Lucent Technologies

Bell Labs Innovations

SP Switch Router Adapter Guide

1.4 Update 2

Contents

Chapter 3   **Monitoring and Management Tools 3-1**

Contents

Contents

Figures

Tables

About this Guide

Lucent's GRF switched IP routers can be used to provide high-speed data communication links between IBM RS/6000 Scalable POWERparallel Systems (SP) and external networks/hosts. When packaged with an IBM SP system, the GRF router is referred to as an RS/6000 SP Switch Router, or SP Switch Router. The SP Switch Router Adapter card is the GRF media card that specifically supports SP system data transfers. To connect to an SP system, the SP Switch Router Adapter card is cabled directly to an SP Switch port.

The *SP Switch Router Adapter Guide* describes the media card itself and explains how to install, verify, and configure the card. The *Guide* provides the same type of information for this media card as is provided for other GRF media cards. Information specific to installing and configuring a GRF router is found in the manuals listed below in the "Manual sets" section.

The RS/6000 SP Switch Router is based on the GRF 400 and GRF1600 routers manufactured by Lucent Technologies. For that reason, this manual contains references to the *GRF 400/1600 Getting Started*, *GRF Reference Guide*, and *GRF Configuration and Management* manuals.

About 1.4 Update 2

The GRF 1.4 Update 2 manual set includes new features added since software release 1.4.12. GateD information is provided in a separate document, the *GRF GateD Manual.*

How to use this Guide

The *Guide* contains the following chapters and an index:

- Chapter 1, "Introduction to the SP Switch Router Adapter Card," describes the SP Switch Router Adapter media card, its cables, LEDs, and SNMP implementation.

- Chapter 2, "Configuring the SP Switch Router Adapter," explains how to configure the SP Switch Router Adapter media card and how to attach it to the SP Switch.

- Chapter 3, "Monitoring and Management Tools," contains information about commands, logs, and dumps useful for maintaining the SP Switch Router and adapter card.

- Appendix A, "Part Numbers," contains a table of corresponding Lucent and IBM part numbers for SP Switch Router components.

- Appendix B, "Log Messages," contains explanations of log messages generated by the SP Switch Router Adapter media card.

- Appendix C, "Network Configuration Examples," contains examples and descriptions of three basic SP Switch network configurations and their requirements.

- Appendix D, "Upgrading SP Switch Router Software," describes how to install new releases of the router's operating software.

Manual sets

This section provides a list of relevant GRF manuals. A second list includes IBM system manuals that contain information specific to the SP supercomputer.

SP Switch Router manuals

The SP Switch Router Adapter media card is described only in the *SP Switch Router Adapter Guide*. The SP Switch Router and other media cards are described in the GRF manual set.

The GRF 1.4 Update 2 documentation set consists of the following manuals:

• *GRF 400/1600 Getting Started - 1.4 Update 2*

• *GRF Configuration and Management - 1.4 Update 2*

• *GRF Reference Guide - 1.4 Update 2*

• *GRF GateD Manual - 1.4 Update 2*

• *SP Switch Router Adapter Guide - 1.4 Update 2*

Router manuals and software upgrade release notes for the 9077 are available in PDF format from this Web site:
```
http://www.rs6000.ibm.com/resource/aix_resource/sp_books/sra
/index.html
```

To check which software release your SP Switch Router is running, use the **getver** command:

```
super> getver
Current  Revision: 1.4.20.ibm Version: default
super>
```

IBM SP system manuals

IBM information specific to the SP Switch Router Adapter card appears in:

• *IBM RS/6000 Scalable POWERparallel Systems:*
  Planning, Volume 1, Hardware and Physical Environment, GA22-7280

• *IBM RS/6000 Scalable POWERparallel Systems:*
  Planning, Volume 2, Control Workstation and Software Environment, GA22-7281

• *IBM Parallel System Support Programs for AIX:*
  Installation and Migration Guide, GA22-7347

• *IBM Parallel System Support Programs for AIX:*
  Administration Guide, SA22-7348

• *IBM Parallel System Support Programs for AIX:*
  Diagnosis Guide, GA22-7350

• *IBM Parallel System Support Programs for AIX:*
  Command and Technical Reference, Volume 1, SA22-7351

• *IBM Parallel System Support Programs for AIX:*
  Command and Technical Reference, Volume 2, SA22-7351

• *IBM Parallel System Support Programs for AIX:*
  Messages Reference, GA22-7352

You can download PDF versions of these manuals from the RS6000 SP Product
Documentation Library at this web site:

```
http://www.rs6000.ibm.com/resource/aix_resource/sp_books/
http://www.rs6000.ibm.com/resource/aix_resource/sp_books/pssp/inde
x.html
```

Documentation conventions

This manual uses the following standard documentation conventions:

Convention	Meaning
Monospace text	Represents text that appears on your computer's screen, or that could appear on your computer's screen.
Boldface text	Represents characters that you enter exactly as shown (unless the characters are also in *italics*—see *Italics*, below). Command names used in text appear in boldface.
Italics	In command usage, italic represent variable information. Do not enter the words themselves in the command. Enter the information they represent. In ordinary text, italics are used for titles of publications, for some terms that would otherwise be in quotation marks, and to show emphasis.
[ ]	Square brackets indicate an optional argument you might add to a command. To include such an argument, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
|	Separates command choices that are mutually exclusive.
Key1-Key2	Represents a combination keystroke. To enter a combination keystroke, press the first key and hold it down while you press one or more other keys. Release all the keys at the same time. (For example, Ctrl-H means hold down the Control key and press the H key.)
Press Enter	Means press the Enter, or Return, key or its equivalent on your computer.
Note:	Introduces important additional information.
⚠ **Caution:**	Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.
⚠ **Warning:**	Warns that a failure to take appropriate safety precautions could result in physical injury.

IP routing publications

Here are some related publications that you may find useful:

- *Internetworking with TCP/IP,* Volume 1 and 2, by Douglas E. Comer, and David L. Stevens. Prentice-Hall,

- *TCP/IP Illustrated,* Volumes 1 and 2*,* by W. Richard Stevens. Addison-Wesley, 1994.

- *Interconnections*, Radia Perlman. Addison-Wesley, 1992.
  Recommended for information about routers and bridging.

- *Routing in the Internet,* by Christian Huitema. Prentice Hall PTR, 1995.
  Recommended for information about IP, OSPF, CIDR, IP multicast, and mobile IP.

- *TCP/IP Network Administration*, by Craig Hunt. O'Reilly & Associates, Inc. 1994.
  Recommended for network management information.

- *Essential System Administration, Æ*leen Frisch. O'Reilly & Associates, Inc. 1991.
  Recommended for network management information.

Introduction to the SP Switch Router Adapter card

1

The RS/6000 SP Switch Router is based on the GRF 400 (4-card) and GRF 1600 (16-card) routers manufactured by Lucent Technologies. For that reason, this manual contains references to the *GRF 400/1600 Getting Started*, *GRF Reference Guide*, and *GRF Configuration and Management* manuals. The SP model of the router is referred to as the SP Switch Router.

SP Switch Routers can be used to provide high-speed data communication links between IBM RS/6000 Scalable POWERparallel Systems (SP) and external networks/hosts. The SP Switch Router Adapter card is the router media card that specifically supports SP system data transfers. To connect to an SP system, the SP Switch Router Adapter card is cabled directly to an SP Switch port.

Material in Chapter 1 provides a basic description of the SP Switch Router Adapter card. Please refer to the *GRF 400/1600 Getting Started* manual for SP Switch Router system installation procedures.

Chapter 1 covers these topics:

What is the RS/6000 SP Switch Router ?

The RS/6000 SP Switch Router is a high-performance switched IP router designed for high-volume, large-scale public and private backbone applications.

It has these main features:

*   Performs Layer-3 switching across 4-16 adapter slots, depending upon router model

*   Supports large suite of dynamic routing protocols

*   Accommodates multiple types of media, including HSSI, 10/100Base-T (fast Ethernet), ATM OC-3c, ATM OC-12c, SONET OC-3c, HIPPI, and FDDI

*   Provides basic filtering, OSPF multicast, SNMP v1

*   Manages 150K-entry route table, batch updating with 20 routes per second

As shown in Figure 1-1, the SP Switch Router attaches to the SP Switch through the SP Switch Router Adapter media card:
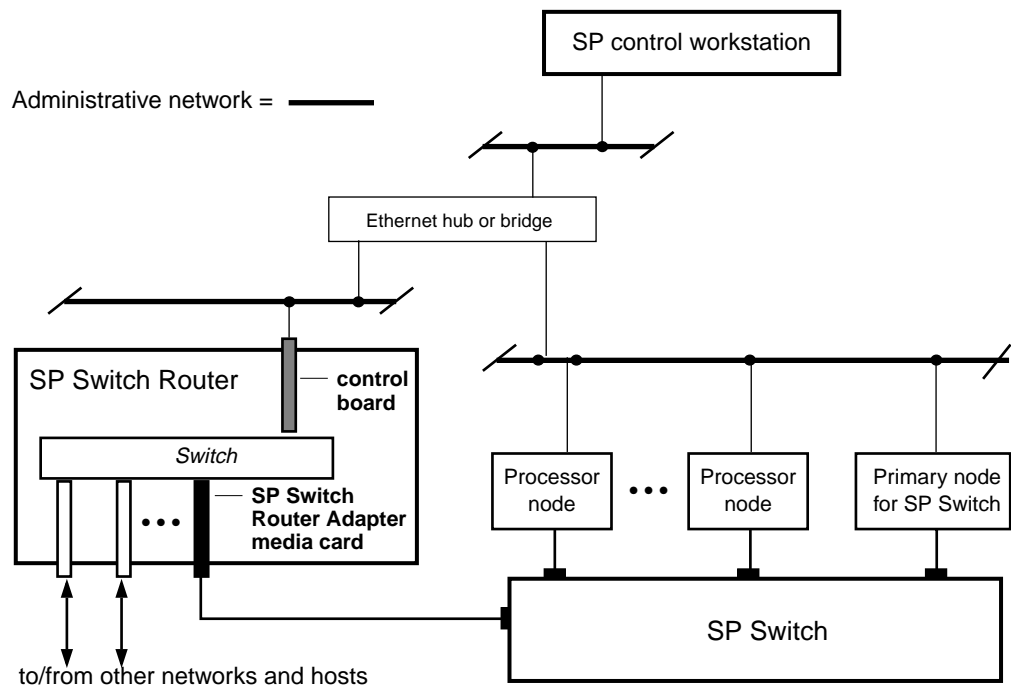
Figure 1-1. Connections between the SP Switch Router and an SP system

Configured with an IBM SP system, the SP Switch Router provides multiple media LAN and WAN connectivity for the SP. The SP Switch Router Adapter card connects directly to the SP Switch. Other components communicate across the administrative Ethernet network. (While using a hub or a bridge to interconnect the administrative Ethernet segments is common, other network components can be used to provide connectivity between the segments.)

By using the appropriate SP Switch Router Adapter card, the SP system can connect to FDDI, fast Ethernet, HSSI, ATM OC-3c, ATM OC-12c, SONET OC-3c, and HIPPI networks and hosts, depending upon which other media cards are installed in the SP Switch Router chassis.

The SP Switch Router supports these connection options:

– a single SP Switch Router Adapter card can be installed in an SP Switch Router

– multiple SP Switch Router Adapter cards can be installed in an SP Switch Router

– more than one card can connect to the same SP system

– a single SP Switch Router can connect to one or multiple SP systems

Each option requires unique IP addressing and network configuration. Appendix C contains examples of specific SP system–SP Switch Router networks. See the IBM documentation related to planning for the SP Switch Router for more information.

SP Switch Router systems for IBM sites

The SP Switch Router Adapter media card communicates directly with the SP. In the SP system configuration, the SP Switch Router Adapter media card is treated as a dependent node and is assigned a node number. There is only one node number address space in the SP system, and traditional SP nodes and dependent nodes are both assigned node numbers from that address space.

You may be given references to models 9076 and 9077:

– Model 9076 is the IBM SP system.

– Model 9077 04S is the 4-card SP Switch Router.

– Model 9077 16S is the 16-card SP Switch Router.

This manual uses SP system and SP Switch Router, respectively, as system names.

Cables included in your system

SP Switch cable

The SP Switch Router Adapter media card connects to an SP Switch via an SP Switch cable. Make sure the shipping box contains one ten- or twenty-meter cable for each SP Switch Router Adapter card you receive. If there is no cable, contact your IBM representative and order the special cable required by the SP Switch Router Adapter media card from IBM:

• SP Switch cable, 10m   (IBM P/N 46H9699)

• SP Switch cable, 20m   (IBM P/N 46H9701)

Although it has 50-pin connector ends, the specified cable has custom signal wiring so that other 50-pin cables cannot be substituted.

Ethernet cable

An Ethernet 10/100Base-T cable is required for connecting the SP Switch Router to the SP control workstation. It is the customer's responsibility to provide the appropriate cable to make this connection as well as any Ethernet hubs or bridges that may be required to connect to the SP LAN.

SP ground strap

A ground strap is included with the SP Switch Router and must be connected between the designated site on the SP Switch Router chassis and an SP frame. Refer to "ESD requirements" on page 1-8 for a diagram showing the location of router ground strap connections.

PCMCIA 520MB disk

The SP Switch Router shipping box also contains a PCMCIA 520MB spinning disk device. The PCMCIA disk installs in the SP Switch Router's control board, in the PCMCIA "A" slot. Once installed, the SP Switch Router can be configured to log and dump locally to the 520MB external storage device.

By default, logging is turned off when the SP Switch Router boots and comes up. After the system comes up, one of the first tasks is to configure the PCMCIA disk. The configuration procedure formats and mounts the external PCMCIA device, and places the required logging pointers. The installation procedure is described in Chapter 2.

Redundant AC power supplies

The SP Switch Router you receive is installed with redundant AC power supplies. You must plug the power supply cords directly into an AC wall or rack receptacle.

Note: The SP Switch Router has no power on/off switch.

When you plug the power supply cord into a live outlet, the SP Switch Router powers on and, since the software is already loaded, immediately begins to boot.

Redundant supply safety

Please note the following when powering off (unplugging) the SP Switch Router unit:

Caution: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords. Care must be taken to correctly connect each power supply to separate AC power sources and (optional) UPS devices.

Vorsicht: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollstandig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten. Achten Sie darauf, daß jedes Stromkabel mit einer separaten Wechselstromquelle und einem separaten USV-Gerät verbunden wird.

Attention: Cet appareil a deux cordons d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux cordons d'alimentation.

Upgrading system memory

Figure 1-2 shows the area of system memory (control board RAM) that can be expanded to meet site requirements. Memory upgrades are made in 128MB increments up to 512MB.
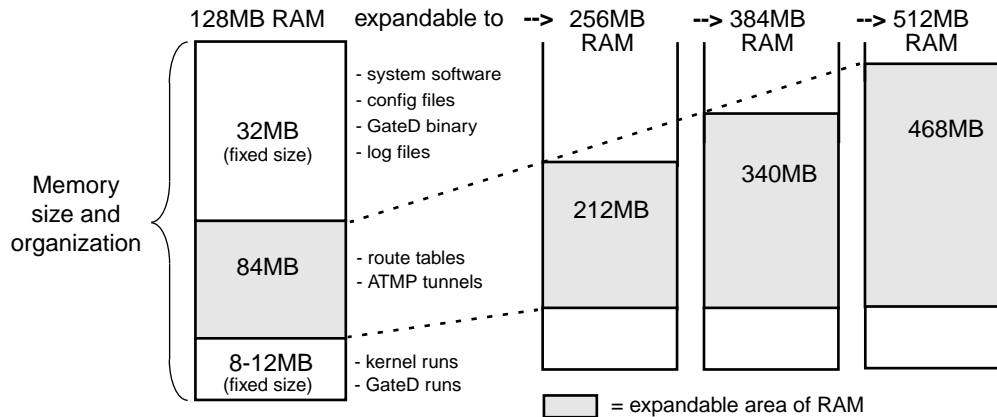
Figure 1-2. Expandable area of system memory

This chart provides general guidelines for memory required in different routing environments. Although the figures assume BGP peers with 50K route entries, additional memory may be required for higher average numbers of routes per BGP peer.

If the SP Switch Router is to support dynamic routing or ATMP home agents and mobile nodes, upgrade to at least 256MB. In environments where large numbers of routes are advertised, upgrade to 512MB.

Customer profile	Amount of control board memory needed	Space for dynamic routing, ATMP tables	Route entries on media card	Route entries in dynamic routing database	Typical number of peer sessions
Static routing: (in high-performance environment)	128MB	84MB	150K	Typical number: 35,800	0
Small POP	256MB	212MB	150K	Typical number: 199,000	3
Medium POP / ISP backbone	384MB	340MB	150K	Typical number: 362,000	9
Large POP / Exchange point / Route reflection server	512MB	468MB	150K	Typical number: 521,000	12

Overview of the SP Switch Router Adapter card

The SP Switch Router Adapter media card is cabled to a connector jack on an SP Switch. This media card transfers data to/from the SP Switch at 100 MB/s in each direction.

Like other SP Switch Router media interfaces, the SP Switch Router Adapter media card:

– is intelligent, and performs IP-level routing and route look-ups

– provides complete speed-decoupling between the connecting media and the gigabit/second router switch core

– fully buffers data for input and output queuing; each card has 16MB of high-speed receive buffer memory and 16MB of high-speed transmit buffers

Face plate diagram

The SP Switch Router Adapter card provides one full-duplex interface.

This illustration shows the faceplate, the interface connector, and the card LEDs.

The actual height of the SP Switch Router Adapter card is 10 inches.

The SP Switch Router Adapter cable 50-pin connector end is also shown.

○ PWR ON
○ 3V

○ RX HB
○ RX ST0
○ RX ST1
○ RX ERR

○ MD RCV
○ SW XMIT

○ TX HB
○ TX ST0
○ TX ST1
○ TX ERR

○ MD XMIT
○ SW RCV
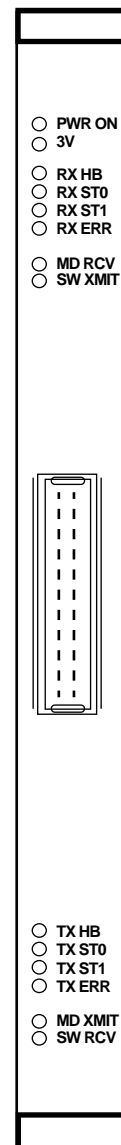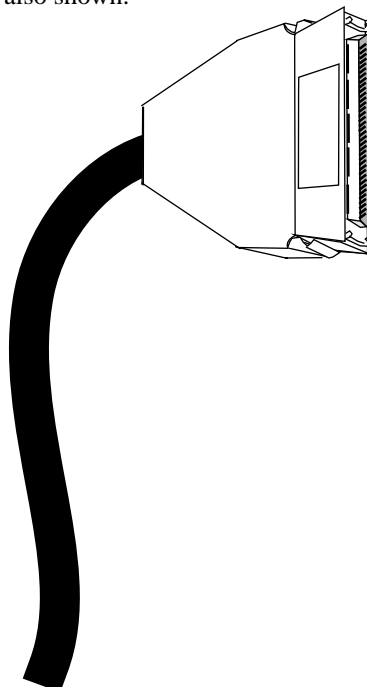
Inserting a media card into the SP Switch Router

Note:

To operate properly, the 16-card SP Switch Router requires that at least two media cards be installed. The 4-card router requires one card be installed. In both models, a face plate cover must be installed in any unused chassis slot to maintain router cooling flows.

Media cards are actually two logic boards joined to make a single component. As shown in Figure 1-3, the smaller board on the right is the serial interface, also called the serial daughter card. The larger one on the left is the media board and has the network ports. Together they comprise an SP Switch Router media card.

Cards install vertically for 16-card SP Switch Router:

Cards install horizontally level for 4-card SP Switch Router:
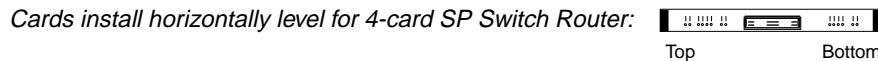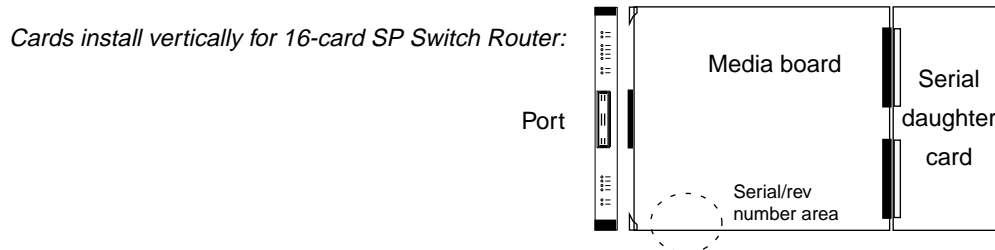
Figure 1-3. Media card components

The two logic boards are joined by a pair of 100-pin connectors and reinforcing plates. Even so, this joint retains some flex and must be carefully supported, especially when inserting the media card into the chassis.

Warning: The backplane of the SP Switch Router contains hazardous energy levels. When replacing a media card, remove only one card at a time. Removing more than one card will expose the operator to this energy hazard.

Warnung: An den Rückwandplatinen der SP Switch Router liegen gefährliche Hochspannungen ab. Zum Auswechseln der Medienkarte jeweils nur eine Karte entfernen. Bei zwei gleichzeitig entfernten Karten ist der Bediener gefährlichen Spannungen ausgesetzt.

ESD requirements

⚠ **Caution:** Media cards are hot swappable and can be installed when the SP Switch Router is running. However, media cards are highly susceptible to damage from electrostatic discharge. You must wear a grounded, conductive wrist strap any time you handle a media card. Make sure the metallic elements in the band directly touch your exposed skin.

SP Switch Router - 16 card

SP Switch Router - 4 card

Wrist strap grounding sites
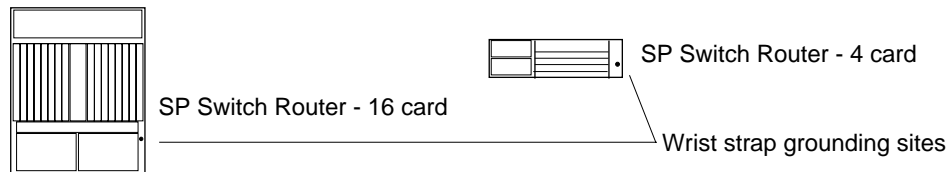
Card insertion procedure

1 When you are properly grounded, remove the media card from its anti-static container.

2 Hold the media card with the network ports facing you.

4-card router

Turn the card horizontal, the top of the media card should be on the left, the bottom of the card should be on the right. As you start, make sure you visually identify the left and right guide pair for this particular slot.

Keeping the media card horizontally level, insert the card fully into the slot, you will feel the card joining with the 100-pin connector on the backplane.

16-card router

Hold the card vertically. As you start, make sure you visually identify the top and bottom guide pair for this particular slot. Have one hand under the card, lightly supporting its weight. Rest just the edge of the bottom corner of the card in the bottom guide. Then, bring the top edge of the card into the top guide. This will help you keep the card level as you slide it in.

Keeping the media card vertically upright, insert the card fully into the slot.

You will feel the card joining with the 100-pin connector on the backplane.

3 When fully inserted, the card's face plate should be flush against the chassis back panel.

Note: Do not force the card into the slot. Doing so can damage the card or slot connector.

4 Tighten the screws at each end of the face plate.

SP Switch Router Adapter card LEDs

The "RX" and "TX" LEDs are under software control and indicate port states on receive and transmit sides. The "MD" and "SW" LEDs are hardware-controlled and reflect data activity on the SP Switch Router switch core or interface side of receive and transmit ports.

"Top" end of card   "Bottom" end of card
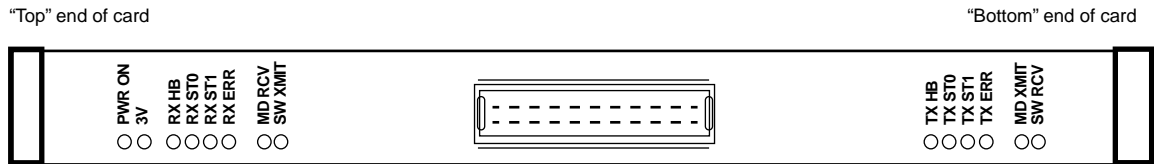
Figure 1-4. LEDs on the SP Switch Router Adapter card

LED activity during boot

During boot and resets, the four software-controlled LEDs indicate different media card activities by flashing in specific patterns. Refer to Table 1-1 for a description of each pattern.

Table 1-1. SP Switch Router Adapter card LED activity during boot and reset

LED	Description
• RX HB (green) • RX ST0 (green) • RX ST1 (amber) • RX ERR (amber)	• ON At reset, all LEDs are lit for 1/2 second • ON as part of on-board diagnostics. • ON Also tests that LEDs are working. • ON
	• OFF ERROR - During a boot or reset, this pattern indicates • OFF a checksum error is detected in • OFF flash memory. • ON
	• ON ERROR - During a boot or reset, this pattern indicates • OFF that the SRAM fails the memory test. • ON • OFF
	• ON -> OFF - During loading, HB and RX ST1 flash • OFF as each section of the code loads. • OFF • ON -> OFF

Table 1-1. SP Switch Router Adapter card LED activity during boot and reset   (continued)

LED	Description
• TX HB (green) • TX ST0 (green) • TX ST1 (amber) • TX ERR (amber)	• ON At reset, all LEDs are lit for 1/2 second • ON as part of on-board diagnostics. • ON Also tests that LEDs are working. • ON
	• OFF ERROR - During a boot or reset, this pattern indicates • OFF a checksum error is detected in • OFF flash memory. • ON
	• ON ERROR - During a boot or reset, this pattern indicates • OFF that the SRAM fails the memory test. • ON • OFF
	• ON -> OFF - During loading, HB and TX ST1 flash • OFF as each section of the code loads. • OFF • ON -> OFF

LED activity during normal operations

Refer to Table 1-2 for a description of SP Switch Router Adapter card LED activity during normal run time operations.

Table 1-2. SP Switch Router Adapter media card LEDs

LED	Description
PWR ON	This green LED is on when 5 volts are present. Both power LEDs, 5V and 3V, can be on simultaneously.
3V	This green LED is on when 3 volts are present.
RX HB (green)	During normal run-time operations, this green LED blinks a "heartbeat" pattern for the receive side CPU. The beat is a long off, short on-off-on pattern . In the pattern, the LED goes off for 1/2 second, comes on for 1/4 second, goes off for 1/4, comes on for 1/4, and then begins the pattern again by going off for 1/2 second.
• RX ST0 (green) • RX ST1 (amber) • RX ERR (amber) These three LEDs light in different combinations to indicate five operating states for the receive port.	• ON STATE_0 - These three LEDs are on during • ON hardware initialization. • ON <hr> • OFF STATE_1 - Bottom two amber LEDs go on during • ON software initialization, show receive port • ON is waiting for configuration parameters. <hr> • ON STATE_2 - Middle amber LED goes off when • OFF configuration parameters are in place and the • ON receive port is ready to be connected. <hr> • OFF STATE_3 - Bottom amber LED goes on to show that • OFF the receive port is connected and the card is • ON ready to be on line <hr> • OFF STATE_4 - These three LEDs are off to show receive • OFF port is online and running/routing. • OFF
MD RCV (amber)	This amber LED lights when data comes into the receive media port from an external source.
SW XMIT (amber)	This amber LED lights when the receive media port sends data to the SP Switch Router switch core (via the serial daughter card).
TX HB (green)	This green LED blinks a "heartbeat" pattern for the transmit side CPU, the beat is a long off, short on-off-on pattern during normal run time operations. In the pattern, the LED goes off for 1/2 second, comes on for 1/4 second, goes off for 1/4, comes on for 1/4, and then begins the pattern again by going off for 1/2 second.

