SP Switch Router Adapter Guide

GA22-7310-00

Part Number 7820-2007-001   October, 1997

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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 any media card in other GRF documentation. Information specific to installing and configuring the GRF router is in the documentation set.

What is in this guide?

The *Guide* contains the following chapters:

- 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,” contain information relating to
- 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.

The *Guide* also includes an index.

Related documentation

The SP Switch Router Adapter media card is not described in other GRF manuals. Information specific to the SP system is found in related IBM manuals.

SP Switch Router documentation consists of the following manuals:

- *GRF 400 Getting Started 1.2*, 7820-2001-002
- *GRF Configuration Guide 1.2*, 7820-2000-002
- *GRF Reference Guide 1.2*, 7820-2002-002
- *SP Switch Router Adapter Guide 1.2*, 7820-2007-001

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

IP routing publications

Here are publications that you may find useful:

- *TCP/IP Network Administration,* Craig Hunt (O'Reilly & Associates, Inc.)
- *Essential System Administration,* Æleen 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**
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 that you append to a command. To include an attribute, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
Italics	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.

Introduction to the SP Switch Router Adapter card

1

The RS/6000 SP Switch Router is based on the GRF 400 router manufactured by Ascend Communications. For that reason, this manual contains references to the *GRF 400 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 Getting Started 1.2* manual for SP Switch Router system installation procedures.

Chapter 1 covers these topics:

What is the RS/6000 SP Switch Router ?

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

- Performs Layer-3 switching across 4 adapter slots (4 media cards)
- Supports large suite of routing protocols
- Accommodates multiple types of media, including HSSI, 10/100Base-T (fast Ethernet), ATM 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:

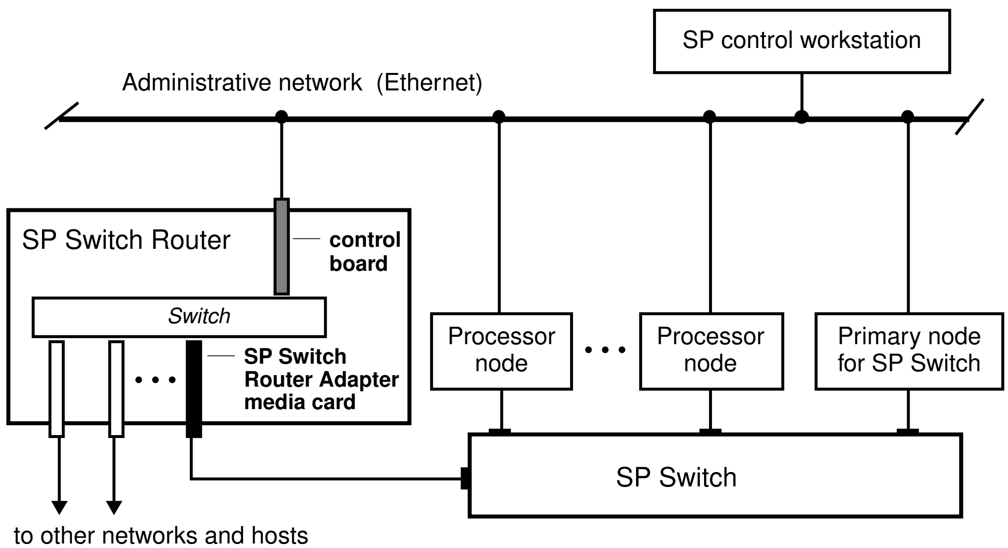


Figure 1-1. Connections between the SP Switch Router and an SP system

Configured with an IBM SP system, the SP Switch Router provides multiple media LAN and WAN connectivity for the SP. By using an SP Switch Router Adapter card, the SP system can connect to FDDI, fast Ethernet, HSSI, ATM, 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 9076 and 9077 systems. The 9076 is the IBM SP system, the 9077 is the 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 SP Switch Router chassis and an SP frame.

PCMCIA 340MB disk

The SP Switch Router shipping box also contains a PCMCIA 340MB 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 340MB external storage device.

By default, logging is turned off when the SP Switch Router boots and comes up. One of the first tasks after the system does come up is to configure the PCMCIA disk. The configuration procedure formats and mounts the device, and places the required logging pointers. This procedure is included in Chapter 2.

Redundant AC power supplies

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

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

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

Redundant supply safety

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

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

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

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

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:

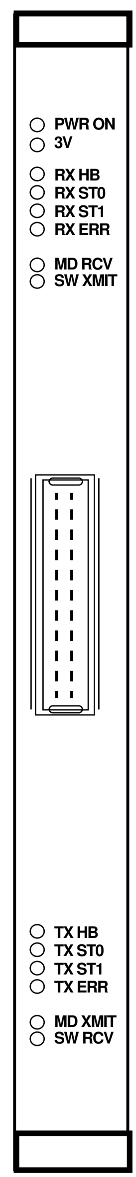
– is intelligent, and performs IP-level routing and route look-ups
– provides complete speed-decoupling between the connecting media and the gigabit/second router switch core
– fully buffers data for input and output queuing; each card has 16MB of high-speed receive buffer memory and 16MB of high-speed transmit buffers

Face plate diagram

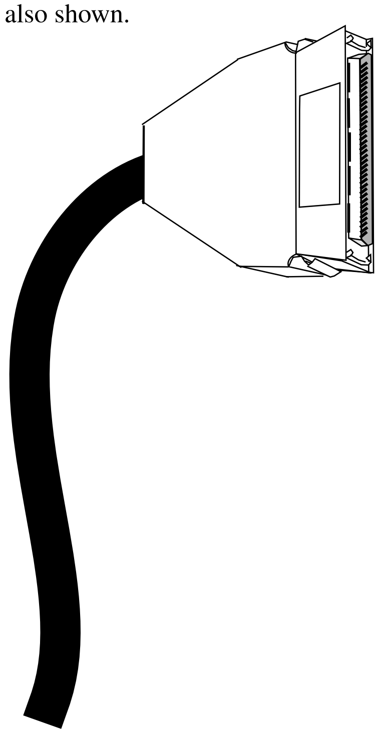
The SP Switch Router Adapter card provides one full-duplex interface.

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.

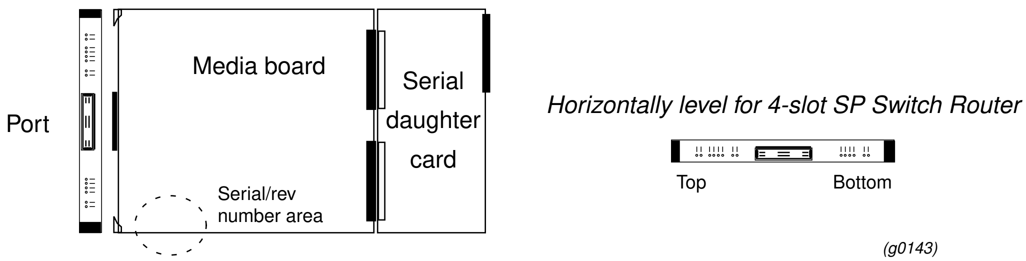


Figure 1-2. Media card components

The 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 a 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.

