representative.
- Use a Web browser to download PostScript or PDF files from <http://techpubs.sgi.com/library>.

Online Man Pages

The IRIX GSN software includes a set of IRIX man pages, formatted in the standard UNIX man page style. These are installed on the main system disk along with the IRIX GSN software, and are displayed using the *man* command. For example, to display the man page for the *gsncntl* command, enter the following command at a shell prompt:

```
man gsncntl
```

IRIX GSN includes man pages for the following items: *gsn*(7m), *gsncntl*(1m), *gsntest*(1m), and *gsnarp*(1m).

Citations in the documentation to these reference pages include the name of the command and the section number in which the command is found. For example, “*gsncntl*(1)” refers to the *gsncntl* command and indicates that it is found in section 1 of the IRIX reference.

For additional information about displaying man pages using the *man* command, see *man*(1).

In addition, the *apropos* command locates man pages based on keywords. For example, to display a list of man pages that describe GSN, enter the following command at a shell prompt:

```
apropos gsn
```

For information about setting up and using *apropos*, see *apropos*(1) and *makewhatis*(1M).

Release Notes

You can view the release notes for a variety of SGI products and software subsystems using one of two utilities:

relnotes Text-based viewer for online release notes

grelnotes Graphical viewer for online release notes

To view the IRIX GSN release notes, type the following at a shell prompt:

```
grelnotes gsn
```

To see a list of available Release Notes, type the following at a shell prompt:

```
relnotes
```

For more information, see the *relnotes(1)* and *grelnotes(1)* man pages.

InfoSearch

InfoSearch is a unified system for retrieving and viewing online information, providing you with quick and easy access to online information about SGI products. With InfoSearch, you can search or browse through release notes, man pages, application help cards, online books, and other forms of online information.

There are two ways to use InfoSearch:

- The *infosearch* utility, which runs on any Silicon Graphics visual workstation or SGI server with graphics.
- A World Wide Web interface, *infosrch.cgi*, that you can access through any Web browser.

An SGI system can be configured as an InfoSearch server so that other systems on your network can use it to retrieve information. However, each system must include graphics support in order to use InfoSearch, either with the *infosearch* command or via a Web browser.

For basic information about getting started with InfoSearch, see the reference pages for *infosearch(1)*, *sgindexAdmin(1)*, *booksAdmin(1)*, and *infosrch.cgi(1)*.

World Wide Web-Accessible Documentation

SGI makes its manuals available via the World Wide Web (WWW). Use your Web browser to open the following URL:
<http://techpubs.sgi.com/library>.

Documentation Conventions

This document uses these conventions:

- References to document titles are in *italics*.
- IRIX commands and names of files appear in text as *italics*.
- Words that are found in the glossary are in *italics*.
- References to other chapters and sections within this guide are in quotation marks.
- Anything that you type on the keyboard is in **Courier bold**.
- Anything displayed on the screen is in `Courier`.
- Names of IRIX man pages are in the default font and are followed by the section number of the reference page. For example “who(1)” refers to the *who* command, which is found in section 1 of the IRIX reference.
- Steps to perform tasks are in numbered sentences. When a numbered step needs more explanation, the explanation follows the step and is preceded by a bullet.

Panel Plates for SGI GSN Products

This chapter describes the panel plates for both SGI GSN products:

- For the single-board product (XT-GSN-C-1XIO), see “Main SGI GSN Board Panel Plate” on page 1
- For the two-board product (XT-GSN-C-2XIO), see “Main SGI GSN Board Panel Plate” on page 1 and “XTOWN Board Panel Plate” on page 9

Main SGI GSN Board Panel Plate

The panel plate on the main SGI GSN board has two ports (a GSN port and a XTOWN port) and six LEDs, as illustrated in Figure 1-1.

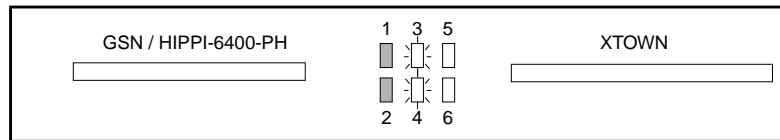


Figure 1-1 Panel Plate for Main SGI GSN Board

GSN Port

This section describes the port labeled **GSN / HIPPI-6400-PH**.

The GSN port connects the SGI GSN subsystem to the GSN fabric. The port can be attached to a switch, to another GSN endpoint, or to itself via a loopback device. The IRIX GSN subsystem (software and hardware together) cannot function unless this port is connected to a GSN node (which can be itself) with an appropriate cable or loopback device. For cable information, see “GSN (HIPPI-6400) Cables” on page 11.

The GSN port's 100-position receptacle complies with the ANSI standard *Information Technology - High-performance Parallel Interface - 6400 Mbit/s Physical Layer (HIPPI-6400-PH)*. This document can be viewed at this Web site: <http://www.hippi.org/cDOCS.html>.

The GSN port's receptacle is keyed (illustrated in Figure 1-2) to ensure correct mating with a GSN cable. The key consists of two slots/notches (one long/wide and one short/narrow) inside the receptacle that mate with two metal bars inside the cable connector.

