GRF 400/1600 Getting Started 1.4

Ascend Customer Service

You can request assistance or additional information by telephone, email, fax, or modem, or over the Internet.

Obtaining Technical Assistance

If you need technical assistance, first gather the information that Ascend Customer Service will need for diagnosing your problem. Then select the most convenient method of contacting Ascend Customer Service.

Information you will need

Before contacting Ascend Customer Service, gather the following information:

- Product name and model
- Software and hardware options
- Software version
- Service Profile Identifiers (SPIDs) associated with your product
- Whether you are routing or bridging with your Ascend product
- Type of computer you are using
- Description of the problem

How to contact Ascend Customer Service

After you gather the necessary information, contact Ascend in one of the following ways:

Telephone in the United States	800-ASCEND-4 (800-272-3634)
Telephone outside the United States	510-769-8027 (800-697-4772)
Austria/Germany/Switzerland	(+33) 492 96 5672
Benelux	(+33) 492 96 5674
France	(+33) 492 96 5673
Italy	(+33) 492 96 5676
Japan	(+81) 3 5325 7397
Middle East/Africa	(+33) 492 96 5679
Scandinavia	(+33) 492 96 5677
Spain/Portugal	(+33) 492 96 5675
UK	(+33) 492 96 5671
Email	support@ascend.com
Email (outside US)	EMEAsupport@ascend.com
Facsimile (FAX)	510-814-2312
Customer Support BBS by modem	510-814-2302

You can also contact the Ascend main office by dialing 510-769-6001, or you can write to Ascend at the following address:

Ascend Communications
1701 Harbor Bay Parkway
Alameda, CA 94502

Need information about new features and products?

Ascend is committed to constant product improvement. You can find out about new features and other improvements as follows:

- For the latest information about the Ascend product line, visit our site on the World Wide Web:

  ```
  http://www.ascend.com
  ```

- For software upgrades, release notes, and addenda to this manual, visit our FTP site:

  ```
  ftp.ascend.com
  ```

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About This Guide

This guide explains how to install and test the GRF 400 and 1600 routers. When you finish with the instructions in this guide, you will be ready to configure the GRF system parameters and the IP media cards. This manual does not cover GRF or GR-II systems using an RMS node.

How to use this guide

The guide contains these chapters:

- Chapter 1, "Getting Acquainted with the GRF 400," describes the GRF 400 system components, operating environment, and system set up.
- Chapter 2, "Getting Acquainted with the GRF 1600," describes the GRF 1600 system components, operating environment, and system set up.
- Chapter 3, "Power On and Initial Configuration," explains GRF rack-mount requirements, system power on, the first-time configuration script, and introduces the Command-line Interface (CLI).
- Chapter 4, "Cabling and Verifying Media Cards," describes the set of available IP media cards, their LED activity, and provides the cable requirements for each card.
- Chapter 5, "GRF Management Tools," describes various tools and techniques for managing the GRF including network logging, dumps, commands, and software upgrades.
- Appendix A, "GRF Specifications," lists technical specifications for the GRF routers and the IP media cards.
- Appendix B, "Warranty," contains the product warranty information.
- Appendix C, "GRF 400 Agency Notices," contains the GRF 400 agency information.
- Appendix D, "GRF 1600 Agency Notices," contains the GRF 1600 agency information.

The guide also includes an index.

What you should know

Configuring and monitoring the GRF requires that a Network Administrator have experience with and an understanding of UNIX systems, and the ability to navigate in a UNIX environment. Knowledge of UNIX, its tools, utilities, and editors is useful, as is experience with administering and maintaining a UNIX system.

Configuring the GRF requires network experience and familiarity with:

- UNIX systems and commands
- IP protocol and routing operations
- IP internetworking

Documentation conventions

This section explains all the special characters and typographical conventions in this manual.

Convention	Meaning
Monospace text	Represents text that appears on your computer's screen, or that could appear on your computer's screen.
Italics	Represent variable information. Do not enter the words themselves in the command. Enter the information they represent. In ordinary text, italics are used for titles of publications, for some terms that would otherwise be in quotation marks, and to show emphasis.
[ ]	Square brackets indicate an optional argument you might add to a command. To include such an argument, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
|	Separates command choices that are mutually exclusive.
Note:	Introduces important additional information.
⚠ **Caution:**	Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.
⚡ **Warning:**	Warns that a failure to take appropriate safety precautions could result in physical injury.

Manual set

The GRF 1.4 documentation set consists of the following manuals:

- *GRF 400/1600 Getting Started 1.4* (this manual)
- *GRF Configuration Guide 1.4*
- *GRF Reference Guide 1.4*

Related publications

Here are some related 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)

Getting Acquainted with the GRF 400

<div style="text-align: right; font-size: 2em;">*1*</div>
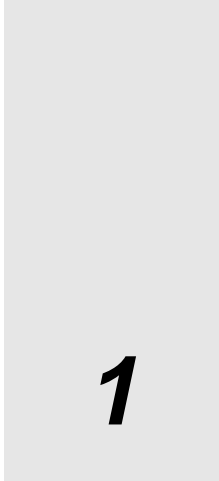
This chapter describes GRF 400 components.

The GRF 400 has hardware that integrates the router management hardware previously contained in the RMS node with components on the GRF 400 control board. A GRF 400 system currently using an RMS node can be upgraded by replacing its control board (optional) and installing 1.4 software.

Software release 1.4 does not support the first versions of the ATM OC-3c or FDDI media cards. These cards are informally called ATM Classic or FDDI Classic. Only the hardware-enhanced versions of these cards are supported, ATM/Q and FDDI/Q.

Chapter 1 covers these topics:

What is the GRF 400?

The GRF 400 is a high-performance IP switch designed for high-volume, large-scale public and private backbone applications. It has these main features:

* Performs Layer-3 switching across 4 gigabits/second aggregate bandwidth

* Supports large suite of routing protocols

* Accommodates 1–4 media cards, available media are ATM OC-3c, ATM OC-12c, 10/100Base-T Ethernet (4- and 8-port), HSSI, HIPPI, SONET OC-3c, and FDDI

* Provides advanced dynamic routing, basic filtering, OSPF multicast, SNMP v1, IPv4

* Accommodates a redundant 400W power supply unit

* Supports an optional -48VDC power supply (negative 48V)

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

The GRF 400 chassis can be mounted in a standard 19" rack unit or on a table. The chassis alone weighs between 26 and 40 pounds (11.9–18.2 kg), depending upon the number of media cards and power supplies installed.

Which items are included in your system?

This section helps you confirm the items in your system.

* Each system includes a GRF 400 base unit.

* Unit contents vary depending upon the type/number of media cards ordered.

* Software is pre-installed at the factory.

Power cord

Make sure the shipping box contains:

* one AC power cord

If your GRF 400 has a redundant power supply, you should have two power cords.

AC power cord requirements

Use only the power cord included with your product or an equivalent cord:

* North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum

* outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 10A, plug type suitable for country of use.

System options

In addition to media cards, options you can order from Ascend include:

– a redundant 400W AC power supply

– a 48V DC power supply

– upgrades to control board 64MB internal DRAM, up to 256MB
(in 64MB increments)

– variable sizes of ATA disk devices in a PCMCIA slot for system logging and backup

The **iflash** command determines the geometry of any PCMCIA Type-II or Type-III
ATA disk device, and formats the disk for use in a GRF.

Two models of PCMCIA modems have been tested with the GRF, they are available from:

– MegaHertz, model CC3288 (28.8Kbps)

– US Robotics, model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Installation and configuration information is in chapter 3 of this manual.

Site-supplied components

To boot the GRF 400, you must attach a VT100-compatible terminal directly to the control
board, and you must supply:

• a standard RS-232 null modem cable and the terminal

Optionally, if you want to directly connect the GRF to a site LAN, you must supply:

• a 10Base-T Ethernet cable to connect the LAN to a receptacle on the control board

Checking the GRF 400 base unit

Figure 1-1 shows the GRF 400 base unit from the front. Cables plug into rear chassis panel.

(g0002)
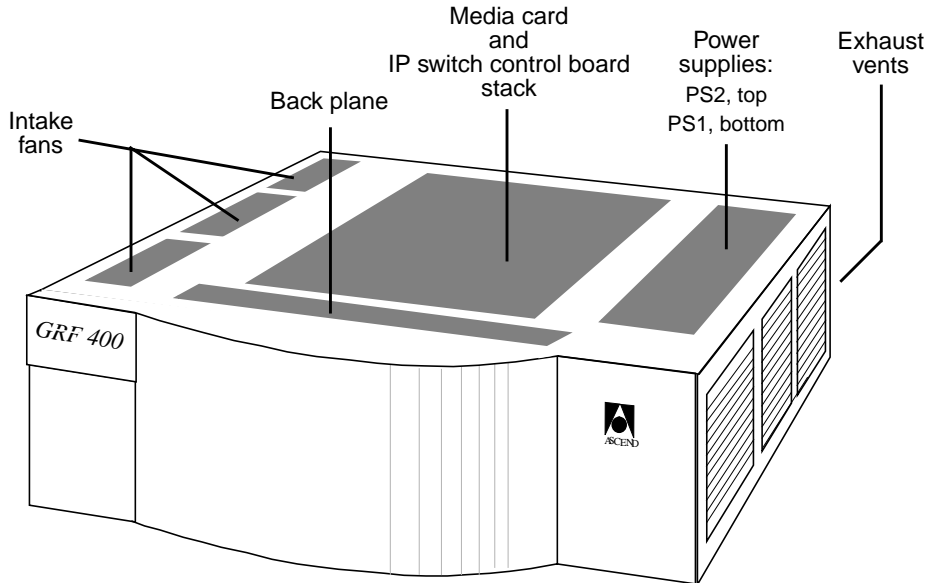
Figure 1-1.   GRF 400 base unit and component areas

Remember that the GRF 400 does not have a power on/off switch. When you plug the power supply cord into a live outlet, the GRF powers on and, since the software is already loaded, immediately begins to boot.

When you install the GRF, you must provide six to ten inches of side clearance for ambient air intake and heated air exhaust.

The GRF 400 has four media card slots, 0–3, and a control board. Slots are numbered top to bottom as shown in Figure 1-2, the control board is always 66:

(g0009)
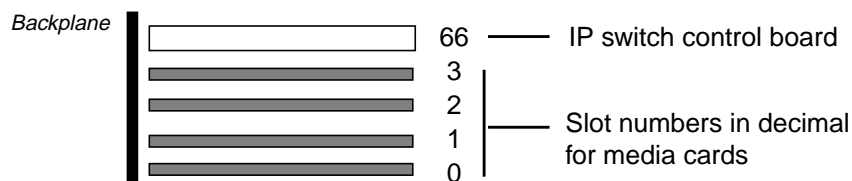
Figure 1-2.   Side view of GRF 400 chassis with slots numbered

IP switch control board

GRF 400 control board hardware runs the router management software (RMS). RMS is the communications and control software for the media cards. Other control board components are the system RAM, internal flash memory, switch hardware, Ethernet connector, and PCMCIA device slots. The control board is field-replaceable, but not hot swappable.
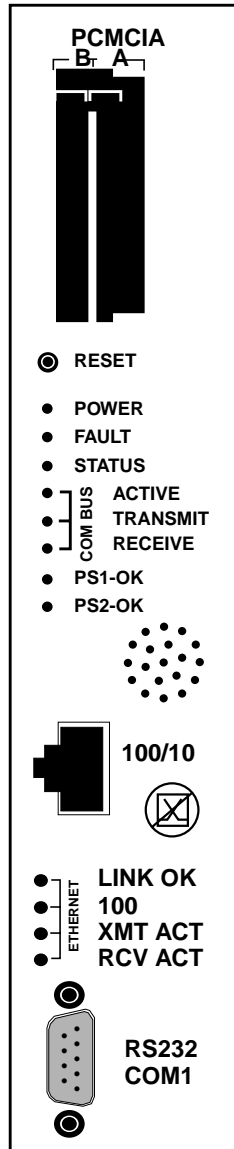
A hardware reset button, receptacles for Ethernet and RS-232 connections, and power, status and fault LEDs are on the board's faceplate, shown left.

PCMCIA slots can contain an external flash memory device and a PCMCIA modem attachment.

LEDs provide status for control board and chassis components.

The system can be reset by depressing the reset button, but a software command reset is preferable since it saves files and leaves the system in order.

The faceplate speaker functions as a typical PC speaker, it chimes during system boot, for example. The control board has another component that sounds an audible alarm when the operating temperature level is exceeded.

The control board has temperature monitoring and reporting capabilities, and provides a command (**temp**) to check the current board-surface operating temperature. If excessive temperature levels are reached, the control board triggers the audible alarm. If levels are exceeded, router management software will shut the system down. The control board also monitors the power supply units, issuing power failure warnings to the user interface via grconslog if power problems are detected. The LEDs do not reflect the actual location of power supplies in the chassis: power supply 2 is on top, power supply 1 is on the bottom.

A 10/100 megabit Ethernet receptacle (autosensing) supports a connection to the administrative LAN. A set of four LEDs indicate activity and connection rate (10 or 100 mbs).

TheVT-100 terminal attaches to the serial port.

Backplane

The GRF 400 backplane spans the width of the chassis and is fixed in place. The backplane is not a field replaceable unit. The backplane supplies power to the media cards and control board. All system boards exchange configuration and status information through the backplane's 80 megabit/second communications bus.

System memory

Figure 1-3 illustrates the RAM and flash memory components on the GRF control board:
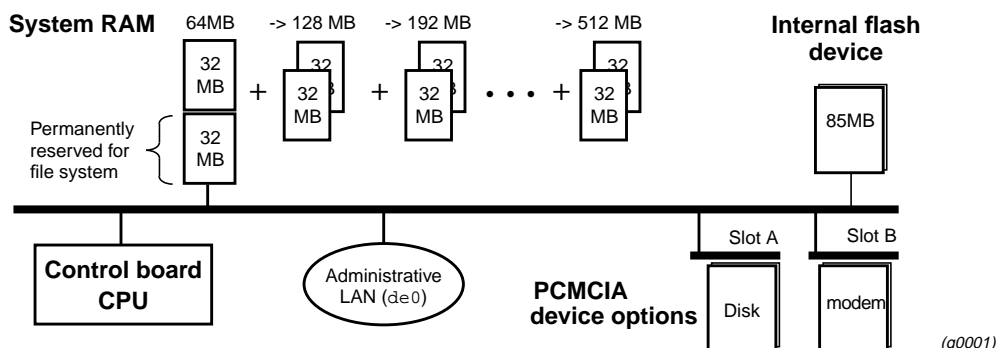
Figure 1-3.   Memory components and options on the control board

RAM   The GRF 1600 is equipped with 64MB internal RAM, 32MB of which are permanently reserved for the file system, including configuration files. The remaining 32MB are used by the operating system and user applications such as GateD.

Figure 1-4 shows the area of system RAM that can be expanded to meet site requirements.
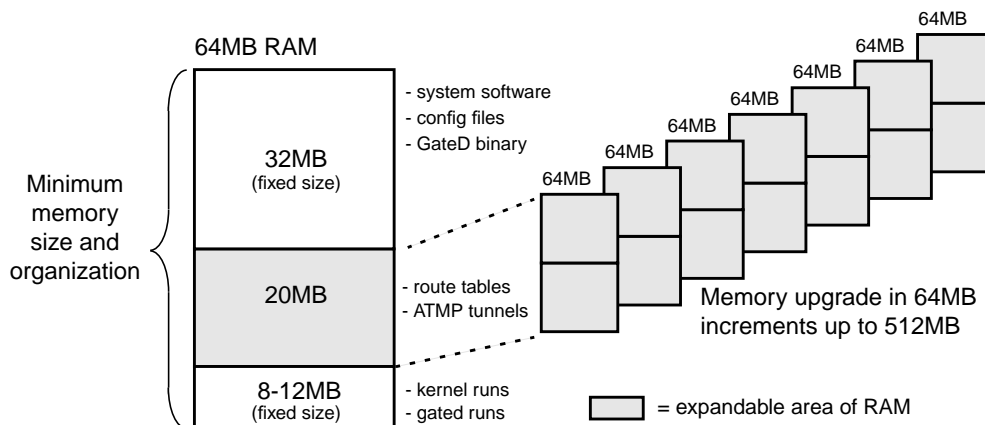
Figure 1-4.   Expandable area of system memory

System memory can be upgraded in 64MB increments up to a total of 512MB, including the 32MB always reserved for the file system. To permit the software to operate in the allocated memory, certain portions of standard UNIX, such as man page files, are omitted. (Man pages for GRF commands are maintained.) Logging is configured to be done remotely via **syslog** or locally to external flash.

Internal flash   The GRF has an internal 85MB ATA flash device from which the system boots. This memory is available for storing different versions of site configurations and operating software.

External flash   PCMCIA slots on the control board support various sizes of ATA flash devices. Although external flash can be used to back up and share router configurations among multiple GRF systems, a GRF cannot boot from an external flash device. Local logging and

dumping to external flash is also supported. The **grwrite** command writes files from system RAM to internal flash, **grsnapshot** copies files between internal and external flash devices. Commands for flash device management are discussed in the *GRF Configuration Guide*.

PCMCIA devices   PCMCIA slot A is used for a portable external disk device. A PCMCIA modem device can operate in either slot A or B. Instructions for configuring the modem and a disk device are in chapter 3.

Fans

Three intake fans push air across the media cards, control board, and power supplies. Warmed air exhausts out the side vents. If the unit is installed in a rack, the sides of the GRF chassis should not be adjacent to a device in the next rack. Be sure that the intake vents do not draw in air exhausted by another device.

Fan "too slow" message

You may occasionally see a message in the `/messages` log file similar to this:

```
Jul 20 04:00:25 tn-btvt-1-E0-1 kernel: rmb0: RMB Fan 0 is too slow
```

This message can be generated when the low-priority task of updating the fan rotation count has been replaced by a higher-priority communication bus activity. Unless you see it repeated frequently in a five-minute period, you can ignore it. If the message is repeated, use the **temp** command to check the chassis temperature.

Battery

The control board has a small 3V lithium battery to store BIOS CMOS configuration and for powering the real time clock if the GRF is powered off.

⚠️ **Caution:** Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Vorsicht: Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

Attention: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Power supplies

AC and negative 48V DC power supplies are both available for the GRF 400. Units are shipped with power supplies installed. Power supplies are to be serviced and replaced only by qualified personnel. Power supplies are housed in open frame drawers for cooling by the chassis fans.

Power supply failure

If a power supply fails, you will see failure messages on-screen at the user interface. The gr.console log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

AC power supplies

The GRF 400 uses one 400W power supply and supports a second, redundant unit.

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.
- Double-pole/neutral fusing.
- For continued protection against risk of fire, replace only with the same type and rating of fuses. Replace F3 and F4 only with recognized 6.3A, 250V, fast-acting fuses. Replace F5 only with 5.0A, 250V, fast-acting fuse.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fach-kräften auszuführen.
- Zweipolige/Neutralleiter-Sicherung
- Nur mit Sicherungen des gleichen Typs und der gleichen Leistung ersetzen, um jegliche Feuergefahr zu vermeiden. F3 und F4 nur mit anerkannten Schnellsicherungen mit 6,3 A, 250 V, ersetzen. F5 nur mit Schnellsicherungen mit 5,0 A, 250 V, ersetzen.

Incompatibilities between AC power supplies

For some time the GRF has been equipped with 400W power supplies manufactured by Astec. These supplies have a black pull handle as shown in Figure 1-5:
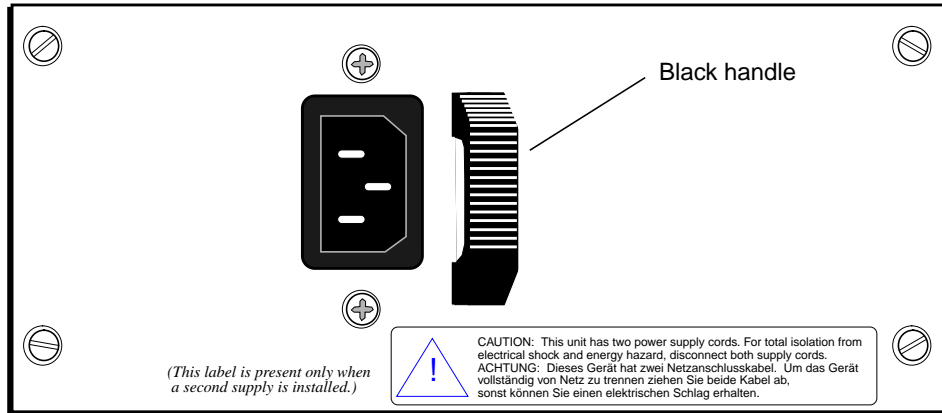
Figure 1-5.   Front of Astec AC power supply drawer.

The standard AC power supply is being switched to a unit manufactured by Zytec. These power supplies have a silver pull handle as shown in Figure 1-6:
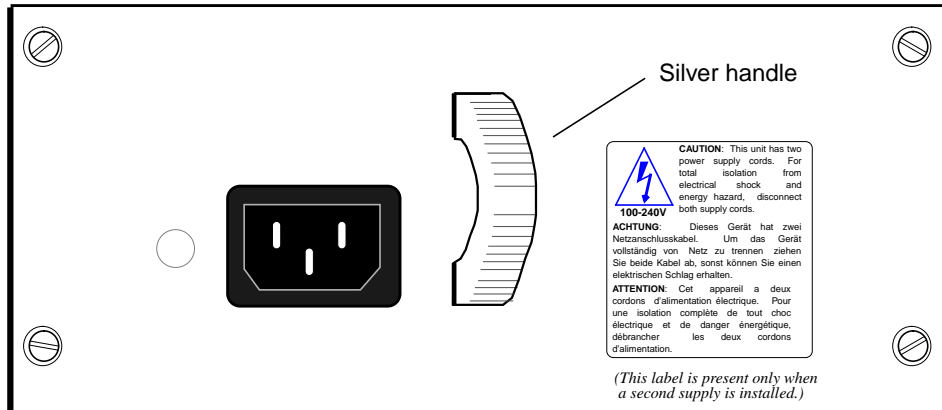
Figure 1-6.   Front of Zytec AC power supply drawer.

The Astec and Zytec power supplies are incompatible. The two models do not consistently support load sharing between them, and their incompatibilities can mask a unit failure. As a result, the two models must not be installed together in the same GRF chassis.