Table 1-2. SP Switch Router Adapter media card LEDs (continued)

LED	Description
• TX ST0 (green) • TX ST1 (amber) • TX ERR (amber) These three LEDs light in different combinations to indicate five operating states for the transmit port.	• ON STATE_0 - These three LEDs are on during • ON hardware initialization. • ON
	• OFF STATE_1 - Bottom two LEDs (amber) go on during • ON software initialization, show transmit port • ON is waiting for configuration parameters
	• ON STATE_2 - Middle LED goes off when • OFF configuration parameters are in place and the • ON transmit port is ready to be connected.
	• OFF STATE_3 - Bottom LED (amber) goes on to show that • OFF the transmit port is connected and the card is • ON ready to be on line.
	• OFF STATE_4 - These three LEDs are off to show transmit • OFF port is online and running/routing. • OFF
MD XMIT (amber)	This amber LED comes on as data leaves the transmit media side going to an external destination.
SW RCV (amber)	This amber LED lights when data from the SP Switch Router switch core (via the serial daughter card) goes to the transmit media side.

Note: The MD RCV, SW XMIT, MD XMIT, and SW RCV LEDs increase in brightness with increasing data traffic. When there is little data traffic, it may be difficult to see that the LED is blinking.

SP Switch Router Adapter card specifications

Refer to Table 1-3 for SP Switch Router Adapter media card characteristics:

Table 1-3. SP Switch Router Adapter media card specifications

Element	Value
Attachment density	One full-duplex interface
Media transfer rate	100 megabytes per second
Processors	40 MHz SPARC, one transmit, one receive
Data buffers	16MB input, 16MB output
Route table support	150K entries
Max transmission unit	The default MTU is 65520 bytes
Card connector	2-row, 50-pin panel-mount receptacle
Cable connector	2-row, 50-pin shielded tab connector
Cables	Twisted-pair copper, 10- or 20-meter length, available from IBM
Power consumption	Approximately 50 watts per media card

Assigning filters

The SP Switch Router Adapter card supports IP packet filtering. You can apply filters to the receive and/or transmit path of a logical interface as described in the "IP Packet Filtering" chapter of the *GRF Configuration and Management* manual.

The filter configuration file is /etc/filterd.conf. The **maint 50 – 58** commands report statistics and information for filters assigned to the receive side of the card. The **maint 150 – 158** commands report on transmit side filters.

The "IP Packet Filtering" chapter describes the entries in /etc/filterd.conf and tells you how to design several types of filters. The binding statement in /etc/filterd.conf is where you assign a filter you have created to a particular logical interface on a specific media card. This statement has two variables that are media card specific, media and vlif.

In a binding statement, media is the type of media card and vlif is the logical interface number to which the filter is assigned. For the SP Switch Router Adapter card, media is always dev1 and the vlif is always 0 since the card has a single interface.

Here is a binding statement for an SP Switch Router Adapter card in slot 5, gt050 (the card is connected to node 8 on an SP switch):

```
media dev1 5 {
      # the filter named "no_host_22" blocks all packets from remote host 192.168.22.22
      bind no_host_22_22 {
            vlif 0;                    # this is the switch node 8 interface
            direction out;             # outbound traffic to node 8
            action filter;
      }
}
```

Here are the supported media names:
```
atm  (OC-3c)
dev1
ether
fddi
hssi
hippi
sonet  (OC-3c)
```

Please refer to the "IP Packet Filtering" chapter of the *GRF Configuration and Management* manual for configuration information and examples.

tcpdump

Filtering supports the standard UNIX **tcpdump** utility that enables you to examine the data crossing an SP Switch Router Adapter interface. A **tcpdump** "listen" command for interface gt030 is:
```
# tcpdump -i gt030
```

SNMP on the SP Switch Router Adapter card

This section describes the SNMP implementation on the SP Switch Router Adapter card as a way of providing information for staff supporting the card from the SP control workstation. Chapter 2 describes the actual configuration procedure performed on the SP Switch Router.

Although the **mib2d** daemon within the SP Switch Router supports several MIBs, the SET command is supported only for the SP Switch Router Adapter card MIB, ibmSPDepNode.

For SP Switch Router Adapter cards specifically, **mib2d** creates a table of ibmSPDepNodeEntry MIB objects, one entry for each possible media card slot.

SNMP write access mode is supported for SP Switch Router Adapter configuration parameters and for an object representing the Administrative state of the adapter.

When a SET command is received for an object defined in the ibmSPDepNode MIB, the /etc/grdev1.conf configuration file is also updated with the newly-set value. The SP Switch Router Adapter card's run-time software reports board status to **mib2d**.

For more information about the use of SNMP to configure the SP Switch Router Adapter card, please refer to the "Managing Extension Nodes" chapter in the *PSSP Administration Guide*.

SP Switch Router Adapter dependent node MIB support

SP Switch Router Adapter MIB support complies with the dependent node MIB definition and provides these objects:

- ibmSPDepNode
- ibmSPDepNodeTable
- ibmSPDepNodeEntry
- ibmSPDepNodeName
- ibmSPDepNodeNumber
- ibmSPDepSwToken
- ibmSPDepSwARP
- ibmSPDepSwNodeNumber
- ibmSPDepIPaddr
- ibmSPDepNetMask
- ibmSPDepIPMaxLinkPkt
- ibmSPDepIPHostOffset
- ibmSPDepConfigState
- ibmSPDepSysName
- ibmSPDepNodeState
- ibmSPDepSwChipLink
- ibmSPDepNodeDelay
- ibmSPDepAdminStatus

The object `ibmSPDepNodeName` serves as an index for the `ibmSPDepNodeTable` and is initialized to a constant text string equivalent to the corresponding chassis slot number: 00–15.

The slot numbers support SP Switch Router chassis with 4 or 16 card slots.

The objects `ibmSPDepConfigState`, `ibmSPDepNodeState`, and `ibmSPDepNodeName` are read-only. At start up, `ibmSPDepConfigState` is set to 1 (not-configured), and is changed as the SP Switch Router Adapter media card state changes.

SP Switch Router Adapter media card states (SNMP)

These states are available as possible instance values for the SNMP `ibmSPDepConfigState` object, but are not directly viewed by the user:

1 - `notConfigured`   (card is initialized)

4 - `diagnosticFailed`   (card's own on-board diagnostics fail)

5 - `microcodeLoadFailed`   (card is waiting for valid, not null, configuration parameters)

6 - `fullyConfigured`   (card is initialized, configured, ready to be brought on line with the SP)

SNMP configuration overview

After the SP Switch Router is powered on and booted, the network administrator logs on to configure the router as a system. The following is a description of the steps that can be taken during router configuration. The actual procedure is described in Chapter 2.

The configuration for the **snmpd** daemon must be updated to identify the SP SNMP Manager(s) that will configure and maintain status of the SP Switch Router Adapter card. The community name to be used for communications with the SP SNMP Manager must be the same community name that is specified in the Extension Node configuration data on the SP control workstation where the SP SNMP Manager resides.

If no community name is specified on the SP control workstation, specify **spenmgmt** as the community name for the SP SNMP Manager. The community name must allow read, write, and trap capabilities. All community names used to communicate with managers other than the SP SNMP Manager(s) should be restricted to read-only and trap capabilities. Traps should be sent to the same UDP port on which the SP SNMP Manager is listening. This port will most often be port number 162.

Using a UNIX editor, the administrator edits the configuration files required for each type of media card. Configuration parameters for the SP Switch Router Adapter card could also be entered in the `/etc/grdev1.conf` file at this time if the card is not going to be configured via SNMP. Save this file using the **grwrite** command.

The administrator now resets the SP Switch Router system to actually install the configuration parameters. During a reset, system daemons restart and reread their files. The media cards also boot, loading their software, configuration information, and the current route table.

Each time the SP Switch Router software boots, **mib2d** starts up. Unless the administrator has already entered SP Switch Router Adapter configuration values in `/etc/grdev1.conf`, file parameters for SP Switch Router Adapter cards will all contain null values.

mib2d generates and sends a `coldStart/warmStart` trap message to all SNMP Managers configured. It creates and initializes its MIB object instances. To support SET commands for any instances of the SP Switch Router Adapter configuration objects, **mib2d** creates an `ibmSPDepNodeTable`. The table contains an `ibmSPDepNodeEntry` MIB entry (there are 16 of these) for each available media card slot in various SP Switch Router models.

SNMP activity during media card start up

After the SP Switch Router software boots, the media cards boot and load their boot diagnostics. The SP Switch Router Adapter media card runs its diagnostics as a check for hardware defects. If no failure is detected, the card's run-time software is loaded. The screen displays diagnostic and boot reports from all the media cards, interleaved as received. If a hardware problem is found, the diagnostic forwards a `ConfigState` trap request to **mib2d**. In turn, **mib2d** sends a `switchConfigState` trap message (with `ConfigState=diagnosticFailed`) to the SP SNMP Manager. The SP Switch Router Adapter card continues to execute its self-test software until the card is powered off (removed from the chassis).

Note: The execution of diagnostics at boot time is an option. The default is for diagnostics to run each time the SP Switch Router Adapter card boots.

After an SP Switch Router Adapter card successfully loads its run-time software, the card requests its configuration parameters. After the run-time software verifies the parameters are valid (not null), the card is ready to begin normal operation.

If the configuration parameters contain null values, the card informs **mib2d** that the configuration parameters have not been sent via a trap request message. **mib2d** sends the SP SNMP Manager a `switchConfigState` trap message (`ConfigState=microcodeLoadFailed`) and also a `switchInfoNeeded` trap message.

The card remains in this state (5, `microcodeLoadFailed`) until it receives valid configuration parameters, or until the card is reset. The card periodically requests configuration parameters and sends trap request messages to **mib2d**.

If the SP SNMP Manager is configured and operational, it responds to the **mib2d** trap messages by sending SET commands to put the parameters in place. If the SP SNMP Manager does not respond, there may be a configuration error that can be detected using the procedures for diagnosing dependent node configuration problems in the *PSSP Diagnosis Guide*.

As a last resort, the network administrator can perform the following operations to install the updated parameters on the SP Switch Router Adapter card:

– run the **dev1config** command

– edit `/etc/grdev1.conf` as required

– use **grreset** *slot* to reset the SP Switch Router Adapter media card

The SP Switch Router Adapter card can receive valid parameters either way. It does not begin normal operation until it is brought on line with the SP system as the IP router interface.

Refer to the section in Chapter 2 on "Bringing the SP Switch Router Adapter card on-line with the SP" for a continuation of the start up scenario discussed here.

Configuring the SP Switch Router Adapter
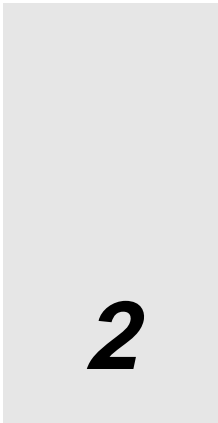
2

This chapter describes configuration and installation tasks required to connect an SP Switch Router Adapter media card to an IBM SP System.

The RS/6000 SP Switch Router is based on the GRF 400 and GRF1600 routers manufactured by Lucent Technologies. For that reason, this manual contains references to the *GRF 400/1600 Getting Started*, *GRF Reference Guide*, and *GRF Configuration and Management* manuals. The SP model of a GRF router is referred to as the SP Switch Router.

For more information about configuration as related to the SP, see the *PSSP Administration Guide* and the *PSSP Command and Technical Reference*. For additional information on troubleshooting your configuration, see the *PSSP Diagnosis Guide.*

Chapter 2 covers these topics:

Introduction to installation and configuration

The SP Switch Router functions as an IP router to provide high-speed data communication links between SP processor nodes and external networks/hosts. The SP Switch Router Adapter media card connects to the SP Switch board in an SP system as shown in Figure 2-1.
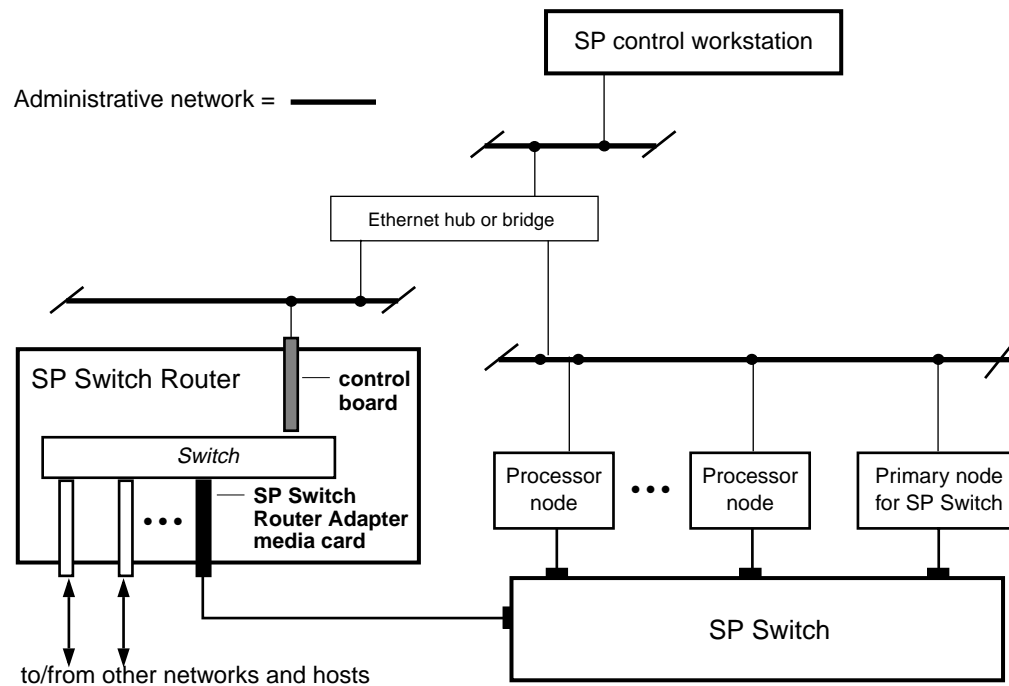
Figure 2-1. Components connecting an SP Switch Router to an SP Switch and control workstation

The SP Switch Router Adapter card also transmits data to/from other types of media cards across the SP Switch Router's internal switch core. These media include HIPPI, HSSI, FDDI, ATM OC-3c, ATM OC-12c, SONET OC-3c, and 100Base-T (Fast Ethernet).

The SP system manages the SP Switch Router Adapter card as a dependent node, under the control of the SP SNMP Manager running on the SP control workstation and the primary node of the SP Switch.

Once powered on and started up, the SP Switch Router can be configured and managed remotely, via a site's administrative network, including Telnet from the SP control workstation. Information about procedures performed from the SP control workstation are found in the "Managing Extension Nodes" chapter in the *PSSP Administration Guide*.

Location of relevant information

The intent of this chapter is to either provide or refer you to the necessary information to enable you to attach an SP Switch Router to an IBM SP system, including:

- Information to physically connect the two independent systems across cables is complete in this chapter.

- Information to start up, configure, and begin operations on the SP Switch Router is contained in the *GRF 400/1600 Getting Started* manual.

- Information to configure the SP Switch Router Adapter card as required for SP Switch Router functionality is complete in this chapter.

- Information to configure the SP Switch Router Adapter card as required for SP system functionality is only partially described in this chapter. Detailed information is contained in the "Managing Extension Nodes" chapter in the *PSSP Administration Guide*.

Pre-installation assumptions

The presentation of information in this chapter assumes the following:

- The SP Switch Router is powered on and has a VT-100 terminal or administrative Ethernet network connected to its control board.

- The SP Switch Router's basic system parameters, primarily IP address and host name, have been configured during the first time power-on configuration script.

  You use the terminal or network to log in to the SP Switch Router system and enter those basic configuration parameters. Procedures for starting and setting up the SP Switch Router are found in the *GRF 400/1600 Getting Started* manual.

- Remote Telnet access is enabled. This requires editing the `/etc/ttys` file and creating an entry for each remote session needed. Refer to Chapter 2 in the *GRF Configuration and Management* manual.

  Use the following command when telneting to the SP Switch Router from an X terminal:

  ```
  xterm -sb -e tn <hostname_of_SP_Switch_Router>
  ```

  This command ensures the screen output of the SP Switch Router is displayed correctly.

- The SP Switch Router's operating parameters, such as SNMP and IP addressing, have been configured and the system rebooted so it is up and operating. Procedures to configure operating parameters are found in the *GRF Configuration and Management* manual, Chapter 2.

  Descriptions of configuration and system management commands you may need are found in the *GRF Reference Guide*.

- You are ready to configure media cards. Procedures to configure media cards other than the SP Switch Router Adapter card are found in the *GRF Configuration and Management* manual

- The IBM SP system is up and operating.

- The SP system administrator has given you one of these pieces of information:

  – the node number assigned to each SP Switch Router Adapter card to be attached to an SP Switch port

  or

  – the port location on each SP Switch reserved for specific SP Switch Router Adapter cards

Order of information

Here is the order in which installation information is presented:

– an installation overview of tasks involving the SP Switch Router, the SP Switch Router Adapter card, and the SP system

– the configuration procedure for the PCMCIA 520MB disk, which also initiates system logging

– a description of which cables to attach between the SP Switch Router and the SP control workstation, and between the SP Switch Router Adapter card and the SP Switch

– methods to determine node number and SP Switch port for an SP Switch Router Adapter card

– a step-by-step configuration of an SP Switch Router Adapter card

– a list of ways to verify that the SP Switch Router Adapter card is correctly installed in the SP Switch Router

– a description of what needs to occur to bring the card on-line with the SP system

Installing an SP Switch Router Adapter card

This section contains the procedure for physical installation and minimal configuration of the SP Switch Router Adapter card for use as an SP dependent node. This includes cabling the card to the SP control workstation and the appropriate SP switch port.

Note: There must be an Ethernet twisted-pair connection between the SP Switch Router control board and the SP control workstation. This is normally done through an Ethernet hub.

Installation overview

IBM support personnel who install the SP Switch Router (9077) will perform the physical installation and minimal configuration described below with help from the customer's system administrator. The system administrator must provide basic configuration information to complete the steps in this procedure.

1 Locate all the components of the SP Switch Router ship group.

2 Perform the complete physical installation of the SP Switch Router unit as described in the "Power On and Initial Configuration" chapter of the *GRF 400/1600 Getting Started* manual.
Make sure that when the "First-time power on configuration script" runs at system boot, the required configuration information is provided by or entered by the customer. This information includes the SP Switch Router unit IP address and host name.

3 Perform the procedure to configure the PCMCIA 520 MB disk. The procedure is included in this chapter.

4 Route the Ethernet twisted-pair cable between the SP Switch Router unit and the Ethernet hub, then connect the cable to the SP Switch Router control board and to the Ethernet hub.

5 Verify that the SP control workstation has a connection to this same Ethernet hub.
If the SP control workstation Ethernet adapter is configured by the system administrator, then a **ping** test from the SP control workstation to the configured SP Switch Router Ethernet address can be done to test Ethernet connectivity.

Physical installation and minimal configuration will be complete at this point.

Review the "Attaching SP Switch Router cables" section in this chapter before connecting the SP Switch Router Adapter card cables to the SP switch ports specified for this configuration.

Installing the PCMCIA spinning disk

Your system is shipped with a PCMCIA disk device that is required to collect the system log files. This disk can hold up to 520MB of data.

You can install the disk any time after the SP Switch Router is powered on and is running. Logging is not enabled until you install the disk and complete this configuration procedure. Logged messages can be helpful while you are configuring media cards.

The configuration is done only once to set up local logs and dumps, and is not affected by software updates or system reboots.

Note that the disk is used only for storage. You cannot boot the router from an external device.

Three logs provide specific information useful for monitoring and debugging SP Switch Router operations. If you are working with Customer Support, these are the three logs they will need to see:

- `/var/log/gr.console`
- `/var/log/messages`
- `/var/log/gr.boot`

The `/var/log` directory contains other log files that collect low-level information useful primarily to system developers.

The procedure formats and initializes an external device (`/dev/wd2a`), temporarily mounts it on `/mnt`, creates subdirectories and symbolic links, and creates a permanent site file for storing the symbolic links.

Note that the **iflash** command can be used with a **-f** option that forces any data on the target device to be overwritten. When you use **iflash** without **-f**, you are informed if there is a file system already on the device and reminded that you must use the **-f** option to overwrite it. Because of its "force" capability, use the **iflash -f** command with caution.

The `/var/portcards` directory only contains media card dump files. These include the dumps from media card panics and dumps created when automatic dumping is selected via the **grreset -D** command (media card dumps when it comes back up). The `/var/crash` directory contains dumps from BSD kernel crashes.

Managing PCMCIA slots

Two commands enable remote management of PCMCIA slots. The **csconfig** *slot_number* command returns status while **csconfig** *slot_number* **up** and **csconfig** *slot_number* **down** mark the specified PCMCIA slot up or down, respectively.

Panic dumps sent to external flash device

The **mountf** and **grdump** commands enable the **grdump** program to work with an external flash device to capture media card dumps.

When a media card panics and there is a formatted external flash device plugged into a PCMCIA slot, a copy of the dump is automatically saved to the external flash in a directory called /var/portcards.

Installation steps

1   Insert the PCMCIA disk into slot A on the SP Switch Router control board (the thickness of the 520MB device requires it be installed in slot A).

2   Log in as root to the SP Switch Router, start the UNIX shell, and execute these commands from the shell:

```
prompt> sh
#
# cd /
# iflash -A
# grsnapshot --dup PA
# mountf -A -w -m /mnt
# mkdir /mnt/crash
# mkdir /mnt/portcards
# cd /var
# mv crash crash.orig
# mv portcards portcards.orig
# ln -s /var/log/portcards /var/portcards
# ln -s /var/log/crash /var/crash
# grsite --perm portcards crash
# cd /var/log
# pax -rw -pe -v . /mnt
# umountf -A
```

Note:
The **grsnapshot --dup** command places a copy of the internal flash boot and configuration files on the spinning disk. Customer Support may use these files to rebuild internal flash if a problem occurs.

3   Edit the file /etc/fstab and add this line as shown in the excerpt below:

```
/dev/wd2a  /var/log   ufs  rw  0 2  #PCMCIA slot A, use wd3a for B

# Filesystem mount table information.  See the fstab(5) man page
# and the /etc/fstab.sample file for more information and examples.
#
# Each line is of the form:
#  device        mount_point     type    flags    dump     fsck_pass
#
# Note that multiple flags (when used) are specified as a
# comma separated list without spaces.
#
```

```
# Blank lines and lines beginning with `#' are comments.
#
/dev/rd0a        /      ufs  rw  0 0
/dev/wd2a  /var/log   ufs  rw  0 2  #PCMCIA slot A, use wd3a for B
```

4   Edit the file `/etc/syslog.conf` to specify the location where the logs will be kept. Uncomment the local log configuration lines in the "`Log messages to Disk`" section by removing `#disk#` from each line and specify `/var/log` as the directory for each log:

These are the first four lines in the section:

```
#disk#*.err;*.notice;kern.debug;lpr,auth.info;mail.crit
   /var/log/messages
#disk# cron.info                          /var/log/cron
#disk# local0.info                        /var/log/gritd.packets
#disk# local1.info                        /var/log/gr.console
```

The file entries should now look like the following:

```
*.err;*.notice;kern.debug;lpr,auth.info;mail.crit
   /var/log/messages
cron.info                          /var/log/cron
local0.info                        /var/log/gritd.packets
local1.info                        /var/log/gr.console
local2.*                           /var/log/gr.boot
local3.*                           /var/log/grinchd.log
local4.*                           /var/log/gr.conferrs
local5.*                           /var/log/mib2d.log
```

If you had previously configured your SP Switch Router to log messages to a directory other than `/var/log`, you changed settings in `/etc/grclean.conf` and `/etc/grclean.logs.conf` files.

Go back into those files now and change the log directory.

5   To install your changes, restart **syslog**:

Determine the PID (process ID) for the **syslog** daemon and then use the **kill -HUP *PID*** command to restart it:

```
# ps -ax | grep syslogd

# kill -HUP PID
```

6   Modify `/etc/grclean.conf` and `/etc/grclean.logs.conf` to reflect the new log directory.

The `/etc/grclean.conf` file specifies which log and dump files the **grclean** program compresses, archives, and deletes.

The `/etc/grclean.conf` file entries should look like the following:

```
#############################################################
# port card dump files.
#############################################################
```

```
hold=4
size=1
remove=y
local=y
logfile=/var/portcards/grdump.*
#################################################################
# cleanup our own log file, if necessary.
#################################################################
DEFAULTS
hold=2
local=y
size=10000
logfile=/var/log/grclean.log
```

The `/etc/grclean.logs.conf` file is used to set size limits on log files. Here are some sample entries:

```
*****************************************************************
* Log files that used to be archived by the
*/etc/{daily|weekly|monthly} scripts.
*****************************************************************
size=150000
logfile=/var/log/gr.console
size=11000
logfile=/var/log/gr.boot
```

7 Save all changes and reboot:

```
# grwrite -v
# reboot -i
```

8 Verify that the PCMCIA interface and device are up:

```
# csconfig -a
            Slot 0: flags=0x3<UP,RUNNING>
              Attached device: wdc2
              Manufacturer Name: "Kingston Technology"
              Product Name: "DataPak 520"
              Function ID: 4 (PC card ATA)
              Assigned IRQ: 11
              Assigned I/O port1: 0x3d0-0x3df
            Slot 1: flags=0x5<UP,EMPTY>
```

9 To run a quick test, execute the **grconslog** command. If the command runs, these steps have been performed correctly:

```
# grconslog
```

Attaching SP Switch Router cables

Three types of cables must be attached:

– the administrative Ethernet LAN cable

– the SP Switch Router Adapter card–SP Switch cable(s)

– the ground strap to the SP frame

Ethernet cable

Route the Ethernet twisted-pair cable between the SP Switch Router unit and the Ethernet hub, then connect the cable to the SP Switch Router control board and to the Ethernet hub. (While using a hub or a bridge to interconnect the administrative Ethernet segments is common, other network components can be used to provide connectivity between the segments.)
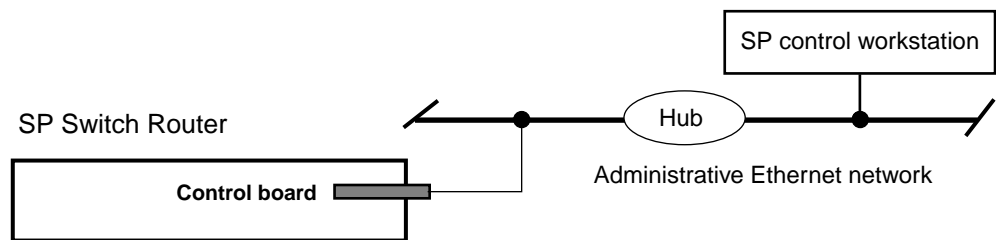
Figure 2-2. SP system administrative Ethernet connections

SP switch cable

The SP Switch Router Adapter card provides one full-duplex attachment and requires a specific cable with 50-pin connector ends obtainable from IBM. The cable has a unique signal wiring map, and is not replaceable by a 50-pin HSSI cable, for example.