Turn the card horizontally. 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.

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

LED activity during normal operations

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

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

LED	Description
PWR ON	This green LED is on when 5 volts are present. Both power LEDs, 5V and 3V, can be on simultaneously.
3V	This green LED is on when 3 volts are present.
RX HB (green)	During normal run-time operations, this green LED blinks a “heartbeat” pattern for the receive side CPU. The beat is a long off, short on-off-on pattern . In the pattern, the LED goes off for 1/2 second, comes on for 1/4 second, goes off for 1/4, comes on for 1/4, and then begins the pattern again by going off for 1/2 second.
• RX ST0 (green) • RX ST1 (amber) • RX ERR (amber) These three LEDs light in different combinations to indicate five operating states for the receive port.	• ON • ON • ON STATE_0 - These three LEDs are on during hardware initialization.
	• OFF • ON • ON STATE_1 - Bottom two amber LEDs go on during software initialization, show receive port is waiting for configuration parameters.
	• ON • OFF • ON STATE_2 - Middle amber LED goes off when configuration parameters are in place and the receive port is ready to be connected.
	• OFF • OFF • ON STATE_3 - Bottom amber LED goes on to show that the receive port is connected and the card is ready to be on line
	• OFF • OFF • 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)	This green LED blinks a “heartbeat” pattern for the transmit side CPU, the beat is a long off, short on-off-on pattern during normal run time operations. In the pattern, the LED goes off for 1/2 second, comes on for 1/4 second, goes off for 1/4, comes on for 1/4, and then begins the pattern again by going off for 1/2 second.

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

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

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

SP Switch Router Adapter card specifications

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

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

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

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 media card slot. The instances of the MIB object are initialized with values queried from **grinchd.**

grinchd has originally read the null values from the `/etc/grdev1.conf` file which is included from the `/etc/grinchd.conf` file.

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*.

SNMP at system start-up

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 reset, system daemons restart and reread their files. The media cards also boot, loading their software, configuration information, and the route table.

Each time the SP Switch Router software boots, **grinchd** and **mib2d** start up. **grinchd** first reads the media card configuration parameters from `grinchd.conf` and stores the information in memory. 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 a SP Switch Router model. The creation of 16 object instances anticipates a future SP Switch Router chassis with 16 card slots.

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 anticipate a future SP Switch Router chassis with 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 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 from **grinchd**. **grinchd** sends the set of parameters according to the slot occupied by the card. 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 from **grinchd** 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, the network administrator can edit `/etc/grdev1.conf` and restart **grinchd** 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” (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 router manufactured by Ascend Communications. For that reason, this manual contains references to the *GRF 400 Getting Started*, *GRF Reference Guide*, and *GRF Configuration Guide* manuals. The SP model of the router is referred to as the SP Switch Router.

Chapter 2 covers these topics:

Introduction to installation and configuration

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

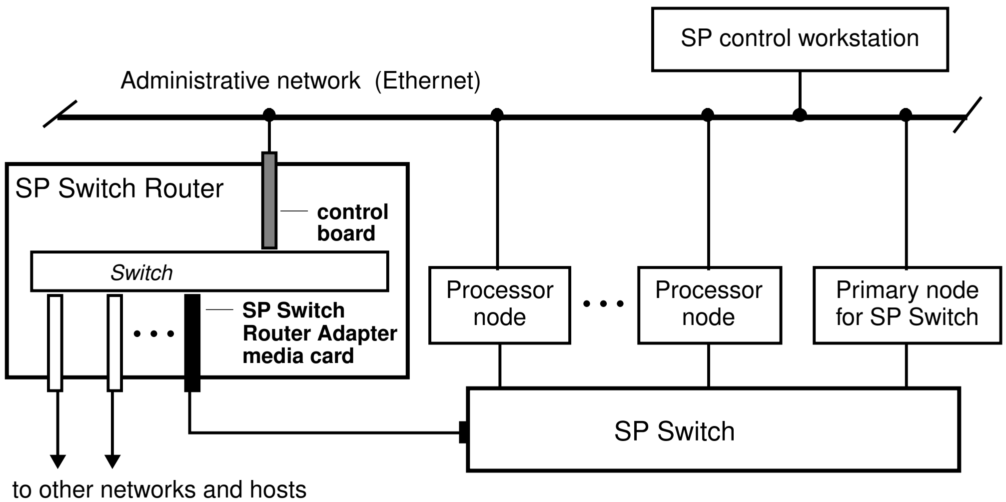


Figure 2-1. Components connecting an SP Switch Router to an SP Switch and control workstation

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

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 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 RS/6000 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, such as 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 Getting Started* manual. Ignore the prompts for network logging.
- 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*.

  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:

- the configuration procedure for the PCMCIA 340MB disk, which also initiates system logging
- an installation overview of tasks involving the SP Switch Router, the SP Switch Router Adapter card, and the SP system
- 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 SW 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 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 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 340 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 340MB 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.

System logs include:

```
gritd.packets        grinchd.log
gr.console           gr.conferrs
gr.boot              mib2d.log
```

The procedure formats and initializes an external flash (`/dev/wd1a`), temporarily mounts it on `/mnt`, creates subdirectories and symbolic links, and creates a permanent site file for storing the symbolic links.

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

3 Edit the file `/etc/rc.boot` and add this line at the end of the file:

```
mount /dev/wd1a /var/log
```

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

```
/dev/wd1a      /var/log        ufs     rw      0 2

# 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/wd1a      /var/log        ufs     rw      0 2
```

5 Edit the file `/etc/syslog.conf` and uncomment the local log configuration lines in the "`Log messages to Network`" section by removing `#net#` from each line:

```
#net#*.err;kern.debug;auth.notice;mail.crit        @server.domain.com
#net#*.notice;kern.debug;lpr,auth.info;mail.crit   @server.domain.com
#net#cron.info                                    @server.domain.com
#net#local0.info                                  @server.domain.com
#net#local1.info                                  @server.domain.com
#net#local2.*                                     @server.domain.com
#net#local3.*                                     @server.domain.com
#net#local4.*                                     @server.domain.com
#net#local5.*                                     @server.domain.com
```

6 Save all changes and reboot:

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

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.