This installation requirement is critical in the following situations:

•   when a site with a single Astec unit intends to install a second unit for redundancy.

    If you intend to add a redundant unit to a GRF with a single Astec unit installed (black handle), you must switch to two Zytec units.

•   when a site with dual Astec units has a failure and needs a replacement unit.

    If you have a failure in a GRF configured with dual Astec units, you must switch to two Zytec units.

- units might be swapped at sites having multiple GRFs with different power supplies.
  If you swap power supplies, remember you cannot mix models in the same GRF chassis.

Contact your Ascend sales representative to order the appropriate power supply units.

Redundant supply safety considerations

If the GRF is equipped with redundant AC power supplies, please note the following when powering off (unplugging) the GRF unit:

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

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

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

The warning label shown in Figure 1-7 is required when a second power supply is installed in a pre-existing system to provide redundancy. When a GRF is shipped with a single power supply, this label will not be on the power supply unit. If a customer orders a redundant power supply, a set of labels is included, along with instructions to attach a label to each unit.

Astec label

! CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

Zytec label

100-240V CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.

ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.

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.

Figure 1-7.   Warning label required for redundant supplies

48V DC power supply

The GRF 400 can be ordered with a 48V DC power supply unit. The DC unit is available only from Ascend. The GRF requires one 400W power supply and provides an option for a second, redundant unit.

Installing a DC unit

Warning: The DC power supply must be installed only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70. Connect to a 48V DC source which is electrically isolated from the AC source and which is reliably connected to earth.

This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment. If this connection is made, all of the following conditions must be met:

- This equipment shall be connected directly to the DC supply system grounding electrode conductor or bonding jumper from a grounding terminal bar or bus to which the DC supply system grounding electrode conductor is connected.

- This equipment shall be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor, and also the point of grounding of the DC system. The DC system shall not be grounded elsewhere.

- The DC supply source is to be located within the same premises as the equipment.

- There shall be no switching or disconnecting devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.

- All DC input wiring shall be routed away from any sharp edges and properly secured in place to prevent chaffing and to provide strain relief. This may be achieved by tie wrapping the wires to the rack frame or by equivalent means.

Warning: A readily accessible disconnect device must be provided in the fixed wiring for a DC power supply. It must be suitable for the rated voltage and current specified.

Warnung: In der Festverdrahtung für ein Gleichstromnetzteil muß ein leicht zugänglicher Trennschalter vorgesehen werden. Er muß für die angegebene Nennspannung und den Nennstrom geeignet sein.

Wiring

Figure 1-8 shows the four terminals on the front of the -48V DC (negative) power supply drawer. Ascend ships the DC unit fitted with an aluminum cover over the terminal area. The cover can be flipped up to attach the DC input wiring. After the DC unit is properly wired, you must also secure the cover using the two screws.

⚠ **Caution:** The first terminal on the left is a NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V Return.

Vorsicht: Der erste Anschluß links ist 48V MINUS. Der zweite Anschluß von links ist die Rückleitung mit 48V MINUS.

When you connect DC wires, remember that the first terminal on the left is NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V Return.

If you connect the two DC wires incorrectly, you blow the input fuses —the DC power supply will not work now. The power supplies may only be serviced by a qualified trained service technician.

Always connect a protective earth ground to the terminal with this label: ⏚
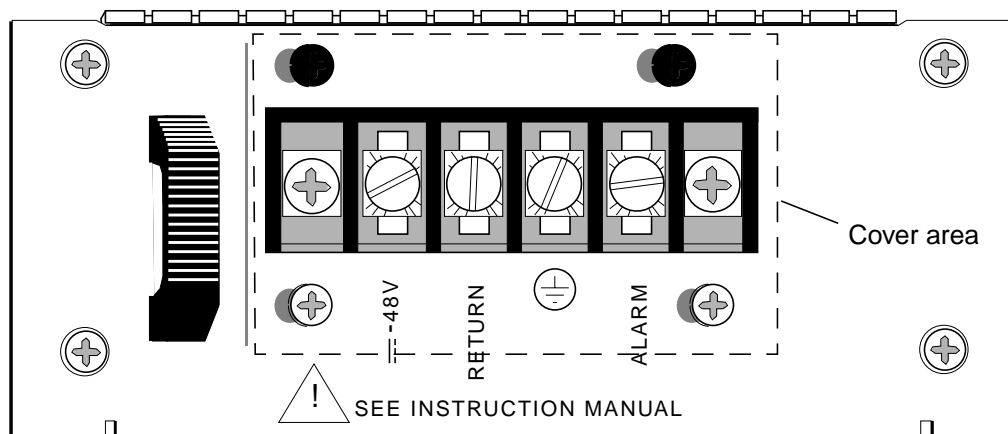
Figure 1-8.   Front of -48V power supply drawer.

Site alarm option

⚠ The right-most terminal, labeled "ALARM", enables you to attach the DC power supply to a site alarm unit. If power fails to reach the backplane of the GRF 400, an internal relay activates and applies the NEGATIVE 48V to the site alarm terminal. This output is fused at 0.5A. When wiring this output, use only UL recognized terminal lug and conductor suitably rated for the voltage and current.

⚠

Caution: The power supplies contain hazardous voltages and energy levels.

• Do not attempt to service a unit yourself. Refer all servicing to qualified personnel.

• Double-pole/neutral fusing.

• For continued protection against risk of fire, replace only with the same type and rating of fuses. Replace F3 and F4 only with recognized 10.0A, 250V, fast-acting fuses. Replace F5 only with 0.5A, 250V, fast-acting fuse.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

• Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fachkräften auszuführen.

• Zweipolige/Neutralleiter-Sicherung

• Nur mit Sicherungen des gleichen Typs und der gleichen Leistung ersetzen, um jegliche Feuergefahr zu vermeiden. F3 und F4 nur mit anerkannten Schnellsicherungen mit 10,0 A, 250 V, ersetzen. F5 nur mit Schnellsicherungen mit 0,5 A, 250 V, ersetzen.

Redundant DC supply safety considerations

The notice shown below appears on the lower edge of the DC power supply:

⚠ SEE INSTRUCTION MANUAL

and refers to the following caution:

If the GRF is equipped with redundant DC power supplies, please note the following when powering off (unwiring) the GRF unit:

⚡

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

Vorsicht: Dieses Gerät hat zwei Stromeingänge. Um das Gerät vollständig vom Netz zu trennen, unterbrechen Sie den Anschluß mit beiden Eingängen, 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 sources d'alimentation électrique. Pour une isolation complète de tout choc électrique et de danger énergétique, débrancher les deux sources d'alimentation.

Getting Acquainted with the GRF 1600
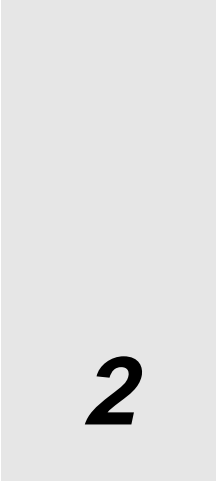
2

This chapter describes GRF 1600 components.

The GRF 1600 replaces the GR-II (GigaRouter) and its RMS node as an Ascend product.

Software release 1.4 does not support the first versions of the ATM OC-3c or FDDI media cards. These cards are informally called ATM Classic or FDDI Classic. Only the hardware-enhanced versions of these cards are supported, ATM/Q and FDDI/Q.

Chapter 2 covers these topics:

What is the GRF 1600?

The GRF 1600 is a high-performance IP switch designed for high-volume, large-scale public and private backbone applications. It has these main features:

- Performs Layer-3 switching across 16 gigabits/second aggregate bandwidth

- Supports large suite of routing protocols

- Accommodates 1–16 media cards, available media are ATM OC-3c, ATM OC-12c, 10/100Base-T Ethernet (4- and 8-port), HSSI, HIPPI, SONET OC-3c, and FDDI

- Provides advanced dynamic routing, basic packet filtering, OSPF multicast, SNMP v1, IPv4

- Accommodates a redundant 1100W power supply unit

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

The GRF 1600 chassis can be mounted in a standard 19" rack unit or on a table. The chassis alone weighs between 107 and 124 pounds (49–56 kg), depending upon the number of power supplies installed. Side rails are recommended to be installed in the rack unit before attempting to insert a GRF 1600. Side rails will help to support the heavy unit as the team inserts the chassis and fastens it to the rack.

⚠️ **Caution:** Because of its weight, installing the GRF 1600 into a rack requires a two-person team.

Vorsicht: Aufgrund seines Gewichts sind zur Installation des GRF 1600 auf dem Regal zwei Personen erforderlich.

Which items are included in your system?

This section helps you confirm the items in your system.

- Each system includes a GRF 1600 base unit.

- Unit contents vary depending upon the type/number of media cards ordered.

- Software is pre-installed at the factory.

- One or two AC power cords are shipped.

Power cord

Make sure the shipping box contains an AC power cord.
If your GRF 1600 has a redundant power supply, you should have two power cords.

Use only the power cord included with your product or an equivalent cord:

- North America:
  UL listed, CSA certified, type SJT or SVT, 3-conductor,
  18AWG minimum

- outside of North America:
  Agency-approved for the country of use, cord type H05VVF3G1.5, 3-conductor,
  1.5mm^2, rated 250V, 16A;
  plug type suitable for country of use

System options

In addition to media cards, GRF 1600 options you can order from Ascend include:

– a redundant 1100W AC power supply

– upgrades to control board 64MB internal DRAM, up to 256MB
(in 64MB increments)

– variable sizes of ATA disk devices in a PCMCIA slot for system logging and backup

The **iflash** command determines the geometry of any PCMCIA Type-II or Type-III
ATA disk device, and formats the disk for use in a GRF.

Options are also available from other vendors:

– a locking clamp for the power supply is available from Panel Components Corpora-
tion, P/N 85910051, (515) 673-5000

Two models of PCMCIA modems have been tested with the GRF, they are available from:

– MegaHertz, model CC3288 (28.8Kbps)

– US Robotics, model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Modem installation and configuration information is in chapter 3 of this manual.

Site-supplied components

To boot the GRF 1600, you must attach a VT100-compatible terminal directly to the serial
receptacle on the control board, and you must supply:

• a standard RS-232 null modem cable

• a VT100-compatible terminal

Optionally, if you want to directly connect the GRF to a site LAN, you must supply:

• a 10Base-T Ethernet cable to connect the LAN to the Ethernet receptacle on the control
board

Checking the GRF 1600 base unit

Figure 2-1 shows the GRF 1600 base unit from the front of the cabinet. All cables and power cords attach at the rear panel. The GRF 1600 chassis is organized into three sections.

In the top section, a pair of high-speed impeller fans draw air up through the media cards and exhaust it out vents on each side of the chassis. These vents must not be obstructed in any way. When you install the GRF, you must provide a minimum of 6 inches of clearance on the sides of the unit and keep the front and back clear of obstruction. The backplane and system cards are installed in the middle section, above the air intake plenum. Intake vents are at each chassis side and front. Power supplies are in the bottom section. Their internal fans exhaust air out the lower chassis front and require a minimum of six inches of clearance.

Note the hand holds on the chassis sides, these are especially helpful when installing the GRF in a rack.

(g0143)
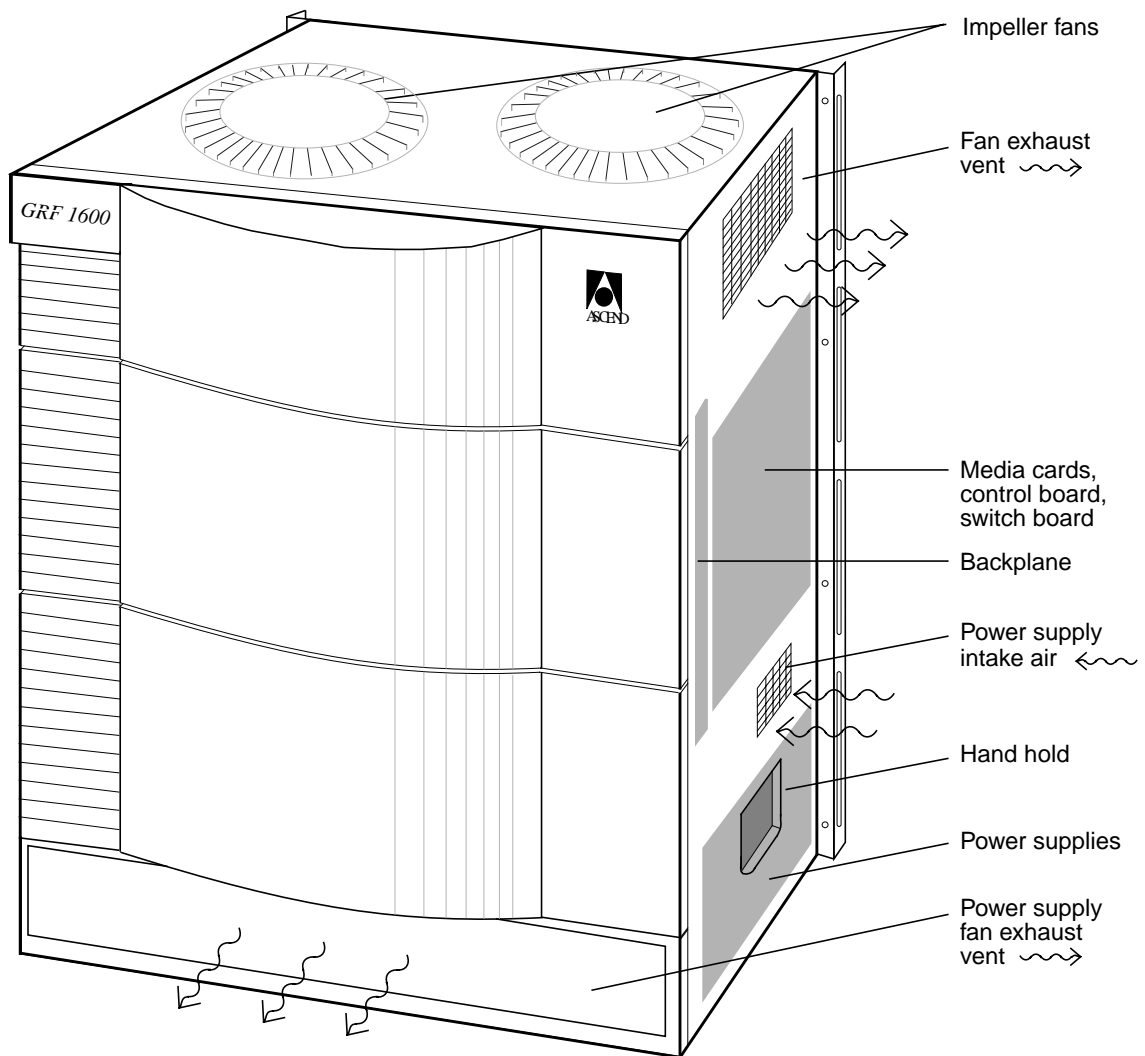
Figure 2-1.   GRF 1600 base unit and component areas (front view)

The rear panel of the GRF 1600 chassis is shown in Figure 2-2. At the top is a fan tray that houses a pair of motorized impeller fans, the tray is replaceable as a single unit.

The top and bottom of the media card section are open grids through which the fans draw air through the chassis air intake vents. The media cards slide in along the guide in each slot and plug into their connector on the backplane. Solid vertical partitions separate the control board and the switch board from the media cards.
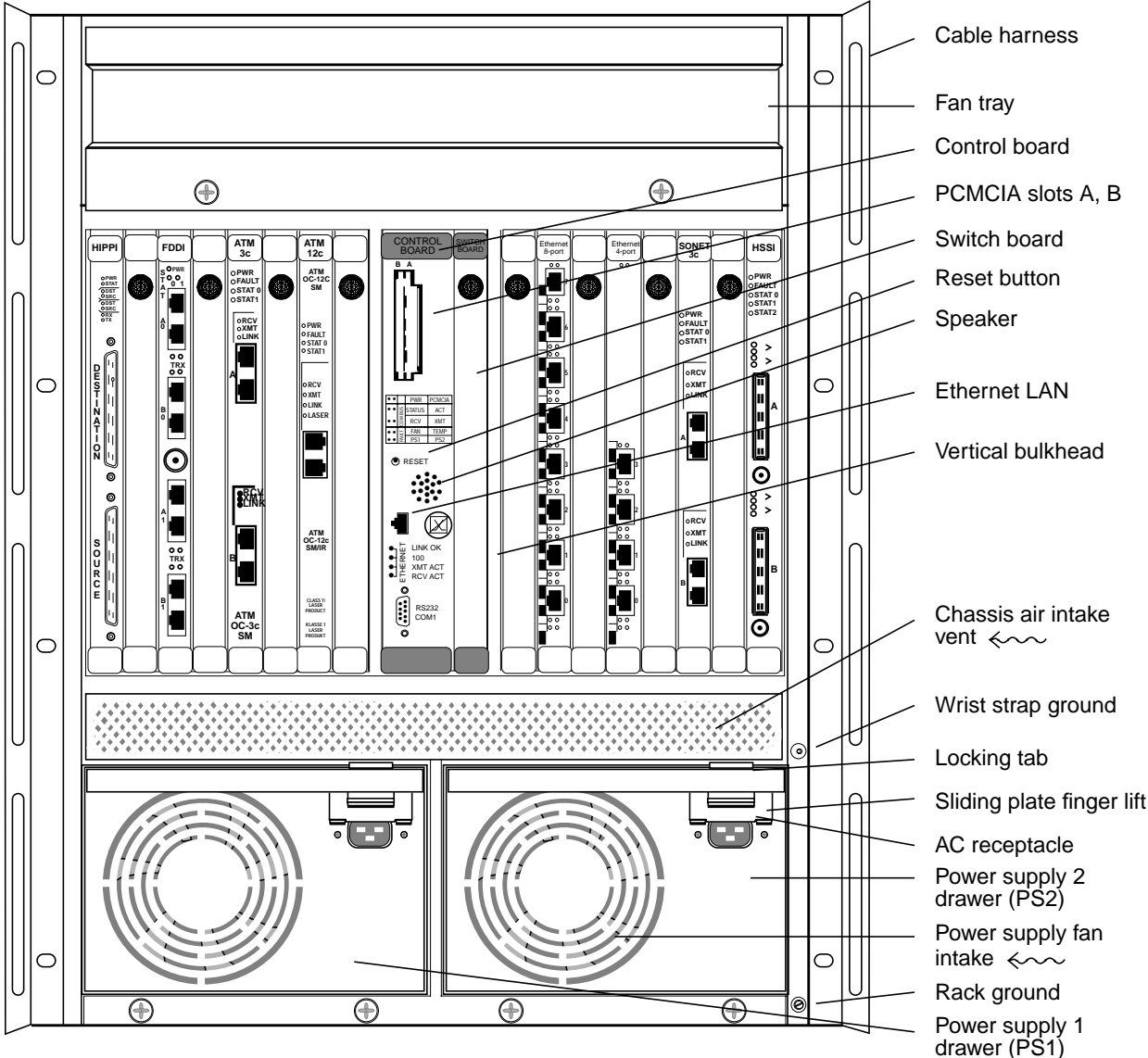
Figure 2-2.   Rear panel view of GRF 1600

Two ground connectors are on the right edge of the chassis, the upper is for a wrist strap and the lower is for the rack ground.

The power supply compartment is completely separate from the rest of the chassis. Each power supply is in an enclosed drawer and is cooled by an internal fan. A locking tab prevents the drawer from being opened accidentally when the AC cord is plugged into the unit. The PS1 or PS2 LED on the control board lights to indicate a problem with a specific power supply.

Control board

GRF 1600 control board hardware runs the router management software (RMS). RMS is the communications and control software for the media cards. Other control board components are the system RAM, internal flash memory, Ethernet connector, and PCMCIA device slots. The control board is field-replaceable, but not hot swappable.
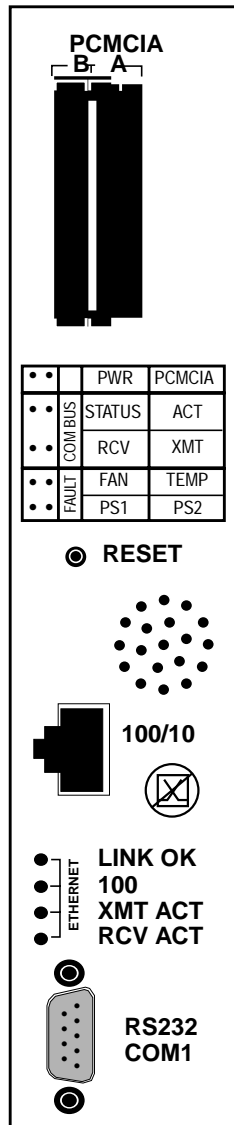
A hardware reset button, receptacles for Ethernet and RS-232 connections, and power, fan, status and fault LEDs are on the board's faceplate, shown left.

PCMCIA slots can contain an external flash memory device and a PCMCIA modem attachment.

LEDs provide status for control board and chassis components.

The system can be reset by depressing the reset button, but a software command reset is preferable since it saves files and leaves the system in order.

The faceplate speaker functions as a typical PC speaker, it chimes during system boot, for example. The control board has another component that sounds an audible alarm when the operating temperature level is exceeded.

The control board has temperature monitoring and reporting capabilities, and provides a command (**temp**) to check the current board-surface operating temperature. If excessive temperature levels are reached, the control board triggers the audible alarm. If levels are exceeded, router management software will shut the system down. The control board also monitors the power supply units, issuing power failure warnings to the user interface if power problems are detected.

A 10/100 megabit Ethernet receptacle (autosensing) supports a connection to the administrative LAN. A set of four LEDs indicate activity and connection rate (10 or 100 mbs).

TheVT-100 terminal attaches to the serial port.

Switch board

The 16x16 switch chip and control hardware reside on the switch board. The switch board is field-replaceable, but not hot swappable.

Chassis fans

Two motorized impeller fans cool the chassis, excluding the power supply compartment. The fans operate in tandem. At start-up, both fans operate at 100% of RPM capability. Gradually each fan slows down so that, in normal conditions, each fan operates at 50% speed. When the GRF is plugged in, you can hear the changes in fan speeds.

Tachometers on each fan unit ensure steady, sufficient airflow. When a tachometer detects that a fan is dropping below the 50% rate, it causes a signal to the other fan to speed up. When a problem occurs with either fan, the control board "FAN" LED lights. The GRF 1600 fan tray is site replaceable, but must be returned to Ascend for service. The fan tray sits on a pair of guides and is held in place by two captured screws.