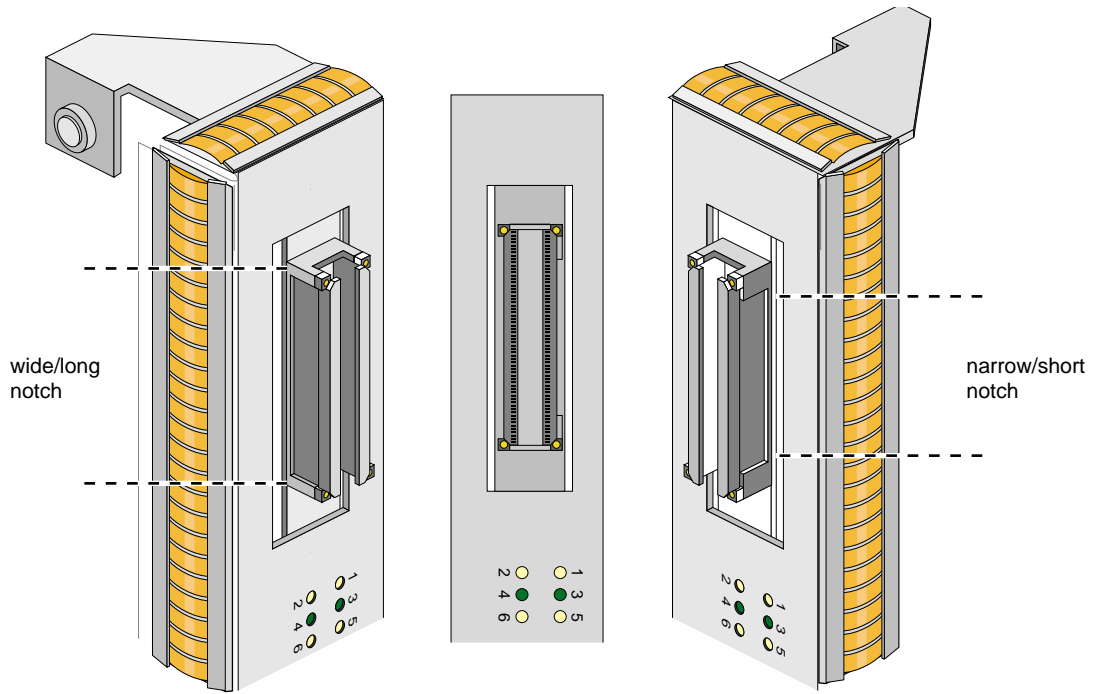


Figure 1-2 GSN Key in Panel Plate Receptacle

XTOWN Port

The **XTOWN** port is a 100-pin receptacle that complies with an SGI proprietary standard.

The XTOWN port connects the main SGI GSN board to an additional SGI GSN board called the XTOWN board. The link between these two boards provides an additional data path for supplying higher bandwidth to the GSN connection. The XTOWN port does not have to be connected for the SGI GSN subsystem to function. The cable for this link is described in “XTOWN Cable” on page 18.

LEDs

The behavior of the LEDs on the main SGI GSN board is controlled by firmware running on the board’s HIPPI-6400-PH (SuMAC) component.

- “LED Behavior During Normal Power On” on page 3 describes the LEDs during normal power on.
- “LED Behavior During Normal Operation” on page 6 describes the LEDs during normal operation.
- “Abnormal LED Behavior” on page 7 describes the LED patterns that indicate problems.

LED Behavior During Normal Power On

Figure 1-3 illustrates normal LED patterns during power-on. Table 1-1 describes each LED during power-on.

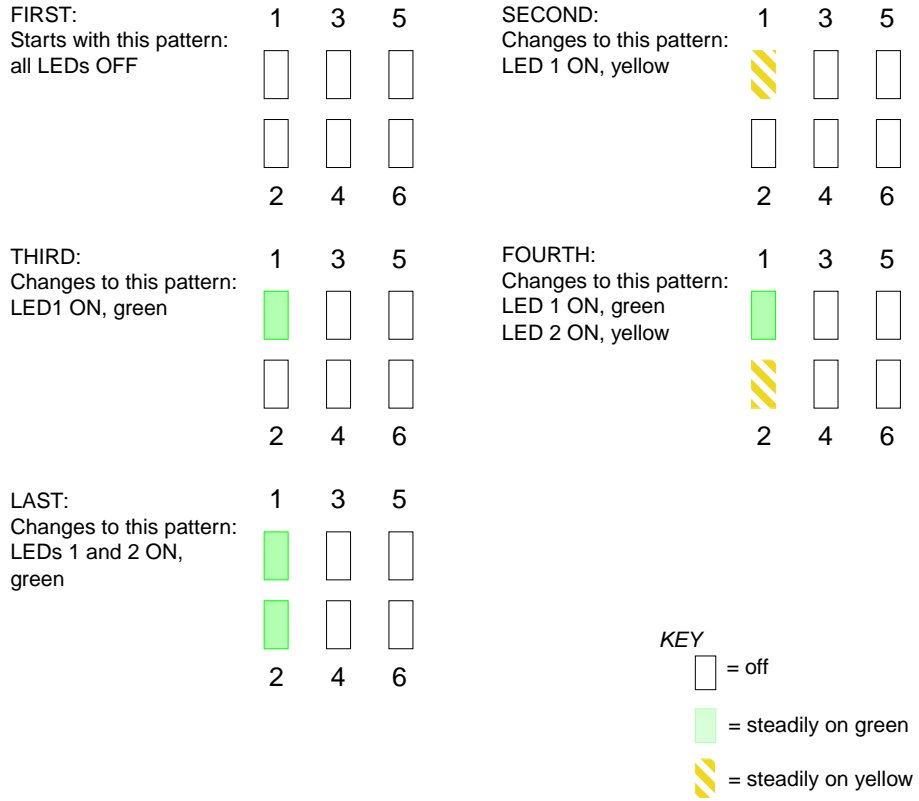


Figure 1-3 LED Behavior on Main SGI GSN Board During Normal Power-on

Table 1-1 Main SGI GSN Panel Plate LEDs During Power-on

LED	Color During Power-on	Description of Pattern
1	off or yellow	<p>Power/Deskew LED</p> <p>When OFF, indicates that the board is not powered on, that there is a problem with the physical link (that is, the cable), or that the GSN board has not yet transitioned out of reset.</p> <p>When steadily yellow, indicates that the CLK2 signal on the physical link is detected by the local Destination (receiving) hardware. This is a normal pattern only during power-on or hardware reset, and should quickly transition to green.</p>
2	off or yellow	<p>CLK2/Credit_Ready LED</p> <p>When OFF, indicates that the physical link has not yet been verified (as indicated by LED 1).</p> <p>When steadily yellow, indicates that the HIPPI-6400-PH initialization and link reset protocol sequences have successfully completed and that the physical link is operational. This is a normal pattern only during power-on or reset, and should quickly transition to green.</p>
3 + 4	off or green	<p>Receive + Send LEDs</p> <p>These LEDs have no meaning during power-on.</p>
5 + 6	off or yellow	<p>Lost Incoming/Outgoing Packet LEDs</p> <p>These LEDs have no meaning during power-on.</p>