Figure 2-3 illustrates the cables 50-pin connector end.
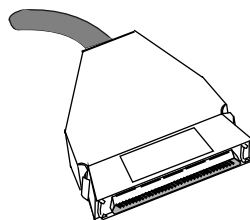
SP Switch Router Adapter card cables are available in 10- and 20-meter lengths (32 or 65 feet).

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

Figure 2-3. SP Switch Router Adapter cable 50-pin connector end

Do not damage the connector ends

Each connector end has 50 fragile pins. Pins can become bent while making the connection to the media card if alignment is wrong. If an SP Switch Router Adapter card link does not work after cabling, check both ends of the cable for bent pins.

Keep the plastic cap on

Cables ship with the connector pins protected by a plastic cap. Keep this cap on while you lay out the cabling. Remove the cap only when you are ready to plug in the connector.

Procedure for attaching cables to card and SP Switch

This procedure connects the SP Switch Router Adapter card(s) to the SP Switch. Before the SP Switch Router unit can begin full operation, all other router media cards must be configured with appropriate customer configuration information.

Be careful with the cable ends. Because they use high-density pins, cable ends are susceptible to physical damage if not handled correctly.

Warning: A connector can build up enough charge to disable the media card.
One way to discharge a cable is to run your finger gently over the tips of the pins, touching pins and the connector shell at the same time.

Warnung: Es kann sich genug Ladung in einem Stecker ansammeln, daß die Datenträgerkarte deaktiviert wird. So wird das Kabel entladen: Fahren Sie mit dem Finger vorsichtig über die Spitzen der Stifte; berühren Sie dabei gleichzeitig die Stifte und das Steckergehäuse.

Make sure you have identified and labeled the SP Switch cable as to which media card and SP Switch port it will be connected to.

1   If there are any terminators on the media card or the switch assembly where you need to attach the switch cable, remove them now.

2   Using appropriate frame entry and exit holes for cable management, route the SP Switch cable between the SP Switch Router unit and the SP Switch.

3   Connect the SP Switch cable to both the media card and the correct SP Switch port:
Connection to media card
The EMI shielding fitted inside the connector end can make insertion difficult. Insert the connector end very nearly perpendicular to the card. Pins can be damaged when the connector is inserted at too much of an angle. Seat the connector firmly so the spring clips are engaged.
Connection to SP Switch port
The cable ends should click onto the connectors.
Determining the correct switch port is described in the section, "Determining the switch connection for a dependent node."

4   Make sure there is positive retention at both ends of the cable by pulling lightly on the cable.

At this point, the SP Switch Router Adapter card configuration information must be entered on the SP control workstation to enable the PSSP code and SP Switch to recognize the adapter. These tasks are discussed in the "Configuration required on the SP system" section.

Configuration required on the SP system

This section describes the SP Switch Router-related configuration information that should be defined by the SP administrator and then entered from the SP control workstation before configuring the SP Switch Router Adapter card.

The SP Switch Router-related configuration information includes:

– SP Switch Router Ethernet IP address

– SP Switch Router Ethernet host name
(this host name is the SP Switch Router's administrative Ethernet host name)

– unique node number(s) for SP Switch Router Adapter card(s)

The SP Switch Router and Adapter card configuration information enables the PSSP code and the SP Switch to recognize and communicate with this card.

Determining the switch connection for a dependent node

The SP Switch Router Adapter connection replaces an SP node connection to the SP Switch. Each SP Switch Router Adapter media card is referred to as a dependent node, and is assigned a node number that corresponds to its specific connection on the SP Switch.

The node number is determined by the SP system administrator based on an understanding of how node numbers are assigned in the SP system and the rules for choosing a valid, unused SP Switch port. The rules are described in the configuration planning section of the *PSSP Planning, Volume 2, Control Workstation and Software Environment* manual.

If proper planning has been done to assign the node number, the system administrator will know which SP frame, switch board, and node slot corresponds to a dependent node. Given this information, you can determine which jack on the switch board should be used by consulting the "Switch Cable Charts" for the SP Switch in the *PSSP Maintenance Information Volume 1, Installation and Customer Engineer Operations* manual.

You should not attempt to connect an SP Switch Router Adapter to the SP Switch until proper planning has been done to assign the node number.

Once the node number is assigned, the SP system administrator can define the corresponding dependent node using SMIT as described in the "Managing Extension Nodes" section of the *PSSP for AIX: Administration Guide*.

After defining new dependent nodes on the SP, the administrator should use the **Eannotator** command to annotate the SP switch topology file. With the file annotated, even if the administrator is not sure of the frame, switch board, or node slot for the dependent node, you can determine the corresponding switch connection with the following procedure.

Procedure

1 From the SP control workstation, determine the switch_node_number by entering:

SDRGetObjects   DependentNode   node_number==n

where n is the node_number of the dependent node.
This command produces output that looks like:

```
node_number   switch_node_number ...
     47              31              ...
```

2 From the SP control workstation, determine the host name of the switch primary node by entering:

splstdata -s

This command produces output that lists information about nodes on the SP switch. It includes the following data and identifies the primary node host name:

```
switch_port    topology      primary      arp        switch_node
  number       filename       name       enabled     nos._used

--------------------------------------------------------------
    1           top.7        ournode1      no           yes
```

In this case, the primary node host name is "ournode1".

3 Log into the primary node by entering:

tn node_hostname

where node_hostname is the host name of the primary node.

4 From the primary node, enter:

pg /var/adm/SPlogs/css/out.top

5 Within the /out.top file, look for the lines containing "tb3". tb3 is immediately followed by the value for the switch_node_number.

For switch_node_number 31, the following line identifies the SP switch jack E02-S17-BH-J15 (Frame 2, switch, bulkhead, jack J15):

```
s 27 3  tb3 31 0    E02-S17-BH-J15 to E03-N47  # Dependent Node
```

If you need help interpreting this identifying string, see the *PSSP Maintenance Information, Volume 2, Maintenance Analysis Procedures and Parts Catalog* for an explanation of the naming standard for RS/6000 SP components.

Sources of configuration information

Here are several ways to determine the node number and other configuration data for a particular card.

- Check the SP Switch `out.top` file:

  - The value of the `switch_node_number` follows the `"tb3"` field in file output. In the example below, the `switch_node_number` is 31:

  ```
  s 27 3  tb3 31 0     E02-S17-BH-J15 to E03-N47  # Dependent Node
  ```

  - The value of the `node_number` can be found by entering:

  ```
  SDRGetObjects  DependentNode  switch_node_number==n
  ```

  where n is the `switch_node_number`.

  This produces output that looks like:

  ```
  node_number   switch_node_number  ...
        47              31              ...
  ```

- If the node is already defined to the SP system, but you do not know other configuration information, this command returns configuration information about the dependent nodes associated with SP Switch Router Adapters in your SP system. From the SP control workstation, enter:

  ```
  SDRGetObjects DependentNode
  ```

- The system administrator may have labeled the switch cable connecting to the media card with the node number.

- If there is no terminal directly-attached to the SP Switch Router, check the router host name from the SP control workstation. From the control workstation, enter:

  ```
  SDRGetObjects DependentNode node_number reliable_hostname
  ```

  This command returns host names and their corresponding node numbers for the attached SP Switch Routers.

  Several dependent nodes will be associated with the same reliable host name for SP Switch Routers that have more than one SP Switch Router Adapter card.

Multiple frames for multiple system connections

SP Switch Router Adapter cards in an SP Switch Router can connect to different switch boards in the same SP system. A configuration problem could arise in which the SP Switch Router Adapter cards would be assigned the same node number if each card plugged into the same port position on each switch board.

The construct of a frame removes the configuration problem. The example below demonstrates the organization of three SP frames, 1, 2, and 3 with switch boards in each.
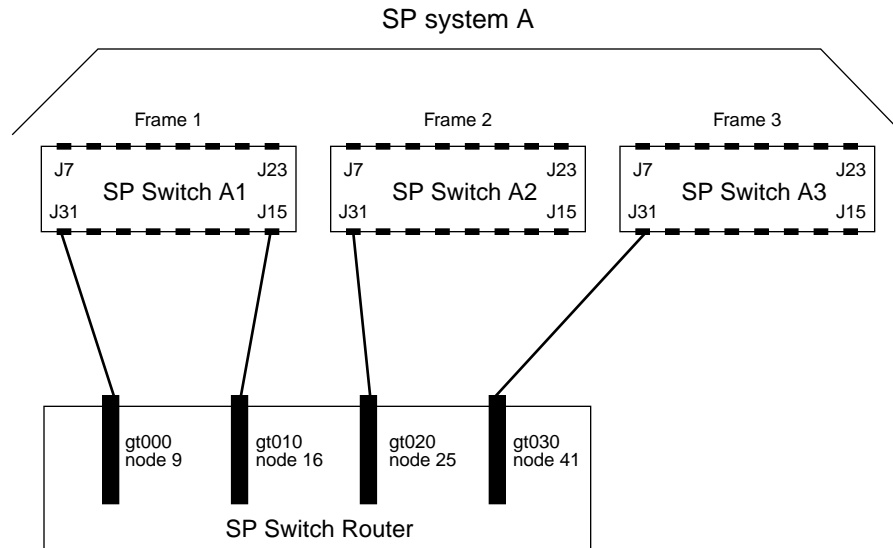
Figure 2-4. How frames enable connections to multiple SP Switches

Figure 2-4 shows how the frame numbering differentiates each SP Switch Router connection:

– the SP Switch Router card connected to port J31 of SP Switch A1 is node number 9

– the SP Switch Router card connected to port J31 of SP Switch A2 is node number 25

– the SP Switch Router card connected to port J31 of SP Switch A3 is node number 41

The SP Switch Router card connected to port J15 of SP Switch A1 is node number 16.

You can now configure the SP Switch Router Adapter card(s).

Step-by-step media card configuration

This section provides a configuration overview and the steps required to configure an SP Switch Router Adapter media card.

Configuration files and their uses

These are the `/etc` configuration files discussed in this chapter:

`grifconfig.conf`   – identifies each logical interface on a media card

`snmpd.conf`   – enables SNMP capabilities

`grdev1.conf`   – configures SP Switch Router Adapter cards

Refer to the *GRF Reference Guide* for templates of all configuration files.

Overview of steps 1–5

Steps 1 through 5 are described following this list.

1   Check SNMP in the SP Switch Router system.

Edit the SNMP configuration file and start SNMP daemon on the SP Switch Router.

2   Assign IP addresses

Assign an IP address and other parameters to each SP Switch Router Adapter interface.

There are two ways to configure these parameters:

a. We recommend using the procedures documented in the "Managing Extension Nodes" chapter of the *PSSP Administration Guide*.

or:

b. As an alternative, you can log in to the SP Switch Router and use a UNIX editor to enter the address and other parameters in the `/etc/grifconfig.conf` file.

3   Change profile settings (optional)

Change default boot diagnostics and dump settings in profiles.

To change the defaults for one card, change settings in the appropriate Card profile.

To change the defaults for all installed SP Switch Router Adapter cards, change settings in the Dump and Load profiles.

The default settings are:

–   enable/disable diagnostic boot sequence: default, *off*

–   when to dump: default, *at card reset or hang*

–   additional dumps to save: default, *two*

Default settings save the first dump of the day, the current dump, and the next two recent dumps.

4 Run **dev1config** to create `/etc/grdev1.conf`.

The SP Switch Router requires a specific configuration file, `/etc/grdev1.conf`, for the SP Switch Router Adapter card to operate. The **dev1config** command creates this skeleton file using configuration information passed to the router in either of two ways:

a. We recommend using the procedures documented in the "Managing Extension Nodes" chapter of the *PSSP Administration Guide*. to install the parameters. (This is the same configuration information as described in the recommended method of step 2.) These parameters will only be available to **dev1config** *after* the SP Switch Router Adapter card is activated on the SP switch.

or:

b. As an alternative, you can log on to the SP Switch Router and use a UNIX editor to enter the parameters in the `/etc/grdev1.conf` file.

5 Reset the SP Switch Router Adapter card to install configuration files.

Details about each step are provided in the next several sections.

Step 1. Check SNMP in the SP Switch Router system

Check the `/etc/snmpd.conf` file to see if a management station and community are defined, and if traps are enabled. Network monitoring devices (management stations) can request or access the SP Switch Router's SNMP information.

Follow the procedure described in Chapter 2 of the *GRF Configuration and Management* manual, "Configure SNMP." Note that the ALLOW and COMMUNITY public statements are in the default `/etc/snmpd.conf` file, and must not be removed.

Here is an `/etc/snmpd.conf` file appropriate for the SP Switch Router connected to an SP system. This configuration assumes two SP control workstations manage the SP Switch Router Adapter cards. Refer to the "SNMP configuration overview" section in Chapter 1 of this manual for background about the values to specify on the MANAGER and COMMUNITY statements that correspond to the SP SNMP Managers.

In the example, the IP addresses of the two SP control workstations are 129.40.61.12 and 129.40.61.5. You will see them defined under "MANAGER". The example assumes that both SP SNMP Managers listen for traps on UDP port 162 and that no other SNMP management programs that need UDP port 162 are installed on the SP control workstations.

```
# Default Agent Configuration File
#
#       This file allows MANAGERS to be specified.  This is used to
#       specify which managers will be receiving which traps.
#
#       Also, COMMUNITYs can be specified. This allows that agent to
#       be configured such that it will only accept requests from
#       certain managers and with certain community strings.
#
# GRAMMAR:
#
#     INITIAL         <name> <String>
#
#     TRANSPORT       <name>
#                     [SNMP | SMUX]
#                     [OVER [UNIX | UDP | TCP] [SOCKET | TLI]]
#                     [AT <addr>]
#
#     MANAGER         <addr> [ON TRANSPORT <name>]
#                     [SEND [ALL | NO | traplist] TRAPS
#                           [TO PORT <#> ]
#                            [WITH COMMUNITY <name>]]
#
#     COMMUNITY       <name>
#                     ALLOW op [,op]* [OPERATIONS]
#                     [AS <name>]
#                     [USE encrypt ENCRYPTION]
#                     [MEMBERS                    <addr> [,<addr>] ]
#
#     ALLOW <subagentId> [ON <hostSpec>]
#           WITH <passwordSpec> [<entitySpec>] [<timeout>]
#
#     DENY <subagentId> ON <hostSpec> WITH <passwordSpec>
#
```

```
#        ENTITY <EntityName> DESCRIPTION <String>
#
#        LOCAL CONTEXT <contextName> [USES] VIEW <viewName>
#              REFERS TO ENTITY <entityName> AS <oid>
#
#        PROXY CONTEXT <oid> [USES] SOURCE PARTY <oid>
#                               DESTINATION PARTY <oid>
#                               [AND] CONTEXT <oid>
#
#        VIEW <viewName> [[INCLUDE | EXCLUDE] SUBTREE <oid>
#              [MASK <bitmask>]]+
#
#        ALLOW op [,op]* [OPERATIONS] <sugar> SOURCE PARTY <partyName>
#                                       DESTINATION PARTY <partyName>
#                                       [AND] CONTEXT <contextName>
#
#        <partyDefinition> ::= [LOCAL] PARTY <name> ON TRANSPORT
#              <transport>
#                               AT <addr> <AuthPriv>
#                               AS <oid>
#
#      <transport> ::= [ snmpUDPDomain | snmpCLNSDomain | snmpCONSDomain
#                     | snmpDDPDomain | snmpIPXDomain  | rfc1157Domain
#        <transport> ::=
#        <AuthPriv> ::= <noAuth> <noPriv> |
#                       <md5Auth> <noPriv> |
#                       <md5Auth> <desPriv>
#
#        <noAuth> ::= <sugar> NO AUTHENTICATION
#
#        <sugar> ::= [AND] [[WITH | USING]]
#
#        <noPriv> ::= <sugar> NO ENCRYPTION
#
#        <md5Auth> ::= <sugar> MD5 AUTHENTICATION <key>
#
#        <key> ::= <sugar> <string> AS KEY
#
#        <desPriv> ::= <sugar> DES ENCRYPTION <key>
#
#        <subagentId>  ::=  SUBAGENT <oid> |
#                           SMUX SUBAGENT <oid> |
#                           UNSPECIFIED SUBAGENTS
#
#        <hostSpec> ::= HOST <hostid> |
#                       UNSPECIFIED HOST[S]
#
#        <passwordSpec> ::= PASSWORD <string>
#                           UNSPECIFIED PASSWORDS
#
#        entitySpec ::= AS ENTITY <entityName>
#
#        <timeout> ::= USING <specificTimeout> TIMEOUT
#        <specificTimeout> ::= <number> SECOND[S] |
#                              NO
#
#        addr ::=         <ip-kind> | <rfc1449addr> | <full-ip>
```

```
#      ip-kind ::=      <hostid> |
#                       <hostid> <portid> |
#                       <portid>
#
#      hostid ::=       <hostname> | <ip>
#                             where: hostname is defined in /etc/host
#      portid ::=       [PORT | : ] <#>
#
#      full-ip ::=      <ip>:<#>
#      ip ::=           <#>.<#>.<#>.<#>
#      traplist ::=     trap [, trap]*
#      trap ::=         <trap_name>
#
#      op ::=           ALL | GET | SET | TRAP
#      encrypt ::=      NO | <name>
#
#      rfc1449addr ::= tcp_ip_addr | osi_addr
#      tcp_ip_addr ::= <ip>/<#>
#      osi_addr ::= <nsap>/<tsel>
#      nsap ::= hexes
#      tsel ::= hexes
#      hexes = hexbyte[: hexbyte]*
#
#
ALLOW           SUBAGENT 1.3.6.1.4.1.1080.1.1.1
                WITH OTHER PASSWORD
                USE 15 SECOND TIMEOUT
COMMUNITY       public
                ALLOW GET, TRAP OPERATIONS
                USE NO ENCRYPTION
MANAGER         129.40.61.12
                SEND ALL TRAPS
                TO PORT 162
                WITH COMMUNITY spenmgmt
MANAGER         129.40.61.5
                SEND ALL TRAPS
                TO PORT 162
                WITH COMMUNITY spenmgmt
COMMUNITY       spenmgmt
                ALLOW ALL OPERATIONS
                USE NO ENCRYPTION
#
```

Put SNMP changes into effect

To have changes to /etc/snmpd.conf take effect, kill **snmpd**. It is automatically restarted.

On the SP Switch Router, log in as super user, find the **snmpd** PID (process ID), and then **kill** the SNMP daemon, as follows:

```
% ps -ax | grep snmpd

  26053 p2  S+     0:00.05 grep snmpd
  127 co- S       1:59.55 snmpd /etc/snmpd.conf /var/run/snmpd.OCT

% kill 127
```

Step 2. Assign IP addresses

You need to assign an IP address and related parameters to the SP Switch Router Adapter interface. You assign a primary IP address and, if needed, an alias address to support multiple subnets on the same physical interface. Netmasks for each address can differ in length. Refer to Appendix C, "Network Configuration Examples," for ways to use IP addressing and subnet masks.

There are two methods to assign IP addresses, one recommended, one optional.

Method 1: Recommended, use SP SNMP Manager

This is the method recommended for configuring the SP Switch Router Adapter card.

From a system point of view, it is appropriate to treat the SP Switch Router Adapter card as an extension node in the SP system. All configuration parameters should be entered using the SMIT panels. Remember that if you enter configuration information into SP Switch Router configuration files, you will also need to access the SMIT panels and re-enter information those panels require.

Refer specifically to the "Managing Extension Nodes" chapter in the *PSSP Administration Guide* for information about setting up SNMP to monitor the SP Switch Router system and configure the SP Switch Router Adapter media card.

Method 2: Optional, edit /etc/grifconfig.conf

Edit the `/etc/grifconfig.conf` file to assign an IP address to each logical SP Switch Router interface. You also can provide other information about the logical IP network to which that interface is physically attached.

Each logical interface is identified in `/etc/grifconfig.conf` as to its:

– interface name *(an SP Switch Router convention, defined below)*

– Internet address

– netmask

– broadcast/destination address

– argument field (can specify a default MTU value here)

The format for an entry (all lower case) in the `/etc/grifconfig.conf` file is:

```
# /etc/grifconfig.conf
#name  address     netmask     broad-dest   arguments
gt020 192.168.15   255.255.255.0 - mtu 65520              # primary
gt020 192.168.16   255.255.255.192 - mtu 65520            # alias
```

Remember that if you enter configuration information into SP Switch Router configuration files, you will also need to access the SMIT panels and re-enter information those panels require.

If you have not done so, use the `super>` prompt to establish the UNIX shell you will use to configure the SP Switch Router Adapter card.

Type `sh` at the `super>` prompt for the UNIX shell prompt to appear:

```
super> sh
#
```

Interface name

The SP Switch Router interface name has five components that describe an individual interface in terms of its physical slot location in the chassis, and its specific and virtual locations on a media card.

In a 4-card SP Switch Router, model 04S, the SP Switch Router Adapter card interface names look like these: `gt000, gt010, gt020, gt030` (only the slot # changes, 0 – 4). Figure 2-5 defines the components in the SP Switch Router Adapter card interface name:

```
                                                               g t 0 y 0

1st:   always "g" for GRF  ──────────────────────────────────┘ │ │ │ │
2nd:   media type, t (SP Adapter), f (FDDI), h (HIPPI), e (100Base-T), etc ──┘ │ │ │
3rd:   chassis number, always "0" (zero)  ─────────────────────┘ │ │
4th:   slot number in hex  ─────────────────────────────────────┘ │
5th    logical interface number in hex, always "0" (zero)  ───────┘
```
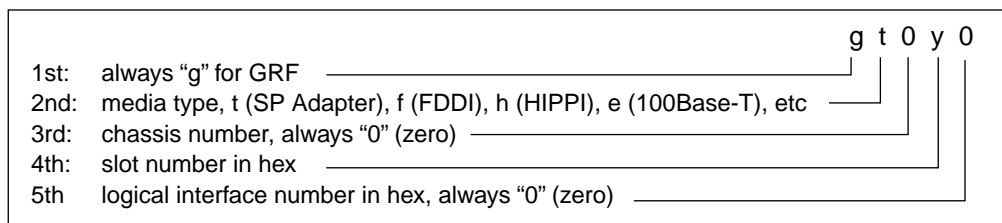
Figure 2-5. Components in the SP Switch Router Adapter card's interface name

Internet address

The Internet address is the 32-bit IP address for the specified logical interface. Enter this address in standard dotted-decimal (octet) notation: `xx.xx.xx.xx`. This value must match any entered into `/etc/grdev1.conf`.

Netmask

Netmask is the 32-bit address for the logical IP network on the physical network to which the specific SP Switch Router or media card physical interface is attached. The netmask is entered in standard dotted-decimal (octet) notation. If no destination/broadcast address is supplied, a netmask is required. This value must match any entered into `/etc/grdev1.conf`.

Broadcast / destination address

The broadcast or destination address is the 32-bit address for this network. Enter the broadcast or destination address in standard dotted-decimal (octet) notation. When a broadcast IP address is assigned to a logical interface, the netmask value is ignored. A dash (-) can be entered in the netmask column, or it can be left blank.

The connection of the SP Switch Router Adapter card to the SP system is point-to-multipoint.

SP Adapter card   SP Switch board

point ──────────────────────▶ *multipoint*
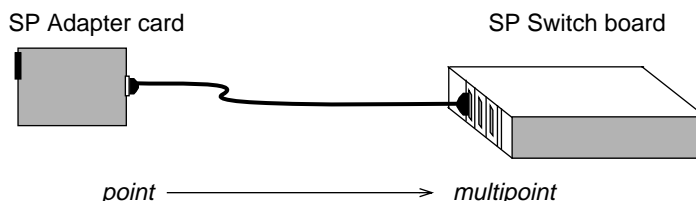
Argument field

This field is optional for SP Switch Router Adapter cards. The arguments field usually specifies an MTU value different from the coded default value of 65520.

Default MTU values

The default MTUs for SP Switch Router media are:

SP Switch Router Adapter:	65520 bytes
HIPPI:	65280 bytes
FDDI:	4352 bytes
ATM OC-3c:	9180 bytes
ATM OC-12c:	9180 bytes
10/100Base-T:	1500 bytes

The default MTUs for these framing protocols are:

Frame Relay:	4352 bytes
HDLC:	4352 bytes
Point-to-Point Protocol:	1496 bytes

MTU discovery facility

Maximum Transmission Unit (MTU) sizes are generally selected at the host end of the route. This is accomplished by turning on the host's MTU discovery facility and allowing the host to send packets. The MTU discovery facility operates by default on the SP Switch Router.

In effect, the discovery facility tells the router not to fragment, but to advise the host when the packet size is larger than the given path can handle. This allows the host to discover the largest packet which the most restrictive of the media components within the same path can handle. Once "discovered", the host then sends only packets in sizes matching the reported maximum, and packets are not fragmented.

Putting grifconfig.conf additions into effect

Additions made to `/etc/grifconfig.conf` after first-time installation will take effect only after the file is reloaded and the media card(s) reset.

Use the **grreset** command to reset each configured SP Switch Router Adapter card by specifying the slot number where each card is installed.

Enter:

```
# grreset <card_slot_number>
```

Refer to the *GRF Reference Guide* for more information about using **grreset**.

Step 3. Change profile settings

Specify card-level parameters – Card profile

Set specific `dev1` card configuration parameters at the Card profile. The fields to set are:

– OPTIONAL: specify ICMP throttling settings

– OPTIONAL: change run-time binaries

– OPTIONAL: change dump variables

This is the card profile for the SP Switch Router Adapter card residing in slot 8. Media card type, `dev1`, is automatically read into the read-only `media-type` field. Other values shown are defaults. At the top level, you see config and ICMP throttling fields:

```
super> read card 8
CARD/8 read
super> list card 8
card-num* = 8
media-type = dev1
debug-level = 0
hssi-frame-protocol = Frame-Relay
sonet-frame-protocol = PPP
ether-verbose = 0
ports = <{ 0{off on 10 3} {single off} {"" "" 1 sonet internal-osc+
load = { 0 < > 1 0 0 }
dump = { 0 < > off off}
config = { 0 1 1 4 0 0 }
icmp-throttling = { 10 10 2147483647 10 10 10 }
```

Specify ICMP throttling

You can specify ICMP throttling changes for this card in these settings. Refer to Chapter 1 in the *GRF Configuration and Management* manual for an explanation of each field, or do a `set <field-name>?` for a brief description. Default values are shown:

```
super> list ic
echo-reply = 10
unreachable = 10
redirect = 2147483647
TTL-timeout = 10
param-problem = 10
time-stamp-reply = 10
```

Change default echo reply and TTL settings with this series of commands:

```
super> set echo-reply = 4
super> set TTL-timeout = 12
super> write
CARD/8 written
```

You do not have to do a **write** until you have finished all changes in the Card profile. However, you get a warning message if you try to exit a profile without saving your changes.