The fan tray is not hot swappable.

Before you replace a fan tray, you must power down the GRF and unplug BOTH power supplies.

Use the **shutdown** command:
```
prompt> shutdown now
```

The amount of time the GRF can operate with a failed fan depends upon the number of installed media cards and the ambient air temperature. The temperature sensor on the control board shuts the GRF down if the operating temperature is exceeded.

Fan "too slow" message

You may occasionally see a message in the `/messages` log file similar to this:
```
Jul 20 04:00:25 tn-btvt-1-E0-1 kernel: rmb0: RMB Fan 0 is too slow
```

This message can be generated when the low-priority task of updating the fan rotation count has been replaced by a higher-priority communication bus activity. Unless you see it repeated frequently in a five-minute period, you can ignore it. If the message is repeated, use the **temp** command to check the chassis temperature.

Battery

The control board has a small 3V lithium battery to store BIOS CMOS configuration and for powering the real time clock if the GRF is powered off.

Caution: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
Vorsicht: Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch denselben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

Attention: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

Backplane

The GRF 1600 backplane spans the width of the chassis and is fixed in place. The backplane is not a field replaceable unit. The backplane supplies power to the media cards and control board. All system boards exchange configuration and status information through the backplane's 80 megabit/second communications bus.

Media cards

The GRF 1600 has 16 media card slots, 0–15, a control board, and a switch board. Slots are numbered left to right as shown in Figure 2-3, the control board is always 66:
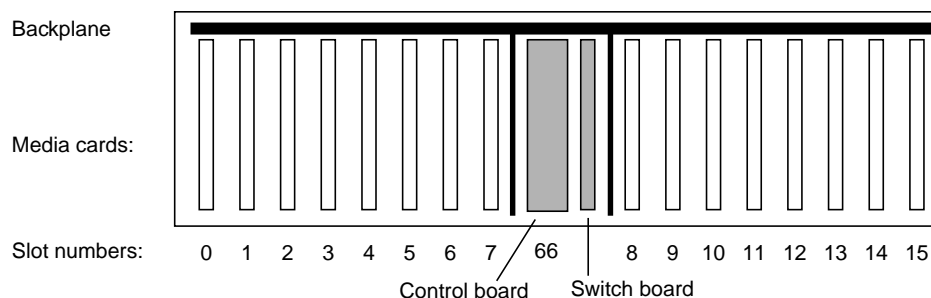
Figure 2-3.   Top view of GRF 1600 chassis with slots numbered

System memory

Figure 2-4 illustrates the RAM and flash memory components on the GRF control board:
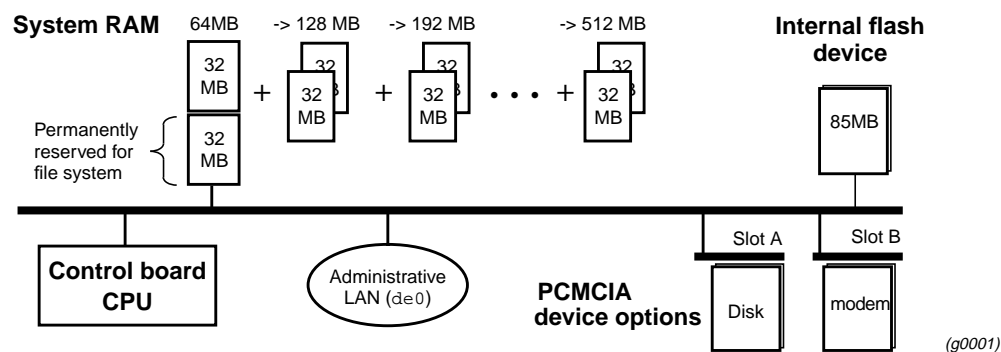
Figure 2-4.   Memory components and options on the control board

RAM   The GRF 1600 is equipped with 64MB internal RAM, 32MB of which are permanently reserved for the file system, including configuration files. The remaining 32MB are used by the operating system and user applications such as GateD.

Figure 2-5 shows the area of system RAM that can be expanded to meet site requirements.
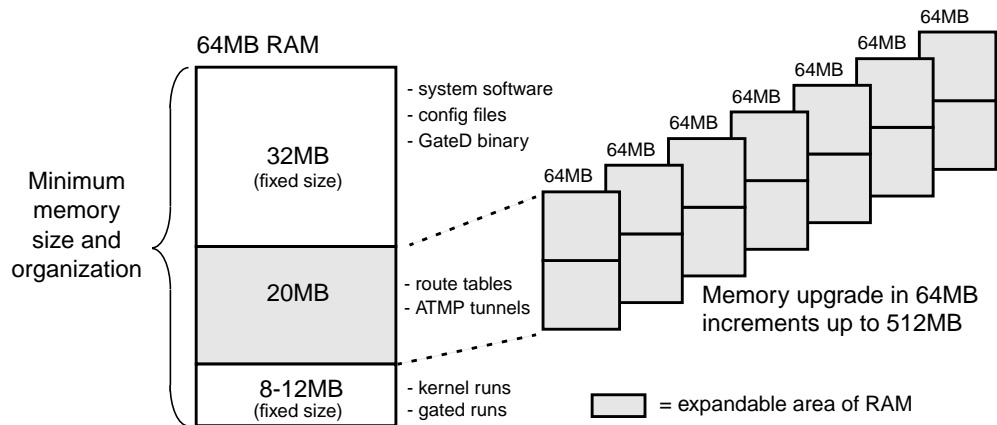
Figure 2-5.   Expandable area of system memory

System memory can be upgraded in 64MB increments up to a total of 512MB, including the 32MB always reserved for the file system. To permit the software to operate in the allocated memory, certain portions of standard UNIX, such as man page files, are omitted. (Man pages for GRF commands are maintained.) Logging is configured to be done remotely via **syslog** or locally to external flash.

Internal flash   The GRF has an internal 85MB ATA flash device from which the system boots. This memory is available for storing different versions of site configurations and operating software.

External flash   PCMCIA slots on the control board support various sizes of ATA flash devices. Although external flash can be used to back up and share router configurations among multiple GRF systems, a GRF cannot boot from an external flash device. Local logging and dumping to external flash is also supported. The **grwrite** command writes files from system RAM to internal flash, **grsnapshot** copies files between internal and external flash devices. Commands for flash device management are discussed in the *GRF Configuration Guide*.

PCMCIA devices   PCMCIA slot A is used for a portable external flash device. A PCMCIA modem device can operate in either slot A or B. Instructions for configuring the modem and a disk device are in chapter 3.

AC power supplies

The GRF 1600 has one 1100W power supply that provides +5.0V to all media cards, control board, switch board, and backplane, and +48V to the fans. If a redundant unit is installed, the two units operate in load-sharing mode. If one fails, the other power supply carries the whole load. Remember that the GRF 1600 does not have a power on/off switch. When you plug the power supply cord into a live outlet, the GRF powers on and, since the software is already loaded, immediately begins to boot.

Figure 2-6 shows the front of an AC power supply drawer and its locking tab components.

Locking tab, down position

Power supply
air intake fan

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.
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
100-240V

Warning label is placed face-up on the horizontal edge below the intake fan.

Drawer handle   Locking tab, up position

Sliding plate

Finger lift

Figure 2-6.   Front of GRF 1600 AC power supply drawer and locking tab

Each power supply has an internal fan to cool that unit. Air is drawn in at the drawer front and exhausted out the rear of the drawer. If a power supply overheats, its regulators will shut the unit down.

Drawer locking tab

The AC power supply drawer is designed with a locking mechanisn that prevents anyone from removing the drawer while it is plugged in. Refer to Figure 2-6. Before you plug the cord into the power supply, you can see that a plate covers part of the AC receptacle. You can easily slide this plate up to insert the cord.

The locking tab is at the top edge of the sliding plate. When the power cord is plugged in, the locking tab stays up in the locked position and prevents the drawer from being pulled out.

Immediately below the sliding plate and at either side of the receptacle are two small screws. These screws attach the AC receptacle to the drawer front. They also are used to attach a power cord clamp. The screws can be untightened 3 or 4 turns to allow the clamp to slide under, but they should never be fully removed.

AC power supply safety considerations

Caution: The power supplies contain hazardous voltages and energy levels.

- Do not attempt to service yourself. Refer all servicing to qualified personnel.
- Double-pole/neutral fusing.

Vorsicht: In den Netzteilen liegen Hochspannung und gefährliche Energiepegel an.

- Versuchen Sie nicht, das Gerät selbst zu warten. Alle Reparaturarbeiten sind von Fach-kräften auszuführen.
- Zweipolige/Neutralleiter-Sicherung

Power supply failure

If a power supply fails, you will see failure messages on-screen at the user interface. The `gr.console` log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

Installing a power cord locking clamp

You can obtain a power cord locking clamp to prevent the power cord from being accidentally pulled out of the AC power supply. Two screws are adjacent to the AC receptacle on the front of the power supply unit. The primary purpose of these screws is to attach the AC receptacle to the drawer front. They can also be used to attach a power cord clamp. The screws can be

untightened 3 or 4 turns, enough to slide the clamp under, but should never be fully removed since their primary purpose is to hold the AC receptacle unit in place.

Warning: If the power supply is equipped with a power cord clamp, the socket outlet must be located near the equipment and shall be easily accessible. The power cord shall have a maximum length of 3 meters (10 feet).

This warning is important because in an emergency, the only safe way to remove power from the GRF is to unplug it at the the wall or socket outlet. In effect, if a clamp is used, the wall or socket outlet serves as the GRF's AC disconnect.

Warnung: Wenn das Netzteil mit einer Netzkabelklemme ausgestattet ist, muß sich die Steckdose nahe dem Gerät befinden und leicht zugänglich sein. Das Netzkabel darf nicht länger als 3 m sein.

Dieser Warnhinweis ist sehr wichtig, da die Stromversorgung des GRF in einem Notfall nur durch Herausziehen des Netzsteckers von der Wandsteckdose getrennt werden kann. Bei Verwendung einer Klemme dient die Wandsteckdose oder Steckdose zum Ausschalten des GRF.

Figure 2-7 shows the clamp and also shows it installed on the power supply drawer.
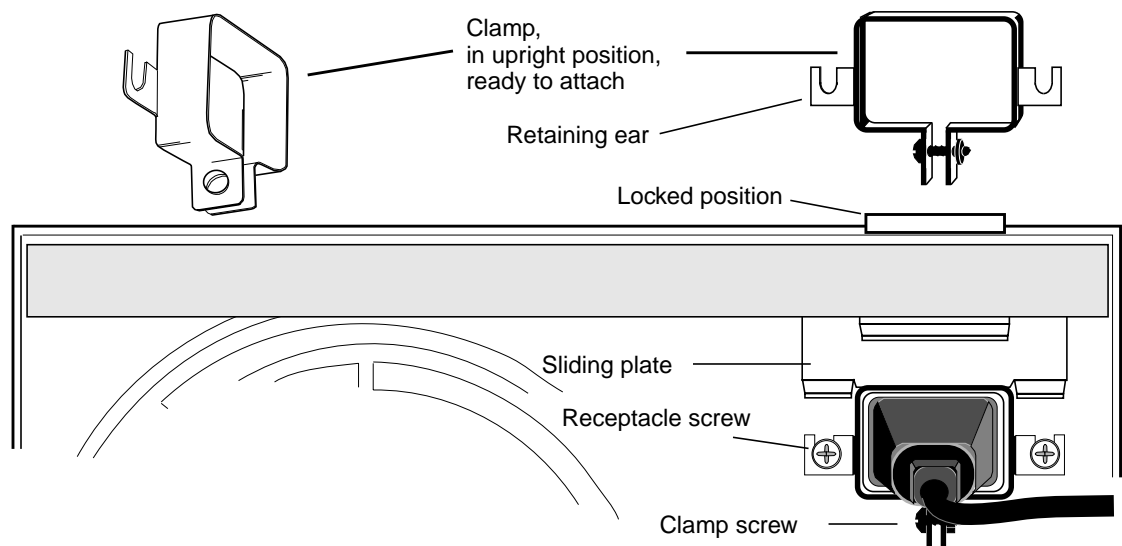
Figure 2-7.   AC power supply power cord locking clamp

Install the cord clamp before you plug the cord into either the GRF or the outlet.

First, slip the clamp over the cord connector, then lift the sliding plate and plug in the connector. Loosen the receptacle screws just far enough to slide the clamp retaining ears underneath. DO NOT COMPLETELY REMOVE THE SCREWS.

How to obtain a clamp

Ascend does not supply cord clamps. Clamps are available from the Panel Components Corporation, P/N 85910051, at (515) 673-5000.

Cooling fans

Each power supply has an internal fan to cool that unit. Air is drawn in at the drawer front and exhausted out the rear of the drawer. If a power supply overheats, its regulators will shut the unit down.

Redundant supply safety considerations

If the GRF is equipped with redundant AC power supplies, please note the following when powering off (unplugging) the GRF 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.

The warning label shown in Figure 2-8 is required when a second power supply is installed in a pre-existing system to provide redundancy. When a GRF is shipped with a single power supply, this label is not on the power supply unit. If a customer orders a redundant power supply, a set of labels is included, along with instructions to attach a label to each unit.

CAUTION: This unit has two power supply cords. For total isolation from electrical shock and energy hazard, disconnect both supply cords.
ACHTUNG: Dieses Gerät hat zwei Netzanschlusskabel. Um das Gerät vollständig von Netz zu trennen ziehen Sie beide Kabel ab, sonst können Sie einen elektrischen Schlag erhalten.
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.

100-240V

Figure 2-8. Warning label required for redundant supplies

The label is actually attached to the top edge of the fastening knob compartment at the bottom of the unit, facing upwards.

Power On and Initial Configuration

3

Chapter 3 describes how to install and power on the GRF routers, and how to perform the initial system configuration.

This chapter includes these topics:

Installation overview

This section is an overview of tasks and procedures used to install a GRF system. At the end of this chapter, you will be ready to cable the media cards and complete system and media card configuration.

Here is what you do to install the GRF:

1 Rack mount and ground the GRF chassis.

2 Insert any additional media cards. The GRF is shipped with all ordered media cards installed, if you have others to install, insert them now.

3 Attach a VT-100-compatible terminal to the serial port (RS-232) on the GRF control board. After you use the terminal to enter the minimum IP configuration information, you can connect the GRF to the administrative Ethernet and disconnect the terminal.

4 Power on the GRF by plugging in the power supply or power supplies. The GRF has no on/off switch, and ships with software already loaded. When you plug in the power supplies, the GRF begins to boot.
You can use control board LEDs to see the status of the system after it has booted.

5 The first time you ever power on a GRF, a configuration script automatically runs. The script prompts you to enter the router's system IP address and host name. You must supply this information to be able to connect the GRF to your administrative Ethernet.
The script also prompts you to begin to configure remote logging by setting up a **syslog** server. If you choose to configure "local" logging to a PCMCIA device, just press the <Enter> key at those prompts.

6 Log in as `root` and change the preset `root` password. You can add other user accounts now if you need to, but you may wish to do this later. More information is presented in the *GRF Configuration Guide*.

7 Set up your cables and attach the GRF to the Ethernet LAN. Use the Ethernet connector on the control board. If you like, you can disconnect the terminal.

8 Before you begin to cable the media cards, enable logging. Procedures for local PCMCIA and network logging are in this chapter.

9 Optionally, you can install and configure a PCMCIA modem connection to the GRF.

Rack mounting the GRF 400

Before you begin installing the GRF 400, make sure you have these items:

– A VT-100 terminal to attach to the control board RS-232 port

– A locally-connected host or workstation that can ping the GRF

– Media cables appropriate to the media cards that were ordered

– If applicable, any media cards that shipped separately

Servicing clearances

Media cards and power supply drawers are 16 inches long. You need three feet of working space to access and remove hot-swappable components at the GRF 400 cable panel.

Rack-mounting requirements

If you are rack-mounting the GRF 400 base unit:

– Always stack the rack from the bottom up to ensure a stable and safe rack.

– The installation of GRF 400 and other units within the rack should not reduce the air flow within the rack. The maximum recommended ambient temperature for the GRF 400 is 40˚ C (104˚ F).

– Make sure you have a two-unit air gap for cooling and cables between the GRF and any other equipment installed in the rack.

– Determine that the cumulative power requirements of the GRF 400 plus other equipment in the rack do not overload the rack supply circuit and/or wiring.

When installing, please consider the location of the GRF in relation to other devices located in an adjacent rack. Ensure that the GRF's air intake is not drawing directly upon heated air from another unit. Figure 3-1 shows air intake and exhaust areas. When you install the GRF, you must provide six to ten inches of side clearance.
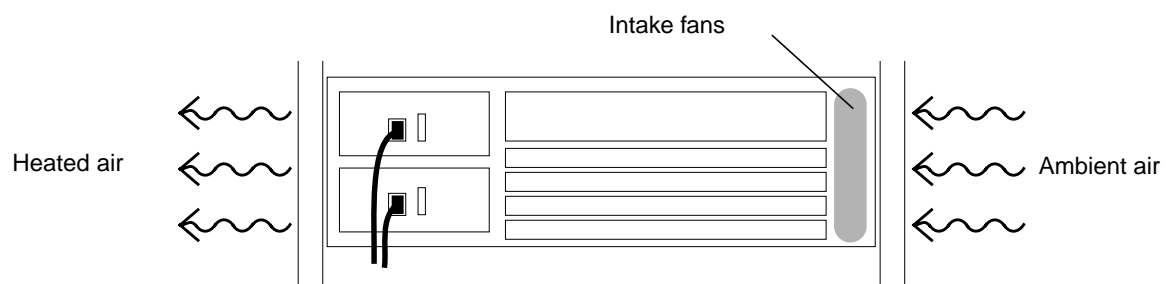
Figure 3-1.   Air intake and exhaust areas of the GRF 400

Power and ground requirements

Caution: If using a power strip or similar supply, make sure the power requirements of the chassis, plus the cumulative power draw of any other equipment in the rack, do not overload the supply circuit.

Vorsicht: Wird ein Sammelstecker oder ähnlicher Netzanschluß verwendet, ist darauf zu achten, daß die Stromerfordernisse des Rahmens gemeinsam mit dem kumulativen Stromverbrauch anderer Geräte auf dem Regal den Versorgungsschaltkreis nicht überbelasten.

Warning: For safe operation, this equipment must be properly grounded.

The chassis should be reliably earth grounded to the rack equipment.

This earth ground connection must be maintained when supply connection is other than direct connection to the branch circuit.

Warnung: Zur Gewährleistung eines sicheren Betriebs muß dieses Gerät vorschriftsmäßig geerdet sein.

Der Geräterahmen muß richtig am Regalbauteil geerdet sein.

Dieser Masseanschluß muß bewahrt werden, wenn die Stromversorgung nicht direkt über den Anschluß an den Abzweigstromkreis erfolgt.

Rack mounting the GRF 1600

Before you begin installation, make sure you have these items:

– A VT-100 terminal to attach to the control board RS-232 port

– A locally-connected host or workstation that can ping the GRF

– Media cables appropriate to the media cards that were ordered

– If applicable, any media cards that shipped separately

Servicing clearances

Media cards and power supply drawers are 16 inches long. You need three feet of working space to access and remove hot-swappable components at the GRF 1600 cable panel.

Grounding

The GRF 1600 has a rack grounding terminal on the lower right side of the cable panel. Also on the right side, above the power supply units, there is a wrist strap ground receptacle.

Warning: For safe operation, this equipment must be properly grounded.

The chassis should be reliably earth grounded to the rack equipment.

This earth ground connection must be maintained when supply connection is other than direct connection to the branch circuit.

Warnung: Zur Gewährleistung eines sicheren Betriebs muß dieses Gerät vorschriftsmäßig geerdet sein.

Der Geräterahmen muß richtig am Regalbauteil geerdet sein.

Dieser Masseanschluß muß bewahrt werden, wenn die Stromversorgung nicht direkt über den Anschluß an den Abzweigstromkreis erfolgt.

Rack-mounting requirements

Rack depth

The minimum rack depth required to install a GRF 1600 is 26" (66.7 cm) if the media cards require flat cables, in which case the rack must be EMI/RFI shielded. If the cards require round shielded cable, the minimum rack depth should be 27" (69 cm).

Side rails

– Always stack the rack from the bottom up to ensure a stable and safe rack.

– If you rack-mount the GRF 1600, Ascend recommends you install side rails in the rack before attempting to insert a GRF 1600. Side rails support the 107-124 pound unit as the team inserts the chassis and fastens it to the rack. The internal width of the GRF 1600 chassis is 17.375" (44.1 cm).

⚠️

Caution: Because of its weight, installing the GRF 1600 into a rack requires a two-person team.

Vorsicht: Aufgrund seines Gewichts sind zur Installation des GRF 1600 auf dem Regal zwei Personen erforderlich.

You need two people to safely maneuver the GRF 1600 into a standard 19" rack. First, make sure the rack will not roll or otherwise move. One person should stand on each side of the chassis. Use the handholds on the chassis side to carry the weight of the unit.

This stick figure drawing illustrates how to support the chassis as you insert it.

– Both people use the handholds to carry most of the weight.

– The person on the left keeps their other hand under the front of the chassis, supporting the weight and making sure it doesn't tip down.

– The person on the right has their other hand on the top of the unit, keeping the unit properly balanced.
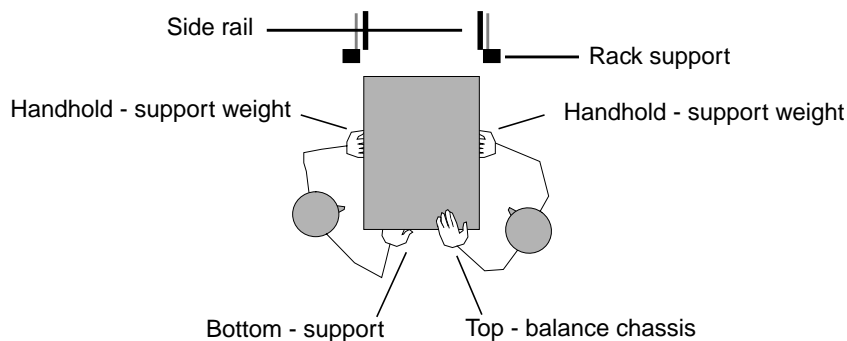
Figure 3-2.   Diagram of proper way to move GRF 1600 into rack

To start, position the lower edges of the chassis on the side rails. Slide the chassis in until the hands using the handholds are at the rack support with the side rails supporting the GRF weight. Let go of the handholds, push the chassis in three or four inches till the handholds are past the rack supports, then use the handholds as necessary to push the chassis all the way in.