LED Behavior During Normal Operation

Figure 1-4 illustrates the normal LED pattern when operational firmware is running. Table 1-2 describes each LED during normal operation.

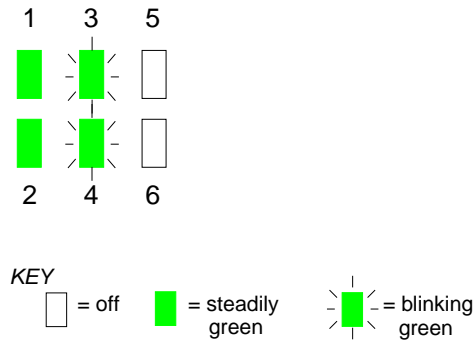


Figure 1-4 LED Behavior on Main SGI GSN Board During Normal Operation

Table 1-2 Main SGI GSN Panel Plate LEDs During Normal Operation

LED	Color	Normal Pattern	Description of Pattern
1	green	steadily on green	<p>Power/Deskew LED</p> <p>When steadily green, indicates that the local Destination hardware's HIPPI-6400-PH signal skew compensation circuit is successfully deskewing the signals on this physical link.</p> <p>In addition, green indicates that all the conditions required for the power-on yellow are true.</p> <p>When blinking or when steadily yellow long after power-on, this indicates an error. See Table 3-1.</p>

Table 1-2 (continued) Main SGI GSN Panel Plate LEDs During Normal Operation

LED	Color	Normal Pattern	Description of Pattern
2	green	steadily on green	<p>CLK2/Credit_Ready LED</p> <p>When steadily green, indicates that the link is not in a shutdown state and that the local Source hardware has at least one credit for at least one virtual channel with which to transmit data.</p> <p>In addition, green indicates that all the conditions required for the power-on yellow are true.</p> <p>When blinking or when steadily yellow long after power-on, this indicates an error. See Table 3-1.</p>
3	green	off or blinking	<p>Receive LED</p> <p>Each blink indicates reception of one HIPPI-6400 micropacket.</p>
4	green	off or blinking	<p>Send LED</p> <p>Each blink indicates transmission of one HIPPI-6400 micropacket.</p>
5	yellow	off	<p>Lost Incoming Packet LED</p> <p>When ON, this LED indicates an error. See Table 1-3.</p>
6	yellow	off	<p>Lost Outgoing Packet LED</p> <p>When ON, this LED indicates an error. See Table 1-3.</p>

Abnormal LED Behavior

Table 1-3 describes the error LEDs on the main SGI GSN board's panel plate.

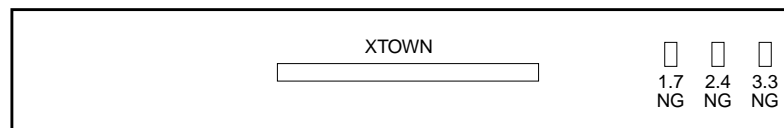
See "Troubleshooting With LEDs" on page 19 for troubleshooting suggestions and for descriptions of abnormal combinations of LEDs.

Table 1-3 Error LEDs on Main SGI GSN Panel Plate

LED	Color	Normal Pattern	Description of Pattern
5	yellow	OFF	<p>Lost Incoming Packet LED</p> <p>An incoming micropacket has been lost. Each blink indicates that the local Destination hardware received an unexpected acknowledgment (that is, the received RSEQ value does not equal or fall between the last_valid+received_RSEQ and the local_Source's_last_TSEQ). The local endpoint has logged an RSEQ_Out_of_Range error. This pattern indicates a problem with the hardware at the remote endpoint or the cable between the endpoints.</p>
6	yellow	OFF	<p>Lost Outgoing Packet LED</p> <p>An outgoing micropacket has been lost. Each blink indicates that the local Source hardware did not receive an acknowledgment (RSEQ) for one of its transmitted micropackets (TSEQ) within the worst-case round-trip timeout period. The local endpoint has retransmitted at least one micropacket and logged an RSEQ_Missing error. This pattern indicates a problem in the GSN fabric that is causing delays or loss: for example, a problem with the hardware at either the local or remote endpoint, or a problem with an intermediate switch or cable.</p>

XTOWN Board Panel Plate

The additional SGI GSN board has one XTOWN port and three LEDs, as illustrated in Figure 1-5. This board is known as the XTOWN board. It is a component of the two-board SGI GSN product.



NOTE: This panel plate applies only to 2-board product.

Figure 1-5 Panel Plate for Additional (XTOWN) SGI GSN Board

Port

This port is identical to the port labeled XTOWN on the main board. See “XTOWN Port” on page 3 for details.

LEDs

The behavior of the LEDs on the XTOWN board are as follows:

- 1.7 NG: when steadily ON (red), indicates a problem with the board’s 1.7 voltage.
- 2.4 NG: when steadily ON (red), indicates a problem with the board’s 2.4 voltage.
- 3.3 NG: when steadily ON (red), indicates a problem with the board’s 3.3 voltage.

Note: NG stands for “not good”.

Troubleshooting

If any of the XTOWN board’s LEDs are ON, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.