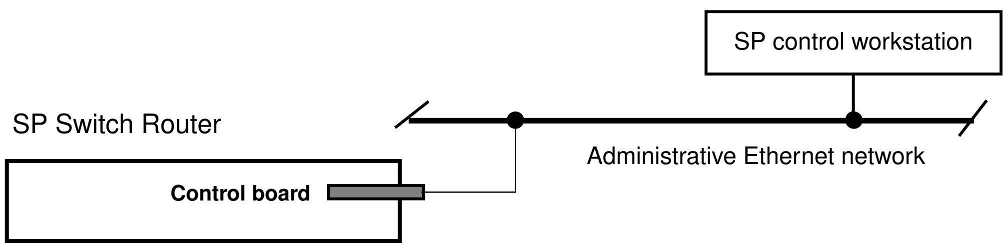


Figure 2-2. SP system administrative Ethernet connections

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.

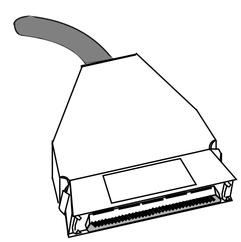


Figure 2-3. SP Switch Router Adapter cable 50-pin connector end

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. 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 related to the SP system” section.

Configuration required on the SP system

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

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 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*. The administrator should also 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 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 produces output that looks like:

```
switch_part     topology      primary      arp       switch_node
  number         filename       name       enabled     nos._used
-----------------------------------------------------------------
     1            top.7        ournode1      no         yes
```

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

3 Log into the primary node by entering:

```
tn node_hostname
```

where `node_hostname` is the host name of the primary node.

4 From the primary node, enter:

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

5 Within the `/out.top` file, look for the line 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
```

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 other 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
```

  - 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.

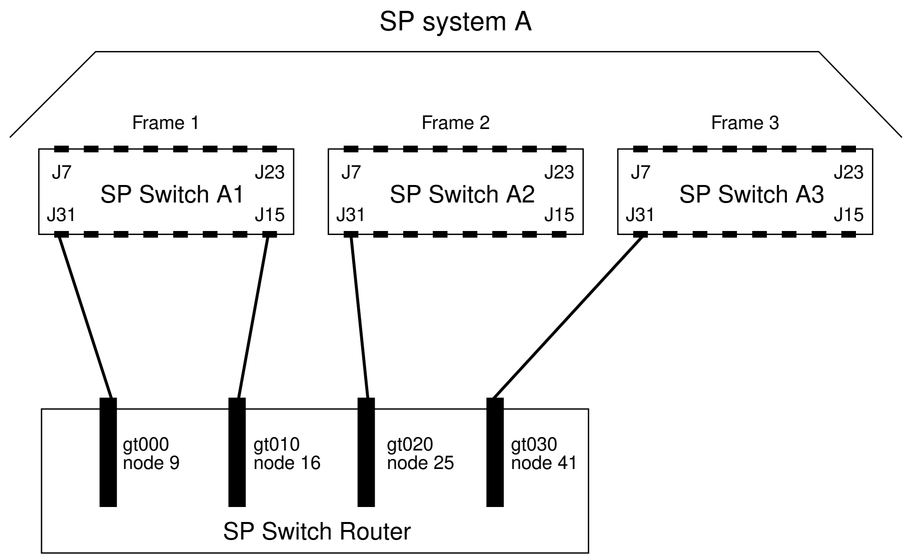


Figure 2-4. How frames enable connections to multiple SP Switches

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:

`grinchd.conf`	– configures media cards and sets other system variables
`grifconfig.conf`	– identifies each logical interface on a media card
`snmpd.conf`	– enables SNMP capabilities
`grdev1.conf`	– configures SP Switch Router Adapter cards

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

Overview of steps 1–5

Steps 1 through 5 are described following this list.

1 Configure diagnostics and dumps.
If you want to change the defaults, edit `/etc/grinchd.conf`. The settings/defaults are:

– enable/disable diagnostic boot sequence: default, *off*
– when to dump: default, *at card reset or hang*
– dumps to save: default, *two*

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

3 Assign an IP address and other parameters to the 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 edit the `/etc/grifconfig.conf` file or run `dev1config` and edit the `/etc/grdev1.conf` file.

These assignments are entered in the SP Switch Router’s `/etc/grifconfig.conf` file:

– interface name (`gt0y0`)
– IP address
– netmask
– broadcast address
– argument (MTU size)

4 Run the **dev1config** program while logged into the SP Switch Router. View the `/etc/grdev1.conf` file to verify configuration data.

5 Reboot the SP Switch Router unit.

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

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
#
```

Step 1. Change boot and dump defaults (optional)

Boot sequence

In the default boot sequence, a media card boots, its executable run-time binaries are loaded, and the card begins to execute that code. In the `/etc/grinchd.conf` file, 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.

Editing /etc/grinchd.conf

Use a UNIX editor to open `/etc/grinchd.conf` and scroll down to "SYS SECTION". Shown below is an excerpt from `/etc/grinchd.conf` that includes the Boot Sequence area and entries for the SP Switch Router Adapter cards.

Note that the HWTYPE value for the SP Switch Router Adapter card is 9. The 2.1.4.3.{HWTYPE}.5 variable sets the boot sequence on or off. The variable specific to the SP Switch Router Adapter card would be 2.1.4.3.9.5. See the uncommented entries following the `# DEV1 Boot sequence` line for variables with HWTYPE 9:

```
################################################################
# SYS SECTION
################################################################
#
                                •
                                •
                                •
#
# Boot sequences (for running diagnostics prior to executing runtime code,
#                      or loading successive runtime binaries into cards.
#                      In the case of diagnostics, grbootd will halt the
#                      load sequence if a diagnostic fails.
# Sequence variables:
#
#      2.1.4.3.{HWTYPE}.5          Turn ON/OFF the use of boot sequences
#                                  1 = ON, 0 = OFF (use defaults above)
#      2.1.4.3.{HWTYPE}.6.{SEQ}.2  type of file (unused)
#      2.1.4.3.{HWTYPE}.6.{SEQ}.3  filename to load
#      2.1.4.3.{HWTYPE}.6.{SEQ}.4  mode (for diags, default = 0)
#      2.1.4.3.{HWTYPE}.6.{SEQ}.5  number of iterations (for diags, def = 1)
#
# Port cards which use more than one processor have the binaries
# for different processors listed as follows:
#
#      2.1.4.3.{HWTYPE}.6.{SEQ}.6.{PROCESSOR+1}.2  type of file (unused)
#      2.1.4.3.{HWTYPE}.6.{SEQ}.6.{PROCESSOR+1}.3  filename to load
#      2.1.4.3.{HWTYPE}.6.{SEQ}.6.{PROCESSOR+1}.4  mode
#      2.1.4.3.{HWTYPE}.6.{SEQ}.6.{PROCESSOR+1}.5  number of iterations
#
                                •
                                •
                                •
#
# DEV1 Boot sequence
2.1.4.3.9.5        0             # DEV1 Boot Sequences 1 = ON,0 + OFF
2.1.4.3.9.6.1.4    0
2.1.4.3.9.6.1.5    1
#  --   DEV1 Binary 1 --
2.1.4.3.9.6.1.6.1.3      "/usr/libexec/portcards/dev1_rx_diag.run"
2.1.4.3.9.6.1.6.129.3    "/usr/libexec/portcards/dev1_tx_diag.run"
#  --   DEV1 Binary 2 --
2.1.4.3.9.6.2.6.1.3       "/usr/libexec/portcards/dev1_rx.run"
2.1.4.3.9.6.2.6.129.3    "/usr/libexec/portcards/dev1_tx.run"
#