Ventilation

Ventilation must comply with these requirements:

– The installation of the GRF 1600 and other units within the rack should not reduce the air flow within the rack. The maximum recommended ambient temperature for the GRF is 40˚ C (104˚ F).

– Make sure you have a two-unit air gap for cooling and cables between the GRF and any other equipment in the rack.

Additionally, please consider the location of the GRF in relation to other devices located in an adjacent rack. Ensure that the GRF's air intake is not drawing directly upon heated air from another unit. Figure 3-3 shows air intake and exhaust areas. When you install the GRF, you must provide six to ten inches of side clearance.
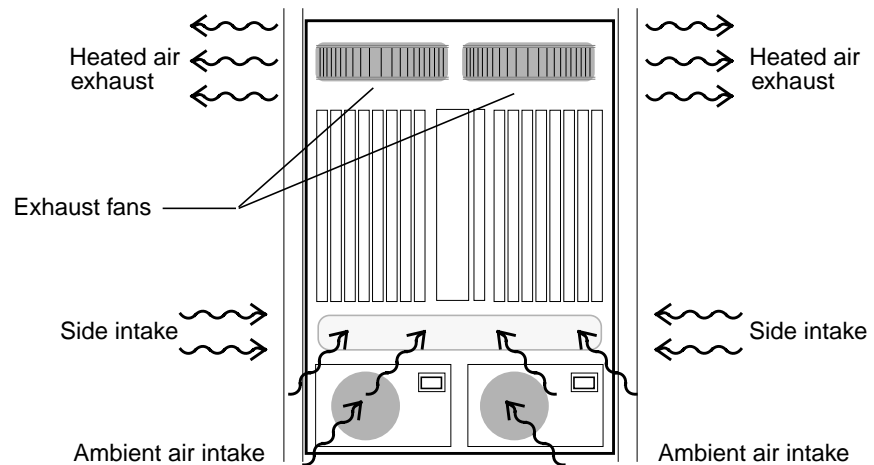
Figure 3-3.   Air intake and exhaust areas of the GRF 1600

Power requirements

Determine that the cumulative power requirements of the GRF 1600 plus other equipment in the rack do not overload the supply circuit and/or wiring of the rack.

Caution: If using a power strip or similar supply, make sure the power requirements of the chassis, plus the cumulative power draw of any other equipment in the rack, do not overload the supply circuit.

Vorsicht: Wird ein Sammelstecker oder ähnlicher Netzanschluß verwendet, ist darauf zu achten, daß die Stromerfordernisse des Rahmens gemeinsam mit dem kumulativen Stromverbrauch anderer Geräte auf dem Regal den Versorgungsschaltkreis nicht überbelasten.

If you ordered GRF media cards separately, go to the section "Inserting a media card."

If all media cards were shipped preinstalled, go to the section "Attaching a VT-100 terminal."

Inserting a media card

Note: To operate properly, the GRF 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 3-4, 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 a GRF media card.

The media card serial and part numbers are printed at the lower edge of the card, near the bottom finger grip/extractor.
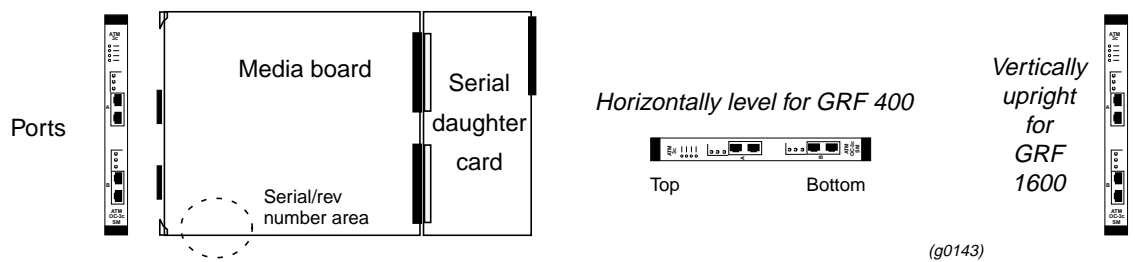
Figure 3-4.   Media card components

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 the media card into a chassis.

Warning: The backplanes of both the GRF 400 and the GRF 1600 contain 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 des GRF 400 und GRF 1600 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: GRF media cards are hot swappable and can be installed when the GRF is running. However, media card are highly susceptible to damage from electrostatic discharge, you must wear a grounded, conductive wrist strap anytime you handle a media card.

Wear a grounded, conductive wrist strap when removing, replacing, and/or handling individual electronic components. Make sure the metallic elements in the band directly touch your exposed skin.

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.

GRF 400

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

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

GRF 1600

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

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

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

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

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

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

Attaching a VT-100 terminal

You must connect a VT-100 compatible terminal to the control board's RS-232 serial port before you power on the GRF. After the system boots, you will enter system IP and host name configuration information in the first time power on script from the terminal.

You can stay at the terminal to perform the rest of the system configuration or you can connect the GRF to the administrative Ethernet and continue configuration from there. After the GRF can be accessed from the administrative Ethernet, the terminal connection is no longer required.
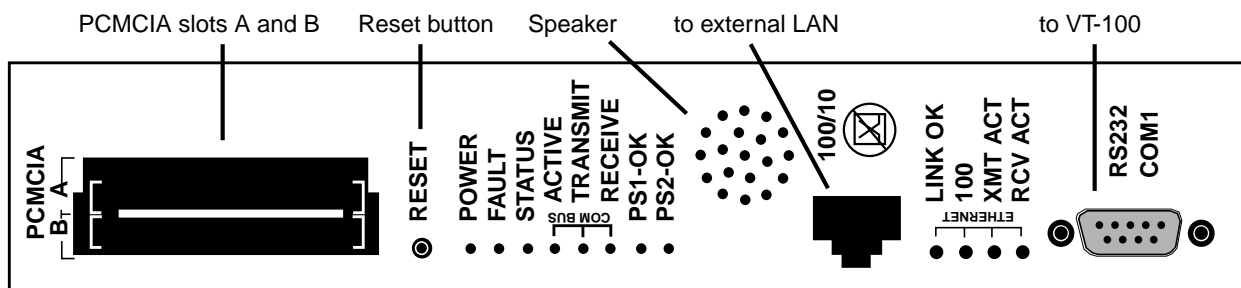
Figure 3-5.   Connectors on IP switch control board

As shown in Figure 3-5, the control board provides multiple connection sites. From left to right are two PCMCIA slots, a reset button, power and status LEDs, speaker apertures, an Ethernet receptacle and associated LEDs, and an RS-232 serial connector site.
(A GRF 400 control board is shown here, the GRF 1600 serial port is the same.)

VT-100 connection settings

Terminal settings are:

– 9600 baud

– no parity

– 8 data bits

– 1 stop bit

Figure 3-6 shows a VT-100 terminal connected to the RS-232 site on the control board. Use a null modem cable.
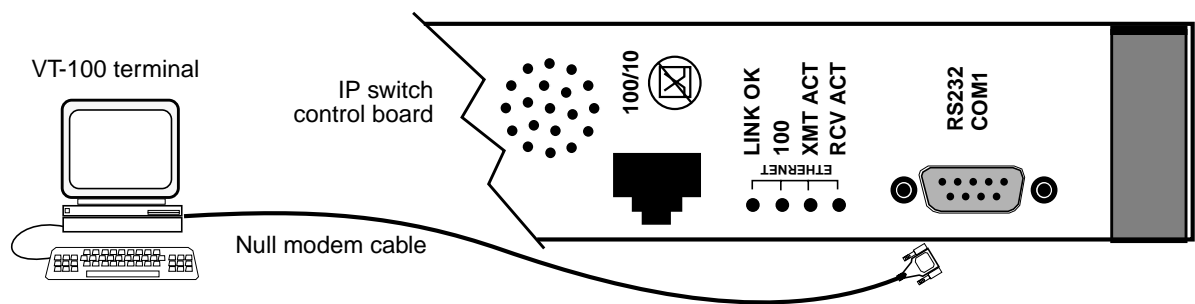
Figure 3-6.   Connecting a VT100 terminal to the GRF

Powering on the GRF 400

As described earlier in this chapter, the initial start-up of the GRF requires a directly-attached terminal for logging in as `root`. This terminal should be connected before you power on the GRF so you can monitor the start up and boot messages that begin immediately.

The GRF 400 is powered by either AC or negative 48V DC power supplies.

The GRF chassis does not have a power on/off switch. When the power cord is plugged in to a power outlet or the DC wiring set is connected, the GRF is powered on. It takes a few seconds for the power supply(s) to cycle before power is supplied to the back panel and the media cards.

When the GRF is powered on, it begins to boot. You can see the boot messages displayed on the VT-100 screen. As it boots, the GRF runs a series of internal diagnostics. The first time a GRF is powered on, the boot process runs a system configuration script. In this script you assign the GRF a host name, configure the maintenance Ethernet, and optionally specify a **syslog** server. The GRF supports remote logging via a **syslog** server as well as local logging (and dumps) to an external flash device.

Media cards will boot automatically and come up ready to operate. The speaker on the control board faceplate emits audible beeps as the board boots.

Redundant power supplies

Installing redundant power supplies ensures against failures of individual units in the chassis. If possible, attach each power supply into a different power source.

Power supply failure

If a GRF 400 power supply fails, you will see failure messages on-screen at the user interface. The `gr.console` log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

AC power supply

Here are the installation steps with AC power supplies installed in your GRF:

1 Do not have the cord plugged into a power source.

2 Check that the power supply unit is pushed fully into the chassis.

3 Connect the power cord into the AC receptacle on the power supply drawer.

4 Plug the power cord into the appropriate rack or wall outlet.

DC power supply

Please read through the steps before you begin, refer to Figure 3-7 as you review.
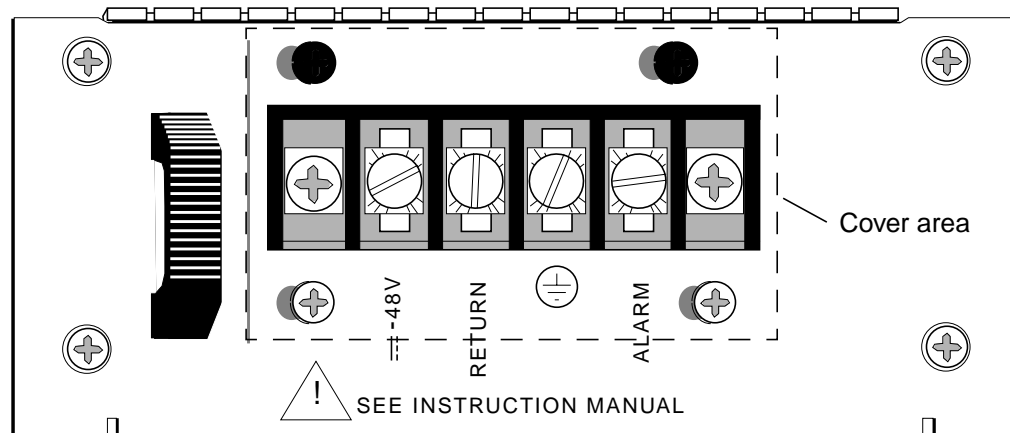
Figure 3-7.   Front of -48V power supply drawer.

⚠ **Caution:** The first terminal on the left is a NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V Return.

Vorsicht: Der erste Anschluß links ist 48V MINUS. Der zweite Anschluß von links ist die Rückleitung mit 48V MINUS.

Here are the steps to attach DC power supplies:

1   Do not have the DC wire set attached to a power source. Check that the power supply drawers are pushed fully into the chassis. Undo the two screws from the aluminum cover and flip the cover back.

2   Attach wires in this order:

  a. Attach the negative 48V wire to the first terminal on the left, it is marked "-48V."

  b. Attach the negative 48V return to the terminal marked "RETURN."

  c. Connect a protective earth ground to the terminal with this symbol: ⏚

When you connect DC wires, remember that the first terminal on the left is NEGATIVE 48V. The second terminal from the left is NEGATIVE 48V Return. If you connect the two DC wires incorrectly, you blow the input fuses —the DC power supply will not work now. The power supplies may only be serviced by a qualified trained service technician.

3   If you are connecting the GRF to a site alarm unit, connect the alarm unit to the right-most terminal, labeled "ALARM." If power fails to reach the backplane of the GRF 400, an internal relay activates and applies the NEGATIVE 48V to the site alarm terminal. This output is fused at 0.5A.

4   Flip the cover back down and replace the two screws.

5   Connect the DC wire set connector to the power source. The GRF will start up and boot.

Interpreting GRF 400 control board LEDs

As you start up the GRF, you need to understand the control board LEDs. Figure 3-8 shows the LEDs on the control board face plate. Refer to Table 3-1 for a description of each LED.

Figure 3-8.   GRF 400 IP switch control board faceplate and LEDs

Table 3-1.   GRF 400 control board LEDs

LED	Description
POWER	This green LED is on when the GRF power is on.
FAULT	This amber LED flashes once as the board starts self-test; then flashes once again when self-test completes. If the Fault LED turns on and remains on, an error condition has been detected.
STATUS	This green LED is on and flashes a "heartbeat" during positive board operation.
COM BUS ACTIVE	This green LED flashes during bus activity.
COM BUS TRANSMIT	This green LED flashes during bus activity.
COM BUS RECEIVE	This green LED flashes during bus activity.
PS1-OK	This green LED is on when power supply 1 is operating at required level. If the power supply fails, the LED goes off.
PS2-OK	This green LED is on when power supply 2 is operating at required level. If the power supply fails, the LED goes off.
LINK OK	This green LED is on while the Ethernet connection from the control board is good.
100	This green LED is on when the Ethernet is in 100Base-T mode. The LED is off under 10Base-T mode.
XMT ACT	This green LED flashes while data is sent to the management software.
RCV ACT	This green LED flashes while data is received from the management software.

Powering on the GRF 1600

As described earlier in this chapter, the initial start-up of the GRF requires a directly-attached terminal for logging in as `root`. This terminal should be connected before you power on the GRF so you can monitor the start up and boot messages that begin immediately. The GRF 1600 is powered by 1100W AC power supplies.

The GRF chassis does not have a power on/off switch. When the power cord is plugged in to a power outlet or the DC wiring set is connected, the GRF is powered on. It takes a few seconds for the power supply(s) to cycle before power is supplied to the back panel and the media cards.

When the GRF is powered on, it begins to boot. You can see the boot messages displayed on the VT-100 screen. As it boots, the GRF runs a series of internal diagnostics. The first time a GRF is powered on, the boot process runs a system configuration script. In this script you assign the GRF a host name, configure the maintenance Ethernet, and optionally specify a **syslog** server. The GRF supports remote logging via a **syslog** server as well as local logging (and dumps) to an external flash device.

Media cards will boot automatically and come up ready to operate.

The speaker on the control board faceplate emits audible beeps as the board boots.

Redundant power supplies

Installing redundant power supplies ensures against failures of individual units in the chassis. If possible, attach each power supply into a different power source.

Power supply failure

If a GRF 1600 power supply fails, you will see failure messages on-screen at the user interface. The `gr.console` log file will also contain related messages. The PS1 or PS2 amber LED on the control board will light, indicating a power supply failure. If you do not already have a replacement unit, order one from Ascend.

Warning: A failed power supply must be replaced by certified personnel only.

Warnung: Das Netzteil darf nur von einer Fachkraft ausgewechselt werden.

AC power supply

Here are the installation steps with AC power supplies installed in your GRF 1600:

1 Be sure the power cord is not plugged into a power source.

2 Check that the power supply drawer is pushed fully into the GRF chassis.

3 If you are using a locking clamp to secure the power cord, refer to the section "Installing a power cord locking clamp."

Otherwise, connect the power cord into the AC receptacle on the power supply drawer.

4 Plug the power cord into the appropriate rack or wall outlet.

Installing a power cord locking clamp

You can install a power cord locking clamp to prevent the power cord from being accidentally pulled out of the power supply.

Two screws are adjacent to the AC receptacle on the front of the power supply unit. The primary purpose of these screws is to attach the AC receptacle to the drawer front. They can also be used to attach a power cord clamp. The screws can be untightened 3 or 4 turns, enough to slide the clamp under, but should never be fully removed since their primary purpose is to hold the AC receptacle unit in place. To install the cord clamp, loosen the screws just far enough to slide the clamp retaining ears underneath. DO NOT COMPLETELY REMOVE THE SCREWS.

Figure 3-9 shows the clamp and also shows it in place on the power supply drawer.
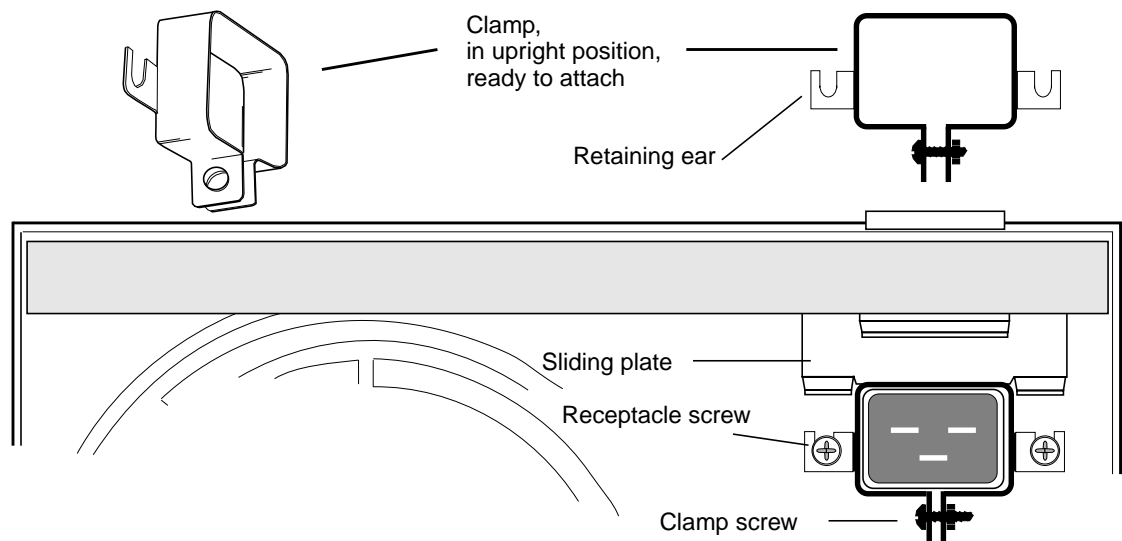
Figure 3-9.   AC power supply power cord locking clamp

Warning: If the power supply is equipped with a power cord clamp, the socket outlet must be located near the equipment and shall be easily accessible. The power cord shall have a maximum length of 3 meters (10 feet).

This warning is important because in an emergency, the only safe way to remove power from the GRF is to unplug it at the wall or socket outlet. In effect, if a clamp is used, the wall or socket outlet serves as the GRF's AC disconnect.

Warnung: Wenn das Netzteil mit einer Netzkabelklemme ausgestattet ist, muß sich die Steckdose nahe dem Gerät befinden und leicht zugänglich sein. Das Netzkabel darf nicht länger als 3 m sein.

Dieser Warnhinweis ist sehr wichtig, da die Stromversorgung des GRF in einem Notfall nur durch Herausziehen des Netzsteckers von der Wandsteckdose getrennt werden kann. Bei Verwendung einer Klemme dient die Wandsteckdose oder Steckdose zum Ausschalten des GRF.

How to obtain a clamp

Ascend does not supply cord clamps. Clamps are available from the Panel Components Corporation, P/N 85910051, at (515) 673-5000.

Interpreting GRF 1600 control board LEDs

As you start up the GRF, you need to understand the control board LEDs. Figure 3-10 shows the LEDs on the control board face plate. Refer to Table 3-2 for a description of each LED.
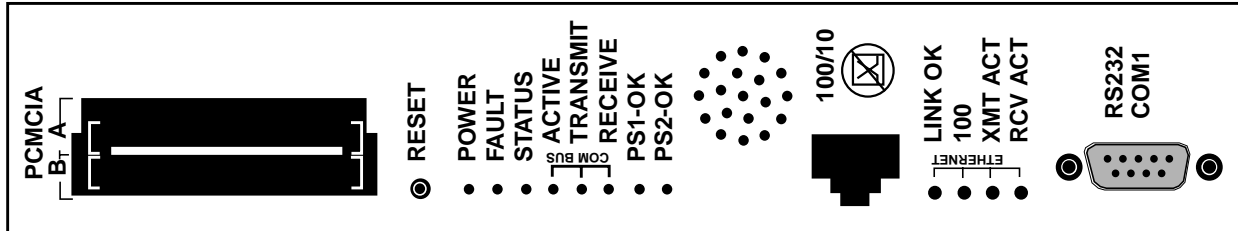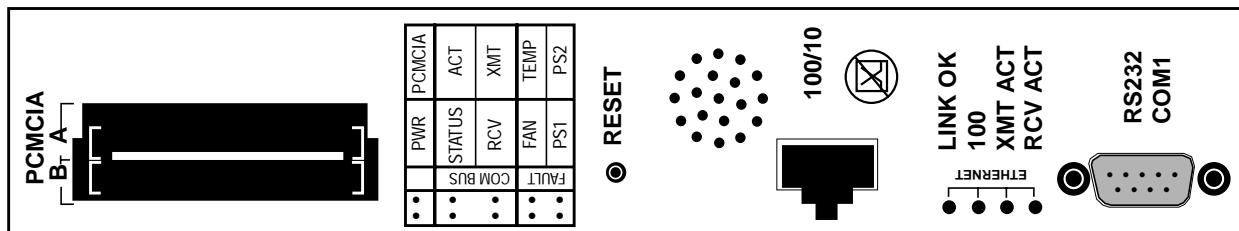

Figure 3-10. GRF 1600 control board faceplate and LEDs

Table 3-2.   GRF 1600 control board LEDs

LED	Description
POWER	This green LED is on when the GRF power is on.
PCMCIA	This green LED lights when either PCMCIA slot is in use.
STATUS	This green LED is on and flashes a "heartbeat" once a second during positive board operation.
ACT	This green LED flashes during com bus activity.
RCV	This green LED flashes during com bus activity.
XMT	This green LED flashes during com bus activity.
FAN	This amber LED is off during normal fan operation. FAN comes on when either Fan1 or Fan2, or both, failed.
TEMP	This amber LED remains off when temperature level is acceptable. TEMP comes on if operating temperature level is exceeded. You will also hear an alarm.
PS1 and PS2	This amber LED is on when a power supply failure is detected. During good working conditions it is normally off.
LINK OK	This green LED is on while the Ethernet connection from the control board is good.
100	This green LED is on while the 100BaseT link is operating.
XMT ACT	This green LED flashes while data is sent to admin node.
RCV ACT	This green LED flashes as data is received from admin node.