Cables for SGI GSN Products

This chapter describes the cables required for SGI GSN products.

- For the single-board SGI GSN copper-medium product, only one cable is required. See “GSN (HIPPI-6400) Cables” on page 11.
- For the two-board SGI GSN copper-medium product, two cables are required. See “GSN (HIPPI-6400) Cables” on page 11 and “XTOWN Cable” on page 18.

GSN (HIPPI-6400) Cables

This section describes site cabling for SGI GSN products.

Description of GSN Cables

The GSN cable required for SGI GSN products is a multi-conductor, copper-medium cable of up to 40 meters with 100-position connectors. The cable and its connectors must meet all the copper cable requirements specified in the HIPPI-6400-PH ISO/ANSI international standard (that is, *Information Technology - High-performance Parallel Interface - 6400 Mbit/s Physical Layer [HIPPI-6400-PH], ISO/IEC 11518-10, Rev. 2.4*), including those items provided in Table 2-1. In case of a discrepancy between Table 2-1 and the standard, the standard prevails.

One copper GSN (HIPPI-6400-PH) cable is required for each SGI GSN product to connect it to the site’s GSN fabric. This cable is not included with the SGI GSN product, but can be purchased from SGI, as summarized in Table 2-2.

To view the ANSI standard for HIPPI-6400-PH, use the following Web site:
<http://www.hippi.org/cDOCS.html>.

Table 2-1 Electrical Specification for GSN Copper-medium Site Cables ^a

Parameter	Units	Maximum	Typical	Minimum	Comments
Z_0	Ω (ohms)	165	150	135	Differential impedance (tolerance 10%)
V_{XTALK}	mV * ns	200	n.a.	n.a.	Reverse crosstalk voltage
V_o	mVp-p		n.a.	200	Single-ended peak-to-peak output voltage
T_{JITTER}	ps	500	n.a.	n.a.	Deterministic peak-to-peak jitter
Channel skew	ns	7	n.a.	n.a.	Channel-to-channel skew
Imbalance skew	ps	250	n.a.	n.a.	Imbalance skew within a signal pair

a. Voltage measurements are single-ended rather than differential.

Purchasing GSN Cables

You can purchase GSN site cabling from your SGI sales representative using the following marketing codes:

Table 2-2 Site Cables Available From SGI to GSN Products

Code	Length	Description
XT-GSN-C-CABLE-5M	5 meters	GSN (HIPPI-6400-PH) copper cable (non-equalized) terminated with angled (at 40-degrees), keyed, 100-pin HIPPI-6400-PH connectors
XT-GSN-C-CABLE-10	10 meters	GSN (HIPPI-6400-PH) copper cable (non-equalized) terminated with angled (at 40-degrees), keyed, 100-pin HIPPI-6400-PH connectors
XT-GSN-C-CABLE-25M	25 meters	GSN (HIPPI-6400-PH) copper cable (equalized) terminated with angled (at 40-degrees), keyed, 100-pin HIPPI-6400-PH connectors

Table 2-2 (continued) Site Cables Available From SGI to GSN Products

Code	Length	Description
XT-GSN-C-CABLE-40M	40 meters	GSN (HIPPI-6400-PH) copper cable (equalized) terminated with angled (at 40-degrees), keyed, 100-pin HIPPI-6400-PH connectors
XT-GSN-C-LOOP	n.a.	GSN (HIPPI-6400-PH) loopback 100-pin connector - Figure 3-1 illustrates this item.

For connectors with different angles or cables of different lengths, contact BERG Electronics at telephone number 800-237-2374 or via the Internet at <http://www.berg.com>.

Using GSN Cables

This section describes the proper procedures for connecting GSN (HIPPI-6400) cables or a loopback device to the SGI GSN panel plate receptacle.

Caution: Copper GSN cables can build up an electrostatic charge when handled or moved. This may present a latent electrostatic discharge (ESD) hazard that can result in serious, permanent equipment damage when the cable is attached. Follow these procedures:

To prevent ESD buildup, install the cable's plastic conductive (antistatic) inserts into the cable's connectors whenever a cable is unattached.

To release buildup energy before attaching a cable, install the cable's plastic conductive (antistatic) inserts into the cable's connectors, then discharge the cable's backshell to an exposed metal part of the chassis on the destination system.

To attach a GSN cable or loopback device to the panel plate of the main SGI GSN board, follow these instructions:

1. If the system is powered on, disable the GSN network interface that is associated with the port to which you will attach a cable:

```
% ifconfig gsn# down
```

2. Locate the site's GSN (HIPPI-6400) copper cable for this SGI GSN connection, or the loopback device, as appropriate.
3. Optional: Put labels on the panel plate and cable.
4. Remove the protective cover from the SGI GSN board's **GSN** (HIPPI-6400-PH) receptacle, as illustrated in Figure 2-1.

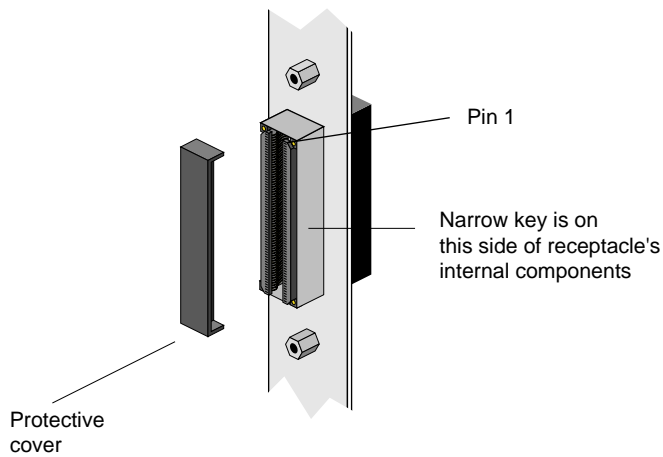


Figure 2-1 GSN Receptacle of Main SGI GSN Board When Installed in XIO Slot 3, 4, 7, 8, 11, or 12 of Origin 2000 or SGI 2100 System, or in XIO Slot 3 of Onyx2 Deskside System

5. Discharge the cable's backshell to an exposed metal part of the chassis.
6. Remove the protective caps or antistatic inserts from the cable's connectors or from loopback device.