                                •
                                •
                                •
```

The lines where you change the setting are:

```
# DEV1 Boot sequence
2.1.4.3.9.5        0             # DEV1 Boot Sequences 1 = ON,0 = OFF
```

The DEV1 **grinchd** variable `2.1.4.3.9.5` is shown set to 0, the default, which is off. To enable diagnostics to run at boot, change the setting to 1:

```
2.1.4.3.9.5        1             # DEV1 Boot Sequences 1 = ON,0 = OFF
```

Dump settings

Due to file system restrictions on the SP Switch Router control board, dumps must be carefully managed. Here is the area in `/etc/grinchd.conf` where dump defaults are changed:

```
##########################################################################
# SYSTEM DEFAULT PORT CARD DUMP SECTION
##########################################################################
#
# When a card gets reset via grreset -D, this grinch variable gets a bit
# set which corresponds to its card position. When the card then boots,
# grdump checks this variable and if it is set for the booting card, the
# card is dumped and its corresponding bit is cleared.
#
2.1.5.4          0
# Configure the number of dumps to retain.  In addition to this number
# of dumps, the current dump will be retained of course, as well as
# the first of the day.
2.1.5.5          0

# This section specifies how the system dumps port cards by default.
# There is one entry for each hardware type, as you'd expect, so that
# HIPPI port cards get dumped one way, FDDI another, etc.
#
# These dump configurations are handled by sets of GRINCHes with the
# following descriptors:
#
#  2.1.5.2.{HWTYPE}.2        hardware type value
#  2.1.5.2.{HWTYPE}.3        configuration bits
#  2.1.5.2.{HWTYPE}.4        file name prefix
#  2.1.5.2.{HWTYPE}.5        number of the dump vector
#
# The configuration bits that can be set are as follows:
#
#  0x0001          dump always (override other bits)
#  0x0002          dump just the next time it reboots
#  0x0004          dump on panic
#  0x0008          dump whenever reset
#  0x0010          dump whenever hung
#  0x0020          dump on power up
#
# The default value that we configure into the entires here is 0x14:
# dump whenever a card panics, or we think it's hung.
# DEV1
2.1.5.2.9.2          9
2.1.5.2.9.3          0x14
2.1.5.2.9.4          /var/portcards/grdump
2.1.5.2.9.5          9
```

There are three dump settings you may change:

- enable/disable dump on **grreset -D** command, default is off
- number of dumps to store at one time, default is 2, the current dump and the first dump of the day
- events at which to dump, default is when a card panics or is hung

To enable dump on reset, change the 0 to 1 in this variable:

```
2.1.5.4          0
```

To store more than two dumps at any one time, change the 0 in this variable to an integer:

```
2.1.5.5          0
```

To change events at which a card dumps, replace 0x14 with another hex value:

```
# DEV1

2.1.5.2.9.3          0x14
```

Change the default 0x14 using one or more of the hex values listed below:

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

The default 0x14 value is the sum of 0x0004 (dump on panic) and 0x0010 (dump whenever hung) expressed in hex, you may sum other values but you must always use hex. To dump during panic, reset, and power up, you sum 0004, 0008, and 0020 to obtain 0x20.

Step 2. 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. If none has been defined, `/etc/snmpd.conf` looks like the file excerpt included here. You must follow the procedure described in Chapter 2 of the *GRF Configuration Guide,* "How to configure SNMP."

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. 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 in the example as "MANAGER".

```
# Default Agent Configuration File
#       This file allows MANAGERS to be specified.  This is used to
#       specify which managers will be receiving which traps.
#
#       Also, COMMUNITYs can be specified. This allows that agent to
#       be configured such that it will only accept requests from
#       certain managers and with certain community strings.
#
# GRAMMAR:
#
#       INITIAL         <name> <String>
#
#       TRANSPORT       <name>
#                       [SNMP | SMUX]
#                       [OVER [UNIX | UDP | TCP] [SOCKET | TLI]]
#                       [AT <addr>]
#
#       MANAGER         <addr> [ON TRANSPORT <name>]
#                       [SEND [ALL | NO | traplist] TRAPS
#                               [TO PORT <#> ]
#                               [WITH COMMUNITY <name>]]
#
#       COMMUNITY       <name>
#                       ALLOW op [,op]* [OPERATIONS]
#                       [AS <name>]
#                       [USE encrypt ENCRYPTION]
#                       [MEMBERS                <addr> [,<addr>] ]
#
#       ALLOW <subagentId> [ON <hostSpec>]
#             WITH <passwordSpec> [<entitySpec>] [<timeout>]
#
#       DENY <subagentId> ON <hostSpec> WITH <passwordSpec>
#
#       ENTITY <EntityName> DESCRIPTION <String>
#
#       LOCAL CONTEXT <contextName> [USES] VIEW <viewName>
#                REFERS TO ENTITY <entityName> AS <oid>
#
#       PROXY CONTEXT <oid> [USES] SOURCE PARTY <oid>
#                               DESTINATION PARTY <oid>
#                               [AND] CONTEXT <oid>
#
#     VIEW <viewName> [[INCLUDE | EXCLUDE] SUBTREE <oid> [MASK <bitmask>]]+x
#
#       ALLOW op [,op]* [OPERATIONS] <sugar> SOURCE PARTY <partyName>
#                                     DESTINATION PARTY <partyName>
#                                     [AND] CONTEXT <contextName>
#
#       <partyDefinition> ::= [LOCAL] PARTY <name> ON TRANSPORT <transport>
#                             AT <addr> <AuthPriv>
```