First-time power on configuration script

When you plug in the GRF, it powers on and begins to boot. Boot activity is displayed on the screen.

The first-time system configuration script runs automatically at this time, but never will again. Here are the questions asked in the script that you need to be ready to answer:

```
Host name for this machine ?
Do you wish to configure the maintenance Ethernet interface ?
Type of interface: TP BNC AUI  ?
IP address for this interface ?
Netmask for this network ?
Which region is this machine located in?
Which time zone ?
```

Next, you are prompted to change the local password for root:

```
New password (8 significant characters):
```

You are also prompted to set up a **syslog** server on which to save and access the GRF system logs. Network logging is one logging option. You can also configure local logging (and dumping) to a PCMCIA flash card, the procedure is described later in this chapter.

If you do want to set up a **syslog** server, follow the instructions in the script. If you choose to configure PCMCIA logging, press <Enter> at the logging prompts.

A target host must be specified to receive log entries or they will not be saved.

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

On <remote.host.name> at <ip_address>
add the following lines to /etc/syslog.conf:
local0.info /var/log/gritd.packets
local1.info /var/log/gr.console
local2.* /var/log/gr.boot
local3.* /var/log/grinchd.log
local4.* /var/log/gr.conferrs
local5.* /var/log/mib2d.log
Use "touch" to create the above files in <remote.host.name>: /etc
Kill and restart syslogd on <remote.host.name>.
Press <Enter> to continue.
Initial configuration is complete.
```

This is the end of the configuration script.

If later you need to change any of the system parameters, run the **config_netstart** script. **config_netstart** is described in the *GRF Configuration Guide*. To set up network logging at a later time, refer to chapter 2 in the *GRF Configuration Guide*.

The configuration script automatically saves any configuration information you have entered. If you later add or change configuration information, save those changes by executing a **grwrite -v** command.

Logging in as root

After you press the Enter key, the `User:` prompt appears:

```
Press <Enter> to continue.
User:
```

At the `User` prompt, type: `root`

```
User: root
Password:
```

At the `Password:` prompt, type the new password you entered in the configuration script. If you did not change the password earlier, use the preset password, type: `Ascend`

```
Password:  • • • • • •
```

When a password is entered, it is not echoed (displayed) on the screen.
The `super>` prompt appears:

```
super>
```

Changing the root password

GRF systems are shipped with `Ascend` *(capital A)* preset as the `root` password. If you have not already done so, Ascend recommends that you change this preset password now, before you begin to configure.

At the super> prompt, execute the **sh** command to create the UNIX shell, enter **sh** and the UNIX prompt appears:

```
super> sh
#
```

At the # prompt, type: `passwd` and you are prompted to enter the old password:

```
#  passwd
Old password:
```

Then you are prompted to enter the new password: (use 8 alphanumeric characters)

```
New password:  • • • • • • • •
```

Enter the new password once more:

```
Retype new password:   • • • • • • • •
```

Using the command-line interface (CLI)

The super> prompt indicates you are in the Command Line Interface (CLI), and are logged in as root. You manage the router and set certain configuration parameters from the CLI.

For current GRF users, these parameters are those you previously set in the grinchd.conf file, you now set those parameters using commands and profiles available in the CLI. Other configuration files such as gratm.conf and grppp.conf are still accessed and set using a UNIX editor. Although the Ascend Embedded OS has many UNIX-like features, some, such as UNIX man pages, are not maintained. Man pages for GRF-specific commands are available.

Here is a list of CLI commands, the complete set is described in the *GRF Reference Guide*:

```
?             ( user )        grroute       ( system )
auth          ( user )        grrt          ( system )
biosver                       grsavecore    ( system )
cd            ( system )      grsite        ( system )
clear         ( user )        grsnapshot    ( system )
date          ( update )      grstat
delete        ( update )      grwrite       ( system )
dir           ( system )      gsm
exit          ( user )        help          ( user )
fastboot      ( system )      ifconfig      ( system )
flashcmd      ( system )      iflash        ( system )
gdc           ( system )      list          ( system )
get           ( system )      load          ( update )
getver        ( system )      ls            ( system )
grarp         ( system )      man           ( system )
grass         ( system )      mem           ( user )
gratm         ( system )      mountf        ( system )
grbist        ( system )      netstat       ( system )
grburn        ( system )      new           ( system )
grc           ( system )      ping          ( system )
grcard        ( system )      pwd           ( system )
grclean       ( system )      pwrfaild      ( system )
grconslog     ( system )      quit          ( user )
grdebug       ( system )      read          ( system )
gredit        ( system )      route         ( system )
grfddi        ( system )      save          ( update )
grfins        ( system )      set           ( system )
grflash       ( system )      setver        ( system )
grfr                          sh            ( user )
grinch        ( system )      shutdown      (system )
grinstall                     temp
grlamap       ( system )      traceroute    ( system )
grmaint       ( system )      umountf       ( system )
grmem         ( system )      vpurge        ( system )
grmrflash     ( system )      whatami       ( system )
grms          ( system )      whereami      ( system )
grppp         ( system )      whoami        ( user )
grreset       ( system )      write         ( update )
grrmb         ( system )
```

Note: UNIX (non-CLI) commands execute in the UNIX shell started with the **sh** command.

Attaching the administrative Ethernet

The control board supports a connection to the GRF from a site's local Ethernet. This is the recommended access for system management and administration.

Ethernet connection to control board

The control board faceplate has an RJ-45 modular connector. It supports 10 or 100 megabit connections, autosensing the line rate. As indicated in Figure 3-11, the Ethernet connector is prohibited from telco lines.
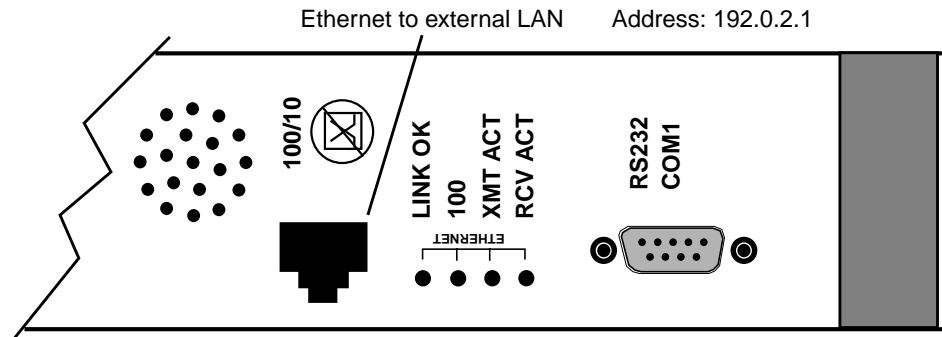
Figure 3-11. Point-to-point Ethernet connector on the control board

The LAN Ethernet connector is labeled "100/10," its network interface is de0, and it is shipped with a temporary network address set to 192.0.2.1. The connector supports 100Base-T and 10Base-T connections.

To connect to an external Ethernet LAN, insert the LAN cable into the receptacle marked "100/10". Its address is configured when the first-time configuration script runs.

Use the administrative account "netstar" to log into the GRF router over the LAN. After you log in, test your network access and administrative account on the router after configuring it on your LAN. Administrative log on is described in the *GRF Configuration Guide*.

Configure logging

When the GRF first boots and loads, logging is not enabled. System memory restrictions on the GRF control board require that logging be to other storage. If target storage is not specified to receive log entries, log entries are not saved.

There are three options for logging, procedures for each are in the next section:

– "local" logging and dumping to an external PCMCIA flash device inserted in the control board

– remote logging (network) to a **syslog** server

– remote logging (network) to an NFS-mounted file system

Logging and dumping to a PCMCIA device

The GRF system can log and dump locally to an external flash device installed in PCMCIA slot A. If you choose this option, install the device any time after the GRF is powered on and is running. However, logging is not enabled until you install the device and complete this configuration procedure. Logged messages can be helpful while you are configuring media cards.

Installing a PCMCIA device

The **iflash** command determines the geometry of any PCMCIA Type-II or Type-III ATA disk device, and formats the disk for use in a GRF.

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 a slot on the control board.

2   Log in as `root`, start the UNIX shell, and execute these commands from the shell:

```
prompt> sh
#
# cd /
# iflash -f -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/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
```

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

The entries should look like the following:

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

If you had previously configured your GRF to log messages to a directory other than
/var/logs, you changed settings in /etc/grclean.conf and
/etc/grclean.logs.conf files. Go back into those files now and change the log directory.

5   Modify /etc/grclean.conf and /etc/grclean.logs.conf to reflect the new log
location. The entries should look like the following:

```
************************************************************************
* Log files that used to be archived by the /etc/{daily|weekly|monthly}
* scripts.
************************************************************************
size=10000
logfile=/var/account/acct
size=10000
#logfile=var/log
logfile=var/log
```

6   Save all changes and reboot:

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

7   Verify that the PCMCIA interface and device are up:

```
# csconfig -a
```

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

Managing PCMCIA slots

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

Panic dumps sent to external flash device

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

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

Setting up a syslog server

One way to log over the network is to use **syslog** and set up a remote **syslogd** host. You can configure remote logging during initial installation via the configuration script or you can change to remote logging at any time. Both procedures are described in this section.

You begin to enable network logging in the first-time power on configuration script as described in the *GRF 400/1600 Getting Started* manual, or, if you are not powering on the GRF for the first time, you can directly edit the /etc/syslog.conf configuration file and set up a remote syslog server. The remote syslog or logging server is another node on your LAN that runs the **syslog** daemon, **syslogd**.

The GRF syslog.conf file configures the GRF to send log messages to a syslog server on your local network. These logs include:

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

Follow these steps to configure the GRF and the syslog server for network logging:

1 On the GRF, open the /etc/syslog.conf file and uncomment these 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
```

Still in /etc/syslog.conf, replace "server.domain.com" with the domain name of the target host (logging server) that will receive the log messages.

2 On the GRF, add the IP address and host name of the logging server to /etc/hosts.

3 On the GRF, run the **grwrite** command to save the changes to the /etc configuration files (/etc/syslog.conf and /etc/hosts).

4 On the syslog server, add these file names to the /etc/syslog.conf file:

```
local0.info /var/log/gritd.packets
local1.info /var/log/gr.console
local2.* /var/log/gr.boot
local3.* /var/log/grinchd.log
```

```
local4.* /var/log/gr.conferrs
local5.* /var/log/mib2d.log
```

5   On the syslog server, use the **touch** command to create the log files in the
server's `/var/log` directory or wherever log files normally reside on the server:

```
# touch /var/log/gritd.packets
```

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

6   On the syslog server, kill and restart **syslogd**.

syslogd must be running with the `-i` option to enable "internet listening." If **syslogd** is
not running with `-i`, kill it and restart it. The **syslogd** `pid` can be found in the file
`/var/run/syslog.pid`. You will lose any messages sent to **syslog** during the
kill/restart processes.

Note: `/etc/rc` can be edited to get `syslogd -i` upon boot.

7   On the GRF, kill and restart **syslogd**.

Because **syslogd** is usually run before the domain name server (**named**) at boot time, you
need to add an entry to `/etc/hosts` that describes the host you want to send to. Here is
a sample entry in `/etc/hosts`:

```
222.222.11.93          server.domain.com
```

Now kill **syslogd** and restart it with the `-i` option. The `-i` can be added to `/etc/rc` to
turn this on at boot time.

Run **grwrite** to save changes made to the `/etc` files. Note that the **grconslog** command
does not differentiate among multiple log files sent to a single remote syslog server from
multiple GRF systems.

This completes the network logging configuration. A copy of the `syslog.conf` file follows:

syslog.conf file

This excerpt from the `syslog.conf` file applies to GRF 400 and GRF 1600 systems:

```
# syslog.conf,v 1.3.28.2 1997/01/06 20:01:00 wdp Exp $
#
*.err;kern.debug;auth.notice;mail.crit          /dev/console
*.notice;auth.debug                             root
*.emerg                                         *
#
# To enable the logging of system messages on GRF systems, edit the
# entries in the "Log messages to Network" section below.
#
#       - uncomment the lines in the "Log messages to Network" section
#                 of this config file (just below these instructions)
#
```

```
#       - change "server.domain.com" to the name of a syslog server on
#               your local network to which this router may send log
messages
#
#       - add the IP address of the log server and its host name to
/etc/hosts
#               on this GRF system.
#
#       - run the "grwrite" command to save your changes to
#               /etc/syslog.conf and /etc/hosts
#
#       - add the following lines to the /etc/syslog.conf on your log
server:
#               (do not include the # from the first column of this
file, ie.,
#               add "local5.* /var/log/mib2d.log" not "#local5.*
/var/...")
#
#               #
#               # Syslog configuration for syslog server systems
#               # GRF-specific log files (from GRF systems over the
network)
#               #
#               local0.info             /var/log/gritd.packets
#               local1.info             /var/log/gr.console
#               local2.*                /var/log/gr.boot
#               local3.*                /var/log/grinchd.log
#               local4.*                /var/log/gr.conferrs
#               local5.*                /var/log/mib2d.log
#
#       - kill and restart syslogd on your syslog server machine after
making
#               sure that the log files added to the config file exist
#               on the log server machine exist (use the "touch" command
#               to create them if they do not exist, then restart
syslogd
#               on the syslog server machine).
#
#       - kill and restart syslogd on the GRF router (or reboot the
GRF).
#
# To uncomment, remove "#net# from each line in this section
#
# Log messages to Network
#
#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
```

Using an NFS-mounted file system

On the GRF 400 and GRF 1600, the maintenance Ethernet interface (usually `de0`) must be used for NFS-mounted file systems.

Note: NFS mounting CANNOT be done through a media card interface (for example, `gf0yz`). The maintenance interface is specified in the `/etc/netstart` file as the value assigned to the variable "`iface`". This variable defines the external connection to the GRF and is set when the GRF is initially installed.

Note: Programs writing to an NFS-mounted file system will block while the NFS connection to the remote file system is dropped.

Setting up NFS on the GRF

You must add the appropriate host and IP information for any NFS server you are using into the `/etc/host` file if either of the following conditions apply:

– The name server(s) in `/etc/resolv.conf` point out one of the media card interfaces and are thus unavailable when the mount occurs.

– The name server(s) in `/etc/resolv.conf` point to a network that is reachable only through a route off the administrative Ethernet and only when GateD is being run. That is, if GateD is not active and a route entry exists in `grroute.conf`, the `/etc/host` entries are not needed.

Powering off a GRF

The GRF does not have an on/off switch. To power down a GRF system, first use the **shutdown** command to cleanly shut down the operating system:

```
# shutdown now
```

Then, unplug the power cord for each power supply.

If the GRF is equipped with redundant power supplies, please note the following when powering off the 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.

Fan unit replacements

GRF 1600

If the FAN LED comes on, there is a problem with one or both fans and you need to replace the unit without delay. The fan tray is field replaceable, contact Ascend to order a replacement. When you have the replacement, exchange the fan trays. Use the packaging from the new unit to return the old unit to Ascend. You can replace the tray while the GRF is running:

– Unloosen the two captive screws on the front of the tray.

– Slide the old tray out, the tray sits on guide rails and weighs 13 pounds (5.85kg).

– Make sure you have it on the guide rails, carefully slide the new tray in —when the tray is fully inserted, you will hear the fans start up.

– Tighten the captured screws.

GRF 400

GRF 400 fans are integral to the chassis and are not field replaceable. A service call is required.

Option: Attaching a modem to the GRF

Although you must connect a VT-100 terminal to do the initial configuration, after that you can install a modem connection.

The GRF supports two modem options. One option is to attach a terminal server to the control board serial port (RS-232) and then attach a modem to the terminal server. Another option is to attach a PCMCIA modem directly into one of the control board PCMCIA (PC-CARD) slots. The modem connection is lost at reboot and you must dial up again to re-establish it.

Instructions for installing the PCMCIA modem are included here. Perform the configuration procedure after the GRF is powered on and the system has booted.

Installing a PCMCIA modem

Two types of PCMCIA modems have been tested and found to work reliably with the GRF and to be compatible with the modem configuration commands specified here.

The tested modems are:

– MegaHertz Model CC3288 (28.8Kbps)

– US Robotics Model 1626 (28.8Kbps, some with 33.6Kbps upgrade)

Although other PCMCIA modems have not been tested, some 28.8K models may work and be configurable with the GRF.

Unpack the PCMCIA modem and insert the modem card into an open PCMCIA slot on the GRF control board. Attach the phone cable to the modem card and then connect the RJ-11 connector to your phone line (using the RJ-11 female adaptor provided, if needed).

Configuration procedure

To enable the PCMCIA modem to accept calls, configure it from the VT-100 terminal using the following procedure:

1 Turn off **getty** on the modem line. Enter:

```
# vi /etc/ttys
```

Find this line:

```
tty02  "/usr/libexec/getty t9600-hf"   vt100   on   secure
```

Change the "on" to "off" so the line reads:

```
tty02  "/usr/libexec/getty t9600-hf"   vt100   off secure
```

Save the file and then enter:

```
# kill -HUP 1
```

2 Configure the modem – this procedure assumes you are connecting a USR 28.8K PCMCIA modem.

You will enter a series of standard modem **at** commands. After you enter an **at** command, you get a response, usually "OK". If you get an error message, please refer to the user documentation that comes with your modem.

To begin the configuration, enter:

–   # chmod 666 /dev/tty02
      # tip tty02

```
at

at&f              <--- resets modem to factory settings

OK

ats0=1            <--- sets answer after one ring

OK

at&w              <--- stores modem configuration to NVRAM

OK

atz               <--- resets modem

OK

~.                <--- disconnects from tip
```

3   Now turn **getty** on for the modem line, this is basically the reverse of step 1. Enter:

```
# vi /etc/ttys
```

Find the line that looks like:

```
tty02  "/usr/libexec/getty t9600-hf"  vt100   off secure
```

Change the "off" to "on":

```
tty02   "/usr/libexec/getty t9600-hf"  vt100   on  secure
```

Save the file and then enter:

```
# kill -HUP 1
```

4   Save your changes. Enter:

```
# grwrite -v        <--- saves your changes to the /etc/ttys file to system RAM.
                         (the -v option displays the names of files as they change)
```

5   Verify that the PCMCIA interface and device are up, information about the csconfig command is in the *GRF Reference Guide*:

```
# csconfig -a
```

You should now be able to dial in to your GRF system using the PCMCIA modem card.

What to do next

At this point the GRF is running, the administrative LAN is connected, and you have completed initial system IP configuration using the first-time configuration script. You should also have configured system logging.

The next chapter describes media card cabling requirements and ways to check out and verify those connections. After attaching media card cables, use the *GRF Configuration Guide* to complete system and media card configuration.

Cabling and Verifying Media Cards

4

Chapter 4 discusses cabling requirements for each type of media card and describes the information provided by each card's set of LEDs. It also describes the range of physical attachment options for FDDI.

Software release 1.4 does not support the first versions of the ATM OC-3c or FDDI media cards. These cards are informally called ATM Classic and FDDI Classic. Only the hardware-enhanced versions of these cards are supported, ATM/Q and FDDI/Q.

The chapter covers these topics:

Cabling the media cards

Note: Wear a grounded, conductive wrist strap when removing, replacing, and/or handling individual GRF electronic components.

The GRF chassis is shipped with all media cards and the control board installed.
The GRF chassis enclosure must have all access panels in place and secured. All available slots must be filled with media cards or blank face platess.

Note: Blank face plates are installed in all unused slots to maintain correct airflow for cabinet cooling. They must remain in place during system operation.

Other than making sure face plate screws are tight, media cards need no attention prior to attaching the media interface cables.

Cable specifications

All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for Ethernet cables, fiber optic cables, and power cables, which are unshielded. Connectors with jackscrews should be securely tightened.

GRF media cards use the following industry-standard cables:

Table 4-1.   Media card cable specifications

Cables/Card	Description
HSSI	25 twisted-pair shielded coax cables
ATM OC-3c multimode	62.5/125 micron fiber optic cables
ATM OC-3c single mode	9/125 micron fiber optic cables
ATM OC-12c multimode	62.5/125 micron fiber optic cables
ATM OC-12c single mode	9/125 micron fiber optic cables
4-port 10/100Base-T	Category 5 UTP cables
8-port 10/100Base-T	Category 5 UTP cables
FDDI multi-mode	62.5/125 micron multi-mode optic cables
HIPPI	Twisted-pair copper cables in 5-, 25-, or 51-meter lengths. Ascend certifies the viability of GRF-to-GRF connections using 51-meter cables, and sells HIPPI cables directly.
SONET OC-3c multimode	62.5/125 micron fiber optic cables
SONET OC-3c single mode	9/125 micron fiber optic cables

Differences in media card loading

The same GRF system does not always come up the same way each time— cards can load in a different order each time the system is brought up.

This is normal and happens because the boot and load signals can catch different points on the communications bus clock cycle. Moving media cards to different slots can also cause variations. Media cards have different boot and diagnostic programs. For example, HIPPI media cards take significantly less time to load and come up than do FDDI.

Reset GRF when all cables are attached

When all cables are in place, reboot the system. This will also reset all media cards.

Use the **shutdown -r now** or **grms** command described at the end of the chapter. That last section describes ways to verify that your media cards are viable even though the system is not yet fully configured.

ATM OC-3c (ATM/Q) media card

The ATM OC-3c (also called ATM/Q) media card provides two full-duplex interfaces. ATM OC-3c cards are available in single and multimode versions. The ATM/Q media card has hardware support for large route table look-up.

Figure 4-1 shows a single mode ATM OC-3c faceplate, single and multimode faceplates are the same except that the single mode interfaces have a "LASER ON" LED.

(g0008)

Figure 4-1.   ATM OC-3c single mode media card faceplate

LEDs

The top four LEDs on the faceplate indicate card status. The duplex interfaces A and B each have a set of LEDs. Refer to Table 4-2 for a description of each LED.