7. Orient the connector to the panel plate receptacle.
 - The cable or loopback device's connector and the receptacle on the panel plate are keyed to ensure proper insertion. The key consists of two parallel bars of metal inside the connector (one long piece and one short piece, as illustrated in Figure 2-2) that fit into two notches inside the receptacle (illustrated in Figure 2-3).
 - Look inside the cable connector and identify the short/narrow bar.

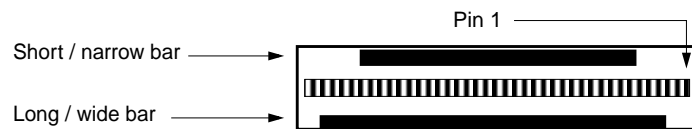


Figure 2-2 GSN Key for Cable or Loopback Device Connectors

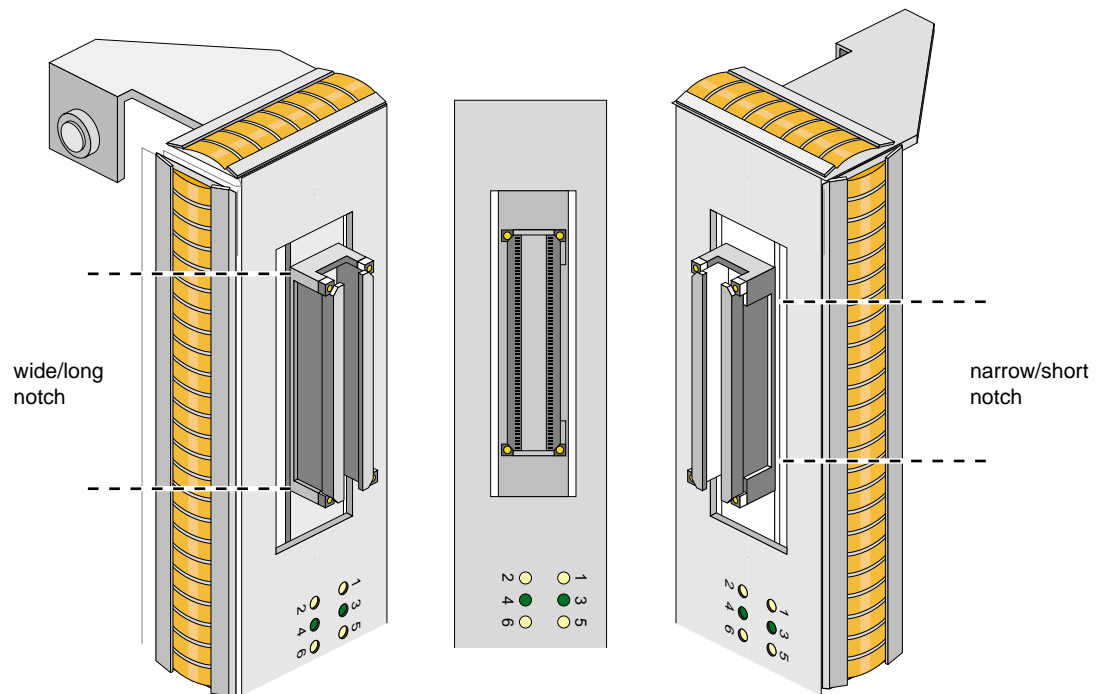


Figure 2-3 GSN Key for Panel Plate Receptacle

- Align the short/narrow bar of the connector to the short/narrow notch inside the receptacle.
 - Some GSN cable connectors are designed with an angle to relieve strain. This style of connector must face downward (as illustrated in Figure 2-4) or sideways (as illustrated in Figure 2-5). If proper alignment of the key results in the cable facing upward, you need to locate a GSN cable with a different angle built into its connector.
8. Attach the cable or loopback device to the panel plate's **GSN** port.
- It is easier to attach the connector to the receptacle if you start the insertion at one end (the 2 parts positioned at a slight angle to each other), rather than head-on (the 2 parts parallel to each other).
 - Push the 2 parts together until they are seated.