```
#                             AS <oid>
#
#       <transport> ::= [ snmpUDPDomain | snmpCLNSDomain | snmpCONSDomain |
#                         snmpDDPDomain | snmpIPXDomain  | rfc1157Domain
#       <transport> ::=
#       <AuthPriv> ::= <noAuth> <noPriv> |
#                      <md5Auth> <noPriv> |
#                      <md5Auth> <desPriv>
#
#       <noAuth> ::= <sugar> NO AUTHENTICATION
#
#       <sugar> ::= [AND] [[WITH | USING]]
#
#       <noPriv> ::= <sugar> NO ENCRYPTION
#
#       <md5Auth> ::= <sugar> MD5 AUTHENTICATION <key>
#
#       <key> ::= <sugar> <string> AS KEY
#
#       <desPriv> ::= <sugar> DES ENCRYPTION <key>
#
#       <subagentId>  ::=  SUBAGENT <oid> |
#                          SMUX SUBAGENT <oid> |
#                          UNSPECIFIED SUBAGENTS
#
#       <hostSpec> ::= HOST <hostid> |
#                      UNSPECIFIED HOST[S]
#
#       <passwordSpec> ::= PASSWORD <string>
#                          UNSPECIFIED PASSWORDS
#
#       entitySpec ::= AS ENTITY <entityName>
#
#       <timeout> ::= USING <specificTimeout> TIMEOUT
#       <specificTimeout> ::= <number> SECOND[S] |
#                             NO
#
#       addr ::=        <ip-kind> | <rfc1449addr> | <full-ip>
#       ip-kind ::=     <hostid> |
#                       <hostid> <portid> |
#                       <portid>
#
#       hostid ::=      <hostname> | <ip>
#                               where: hostname is defined in /etc/host
#       portid ::=      [PORT | : ] <#>
#
#       full-ip ::=     <ip>:<#>
#       ip ::=          <#>.<#>.<#>.<#>
#       traplist ::=    trap [, trap]*
#       trap ::=        <trap_name>
#
#       op ::=          ALL | GET | SET | TRAP
#       encrypt ::=     NO | <name>
#
#       rfc1449addr ::= tcp_ip_addr | osi_addr
#       tcp_ip_addr ::= <ip>/<#>
#       osi_addr ::= <nsap>/<tsel>
#       nsap ::= hexes
#       tsel ::= hexes
#       hexes = hexbyte[: hexbyte]*

                WITH OTHER PASSWORD1.1080.1.1.1
                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.NOV
% kill 127
```

Step 3. Assign IP addresses - grifconfig.conf

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 `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 `grifconfig.conf` as to its:

- interface name *(an SP Switch Router convention, defined below)*
- Internet address
- netmask
- broadcast/destination address
- argument field

Some examples in this manual use slots 0–3, others use 0–15. Particular slot numbers are not significant in examples.

The format for an entry in the `grifconfig.conf` file is:

```
| interface    internet      destination  broadcast       argument |
|    name       address        netmask     address                 |
    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.

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:

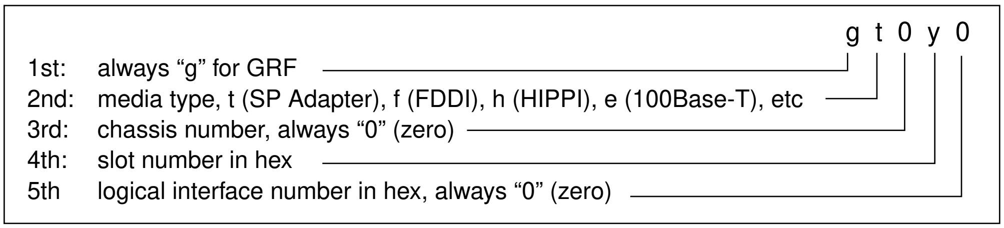


Figure 2-5. Components in the SP Switch Router Adapter card’s interface name

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

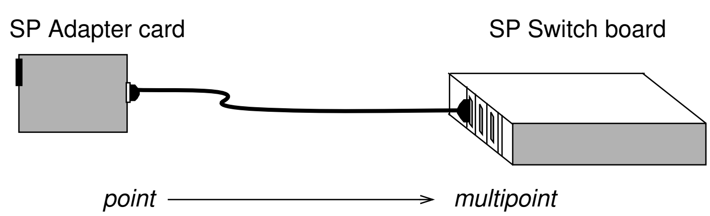
Netmask is the 32-bit address for the logical IP network on the physical network to which the specific SP Switch Router or media card physical interface is attached. The netmask is entered in standard dotted-decimal (octet) notation. If no destination/broadcast address is supplied, a netmask is required.

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.

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.

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



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. Arguments are passed to the **ifconfig** command executed by **grifconfig**.

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
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 4. Run dev1config, then view /etc/grdev1.conf

To create configuration files that are necessary for the setup of your SP Switch Router Adapter card, including `/etc/grdev1.conf`, you must run the **dev1config** command on your SP Switch Router.

Log into the SP Switch Router and start the UNIX shell using the **sh** command:

```
super> sh
#
```

Enter the **dev1config** command:

```
# dev1config
#
```

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

Contents of /etc/grdev1.conf

If you use SNMP to configure the SP Switch Router Adapter card, you do not actually edit the `/etc/grdev1.conf` file. SNMP or **ifconfig** programs write values as required. You only use this file to verify correct values for each of the configuration parameters.

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

- SNMP expects 16 interface entries, so do not remove any even if they will be unused.
- Leave the “x” in place in front of the IP address and Net Mask parameters.

```
% more /etc/grdev1.conf

###########################################################################
#  DEV1 Configuration
###########################################################################
#  There are several variables that an SP Adapter card needs at start up.
#  These are handled by a set of GRINCHES whose descriptors are indexed
#  by card number and interface number as follows:
#
#      2.21.{CARD+1}.1.{INTERFACE+1}
#
#  This template specifies the start-up values for all potential cards
#  in a 16-card GRF router.  Initially these are default values indicating
#  that the card needs to be configured.
#
#  The descriptors are grouped by card and interface so that a particular
#  interface can be easily configured.
#
###########################################################################
#
#  CARD  0  Interface 0
#
-> 2.21.1.1.1.1            "00"                   # Extension Node Identifier
   2.21.1.1.1.2            -1                    # Node Name
```

```
   2.21.1.1.1.3          "00:00:00:01:00:00:00:02:00:03" # Switch Token
   2.21.1.1.1.4          1                         # Switch ARP
   2.21.1.1.1.5          0                         # Switch Node Number
   2.21.1.1.1.6          x0.0.0.0                  # IP Address
   2.21.1.1.1.7          x0.0.0.0                  # Net Mask
-> 2.21.1.1.1.8          1024                      # Max Link Pckt Len.(bytes)
   2.21.1.1.1.9          0                         # IP Host Offset
-> 2.21.1.1.1.10         1                         # Configuration State
   2.21.1.1.1.11         "sp_00"                   # System Name
-> 2.21.1.1.1.12         2                         # Node State
   2.21.1.1.1.13         0                         # Switch Chip Link
   2.21.1.1.1.14         31                        # Node Delay (cycles)
   2.21.1.1.1.15         1                         # Admin Status
   #
```

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

Parameter definitions

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

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

Node Name `ibmSPDepNodeNumber`
is a 2-digit 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, switch chip number, and chip port number 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 system 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.

