

SP Switch Router Adapter Guide

Ascend Communications, Inc.

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About this Guide

Ascend 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 in the manuals listed in the “Manual sets” section.

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 Ascend 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 two lists, one of relevant GRF manuals and another of IBM manuals. Information specific to the SP system is found in related IBM manuals.

The SP Switch Router Adapter media card is described only in the *SP Switch Router Adapter Guide 1.4* manual. The SP Switch Router and other media cards are described in the GRF manuals. SP Switch Router documentation for software release 1.4 consists of the following manuals:

- *GRF 400/1600 Getting Started 1.4*, 7820-2013-001
- *GRF Configuration Guide 1.4*, 7820-2011-001
- *GRF Reference Guide 1.4*, 7820-2012-001
- *SP Switch Router Adapter Guide 1.4*, 7820-2026-001

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

```
super> getver
Current Revision: 1.4.6.ibm Version: default
super>
```

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*, GC23-3898
- *IBM Parallel System Support Programs for AIX: Administration Guide*, GC23-3897
- *IBM Parallel System Support Programs for AIX: Diagnosis and Messages Guide*, GC23-3899
- *IBM Parallel System Support Programs for AIX: Command and Technical Reference*, GC23-3900

Software upgrade release notes for the 9077 appear on the SP Service and Support web site:

<http://www.rs6000.ibm.com/support/sp>

IP routing publications

Here are other publications that you may find useful:

- *TCP/IP Network Administration*, Craig Hunt (O'Reilly & Associates, Inc.)
- *Essential System Administration*, Eileen Frisch (O'Reilly & Associates, Inc.)
- *Internetworking with TCP/IP, Volume 1*, Douglas E. Comer, David L. Stevens (Prentice-Hall)
- *TCP/IP Illustrated, Volume 1*, W. Richard Stevens (Addison-Wesley)

Documentation conventions

These are the documentation conventions used in the manual.

Convention	Meaning
Bold	Bold is used when command names and commands appear in text rather than in examples and sample input. Bold is also used for software programs and daemons such as syslogd .
Monospace text	Monospace text represents command information that you enter exactly as shown. It is also the text used for file names and screen displays.
[]	Square brackets indicate an optional attribute you append to a command. To include an attribute, type only the information inside the brackets. Do not type brackets unless they appear in bold.
<i>Italics</i>	Italics represent variable information. Do not enter italicized words as part of a command, enter the information they represent.
Note:	A note signifies important additional information.
 Caution:	A caution means a failure to follow the recommended procedure could result in a loss of data or damage to equipment.
 Warning:	A warning means that a failure to take appropriate safety precautions could result in physical injury.

About this Guide

Documentation conventions

Introduction to the SP Switch Router Adapter card

The RS/6000 SP Switch Router is based on the GRF 400 (4-card) and GRF 1600 (16-card) routers manufactured by Ascend Communications. For that reason, this manual contains references to the *GRF 400/1600 Getting Started*, *GRF Reference Guide*, and *GRF Configuration Guide* 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 1.4* manual for SP Switch Router system installation procedures.

Chapter 1 covers these topics:

- What is the RS/6000 SP Switch Router ? 1-2
- SP Switch Router systems for IBM sites 1-3
- Overview of the SP Switch Router Adapter card 1-5
- Inserting a media card into the SP Switch Router 1-6
- SP Switch Router Adapter card LEDs 1-8
- SP Switch Router Adapter card specifications 1-11
- SNMP on the SP Switch Router Adapter card 1-12

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:

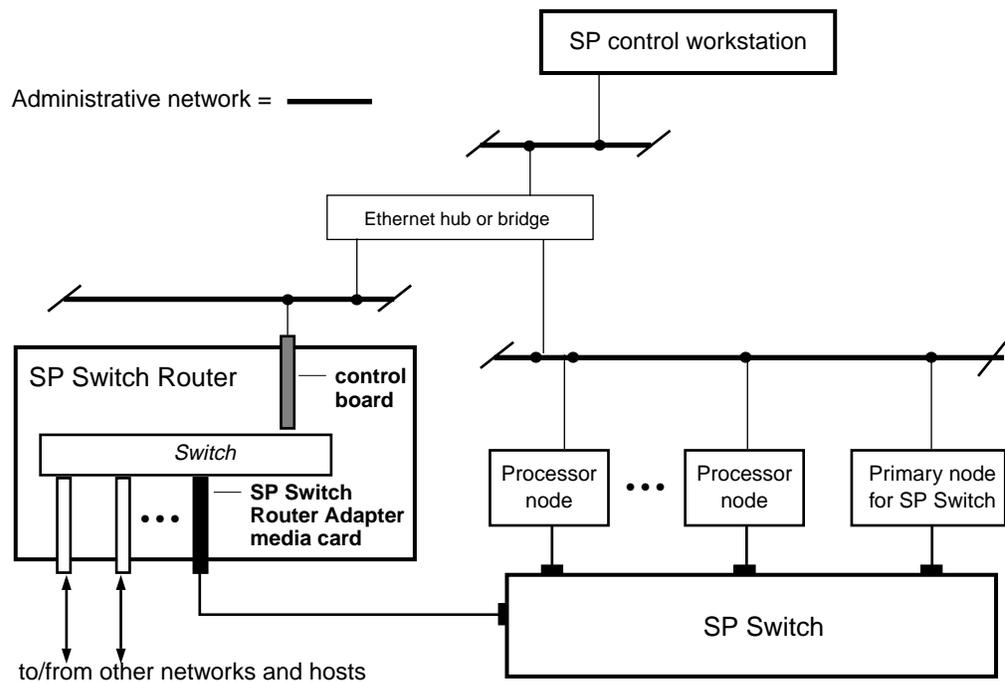


Figure 1-1. Connections between the SP Switch Router and an SP system

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 an 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 and 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.

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 will 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 vollständig 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.

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

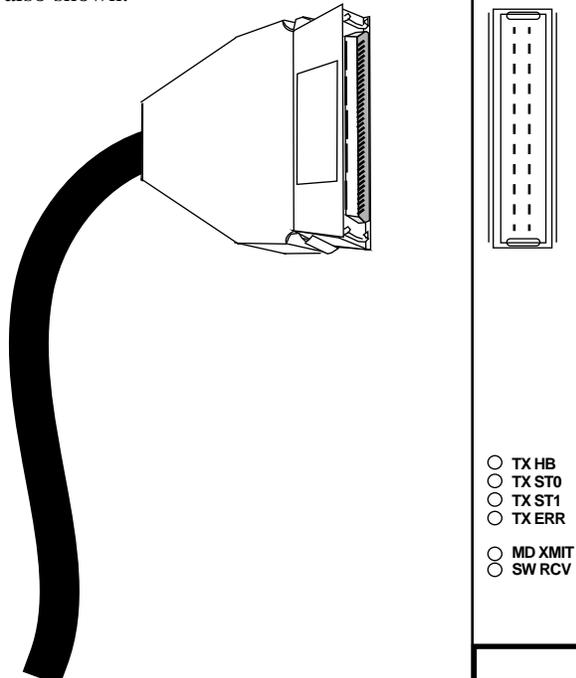
Face plate diagram

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.



Inserting a media card into the SP Switch Router

Note: To operate properly, the SP Switch Router requires that at least one media card be installed. Also, a face plate cover must be installed in any unused slot to maintain cooling flows.

Media cards are actually two logic boards joined to make a single component. As shown in Figure 1-2, 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.