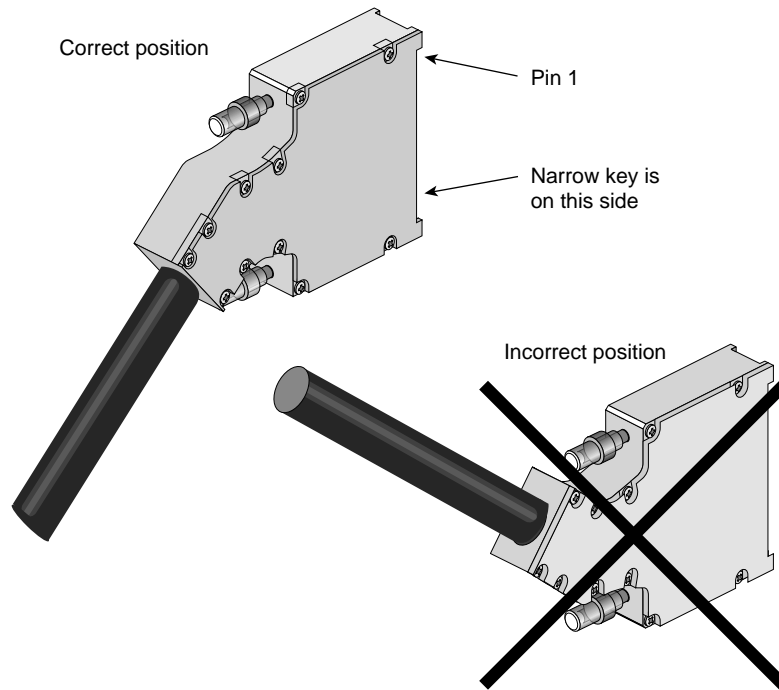


Figure 2-4 GSN Cable Connector for Origin 2000 and Onyx2 Modules

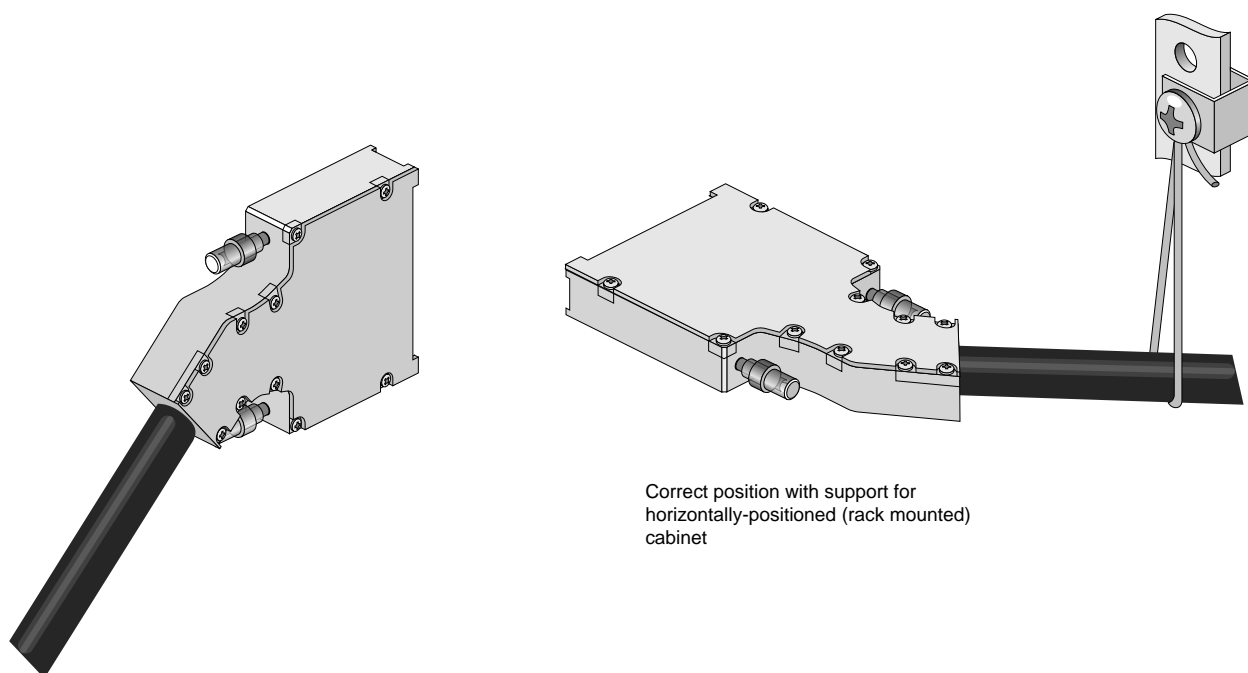


Figure 2-5 GSN Cable Connectors for Horizontally-Positioned Cabinet

9. Finger tighten both thumb-screws. Engaging these screws completes the chassis ground circuit for the GSN link.

Note: Failure to engage these screws can compromise the product's electromagnetic integrity.

Caution: Overtightening, which may occur if you use a screwdriver, can break these screws.

10. For a GSN cable, make sure that the other end of the cable is attached to a switch or GSN endpoint.
11. If the system is powered on, enable the GSN network interface:

```
% ifconfig gsn# up
```

XTOWN Cable

The XTOWN (also known as XIO) cable is a 58-inch, 100-position, copper-medium cable made by SGI (part number 018-0564-00x, marketing code XTOWN Cable Assembly). This cable provides the datapath between the main SGI GSN board and the additional SGI GSN board, using the **XTOWN** port on each board. This cable is shipped with the two-board SGI GSN product (XT-GSN-C-2XIO); it is not needed for the single-board SGI GSN product.

Verifying and Testing SGI GSN Products

This chapter describes some basic hardware verification and troubleshooting for SGI GSN products. See the online document *IRIX GSN Administrator's Guide* for more complete procedures.

Troubleshooting With LEDs

This section describes LED patterns on the main SGI GSN board that indicate problems. The section also provides suggestions of actions you can take to remedy the problem.

Troubleshooting With XTOWN Board LEDs

If any of the LEDs on the additional (XTOWN) SGI GSN board are ON, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.

Troubleshooting With Main SGI GSN Board LEDs

Table 3-1 describes LED patterns that indicate a problem with the main SGI GSN board or the GSN connection. The table also provides suggestions for resolving the problem.

Table 3-1 Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
1	OFF	<p>When LEDs 1 and 2 are stuck in this pattern, the problem can be any of the following:</p> <ul style="list-style-type: none"> •Power to the module is not on. •Board is not UP (for example, board is not seated firmly into its slot). •Unconnected, loose, damaged, or defective connectors at either end of the cable. •Damaged or defective GSN cable. •Dysfunctional GSN (HIPPI-6400-PH) hardware/node at either end of the cable. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Invoke <i>gsncnt1 startup</i> for the GSN board. - Check the cable connections at each end of the cable. Make sure the thumb screws are tightened and the connectors are correctly and tightly seated. - Verify functionality of each endpoint (that is, each system connected to the cable). To do this step for the local system, follow the procedure in “Verification With a Loopback Device” on page 27. - Replace the cable with one that is known to be functional.
2	OFF	

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
1 (yellow) 2	ON OFF	<p>When LEDs 1 and 2 are stuck in this pattern, the problem can be any of the following:</p> <ul style="list-style-type: none"> • Loose, damaged, or defective cable. • Dysfunctional HIPPI-6400-PH hardware at either end of the cable: signal skew compensation is not working. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Check the cable connections at each end of the cable. Make sure the thumb screws are tightened. - Reset the local SGI GSN subsystem as described in the online <i>IRIX GSN Administrator's Guide</i>. - Reset the GSN subsystem at the other end of the cable by following the reset procedure supplied by its manufacturer. - Replace the cable with one that is known to be functional. - Verify the local SGI GSN endpoint functionality by following the procedure in "Verification With a Loopback Device" on page 27. - Verify the GSN functionality at the other end of the cable by following the verification procedure supplied by its manufacturer.