Specify different executables

A media card's Card profile can be used to specify a custom binary setting that overrides the standard media binary configured in the system Load profile.

Card-specific executables can be set at the Card profile in the `load`/`hw-table` field. The `hw-table` field is empty until you specify the path name of a new run-time binary. This specified run-time binary will execute in this SP Switch Router Adapter card only.

```
super> read card 8
CARD/8 read
super> list card 8
card-num* = 8
media-type = dev1
debug-level = 0
hssi-frame-protocol = Frame-Relay
sonet-frame-protocol = PPP
ether-verbose = 0
ports = <{ 0{off on 10 3} {single off} {"" "" 1 sonet internal-osc+
load = { 0 < > 1 0 0 }
dump = { 0 < > off off}
config = { 0 1 1 4 0 0 }
icmp-throttling = { 10 10 2147483647 10 10 10 }

super> list load
config = 0
hw-table = < >
boot-seq-index = 1
boot-seq-state = 0
boot-seq-diagcode = 0
```

If you want to try a test binary, specify the new path in the `hw-table` field:

```
super> set hw-table = /usr/libexec/portcard/test_exec_for_dev1
super> write
CARD/8 written
```

Specify different dump settings

A media card's Card profile can be used to specify custom dump settings that override the system options configured in the system Dump profile.

Card-specific dump file names can be set at the Card profile in the `dump`/`hw-table` field. The `hw-table` field is empty until you specify a new path name where you want dumps for this card to be kept.

```
super> read card 8
card/8 read
super> list dump
config = 0
hw-table = < >
config-spontaneous = off
dump-on-boot = off
```

In a Card profile's `config` field you can specify when dumps will be taken for a particular card. You set the field equal to a value that represents a certain event or several such events. You can specify the value in either hex or decimal. However, after you save (write) your specified

value and you later read the field, the setting is always displayed in decimal. Here are the hex values for dump events:

    0x0001   - dump always (override other bits)
    0x0002   - dump just the next time the card reboots
    0x0004   - dump on card panic
    0x0008   - dump whenever card is reset
    0x0010   - dump whenever card is hung
    0x0020   - dump on power up

To specify dump on panic and dump when card hangs, you OR together 0x0004 (dump on card panic) and 0x0010 (dump whenever card is hung). The result in hex is 0x0014, or 20 in decimal. You could specify either of these settings to get the same result:

```
super> set config = 0x14
or:
super> set config = 20
super> write
DUMP/ written
```

After you save (write) your specified value and you later read the field, you will see the panic and hang setting displayed as `config = 20`.

To specify dump during panic, reset, and power up, you OR together 0004, 0008, and 0020. The result in hex is 0x2c, the decimal equivalent is 44. Both settings produce the same result:

```
super> set config = 0x2c
or:
super> set config = 44
super> write
DUMP/ written
```

After you save (write) your specified value and you later read the field, you will see the panic, reset, and power up setting displayed as 44.

Note: Dump settings for all installed media cards are specified in the system Dump profile. There are two fields, `keep-count` and `config`. These fields are overridden by settings in a particular Card profile.

The `keep-count` field enables you to specify numbers of dumps to be saved for all installed cards. The default setting is `keep-count = 0`, which means two more dumps are saved in addition to the current dump and the first dump of the day. A total of four dumps will be available with this default setting. At minimum, the first dump of the day and the current dump are always saved.

The `config` field in the system Dump is the same as the `config` field in a Card profile. The default for this setting is 20, expressed in decimal, and means that dumps are taken when cards panic and hang.

Refer to the *GRF Configuration and Management* manual for a description of other system Dump profile fields.

Change executables for all dev1 cards - Load profile

Global values for executable binaries are set at the Load profile in the `hw-table` field. These only change when you want to execute new run-time code in **all** SP Switch Router Adapter cards.

Here is the path, default settings are shown:

```
super> read load
LOAD read

super> list
hippi = {"" N/A on 0 1 <{1 /usr/libexec/portcards/xlxload.run N/A}+
rmb = { /usr/libexec/portcards/rm.run N/A off 0 1 < > }
hssi = {/usr/libexec/portcards/hssi_rx.run /usr/libexec/portcards+
dev1 = {/usr/libexec/portcards/dev1_rx.run /usr/libexec/portcards+
atm-oc3-v2 = {/usr/libexec/portcards/atmq_rx.run /usr/libexec/por+
fddi-v2 = {/usr/libexec/portcards/fddiq-0.run /usr/libexec/portca+
atm-oc12-v1 = { /usr/libexec/portcards/atm-12.run N/A off 0 1 < >+
ethernet-v1 = {/usr/libexec/portcards/ether_rx.run /usr/libexec/p+
sonet-v1 = {/usr/libexec/portcards/sonet_rx.run /usr/libexec/port+
atm-oc12-v2 = {/usr/libexec/portcards/atm-12v2.run N/A off 0 1 < +
```

Look at the SP Switch Router Adapter card settings:

```
super> list dev1
type = dev1
rx-config = 0
rx-path = /usr/libexec/portcards/dev1_rx.run
tx-config = 0
tx-path = /usr/libexec/portcards/dev1_tx.run
enable-boot-seq = off
mode = 0
iterations = 1
boot-seq-table = < >
```

To execute different run-time code on the receive side of the SP Switch Router Adapter card, replace `/usr/libexec/portcards/dev1_rx.run` with the path to the new code:

```
super> set rx-path = /usr/libexec/portcards/newdev1_rx.run
super> write
LOAD written
```

Change dump defaults for all dev1 cards - Dump profile

Global values for dump settings are at the Dump profile. These settings are usually changed only for debug purposes. Default settings are shown in this example.

The `keep-count` field specifies how many dumps are compressed and stored at one time for each media card. The file system can store the default setting of 2 which actually stores four dumps per day (the current dump, the first dump of the day, and two additional dumps). Use caution if you change the recommended default.

Here is the path, default settings are shown:

```
super> read dump
DUMP read

super> list
hw-table = <{hippi 20 /var/portcards/grdump 0} {rmb 20 /var/portc+
dump-vector-table = <{3 rmb "RMB default dump vectors" < {1 SRAM 2+
config-spontaneous = off
keep-count = 2
```

The `hw-table` field has settings to specify when dumps are taken and where dumps are stored. Here is the path to examine the global SP Switch Router Adapter settings:

```
super> list hw-table
hippi = { hippi 20 /var/portcards/grdump 0 }
rmb = { rmb 20 /var/portcards/grdump 3 }
hssi = { hssi 20 /var/portcards/grdump 7 }
dev1 = { dev1 20 /var/portcards/grdump 9 }
atm-oc3-v2 = { atm-oc3-v2 20 /var/portcards/grdump 5 }
fddi-v2 = { fddi-v2 20 /var/portcards/grdump 6 }
atm-oc12-v1 = { atm-oc12-v1 20 /var/portcards/grdump 10 }
ethernet-v1 = { ethernet-v1 20 /var/portcards/grdump 8 }
sonet-v1 = { sonet-v1 20 /var/portcards/grdump 11 }
atm-oc12-v2 = { atm-oc12-v2 20 /var/portcards/grdump 14 }

super> list dev1
media = dev1
config = 20
path = /var/portcards/grdump
```

In the `config` field you can specify when dumps will be taken by using a value that represents a certain event or several such events. You can specify the value in either hex or decimal. However, after you save (write) your specified value and you later read the field, the setting is always displayed in decimal. Here are the hex values for dump events:

0x0001   - dump always (override other bits)

0x0002   - dump just the next time the card reboots

0x0004   - dump on card panic

0x0008   - dump whenever card is reset

0x0010   - dump whenever card is hung

0x0020   - dump on power up

To specify dump on panic and dump when card hangs, you OR together 0x0004 (dump on card panic) and 0x0010 (dump whenever card is hung). The result in hex is 0x0014, or 20 in decimal. You could specify either of these settings to get the same result:

```
super> set config = 0x14
or:
super> set config = 20
super> write
DUMP/ written
```

After you save (write) your specified value and you later read the field, you will see the panic and hang setting displayed as `config = 20`.

To specify dump during panic, reset, and power up, you OR together 0004, 0008, and 0020. The result in hex is 0x2c, the decimal equivalent is 44. Both settings produce the same result:

```
super> set config = 0x2c
or:
super> set config = 44
super> write
DUMP/ written
```

After you save (write) your specified value and you later read the field, you will see the panic, reset, and power up setting displayed as 44.

Dump vectors (read-only)

The `segment-table` fields in the `dump-vector-table` describe the areas in core memory that will be dumped for all SP Switch Router Adapter cards. These are read-only settings, you cannot change them.

Here is the path, **cd** .. go back up to the main level if necessary:

```
super> cd ..
super> list dump-vector-table
3 = {3 rmb "RMB default dump vectors" < {1 SRAM 262144 524288} > +
5 = {5 atm-oc3-v2 "ATM/Q default dump vectors" <{1 "atm inst memo+
6 = {6 fddi-v2 "FDDI/Q default dump vectors" < {1 "fddi/Q CPU0 co+
7 = {7 hssi "HSSI default dump vectors" < {1 "hssi rx SRAM memory+
8 = {8 ethernet-v1 "ETHERNET default dump vectors" <{1 "Ethernet +
9 = {9 dev1 "DEV1 default dump vectors" <{1 "dev1 rx SRAM memory"+
10 = {10 atm-oc12-v1 "ATM OC-12 default dump vectors" <{1 "ATM-12+
11 = {11 sonet-v1 "SONET default dump vectors" <{1 "SONET rx SRAM+
14 = {14 atm-oc12-v2 "ATM OC-12-V2 default dump vectors" <{1 "ATM+
```

This sequence shows the segments in the SP Switch Router Adapter card that are dumped:

```
super> list 9
index = 9
hw-type = dev1
description = "DEV1 default dump vectors"
segment-table = <{1 "dev1 rx SRAM memory" 2097152 2097152} {2"dev1+

super> list seg
1 = { 1 "dev1 rx SRAM memory" 2097152 2097152 }
2 = { 2 "dev1 shared SRAM memory" 131072 32768 }
```

```
super> list 1
index = 1
description = "dev1 rx SRAM memory"
start = 2097152
length = 2097152

super> cd ..
index = 9
hw-type = dev1
description = "DEV1 default dump vectors"
segment-table = <{1 "dev1 rx SRAM memory" 2097152 2097152}{2 "dev1+

super> list seg 2
index = 2
description = "dev1 shared SRAM memory"
start = 131072
length = 32768
```

Step 4. Run dev1config to create grdev1.conf

The **dev1config** command creates configuration files that are necessary for the set up of your SP Switch Router Adapter card, including /etc/grdev1.conf file.

This command creates the /etc/grdev1.conf file that contains the null values for the SP Switch Router Adapter MIB. Your SP Switch Router Adapter card configuration will fail if you do not run this command.

⚠ **Caution:** You cannot verify that the parameters have been set in /etc/grdev1.conf until after the SP Switch Router Adapter card is activated on the SP switch.

There are two ways to get configuration parameters into the /etc/grdev1.conf file.

Method 1: Recommended, use SP SNMP Manager

This is the method recommended for configuring the SP Switch Router Adapter card. From a system point of view, it is appropriate to treat the SP Switch Router Adapter card as an extension node in the SP system. All configuration parameters should be entered using the SMIT panels.

Refer specifically to the "Managing Extension Nodes" chapter in the *PSSP Administration Guide* for information about setting up SNMP to monitor the SP Switch Router system and configure the SP Switch Router Adapter media card.

This is the same configuration information as described earlier in Method 1 of Step 2. These parameters will only be available in the /etc/grdev1.conf file *after* the SP Switch Router Adapter card is activated on the SP switch.

Method 2: Optional, edit /etc/grdev1.conf

On the SP Switch Router, edit the /etc/grdev1.conf file to assign parameters to each logical SP Switch Router interface. These parameters are described on the next page.

Remember that if you enter configuration information into SP Switch Router configuration files, you also need to access the SMIT panels and re-enter information those panels require.

How to run the command

You must run the **dev1config** command while you are logged on to the SP Switch Router. Log on and start the UNIX shell using the **sh** command:

```
super> sh
#
```

Enter the **dev1config** command:

```
# dev1config
```

Then, after the SP Switch Router Adapter card is activated on the SP switch, use the **vi** editor command to open the /etc/grdev1.conf file and verify that it does contain the configuration data.

Contents of /etc/grdev1.conf

Here is an excerpt from the `/etc/grdev1.conf` configuration file. It shows only the slot 0 card interface entry.

– SNMP expects 16 interface entries, so do not remove any even if they will be unused.

– Leave the "x" in place in front of the IP address and Net Mask parameters.

```
# more /etc/grdev1.conf
######################################################################
#   DEV1 Configuration
######################################################################
#  There are several variables that an SP Adapter card needs at
#  start up. These are handled by a set of GRINCHES whose descriptors
#  are indexed by card number and interface number as follows:
#
#      2.21.{CARD+1}.1.{INTERFACE+1}
#
#  This template specifies the start-up values for all potential cards
#  in a 16-card GRF router.  Initially these are default values
#  indicating that the card needs to be configured.
#
#  The descriptors are grouped by card and interface so that a
#  particular interface can be easily configured.
######################################################################
#  CARD  0  Interface 0
   #
-> 2.21.1.1.1.1        "00"                # Extension Node Identifier
   2.21.1.1.1.2        -1                  # Node Name
   2.21.1.1.1.3        "00:00:00:01:00:00:00:02:00:03" # Switch Token
   2.21.1.1.1.4        1                         # Switch ARP
   2.21.1.1.1.5        0                         # Switch Node Number
   2.21.1.1.1.6        x0.0.0.0              # IP Address
   2.21.1.1.1.7        x0.0.0.0              # Net Mask
-> 2.21.1.1.1.8        1024                # Max Link Pckt Len.(bytes)
   2.21.1.1.1.9        0                         # IP Host Offset
-> 2.21.1.1.1.10       1                         # Configuration State
   2.21.1.1.1.11       "sp_00"             # System Name
-> 2.21.1.1.1.12       2                         # Node State
   2.21.1.1.1.13       0                         # Switch Chip Link
   2.21.1.1.1.14       31                        # Node Delay (cycles)
   2.21.1.1.1.15       1                         # Admin Status
   #
```

The arrows (**->**) indicate read-only values that will not be changed.

Parameter definitions

This section describes the parameters in the `/etc/grdev1.conf` file that are read from SNMP variables:

Extension Node Identifier `ibmSPDepNodeName` (read-only)
is a 2-digit value that corresponds to the SP Switch Router slot number for the resident SP Switch Router Adapter card. Valid values are between 00 and 15.

Node Name `ibmSPDepNodeNumber`
is an integer value that is the node number assigned to this card based on its physical connection to an SP Switch port.

Switch Token `ibmSPDepSwToken`
is an octet string size 10 value that internally identifies the SP Switch Router Adapter card's connection to the SP Switch network.

When you edit the `grdev1.conf` file, you should consult the SP system administrator to determine what the Switch Token value should be since the makeup of this field could change in future releases. For the initial release of SP Switch Router support, the field includes the switch board number (octets 1–4), switch chip number (octets 5–8), and chip port number (octets 9 and 10) to which the adapter is connected. The SP system administrator can determine these values from the SP System Data Repository (SDR) object for the dependent node.

Switch ARP `ibmSPDepSwARP`
is an integer, either 1 or 2. A value of 2, enabled, indicates that ARP is to be used to resolve network protocol addresses to switch node numbers for the switch network.

A value of 1, disabled, indicates that ARP is not to be used to resolve network protocol addresses to switch node numbers for the switch network. Instead, the mapping of IP addresses to switch node numbers is determined via the IP Host Offset.

Switch Node Number `ibmSPDepSwNodeNumber`
is an integer that indicates the physical address or switch node number for the SP Switch Router Adapter card on the SP switch network (also called the Node Device ID).

IP Address `ibmSPDepIPaddr`
is the IP address of the card expressed in standard IP notation, x00.00.00.00, and requires the x prefix to be attached.

Net Mask `ibmSPDepNetMask`
is the subnet netmask for the SP Switch Router Adapter card's IP address expressed in standard IP notation, x255.255.255.0, and requires the x prefix to be attached. All network bits must be set to 1, all host bits set to 0.

Max Link Pckt Length `ibmSPDepIPMaxLinkPkt` (read-only)
is the maximum number of bytes carried in the data portion of the IP datagram transmitted on the SP Switch network, the required setting is 1024.

IP Host Offset `ibmSPDepIPHostOffset`
Specified when ARP is disabled, is an integer whose value is the difference between switch node numbers and the host portion of the corresponding IP addresses. The value to subtract from the host portion of an IP address to calculate the corresponding switch node number.

Configuration State `ibmSPDepConfigState` (read-only)
is an integer that indicates the final configuration state of the SP Switch Router Adapter card.

    1 = not configured
    2 = firmware load failed
    3 = driver load failed
    4 = diagnostic failed
    5 = microcode load failed
    6 = fully configured

System Name `ibmSPDepSysName`
is a quoted string which is the host name of the control workstation for the system partition to which the SP Switch Router Adapter card is connected. The format could be anything and is determined by the value specified in the SP system configuration.

Node State `ibmSPDepNodeState` (read-only)
is an integer, either 1 or 2, that indicates whether the SP Switch Router Adapter card is responding. A value of 2, down, indicates the card is not responding. A value of 1, up, indicates the card is up and can be unfenced if it had previously been fenced from the SP Switch network.

Switch Chip Link `ibmSPDepSwChipLink`
is an integer with a value that corresponds to the send port number for packets from the adjacent switch chip to the SP Switch Router Adapter card. The card uses this value in the wake-up packet it sends to the adjacent switch chip. The SP system administrator can determine this value from the SDR object for the dependent node.

Node Delay `ibmSPDepNodeDelay`
is an integer that expresses an estimated amount of clock cycles that can elapse before the switch chip loads a synchronization register in the SP Switch Router Adapter card. The card uses this value in the wake-up packet it sends to the adjacent switch chip. The SP system administrator can determine this value from the SDR object for the switch partition that contains the dependent node.

Admin Status `ibmSPDepAdminStatus`
is an integer, either 1, 2, or 3, that indicates whether the SP Switch Router Adapter card is set to communicate with the Switch Manager protocol. The SP SNMP Manager sets this value to trigger resetting or reconfiguration of the SP Switch Router Adapter card.

    1 = the card is ready
    2 = the card is not ready and should be reset
    3 = the card needs to be reconfigured and made ready

Step 5. Reset card to install files

To install the SP Switch Router Adapter configuration files, first save the files and then reset the SP Switch Router Adapter card.

Save the files after you complete the system parameters and again after you configure the media cards and any network services such as filtering or dynamic routing.

```
# grwrite -v
# grreset <card_slot_number>
```

Saving configuration files

Use the **grwrite** command to save the /etc configuration directory from RAM to the internal flash device. This preserves the configuration files over a reboot.

```
# grwrite -v
```

With the /etc directory saved, use the **grsnapshot** command to save an alternate version of the operating software to the internal flash that will be based upon the configuration currently running on the internal flash device:

```
# grsnapshot -sP=revision,version -dP=revision,version
```

In the command, **-sP** specifies the source as primary internal flash (the SP Switch Router has only a primary internal flash), and **-dp** specifies the destination device as the primary internal flash. A specific configuration is defined as a release and version. For example, if the current operating release is 1.4.20, then the source might be **1.4.20.ibm,default** and you may name the saved configuration as **1.4.20.ibm,backup**.

For more information about these commands, see the *GRF Reference Guide*.

Verify SP Switch Router Adapter card from router

This section describes tools available from the SP Switch Router system software to check out newly-installed media cards. These tools are to be used on the SP Switch Router.

- The **ping** command tests whether an SP Switch Router Adapter media card can process and return a message.

- The **grcard** command tells you the operating state of an installed SP Switch Router Adapter card.

- The **grreset** command allows you to reset all or an individual card.

Note: Output from logs and other system reporting functions refer to the SP Switch Router Adapter card as DEV1 or dev1.

Verify media card operation using ping

Check SP Switch Router Adapter media card viability using the **ping** command. This UNIX command is modified to support SP Switch Router board components. This use of **ping** only tests internal communication between the SP Switch Router control board and the specified media card. It does not test message routing between media cards or communication between media cards and external devices.

Note: The **ping** command does not disturb normal SP Switch Router operations.

The **ping -P grid** *<slot number>* command sends a message to a specified SP Switch Router Adapter card asking the card to respond back with another message.

1 Log in as root to the SP Switch Router.

2 Enter a **ping -P grid** command to send a **ping** from the control board. Specify the appropriate media card by its chassis slot number.

For example, to act on the SP Switch Router Adapter media card in slot 3, enter:

```
# ping -P grid 3
```

This is what you see when the media card responds:

```
68 bytes from 0:0x3:0:  time=0.293 ms
68 bytes from 0:0x3:0:  time=0.251 ms
68 bytes from 0:0x3:0:  time=0.288 ms
                •
                •
                •
```

Do a Control-C to stop the ping and view ping statistics:

```
-- 2 GRID ECHO Statistics --
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0.969/1.060/1.172 ms
```

To act on the IP switch control board, enter:

```
# ping -P grid 66
```

Verify switch node connectivity using ping

You can execute a **ping** command that will verify the connection between the switch node and the SP Switch Router Adapter card's inbound and outbound data paths.

Note: You must make sure that the SP Switch Router Adapter card has been unfenced before executing the **ping**.

1 Log in as `root` to the SP Switch Router.

2 Enter a **ping** *ip_address* command where *ip_address* is the IP address of the target SP Switch Router Adapter card.

```
# ping xxx.yyy.zzz.nnn
```

Refer to the *GRF Reference Guide* for a description of the **ping** command.

Check media card status using grcard

The **grcard** command returns information about the status of all installed media cards. Output from logs and other system reporting functions refer to the SP Switch Router Adapter card as `DEV1_v1` or `dev1`.

Enter:

```
# grcard -v
```

Here is a sample of the slot, media, and state information returned from the **grcard** command:

```
# grcard -v

Slot     HWtype      State
0        HSSI_V1    running
1        ATM_OC3_V1       running
2        DEV1_V1    running
3        FDDI_V2    running
```

The SP Switch Router Adapter card resides in slot 2 and its state is reported as running.

Refer to the command descriptions in the *GRF Reference Guide* for a description of **grcard**.

Media card states

The following SP Switch Router media card states are reported:

POWER-UP	- initial state of a card at system power on
BOOT-REQUESTED	- card has requested its run-time code
DUMPING	- card is being dumped
LOADING	- card is receiving run-time code
CONFIGURING	- card has requested its configuration tables
RUNNING	- card is configured and operating
NOT-RESPONDING	- card does not respond to requests from the management software
PANIC	- card has encountered a system fault
HELD_RESET	- card is being held in reset state
STATE_UNKNOWN	- state cannot be determined

The POWER-UP state is the normal condition as power is being applied to the media card.

The BOOT-REQUESTED state is one step in the progress of a card during initial power-up, while a card is coming up, or while a card is being reset due to user or software direction.

DUMPING is the resulting state when a card is directed to dump at reset, at a panic, or as user-specified in the Dump or appropriate Card profile.

LOADING is a state during which the card receives its run-time image.

CONFIGURING is a waiting state for the media card after it issues a request for configuration parameters. The media card stays in the CONFIGURING state after being loaded until it has all necessary configuration information, is initialized, and the kernel recognizes the card is up.

RUNNING is the normal operating state, the card is able to receive and send packets.

NOT-RESPONDING is a state in which the card does not answer requests from the operating software. The card could be hung. If it decides a card is hung, the kernel begins an automatic reset.

A system fault can cause a card to go into the PANIC state. After a card panics, it needs operator or kernel intervention to start up. The kernel either reboots the card, or dumps and then reboots, depending upon how variables are user-specified in the Dump or appropriate Card profile.

An operator can use the **grreset -h** command to put a card into the HELD_RESET state to keep it up but not transferring packets.

When the kernel cannot determine what a media card is doing, it places the card into STATE_UNKNOWN, and either reboots the card, or dumps and then reboots the card, depending upon how variables are user-specified in the Dump or appropriate Card profile.

Reset media card using grreset

Use the **grreset** command to reset a media card from the UNIX prompt.

Note: The **grreset** command can be used on a media card without disturbing normal SP Switch Router system operations.

1   Log in as `root` on the SP Switch Router.

2   Enter the **grreset** command, specifying the appropriate media card by its slot number.

To reset all the media cards, enter:

```
 # grreset all
```

To reset the media cards in slot 0, enter:

```
# grreset 0
```

To reset the card in slot 4 and dump its memory, enter:

```
# grreset -D 4
```

To reset the card in slot 4 and return debug information, enter:

```
# grreset -d 4
```

The hold reset option (-h) has numerous uses, here are three.

– To isolate a possible problem, set all cards to hold reset and bring them on-line one at a time.

– To determine whether a card is affecting other media cards, put that one in hold reset to verify what is happening.

– If certain cards cannot restart while under heavy load from the router switch, you can put all cards in hold reset and then bring up those cards having trouble first while the switch load is light.

These commands hold either all or one media card in reset:

```
# grreset all -h
# grreset slot -h
```

Refer to the command section in the *GRF Reference Guide* for a description of **grreset**.

Bringing the SP Switch Router Adapter card on-line with the SP

After the SP Switch Router Adapter media card completes initialization, its state machine enters the Configured state (6). The media card sends an up-trap request to **mib2d**. **mib2d** sends the SP Switch manager a pair of switchNodeUp and switchConfigState (ConfigState=FullyConfigured) trap messages.

The SP system administrator now decides which action is required to bring the IP router interface on-line.

If the SP Switch Router Adapter was previously fenced from the switch network with the -autojoin option, the SP SNMP Manager will automatically unfence the adapter. Otherwise, the SP system administrator must perform one of the following actions to bring the SP Switch Router Adapter card on-line. Possible actions include:

- a switch initialization
- an unfencing sequence
- other switch management sequence

The appropriate action depends on what state the SP system is in with respect to the dependent node. For example, if no **Estart** command has been issued to re-initialize the SP switch since the dependent node (the SP Switch Router Adapter) was installed, then an **Estart** command is needed. If the dependent node was fenced from the SP switch without the **-autojoin** option, then an **Eunfence** command is needed.