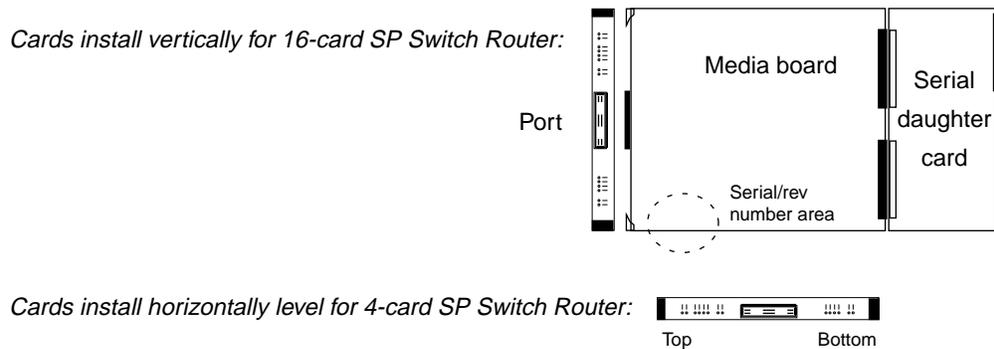


Figure 1-2. Media card components

The two logic boards are joined by two 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.



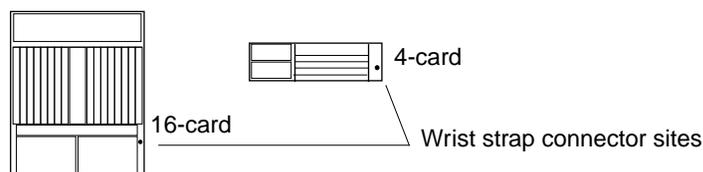
Warning: The backplane of the SP Switch Router contains hazardous energy levels. When replacing a media card, remove only one card at a time. Removing more than one card will expose the operator to this energy hazard.

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.



Chassis 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

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.

LED activity during boot

During boot and resets, the four software-controlled LEDs indicate different media card activity. 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
<ul style="list-style-type: none"> • RX HB (green) • RX ST0 (green) • RX ST1 (amber) • RX ERR (amber) 	<ul style="list-style-type: none"> • 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
	<ul style="list-style-type: none"> • OFF ERROR - During a boot or reset, this pattern indicates a checksum error is detected in flash memory. • OFF • OFF • ON
	<ul style="list-style-type: none"> • ON ERROR - During a boot or reset, this pattern indicates that the SRAM fails the memory test. • OFF • ON • OFF
	<ul style="list-style-type: none"> • ON -> OFF - During loading, HB and RX ST1 flash as each section of the code loads. • OFF • OFF • ON -> OFF
<ul style="list-style-type: none"> • TX HB (green) • TX ST0 (green) • TX ST1 (amber) • TX ERR (amber) 	<ul style="list-style-type: none"> • 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
	<ul style="list-style-type: none"> • OFF ERROR - During a boot or reset, this pattern indicates a checksum error is detected in flash memory. • OFF • OFF • ON
	<ul style="list-style-type: none"> • ON ERROR - During a boot or reset, this pattern indicates that the SRAM fails the memory test. • OFF • ON • OFF
	<ul style="list-style-type: none"> • ON -> OFF - During loading, HB and TX ST1 flash as each section of the code loads. • OFF • 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)	<p>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 .</p> <p>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.</p>
<ul style="list-style-type: none"> • RX ST0 (green) • RX ST1 (amber) • RX ERR (amber) <p>These three LEDs light in different combinations to indicate five operating states for the receive port.</p>	<ul style="list-style-type: none"> • ON STATE_0 - These three LEDs are on during hardware initialization.
	<ul style="list-style-type: none"> • OFF STATE_1 - Bottom two amber LEDs go on during software initialization, show receive port is waiting for configuration parameters.
	<ul style="list-style-type: none"> • ON STATE_2 - Middle amber LED goes off when configuration parameters are in place and the receive port is ready to be connected.
	<ul style="list-style-type: none"> • OFF STATE_3 - Bottom amber LED goes on to show that the receive port is connected and the card is ready to be on line
	<ul style="list-style-type: none"> • OFF STATE_4 - These three LEDs are off to show receive port is online and running/routing.
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)	<p>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.</p> <p>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.</p>

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

LED	Description
<ul style="list-style-type: none"> • TX ST0 (green) • TX ST1 (amber) • TX ERR (amber) <p>These three LEDs light in different combinations to indicate five operating states for the transmit port.</p>	<ul style="list-style-type: none"> • ON STATE_0 - These three LEDs are on during hardware initialization. • ON • ON
	<ul style="list-style-type: none"> • OFF STATE_1 - Bottom two LEDs (amber) go on during software initialization, show transmit port is waiting for configuration parameters • ON • ON
	<ul style="list-style-type: none"> • ON STATE_2 - Middle LED goes off when configuration parameters are in place and the transmit port is ready to be connected. • OFF • ON
	<ul style="list-style-type: none"> • OFF STATE_3 - Bottom LED (amber) goes on to show that the transmit port is connected and the card is ready to be on line. • OFF • ON
	<ul style="list-style-type: none"> • OFF STATE_4 - These three LEDs are off to show transmit port is online and running/routing. • OFF • OFF
<p>MD XMIT (amber)</p>	<p>This amber LED comes on as data leaves the transmit media side going to an external destination.</p>
<p>SW RCV (amber)</p>	<p>This amber LED lights when data from the SP Switch Router switch core (via the serial daughter card) goes to the transmit media side.</p>

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

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.

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 and Messages Guide*. As a last resort, the network administrator can edit `/etc/grdev1.conf` and run the **dev1config** program to install the updated parameters on the SP Switch Router Adapter 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 on “Bringing the SP Switch Router Adapter card on-line with the SP” in Chapter 2 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 Ascend Communications. For that reason, this manual contains references to the *GRF 400/1600 Getting Started*, *GRF Reference Guide*, and *GRF Configuration Guide* manuals. The SP model of a GRF router is referred to as the SP Switch Router.

Chapter 2 covers these topics:

- Introduction to installation and configuration 2-2
- Installing an SP Switch Router Adapter card 2-5
- Installing the PCMCIA spinning disk 2-6
- Attaching SP Switch Router cables 2-10
- Configuration required on the SP system 2-12
- Step-by-step media card configuration 2-16
- Step 1. Check SNMP in the SP Switch Router system 2-18
- Step 2. Assign IP addresses 2-21
- Step 3. Change profile settings 2-24
- Step 4. Run dev1config to create grdev1.conf 2-30
- Step 5. Reset SP Switch Router to install files 2-34
- Verify SP Switch Router Adapter card from router 2-35
- Bringing the SP Switch Router Adapter card on-line with the SP 2-38

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.

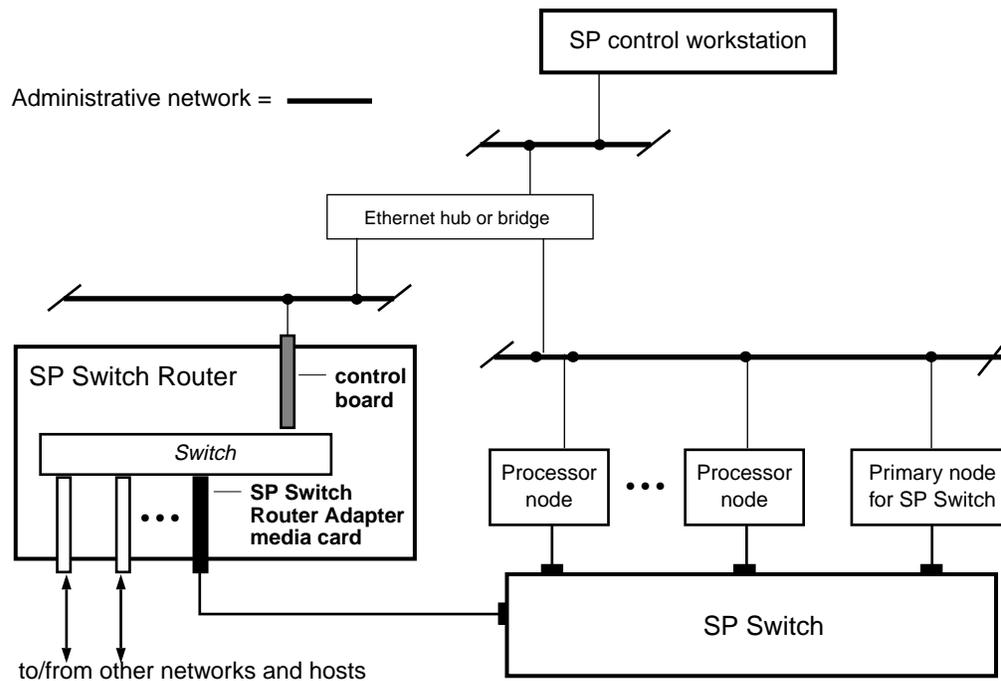


Figure 2-1. Components connecting an SP Switch Router to an SP Switch and control workstation

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 configure the SP Switch Router Adapter card as required for SP Switch Router functionality is complete in this chapter
- 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 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 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. Ignore script prompts such as these for network logging:

```
Enter the remote logging host name:  
Enter the logging host IP address:
```

Since you will configure logging to a PCMCIA device, press <Enter> at these prompts.