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
1 (green) 2	ON OFF	<p>When LEDs 1 and 2 are stuck in this pattern, the problem can be any of the following:</p> <ul style="list-style-type: none"> •Dysfunctional HIPPI-6400-PH hardware at either end of the cable: initialize/reset handshake is not working. •Damaged or defective cable. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Verify the local SGI GSN endpoint functionality by following the procedure in "Verification With a Loopback Device" on page 27. - Verify the GSN functionality at the other endpoint by following the verification procedure supplied by its manufacturer. - Reset the local SGI GSN subsystem as described in the online <i>IRIX GSN Administrator's Guide</i>. - Reset the GSN subsystem at the other end of the cable by following the reset procedure supplied by its manufacturer. - Replace the cable with one that is known to be functional.

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
1 (green)	ON	When LEDs 1 and 2 are stuck in either of these patterns, the problem can be any of the following:
2 (yellow)	ON	
	or	
1 (green)	ON	<ul style="list-style-type: none"> • Loose cable connection at either end. • Dysfunctional HIPPI-6400-PH hardware at either end of the cable: for example., the link is shut down, the Destination at the other end of the cable is not sending credits, the local Source is not receiving credits, or the checksums are failing due to loose cable connectors, dysfunctional cable, or hardware. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Verify that cable connections at each endpoint are seated correctly and tightly. - Exchange the cable with a known good cable. - Verify each endpoint of this link by following the procedure in "Verification With a Loopback Device" on page 27. - Reset the local SGI GSN subsystem as described in the online <i>IRIX GSN Administrator's Guide</i>. - Reset the GSN subsystem at the other end of the cable by following the reset procedure supplied by its manufacturer.
2 (green)	blinking	

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
3 Receive	does not blink	<p>When LED 3 does not blink and LEDs 1 and 2 are both green, the problem can be any of the following:</p> <ul style="list-style-type: none"> •Link is quiescent because no data is passing through the link; the remote Source is not transmitting. •Remote Source is dysfunctional. •Loose or dysfunctional cable or cable connections. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Verify that the cable connections at each endpoint are seated correctly and tightly. - Verify that the remote Source is actually transmitting data. - Verify the local endpoint reception functionality by following the procedure in “Verification With a Loopback Device” on page 27.
4 Send	does not blink	<p>When LED 4 does not blink and LEDs 1 and 2 are both green, the problem can be any of the following:</p> <ul style="list-style-type: none"> •Link is quiescent simply because no data is passing through the link; local Source is not transmitting. •Local Source is dysfunctional. •Upper-layer protocol stack (software) is configured improperly so that no data is being passed to the GSN hardware. •Loose or dysfunctional cable or cable connections. <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - Verify that the cable connections at each endpoint are seated correctly and tightly. - Verify the local endpoint transmission functionality by following the procedure in “Verification With a Loopback Device” on page 27.

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
5 (yellow) Lost In	blink	<p>Whenever LED 5 blinks and LEDs 1-4 display normal operational patterns, any of the following may be the problem:</p> <ul style="list-style-type: none"> •Data is being corrupted before the local Destination accepts it. •The local HIPPI-6400-PH Destination hardware is dysfunctional (for example, incorrectly generating or managing RSEQ values). •The remote HIPPI-6400-PH Source hardware (at the other end of the cable) is dysfunctional (for example, incorrectly collapsing multiple RSEQ values before transmitting). <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - If this error occurs extremely rarely (for example, once in a day), ignore it as long as there are no accompanying upper-layer (software) errors. No data is lost because the remote Source retransmits. - Verify that the cable connections at each endpoint are seated correctly and tightly. - Replace the cable with a known good one. - Identify which endpoint is dysfunctional and follow the manufacturer's instructions to fix it. For example, for an SGI GSN endpoint, follow the procedure in "Verification With a Loopback Device" on page 27. - If the dysfunctional endpoint is an SGI GSN board, replace that board. Otherwise, follow the manufacturer's instructions.

Table 3-1 (continued) Troubleshooting With SGI GSN Panel Plate LEDs

LED	Pattern	Description
6 (yellow) Lost Out	blink	<p>Whenever LED 6 blinks and LEDs 1-4 display normal operational patterns, any of the following may be the problem:</p> <ul style="list-style-type: none"> •Data is being corrupted before the remote Destination accepts it. •The local round-trip timeout value for this link is too short. •The remote HIPPI-6400-PH hardware (at the other end of the cable) is experiencing problems that cause delays that exceed the timeouts. •A parity error occurred that resulted in the remote HIPPI-6400-PH Destination discarding the micropacket. •The remote HIPPI-6400-PH Destination is dysfunctional (for example, not generating ACKs or incorrectly discarding micropackets). •The remote HIPPI-6400-PH Source is dysfunctional (for example, not transmitting the ACKs it receives from its own Destination logic). •The local HIPPI-6400-PH Source hardware is dysfunctional (for example, transmitting incorrectly formatted micropackets that cause the other endpoint to discard the micropackets). <p>Troubleshooting suggestions:</p> <ul style="list-style-type: none"> - If this error occurs extremely rarely (for example, once in a day), ignore it as long as there are no accompanying upper-layer (software) errors. No data is lost because the Source retransmits. - Verify that the cable connections at each endpoint are seated correctly and tightly. - Replace the cable with a known good one. - Identify which endpoint is dysfunctional and follow the manufacturer’s instructions to fix it. For example, for an SGI GSN endpoint, follow the procedure in “Verification With a Loopback Device” on page 27.