Table 4-2.   ATM OC-3c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as ATM cells are received at the interface.
XMIT ACT	This amber LED blinks as ATM cells are transmitted out of the interface.
LINK OK	This green LED goes on when an optic cable is plugged into an interface and remains on while connection is good at both cable ends.
LASER ON	This green LED provides a safety warning on single mode ATM cards. One should not look into a laser-active interface component if a cable is not plugged in.

Laser safety

The ATM OC-3c single mode media card contains a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

CLASS 1 LASER PRODUCT

KLASSE 1 LASER PRODUKT

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: Lebenensgefahr Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 4-3 provides technical information about the laser diode on the ATM OC-3c single mode media cards:

Table 4-3.   ATM OC-3c single mode laser information

Manufacturer	Amp Inc.
Part number	269085-1
Laser type	InGaAsP diode
Wave length	1310 nm (+/- 50 nm)
Output power	-14dBm min., -8dBm max

Agency approvals	TUV Rheinland - EN 60950
	                      - EN 60825-1
	                      - EN 60825-2
	Complies with 21 CFR 1040.10 and 1040.11

ATM OC-12c media card

The ATM OC-12c media card provides a single full-duplex interface and has hardware support for large route table look-up. ATM OC-12c cards are available in single and multimode versions.

Figure 4-2 shows a single mode ATM OC-12c faceplate, single and multimode faceplates are the same except that the single mode interface has a "LASER ON" LED.
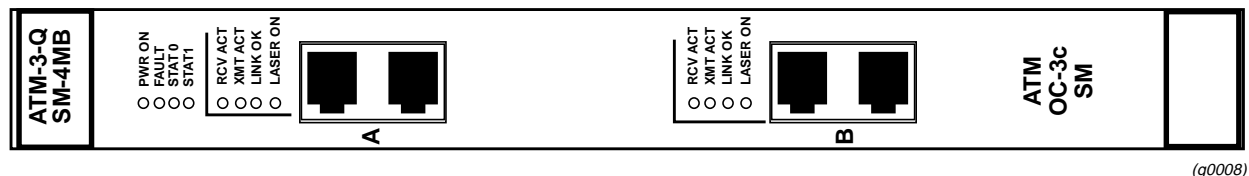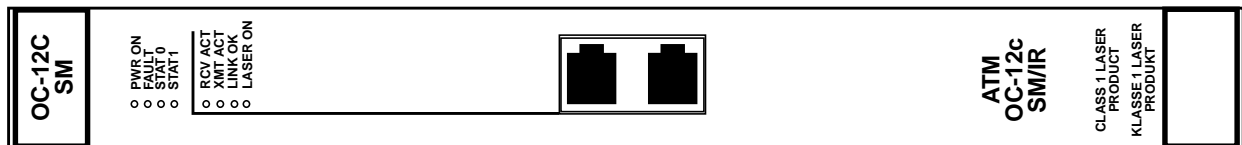

(g0008)

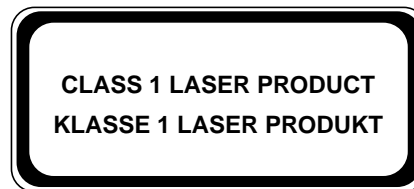*Figure 4-2.   ATM OC-12c single mode media card faceplate*

LEDs

The top four LEDs indicate card status. The duplex interface has a set of LEDs. Table 4-4 describes the ATM card LEDs.

Table 4-4.   ATM OC-12c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as ATM cells are received at the interface.
XMT ACT	This amber LED blinks as ATM cells are transmitted out of the interface.
LINK OK	This green LED goes on when an optic cable is plugged into an interface and remains on while connection is good at both cable ends.
LASER ON	This green LED provides a safety warning on single mode ATM cards. One should not look into a laser-active interface component if a cable is not plugged in.

Laser safety

The ATM OC-12c single mode media card contains a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

CLASS 1 LASER PRODUCT

KLASSE 1 LASER PRODUKT

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: Lebenensgefahr Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 4-5 provides technical information about the laser diode on the ATM OC-12c single mode media card:

Table 4-5.   ATM OC-12c csingle mode laser information

Manufacturer	Hewlett Packard
Part number	CDX2622
Laser type	Fabry Perot
Wave length	1274 nm minimum, 1356 nm maximum
Output power	-15dBm min., -8dBm max
Agency approvals	TUV Rheinland - EN 60950 - EN 60825-1 - EN 60825-2 Complies with 21 CFR 1040.10 and 1040.11

Attaching ATM media cables

GRF ATM media cards are available in both multimode and single mode.

A multimode card requires duplex SC fiber optic cable and has a distance limitation of approximately two kilometers. A single mode card requires simplex SC fiber optic cable and has a distance limitation of approximately 15 kilometers. Figure 4-3 shows both types of cables.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.
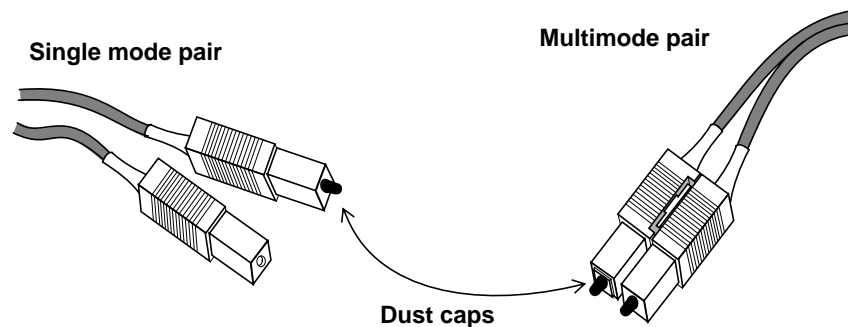
Figure 4-3.   Single and multi-mode ATM cable ends

Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work fine temporarily but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card. Leave the dust caps on until you are ready to insert the cable ends.

⚠️

Caution: Although there may be no hazard with multimode fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

FDDI/Q media cards

The FDDI/Q media card provides four full-duplex interfaces. Figure 4-4 shows a FDDI/Q faceplate.

(g0005)
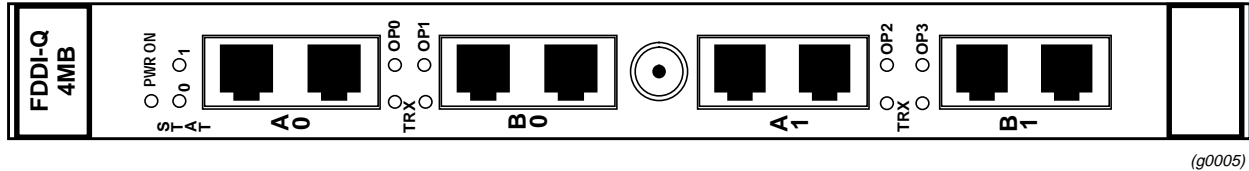
Figure 4-4.   FDDI/Q media card faceplate

LEDs

Each interface has a pair of LEDs that show the type of connection (OP) and traffic activity (TRX) at that interface. Refer to Figure 4-5.
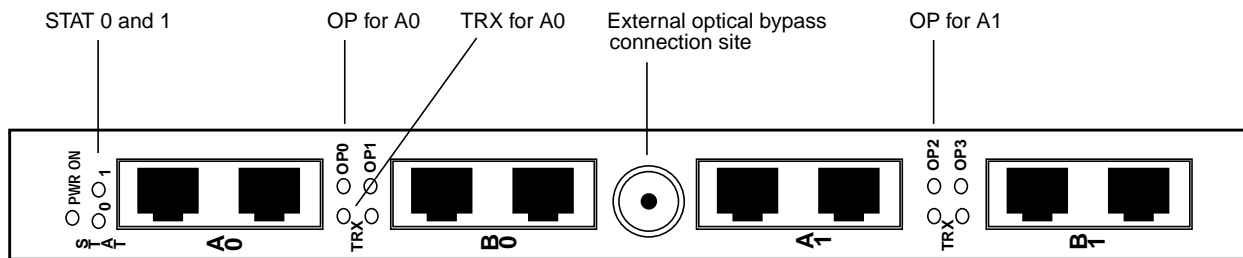
Figure 4-5.   FDDI/Q media card faceplate and LEDs

Certain LEDs on the FDDI/Q media card can be either amber or green depending upon the type of information they convey at the time. Table 4-6 describes FDDI/Q card LEDs.

Table 4-6.   FDDI/Q media card LEDs

LED	Description
PWR ON	This green LED is on when GRF power is on.
STAT 0 STAT 1	The amber / green Status LEDs at the top of each FDDI/Q media card are amber during self-test. When self test completes, the LEDs turn green.
	The Status LEDs alternate amber during power-on/dumping, and alternate green during power-on/loading.
	When status is normal:
	- the green 0 LED on the left blinks ten times a second
	- the green 1 LED on the right blinks once a second
	FDDI/Q Status LEDs do not blink error codes.

Table 4-6.   FDDI/Q media card LEDs   (continued)

LED	Description
OP0, OP1, OP2, OP3	The amber / green OP LEDs indicate the type of ring connection made at the particular interface: When OP is off, no viable connection is enabled. When OP is green, a SAS connection is configured. When OP is amber, a DAS connection is configured.
TRX	These green LEDs blink when FDDI/Q traffic is active in either direction at a particular interface (updated each 100 ms).

Attaching FDDI/Q media cables

Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.

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

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work temporarily, but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can still deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card.

Leave the dust caps on until you are ready to insert the cable ends.

⚠️   **Caution:** Although there may be no hazard with multimedia fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

FDDI connector keys

Connector keys are small plastic fittings that physically prevent the wrong type of FDDI connector from being inserted into a media card interface. Ascend ships a set of keys with each FDDI media card. Figure 4-6 shows a set of "B" keys installed on a FDDI connector and a set of "A" keys as they are shipped with a FDDI card.
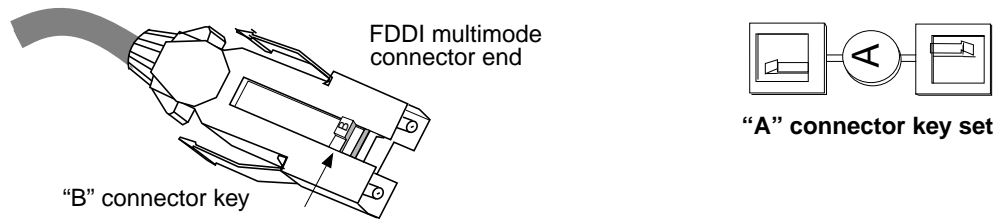
Figure 4-6.   FDDI optic cable connector and keys

A set of keys physically installs in both the card interface and the cable connector. Installing keys in FDDI media card interfaces is easy even though installation requires removing the FDDI media card from the chassis. The key "snaps" into a slot within the interface.

Different cables are required for single and dual attached interfaces. Dual attach FDDI cables have an "A" connector on one end and a "B" connector on the other. Single attach FDDI cables have an "M" connector on one end and an "S" connector on the other. Connector keys are site-installed according to site practice. Not every site uses them.

It is not necessary that connector keys be used. The GRF FDDI card already has "A" and "B" labels on its faceplate that provide visual "keys" for dual attachments. As a single attachment, the interface accepts both master and slave cable connectors without affecting configuration.

Connector key types

Once installed, a key limits the type of FDDI cable that can be inserted into that interface. Different cables are matched to single and dual attached interfaces. Cables and interface ports are labeled or "keyed" so they will connect only to a compatible interface type.

Figure 4-7 illustrates different types of receptacle and connector keys:
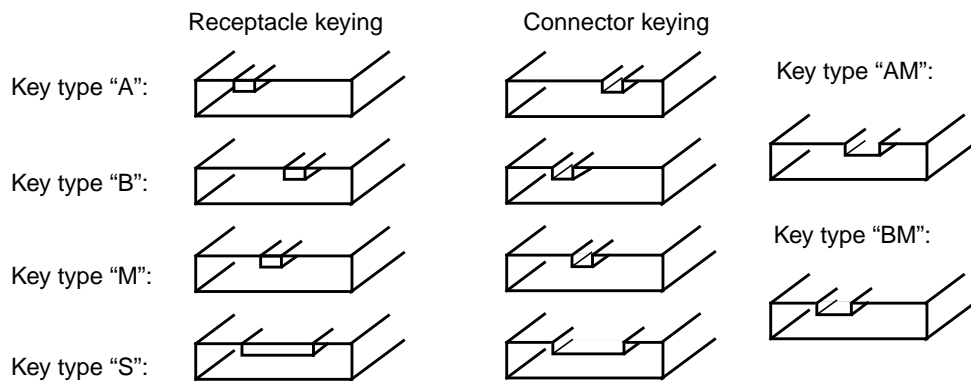
Figure 4-7.   Types of FDDI connector keys

FDDI attachment options

Attachment summary

A variety of attachment options are supported on GRF FDDI cards. Figure 4-8 summarizes all possible options:
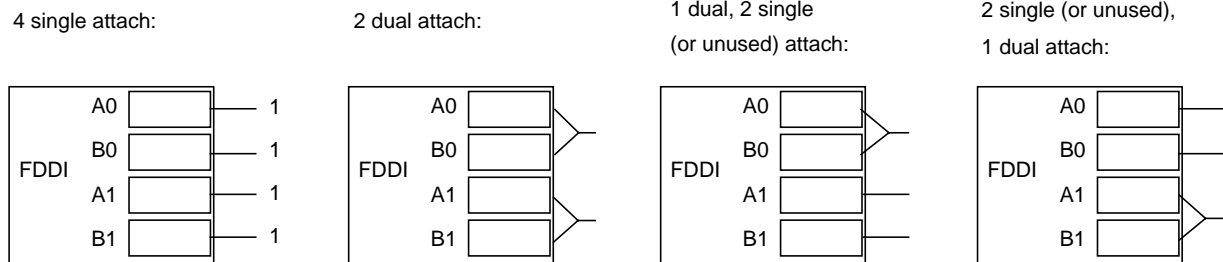
Figure 4-8.   DAS and SAS connection options

Refer to the *GRF Configuration Guide* for FDDI configuration information and copies of configuration files.

SAS and DAS attachments

Single attach station (SAS) refers to a device connected to FDDI media via a single connector.

In comparison, a dual attach station (DAS) device has independent connections to each of two FDDI rings, for redundancy. Figure 4-9 shows an example of each type of attachment.
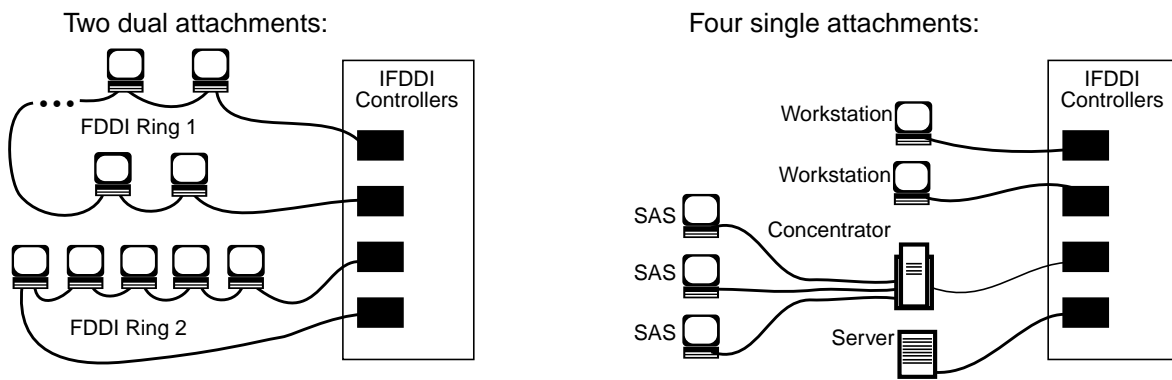
Figure 4-9.   FDDI media cards used as single and dual attachment nodes

Single attach - M and S interfaces

Single attach FDDI interfaces can be either master (M) or slave (S) interfaces.

They require a cable with a corresponding master or slave connector. Single attach cables have an "M" connector at one end and an "S" connector on the other. With no key installed, "M" and "S" connectors both fit the FDDI interface.

Figure 4-10 show the relationship between master and slave interfaces.
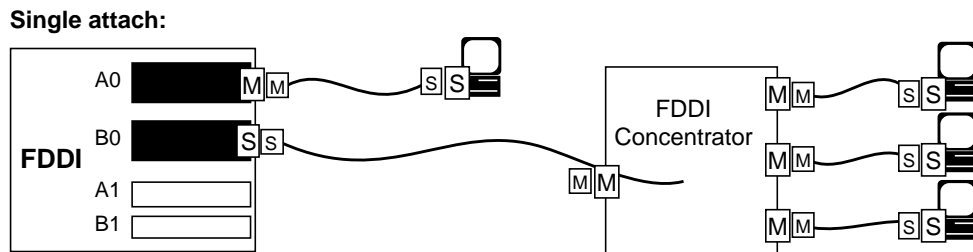
Figure 4-10. Single attach FDDI interface using master / slave keys

A single attach FDDI interface on the GRF is a master interface when it directly connects to a workstation. It is a slave interface when connected to the master interface of a FDDI concentrator. Such concentrators connect, in turn, to the slave interfaces of single-attach workstations.

Dual attach - A and B interfaces

Dual attach interfaces connect to form two unbroken counter-rotating rings, one being a redundant backup. Each interface, or station, has both an "A" and a "B" interface. Dual attach cables have an "A" connector on one end and a "B" connector on the other.

The "A" interface connects a station to its downstream neighbor; the "B" interface connects a station to its upstream neighbor. To create a logical ring, "A" must connect to "B", "B" must connect to "A". Otherwise, the network does not operate as a logical ring and segments into unconnected suborns. Figure 4-11 illustrates a logical ring.
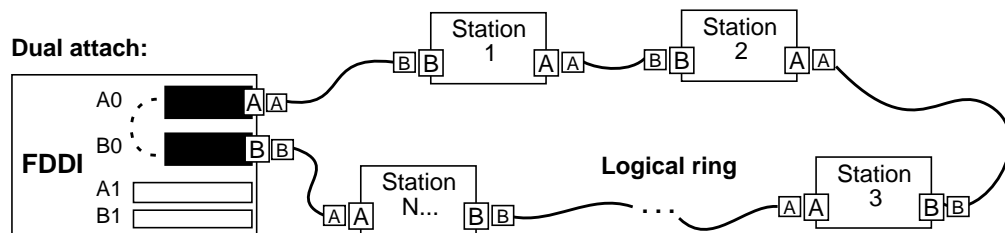
Figure 4-11. Dual attach FDDI interface using A / B keys

Installing a FDDI optical bypass

Optical bypass capability is provided externally to the FDDI media card.

A miniature six-pin DIN connector is provided on the FDDI face plate for controlling two external optical bypass switches, one for each dual attachment transceiver pair.

An external converter cable is required to split out two optical bypass connectors from the single face plate connector.   Control and status bits for the optical bypass switches are provided in the main processor's status and control registers.

As shown in Figure 4-12, two bypass switches can be attached with the Ascend-supplied Y-cable adapter. The Y-cable is required to reconcile control pin assignments between the GRF and the external switch module.

Through the Y-cable, an optical bypass switch module attaches to a pair of media interface connectors on the FDDI card.
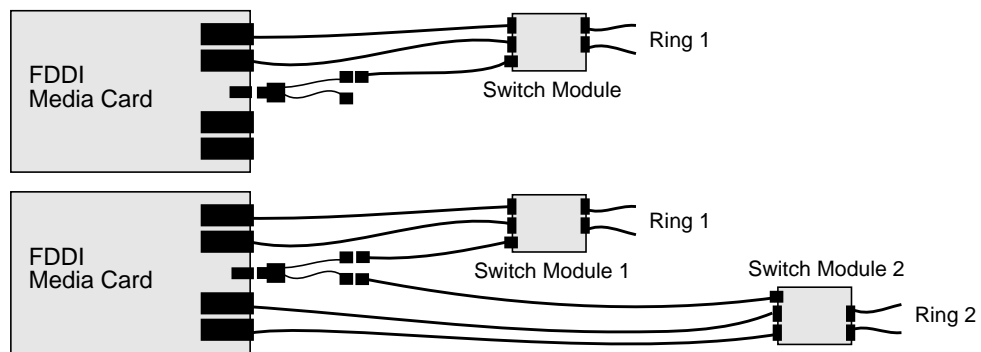
Figure 4-12. Optical bypass switch attachments

A bypass switch allows the GRF to remove itself from the dual ring during a failure or maintenance without causing the ring to wrap at upstream and downstream neighbors. If a GRF failure occurs, the bypass switch connects upstream and downstream neighbors on both the primary and secondary rings, and allows the GRF node to remove itself from the ring while still retaining ring continuity.

A node failure without a bypass switch causes the dual ring to "wrap." A wrapped ring absorbs the secondary ring into the primary ring and no longer has a backup ring.

Manual enable/disable

With the bypass physically installed, you can enable or disable the function in the Card profile for the specific FDDI card. Refer to the FDDI configuration chapter in the *GRF Configuration Guide*.

HIPPI media card

The HIPPI IP forwarding card provides a single full-duplex interface. Figure 4-13 shows a HIPPI faceplate.

(g0006)
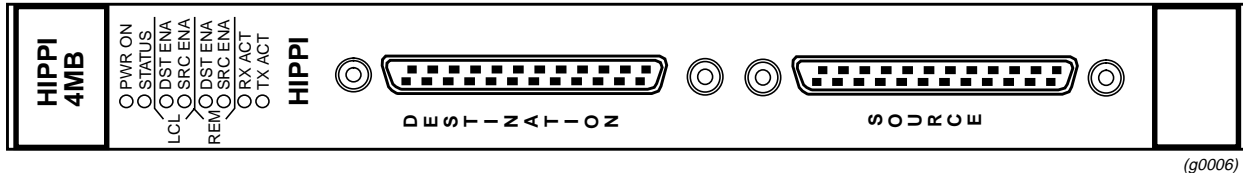
Figure 4-13. HIPPI media card faceplate

Attaching HIPPI media cables

The HIPPI media card provides a single duplex attachment and requires a pair of copper cables/connector ends as described in the standard *HIPPI-PH*, ANSI x3.183-1991.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils. HIPPI cables are specified in the standard to a length of 25 meters. Ascend certifies the viability of GRF-to-GRF connections using cables 51 meters long.