Many different states are possible. Consult the *PSSP Installation and Migration Guide* and the *PSSP Administration Guide* for descriptions of the administrative actions needed to bring extension nodes on-line (dependent nodes are specific types of extension nodes). See the *PSSP Diagnosis Guide*" for information on diagnosing extension node configuration problems.

The SP Switch Router Adapter media card remains in fullyConfigured state until it is actually brought on line via a switch initialization or unfencing sequence. Should the switchNodeUp trap message not reach the SP SNMP Manager, use the **grcard** command to check the card's readiness and state. The **grcard** command returns "*running*" if the card is ready to be brought on-line.

Checking connectivity to the SP system

The procedure in this section is useful when a problem is suspected with the SP Switch Router Adapter media card, its connection to the SP Switch, or its connection to the SP Switch Router hardware. This section is intended for hardware service personnel, although parts may be applicable to customer problem determination.

Before beginning this procedure, it may be helpful to verify the configuration of the media adapter. Use the **vi** editor to determine whether proper or NULL parameters are set in the /etc/grdev1.conf file. You can also use the **maint 3** command to view the parameters for a single card.

If you are unable to find a configuration problem or are unable to correct the configuration due to potential hardware problems, the procedure should be used to check the connection to the SP switch. Each SP Switch Router Adapter media card is considered a dependent node for the

SP System. Each dependent node has a `node_number` and other configuration and status information which is unique to that dependent node.

Procedure

1   Check the SP Switch cable for obvious problems such as a loose or disconnected connector. If any problems are found, correct the problem.

2   Check the 10Base-T twisted-pair connection between the SP Switch Router control board and the SP control workstation. This connection is normally routed through an Ethernet hub.

3   If there is no terminal directly-attached to the SP Switch Router, check the SP Switch Router host name from the SP control workstation. From the control workstation, enter:

         SDRGetObjects DependentNode node_number reliable_hostname

   This will return the node numbers and the corresponding host names for the SP Switch Router systems.

4   Test Ethernet connectivity by performing a **ping** test from the SP control workstation to the SP Switch Router administrative Ethernet address.

5   Check the status of the SP Switch Router Adapter LEDs.

   Use the tables in the "SP Switch Router Adapter LEDs" section in Chapter 1 to determine the state of the card.

   Generally, "RX ST0/ST1/ERR" and "TX ST0/ST1/ERR" will indicate a problem. The problem might be due to connection, configuration, hardware, or software.

   To further test the SP Switch Router Adapter card hardware, you can reset or reseat the card, and then use the tables under "LED activity during boot" (Chapter 1) to interpret the results.

   Note: Before you reset an SP Switch Router Adapter card or re-seat a card in the router chassis, be sure that the switch node has been fenced. Use an **Efence** command to take the dependent node off the switch node.

6   From the SP control workstation, use an **Eunfence** and/or **Estart** command to bring the dependent node back into the configuration.

   From the control workstation, check `switch_responds` for a good value.

   If `switch_responds` returns "1" or shows green in Perspectives, then the dependent node is active again.

7   You may need to log in to the SP Switch Router to perform additional analysis before determining whether any hardware needs replacement.

8   If problems remain, you will have to contact the next level of Customer Support for further direction. They may log into the SP Switch Router to perform additional analysis. If you were directed here by the *RS/6000 SP Maintenance Information Manual* Dependent Node MAP, return to that procedure.

For more information about configuration as related to the SP, see the *PSSP Administration Guide* and the *PSSP Command and Technical Reference*. For additional information on troubleshooting your configuration, see the *PSSP Diagnosis Guide.*

Monitoring and Management Tools

3

This chapter describes tools used to monitor day-to-day operations of the SP Switch Router Adapter card or to indicate the causes of problems which may develop.

These tools operate from the SP Switch Router, and apply to the SP Switch Router and the SP Switch Router Adapter card. The "Management Commands and Tools" and "Management Tasks" chapters in the *GRF Configuration and Management* manual provide more information related to monitoring and managing the router.

Other tools that apply to the SP Switch Router Adapter card, notably SNMP, operate from the SP control workstation. Information about procedures performed from the SP control workstation are found in the "Managing Extension Nodes" chapter in the *PSSP Administration Guide*.

Chapter 3 contains these topics:

SP Switch Router command overview

This section provides a brief overview of frequently-used management commands. These are administrative and configuration commands, most are prefixed with **gr** and most operate on the router's internal flash.

These commands manage memory and support multiple configuration versions. These include: **flashcmd**, **getver**, **grfins**, **grsite**, **grsnapshot**, **grwrite**, **mountf**, **setver**, **umountf**, and **vpurge**.

Refer to the *GRF Reference Guide* for command syntax and examples. Man pages are available for most of these commands.

Many of the commands read/write the internal flash device. Those commands will mount the flash (**mountf -w**), perform their function, and then unmount the flash. Mounting takes several seconds. If you are doing several commands in a row, mount the flash yourself to avoid the repeated mount/unmount delay. The commands do not mount flash if it is already mounted and do not unmount it if they did not mount it.

This diagram of the control board memory structure provides a reference point as you review the memory commands.
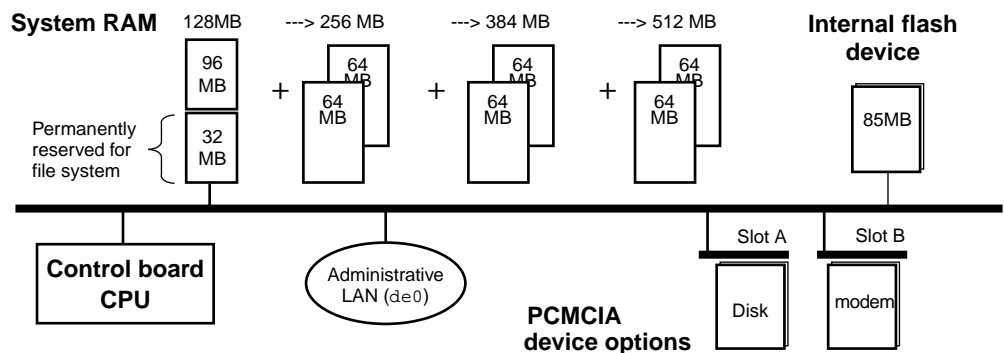
Figure 3-1. SP Switch Router control board memory components

csconfig

csconfig sets a PCMCIA slot interface on (up) or off (down), and reports general interface and device status. This command is useful for remote management of PCMCIA devices to verify the status of device and slot interface readiness.

flashcmd

This SP Switch Router command mounts the specified flash device, executes a command (such as **write**, **read**, **ls**, **df**) on the device, and then unmounts the device. For example, to use the **df** command to determine device capacity, use **flashcmd df**.

getver

This command tells you the version of the operating system that is currently running. It can also report which release version will be run the next time the system is booted. In this case, **getver** is used in conjunction with **setver**. The **setver** command specifies which release will be run at the next system boot.

grarp

The **grarp** command displays the ARP table for a given IP address. If you specify **grarp** with the IP address of the SP Switch Router Adapter card, it returns a physical address that is the switch node number to which this card connects.

```
# grarp 192.146.162.67
gt030   (0): 192.146.162.67 at 0:0:0:0:0:2
```

In this example, 192.146.162.67 is the IP address of the SP Switch Router Adapter card in slot 3 (interface name gt030), and 0:0:0:0:0:2 is the switch node number. Other **grarp** options edit, add, or remove ARP table entries.

grcard

This command displays slot number, media type, and current operating status of the installed media cards.

```
super> grcard
  0       FDDI_V2         running
  1       FDDI_V2         running
  2       ETHER_V1        running
  3       HSSI_V1         running
  5       HSSI_V1         running
  6       SONET_V1        running
  7       ETHER_V1        running
  8       FDDI_V2         running
  9       ATM_OC3_V2      running
  10      HIPPI_V1        running
  11      HSSI_V1         running
  12      DEV1_V1         running
  13      DEV1_V1         running
  14      ATM_OC12_V2     running
  15      ATM_OC12_V2     running
```

grfins

This command installs a release onto the internal flash device. In the process, it installs all the new files and converts the system configuration files as required. Rebooting moves the image to RAM.

As an example, if a release has a new /etc/gratm.conf file, **grfins** does not write over your current version. Instead, it installs a new version of the /etc/gratm.conf.template file. In this way, you can copy the current configuration information into the new .template file, make any changes, and then save that file as the new /etc/gratm.conf.

grms

This command enables non-privileged users to reboot, halt, or shutdown the SP Switch Router in an orderly manner that precludes damage to the system.

grreset

This command resets one or more specified media cards. Options can direct that memory be dumped when the media card comes back up (**grreset -D**) or that the media card be held in reset (**grreset -h**).

grrmb

This command enables you to use the **maint** command set to display media card statistics. **maint** commands require the GR ##> screen prompt which is invoked by executing the **grrmb** command.When **grrmb** is entered, the screen prompt changes to:

```
# grrmb
GR ##>
```

where ## is the number of a chassis slot. The default is 66, specifying that the command will act on slot 66, the router control board. The **port** command changes the prompt slot number. Using **grrmb** and the **maint** commands is described in the section "SP Switch Router Adapter card maint commands" on page 3-15.

grroute

This command adds the routes specified in the /etc/grroute.conf configuration file. This file maintains the set of static routes to remote nodes. If you are running GateD, do not use **grroute**, you must use the GateD Static statement to create static routes.

grrt

The **grrt -p** *slot* **-S** command displays the route table for an individual media card. Other options delete table entries, display the route to a specified address, and so on.

grsite

This command enables a site to manage and install special files after the main release is loaded into RAM. A special file could be a single binary image for a type of media card to be used for debug or testing, for example, an experimental version of the FDDI run-time file /var/portcards/fddi.run. **grsite** has options to add, delete, or list files in the current release, the next boot release, or an arbitrary release set.

grsnapshot

This command runs a script that can be specified to copy configuration files (or release images) to a target flash device under a new or the current version name. For example, **grsnapshot** can

be set up to initialize an external (PCMCIA) flash device, copy the entire contents of the internal flash device to it, and rename the image as a backup.

grstat

The **grstat** command options report layer 3 (IP and ICMP) forwarding statistics for the SP Switch Router Adapter card and all other media card types excpt HIPPI. Error reporting includes the saved source and destination IP addresses of the packet that caused the last error of each type reported.

The **grstat l2** command reports many of the Layer 2 (data link layer) statistics currently reported by individual media card **maint** commands for SP Switch Router Adapter, ATM OC-3c, HSSI, Ethernet, and SONET OC-3c cards. Examples are included in "Obtaining layer 2 and 3 statistics - grstat" on page 3-12.

grwrite

The **grwrite** command is crucial on the SP Switch Router because it saves configuration changes made in the /etc directory to a flash device so the changes survive the boot-up process. By default, **grwrite** saves a copy of those files with a newer time stamp than the last boot.

mountf

This command mounts an external device so that the device looks like a file system to the operating system. Mounting an external device enables various processes to be applied to the device. A device is mounted as read only (default) or writable. **mountf** verifies (**fsck**) the device before doing the mount. When a media card panics, **mountf** works with **grdump** to write a panic dump out to an external storage device in a PCMCIA slot. See also **umountf**.

setver

This command specifies the software version that will load during the next system reboot. The general form of the command is setver *release_name*. When **setver** executes, it verifies that the specified *release_name* can actually be loaded by checking to see that the appropriate release files, start-up scripts, and configuration entities are in place. You see a message if these release components are incomplete. See also **getver**.

umountf

This command unmounts a flash device previously mounted by the **mountf** command. See also **mountf**.

vpurge

This command removes a specified release or configuration version from a specified flash device.

SP Switch Router UNIX tools

Determining that TCP/IP routing is configured properly between the SP system and the SP Switch Router is another task for a system administrator. This section details some commands that can be useful in performing this task. For more information on managing the SP Switch Router network data, please see the sections of the *IBM PSSP Administration Guide* that deal with managing extension nodes.

ping

This standard tool generates and receives ICMP/IP echo request and reply messages. It is used to test connectivity to a specific interface or to a host such as the SP. The version running on the SP Switch Router is modified for use with media card protocols.

The most common use of **ping** is to use it from an SP standard node to determine if you have a path to your SP Switch Router Adapter on the SP Switch network. This is necessary if you are to reach or be reached by external networks that the SP Switch Router can access. From an SP standard node, you can **ping** the IP address for the SP dependent node that corresponds to the SP Switch Router Adapter. This IP address can be obtained by using the **host** command if you have domain host name resolution configured in your network. If not, then this address is the address associated with the switch network for that node, and not the address that would be associated with the administrative network for nodes in your SP.

The following example shows how you might use **host** and **ping** to verify your path to the SP Switch Router Adapter on an SP node named sp_n3. The SP dependent node in the same SP system is sp_sn2.

```
[sp_n3][/]> host sp_sn2
sp_sn2.ppd.pok.ibm.com is 129.40.85.130
[sp_n3][/]> ping 129.40.85.130
PING 129.40.85.130: (129.40.85.130): 56 data bytes
64 bytes from 129.40.85.130: icmp_seq=0 ttl=255 time=0 ms
64 bytes from 129.40.85.130: icmp_seq=1 ttl=255 time=0 ms
64 bytes from 129.40.85.130: icmp_seq=2 ttl=255 time=0 ms
 ----129.40.85.130 PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0/0/0 ms
[sp_n3][/]>
```

In this example, note the difference between sp_nX host names that refer to the Ethernet IP address of a node, and the sp_snX host names that refer to the switch network IP address of a node.

Refer to the *GRF Reference Guide* for other **ping** examples.

route

Static routing can be configured by using either the UNIX **route** command or the SP Switch Router **grroute** command. Routing is the primary function of a router that allows IP traffic from one network to reach another network. The SP Switch Router and the SP Switch Router Adapter card support both static and dynamic IP routing.

The UNIX **route** command can be used to manually add or delete routes. When **route** is used, no media card or system reset is needed to install the new routes, the new routes are updated in the kernel and downloaded into each media card automatically.

The SP Switch Router **grrt** command can also be used to examine the routing table on a specific media card but it is not recommended for routing table configuration because it does not ensure that routing tables are synchronized among the various media cards.

Static routes can also be set by editing the `/etc/grroute.conf` configuration file. Changes made via this configuration file do not take effect until the affected media card is reset or the SP Switch Router system is reset.

IP dynamic routing can be configured by editing the `/etc/gated.conf` configuration file and running the **gated** daemon in the SP Switch Router. GateD implements complex routing protocols. Please refer to the *GRF Reference Guide* and the *GRF Configuration Guide* for information about using GateD on the SP Switch Router.

Note: If you plan to run GateD, set up your static routes in `/etc/gated.conf` by using the Static statement. If you add routes using the **route** command when GateD is active, those routes are not maintained and are removed by GateD.

grroute.conf file

Route tables can also be set by editing the `/etc/grroute.conf` configuration file. Changes made via this configuration file do not take effect until the affected media card is reset. Information in `grroute.conf` is eventually turned into **route** commands.

tcpdump

This standard UNIX media examination tool is modified for use with media card protocols. **tcpdump** prints out all packet headers or a specified type of header transmitting on the target network. Note that **tcpdump** can interfere with network operations and performance.

tcpdump works on the router's Ethernet LAN interface located on the SP Switch Router control board (`de0`), and the router's communications bus (`rmb0`). The TCP Dump utility also functions on the SP Switch Router Adapter card.

To collect packet headers from an SP Switch Router Adapter card in slot 6, enter:

```
# tcpdump -i gt060
```

traceroute

This standard UNIX command prints the route that packets likely take to a destination network host. **traceroute** uses the ICMP/IP parameters time-to-live and time-exceeded to trace a route between two IP entities.

You can use the **traceroute** command to determine if packets from an SP node are actually being routed through the SP Switch Router to get to the target destination address.

Using the netstat command

The UNIX **netstat** command reports status and information about SP Switch Router media card physical interfaces. **netstat** is available from the CLI and the UNIX shell.

– **netstat -r -s** prints routing statistics

– **netstat -i -n** shows all configured interfaces

– **netstat -a -n** prints a list of all active connections

– **netstat -g -n** prints the multicast route table

– **netstat -r -n** prints the current table of installed routes

In the output from **netstat -r -n**, the => symbol next to a route means it is a duplicate key, but with a different netmask.

– **netstat -rn | wc -l** returns the number of entries in the routing table, here is an example of a 50-entry table:

```
# netstat  -rn | wc -l
     50
```

– **netstat -s** prints comprehensive statistics for protocols, including: IP, ICMP, TCP, and UDP, and GRIT, GRIEF, and GRID for SP Switch Router entities.

Refer to the man page for a complete list of **netstat** options. Examples of **netstat** usage follow.

netstat -rn

Use this **netstat** command to determine that the SP Switch Router Adapter card has the correct routing table entries. You must have properly configured routing table entries so that TCP/IP packets can be routed to and from the SP system to the SP Switch Router Adapter card. Use **netstat** with the **-rn** options to view the card's current routing table entries:

```
# netstat -rn
Routing tables
Internet:
Destination        Gateway          Flags    Refs     Use   Interface
default            129.40.85.126    UGS        3    19356   tn0
127.0.0.1          127.0.0.1        UH         0       19   lo0
129.40.85.64/26    link#1           UC         0        0   tn0
129.40.85.121      0:c0:f2:0:26:8a  UHL        4      490   lo0
129.40.85.126      0:0:a2:1:ff:e8   UHL        1        2   tn0
129.40.85.128/26   129.40.85.130    U          0        0   gt020
129.40.158.128/26  129.40.158.139   U          0    88652   gt030
129.40.192.128/26  129.40.192.139   U          0       34   gt060
224/8              link#1           UC         0        0   tn0
```

In the **netstat -rn** output, you will see the routing entries for the various SP Switch Router Adapters installed in the SP Switch Router. In the example above there are three. These are identified by their Interface names having the form gt0y0 where y is the number of the chassis slot in which a specific SP Switch Router Adapter is installed. For more information on the logical interface naming convention, refer to Chapter 2.

Each Interface in the **netstat -rn** output should correspond to at least one route that specifies the reachable network in the Destination column. The TCP/IP address of the SP

dependent node for this SP Switch Router Adapter will be specified in the `Gateway` column. This is the address to which packets for the destination network will be sent when they enter the SP Switch Router from external networks or from other SP Switch Router Adapter networks. This is how you display the route paths that have been built for packets destined for or sent from the SP system.

netstat -rs

Using both the **-r** and **-s** options, **netstat** prints routing statistics:

```
% netstat -rs

routing:
        0 bad routing redirects
        0 dynamically created routes
        0 new gateways due to redirects
        44 destinations found unreachable
        0 uses of a wildcard route
```

netstat -in

Here is an example of output from **netstat -in** with interface information. Interface `gt020` is the SP Switch Router Adapter card from slot 2:

```
# netstat -in
```

Name	Mtu	Network	Address	Ipkts	Ierrs	Opkts	Oerrs	Coll
de0	1500	<link1>	00:c0:80:0b:30:53	492665	0	8099	0	2584
de0	1500	198.174.11	198.174.11.249	492665	0	8099	0	2584
rmb0	596	<link2>	00:00:00:00:00:00	130022	0	129726	0	0
rmb0	596	<GRIT>	0:0x40:0	130022	0	129726	0	0
lo0	1536	<link3>		496	0	496	0	0
lo0	1536	<GRIT>	0:0x48:0	496	0	496	0	0
gl000*	1524	<link4>		0	0	0	0	0
gh010*	65280	<link11>		0	0	0	0	0
gt020	65520	<link5>		0	0	0	0	0
gt020	65520	206.146.162	206.146.162.67	0	0	0	0	0
gf080	4352	<link7>	00:c0:80:00:04:db	0	0	0	0	0
gf080	4352	206.146.162	206.146.162.129	0	0	0	0	0
gf081*	4352	<link8>	00:c0:80:00:04:dc	0	0	0	0	0
gf082*	4352	<link9>	00:c0:80:00:04:dd	0	0	0	0	0
gf083*	4352	<link10>	00:c0:80:00:04:de	0	0	0	0	0
gs0b0*	4352	<link6>		0	0	0	0	0

netstat -an

Here is an excerpt from **netstat -an** showing active connections:

```
# netstat -an
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address        Foreign Address        (state)
tcp      0      0  198.174.11.249.23    198.174.11.38.1073    ESTABLISHED
tcp      0      0  198.174.11.249.199   198.174.11.249.1026   ESTABLISHED
tcp      0      0  198.174.11.249.1026  198.174.11.249.199    ESTABLISHED
tcp      0      0  *.199                    *.*                    LISTEN
tcp      0      0  198.174.11.249.199   198.174.11.249.1024   ESTABLISHED
tcp      0      0  198.174.11.249.1024  198.174.11.249.199    ESTABLISHED
tcp      0      0  *.23                     *.*                    LISTEN
udp      0      0  *.*                      *.*
udp      0      0  *.161                    *.*
udp      0      0  198.174.11.249.1056  198.174.11.239.2049
udp      0      0  198.174.11.249.1054  198.174.11.239.2049
udp      0      0  198.174.11.249.1046  198.174.11.239.2049
udp      0      0  198.174.11.249.1044  198.174.11.239.2049
udp      0      0  *.*                      *.*
Active GRIT connections (including servers)
Proto Recv-Q Send-Q  Local Address        Foreign Address       (state)
grit     0      0  *:25                     *:*
grit     0      0  *:*                      *:*
grit     0      0  *:32                     *:*
grit     0      0  *:*                      *:*
grit     0      0  *:27                     *:*
Active UNIX domain sockets
Address   Type    Recv-Q Send-Q   Inode    Conn      Refs  Nextref Addr
f0d5ff80 dgram      0      0        0    f0793b94      0  f0c4d694
f0cd4500 dgram      0      0        0    f0793b94      0  f0879494
f09eb200 stream     0      0        0        0         0       0
f0c22980 stream     0      0        0        0         0       0
f0dc0f80 stream     0      0        0        0         0       0
f0cd4e00 dgram      0      0        0    f0793b94      0  f0c8a414
f0cd4b00 dgram      0      0        0    f0793b94      0       0
#
```

netstat -s

netstat -s shows the statistics reported for all protocols, this excerpt shows the statistics reported for IP:

```
# netstat -s
ip:
        211338 total packets received
        0 bad header checksums
        0 with size smaller than minimum
        0 with data size < data length
        0 with header length < data size
        0 with data length < header length
        0 with bad options
        0 with incorrect version number
        29285 fragments received
        0 fragments dropped (dup or out of space)
        0 fragments dropped after timeout
        4885 packets reassembled ok
        171636 packets for this host
        2948 packets for unknown/unsupported protocol
        0 packets forwarded
        12295 packets not forwardable
        0 redirects sent
        8049 packets sent from this host
        0 packets sent with fabricated ip header
        0 output packets dropped due to no bufs, etc.
        0 output packets discarded due to no route
        0 output datagrams fragmented
        0 fragments created
        0 datagrams that can't be fragmented
```

Obtaining layer 2 and 3 statistics - grstat

Options

- grid, displays the combus and other messaging statistics.

- ipstat, lists IP statistics.

- ipdrop, lists IPDROP statistics.

- ip, lists IPSTAT and IPDROP statistics.

- icmpin, lists ICMPIN (input) statistics.

- icmpout, lists ICMPOUT (output) statistics.

- icmperr, lists ICMPERR (error) statistics.

- icmp, lists ICMPERR, ICMPIN, and ICMPOUT statistics.

- l2, displays the Layer 2 media I/O statistics:
  grstat l2rx , displays receive side statistics.
  grstat l2tx, displays transmit side statistics.

- switch, displays the switch statistics.

Layer 3 statistics

The **grstat** command reports layer 3 (IP and ICMP) forwarding statistics for SP Switch Router Adapter and all other media card types except HIPPI. Error reporting includes the saved source and destination IP addresses of the packet that caused the last error of each type reported.

List of IP stats

This is a list of all IP statistics returned with **grstat**, the **-a** option returns all entries even when 0 (they are not displayed without **-a**):

```
# grstat -a ip
all cards (17 interfaces found)
  ipstat totals
       count description
       13751 total packets received
           1 packets dropped
        2665 packets forwarded normally
           0 packets redirected out receiving interface
           0 packets fragmented
           0 fragments created
           0 packets forwarded locally to card
           0 packets handled by the card
       11085 packets forwarded to the RMS
           0 packets segmented to the RMS
        7593 multicast packets received
```

```
                       0 multicast packets attempted to route
                    7593 multicast packets sent to RMS
                       0 multicast packets received on rincorrect interface
                       0 multicast packets for forwarding
                       0 multicast packets (copies) transmitted
                       0 packets ATMP encapsulated
                       0 packets ATMP decapsulated
                       0 packets forwarded to resolved bridge destinations
                       0 packets ATMP encapsulated with pre-fragmentation
                       0 packets ATMP encapsulated with pre-fragmentation and
                                    mtu-limit override
                    0 packets ATMP encapsulated with pre-fragmentation,
                          clearing DF
            ipdrop totals
                    count description
                       1 packet received on down interface
                       0 received data below IP header minimum
                       0 not version 4 IP
                       0 header length below minimum
                       0 bad header checksum
                       0 header length longer than packet length
                       0 received data less than packet length
                       0 source address from 127.*.*.*
                       0 source address from 192.0.2.*
                       0 packet filtered on input from media
                       0 no route to destination address
                       0 destination interface is down
                       0 TTL expired
                       0 needed to frag packet but DF set
                       0 multicast routing not yet supported
                       0 routing to bridge groups not supported
                       0 route table says to drop dest address
                       0 unknown special processing code
                       0 IP option with length <= 0
                       0 IP option length past header length
                       0 Record Route offset less than minimum
                       0 couln't find interface address for dest
                       0 TimeStamp offset less than minimum
                       0 bad TimeStamp option flag
                       0 TimeStamp option overflow beyond maximum
                       0 Source Route offset less than minimum
                       0 next Strict Source Route address not ours
                       0 bad ICMP checksum
                       0 local interface is down for ICMP ECHO
                       0 no route back for reply to ICMP ECHO
                       0 no next route for Strict Source Route
                       0 no next route for Loose Source Route
                       0 no interface addr for Source Route
                       0 can't forward link-layer broadcast
                       0 can't forward link-layer multicast
                       0 loose source routing disabled
                       0 strict source routing disabled
                       0 no buffer to generate packet
                       0 Rate overflow on ICMP generation
                       0 packet filtered into-me
                       0 ATMP err: can't find Home Network entry
                       0 ATMP err: bad GRE header
```

```
0 ATMP err: can't find mobile node entry
0 ATMP err: Invalid IP header
0 multicast replicated, original dropped
0 multicast TTL expired
0 multicast packet on wrong interface
0 can't forward to/through control board
```

Layer 2 statistics

The **grstat** command reports many of the Layer 2 (data link layer) statistics currently reported by individual media card **maint** commands. Layer 2 statistics are reported for SP Switch Router Adapter, ATM OC-3c (ATM/Q), HSSI, Ethernet, and SONET OC-3c media cards.