- 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, *GRF Configuration Guide*.

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 that 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 Guide*, 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 Guide*.
- 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.
Ignore script references to network or syslog logging.
- 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 GRF operations. If you are working with Customer Support, these are the three logs they will need to see:

- /var/logs/gr.console
- /var/logs/messages
- /var/logs/gr.boot

The /var/logs 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 **greset -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 PCMCIA slot A, a copy of the dump is automatically saved to the external flash in a directory called /portcards.

Installation steps

- 1 Insert the PCMCIA disk into slot A on the SP Switch Router control board (the thickness of the 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
# 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
```

- 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 slot 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 slot 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 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
local11.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 GRF to log messages to a directory other than /var/logs, 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 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
```

- 6** Save all changes and reboot:

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

- 7** 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>
```

- 8** 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.)

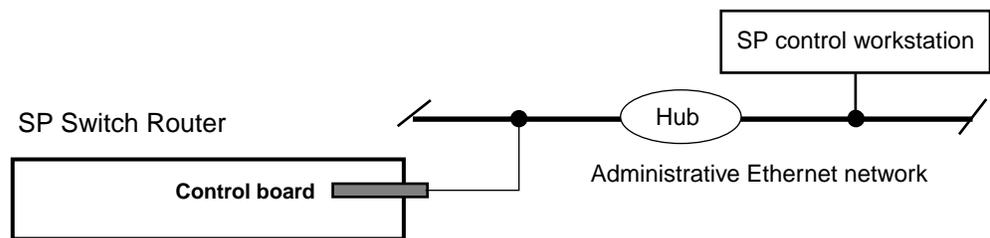


Figure 2-2. SP system administrative Ethernet connections

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.

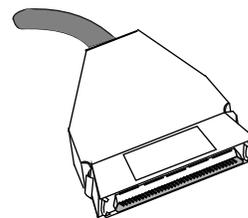


Figure 2-3. SP Switch Router Adapter cable 50-pin connector end

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 number	topology filename	primary name	arp enabled	switch_node 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.

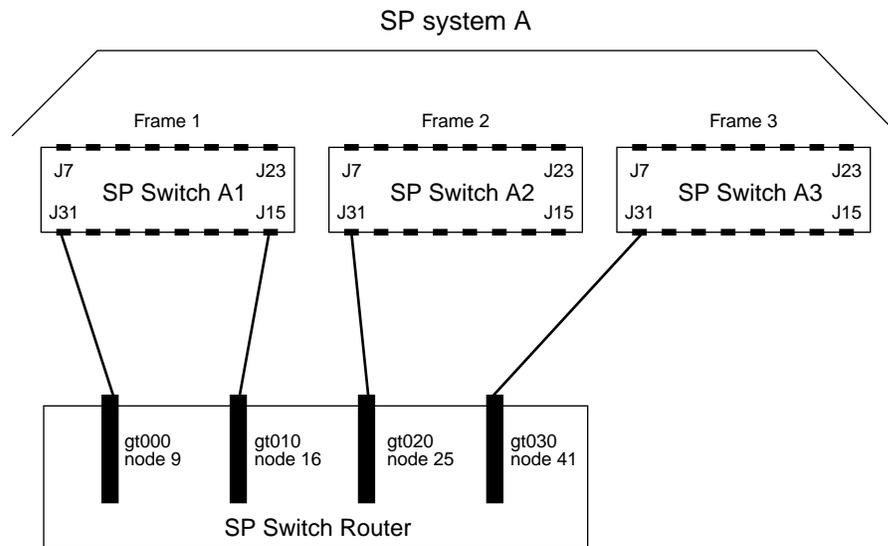


Figure 2-4. How frames enable connections to multiple SP Switches

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:

<code>grifconfig.conf</code>	- identifies each logical interface on a media card
<code>snmpd.conf</code>	- enables SNMP capabilities
<code>grdev1.conf</code>	- 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, <i>off</i> |
| - when to dump: | default, <i>at card reset or hang</i> |
| - dumps to save: | default, <i>four</i> |

- 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 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 Guide*, "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 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>
#
```

Configuring the SP Switch Router Adapter

Step 1. Check SNMP in the SP Switch Router system

```
# 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
#
```

Configuring the SP Switch Router Adapter

Step 1. Check SNMP in the SP Switch Router system

```
#      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>/<tssel>
#      nsap ::=     hexes
#      tssel ::=    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.

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.JAN
% kill 127
```

Step 2. Assign IP addresses

Assign an IP address and other parameters to the SP Switch Router Adapter interface. There are two ways, 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

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

```
# name address netmask broad-dest arguments |
gt020 198.11.152.24 255.255.255.0 255.255.255.255 mtu value
```

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:

```
super> sh
#
```

Configuring the SP Switch Router Adapter

Step 2. Assign IP addresses

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 an SP Switch Router, model 04S, the SP Switch Router Adapter card interface names look like these: `gt000`, `gt010`, `gt020`, `gt030` (only the slot # changes).

Figure 2-5 defines the components in the SP Switch Router Adapter card interface name:

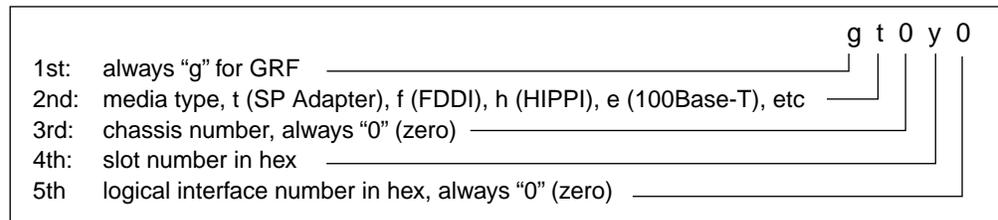


Figure 2-5. Components in the SP Switch Router Adapter card's interface name

Internet address

The Internet address is the 32-bit IP address for the specified logical interface. The address is in standard dotted-decimal (octet) notation: `xx.xx.xx.xx`.

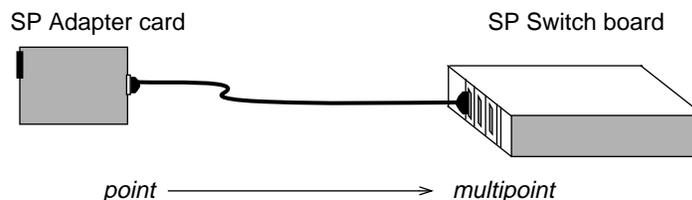
Netmask

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.

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.



When you assign an IP address to a logical interface on a point-to-point media such as HIPPI or ATM, the destination address is entered in the broadcast address field. Note that any entry in the broadcast address field for HIPPI or ATM makes it a point-to-point connection to that

address. If you remove the broadcast address, you create a non-broadcast, multi access (NBMA) interface.