As shown in Figure 4-14, the upper HIPPI interface (RCV or destination interface) receives data from the host. The lower interface (XMT or source interface) transmits data to a host.
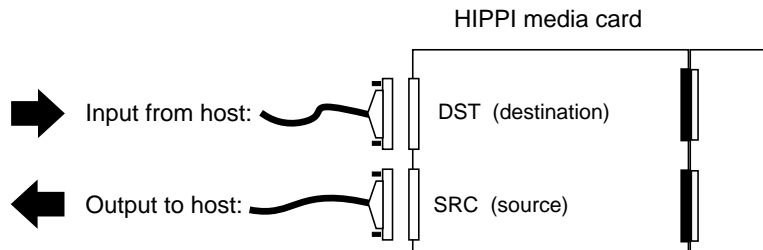
Figure 4-14. Cabling a HIPPI media card

Do not damage the connector ends

Each connector end has 100 fragile pins. Figure 4-15 illustrates a HIPPI cable connector end.

Pins can become bent while making the connection to the media card if alignment is wrong. If a HIPPI link does not work after cabling, check both ends of the cable for bent pins.

**HIPPI 100-pin
connector end**
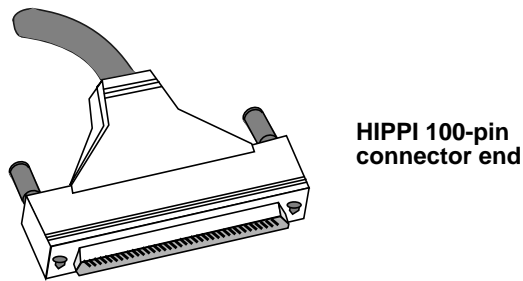
Figure 4-15. HIPPI 100-pin connector

Keep the bubble wrap on

Ascend ships cables with the connector ends enclosed in bubble wrap. Keep this bubble wrap on while you lay out the cabling. Remove the bubble wrap when you are ready to plug in the connector.

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.

Insert the connector perpendicular to the 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.

Tighten the jackscrews all the way down

Connector ends are heavy and tend to resist being completely seated. Tighten the jackscrews to make a firm attachment. Jackscrews should turn easily and stop abruptly when they hit bottom. If the connector is not fully seated, it may not operate properly.

HIPPI card LEDs

The HIPPI media card has one receive (from destination) interface and one transmit (to source) interface. The upper interface, A, is the RCV or destination interface. The lower interface, B, is the SRC or source interface. Figure 4-16 shows the set of eight LEDs at the top of the faceplate.
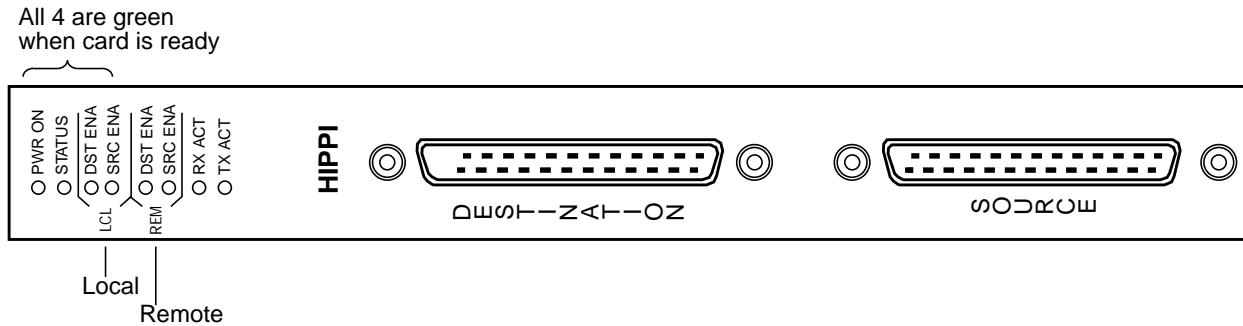
Figure 4-16. HIPPI media card faceplate and LEDs

Refer to Table 4-7 for a description of HIPPI card LEDs.

Table 4-7.   HIPPI media card LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Status	When self-test completes, this green LED turns on and remains steadily on during normal operations. The Status LED blinks when an error condition is detected.
DST ENA (local)	This green LED is on when the input destination interface is asserting the interconnect signal and is ready for operation.
SRC ENA (local)	This green LED is on when the output source interface is asserting the interconnect signal and is ready for operation.
DST ENA (remote)	HIPPI directly connects to a HIPPI host or to a network device. This green LED is on when the remote destination interface is asserting the interconnect signal and is ready for operation.
SRC ENA (remote)	HIPPI directly connects to a HIPPI host or to a network device. This green LED is on when the remote source interface is asserting the interconnect signal and is ready for operation.
RX ACT	This green LED indicates data is being received at the input interface, the blink rate depends on the traffic load.
TX ACT	This green LED indicates data is being sent from at the output interface, the blink rate depends on the traffic load.

HSSI media card

A HSSI media card provides two full-duplex interfaces. Figure 4-17 shows a HSSI faceplate.

(g0007)
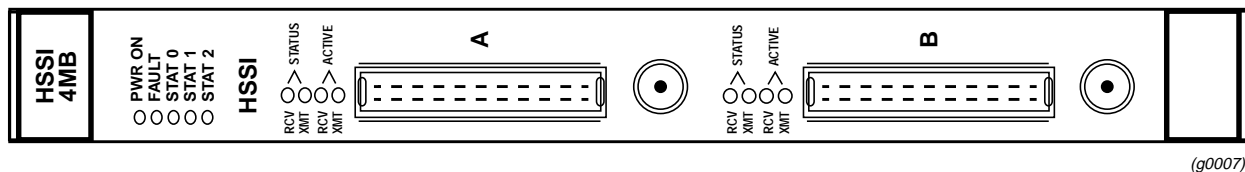
Figure 4-17. HSSI media card faceplate

Attaching HSSI media cables

The GRF HSSI media card provides two full-duplex attachments and requires a pair of copper cables/connector ends as described in the *HSSI High Speed Serial Interface Design Specification* (March 1990). Figure 4-18 illustrates a HSSI cable connector.

HSSI cables are specified to a length of 15 meters (50 feet). Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils.

HSSI 50-pin connector end
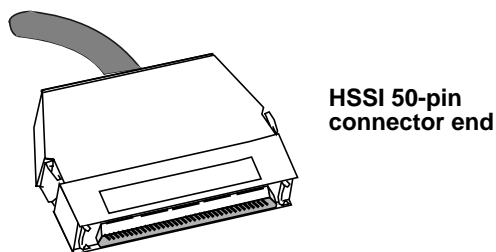
Figure 4-18. HSSI 50-pin connector end

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 a HSSI link does not work, check both ends of the cable for bent pins.

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 Daten-trägerkarte 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.

Insert the connector perpendicular to the 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.

Problems with bad HSSI cables

Messages similar to the following may show up in the `gr.conslog` log if a HSSI cable is bad:

```
# grconslog -pf
   [6] [RX] Received with errors.  Desc: 0x642C8002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642CC002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642D0002
   [6] [RX]        (Abort.)
   [6] [RX] Received with errors.  Desc: 0x642D4002
   [6] [RX]        (Abort.)
```

HSSI card LEDs

Figure 4-19 shows the HSSI faceplate and LEDs. At the top of the HSSI face plate are five LEDs that indicate card status. Each HSSI interface has two sets of LEDs that indicate link and packet information. Each interface has a connector for attaching an encryption modem.
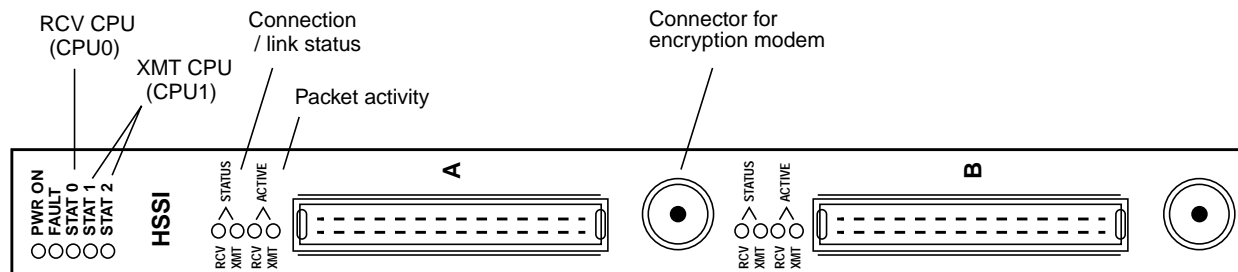
Figure 4-19. HSSI media card faceplate and LEDs

Refer to Table 4-8 for a description of HSSI card LEDs.

Table 4-8.   HSSI media card LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
	The Fault and STAT 0 LEDs alternate during self-test and while the HSSI card is loading. If the HSSI card is dumping, these two flash in unison.
STAT 0 STAT 1	During normal running time, these green LEDs blink together in a heartbeat pattern, one for each CPU on the card.
STAT 2	This green LED is inactive during normal running time.
RCV / XMT Status	These green LEDs indicate the status or viability of the HSSI connection for interface A or interface B.
RCV / XMT Active	These green LEDs indicate the frequency of packet traffic across an interface.

10/100Base-T media cards

The 8-port 10/100Base-T IP forwarding card provides eight full-duplex interfaces. Figure 4-20 shows an 8-port faceplate.
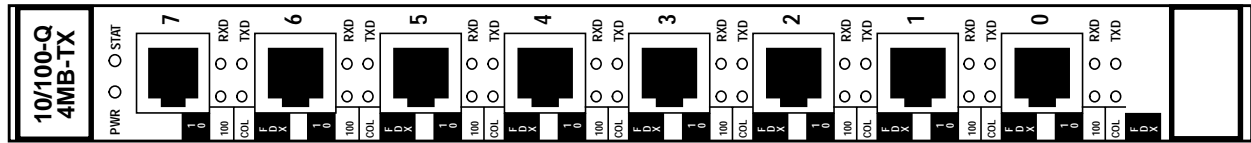
(g0003)

Figure 4-20. 10/100Base-T 8-port media card faceplate

The 4-port 10/100Base-T IP forwarding card provides four full-duplex interfaces. Figure 4-21 shows a 4-port faceplate.
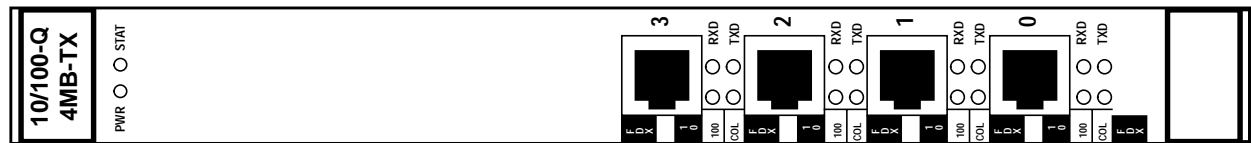
(g0141)

Figure 4-21. 10/100Base-T 4-port media card faceplate

Attaching 10/100Base-T media cables

There are two types of Ethernet 10/100Base-T media cards, one provides four physical interfaces, one provides eight physical interfaces. The cards run the same code, have the same LEDs, and are otherwise the same. Each physical interface is capable of full and half-duplex operation, and can run at either 100 Mb/s or 10 Mb/s rates.

10/100Base-T cables are specified to a length of 100 meters.

As shown in Figure 4-22, the Ethernet interface requires RJ-45 connectors and Category 5 UTP cables.
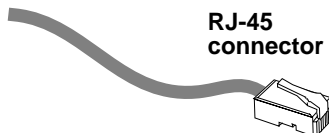
Figure 4-22. Cable connector for a 10/100Base-T interface.

10/100Base-T card LEDs

Each Ethernet port has a set of four LEDs that describe the presence of a link and its type, the type of duplex or collision interface implemented, and port transfer activity.

An 8-port 100/10Base-T faceplate and LEDs are shown in Figure 4-23. LEDs for either type of Ethernet card are described in Table 4-9.
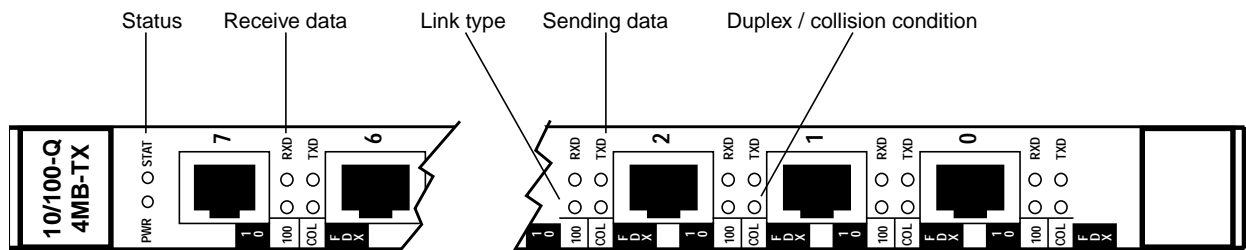
Figure 4-23. 10/100Base-T media card faceplate and LEDs

Table 4-9.   10/100Base-T media card LEDs

LED	Description
PWR	This green LED is on when GRF power is on.
STAT	During normal operations, this LED is green.
	If an error condition is detected, this LED turns amber and remains on.
100	This LED is green for a 10 megabit link.
	This LED is amber for a 100 megabit link.
	This LED remains off (dark) when there is no viable link.
COL	This LED reads black (dark) for a half-duplex interface.
	This LED is amber for a half-duplex interface when encountering a transmission collision condition.
	This LED is green for a full-duplex interface.
RXD	This green LED indicates this port is receiving data.
TXD	This green LED indicates this port is transmitting data.

SONET OC-3c media card

The SONET OC-3c media card provides a single redundant full-duplex interface and has hardware-enhanced route table lookup. The SONET card is available in single and multimode versions. Figure 4-24 shows a SONET OC-3c faceplate.

The SONET card provides redundant link connections across two physical interfaces. Only one logical interface is supported. By default, the upper link (A) is active. Use this interface if you are not setting up redundant links. If the active link is terminated, the redundant interface automatically becomes active.

(g0137)
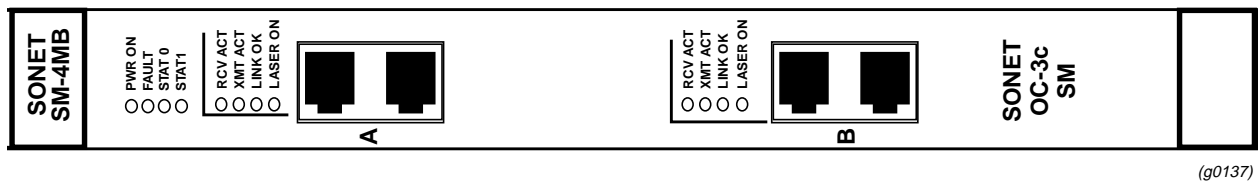
Figure 4-24. SONET OC-3c single mode media card faceplate

Laser safety

The SONET OC-3c single mode media cards contain a Class 1 laser product. The Class 1 laser diode is an integral part of the transceiver module.

CLASS 1 LASER PRODUCT

KLASSE 1 LASER PRODUKT

(g0079)

Warning: Only authorized service personnel should attempt to repair this equipment. All problem discovery and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

Warnung: Lebenensgefahr Achtung, nur authorisiertes Kundendiestpersonal darf dieses Geraet reparieren. Alle Fehler- und Reparaturvorschriften sehen nur den Austausch von Baugruppen oder Module vor. Wegen der Komplexitaet der einzelnen Platinen und Baugruppen soll niemand versuchen Reparaturen auf der Bauteilebene oder Modifikationen an den Platinen vorzunehmen. Falsche Reparaturen koennen lebensgefaehrlich sein.

Table 4-10 provides technical information about the laser diode on the SONET OC-3c single mode media card:

Table 4-10. SONET OC-3c single mode laser information

Manufacturer	Amp Inc.
Part number	269085-1
Laser type	InGaAsP diode
Wave length	1310 nm (+/- 50 nm)
Output power	-14dBm min., -8dBm max
Agency approvals	TUV Rheinland - EN 60950 - EN 60825-1 - EN 60825-2 Complies with 21 CFR 1040.10 and 1040.11

Attaching SONET media cables

GRF SONET OC-3c media cards are available in both multimode and single mode.

A multimode card requires duplex SC fiber optic cable and has a distance limitation of approximately two kilometers. A single mode card requires simplex SC fiber optic cable and has a distance limitation of approximately 15 kilometers. Figure 4-25 shows both types of cables.

Excess cable lengths should be bound in a figure-eight pattern. Do not wind excess cable into circular coils. Not only are fiber cables easier to damage than coax and other types of cables, but the damage is harder to detect.
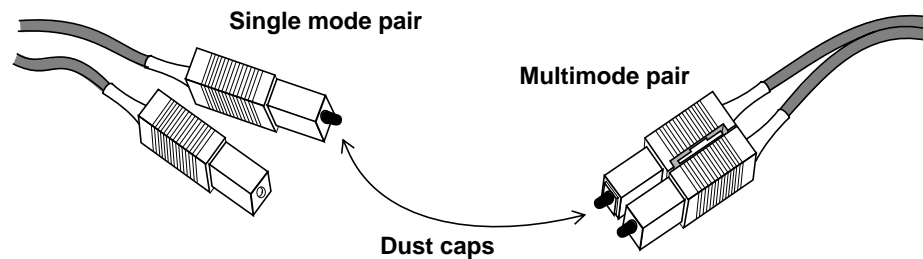
Figure 4-25. Single and multi-mode SONET cable ends

Keep cables off the floor

Cables left on the floor can get damaged. The resulting broken fiber might work fine temporarily but begin to cause problems when the cable is moved or bent the other way.

Keep the connectors clean

A broken cable or dirty connector can deliver data, but with errors. Attaching a dirty connector can soil the optical component on the media card. Leave the dust caps on until you are ready to insert the cable ends.

⚠️ **Caution:** Although there may be no hazard with multimode fiber, it is not a wise practice to look into the end of any fiber optic cable.

Vorsicht: Obwohl Multimodenfasern voraussichtlich keine Gefahr darstellen, empfiehlt es sich, nicht in das Ende eines Glasfaserkabels hineinzuschauen.

SONET card LEDs

The top four LEDs indicate card status. The SONET media card has two duplex interfaces, A and B, and each interface has its own set of three LEDs. Refer to Figure 4-26.

(g0140)
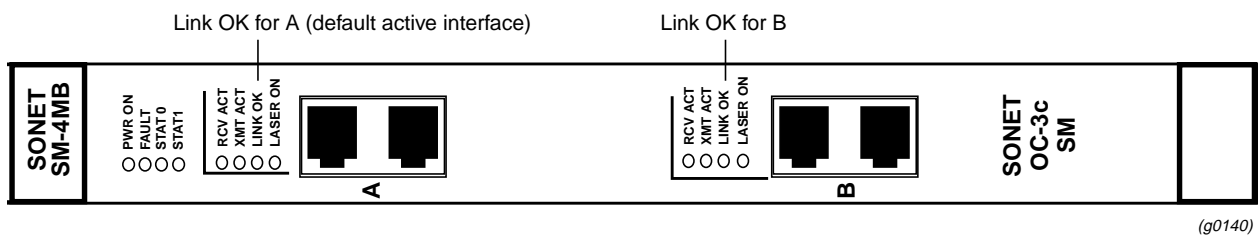
Figure 4-26. SONET OC-3c single mode media card faceplate and LEDs

Table 4-11 describes the SONET card LEDs.

Table 4-11. SONET OC-3c LEDs

LED	Description
Power	This green LED is on when GRF power is on.
Fault	This amber LED turns on and remains on if an error condition is detected.
STAT 0 STAT 1	These green LEDs blink during self-test. When self-test completes, STAT 0 blinks ten times a second and STAT 1 blinks once a second. STAT 0 and STAT 1 indicate the activity of normal system interrupts. If the media card hangs, they either turn off and remain off, or they turn on and remain on.
RCV ACT	This amber LED blinks as data is received at the interface.
XMIT ACT	This amber LED blinks as data is transmitted out of the interface.
LINK OK	This green LED is on steadily to indicate which of the interfaces is active. The LED for the non-active interface blinks on and off.
LASER ON	This green LED provides a safety warning on single mode ATM cards. One should not look into a laser-active interface component if a cable is not plugged in.

Media card reset and checkout

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

- The **ping** command tests whether a media card can process and return a message.

- The **grcard** command tells you the operating state of an installed media card.

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

Verify media card operation using ping

Check media card viability using the **ping** command. This UNIX command is modified to support GRF board components. This use of **ping** only tests internal communication between the GRF 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 can be used without disturbing normal GRF operations.

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

1 Log in as root.

2 Enter a **ping** command. Specify the appropriate media card by its chassis slot number.

For example, to act on the media card in slot 3, enter:

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

This is what you see when the media card responds:

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

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

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

To act on the 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.