List of layer 2 stats

The **grstat** command has options to return layer 2 data per interface or per media card.

```
# grstat -a l2 gt000
gt000
  Layer 2 statistics
    physical port 0
              count description
           297233 RX packets
        107210916 RX bytes
                0 RX errors
                0 RX discard
             9847 TX packets
           708984 TX bytes
                0 FIFO full
                0 Line down
```

Please refer to the *GRF Reference Guide* for a description of **grstat** options and uses.

SP Switch Router Adapter card maint commands

Each type of media card has a set of maintenance or **maint** commands. Some of the commands operate on most types of media cards, others are media-specific.

A small set of the **maint** commands provide card-specific status information. The majority of **maint** commands are useful only to system developers. You can use the **maint** commands listed below at any time, they do not interrupt or affect media card operations.

Several **maint** commands that return useful feedback on card status useful to administrators and support staff are:

– **maint 3**, Display Configuration and Status

– **maint 4**, Display Media Statistics

– **maint 5**, Display SWITCH Statistics

– **maint 6**, Display Combus Statistics

– **maint 189** displays the ARP table for the specified interface's IP address

The SP Switch Router Adapter card has two processors, one on the receive side, one on the transmit side. One set of **maint** commands returns developer-level information and information specific to the receive side. A small set of **maint** commands returns developer-level information specific to the transmit side. Commands 81–89 are reserved because certain of their effects upon the card can be destructive.

You must start the **grrmb** program before you can enter a **maint** command.

Preparing to use maint commands

First, start the **grrmb** program to invoke the GR 66> prompt. From the UNIX shell enter:

```
# grrmb
```

The new prompt appears:

```
GR 66>
```

Use the **port** command to change the prompt number to the slot occupied by the SP Switch Router Adapter media card. For example, if the card is in slot 7, enter:

```
GR 66> port 7
```

This message is returned along with the changed prompt:

```
Current port card is 07
GR 07>
```

To exit the **grrmb** program, enter **quit**:

```
GR 07> quit
#
```

Sample maint commands

The next pages show examples of **maint** commands you may find useful.

Find hardware and software version numbers - maint 2

The **maint 2** command returns the system software version and the card's receive side (rx) binary version:

```
GR 0> maint 2
[RX]
[RX]            DEV1 Port Card Hardware and Software Revisions:
[RX]            ===============================================
[RX]
[RX] HW:
[RX]     Power-On Self-Test (POST) result code: 0x0.
[RX]     DEV1 Media Board HW Rev: 0x6, with 4M Sram.
[RX]     DEV1 Xilinx Version: 0x0.
[RX]     SDC Board HW Rev: 0x9  (SDC2).
[RX]             SDC2 Combus Xilinx version: 0x6.
[RX]             SDC2 Switch Transmit Xilinx version: 0x5.
[RX]             SDC2 Switch Receive Xilinx version: 0x8.
[RX] SW:
[RX]     DEV1 Code Version: A1_4_20,Compiled Mon Aug 30 15:20:26 CDT
[RX]     1999,in directory: /nit/A1_4_20/dev1/rx.
[RX]     IF Library Version: 1.1.0.0, Compiled on Mon Aug 30
[RX]     15:16:07 CDT 1999.
```

Find transmit (tx) binary version - maint 102

The **maint 102** command returns the card's transmit side (tx) binary version:

```
GR 0> maint 102
[TX]
[TX]     Code Version: A1_4_20
[TX]     Compiled in: /nit/A1_4_20/dev1/tx,
[TX]             on: Mon Aug 30 15:21:35 CDT 1999.
```

Display configuration and status - maint 3

Use **maint 3** to display internal SP Switch Router Adapter card configuration parameters. All of the reported values relate to the SP Switch Router Adapter card, they do not reflect the SP Switch.

```
GR 07> maint 3
[RX] Configuration Parameters:
[RX]     Slot Number..........: 7
[RX]     Node Number..........: 9
[RX]     Node Name............: 07
[RX]     SW Token.............: 0001000600
[RX]     Arp Enabled..........: 1
[RX]     SW Node Number.......: 2
[RX]     IP...................: 0xce92a243
[RX]     IP Mask..............: 0xffffffc0
[RX]     Alias IP.............: 0x0
[RX]     Max Link Size........: 1024
```

```
[RX]      Host Offset..........: 1
[RX]      Config State.........: 1
[RX]      System Name..........: giga_SP
[RX]      Node State...........: 2
[RX]      Switch Chip Link.....: 0
[RX]      Transmit Delay.......: 31
```

maint 4 - display media statistics

Use **maint 4** to return a set of data transfer statistics for the input and output ports (ignore the report for port 1):

```
GR 07> maint 4
[RX]                     Media Statistics
[RX] input:
[RX] Port    Bytes              Packets           Errors     Discards
[RX]
      ----------------------------------------------------------------
[RX]  0 00000000055233360 0000000000000843 0000000002 0000000002
[RX]  1 00000000000000000 0000000000000000 0000000000 0000000000
[RX]
[RX] output:
[RX] Port       Bytes              Packets          Discards
[RX] ------------------------------------------------------
[RX]  0 00000000000339524640 00000000000000005182 0000000000
[RX]  1 00000000000000000000 00000000000000000000 0000000000
[RX]
[RX] Port 0:
[RX]    Odd Length TX Packets: 0
[RX]    TX Dropped Fifo Full:  0
[RX]    TX Dropped Line Down:  0
[RX] Port 1:
[RX]    Odd Length TX Packets: 0
[RX]    TX Dropped Fifo Full:  0
[RX]    TX Dropped Line Down:  0
```

maint 5 - display switch statistics

This command provides you with information about data transfers between the SP Switch Router's internal switch and the SP Switch Router Adapter card. Enter: **maint 5**

```
GR 07> maint 5
[RX]                     Switch Statistics
[RX] input:
[RX]        Bytes              Packets           Errors
[RX] --------------------------------------------------------
[RX]  00000000000000000    00000000000000000    000000000
[RX]
[RX] output:
[RX]        Bytes              Packets           Errors
[RX] --------------------------------------------------------
[RX]  00000000000000000    00000000000000000    000000000
[RX]
[RX] Switch Transmit Data Errors:            0
[RX] Switch Transmit Fifo Parity Errors:     0
[RX] Switch Transmit Internal Parity Errors: 0
```

```
[RX] Switch Transmit Connection Rejects:      0
[RX] Switch Receive Encoding Errors:          0
[RX] Switch Receive Running Disparity Errors: 0
[RX] Switch Receive Receiver Errors:          0
[RX] Switch Receive Running Checksum Errors:  0
[RX] dont-free packets: 0
[RX] fifo-full packets: 0
```

maint 6 - display combus statistics

To look at information about the exchanges between the system software and the SP Switch Router Adapter card, enter **maint 6** for the receive side and **maint 106** for the transmit side.

```
GR 07> maint 6
[RX] Combus Status:
[RX]     Last interrupt status:            0x50502055
[RX] Combus Statistics:
[RX]     Message ready interrupts:         16153
[RX]     Truncated input messages:             0
[RX]     Grit messages for TX-CPU:           155
[RX]     Ip messages Rcvd (non-bypass):        0
[RX]     Raw messages:                         0
[RX]     ISO messages:                         0
[RX]     Grid messages:                    15998
[RX]     Grid echo requests:               15865
[RX]     Port available messages:              0
[RX]     Segmented Packets:                    0
[RX]     Segments Sent:                        0
[RX] Combus Errors:
[RX]     Bus in timeouts:       0    Bus out timeouts:       0
[RX]     Out of buffer cond.:   0    Bad packet type:        0
[RX]     Dropped IP packets:    0    Bad packet dest:        0
[RX]     Receive Msg Errors:    0    Receive Format Errors:  0
[RX]     Receive Past End:      0    Received Long Message:  0
```

Filtering commands - maint 50-58, 150-58

Odd-numbered commands 51–55 return information based on filter ID. Even-numbered commands 50–54 return information based on interface number. These are parameters added to some filter commands:

– `detail_level` is an optional parameter that specifies how much information is returned, useful levels are 0 and 1.

– `IF` is an optional parameter that specifies the interface number.

– `ID` is an optional parameter that specifies the filter ID randomly assigned by **filterd**.

```
[RX]  50:    Filtering filter list: [detail_level [ID]]
[RX]  51:    Filtering filter list: [detail_level [IF]]
[RX]  52:    Filtering action list: [detail_level [ID]]
[RX]  53:    Filtering action list: [detail_level [IF]]
[RX]  54:    Filtering binding list: [detail_level [ID]]
[RX]  55:    Filtering binding list: [detail_level [IF]]
[RX]  56:    Display filtering statistics: [IF#]
[RX]  57:    Reset filtering statistics: [IF#]
[RX]  58:    Show filter protocol statistics
```

```
[RX]            note, IF/ID may be '-1' to indicate all of the given
[RX]             item while detail level is 0|1|2.
```

Please refer to the "IP Packet Filtering" chapter in the *GRF Configuration and Management* manual for a full discussion of the filtering command set. A few examples are shown here.

List the filters per media card - maint 50

The filters are listed per interface:
```
GR 0> maint 50 gt000
[RX]
[RX]   filterID     type    status   access
[RX]   00000022   ctable (loaded)    0002
```

You need the **grfutil** command to decipher the filterID value and get the filter name:

```
# grfutil -f 22
  filterID  temp  BPF SPARC SSPARC C30 CTABLE fname
  00000022   No  Yes    No     No  No    Yes mail_server_allow
```

You see a message if no filters are found:

```
GR 0> maint 50
[RX]
[RX] No filters found.
```

List where filters are assigned - maint 54

This command shows which logical interface numbers (`vlif`) have filter "ID 22" assigned:

```
GR 00> maint 54 22
[RX] vlif    BindID       state  location  filterID  action_cnt
[RX] 0000 00000040     FastOp     IPin      22          1
[RX] 0000 00000041     FastOp     IPout     22          1
[RX] 0001 00000042     FastOp     IPin      22          1
[RX] 0001 00000043     FastOp     IPout     22          1
```

Configure UDP packet discards - maint 89 7

The **maint 89 7** command provides a way to drop certain packets such as HATS traffic that are known to be unnecessary. Minimizing unnecessary traffic to the SP Switch Router management system frees the router's communication bus for other internal messaging.

A site uses the command to specify that all UDP packets bound for a specified port are discarded. After the specified UDP port number is entered via **maint 89 7** *port_number*, all UDP messages with source and destination ports set to *port_number* are discarded.

This example discards HATS packets and shows how to specify the target UDP port of 10000 on the SP Switch Router Adapter card in slot 13. The "port set" message confirms the setting:

```
# grrmb
GR 1> port 13
  Current port is 13.
GR 13>
GR 13> maint 89 7 10000
```

```
[RX]
[RX] SP HATS UDP port set to: 10000
```

Use **maint 89 8** to view the current port number setting and number of messages discarded:

```
GR 13> maint 89 8
[RX] SP HATS UDP port number: 10000
[RX] SP HATS (RMS) discards: 654
```

To disable UDP discards, set the port number to an unused number (the range is 0 to 65535):

```
GR 13> maint 89 7 65533
[RX] SP HATS UDP port set to: 65533
```

If you enter an out-of-range port number, here is the response:

```
GR 13> maint 89 7 101010
[RX] Illegal port number (0 << port# << 65535
```

Display ARP table - maint 189 1

The **maint 189 1** command returns the current ARP entries. IP= is the address for the node, SW-node= is a physical address assigned to an SP switch node, and state=3 means the node is active.

```
GR 0> maint 189 1
[TX]
[TX] ARP Entry: IP= 192.168.178.202, SW-node=5, state=3
[TX] ARP Entry: IP= 192.168.178.203, SW-node=6, state=3
[TX] ARP Entry: IP= 192.168.178.204, SW-node=7, state=3
[TX] ARP Entry: IP= 192.168.178.205, SW-node=1, state=3
[TX] ARP Entry: IP= 192.168.178.206, SW-node=2, state=3
[TX] ARP Entry: IP= 192.168.178.207, SW-node=3, state=3
[TX] ARP Entry: IP= 192.168.178.208, SW-node=4, state=3
```

Note:
The SW-node= is the same as the Node_ID: parameter in **maint 189 2** data.

Flush the ARP cache - maint 189 10

This command removes all ARP entries:

```
GR 0> maint 189 10
[TX]
[TX] Flush ARP Entry: IP= 192.168.178.202, SW-node=5, state=3
[TX] Flush ARP Entry: IP= 192.168.178.203, SW-node=6, state=3
[TX] Flush ARP Entry: IP= 192.168.178.204, SW-node=7, state=3
[TX] Flush ARP Entry: IP= 192.168.178.205, SW-node=1, state=3
[TX] Flush ARP Entry: IP= 192.168.178.206, SW-node=2, state=3
[TX] Flush ARP Entry: IP= 192.168.178.207, SW-node=3, state=3
[TX] Flush ARP Entry: IP= 192.168.178.208, SW-node=4, state=3
[TX] Flush ARP cache complete
```

Display switch route table - maint 189 2

The SP Switch sends the SP Switch Router Adapter card routes for the active nodes. The SP Switch Router Adapter card receives these routes and appends the hex addresses to packets going to the target node on the SP Switch (identified by Node_ID.

```
GR 0> maint 189 2
[TX]    Switch Route Table:
[TX] Node_ID: 0, Loopback Routes
[TX]    Route-1: [0x80000000, 0x1], Route-2: [0x80000000, 0x1]
[TX]    Route-3: [0x80000000, 0x1], Route-4: [0x80000000, 0x1]
[TX] Node_ID: 1
[TX]    Route-1: [0x8a000000, 0x1], Route-2: [0x8a000000, 0x1]
[TX]    Route-3: [0x8a000000, 0x1], Route-4: [0x8a000000, 0x1]
[TX] Node_ID: 2
[TX]    Route-1: [0x46800000, 0x2], Route-2: [0x5e800000, 0x2]
[TX]    Route-3: [0x6e800000, 0x2], Route-4: [0x76800000, 0x2]
[TX] Node_ID: 3
[TX]    Route-1: [0x46890000, 0x2], Route-2: [0x5e890000, 0x2]
[TX]    Route-3: [0x6e890000, 0x2], Route-4: [0x76890000, 0x2]
[TX] Node_ID: 4
[TX]    Route-1: [0x89000000, 0x1], Route-2: [0x89000000, 0x1]
[TX]    Route-3: [0x89000000, 0x1], Route-4: [0x89000000, 0x1]
[TX] Node_ID: 5
[TX]    Route-1: [0x80000000, 0x1], Route-2: [0x80000000, 0x1]
[TX]    Route-3: [0x80000000, 0x1], Route-4: [0x80000000, 0x1]
[TX] Node_ID: 6
[TX]    Route-1: [0x468a0000, 0x2], Route-2: [0x5e8a0000, 0x2]
[TX]    Route-3: [0x6e8a0000, 0x2], Route-4: [0x768a0000, 0x2]
[TX] Node_ID: 7
[TX]    Route-1: [0x46830000, 0x2], Route-2: [0x5e830000, 0x2]
[TX]    Route-3: [0x6e830000, 0x2], Route-4: [0x76830000, 0x2]
```

Note: The Node_ID: is the same as the SW-node= parameter in **maint 189 1** and **10** data.

If switch route table addresses do not match the SP Switch Router Adapter card entries, the `gr.console` log displays a series of "Switch route not found" messages.

"Switch route not found"

The message is sent during ARP processing when a searched-for entry is not found in the switch route table. The table mismatch is due either to a configuration error or to corrupted packets coming from the the SP Switch. Here is an example of the message:

```
Switch route not found, node=33386
```

The node= value is the SP Switch node number in decimal. If the node= value is low, the cause is probably a configuration error. With ARP mode set to 0, the card's ARP table does not have a switch route from the switch to match the destination IP address/netmask for an ARP to be created. The message also appears when the SP Switch Router Adapter media card receives an ARP from the switch, but the hardware address in the ARP packet does not match any switch routes in the switch route table. In either case, the message means the switch route table that the SP Switch Router Adapter card receives from the SP Switch is not matching up with addresses that are attempting to flow through the media card.

If the node= value is high, as in the example, it is likely due to corrupted packets coming from the SP Switch.

Checking for hardware problems - grdiag

This section describes the diagnostic capability provided by the **grdiag** command. Users can run a set of internal BIST-level diagnostics to verify media card (including SP Switch Router Adapter card) hardware. A card that fails this set of diagnostics must be replaced. HIPPI media cards do not support the **grdiag** command.

The **grdiag** script puts the selected media card(s) into diagnostic mode and runs the diagnostics. After the diagnostics complete, **grdiag** reloads the media card's software and configuration currently saved in flash memory, then reboots the card. For this reason, it is very important that you save any configuration changes before you run **grdiag**. Unsaved media card changes will be lost. These diagnostics affect the operation of only the target card or cards.

You can run diagnostics on all the chassis cards at the same time. The length of time needed for the diagnostic to run depends on the type of media card and how many cards are being tested at one time.

What is tested

grdiag is intended to help users determine whether hardware is causing a problem that is being seen. These diagnostics do not determine which type of hardware failure occurred. The diagnostics report no error information, only pass-fail results.

The diagnostics verify the following media card and slot functions:

- – all memory
- – all media hardware logic (media card)
- – all serial hardware logic (serial daughter card)
- – the connection between the slot and the switch
- – the connection between the slot and the communications bus
- – the connection between the slot and power delivery

The diagnostics do not exercise the physical interfaces or transceivers. Generally, you can expect to test 95% of the media card.

Where to find the user guide

The "Management Command and Tools" chapter in the *GRF Configuration and Management* manual contains a complete usage guide and examples for using grdiag.

Stopping or halting grdiag

You can use Control-C to stop the diagnostic sequence at any time. After you enter Control-C, **grdiag** reloads the card's run-time binary and last-saved configuration, and then reboots the card.

When a media card does not boot after grdiag

For **grdiag** to run, a card must be able to boot. If the **grcard** display does not include the slot in which the problem card resides, **grdiag** cannot operate on that card.

For example, **grdiag** cannot run diagnostics on the card in slot 1 of this router:

```
# grcard
 0      ATM_OC3_V2      running
 2      DEV1_V1         running
 3      HSSI_V1         running
```

"Switch receive error" can indicate hardware problem

The `Switch Receive Error` means a media card has received a packet from the SP Switch Router backplane switch that contains errors. Here are examples of such packets sent by the card in slot 3 and received by the Ethernet card in slot 4:

```
Jul 20 02:25:04 grf400.site.com gritd: from 0:0x3:0:
dst=0:0x40:16, src=0:0x3:0, type=GRID:  hwtype=ETHER_V1 cmd=MSGP
'[RX] Switch Recieve Error.  Status: 0xb04\r\n'
                •
                •
                •
Jul 20 02:26:16 grf400.site.com gritd: from 0:0x3:0:
dst=0:0x40:16, src=0:0x3:0, type=GRID:  hwtype=ETHER_V1 cmd=MSGP
'[RX] Switch Recieve Error.  Status: 0xb04\r\n'
```

An occasional occurrence of this error in the `gr.console` log is part of normal operations and can safely be ignored.

However, if clusters of many such errors are reported, it is likely that there is a problem with the switch hardware in either the sending media card or the receiving media card. A card may need to be replaced. If you see the message repeated many times, please contact Customer Service.

SP Switch Router dumps

The SP Switch Router can be configured to send dumps to an external PCMCIA 520MB disk rather than to its own system memory.

On the SP Switch Router, output from dumps, logs, and other system reporting functions refer to the SP Switch Router Adapter card as `DEV1_v1` or `dev1`. Dumps are maintained in the directories `/var/portcards` and `/var/crash`.

Dumps are compressed to save space, and the compressed files are appended with `.gz`. Media card dumps are stored in `/var/portcards` in a file named with the convention
`grdump.n.x.gz`
where `n` is the card slot number and `x` is the number of the saved dump, 1, 2, 3....

Dumps provide specific information useful for monitoring and debugging the SP Switch Router and SP Switch Router Adapter card operations. If you are working with Customer Support, these are dumps they might need to see:

 – `bsdx.core` - a kernel dump resulting from a system reset or panic, sent to `/var/crash` (x is number of the dump, 1, 2, 3...)

 – `grdump.n.x.gz` - a dump resulting from a media card reset or panic, sent to `/var/portcards`

System dumps

If the SP Switch Router is reset or panics, a dump is saved in `/var/crash` under the naming convention `bsdx.core`.

This dump is generally too large to send by e-mail. Customer Support will tell you how to send it to them.

The **grsavecore** command copies and formats information generated from a kernel panic as the data is written to standard output. The formatted data is written to `grsavecore.out` in the `/var/crash` directory.

Media card dumps

The `grdump` program saves and manages media card dumps. As described in Chapter 2, you use the Dump or appropriate Card profile to specify the number of dumps to be saved in addition to the first dump of the day and the most current dump . The default number is two per day for each media card. Dumps are collected from media cards when they panic or when they are reset by the system administrator using the **grreset -D** command.

This dump is generally 4–8MB, and may possibly be e-mailed. Customer Support will tell you how to send it to them.

Use grdinfo to collect logs

With a single command, **grdinfo** collects the files in local `/var/log/*` (including compressed files)and compresses them in a log file. Refer to the **grdinfo** section in this chapter for more information.

Data collection utility - grdinfo

The **grdinfo** utility enables the site to use a single command to collect a comprehensive set of debug and configuration information for the SP Switch Router. **grdinfo** options specify the type of information collected, including logs, dumps, media card statistics, protocol statistics, and control board data. Target data can be obtained at the system level or at the card level.

You can execute **grdinfo** while the SP Switch Router is running although there will be an impact on performance while the information is collected. This is a diagnostic tool. If the media cards are busy forwarding data and are unable to respond to statistics requests, or if not enough disk space is available, you will get an error message reporting the condition. In most cases, **grdinfo** stops and ends.

The **grdinfo** utility is to be used in conjunction with Customer Support staff. Some files **grdinfo** creates are very large. As a result, the collection process can interfere with system operations. Data is saved in compressed TAR files for ease in transfers to Customer Support.

Information specified by the specified option or options is collected and compressed into a `grdinfo.tar.gz` file in the `/var/tmp/grdinfo` directory. One **grdinfo** file is collected at a time. The size of a particular `grdinfo.tar.gz` file will vary widely and can tax system file system resources. The **grdinfo** utility is intended to collect information, not to store it. After you use **grdinfo** to collect the needed information, copy the data to external storage such as a file server, and then clean up the `/var/tmp/grdinfo` directory.

It is suggested that you move the output file off the SP Switch Router for analysis. Do not extract the data out of the `grdinfo.tar.gz` output file while it is on the SP Switch Router.

Note:
This is a brief overview of the **grdinfo** program. The "Management Commands and Tools" chapter of the *GRF Configuration and Management* manual contains complete information. Please use that chapter as a guide for collecting diagnostic information.

Options

Options are:

– **grdinfo -card=*slot* / all**
This command returns configuration and state information for a specific media card or for all installed cards. This includes SP Switch Router Adapter, ATM OC-3c, ATM OC-12c, HSSI, SONET, Ethernet, FDDI, and HIPPI cards.

– **grdinfo -config**
the collection of system configuration data, including Card, System, Dump, and Load profiles, and all `/etc/*.conf` configuration files, including `/etc/gated.conf`.

– **grdinfo -log**
the collection of all log files from the local `/var/log` directory

– **grdinfo -dump**
the collection of all dump files from the local `/var` directory, including media card, utility, and kernel dumps

– **grdinfo -system**
an extensive collection of control board (RMS) data

- **grdinfo -frame**
  the collection of system-wide Frame Relay status, configurations, and statistics

- **grdinfo -bridge**
  the collection of system-wide bridging status, configurations, and statistics

- **grdinfo -dr**
  The dynamic routing option is not available in this release.