Argument field

This field is optional for SP Switch Router Adapter cards. The arguments field 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-oscillato+
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 Guide 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-oscillato+
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_executable_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 at which specific events a dump is taken for a particular card.

The setting is the sum of one or more values. You can enter the sum in either decimal or hex.

Configuring the SP Switch Router Adapter

Step 3. Change profile settings

Here are the values used, the decimal value is in parenthesis:

```
0x0001 (1) - dump always (override other bits)
0x0002 (2) - dump just the next time it reboots
0x0004 (4) - dump on panic
0x0008 (8) - dump whenever reset
0x0010 (16) - dump whenever hung
0x0020 (32) - dump on power up
```

The setting `config = 20` is the sum of `0x0004` (dump on panic), and `0x0010` (dump whenever hung) expressed in decimal.

The setting `config = 0x2c` is the sum of `0x0004`, `0x0008`, and `0x0020`: dump during panic, reset, and power up (you sum to obtain `0x2c`). You can also enter this sum as `config = 44`.

```
super> set config = 44
super> write
CARD8/ written
```

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 = 2`, 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 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 Guide* for a description of the system Dump profile.

Change executables for all dev1 cards - Load profile

Global 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 } {2 /+
rmb = { /usr/libexec/portcards/rm.run N/A off 0 1 < > }
hssi = { /usr/libexec/portcards/hssi_rx.run /usr/libexec/portcards/hssi_+
dev1 = { /usr/libexec/portcards/dev1_rx.run /usr/libexec/portcards/dev1_+
atm-oc3-v2 = { /usr/libexec/portcards/atmq_rx.run /usr/libexec/portcards+
fdi-v2 = { /usr/libexec/portcards/fddiq-0.run /usr/libexec/portcards/fd+
atm-oc12-v1 = { /usr/libexec/portcards/atm-12.run N/A off 0 1 < > }
ethernet-v1 = { /usr/libexec/portcards/ether_rx.run /usr/libexec/portcar+
sonet-v1 = { /usr/libexec/portcards/sonet_rx.run /usr/libexec/portcards/+
```

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
```

Enable diagnostic boot sequence

You can also enable a diagnostic boot sequence using the `enable-boot-seq` field.

In the default boot sequence, a media card boots, its executable run-time binaries are loaded, and the card begins to execute that code. You have the option to configure the card's boot sequence so that after booting, the card loads and runs diagnostics before it loads and runs the executable binaries. Set the `enable-boot-seq` field to on and use **write** to save the change:

```
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 = < >

super> set enable-boot-seq = on
super> write
LOAD written
```

To disable the diagnostic boot sequence, read the Load profile again, bring up the `dev1` fields, and set the `enable-boot-seq` field to off. Use **write** to save the change:

```
super> set enable-boot-seq = off
super> write
LOAD written
```

Change dump defaults for all dev1 cards - Dump profile

Global 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 0} {fddi 20 /var/portcards/grdump 2} {rmb 20 /+
dump-vector-table = <{2 fddi "FDDI default dump vectors" <{1 "fddi core +
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 = { hippo 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 }

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

The setting is the sum of one or more values. You can enter the sum in either decimal or hex.

Here are the values used, the decimal value is in parenthesis:

```
0x0001 (1) - dump always (override other bits)
0x0002 (2) - dump just the next time it reboots
0x0004 (4) - dump on panic
0x0008 (8) - dump whenever reset
0x0010 (16) - dump whenever hung
0x0020 (32) - dump on power up
```

The setting `config = 20` is the sum of 0x0004 (dump on panic) and 0x0010 (dump whenever hung) expressed in decimal.

The setting `config = 0x2c` is the sum of 0004, 0008, and 0020: dump during panic, reset, and power up (you sum to obtain 0x2c). You can also enter this sum as `config = 44`.

```
super> set config = 44
super> write
CARD8/ written
```

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 memory" 16+
6 = {6 fddi-v2 "FDDI/Q default dump vectors" < { 1 "fddi/Q CPU0 core mem+
7 = {7 hssi "HSSI default dump vectors" < { 1 "hssi rx SRAM memory" 2097+
8 = {8 ethernet-v1 "ETHERNET default dump vectors" < {1 "Ethernet rx SRA+
9 = {9 dev1 "DEV1 default dump vectors" < { 1 "dev1 rx SRAM memory" 2097+
10 = {10 atm-oc12-v1 "ATM OC-12 default dump vectors" < {1 "ATM-12 SDRAM+
11 = {11 sonet-v1 "SONET default dump vectors" < {1 "SONET rx SRAM memor+
```

This sequence shows the areas 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 share+

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 share+

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 setup 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 to **dev1config** after the SP Switch Router Adapter card is activated on the SP switch.

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

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      "00:00:00:01:00:00:02:00:03" # 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
```

Configuring the SP Switch Router Adapter

Step 4. Run `dev1config` to create `grdev1.conf`

```
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 domain name of the SP 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 SP Switch Router to install files

To install the system configuration files, first save the files and then reboot the SP Switch Router.

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
# reboot -i
```

Saving configuration files

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

```
# grwrite -v
```

To save an alternate configuration on the internal flash based upon the currently-running configuration on the internal flash device:

```
# grsnapshot -si -di=revision,version
```

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** command. 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 `Ctrl+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
```

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 Configuration 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 and Messages 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 **gcard** command to check the card's readiness and state. The **gcard** 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. 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.
- 6 From the SP control workstation, use an **Eunforce** 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 and Messages Guide*.

Configuring the SP Switch Router Adapter

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

Monitoring and Management Tools

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

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 commands	3-2
SP Switch Router UNIX tools	3-5
Using the netstat command	3-7
SP Switch Router Adapter card maint commands	3-11
Burning in media card flash memory	3-14
SP Switch Router dumps	3-15
SP Switch Router logs	3-16

SP Switch Router commands

This section provides a brief overview of SP Switch Router-specific commands. These are administrative and configuration commands, and most are prefixed with **gr**. SP Switch Router commands manage memory and support multiple configuration versions. These include: **cscslog**, **getver**, **grfins**, **grsite**, **grsnapshot**, **grwrite**, **mountf**, **setver**, **umountf**, and **vpurge**.

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

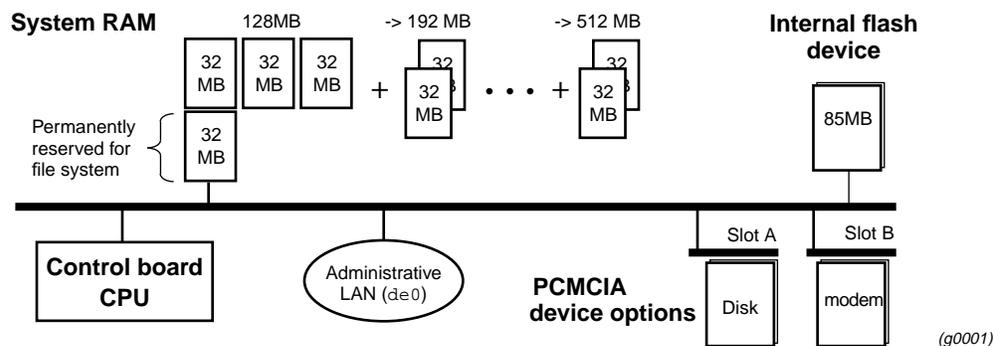


Figure 3-1. SP Switch Router control board memory components

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

cscsconfig

cscsconfig 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.

getver

This command tells you the version of the operating system that is currently running. Used in conjunction with **setver**, **getver** can also report which release version will be run the next time the system is booted. **setver** 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.

grcard

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

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.

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. When **grrmb** is entered, the screen prompt changes to:

```
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.

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

This command displays an individual media card's route table.

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 reports layer 3 (IP and ICMP) forwarding statistics for all media card types. Error reporting includes the saved source and destination IP addresses of the packet that caused the last error of each type reported.