Save 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 an 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 `/etc/grinchd.conf`.

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 that 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 set in `/etc/grinchd.conf`.

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 set in `/etc/grinchd.conf`.

Reset media card using grreset

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

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

2 Enter the **grreset** command.
Specify the appropriate media card by its chassis 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
```

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

Refer to the command descriptions 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 SP Switch Router Adapter media card remains in `fullyConfigured` state until it is actually brought on line via a switch initialization or unfencing sequence.

Should the `switchNodeUp` trap message not reach the SP SNMP Manager, use the **grcard** command to check the card's readiness and state. The **grcard** command returns "*running*" if the card is ready to be brought on-line.

Checking connectivity to the SP system

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, this 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 **Eunfence** and/or **Estart** command to bring the dependent node back into the configuration.

From the control workstation, check `switch_responds` for a good value. If `switch_responds` returns "1" or shows green in Perspectives, then the dependent node is active again.

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

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

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

For additional information on troubleshooting your configuration, see the *PSSP Diagnosis and Messages Guide.*

Monitoring and Management Tools

3

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

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: **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.

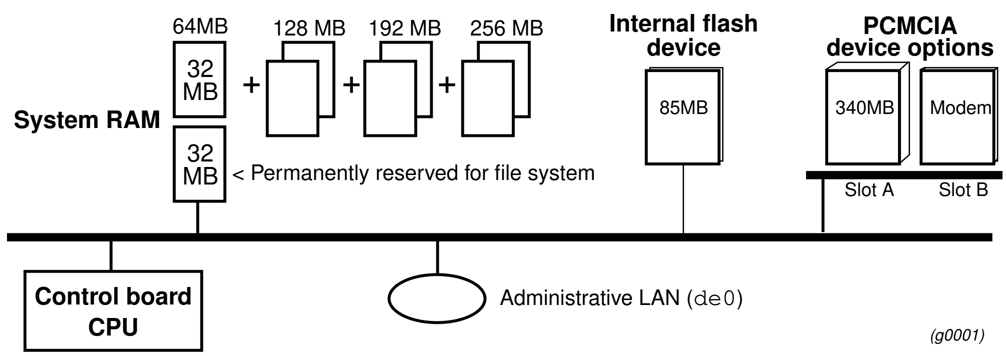


Figure 3-6. SP Switch Router control board memory components

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

getver

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

grarp

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

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

In this example, 192.146.162.67 is the IP address of the SP Switch Router Adapter card in slot 3 (interface name `gt030`), and 0:0:0:0:0:2 is the switch node number.

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 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.

grrmb

This command enables you to use the **maint** command set.

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 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.

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

  In the output from **netstat -r -n**, the => symbol next to a route means it is a duplicate key, but with a different netmask.
- **netstat -r -s** prints routing statistics
- **netstat -i -n** shows all configured interfaces
- **netstat -a -n** 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 -r -n

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 -r -n
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 -r -s

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

```
% netstat -r -s

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 -i -n

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

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

netstat -a -n

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

```
# netstat -a -n
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        (state)
tcp        0      0  198.174.11.249.23      198.174.11.38.1073     ESTABLISHED
tcp        0      0  198.174.11.249.199     198.174.11.249.1026    ESTABLISHED
tcp        0      0  198.174.11.249.1026    198.174.11.249.199     ESTABLISHED
tcp        0      0  *.199                  *.*                    LISTEN
tcp        0      0  198.174.11.249.199     198.174.11.249.1024    ESTABLISHED
tcp        0      0  198.174.11.249.1024    198.174.11.249.199     ESTABLISHED
tcp        0      0  *.23                   *.*                    LISTEN
udp        0      0  *.*                    *.*
udp        0      0  *.161                  *.*
udp        0      0  198.174.11.249.1056    198.174.11.239.2049
udp        0      0  198.174.11.249.1054    198.174.11.239.2049
udp        0      0  198.174.11.249.1046    198.174.11.239.2049
udp        0      0  198.174.11.249.1044    198.174.11.239.2049
udp        0      0  *.*                    *.*
Active GRIT connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        (state)
```

```
grit       0      0  *:25                  *:*
grit       0      0  *:*                   *:*
grit       0      0  *:32                  *:*
grit       0      0  *:*                   *:*
grit       0      0  *:27                  *:*
Active UNIX domain sockets
Address  Type   Recv-Q Send-Q    Inode     Conn     Refs  Nextref Addr
f0d5ff80 dgram       0      0        0 f0793b94        0 f0c4d694
f0cd4500 dgram       0      0        0 f0793b94        0 f0879494
f09eb200 stream      0      0        0        0        0        0
f0c22980 stream      0      0        0        0        0        0
f0dc0f80 stream      0      0        0        0        0        0
f0cd4e00 dgram       0      0        0 f0793b94        0 f0c8a414
f0cd4b00 dgram       0      0        0 f0793b94        0        0
#
```

netstat -s

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

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

SP Switch Router Adapter card maint commands

The SP Switch Router media card has a set of **maint** commands that operate only on a particular media card.

A small set of maintenance or **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
GR 07> [RX]
[RX] Configuration Parameters:
[RX]    Slot Number..........: 7
[RX]    Node Number..........: 9
[RX]    Node Name............: 07
[RX]    SW Token.............: 0001000600
[RX]    Arp Enabled..........: 1
[RX]    SW Node Number.......: 2
[RX]    IP...................: 0xce92a243
[RX]    IP Mask..............: 0xffffffc0
[RX]    Alias IP.............: 0x0
[RX]    Max Link Size........: 1024
[RX]    Host Offset..........: 1
[RX]    Config State.........: 1
[RX]    System Name..........: giga_SP
[RX]    Node State...........: 2
[RX]    Switch Chip Link.....: 0
[RX]    Transmit Delay.......: 31
```

maint 4 - display media statistics

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