- **grdinfo -all**
  collects and combines all the data the other options collect (not recommended)

Caution: The **grdinfo all** command can fill up the file system. It will hang, and you must use Control-C to end the process. Clean up any files that were saved before the abort.

grdinfo collects and compresses the requested information into a `tar.gz` file in the `/var/tmp/grdinfo` directory:

```
grdinfo.tar.gz
```

SP Switch Router example

This example collects card statistics for the SP Switch Router Adapter card in slot 11:

```
# grdinfo -card=11
Output from /usr/nbin/grdinfo is going to file
/var/tmp/grdinfo/grdinfo.tar.gz
# cd /var/tmp/grdinfo/
# ls
grdinfo.tar.gz
# gunzip grdinfo.tar.gz
# ls
grdinfo.tar
# tar xvf grdinfo.tar
/var/tmp/grdinfo/grdinfo.145041.info
/var/tmp/grdinfo/grdinfo.145041.errors
tar: tar vol 1, 2 files, 10240 bytes read.
#
# vi /var/tmp/grdinfo/grdinfo.145041.info
```

Here are the contents of the file saved for the SP Switch Router Adapter card:

```
============================================================
This file contains data collected by grdinfo while running.
============================================================


Not collecting configuration files
Not collecting log files
Not collecting media and kernel dump files
Not collecting system information
Not collecting frame relay information
Not collecting transparent bridging information
Getting maint information from cards : args -> 11

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
Card 11 / DEV1.
```

```
            ============================================================
            Maint 2
            [RX]              DEV1 Port Card Hardware and Software Revisions:
            [RX]              ============================================
            [RX] HW:
            [RX]    Power-On Self-Test (POST) result code: 0x0.
            [RX]    DEV1 Media Board HW Rev: 0x6, with 4M Sram.
            [RX]    DEV1 Xilinx Version: 0x0.
            [RX]    SDC Board HW Rev: 0x9  (SDC2).
            [RX]              SDC2 Combus Xilinx version: 0x6.
            [RX]              SDC2 Switch Transmit Xilinx version: 0x5.
            [RX]              SDC2 Switch Receive Xilinx version: 0x7.
            [RX] SW:
            [RX]  DEV1 Code Version: A1_4_20R, Compiled Tue Oct 20 21:38:06 CDT
            [RX]    1999, in directory: /raid1/cvp/EOI/A1_4_20R/dev1/rx.
            [RX]    IF Library Version: 1.1.0.0, Compiled on Sun Oct 18
            [RX]    19:53:48 CDT 1999.
            ------------------------------------------------------------
            Maint 3
            [RX]
            [RX] Configuration Parameters:
            [RX]    Slot Number..........: 11
            [RX]    Node Number..........: 11
            [RX]    Node Name............: 11
            [RX]    SW Token.............: 0001000601
            [RX]    Arp Enabled..........: 0
            [RX]    SW Node Number.......: 1
            [RX]    IP...................: 0xce010702
            [RX]    IP Mask..............: 0xffffff00
            [RX]    Alias IP.............: 0x0
            [RX]    Max Link Size........: 1024
            [RX]    Host Offset..........: 1
            [RX]    Config State.........: 1
            [RX]    System Name..........: giga_SP
            [RX]    Node State...........: 2
            [RX]    Switch Link Chip.....: 0
            [RX]    Transmit Delay.......: 64
            ------------------------------------------------------------
            Maint 4
            [RX]                 Media Statistics
            [RX] input:
            [RX] Port       Bytes              Packets          Errors   Discards
            [RX]
            --------------------------------------------------------------------
            [RX]  0 0000000000000000 0000000000000000 0000000000 0000000000
            [RX]  1 0000000000000000 0000000000000000 0000000000 0000000000
            [RX]
            [RX] output:
            [RX] Port       Bytes              Packets          Discards
            [RX] -------------------------------------------------------
            [RX]  0 0000000000000000000 0000000000000000000 0000000000
            [RX]  1 0000000000000000000 0000000000000000000 0000000000
            [RX]
            [RX] Port 0:
            [RX]    Odd Length TX Packets: 0
            [RX]    TX Dropped Fifo Full:  0
            [RX]    TX Dropped Line Down:  0
```

```
[RX]    TX Dropped SPD:        0
-------------------------------------------------------------
Maint 5
[RX]                 Switch Statistics
[RX] input:
[RX]        Bytes             Packets          Errors
[RX] -------------------------------------------------------
[RX] 00000000000000000000 00000000000000000000 000000000
[RX]
[RX] output:
[RX]        Bytes             Packets          Errors   Overruns
[RX] ---------------------------------------------------------
[RX] 00000000000000000000 00000000000000000000 000000000 000000000
[RX]
[RX] Switch Transmit Data Errors:          0
[RX] Switch Transmit Fifo Parity Errors:     0
[RX] Switch Transmit Internal Parity Errors:  0
[RX] Switch Transmit Connection Rejects:     0
[RX] Switch Receive Encoding Errors:         0
[RX] Switch Receive Running Disparity Errors: 0
[RX] Switch Receive Receiver Errors:         0
[RX] Switch Receive Running Checksum Errors:  0
-------------------------------------------------------------
Maint 6
[RX]
[RX] Combus Status:
[RX]    Last interrupt status:          0x50503055
[RX] Combus Statistics:
[RX]    Message ready interrupts:           8510
[RX]    Truncated input messages:              0
[RX]    Grit messages for TX-CPU:            258
[RX]    Ip messages Rcvd (non-bypass):         0
[RX]    Raw messages:                          0
[RX]    ISO messages:                          0
[RX]    Grid messages:                      8252
[RX]    Grid echo requests:                 8143
[RX]    Port available messages:               0
[RX]    Segmented Packets:                     0
[RX]    Segments Sent:                         0
[RX] Combus Errors:
-------------------------------------------------------------
Maint 11
[RX] IPC Stats:
[RX] =========
[RX] RX IPC Message Received: 18
[RX] RX IPC Message Sent:     5
[RX] RX Grid Packets Received: 0
[RX] RX Overruns:             0
[RX] RX Local Messages:       0
[RX] TX IPC Message Received: 5
[RX] TX IPC Message Sent:     18
[RX] TX Grid Packets Received: 2
[RX] TX Overruns:             0
[RX] TX Local Messages:       0
-------------------------------------------------------------
Maint 89 1
[RX]
```

```
[RX] # of pullup calls: 0
--------------------------------------------------------------
Maint 89 2
[RX]
[RX] IOSTB3 Card State Machine
[RX]    RX-CPU: CONFIGURED, RX-DMA: RUNNING, RX-TBIC: RUNNING
[RX]    TX-CPU: CONFIGURED, TX-DMA: RUNNING, TX-TBIC: RUNNING
--------------------------------------------------------------
Maint 89 3
[RX]
[RX] # of no-buf TB4 discarded: 0
[RX] # of wrong-state TB4 discarded: 0
--------------------------------------------------------------
Maint 89 4
[RX]
[RX] There are 250 buffers in the FIFO
[RX] 255 254 253 252 251 250 249 248 247 246 245 244 243 242 241 240
[RX] 239 238 237 236 235 234 233 232 231 230 229 228 227 226 225 224
[RX] 221 220 219 218 217 216 215 214 213 212 211 210 209 208 207 206
[RX] 204 203 202 201 200 199 198 197 196 195 194 193 192 191 190 189
[RX] 187 186 185 184 183 182 181 180 179 178 177 176 175 174 173 172
[RX] 170 169 168 167 166 165 164 163 162 161 160 159 158 157 156 155
[RX] 153 152 151 150 149 148 147 146 145 144 143 142 141 140 139 138
[RX] 136 135 134 133 132 131 130 129 128 127 126 125 124 123 122 121
[RX] 119 118 117 116 115 114 113 112 111 110 109 108 107 106 105 104
[RX] 102 101 100  99  98  97  96  95  94  93  92  91  90  89  88  87
[RX]  85  84  83  82  81  80  79  78  77  76  75  74  73  72  71  70
[RX]  68  67  66  65  64  63  62  61  60  59  58  57  56  55  54  53
[RX]  51  50  49  48  47  46  45  44  43  42  41  40  39  38  37  36
[RX]  34  33  32  31  30  29  28  27  26  25  24  23  22  21  20  19
[RX]  17  16  15  14  13  12  11  10   9   8   7   6 ------
[RX] Buffer in use: -1
--------------------------------------------------------------
Maint 189 1
[RX]
000000bd 00000001[TX]
--------------------------------------------------------------
Maint 189 2
[RX]
000000bd 00000002[TX]
[TX]    Switch Route Table:
--------------------------------------------------------------
Maint 189 3
[RX]
000000bd 00000003[TX]
[TX] # nobuf discarded messages: 0
--------------------------------------------------------------
Maint 189 4
[RX]
000000bd 00000004[TX]
[TX] There are 253 buffers in the FIFO
--------------------------------------------------------------
Not collecting dynamic routing information
tarring files with command :/bin/tar cf
/var/tmp/grdinfo/grdinfo.tar /var/tmp/gr
dinfo/grdinfo.145041.info /var/tmp/grdinfo/grdinfo.145041.errors
```

SP Switch Router logs

This section provides examples of logged information for the SP Switch Router and the SP Switch Router Adapter media card.

When so configured, the SP Switch Router logs to a PCMCIA 520MB disk rather than to its own system memory. The procedure to configure the PCMCIA disk is in Chapter 2.

On the SP Switch Router, output from logs and other system reporting functions refer to the SP Switch Router Adapter card as `DEV1_v1` or `dev1`. Logs are maintained in the directory `/var/log`.

Appendix B contains a list of log messages that are sent by the SP Switch Router Adapter card to system logs, usually to the `/var/log/gr.console` file.

Three logs provide specific information useful for monitoring and debugging the SP Switch Router and SP Switch Router Adapter card operations. If you are working with Customer Support, these are the three logs they will need to see:

- — `/var/log/gr.console`

- — `/var/log/messages`

- — `/var/log/gr.boot`

The `/var/log` directory contains other log files that collect low-level information useful primarily to system developers.

The `gr.console` log is the most useful log. It contains status and events for the SP Switch Router system and all media cards, including the SP Switch Router Adapter card. When a media card resets, many events of the resetting are reported, including initializing, loading run-time code, requesting and reading configuration parameters, and so on. At the end, you see a message that indicates the cause of the reset.

The `messages` log contains system-related events connected usually with the management software (also referred to as RMS, Router Management System) and the operating system kernel.

The `gr.boot` log contains events reported during system and media card boot. These can be helpful if a card has problems booting and coming up.

Accessing a log file

Change directories to `/log` and use the **more** command to display the contents of a specific log file. To access the **grconsole** log, use this sequence of commands:

```
# cd /var
# cd log
# more gr.console
```

Sample gr.console log

The `gr.console` log contains messages issued by the media cards and SP Switch Router control board. This includes run-time errors, diagnostic information, and information about the operational status of each media card.

Here is a sample log from the SP Switch Router with host name `tester.site.com`.

```
tester-22  more gr.console
Mar 14 23:16:22 tester gritd: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=DEV1_V1 cmd=MSGP '[TX] \tBroadcasting an Gratuitous ARP Request.. \r\n'
Mar 14 23:26:24 tester gritd: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=DEV1_V1 cmd=MSGP '[TX] \tBroadcasting an Gratuitous ARP Request.. \r\n'
Mar 14 23:36:26 tester gritd: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=DEV1_V1 cmd=MSGP '[TX] \tBroadcasting an Gratuitous ARP Request.. \r\n'
Mar 14 23:46:28 tester gritd: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=DEV1_V1 cmd=MSGP '[TX] \tBroadcasting an Gratuitous ARP Request.. \r\n'
Mar 16 11:27:42 tester syslog: from 0:0xc:0:  dst=0:0x40:16, src=0:0xc:0,
   type=GRID:  hwtype=FDDI cmd=MSGP '  Doing slow check\r\n'
Mar 16 11:28:12 tester syslog: from 0:0xc:0:  dst=0:0x40:16, src=0:0xc:0, type=GRID:
   hwtype=FDDI cmd=MSGP 'IF:0 - Received 0xc4-byte IP packet from fddi.\r\n'
Mar 16 11:28:12 tester syslog: from 0:0xc:0:  dst=0:0x40:16, src=0:0xc:0, type=GRID:
   hwtype=FDDI cmd=MSGP '\tSource IP Addr: 198.174.59.2,
   Dest IP Addr: 198.174 .59.0 . \r\n'
Mar 23 11:15:13 tester syslog: from 0:0x3:0:  dst=0:0x40:16, src=0:0x3:0, type=GRID:
   hwtype=HIPPI cmd=MSGP 'Interface 0:3:0 active.\r\n'
Mar 23 11:18:05 tester syslog: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=HIPPI cmd=MSG 'BOOT ME\n\r'
Mar 23 11:18:13 tester syslog: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
   hwtype=HIPPI cmd=MSGP 'HIPPI boot complete\r\n'
Mar 23 11:18:13 tester syslog: from 0:0x3:0:  dst=0:0x40:16, src=0:0x3:0,
   type=GRID:  hwtype=HIPPI cmd=MSGP 'SRAM size is 4096KB\r\n'
tester-23
```

Figure 3-2. Sample entries in the gr.console log

The `gr.console` message text is preceded by a long preamble. The preamble interprets the protocol header of the print message that came from the media card or router manager board. For example:

```
Jul 30 05:59:33 corebox gritd: from 0:0x2:0:  dst=0:0x40:16,
  src=0:0x2:0, type=GRID:  hwtype=HSSI_V1 cmd=MSGP
  '[RX] Combus_skip: 152 words skipped\r\n'
```

Breaking this down:

`Jul 30 05:59:33`	- Date/time stamp
`corebox gritd:`	- Host name and internal source
`from 0:0x2:0:`	- media card address (in GRIT format) , this is gs020

Protocol header information:

`dst=0:0x40:16`	- destination address
`src=0:0x2:0`	- source address
`type=GRID:`	- internal protocol type
`hwtype=HSSI_V1`	- board hardware type

```
          cmd=MSGP              - command code (MSGP is a print message)
          '[RX] Combus_skip: 152 words skipped\r\n'  - Message text
```

The host name indicates which SP Switch Router is logging the message.The media card address consists of the chassis number (always zero), the slot number, and the interface number (both in hex). The `protocol header` fields can be ignored, except that the `hwtype` field indicates whether the control board or a media card is issuing the message. The `cmd=MSGP` indicates this is a `printf` to the console, and the `printf` text follows it in single quotes. The log interprets control characters in C-language convention (e.g. \r\n for CR/LF).

Sample gr.boot log

When a media card boots, information about its boot status is written to `gr.boot`. Lines at Mar 24 show the release of a boot image for the `dev1` and other media card receive and transmit ports. Here is a sample `gr.boot` log from the SP Switch Router with host name `tester.site.com`.

```
tester-26 more gr.boot
Mar 23 11:08:38 tester grboot[27388]: Starting up (after openlog)...
Mar 23 11:08:38 tester grboot[27389]: read packet from 0:0x3:0 (cmd=BOOTME)
Mar 23 11:08:38 tester grboot[27389]: grinch dump config (2.12.2.4.7.2.3.3=0x14)
Mar 23 11:08:38 tester grboot[27389]: grinch card death state (2.12.2.4.5.4=0x2)
Mar 23 11:08:38 tester grboot[27389]: sending ACK|BOOTME to 0:0x3:0
Mar 23 11:08:38 tester grboot[27389]: past switch(grid->grid_cmd)
Mar 23 11:08:38 tester grboot[27389]: past receive(); exiting main()
Mar 23 11:08:39 tester grboot[27390]: Starting up (after openlog)...
Mar 23 11:08:39 tester grboot[27391]: read packet from 0:0x3:0 (cmd=LOAD)
Mar 23 11:08:39 tester grboot[27391]: exec /usr/nbin/grload.sh -h HIPPI -p 0:0x3:0 -s 0
Mar 23 11:08:40 tester log2[27398]: grload exec /usr/nbin/grload -p 0:0x3:0 - s 0 -i 3
Mar 24 10:10:24 tester grbootd[208]: boot image ager scheduled for 60s
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /hippi.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /runload.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /hssi_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /dev1_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/ portcards
     /dev1_rx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /hssi_rx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /fddi.run (age6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards
     /xlxload.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: 1 boot images resident (1 max)
```

Figure 3-3. Sample entries in the gr.boot log

Sample messages log

The messages log is the general operating system log. It contains boot or deadstart commentary, system-level warnings, and error messages.

In the excerpt below, the third line from the top shows the SP Switch Router Adapter card, DEV1, being configured with its interface name, gt020.

This is a sample messages log from the SP Switch Router with host name tester.site.com.

```
tester-6 more messages
Feb 10 03:30:17 tester grinchd[122]: sendto: No buffer space available
Feb 10 10:49:57 tester kernel: de0: framing error
Feb 10 10:04:52 tester kernel: gt020: creating interface: GigaRouter DEV1, GRIT
address 0:7:0
Feb 10 10:04:58 tester kernel: gs0b0:creating interface: GigaRouter HSSI, GRIT
address 0:0xb:0
Feb 10 10:04:59 tester kernel: gf080: creating interface: GigaRouter FDDI, GRIT
address 0:8:0
Feb 10 10:04:59 tester kernel: gf081: creating interface: GigaRouter FDDI, GRIT
address 0:8:1
Feb 10 10:04:59 tester kernel: gf082: creating interface: GigaRouter FDDI, GRIT
address 0:8:2
Feb 10 10:04:59 tester kernel: gf083: creating interface: GigaRouter FDDI, GRIT
address 0:8:3
Feb 17 15:57:39 tester kernel: uid 26 on /usr: file system full
Feb 17 15:57:54 tester last message repeated 2 times
Feb 17 19:47:53 tester Error opening grifconfig file drifconfig.conf.  Exiting.
Feb 17 20:04:32 tester last message repeated 6 times
Feb 17 21:54:40 tester login: ROOT LOGIN (root) ON ttyp1 FROM mondo
Feb 17 21:55:58 tester LMI type STANDARD is not supported, type NONE is selected
Feb 17 21:55:58 tester last message repeated 6 times
Feb 17 22:44:57 tester fr[5898]: Route Circuit configured on an un-defined link
Feb 17 22:44:57 tester fr[5898]:     Slot: 1, Link: 0
Feb 17 22:44:57 tester fr[5898]: Switch Circuit configured on an un-defined link
Feb 17 22:44:57 tester fr[5898]:     Slot: 0, Link: 1
Feb 17 22:50:39 tester fr[6025]: un-supported auto-grif i/f name configured
Feb 17 22:50:39 tester fr[6025]:     I/F name:gO060, Slot=6, Port=0
Feb 17 22:50:40 tester fr[6025]: Route Circuit configured on an un-defined link
Feb 17 22:50:40 tester fr[6025]:     Slot: 6, Link: 0
Feb 18 10:02:59 tester reboot: rebooted by root
Feb 18 10:02:59 tester syslogd: exiting on signal 15
Feb 18 10:04:17 tester kernel:  Kernel #0 (nit): Thu Feb 13 08:46:56 CST 1999
Feb 18 10:04:17 tester kernel: cpu = 80486 (about 66 MHz)
Feb 18 10:04:17 tester kernel: delay multiplier 1050
Feb 18 10:04:17 tester kernel: real mem = 37748736
Feb 18 10:04:17 tester kernel: avail mem = 34865152
Feb 18 10:04:17 tester kernel: buffer cache = 3608576
Feb 18 10:04:17 tester kernel: isa0 (root)
tester-7
```

Figure 3-4. Sample entries in the messages log

Burning in media card flash memory

grflash provides the ability to upgrade flash code at customer sites. The **grflash** command reprograms (reburns) the code in internal flash (the boot loader). This is different than updating the system software with a new release. Typically, new software releases are loaded into the system and then downloaded into the specific type of media card, they do not require burning into internal flash. The reburn procedure is done only under direction of Customer Support.

Please work with Customer Support to schedule a session with them in the rare instance that the **grflash** command is needed. If not carefully and correctly done, the reburn process could disable the memory component and the SP Switch Router. A **grflash** man page is available, and the command is also described in the *GRF Reference Guide*.

Part Numbers

A

This appendix contains lists of IBM and Lucent part numbers for
Model 04S (4-card) and Model 16S (16-card) SP Switch Router components,
and publication numbers for related IBM manuals.

Parts list – model 04S

Table A-1. IBM and Lucent part numbers for model 04S

IBM part number	Lucent part number	SP Switch Router (04S) part description
05L5677	GRF-MC-AOC3M	ATM OC-3c multi-mode media card
05L5678	GRF-MC-AOC3S	ATM OC-3c single-mode media card
05L7197	GRF-MC-AOC12M	ATM OC-12c multi-mode media card
05L5684	GRF-MC-AOC12S	ATM OC-12c single-mode media card
05L5675	GRF-MC-EN4	Ethernet 10/100Base-T 4-port media card
05L5676	GRF-MC-EN8	Ethernet 10/100Base-T 8-port media card
05L5674	GRF-MC-FDDI	FDDI media card
05L5680	GRF-MC-HPPI	HIPPI media card
05L5679	GRF-MC-HSSI	HSSI media card
05L5682	GRF-MC-IPSM	SONET OC3 multi-mode media card
05L5681	GRF-MC-IPSS	SONET OC3 single-mode media card
08J6117	GRF-MC-IOSTB3	SP Switch Router Adapter card
05L5687	GRF-MEM-64	64 MB memory module (optional)
05L5686	GRF-AC-CB4	GRF 400 switch/control board
05L5685	GRF-AC-ZPS	GRF 400 AC power module
05L7772	GRF-4-BC	GRF 400 base router chassis
05L7705	N/A	520MB PCMCIA hard drive
08J6118	N/A	Frame-to-frame groundstrap, 10 meter
08J6119	N/A	Frame-to-frame groundstrap, 20 meter
46H9699	N/A	SP switch cable, 10 meter
46H9701	N/A	SP switch cable, 20 meter

Parts list – model 16S

Table A-2. IBM and Lucent part numbers for model 16S

IBM part number	Lucent part number	SP Switch Router (16S) part description
05L5677	GRF-MC-AOC3M	ATM OC-3c multi-mode media card
05L5678	GRF-MC-AOC3S	ATM OC-3c single-mode media card
05L7197	GRF-MC-AOC12M	ATM OC-12c multi-mode media card
05L5684	GRF-MC-AOC12S	ATM OC-12c single-mode media card
05L5675	GRF-MC-EN4	Ethernet 10/100Base-T 4-port media card
05L5676	GRF-MC-EN8	Ethernet 10/100Base-T 8-port media card
05L5674	GRF-MC-FDDI	FDDI media card
05L5680	GRF-MC-HPPI	HIPPI media card
05L5679	GRF-MC-HSSI	HSSI media card
05L5682	GRF-MC-IPSM	SONET OC3 multi-mode media card
05L5681	GRF-MC-IPSS	SONET OC3 single-mode media card
08J6117	GRF-MC-IOSTB3	SP Switch Router Adapter card
05L5687	GRF-MEM-64	64 MB memory module (optional)
31L7925	GRF-MEM-128	128 MB memory module (optional)
05L5874	GRF-AC-SWB16	GRF 1600 switch board
05L5873	GRF-AC-CB16	GRF 1600 control board
05L5876	GRF-AC-AC16	GRF 1600 AC power module
05L7778	GRF-16-BC	GRF 1600 base router chassis
05L7705	N/A	520MB PCMCIA hard drive
08J6118	N/A	Frame-to-frame groundstrap, 10 meter
08J6119	N/A	Frame-to-frame groundstrap, 20 meter
46H9699	N/A	SP switch cable, 10 meter
46H9701	N/A	SP switch cable, 20 meter

Publication numbers – IBM manuals

Table A-3. Publication numbers for related IBM manuals

IBM publication number	Manual title
GA22-7441	*RS/6000 SP Installation and Relocation Guide*
GA22-7442	*RS/6000 SP System Service Guide*
GA22-7280	*RS/6000 SP Planning Volume 1, Hardware and Physical Environment*
GA22-7281	*RS/6000 SP Planning Volume 2, Control Workstation and Software Environment*

Log Messages

B

This appendix contains brief explanations of log messages that are generated by the SP Switch Router Adapter card. You will see most of them in the `/var/log/gr.console` file.

Alphabetical list of messages

The first line of each error message and the page on which it appears are listed here:

Message descriptions

For each message described, related information to the message is also included to aid in analysis and interpretation:

– LOG_FILE provides the name of the file where the message text is written

– SOURCE_FILE specifies the software module that generates the message

– SCOPE specifies the scope of the message, either CARD (media card) or RMS (management software)

– CONTEXT specifies the state of the SP Switch Router Adapter card:

INIT = initialization phase

BIST = Built-In-Self-Test phase

RUNNING = operational phase

– SEVERITY specifies the severity of the message: INFO, WARNING, ERROR, or FATAL

– DESCRIPTION provides additional information (when, why, how) about the message.

References to "IOSTB3" should be read as the SP Switch Router Adapter card, `dev1`.

"Access FIFO Sync Error from RC, int1=%d"

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	rx/tbsi_svc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the RX-CPU detects that the CPU and the RC are out-of-synch. This is a fatal error. The card is reset and automatically reloaded. `int1` is the content of the RC's interrupt register.

"Access FIFO Sync Error from TC, int1=%d"

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	tx/tbsi_svc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the TX-CPU detects that the CPU and the TC are out-of-synch. This is a fatal error. The card is reset and automatically reloaded. `int1` is the content of the TC's interrupt register.

"ACK WORDS: 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x"

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	tx/tbsi_svc.c
SCOPE:	CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged when the TX-CPU sends an ACK service message to the switch manager. This message was/is used primarily as a debug tool to debug the SP switch manager code.

"ARP added: IP= %s, SW-node=%d, state=%d"

SOURCE_FILE: tx/tbsi_arp.c

LOG_FILE: /var/log/gr.console

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged whenever the TX-CPU adds an ARP entry to the ARP table.

"Bad Hdr/Svc received, Ret code=%d"

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/tbsi_svc.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: WARNING

DESCRIPTION: This message is logged when a bad service message header is received. This is an indication that there was some sort of error on the link.

"Board Configuration timed-out, retrying"

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/main.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged when a timed-out condition has occurred while the SP Switch Router Adapter card is waiting for it configuration parameters from the RMS. The card will retry, no actions need to be taken.

"Broadcasting an ARP Request."
"Broadcasting a Gratuitous ARP Request"

LOG_FILE: /var/log/gr.console

SOURCE_FILE: tx/tbsi_arp.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged whenever the TX-CPU broadcasts an ARP request or a gratuitous ARP message.

"Configuration Parameters:"

The associated parameters can be any of the following:

Slot Number..........: %d

Node Number..........: %d

Node Name............: %s

SW Token.............: %s

Arp Enabled..........: %d

SW Node Number.......: %d

IP...................: 0x%x

IP Mask..............: 0x%x

Max Link Size........: %d

Host Offset..........: %d

Config State.........: %d

System Name..........: %s

Node State...........: %d

Switch Link Chip.....: %d

Transmit Delay.......: %d

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_cnfg.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the SP Switch Router Adapter card receives its configuration parameters.

"Configuring transmit side."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_ipc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX-CPU is ready to send configuration parameters to the TX-CPU.

"CPU ready msg received from TX-CPU"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_ipc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX-CPU is loaded and configured.

"Descriptor Sync Error from RC, int1=%d"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the RX-CPU detects that the CPU and the RC are out-of-synch. This is a fatal error. The card is reset and automatically reloaded. `int1` is the content of the RC's interrupt register.

"Descriptor Sync Error from TC, int1=%d"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the TX-CPU detects that the CPU and the TC are out-of-synch. This is a fatal error, the card is reset and reloaded automatically. `int1` is the content of the TC's interrupt register.

"Discarding msg, unknown msg_type 0x%x"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when the SP Switch Router Adapter card receives a message with unknown message type. This message is an indication of software mismatched between processor nodes and the gateway node (SP Switch Router Adapter card). To correct the problem, upgrade the nodes with the latest released microcode..

"ERR! Duplicated buffer %d"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when the RX CPU has detected a duplicated condition of a buffer. This is an indication that there is an error in the receive logic. The receive logic will attempt to recover from the error. If the problem persists, please contact Customer Support.

"Expect NODE_INIT but received Stat/Err Request"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when a Read Status service message is received while the SP Switch Router Adapter card is expecting a NODE_INIT message.

"Expired IP buffer received: %d"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when the RX CPU receives an IP header from the receive HW logic for which the buffer has been returned to the pool. This is an indication of errors in the receiving logic (software and/or hardware). If the problem persists, please contact Customer Support.

"Hot interrupt detected, ier1=0x%8x, ier2=0x8x"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when a TBIC hot-interrupt condition has been detected.

"Hot interrupt detected, ier1=0x%8x, ier2=0x8x"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when a TBIC hot-interrupt condition has been detected.

"Initializing Main Task..."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/main.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX-CPU enters its main control (while) loop.

"Initializing RX Subsystem data structure."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX Side is ready to initialize its subsystem to bring the up the interface.

"IOSTB3:RX SET TOD service message received."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged every time a SET TOD service message is received. Historically, this type of message was used to aid debugging between the switch manager and the card.

"Loopback routes found for IP adr: 0x%x, sw-node."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_arp.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX CPU has failed to find a switch node address for an IP address. Not resolving the switch node address is normal for a node(s) which once existed on the network but has since been fenced.

"Lost of STI clock, TBIC Status = 0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	ERROR

DESCRIPTION: This message is logged when the TBIC's STI clock (status bit) becomes invalid. Status is the TBIC's status register.

"Lost of STI clock, TBIC Status = 0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	ERROR

DESCRIPTION: Logged when the TBIC's STI clock (status bit) becomes invalid.

"NetStar GigaRouter %s RX Interface Initializing:"

Code Version: %s
Compiled in: %s,
  on: %s.

LOG_FILE: /var/log/gr.console
SOURCE_FILE: rx/main.c
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the RX-CPU starts the execution of its run-time software. The message is used to log the version the software executed.

"NetStar GigaRouter %s TX Interface Initializing:"

Code Version: %s
Compiled in: %s,
  on: %s.

LOG_FILE: /var/log/gr.console
SOURCE_FILE: tx/main.c
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the TX-CPU starts the execution of its run-time software. The message is used to log the version of the software executed.

"RX: Clock is valid."

LOG_FILE: /var/log/gr.console
SOURCE_FILE: rx/tbsi_rc.c
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when Receive TBIC's STI clock becomes valid.