The **grstat** command reports many of the Layer 2 (data link layer) statistics currently reported by individual media card **maint** commands. Examples are at the end of this section.

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 Ascend 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** also works on the router's Ethernet LAN interface located on the SP Switch Router control board (`de0`), and the SP Switch Router communications bus (`rmb0`).

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.

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 -rn** prints the current table of installed routes
In the output from **netstat -rn**, the => symbol next to a route means it is a duplicate key, but with a different netmask.
- **netstat -rs** prints routing statistics
- **netstat -in** shows all configured interfaces
- **netstat -an** prints a list of all active connections
- **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>      0:0x48:0        496      0    496     0    0
lo0       1536 <GRIT>       0:0x48:0        496      0    496     0    0
gl000*   1524 <link4>      0              0      0     0      0    0
gh010*   65280 <link11>     0              0      0     0      0    0
gt020    65520 <link5>      0              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    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

```

Monitoring and Management Tools

Using the netstat command

```
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
```

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 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 samples of **maint** commands you may find useful.

maint 3 - display configuration and status

To return internal SP Switch Router Adapter card configuration parameters, enter: **maint 3**

```
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.....: 0xffffffffc0
[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

To return a set of data transfer statistics for the input and output ports, enter: **maint 4**

```
GR 07> maint 4
[RX] Media Statistics
[RX] input:
[RX] Port      Bytes      Packets      Errors      Discards
[RX] -----
[RX] 0 0000000000005233360 0000000000000000843 0000000002 0000000002
[RX] 1 0000000000000000000 0000000000000000000 0000000000 0000000000
[RX]
[RX] output:
[RX] Port      Bytes      Packets      Discards
[RX] -----
[RX] 0 000000000000339524640 00000000000000005182 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] Port 1:
[RX] Odd Length TX Packets: 0
[RX] TX Dropped Fifo Full: 0
[RX] TX Dropped Line Down: 0
```

(Ignore the output at the end of the display for port 1, port 1 does not exist.)

maint 16 - display multicast routing table

This command shows current entries in the virtual interface table and the multicast forwarding cache; it may be of use when multicast options are implemented.

```
GR 07> maint 16
GR 07> [RX]
[RX]
[RX] Virtual Interface Table is empty
[RX]
[RX] Multicast Forwarding Cache is empty
[RX]
```

maint 189 - display ARP table

This command returns the current ARP entries and IP address:

```
GR 07> maint 189 1
GR 07> [RX]
[TX]
[TX] ARP Entry: IP= 129.40.192.131, SW-node=2, state=3
[TX] ARP Entry: IP= 129.40.192.132, SW-node=3, state=3
[TX] ARP Entry: IP= 129.40.192.135, SW-node=6, state=3
[TX] ARP Entry: IP= 129.40.192.136, SW-node=7, state=3
[TX] ARP Entry: IP= 129.40.192.139, SW-node=10, state=3
[TX] ARP Entry: IP= 129.40.158.131, SW-node=2, state=3
[TX] ARP Entry: IP= 129.40.158.132, SW-node=3, state=3
[TX] ARP Entry: IP= 129.40.158.135, SW-node=6, state=3
[TX] ARP Entry: IP= 129.40.158.136, SW-node=7, state=3
[TX] ARP Entry: IP= 129.40.158.139, SW-node=10, state=3
[TX] ARP Entry: IP= 129.40.158.131, SW-node=255, state=1
```

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*.

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:

- `bsdxc.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 `bsdxc.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 can specify the number of dumps in the Dump or appropriate Card profile. 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.

tcpdump

You can also execute the UNIX `tcpdump` command on any SP Switch Router media card. Note that `tcpdump` can interfere with network operations and performance because it turns on filtering to log the IP packet headers. Refer to the `tcpdump` man page for more information.

The following command produces a line of information for each IP packet an SP Switch Router Adapter card in slot 2 sees:

```
# tcpdump -i gt020
```

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/logs`.

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

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

The `/var/logs` 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\r\n'
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 0:0x7:0: dst=0:0x40:16, src=0:0x7:0, type=GRID:
hwtype=HIPPI cmd=MSGP 'SRAM size is 512KB\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 '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

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 fr[3289]: Error opening grifconfig file drifconfig.conf. Exiting.
Feb 17 20:04:31 tester fr[3637]: LMI type STANDARD is not supported, type NONE is
selected
Feb 17 20:04:32 tester last message repeated 6 times
Feb 17 21:54:40 tester login: ROOT LOGIN (root) ON tty1 FROM mondo
Feb 17 21:55:58 tester fr[5107]: 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:g0060, 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 1997
Feb 18 10:04:17 tester kernel: nit@bsd2.netstar.com:/nit/A1_2_8/BSDI/sys/compile/RMS
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 3-3. Sample entries in the messages log

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`.

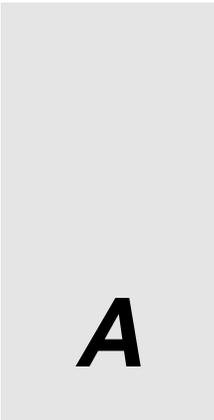
```
tester-26 more gr.boot
Mar 23 11:08:38 tester grboot[27388]: Starting up (after openlog)...
Mar 23 11:08:38 tester grboot[27389]: read packet from 0:0x3:0 (cmd=BOOTME)
Mar 23 11:08:38 tester grboot[27389]: grinch dump config (2.12.2.4.7.2.3.3=0x14)
Mar 23 11:08:38 tester grboot[27389]: grinch card 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 11:08:40 tester log2[27398]: grload.sh 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/run-
load.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/port-
cards/hssi_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/port-
cards/dev1_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/port-
cards/dev1_rx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/port-
cards/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/xlx-
load.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: 1 boot images resident (1 max)
```

Figure 3-4. Sample entries in the `gr.boot` log

Monitoring and Management Tools

SP Switch Router logs

Part Numbers



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

Parts list – model 04S

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

IBM part number	Ascend 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
64G5589	N/A	<i>IBM 9076 SP Maintenance Information Manual, Vol 1</i>
64G5586	N/A	<i>IBM 9076 SP Maintenance Information Manual, Vol 2</i>
17H5085	N/A	<i>IBM 9076 SP Site Planning Guide</i>

Parts list – model 16S

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

IBM part number	Ascend 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)
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
64G5589	N/A	<i>IBM 9076 SP Maintenance Information Manual, Vol 1</i>
64G5586	N/A	<i>IBM 9076 SP Maintenance Information Manual, Vol 2</i>
17H5085	N/A	<i>IBM 9076 SP Site Planning Guide</i>

Part Numbers
Parts list – model 16S

Log Messages

B

This appendix describes log messages that are generated by the SP Switch Router Adapter card. Most are written to the `/var/log/gr.console` file.

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

- `SOURCE_FILE` specifies the software module that generates the message
- `TEXT` is the actual text of the message
- `LOG_FILE` provides the name of the file where the message text is written
- `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`.