Verification With a Loopback Device

When the procedure described in this section succeeds, the path between the local IRIX operating system and the SGI GSN hardware is functional and the entire SGI GSN board is functional, including the external GSN (HIPPI-6400-PH) connectors. This test does not verify the functionality of the upper-layers of the protocol stack (for example, TCP or ST).

1. Disable the GSN network interface that needs to be verified:

```
% ifconfig gns# down
```

2. At the SGI GSN port, remove the external GSN cable and install a loopback device (illustrated in Figure 3-1).

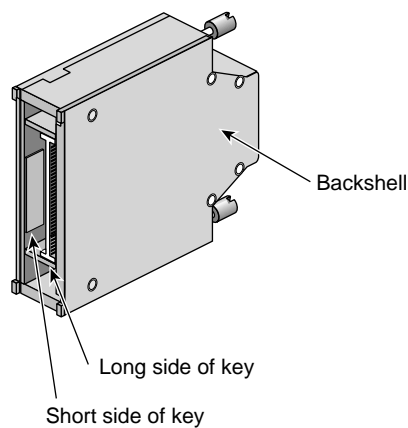


Figure 3-1 GSN Loopback Device

3. Enable the network interface:

```
% ifconfig gns# up
```

- Transmit and receive data through the loopback device using these commands:

```
% su
Password: your_password
# /usr/etc/gstest gsn#
GSN PING hop 0: Received ping cmd/response from element in 122.40 us
GSN PING hop 1: Received ping cmd/response from element in 96.80 us
GSN PING hop 2: Received ping cmd/response from element in 1672 us
```

where Figure 3-2 illustrates the element (hop) that is responding to each PING message.

- If this test fails, use Table 3-2 to proceed.

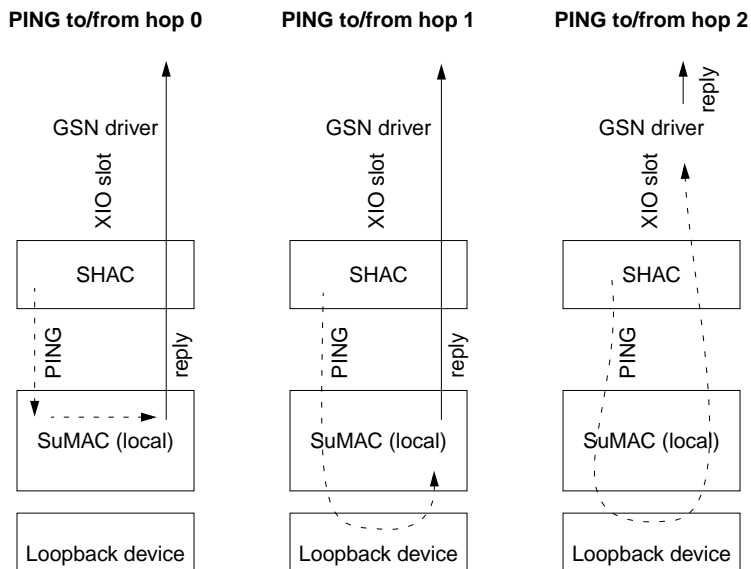


Figure 3-2 Hops Involved in *gstest* With External Loopback Device

Table 3-2 How to Proceed When *gsntest* Fails

Error Message	Procedure
Admin packet read/write error	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.
Command not found	Use <i>versions gsn</i> to verify that the IRIX GSN software is installed. If it is not, install it. If IRIX GSN is installed, use <i>ls /usr/etc</i> to verify that <i>gsntest</i> is located correctly. If it is not, reinstall the IRIX GSN software.
ERROR: ioctl call failed	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.
Error opening <i>device_name</i> for dev access: <i>error</i>	The specified GSN device did not respond to the open() request due to the reason indicated by the <i>error</i> . Use <i>hinv</i> to verify that the GSN hardware is known to the operating system. Use <i>ls /dev/gsn*</i> to verify that a device file exists for the hardware. Use <i>gsncntl status device</i> to verify that the link state is LNK_RDY and <i>gsncntl status element</i> to verify that hop 0 (the local SuMAC) is responding. If any of these verifications fails, invoke <i>ifconfig gsn# down; ifconfig gsn# up</i> . Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.
Error writing to SuMAC	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.

Table 3-2 (continued) How to Proceed When *gsntest* Fails

Error Message	Procedure
PING error on hop # (status = <i>hex_value</i>)	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.
Unable to receive GSN PING response	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.
Unexpected command response	Use <i>ifconfig gsn# down; ifconfig gsn# up</i> to reset the GSN subsystem. Then repeat the test. If the test still fails, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.

If this test succeeds, the SGI GSN subsystem (including the board) is functional. If the link between this GSN port and another GSN port has been problematic, install the loopback device on the other GSN port, then run verification tests on that system. If the verification test succeeds, replace the HIPPI-6400 cabling that connects these two ports.

Note: You must use *ifconfig* to disable then re-enable the GSN network interface when you remove the loopback device and (re)connect a GSN cable.

6. If the problem recurs, replace the cable with a known good cable.
7. If replacing the cable does not solve the problem, contact the SGI North American Technical Assistance Center at 1-800-800-4SGI or the local sales office.

Note: Additional verification procedures are provided in the online *IRIX GSN Administrator's Guide*.

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