"RX-CPU Loaded msg received from TX-CPU."

LOG_FILE: /var/log/gr.console
SOURCE_FILE: rx/tbsi_ipc.c
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: Logged when the TX Side run-time software is successfully loaded.

"RX: got TBIC INITED fron TX."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_ipc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: Logged when the TX-CPU has initialized the Transmit TBIC.

"RX: Port connected, stat=0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: Logged when the Receive TBIC's receive port is connected to the switch chip's send port.

"RX: send SEND_TOD to the switch." or
"RX: Reading TBIC's TOD ."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: Historically, these messages were used to aid debugging between the switch manager and the card.

"RX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x..,"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when a TBIC outage error occurs. The TBICs are reset and the state machine goes back to CONFIGURED state. The SP Switch Router Adapter card treats TBIC outage errors as permanent errors.

"RX-TBIC permanent error(s) detected IER1=0x%x, IER2=0x%x..,"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when a TBIC permanent error occurs. The TBICs are reset and the state machine go back to CONFIGURED state.

"RX-TBIC transientt error(s) detected IER1=0x%x, IER2=0x%x",

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	rx/tbsi_svc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when a TBIC transient error occurs.

"Rx timed-out, src_node=%d, msg_id=%d,
        bytes rxed: %d, bufnum: %d, bufaddr: 0x%x."

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	rx/tbsi_rx.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX CPU has detected a packet receive timed-out condition. A packet receive timed-out condition is expected. However, if the condition occurs frequently, it might be a signal that something is not working / configured correctly.

"SEND TOD service message received "

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	tx/tbsi_svc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX-CPU receives a SEND TOD service message from the RX-CPU. This message indicates that a SEND TOD service message is being sent to the adjacent switch chip.

"Sending Grid Init"
"Sending IF Init for IF 0x%x."

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	rx/tbsi_ipc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the SP Switch Router Adapter card is loaded, configured, and is requesting the RMS to create and bring up the interface for the card.

"Sending IF RESET message to TX-CPU."

LOG_FILE:	/var/log/gr.console
SOURCE_FILE:	rx/tbsi_svc.c
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when RX-CPU sends an interface reset message to the TX-CPU when the state machine is changing from RUNNING to other states.

"Sending mib-2 trap, type = %d, state = %d."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_cnfg.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the SP Switch Router Adapter card sends a trap request to the **mib2d**. **mib2d**, in turn, will generate and send a TRAP PDU to the managers.

"Sending params to TX..."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/main.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX-CPU sends the board's configuration parameters to the TX-CPU.

"State machine changes from xxx to yyy."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: The SP Switch Router Adapter card's state machine is changing from the xxx state to yyy state where xxx and yyy are the values of the card state:

- Configured = 2

- Off-line = 3

- Off-line-Q = 4

- Running = 5

- Quiesced = 6

"State machine changes from xxx to yyy."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: The SP Switch Router Adapter card's state machine is changing from the xxx state to yyy state where xxx and yyy are the values of the card state:

- Configured = 2

- Off-line = 3

- Off-line-Q = 4

- Running = 5

- Quiesced = 6

"Status/Err service message received."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged every time a Read Status service mesages is received. Historically, this type of messages was used to aid debugging between the switch manager and the card.

"Svc Msg rxed, svc_cmd=0x%x %s, node_cmd: 0x%x %s."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged every time a service mesages is received. Historically, this type of message was used to trace bugs in the protocols between the switch manager and the card.

"Switch received with errors. Descriptor: 0x%8x."

LOG_FILE	/var/log/gr.console
SOURCE_FILE:	`tx/switch.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX CPU receives a descriptor with error(s). This type of messages is used to aid debugging of the SDC and/or SP Switch Router Adapter cards. The first 16 words of the header are also logged to provide additional information.

"Switch route entry not found, node = %d."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when the SP Switch Router Adapter card fails to find a switch route entry for a node. This indicates that there is an error in building the switch route table or in the downloading function.

"Switch Route table loaded, %d entries."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the transient switch route table has been moved to the permanent switch route table resulted from the processing of a Load Routes service message.

"TB4 segment received in error."
"TB4-HDR word%d: 0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when a TB4 segment was received in error. The TB4 header and the message data are included in the log.

"TB4 segment received in wrong state."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_rx.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged when a TB4 segment is received while the SP Switch Router Adapter card's state machine is not in RUNNING or QUIESCED state. The TB4 header and the message data are included in the log. This happens when a node sends data packets to the SP Switch Router Adapter card without knowing that the card interface is down.

"TBIC INIT msg sent to TX-CPU."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_ipc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the RX-CPU sends a message to the TX-CPU to initialize the TBIC. The RX-CPU will then wait for a TBIC INITED message from the TX-CPU.

"TBSI Online Init the ORCAs /
xmain_dp= %x, xmain_hp= %x, len1=%d, time=%x, date=%x, data=%x"

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_cnfg.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: Logged when the SP Switch Router Adapter card prepares to program the FPGAs.

"TBSI-RX: TBIC's TOD: 0x%x, 0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: The SP Switch Router Adapter card displays the content of the TBIC's TOD register every time it reads it.

"TBSI-TX Unexpected SVC threshold interrupt."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	WARNING

DESCRIPTION: This message is logged whenever the TX-CPU receives an interrupt from the Transmit TBIC indicating that it has received a service message. No action will need to be taken, but if the problem persists, reset the card.

"TBUS Parity Error from RC, int1=%d."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`rx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the RX-CPU detects that the RC has detected a parity error on the TBUS. This is a fatal error, the card is reset and reloaded automatically. If the problem persists, reset/replace the card. `int1` is the content of the RC's interrupt register.

"TBUS Parity Error from TC, int1=%d."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	FATAL

DESCRIPTION: This message is logged when the TX-CPU detects that the TC has detected a parity error on the TBUS. This is a fatal error, the card is reset and reloaded automatically. If the problem persists, reset/replace the card. `int1` is the content of the TC's interrupt register.

"Timeout waiting for CFG_DN bits clear, stat0=%x."

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/tbsi_fpga.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: FATAL

DESCRIPTION: This message is logged when the SP Switch Router Adapter card fails to program the FPGAs. Replace the card. `stat0` is the content of the hardware status register.

"Timeout waiting for FPGA_INIT_COMPLETE, stat0=%x."

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/tbsi_fpga.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: FATAL

DESCRIPTION: This message is logged when the FPGAs fail to complete their power on/reset initialization sequence. Replace the card. `stat0` is the content of the hardware status register.

"RX: got TBIC INITED fron TX."

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/tbsi_ipc.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged when the TX-CPU has initialized the Transmit TBIC.

"RX: Port connected, stat=0x%x."

LOG_FILE: /var/log/gr.console

SOURCE_FILE: rx/tbsi_rc.c

SCOPE: CARD

CONTEXT: RUNNING

SEVERITY: INFO

DESCRIPTION: This message is logged when the Receive TBIC's receive port is connected to the switch chip's Send port.

"RX: Setting the RC in operational mode, stat=0x%x."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `rx/tbsi_rc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the RX Side of the SP Switch Router Adapter card is ready to receive data messages from the switch.

"Timed out resolving ARP. If: %d IP: %d.%d.%d.%d."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_arp.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING
DESCRIPTION: This message is logged whenever the TX-CPU fails to resolve an IP address. This message indicates that either the node with the IP address does not receive nor send the ARP request/reponse or the node is down.

"TX-CPU: Access FIFO busy, discarding IP packet."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_arp.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING
DESCRIPTION: This message is logged whenever the TX-CPU discards an IP packet due to the link (TBIC) congestion. This log message indicates that, potentially, the switch is congested.

"TX-CPU Config Params msg received from RX-CPU."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_ipc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the TX-CPU receives the board's configuration parameters from the RX-CPU.

"TX-CPU sending msg type=%d to RX-CPU."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_ipc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged whenever the TX-CPU sends a message to the RX-CPU via the IPC channel.

"TX-CPU TBIC Init msg received from RX-CPU."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_ipc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX-CPU receives a TBIC Init message from the TX-CPU. The TX-CPU initializes the Transmit TBIC getting it ready for transmitting data.

"TX: Port is connected, stat=0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_tc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the Transmit TBIC's Send port is connected with the switch chip receive port.

"TX-PROR: start_node: %d, end_node: %d, # entries: %d."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_svc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when a Processor Routes service message is processed.

"TX: pseudo STI clock is valid."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_tc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the Transmit TBIC STI clock becomes valid. The term "pseudo" is used to remind (us) that the STI is not from the interface, but from the Receive TBIC.

"TX: Setting the TC in operational mode, stat= 0x%x."
"TX clearing interrupts, i0=0x%x, i1=0x%x."

LOG_FILE:	`/var/log/gr.console`
SOURCE_FILE:	`tx/tbsi_tc.c`
SCOPE:	CARD
CONTEXT:	RUNNING
SEVERITY:	INFO

DESCRIPTION: This message is logged when the TX-CPU is ready to go to operational state. That is, the card will be able to send data to the TBIC.

"TX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x,"

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_svc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: FATAL

DESCRIPTION: This message is logged when a TBIC outage error occurs. The TBICs are reset and the state machine goes back to CONFIGURED state. The SP Switch Router Adapter card treats TBIC outage errors as permanent errors.

"TX-TBIC permanent error(s) detected IER1=0x%x, IER2=0x%x,"

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_svc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: FATAL

DESCRIPTION: This message is logged when a TBIC permanent error occurs. The TBICs are reset and the state machine goes back to CONFIGURED state.

"TX-TBIC transient error(s) detected IER1=0x%x, IER2=0x%x,"

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_svc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when a TBIC transient error occurs.

"Un-expected descriptor from RC, desc_type=%d."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `rx/tbsi_svc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING

DESCRIPTION: This message is logged when the RX-CPU receives a descriptor that is expected by the CPU in its current state. Reset/reload the card if the card could not be brought on-line.

"Un-expected descriptor from TC, desc_type=%d."

LOG_FILE: `/var/log/gr.console`
SOURCE_FILE: `tx/tbsi_svc.c`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING

DESCRIPTION: This message is logged when the TX-CPU receives a descriptor that is expected by the CPU in its current state. Reset/reload the card if the card could not be brought on-line.

Network Configuration Examples

C

The SP Switch Router provides LAN and WAN access for SP processor nodes. The SP Switch Router Adapter card and SP processor nodes are IP-addressed nodes on the SP Switch network.

Three basic configurations are building blocks for more complex networking topologies that include the SP Switch Router:

1. single SP Switch Router Adapter card   and   single SP partition
2. multiple SP Switch Router Adapter cards   and   single SP partition
3. multiple SP Switch Router Adapter cards   and   multiple SP partitions

Appendix C provides an example of each configuration type, and discusses IP addressing and routing considerations that will help you design your configuration.

Example 1: Single SP Switch Router Adapter card, single SP partition

In this configuration, a single SP Switch Router Adapter card is connected to a single SP partition. The IP address of the SP Switch network is 198.174.11. The partition of SP nodes is shown in the shaded area of Figure C-1.
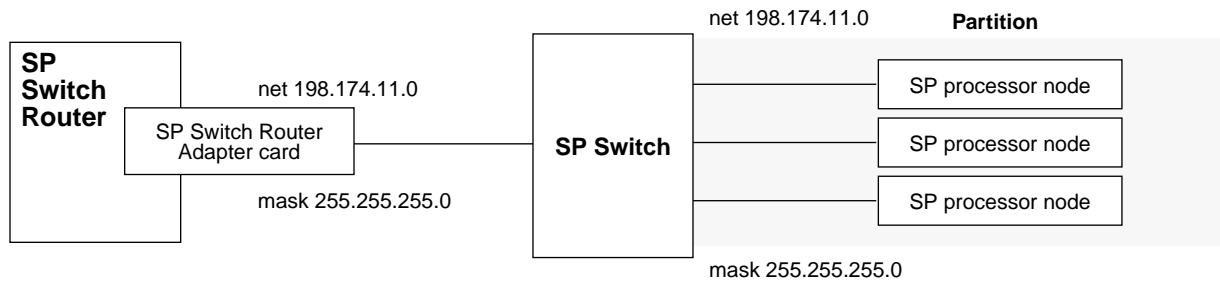
Figure C-1.   Example 1– single card, single SP partition network configuration

Configuration requirements

- All network nodes (SP Switch Router Adapter card and SP processor nodes) must have the same IP net in the network portion of their IP address. In the example, this is 198.174.11.

- ARP is enabled on the SP Switch network to provide the most flexibility in assigning IP addresses

- If ARP is disabled on the SP Switch, the Host Offset value must be defined to all network nodes (SP Switch Router Adapter card and SP processor nodes), and the IP addresses assigned to the nodes must have host values that are determined by the host offset and switch port. Please refer to the *RS/6000 SP Planning, Volume 2, Control Workstation and Software Environment* manual for details.

  If the network is 198.174.11.0 and the netmask is 255.255.255.0, then the IP address of the SP Switch Router Adapter card and any SP processor nodes must be between 198.174.11.1 and 198.174.11.254. The SP Switch Router Adapter card will not properly forward IP data to nodes that are assigned with an IP address that is not in this address range (those IP messages will most likely be forwarded to the default gateway).

Example 2: Multiple cards, single partition

This network configuration divides the traffic for an SP processor node partition between two or more SP Switch Router Adapter cards and achieves some load leveling among the SP processor nodes. It provides dual, not truly redundant, connections to the router in case of SP Switch Router Adapter card failure.

For this type of configuration, you must divide the router side of the IP network into logical subnets and assign each SP Switch Router Adapter card to a different subnet. This logical subnetting is required only on the router, the SP Switch viewpoint sees a single network.

Configuration requirements

- As configured in example 2, each SP Switch Router Adapter card is an active node on a different subnet, each card interface is a subnet.

- Each card must have a unique IP address. An alias IP address cannot be used on two active cards on the same router system.

- Enable ARP on the SP Switch network to allow assignment of alias IP addresses as part of the recovery procedure described later in this section.

- On the router, netmasks are used to create different subnets when multiple SP Switch Router Adapter cards are connected to the same network.

Warning: Be careful that the subnet mask does not, in effect, create a single subnet. If Card 1 (gt010) is assigned the 255.255.255.0 netmask, then, for routing, both SP Switch Router Adapter cards would be on a single subnet. This type of configuration does not work. Each SP Switch Router Adapter card in a single router must be configured on a different subnet.
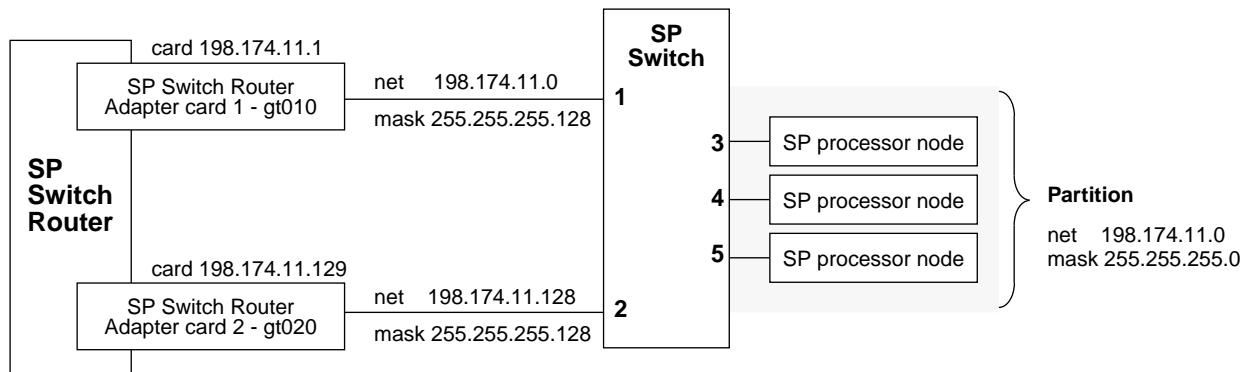
Figure C-2.   Example 2 – multiple card, single SP partition configuration

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Configuration tasks

Given:

– the IP network is 198.174.11.0

– the netmask is 255.255.255.0

– there can be up to 254 nodes on the network
   (including the two SP Switch Router Adapter cards)

1 Configure the SP processor nodes with 198.174.11.0 as the network and 255.255.255.0 as the netmask.
The address of individual nodes must be between 198.174.11.1 and 198.174.11.254.

2 Configure the two SP Switch Router Adapter cards as follows:
- divide the 198.174.11.0 network into two subnets, 198.174.11.0 and 198.174.11.128, with a subnet netmask of 255.255.255.128
- assign any of the 198.174.11.1-126 addresses, mask 255.255.255.128, to card `gt010`
- assign any of the 198.174.11.129 -254 addresses, mask 255.255.255.128, to card `gt020`

Incoming traffic (going to SP processor nodes)

Traffic destined to node addresses 198.174.11.1 to 198.174.11.127 is routed through `gt010`.

Traffic destined to node addresses 198.174.11.129 to 198.174.11.255 is routed through `gt020`. Each SP Switch Router Adapter card handles roughly half the incoming traffic.

Outgoing traffic (coming from SP processor nodes)

Traffic destined to the SP Switch Router Adapter cards from SP processor nodes is directed by changing the SP processor nodes' default route or adding static routes to force their outgoing traffic to be sent to `gt010` or `gt020`. For example, half of the nodes would have their default route set to the `gt010` card and the other half would have their default route set to the `gt020` card.

If more SP Switch Router Adapter cards are configured, you must divide the net into more (but smaller) subnets. For example, if the number of cards increases to four, you would set the subnet netmask to 255.255.255.192 (ff.ff.ff.c0).

Recovery procedure if an SP Switch Router Adapter card fails

The configuration in Figure C-2 is not redundant because two active SP Switch Router Adapter cards cannot carry the same IP address. Alias addresses cannot be used if more than one of the cards sharing the address are active. An alias address can be shared between two cards if only one card is active. This is shown in Figure C-3.

Multiple logical addresses can be assigned to the single physical interface on one SP Switch Router Adapter card. In a multiple card configuration, the failure of one card is recovered by assigning its logical IP address to another card. This card will then carry the traffic for both, and traffic for the failed card will be routed through the other card's SP Switch connection. You can verify the new configuration by displaying the new ARP table.
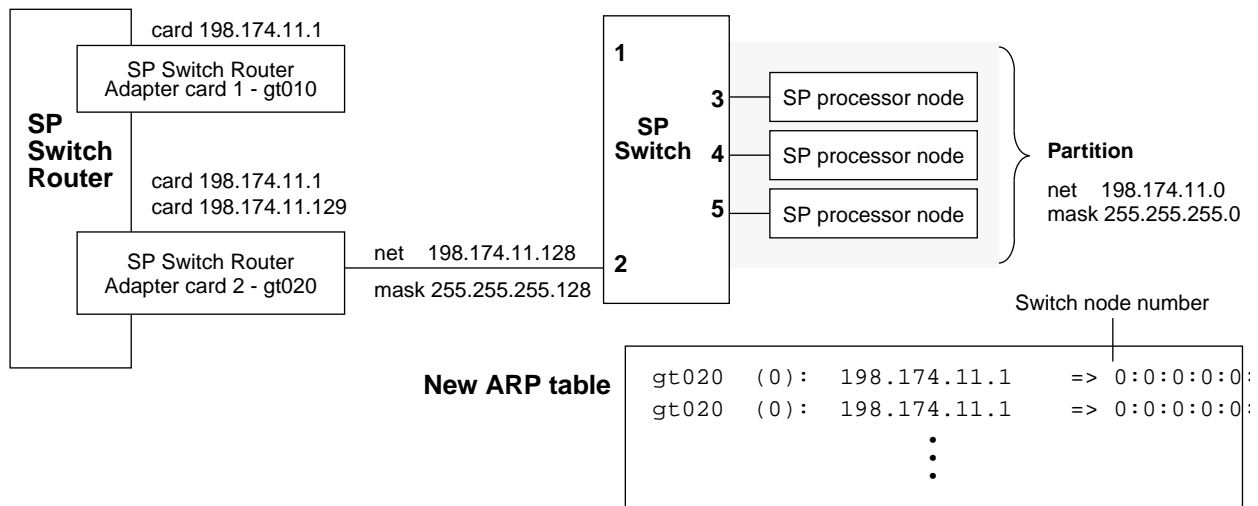
Figure C-3. Recovery from a card failure in a dually-connected configuration

If the `gt010` card fails, the SP system administrator must manually reconfigure the SP Switch Router subnets by logging into the router and performing these steps:

1 Remove `gt010` from active status using the following **ifconfig** command:

```
# ifconfig gt010 delete
```

2 Assign the surviving card, `gt020`, the alias address:

```
# ifconfig gt020 198.174.11.1 255.255.255.128
```

If `gt020` fails, here are the steps:

1 Remove `gt020` from active status using the following **ifconfig** command:

```
# ifconfig gt020 delete
```

2 Assign the surviving card, `gt010`, the alias address:

```
# ifconfig gt010 198.174.11.129 255.255.255.128
```

From the router, use the **grarp** command to verify that the ARP table shows correct IP addresses and corresponding physical SP Switch addresses (Switch node number):

```
# grarp 198.174.11.1
gt020 (0):  198.174.11.1    at 0:0:0:0:0:2
gt020 (0):  198.174.11.129  at 0:0:0:0:0:2
```

Example 3:   Multiple cards, multiple SP partitions:

In this configuration, subnetting is required on both the SP Switch Router and the SP system.

Each subnet contains a different SP Switch Router Adapter card and a different SP processor node partition.

Note that the partitions logically "cross" the SP Switch. This configuration is created by multiples of the configuration discussed in example 1.
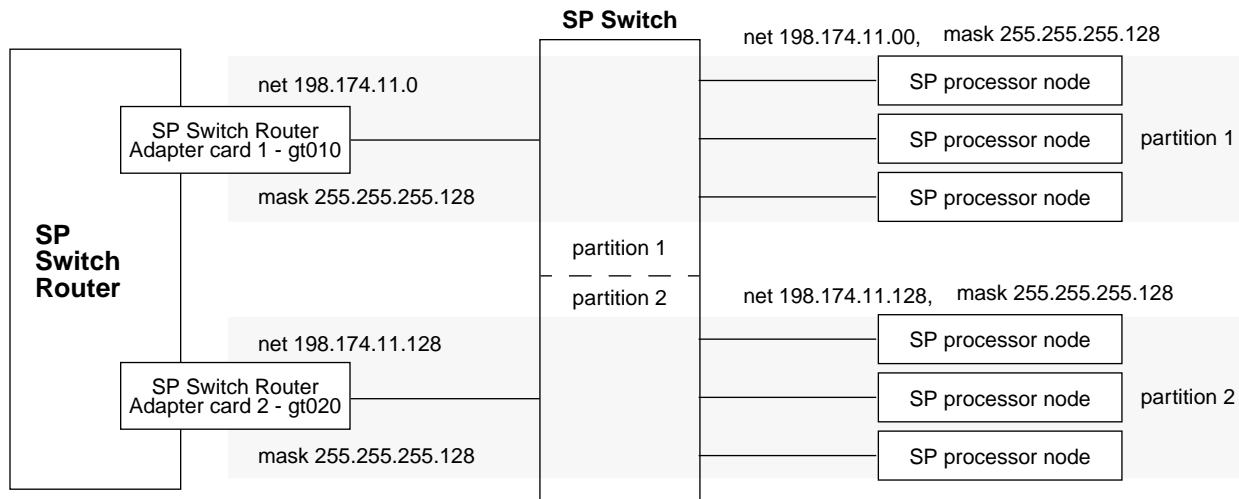
Figure C-4.   Example 3 – multiple card, multiple SP partition configuration

Configuration tasks

Given:

– the IP network is 198.174.11.0

– the netmask is 255.255.255.0

– there 254 nodes on the network (including the two SP Switch Router Adapter cards

1   Create two subnets: 198.174.11.0 and 198.174.11.128, subnet mask of 255.255.255.128

2   Configure partition 1:
Assign 198.174.11.0 as the network address to SP partition 1 and the `gt010` card

3   Configure partition 2:
Assign 198.174.11.128 as the network address to SP partition 2 and the `gt020` card

Traffic destined to SP processor nodes on partition 1 is routed through the `gt010` card.

Traffic destined to SP processor nodes on partition 2 is routed through the `gt020` card. Each SP Switch Router Adapter card handles traffic coming from its partition.

Traffic destined to the SP Switch Router Adapter cards from the SP processor nodes should be directed to the SP Switch Router Adapter card configured in their partition. Set the SP processor node default route to the partition's SP Switch Router Adapter card.

Upgrading Router Software

<div style="text-align: right;">**D**</div>

This Appendix provides general information about obtaining and installing new operating software (hereafter referred to as machine code) for the SP Switch Router.

The SP Switch Router as an IBM product

As is noted in this manual, the SP Switch Router is based on a product from Lucent Technologies, Inc. IBM customers order and receive the SP Switch Router from IBM. IBM provides all support for this product for IBM customers.

SP Switch Routers are delivered with the current level of machine code already installed. Customers who wish to upgrade to new releases of the machine code should contact their IBM representative.

Obtaining new machine code

New releases of the machine code must be obtained from the IBM FTP server:

```
service2.boulder.ibm.com.
```

Although a new release of the machine code will correspond to an Lucent release of GRF code, only the IBM version of the code will work on the SP Switch Router. Do not try to use GRF code releases obtained from the Lucent FTP site on the SP Switch Router.

Instructions on how to download new releases from the FTP site and install them are included in the Release Notes provided with each release.

Support for code installation

The Release Notes are posted on the SP Service and Support web site when a new release becomes available. As this is written, the starting page for the SP Service and Support web site is:

```
http://www.rs6000.ibm.com/support/sp
```

Look for 9077 "SP Switch Router" information near the end of the "Service status" pages.

Terms in the IBM "License Agreement for Machine Code" govern usage of the SP Switch Router machine code. A copy of this license is included in this Appendix.

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Form No: Z125-5468-00 8/96

Index

T

tcpdump, 3-7
  modification for SP Switch Router, 3-7
  on SP Adapter interface, 1-14
telnet, enable remote sessions, 2-3
testing SP Switch network, 3-6
traceroute, 3-7
traffic, as indicated by LEDs, 1-12
transmit port, states (LEDs), 1-12
traps, port 162 (SNMP), 1-17

U

UDP packets, how to discard, 3-19
UDP port number, 3-19
umountf command, 3-5
UNIX management tools, 3-6
UNIX shell
  how to establish for SP Switch Router
    session, 2-22
upgrades
  from IBM ftp server, D-1
  SP Switch Router machine code, D-1
  SP Switch Router software, D-1
upgrading system memory, 1-5

V

/var/crash, dump directory, 2-6
/var/logs directory contents, 2-6, 3-30
/var/portcards, dump directory, 2-6
verifying connectivity, 2-40
versions
  for card run-time binaries, 3-16
  software, 3-3, 3-5
  software and hardware, 3-16
vlif, in filter configuration, 1-14
vpurge command, 3-5

W

wrist strap, connector sites, 1-8

X

X terminal, Telnet display setting, 2-3