Alphabetical list of messages

The first line of each error message is listed here. Messages appear in the order in which they are described in the following pages.

```
"Access FIFO Sync Error from RC, int1=%d\n"  
"Access FIFO Sync Error from TC, int1=%d\n"  
"ACK WORDS: 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x\n"  
" ARP added: IP= %s, SW-node=%d, state=%d\n"  
"Bad Hdr/Svc received, Ret code=%d\n"  
"Board Configuration timed-out, retrying\n"  
"\tBroadcasting an ARP Request.. \n"  
"Configuration Parameters:\n"  
"Configuring transmit side.\n"  
"CPU ready msg received from TX-CPU\n"  
"Descriptor Sync Error from RC, int1=%d\n"  
"Descriptor Sync Error from TC, int1=%d\n"  
"Discarding arp msg, msg_type is not 0x82\n"  
"Expect NODE_INIT but received Stat/Err Request\n");  
"Hot interrupt detected, ier1=0x%8x, ier2=0x8x\n"  
"Hot interrupt detected, ier1=0x%8x, ier2=0x8x\n"  
"Initializing Main Task...\n"  
"Initializing RX Subsystem data structure.\n"  
"IOSTB3:RX SET TOD service message received\n"  
"Lost of STI clock, TBIC Status = 0x%x\n"  
"Lost of STI clock, TBIC Status = 0x%x\n"  
"NetStar GigaRouter %s RX Interface Initializing:\n"  
"NetStar GigaRouter %s TX Interface Initializing:\n"  
"RX: Clock is valid\n"  
"RX-CPU Loaded msg received from TX-CPU\n"  
"RX: got TBIC INITED from TX\n"  
"RX: Port connected, stat=0x%x\n"  
"\tRX: send SEND_TOD to the switch\n" or  
"RX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x\n"  
"RX-TBIC permanent error(s) detected IER1=0x%x,  
"RX-TBIC transient error(s) detected IER1=0x%x, IER2=0x%x\n"  
"SEND TOD service message received\n"  
"Sending Grid Init\n"  
"Sending IF RESET message to TX-CPU\n"  
"Sending mib-2 trap, type = %d, state = %d\n"  
"Sending params to TX...\n"  
"State machine changes from xxx to yyy\n"  
"State machine changes from xxx to yyy\n"  
"Status/Err service message received\n"  
"Svc Msg rxed, svc_cmd=0x%x %s, node_cmd: 0x%x %s\n"
```

"Switch Route table loaded, %d entries\n"
"Switch route entry not found, node = %d\n"
"TB4 segment received in error\n"
"TB4 segment received in wrong state\n"
" TBIC INIT msg sent to TX-CPU \n"
"TBSI Online Init the ORCAs\n"
"\tTBSI-RX: TBIC's TOD: 0x%x, 0x%x\n"
"TBSI-TX Unexpected SVC threshold interrupt\n"
"TBUS Parity Error from RC, int1=%d\n"
"TBUS Parity Error from TC, int1=%d\n"
"Timed out resolving ARP. If: %d IP: %d.%d.%d.%d\n"
"Timeout waiting for CFG_DN bits clear, stat0=%x\n"
"Timeout waiting for FPGA_INIT_COMPLETE, stat0=%x\n"
" TX-CPU: Access FIFO busy, discarding IP packet\n"
"TX-CPU Config Params msg received from RX-CPU\n"
" TX-CPU sending msg type=%d to RX-CPU\n"
" TX-CPU TBIC Init msg received from RX-CPU\n"
"\tTX: Port is connected, stat=0x%x\n"
"TX-PROR: start_node: %d, end_node: %d, # entries: %d\n"
"\tTX: psuedo STI clock is valid\n"
"\tTX: Setting the TC in operational mode, stat= 0x%x\n"
"TX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x\n"
"TX-TBIC permanent error(s) detected IER1=0x%x
"TX-TBIC transient error(s) detected IER1=0x%x, IER2=0x%x\n"
"Un-expected descriptor from RC, desc_type=%d\n"
"Un-expected descriptor from TC, desc_type=%d\n"

Message descriptions

The description are in alphabetical order.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Access FIFO Sync Error from RC, int1=%d\n"
LOG_FILE: /var/log/gr_console
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-synched. This is a fatal error, the card is reset and reloaded automatically. int1 is the content of the RC's interrupt register.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Access FIFO Sync Error from TC, int1=%d\n"
LOG_FILE: /var/log/gr_console
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-synched. This is a fatal error, the card is reset and reloaded automatically. int1 is the cpntent of the TC's interrupt register.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "ACK WORDS: 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x, 0x%08x\n",
LOG_FILE: /var/log/gr_console
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 primary as a debug tool to debug the SP switch manager code.

SOURCE_FILE: tx/tbsi_arp.c
TEXT: " ARP added: IP= %s, SW-node=%d, state=%d\n"
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.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Bad Hdr/Svc received, Ret code=%d\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING
DESCRIPTION: This message is logged when a bad service message header is received. This is a indication that there was some sort of error on the link.

SOURCE_FILE: rx/main.c
TEXT: "Board Configuration timed-out, retrying\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when a timed-out condition has occurred while the IOSTB3 is waiting for it configuration parameters from the RMS. The card will retry, no actions need to be taken.

SOURCE_FILE: tx/tbsi_arp.c
TEXT: "\tBroadcasting an ARP Request.. \n"
TEXT: "\tBroadcasting an Gratuitous ARP Request.. \n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged whenever the TX-CPU broadcasts an arp request or a gratuitous arp message.

SOURCE_FILE: rx/tbsi_cnfg.c
TEXT: "Configuration Parameters:\n"
TEXT: "\tSlot Number.....: %d\n"
TEXT: "\tNode Number.....: %d\n"
TEXT: "\tNode Name.....: %s\n"
TEXT: "\tSW Token.....: %s\n"
TEXT: "\tArp Enabled.....: %d\n"
TEXT: "\tSW Node Number.....: %d\n"
TEXT: " tIP.....: 0x%x\n"
TEXT: "\tIP Mask.....: 0x%x\n"
TEXT: "\tMax Link Size.....: %d\n"
TEXT: "\tHost Offset.....: %d\n"
TEXT: "\tConfig State.....: %d\n"
TEXT: "\tSystem Name.....: %s\n"
TEXT: "\tNode State.....: %d\n"
TEXT: "\tSwitch Link Chip.....: %d\n"
TEXT: "\tTransmit Delay.....: %d\n"
LOG_FILE: /var/log/gr_console

Log Messages

Message descriptions

SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the IOSTB3 receives its configuration parameters.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "Configuring transmit side.\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "CPU ready msg received from TX-CPU\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the TX-CPU is loaded and configured.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Descriptor Sync Error from RC, int1=%d\n"
LOG_FILE: /var/log/gr_console
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-synched. This is a fatal error, the card is reset and reloaded automatically. int1 is the content of the RC's interrupt register.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Descriptor Sync Error from TC, int1=%d\n"
LOG_FILE: /var/log/gr_console
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-synched. This is a fatal error, the card is reset and reloaded automatically. int1 is the content of the TC's interrupt register.

SOURCE_FILE: rx/tbsi_rx.c
TEXT: "Discarding arp msg, msg_type is not 0x82\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING
DESCRIPTION: This message is logged when the IOSTB3 card receives a message expected to be an ARP message, and it is not. This message was used, historically, to log errors from the node during the test phase when the software on the node did not conform the spec. The TB4 header and the message data are included in the log.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Expect NODE_INIT but received Stat/Err Request\n");
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when a Read Status service message is received while the IOSTB3 card is expecting a NODE_INIT message.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Hot interrupt detected, ier1=0x%8x, ier2=0x8x\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: FATAL
DESCRIPTION: This message is logged when a TBIC hot interrupt condition has been detected.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Hot interrupt detected, ier1=0x%8x, ier2=0x8x\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: FATAL
DESCRIPTION: This message is logged when a TBIC hot interrupt condition has been detected.

SOURCE_FILE: rx/main.c
TEXT: "Initializing Main Task...\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the RX-CPU enters its main control (while) loop.

Log Messages

Message descriptions

SOURCE_FILE: rx/tbsi_rx.c
TEXT: "Initializing RX Subsystem data structure.\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "IOSTB3:RX SET TOD service message received\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged every time a SET TOD service messages is received. Historically, this type of messages was used to aid debugging between the switch manager and the card.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Lost of STI clock, TBIC Status = 0x%x\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: ERROR
DESCRIPTION: This message is logged when the TBIC's STI clock (sttaus bit) becomes invalid. Status is the TBIC's status register.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Lost of STI clock, TBIC Status = 0x%x\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: ERROR
DESCRIPTION: Logged when the TBIC's STI clock (sttaus bit) becomes invalid.