```
maint 4
GR 07> [RX]
[RX]
[RX]                    Media Statistics
[RX] input:
[RX] Port       Bytes                Packets         Errors    Discards
[RX] ------------------------------------------------------------------
[RX]  0 00000000000055233360 00000000000000000843 0000000002 0000000002
[RX]  1 00000000000000000000 00000000000000000000 0000000000 0000000000
[RX]
[RX] output:
[RX] Port       Bytes                Packets        Discards
[RX] -------------------------------------------------------
[RX]  0 00000000000339524640 00000000000000005182 0000000000
[RX]  1 00000000000000000000 00000000000000000000 0000000000
[RX]
[RX] Port 0:
[RX]    Odd Length TX Packets: 0
[RX]    TX Dropped Fifo Full:  0
[RX]    TX Dropped Line Down:  0
[RX] Port 1:
[RX]    Odd Length TX Packets: 0
[RX]    TX Dropped Fifo Full:  0
[RX]    TX Dropped Line Down:  0
```

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

maint 5 - display switch statistics

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

```
GR 07> maint 5
GR 07> [RX]
[RX]                    Switch Statistics
[RX] input:
[RX]        Bytes              Packets          Errors
[RX] ---------------------------------------------------------
[RX]  000000000000000000    000000000000000000    000000000
[RX]
[RX] output:
[RX]        Bytes              Packets          Errors
[RX] ---------------------------------------------------------
[RX]  000000000000000000    000000000000000000    000000000
[RX]
[RX] Switch Transmit Data Errors:             0
[RX] Switch Transmit Fifo Parity Errors:      0
[RX] Switch Transmit Internal Parity Errors:  0
[RX] Switch Transmit Connection Rejects:      0
[RX] Switch Receive Encoding Errors:          0
[RX] Switch Receive Running Disparity Errors: 0
[RX] Switch Receive Receiver Errors:          0
[RX] Switch Receive Running Checksum Errors:  0
[RX] dont-free packets: 0
[RX] fifo-full packets: 0
```

maint 6 -display combus statistics

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

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

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]
GR 07>
```

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 d

The SP Switch Router sends dumps to an external PCMCIA 340MB 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 provide specific information useful for monitoring and debugging the SP Switch Router and SP Switch Router Adapter card operations. If you are working with Customer Support, these are dumps they might need to see:

- `bsdx.core` - a kernel dump resulting from a system reset or panic, sent to `/var/crash` (`x` is number of the dump, 1, 2, 3...)
- `grdump,n.x.gz` - a dump resulting from a media card reset or panic, sent to `/var/portcards` (`n` is the media card slot, `x` is number of the dump, 1, 2, 3...)

System dumps

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

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

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

Media card dumps

The `grdump` program saves and manages media card dumps. As described in Chapter 2, you can specify the number of dumps in a `/etc/grinchd.conf` file variable. 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.

The SP Switch Router logs to a PCMCIA 340MB 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\n\r'
Mar 23 11:18:13 tester syslog: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID:
hwtype=HIPPI cmd=MSGP 'HIPPI boot complete\r\n'
Mar 23 11:18:13 tester syslog: from 0:0x7:0:  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 3-7. 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 ttyp1 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:gO060, Slot=6, Port=0
Feb 17 22:50:40 tester fr[6025]: Route Circuit configured on an un-defined link
Feb 17 22:50:40 tester fr[6025]:     Slot: 6, Link: 0
Feb 18 10:02:59 tester reboot: rebooted by root
Feb 18 10:02:59 tester syslogd: exiting on signal 15
Feb 18 10:04:17 tester kernel:  Kernel #0 (nit): Thu Feb 13 08:46:56 CST 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 3-8. 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 11:08:39 tester grboot[27391]: exec '/usr/nbin/grload.sh -h HIPPI -p 0:0x3 :0 -s 0'
Mar 23 11:08:40 tester log2[27398]: grload.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/runload.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/hssi_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/dev1_tx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/dev1_rx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/hssi_rx.run (age 6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/fddi.run (age6)
Mar 24 10:11:24 tester grbootd[208]: freeing boot image for /usr/libexec/portcards/xlxload.run (age6)
Mar 24 10:11:24 tester grbootd[208]: 1 boot images resident (1 max)
```

Figure 3-9. Sample entries in the gr.boot log

Part Numbers

A

This appendix contains a list of IBM and Ascend part numbers for the SP Switch Router, model 04S, components.

Parts list

Table A-1. IBM and Ascend part numbers

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
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-PS	GRF 400 AC power module
--	GRF-4-AC	GRF 400 Base Router Chassis
71H0986	N/A	340MB PCMCIA hard drive
08J6118	N/A	Frame-to-frame groundstrap, 10 meter
08J6119	N/A	Frame-to-frame groundstrap, 20 meter

Table A-1. IBM and Ascend part numbers (continued)

IBM part number	Ascend part number	SP Switch Router (04S) part description
46H9699	N/A	SP switch cable, 10 meter
46H9701	N/A	SP switch cable, 20 meter
64G5589	N/A	IBM 9076 SP Maintenance Info. Manual, Vol 1
64G5586	N/A	IBM 9076 SP Maintenance Info. Manual, Vol 2
17H5085	N/A	IBM 9076 SP Site Planning Guide

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 addtional 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

These are the first lines of each error message described here.

"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, 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 fron 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 trasientt 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 segement received in error\n"

"TB4 segement 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 trasientt 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"
TEST: "\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
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is logged when the IOSTB3 receives it 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 cpntent 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.

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 mesages 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: This message is 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 the 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: This message is logged when the TX Side run-time software has been successfully load.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "RX: got TBIC INITED fron 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_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 was 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 trasientt 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 the 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 mesages 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 rxed, 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 mesages 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 segement 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 segement 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_cnfg.c
TEXT: "TBSI Online Init the ORCAs\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`
SCOPE: CARD
CONTEXT: RUNNING
SEVERITY: INFO
DESCRIPTION: This message is 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 cpntent 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 intialization sequence. Replace the card. stat0 is the content of the hardware status register.

SOURCE_FILE: rx/tbsi_ipc.c
TEXT: "RX: got TBIC INITED fron 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.

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 Procesor 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
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.

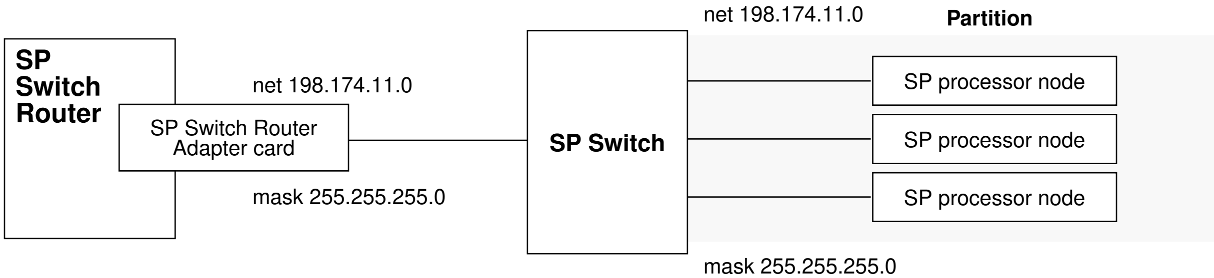


Figure C-1. Example 1: one card- one SP partition network configuration

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

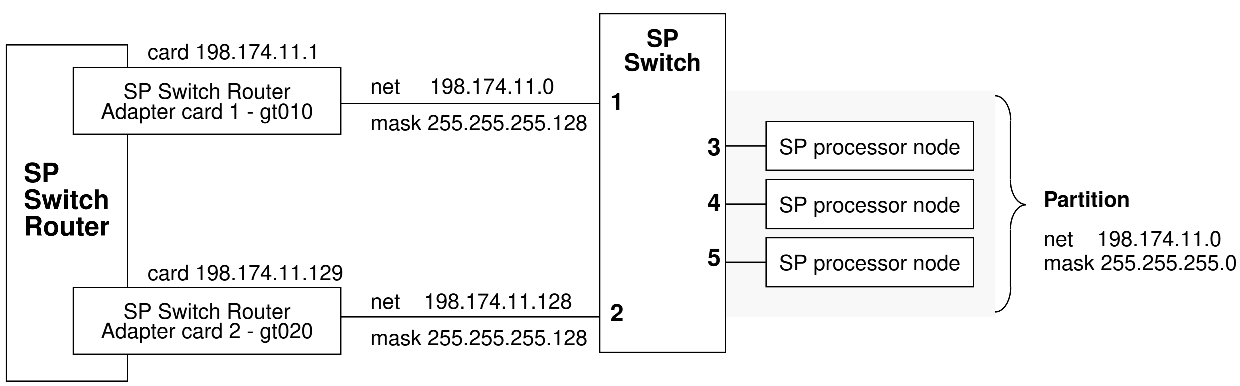
This network configuration divides the traffic for an SP processor node partition between two or more SP Switch Router Adapter cards and achieves some load leveling among the SP processor nodes. It provides dual, not truly redundant, connections to the router in case of SP Switch Router Adapter card 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

Switch node number