SOURCE_FILE: rx/main.c
TEXT: "NetStar GigaRouter %s RX Interface Initializing:\n"
TEXT: "\tCode Version: %s\n"
TEXT: "\tCompiled in: %s,\n"
TEXT: "\t on: %s.\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/main.c
TEXT: "NetStar GigaRouter %s TX Interface Initializing:\n"
TEXT: "\tCode Version: %s\n"
TEXT: "\tCompiled in: %s,\n"
TEXT: "\t on: %s.\n"
LOG_FILE: /var/log/gr.console
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 version the software executed.

SOURCE_FILE: rx/tbsi_rc.c
TEXT: "RX: Clock is valid\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when Receive TBIC's STI clock becomes valid.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "RX-CPU Loaded msg received from TX-CPU\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: Logged when the TX Side run-time software is successfully loaded.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "RX: got TBIC INITED from TX\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: Logged when the TX-CPU has initialized the Transmit TBIC.

SOURCE_FILE: rx/tbsi_rc.c
TEXT: "RX: Port connected, stat=0x%x\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

Log Messages

Message descriptions

DESCRIPTION: Logged when the Receive TBIC's receive port is connected to the switch chip's send port.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "\tRX: send SEND_TOD to the switch\n" or
TEXT: "\tRX: Reading TBIC's TOD \n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: Historically, these messages were used to aid debugging between the switch manager and the card.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "RX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
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 go back to CONFIGURED state. The IOSTB3 card treats TBIC outage errors as permanent errors.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "RX-TBIC permanent error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "RX-TBIC transient error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when a TBIC transient error occurs.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "SEND TOD service message received\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "Sending Grid Init\n"
TEXT: "Sending IF Init for IF 0x%x.\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when the IOSTB3 card is loaded, configured, and it is requesting the RMS to create and bring up the interface for the card.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Sending IF RESET message to TX-CPU\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_cnfg.c
TEXT: "Sending mib-2 trap, type = %d, state = %d\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when the IOSTB3 sends an trap request the mib2d. mib2d, in turn, will generate and send a TRAP PDU to the managers

SOURCE_FILE: rx/main.c
TEXT: "Sending params to TX...\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "State machine changes from xxx to yyy\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: The IOSTB3's state machine is changing from the xxx state to yyy state where xxx and yyy are the values of the IOSTB3 state. Configured: 2, Off-line: 3, Off-line-Q: 4, Running: 5, and Quiesced: 6.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "State machine changes from xxx to yyy\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: The IOSTB3's state machine is changing from the xxx state to yyy state where xxx and yyy are the values of the IOSTB3 state. Configured: 2, Off-line: 3, Off-line-Q: 4, Running: 5, and Quiesced: 6.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Status/Err service message received\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged every time a Read Status service messages is received. Historically, this type of messages was used to aid debugging between the switch manager and the card.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Svc Msg rxd, svc_cmd=0x%x %s, node_cmd: 0x%x %s\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged every time a service messages is received. Historically, this type of messages was used to trace bugs in the protocols between the switch manager and the card.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Switch route entry not found, node = %d\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING

DESCRIPTION: This message is logged when the IOSTB3 card fails to find an switch route entry for a node. This indicates that there is an error in the building the switch route table or downloading function.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Switch Route table loaded, %d entries\n"
LOG_FILE: /var/log/gr_console
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 a Load Routes service message.

SOURCE_FILE: rx/tbsi_rx.c
TEXT: "TB4 segment received in error\n"
TEXT: "TB4-HDR word%d: 0x%x\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_rx.c
TEXT: "TB4 segment received in wrong state\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: WARNING
DESCRIPTION: This message is logged when a TB4 segment was received when the IOSTB3 state machine is not RUNNING nor QUIESCED state. The TB4 header and the message data are included in the log. This happens when a node sends data packets to the IOSTB3 card without knowing that the card interface is down.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: " TBIC INIT msg sent to TX-CPU \n"
LOG_FILE: /var/log/gr_console
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 TBIC INITED message from the TX-CPU.

SOURCE_FILE: rx/tbsi_cfg.c
TEXT: "TBSI Online Init the ORCA\n"
TEXT: "xmain_dp= %x, xmain_hp= %x\n"
TEXT: "len1=%d, time=%x, date=%x, data=%x\n"
LOG_FILE: /var/log/gr_console

Log Messages

Message descriptions

SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: Logged when the IOSTB3 prepares to program the FPGAs.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "\\tTBSI-RX: TBIC's TOD: 0x%x, 0x%x\\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: The IOSTB3 displays the content of the TBIC's TOD register every time it reads it.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TBSI-TX Unexpected SVC threshold interrupt\\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "TBUS Parity Error from RC, int1=%d\\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TBUS Parity Error from TC, int1=%d\\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: rx/tbsi_fpga.c
TEXT: "Timeout waiting for CFG_DN bits clear, stat0=%x\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: FATAL
DESCRIPTION: This message is logged when the IOSTB3 fails to program the FPGAs. Replace the card. stat0 is the content of the hardware status register.

SOURCE_FILE: rx/tbsi_fpga.c
TEXT: "Timeout waiting for FPGA_INIT_COMPLETE, stat0=%x\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "RX: got TBIC INITED from TX\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the TX-CPU has initialized the Transmit TBIC.

SOURCE_FILE: rx/tbsi_rc.c
TEXT: "RX: Port connected, stat=0x%x\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: rx/tbsi_rc.c
TEXT: "RX: Setting the RC in operational mode, stat=0x%x\n"
LOG_FILE: /var/log/gr.console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the RX Side of the IOSTB3 card is ready to receive data messages from the switch.

Log Messages

Message descriptions

SOURCE_FILE: tx/tbsi_arp.c
TEXT: "Timed out resolving ARP. If: %d IP: %d.%d.%d.%d\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: tx/tbsi_arp.c
TEXT: " TX-CPU: Access FIFO busy, discarding IP packet\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: tx/tbsi_ipc.c
TEXT: "TX-CPU Config Params msg received from RX-CPU\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: tx/tbsi_ipc.c
TEXT: " TX-CPU sending msg type=%d to RX-CPU\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: tx/tbsi_ipc.c
TEXT: " TX-CPU TBIC Init msg received from RX-CPU\n"
LOG_FILE: /var/log/gr.console
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.

SOURCE_FILE: tx/tbsi_tc.c
TEXT: "\tTX: Port is connected, stat=0x%x\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TX-PROR: start_node: %d, end_node: %d, # entries: %d\n"
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when a Processor Routes service message is processed

SOURCE_FILE: tx/tbsi_tc.c
TEXT: "\tTX: psuedo STI clock is valid\n"
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/tbsi_tc.c
TEXT: "\tTX: Setting the TC in operational mode, stat= 0x%x\n"
TEXT: "\tTX clearing interrupts, i0=0x%x, i1=0x%x\n",
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO

DESCRIPTION: This message is logged when the TX-CPU is ready to go to operational state - that is being able to send data to the TBIC.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TX-TBIC outage error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
SCOPE: CARD

Log Messages

Message descriptions

CONTEXT: RUNNING
SEVERITY: FATAL
DESCRIPTION: This message is logged when a TBIC outage error occurs. The TBICs are reset and the state machine go back to CONFIGURED state. The IOSTB3 card treats TBIC outage errors as permanent errors.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TX-TBIC permanent error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "TX-TBIC transient error(s) detected IER1=0x%x, IER2=0x%x\n",
LOG_FILE: /var/log/gr_console
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when a TBIC transient error occurs.

SOURCE_FILE: rx/tbsi_svc.c
TEXT: "Un-expected descriptor from RC, desc_type=%d\n
LOG_FILE: /var/log/gr_console
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.

SOURCE_FILE: tx/tbsi_svc.c
TEXT: "Un-expected descriptor from TC, desc_type=%d\n
LOG_FILE: /var/log/gr_console
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.

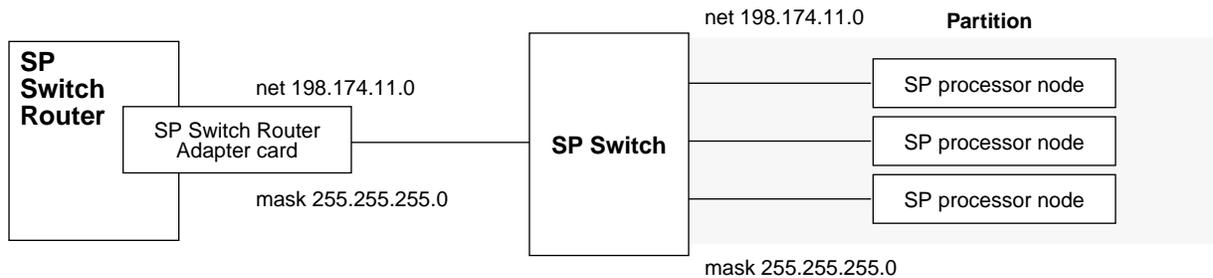


Figure C-1. Example 1: one card- one SP partition network configuration

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 *PSSP 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.

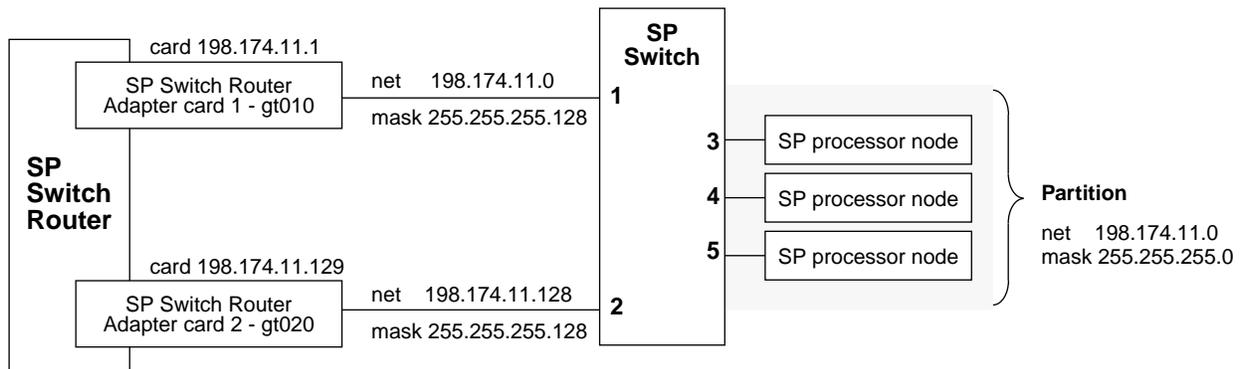
For this type of configuration, you must divide the router side of the IP network into logical subnets and assign each SP Switch Router Adapter card to a different subnet. This logical subnetting is required only on the router, the SP Switch viewpoint sees a single network.

Configuration requirements

- As configured in this example, 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.



ARP table

gt010	(0):	198.174.11.1	at	0:0:0:0:0:1
gt020	(0):	198.174.11.129	at	0:0:0:0:0:2
				⋮
				⋮

Switch node number

Figure C-2. Example 2: multiple card-single SP partition configuration

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 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 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.

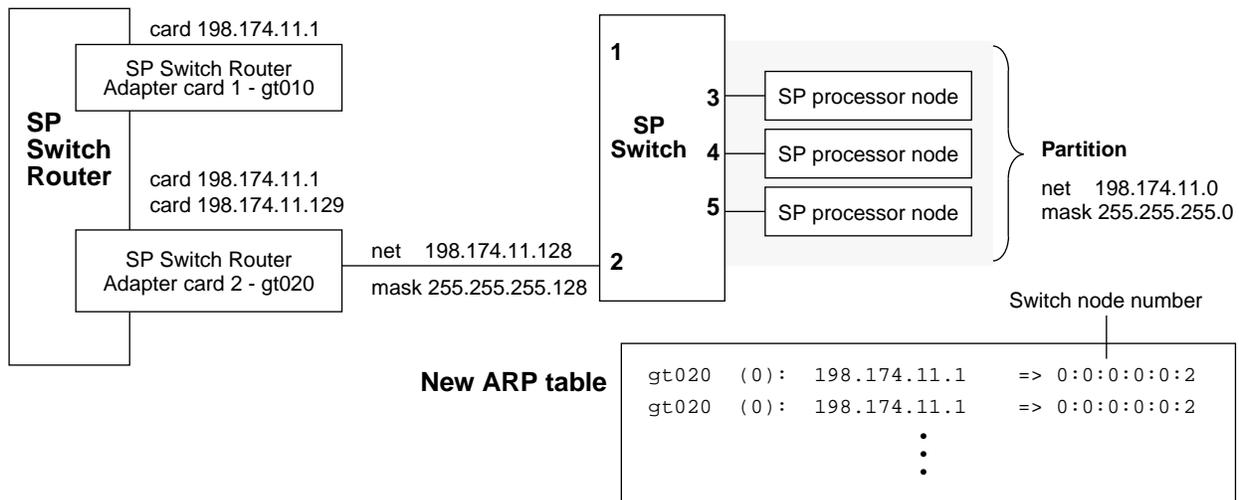


Figure C-3. Recovery from a card failure in a dually-connected configuration

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.

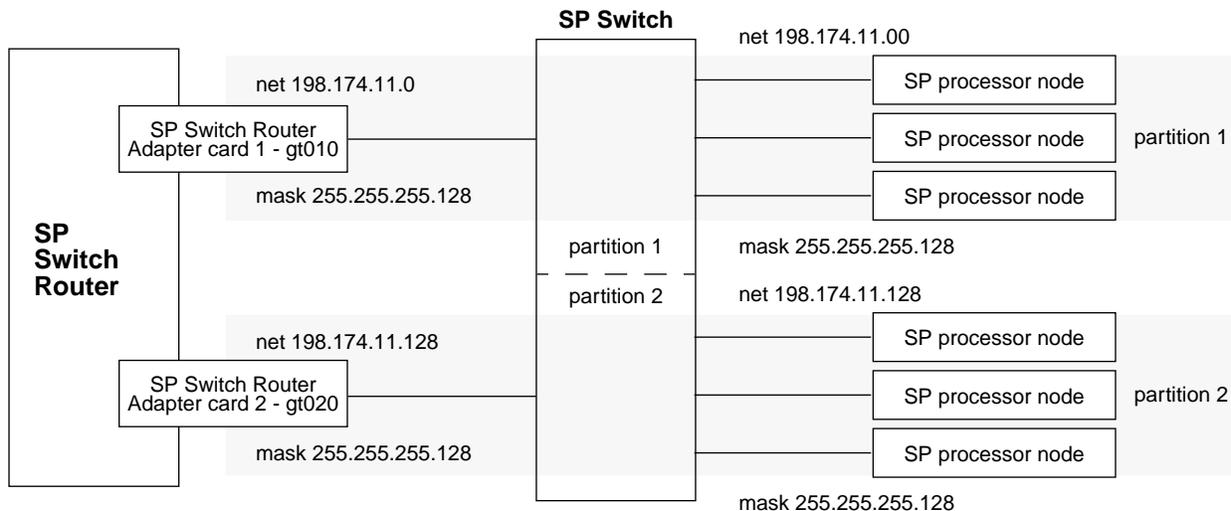


Figure C-4. Example 3: multiple card-multiple SP partition configuration

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

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 Ascend Communications, 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 Ascend 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 Ascend 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 in 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.

IBM License Agreement for Machine Code

Regardless of how you acquire (electronically, preloaded, on media or otherwise) BIOS, Utilities, Diagnostics, Device Drivers or Microcode (collectively called "Machine Code"), you accept the terms of this Agreement by your initial use of a Machine or Machine Code. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements or accessories, or any combination of them. Acceptance of these license terms authorizes you to use Machine Code with the specific product for which it is provided.

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