```
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
                  •
                  •
                  •
```

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 C-2 is not redundant because two active SP Switch Router Adapter cards cannot carry the same IP address. Alias addresses cannot be used if more than one of the cards sharing the address are active. An alias address can be shared between two cards if only one card is active.

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.

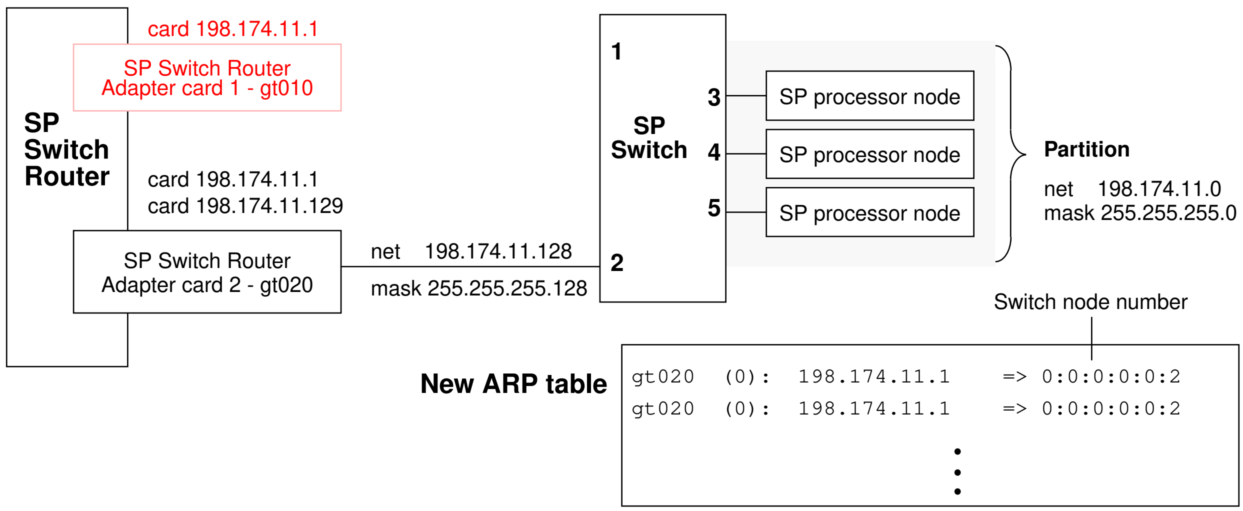


Figure C-3. Recovery from a card failure in a dually-connected configuration

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.

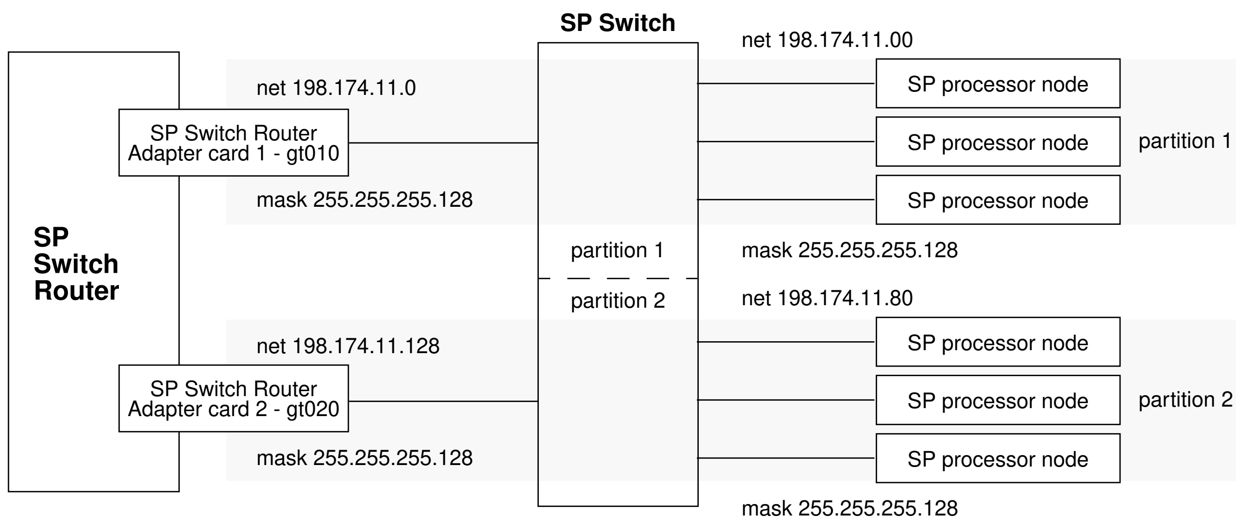


Figure C-4. Example 3: Multiple card-multiple SP partition configuration

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.

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