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       FDDI_V1    running
3       FDDI_V2    running
```

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

Media card states

The following states are reported:

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

The Power-up state is the normal condition as power is being applied to the media card.

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

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

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

Configuring is a waiting state for the media card after it issues a request for configuration parameters. The 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 the Dump or Card profile.

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

When the kernel cannot determine what a media card is doing, it places the card into State unknown, and either reboots the card, or dumps and then reboots the card, depending upon how variables are set in the Dump or Card profile.

Q cards

A /Q card has dedicated hardware support for expanded route table lookup.

For FDDI and ATM cards, the _v2 after in **grcard** output indicates the card is a /Q version of that type of card. All Ethernet, HSSI, ATM OC-12c, and SONET cards have the /Q hardware although they appear in **grcard** output as _v1. There is one version of HIPPI, these cards do not have /Q hardware.

Reset media card using grreset

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

1   Log in as root.

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 slots 0 and 1, enter:

```
# grreset 0 1
```

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 GRF system operations.

Refer to the command descriptions in the *GRF Configuration Guide* for a description of **grreset**.

Reboot the system using grms

Use the **grms** command to halt, reboot, or shut down the system from the UNIX prompt.

grms performs the same function as **shutdown** but does not require the user to be logged in as `root`. However, it can only be used from the control board VT-100 terminal. Use **shutdown** and its corresponding options if you manage the GRF from a remote terminal.

The **grms** command performs an orderly shutdown, saving memory and allowing any transfers to complete. When the reboot option is specified, the system is rebooted and all media cards are reset.

1   Attach a keyboard to the VT-100 terminal and log in. You do not have to be `root`.

2   Enter the `grms` command with one of its options:
With the **-h** option, **grms** halts the system (like **shutdown -h now**).
With the **-r** option, **grms** performs an orderly reboot of the system (like **shutdown -r now**).
With the **-s** option, **grms** performs an orderly shutdown of the system. To restart, enter the **reboot** command.

Reboot the system remotely using shutdown

If you manage the GRF from a remote station, use the **shutdown** command to reset the system from a UNIX prompt.

The **shutdown** command performs an orderly shutdown, saving memory and allowing any transfers to complete. With the **-r** and **now** options, the command performs an orderly reset of the system. It also issues a special command to the control board to restart the GRF immediately.

1   Log in as `root`.

2   Enter the **shutdown -r now** command.

After the shutdown completes, the prompt appears and you can log in again.

Running media card hardware diagnostics

You can run a basic diagnostic that will tell you if a media card has a hardware problem. A hardware problem detected by this diagnostic will require that the card be returned to Ascend for repair.

Using the Card profile, the diagnostic can be run on a specific media card without disturbing any other system operation.

Overview

There are three steps to configure diagnostics:

    1. Enable diagnostics to run at boot (enable-boot-seq field)

    2. Specify the pathname for the transmit- and/or receive-side diagnostic binary to run

    Each type of media card requires a specific diagnostic, some cards require both transmit and receive side binaries, some require only one binary

    3. Configure the card's functional code to load and run after the diagnostic finishes so the card will come up and be ready to operate

Process for a single media card

Remote or local logging must be enabled. Log in as root and perform the following procedure at the CLI prompt. The example described here runs a basic hardware diagnostic on a single Ethernet card in slot 3. Specific entries of interest are marked with ">".

Note: Abbreviations can be used in commands if the abbreviation uniquely defines an entity. For example, "atm" is not an acceptable abbreviation since it can refer to either atm-oc3-v2 or atm-oc12-v1 cards. The Ethernet card is ethernet-v1, it is usually abbreviated to "eth". Examples of acceptable abbreviations are used in several places in this configuration process.

Read the Card profile for the target media card's into memory:

```
super> read card 3
CARD/3 read
```

List the contents of the card profile:

```
  super> list
  card-num* = 3
  media-type = ethernet-v1
  debug-level = 0
  hssi-frame-protocol = Frame-Relay
  sonet-frame-protocol = PPP
  ether-verbose = 0
  ports = < {0 {off on 10 3} {single off}{"" "" 1 sonet
  internal-oscillato+
> load = { 0 < > 1 0 0 }
  dump = { 0 < > off off }
  config = { 0 1 1 4 0 0 }
  icmp-throttling = { 10 10 2147483647 10 10 10 }
  super>
```

The Card profile `load` parameters specify which code is loaded during the media card boot, so here is where the diagnostic code is enabled and specified for a particular card.

List the `load` field parameters (default values are shown):

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

The `hw-table` field is where you enable diagnostics to run and specify the pathname of the diagnostic code. Notice that when the `load` field is listed, the `hw-table` field is empty, as indicated by the `= < >` marks. You will create a new entry in the `hw-table` to specify that diagnostic code will be loaded. The default load is the media card run-time code.

Use the CLI **new** command to start the process. The **new** command creates an instance of the `hw-table` containing a set of parameters (the field is no longer empty) and puts the field in memory where you can edit the parameters.

Use **new** with the `hw-table` field:

```
    super> new hw-table
    hw-table/ethernet-v1 created
```

The return message tells you that an Ethernet `hw-table` entry has been created. An entry for Ethernet media is created automatically. If you were in a HSSI card profile, an entry for HSSI would be created automatically.

List the new `hw-table` field parameters:
```
    super> list
    config = 0
>   hw-table = < { ethernet-v1 0 "" 0 "" off 0 1 < > } >
    boot-seq-index = 1
    boot-seq-state = 0
    boot-seq-diagcode = 0
    super>
```

Now list the Ethernet `hw-table` parameters, notice the `enable-boot-seq` field is set to off and that `boot-seq-table` is empty. The `enable-boot-seq` field is where you enable diagnostics to run (on). The `boot-seq-table` field is where where you specify the pathname for the diagnostic code that will run before the functional run-time code is loaded and run:

```
    super> list hw-table eth    (or abbreviate, enter: cd hw eth )
    hw-type = ethernet-v1
    rx-config = 0
    rx-path = ""
    tx-config = 0
    tx-path = ""
>   enable-boot-seq = off
```

```
      mode = 0
      iterations = 1
>     boot-seq-table = < >
      super>
```

Step 1

When the `enable-boot-seq` field is equal to off, diagnostics are not run at boot. Change the `enable-boot-seq` field from off to on using the **set** command. This is the first configuration step:

```
      super> set enable-boot-seq = on
```

Save your changes:

```
      super> write card
      CARD/3 written
```

Step 2

The `boot-seq-table` specifies which code will be loaded and run during the boot process. You will specify diagnostic code as well as functional run-time code using separate table entries.

In step 2, you create a new `boot-seq-table` in which you will specify the pathname of the diagnostics to be run.

Use the **new** command again just as you did for `hw-table`:

```
      super> new boot-seq-table 1   (or abbreviate, enter: new boot 1 )
      boot-seq-table/1 created
```

If you list the Ethernet `hw-table` parameters, you see that the `boot-seq-table` is no longer empty:

```
      super> list
      hw-type = ethernet-v1
      rx-config = 0
      rx-path = ""
      tx-config = 0
      tx-path = ""
      enable-boot-seq = on
      mode = 0
      iterations = 1
>     boot-seq-table = < { 1 no-media "" "" } >
```

Now list the contents of the new boot 1 table:

```
      super> list boot 1
      index = 1
      hw-type = no-media
      rx-path = ""
      tx-path = ""
```

In this step, you supply the `hw-type`, the diagnostic receive path (`rx-path`), and the diagnostic transmit path (`tx-path`). Note that some media cards require one path, most require two. Here is a list of the hardware type names in use and their diagnostic code pathname(s):

```
hippi           (no diagnostic available)
hssi            /usr/libexec/portcards/hssi_rx_diag.run
                /usr/libexec/portcards/hssi_tx_diag.run
dev1            /usr/libexec/portcards/dev1_rx_diag.run
                /usr/libexec/portcards/dev1_tx_diag.run
atm-oc3-v2      /usr/libexec/portcards/atmqdiag.run
fddi-v2         /usr/libexec/portcards/fddiq_cpu0_diag.run
                /usr/libexec/portcards/fddiq_cpu1_diag.run
atm-oc12-v1     /usr/libexec/portcards/atm-12_diag.run
ethernet-v1     /usr/libexec/portcards/ether_rx_diag.run
                /usr/libexec/portcards/ether_tx_diag.run
sonet-v1        /usr/libexec/portcards/sonet_rx_diag.run
                /usr/libexec/portcards/sonet_tx_diag.run
t1_v1           /usr/libexec/portcards/t1_rx_diag.run
                /usr/libexec/portcards/t1_tx_diag.run
```

Specify hardware type and the diagnostic pathnames:

```
super> set hw-type = ethernet-v1
super> set rx-path = /usr/libexec/portcards/ether_rx_diag.run
super> set tx-path = /usr/libexec/portcards/ether_tx_diag.run
```

Save your changes:
```
super> write card
CARD/3 written
```

Now verify your changes to the boot 1 table:

```
super> list
index = 1
hw-type = ethernet-v1
rx-path = /usr/libexec/portcards/ether_rx_diag.run
tx-path = /usr/libexec/portcards/ether_tx_diag.run
```

Step 3

In step 3, you create a second `boot-seq-table`, `boot2`, in which you specify the pathname of the functional run-time code that will load and run after the diagnostic finishes.

With both types of code specified, the media card will boot, run the diagnostic, then load its run-time code and be ready to operate (assuming no hardware problems are detected). If you don't create `boot2` and specify the functional run-time code to be loaded, the card will run diagnostics but will not come up ready to operate. The card will run diagnostics code over and over.

Use the **new** command again just as you did for `boot1`:

```
super> new boot-seq-table 2    (or abbreviate, enter: new boot 2 )
boot-seq-table/2 created
```

Here is the list of hardware type names to use and their run-time code pathname(s):

```
hippi          /usr/libexec/portcards/x|xload.run
hssi           /usr/libexec/portcards/hssi_rx.run
               /usr/libexec/portcards/hssi_tx.run
dev1           /usr/libexec/portcards/dev1_rx.run
               /usr/libexec/portcards/dev1_tx.run
atm-oc3-v2     /usr/libexec/portcards/atmq_rx.run
               /usr/libexec/portcards/atmq_tx.run
fddi-v2        /usr/libexec/portcards/fddiq-0.run
               /usr/libexec/portcards/fddiq-1.run
atm-oc12-v1    /usr/libexec/portcards/atm-12.run
ethernet-v1    /usr/libexec/portcards/ether_rx.run
               /usr/libexec/portcards/ether_tx.run
sonet-v1       /usr/libexec/portcards/sonet_rx.run
               /usr/libexec/portcards/sonet_tx.run
t1_v1          /usr/libexec/portcards/t1_rx.run
               /usr/libexec/portcards/t1_tx.run
```

List the contents of the newly-created boot 2 table:

```
super> list boot 2
index = 2
hw-type = no-media
rx-path = ""
tx-path = ""
```

Specify hardware type and the functional code pathnames:

```
super> set hw-type = ethernet-v1
super> set rx-path = /usr/libexec/portcards/ether_rx.run
super> set tx-path = /usr/libexec/portcards/ether_tx.run
```

Save your changes:
```
super> write card
CARD/3 written
```

Now verify your changes to boot 2:

```
super> list
index = 2
hw-type = ethernet-v1
rx-path = /usr/libexec/portcards/ether_rx.run
tx-path = /usr/libexec/portcards/ether_tx.run
```

Reset the Ethernet card so it will boot and run the diagnostic, use the **grreset** *slot* command:
```
super> grreset 3
Ports reset: 3
```

The diagnostic takes about 30 seconds to run. You will not usually see messages while it runs. Use this command to see if any messages are in the console log:

```
tail -f /var/log/gr.console
```

Results

When no problem is found

If no hardware problem is detected during the diagnostic run, you will see a message similar to the following:

```
Field diagnostics complete.
        •
        •
        •
Creating interfaces...
```

Run-time code will be loaded, and the card will operate. At the next boot, however, the card will rerun the diagnostic and code as set in boot1 and boot2. If you do not want this sequence to re-occur, you need to disable diagnostics and delete the boot-loading pathnames in boot1 and boot2. The next section describes how to disable diagnostics.

When a problem is reported

If there is a hardware problem, you will see an error code message similar to the following:

```
B. I. S. T. Error Code = xx-yyyy-xx
Starting Built-In Self Test Debug Monitor
```

Please note the error code and contact your Ascend Technical Support representative.

Disabling diagnostics

To disable diagnostics from running, you must change the enable-boot-seq field back to off and you must delete the hw-table and boot-seq-table entries you created. Otherwise, the card will behave according to those currently configured diagnostic load parameters.

Disable the boot sequence and boot sequence tables (boot1 and boot2) first, then the hardware table.

Here is the command summary:

```
super> read card 3
CARD/3 read

super> list load
config = 0
hw-table = < {ethernet-v1 0 "" 0 "" on 0 1 <{1 ethernet-v1
/usr/libex}+
boot-seq-index = 1
boot-seq-state = 1
boot-seq-diagcode = 257953793

super> delete hw-table eth            or:  list hw eth
super> delete hw-table eth
Delete hw-table/eth ?  [y/n] y
```

Save the changes:

```
super> write card
```

```
CARD/3 written
```

Returning a media card to Ascend

If you are upgrading a media card or have a hardware problem with a media card, please use the following procedure to return the media card to Ascend.

1 Obtain a Return Material Authorization (RMA) number from Customer Service to track your board.
RMA numbers are important, they help us improve board quality and design.

2 Correctly package your board.

3 Ship the board to Ascend Alameda.

Here are the details for each step:

RMA number

Call Customer Support and ask for an RMA number.

We will assign your board a number and ticket, usually by FAX.
(You can also request an ESD box !)

– - In the U.S., call: 800-ASCEND-4 (800-272-3634)

– - From elsewhere, call: 510-769-8027

– - Customer Support FAX number: 510-814-2300

– - Customer Support E-mail: `support@ascend.com`

Packaging your board

Media cards and boards are easily damaged.

These are the requirements for packaging your media card or board you are returning to Ascend:

ALWAYS: Always put a media card or board into an antistatic bag.

• In fact, any time a board is not installed in a GRF chassis, it should immediately be put into an antistatic bag.

BEST packaging:

Use the same ESD box/foam liner in which this or a similar board was shipped to you. It is always good to keep a few of these ESD boxes on hand.

• Please call Customer Support, we will ship you an ESD box OVERNIGHT.

• If you don't have an ESD box from Ascend, you can ship an Ascend board back in another vendor's box as long as the board is in its antistatic bag.

ACCEPTABLE:

Sturdy cardboard box and foam wrapping.

• Tape the antistatic bag closed so no part of the GRF board can slide out

• Wrap the bag and pad the box with foam

- – **NEVER USE PAPER OR PEANUTS** –
  tape the foam around the antistatic bag so the board doesn't slide between gaps.

- Use a heavy-duty cardboard box, tape securely shut.

Ship via FedEx

Enclose the RMA number and ship via FedEx to:

Ascend Communications, Inc.
RMA Department
1701 Harbor Parkway
Alameda, CA 94502

GRF Management Tools

5

This chapter covers these topics:

GRF commands – an overview

This section provides a brief overview of the GRF-specific commands. These are administrative and configuration commands, and most are prefixed with **gr**.

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

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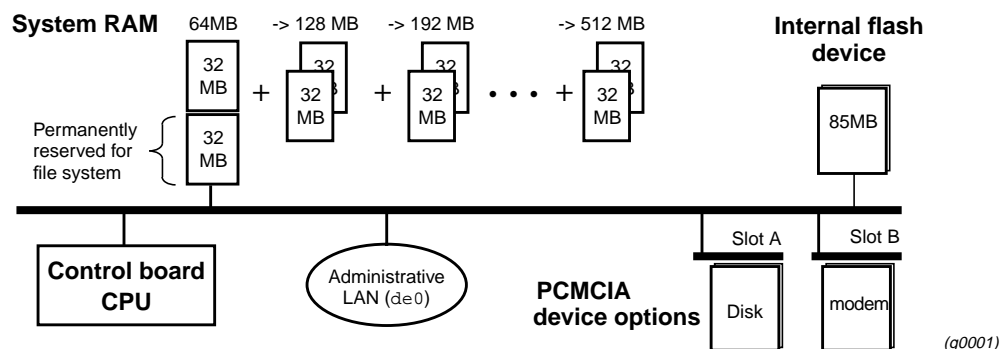

Figure 5-1.   GRF control board memory components

Refer to the *GRF Reference Guide* for command syntax and examples. Man pages are available for most of these commands. An asterisk (*) indicates a command used only on RMS node systems.

flashcmd

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

getver

This GRF 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

grarp builds tables on media cards that map IP addresses to physical addresses. For HIPPI, the physical address is an I-field; for FDDI and 10/100Base-T, a 48-bit MAC address; and for ATM, an option is the VPI/VCI value.

*grc

On GRF and GR-II systems using an RMS node, the **grc** script archives media configuration files and certain internal OS configuration files such as /etc/passwd. This command is replaced on the new GRF control board by **grsnapshot**.

grcard

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

grfddi

This command is a utility for setting dual and single attachment connections for FDDI media card interfaces.

grfins

This command is used instead of **grinstall** on the GRF 400 and GRF 1600. **grfins** 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.

*grinstall

On GRF and GR-II systems using an RMS node, **grinstall** installs the specified version of the operating software. This command is replaced by the **grfins** command on the GRF 400 and GRF 1600.

grlamap

This command builds a table that sets logical addresses to slot number mappings for HIPPI-SC (switch mode) addressing.

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 GRF maintenance command set (see below).

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.

grrmb maintenance commands

A set of maintenance commands developed for the GRF control board is also available. Some of these have been replaced, however, older commands may still be helpful on occasion. Refer to the *GRF Reference Guide* for detailed descriptions of maintenance commands.

grrmb commands require a GR ##> screen prompt to execute on the control board. The GR ##> prompt is obtained by executing the **grrmb** command.

grrmb commands include:

?	-	lists **grrmb** command set
bignore	-	displays broadcast ignore status, on or off
fan	-	displays RPMs for the chassis fans
maint *number*	-	these commands return media card statistics
power	-	displays on/off status of GRF 1600 power supplies
port *number*	-	sets specific slot for GR##> prompt
temp	-	returns internal temperature readings

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 GRF command enables a site to manage and install special files after the main release is loaded onto 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.

grstat

This command returns Layer 2 and Layer 3media card statistics.

grsnapshot

This GRF 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.

On the GRF 400 and GRF 1600, **grsnapshot** replaces **grc**, the archival command used on the RMS node.

grwrite

The **grwrite** command is crucial on the GRF because it saves configuration changes made in the /etc directory to a flash device so the changes survive boots. By default, **grwrite** saves a copy of those files with a newer timestamp than the last boot.

mountf

This GRF command mounts any flash device so that the device looks like a file system to the operating system. The flash device is mapped as /flash into working RAM as part of the available file system. Mounting a flash device enables various processes to be applied to the device. A device is mounted as read only (default) or writable. See the **umountf** command.

*pwrfaild

This command is used on GRF and GR-II systems using an RMS node but is not needed on the GRF 400 or GRF 1600. **pwrfaild** is the power failure monitoring daemon. It responds to power failure signals sent by a UPS connected to the RMS node, and initiates a clean shutdown of the router manager system.

setver

This GRF 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, startup scripts, and configuration entities are in place. You see a message if these release components are incomplete. See also **getver**.

umountf

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

vpurge

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

UNIX tools

The system provides standard UNIX debugging tools for monitoring and debugging. Please access a UNIX system for standard UNIX man pages. GRF-specific command man pages are available.

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 host.

When **ping** is directed from the kernel out to a system external to the GRF, the command behaves in the standard manner. When **ping** is directed from the kernel to one of the router's interface addresses, the echo request is sent to the appropriate media card and the status of the network interconnection is checked.

When **ping** is directed from an external system to any GRF address, the echo request is sent to the appropriate media card and the status of the network interconnection is checked.

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

route

Static routing can be configured by using either the UNIX **route** command or the GRF **grroute** command. Routing is the primary function of a router that allows IP traffic from one network to reach another network. The GRF supports 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 GRF **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 GRF 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 GRF.

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.

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 GRF control board (de0), and the 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.

When using a **tcpdump** on a router interface, local pings are reported as two ICMP requests instead of a request-response pair. This is an artifact resulting from the way in which filtering and local ping sequencing is handled on the media cards. No other effects on packet filtering or other operations of **tcpdump** have been observed as a result of this artifact.

traceroute

This standard command prints the route that packets must 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 and provide IP destination statistics. **traceroute** is available from the CLI and the UNIX shell.

You can use the **traceroute** command to determine if packets from an external host are actually being routed through the GRF to get to the target destination address.

ifconfig

ifconfig is used to assign an address to a logical GRF interface and/or to configure interface parameters. The command has been modified for use in the GRF.

One modification includes the use of three special interface names, **-a**, **-ad** and **-au**. The names are reserved and specify a group of logical system interfaces. When one of these interface names is used, the commands following it apply to the specified group:

– **a** applies the command(s) to all interfaces in the system

– **ad** applies the command(s) to all interfaces marked "down"

– **au** applies the command(s) to all interfaces marked "up"

You can also configure GRF interfaces by editing the grifconfig.conf file. Information in grifconfig.conf is eventually turned into **ifconfig** commands.

Using the netstat command

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

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

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

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

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

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

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

- **netstat -s** prints comprehensive statistics for protocols, including: IP, ICMP, TCP, and UDP, and GRIT, GRIEF, and GRID for GRF 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 a media card has the correct routing table entries. **netstat -rn** shows current routing tables, **-n** prints out numeric IP addresses:

```
# netstat -rn
Routing tables

Internet:
Destination       Gateway           Flags     Refs      Use   Interface
192.168.20        192.168.20.11     U            0        0   gf010
198.174.11        link#1            UC           0        0   de0
198.174.11.2      8:0:20:1b:24:d2   UHL          0        3   de0
198.174.11.38     8:0:7:bc:d:b1     UHL          2       83   de0
198.174.11.155    8:0:20:78:9c:60   UHL          1      255   de0
198.174.11.156    8:0:20:7a:e0:63   UHL          1     1673   de0
198.174.11.239    8:0:20:74:1a:a8   UHL         16     5640   de0
198.174.11.249    0:c0:80:b:30:53   UHL          4      170   lo0
198.174.11.250    0:60:2f:3:45:42   UHL          0        0   de0
204.221.156       204.221.156.33    U            0        0   gh030
222.222.90/26     222.222.90.3      U            0        0   ga020
222.222.90.64/26  222.222.90.67     U            0        0   ga0280
222.222.91/26     222.222.91.3      U            0        0   ga021
222.222.91.64/26  222.222.91.67     U            0        0   ga022
222.222.92/26     222.222.92.3      U            0        0   ga023
222.222.92.64/26  222.222.92.67     U            0        0   ga024
224/8             link#1            UC           0        0   de0
#
```

In the **netstat -rn** output, you will see the routing entries for the media cards installed in the router. In the example above there are three cards, a FDDI card in slot 1, a HIPPI card in slot 3, and an ATM card in slot 2. Media cards are identified by their Interface names having the form gt0y0 where y is the number of the chassis slot in which a specific card is installed. For more information on the logical interface naming convention, refer to the *GRF Configuration Guide*.

Each `Interface` in the **netstat -rn** output should correspond to at least one route that specifies the reachable network in the `Destination` column.

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** listed by media card interface name:

```
# 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
gf010   4352  <link5>       00:c0:80:00:55:d1       0     0       0     0     0
gf010   4352  192.168.20    192.168.20.11           0     0       0     0     0
gf011*  4352  <link6>       00:c0:80:00:55:d2       0     0       0     0     0
gf012*  4352  <link7>       00:c0:80:00:55:d3       0     0       0     0     0
gf013*  4352  <link8>       00:c0:80:00:55:d4       0     0       0     0     0
ga020   9180  <link10>                              0     0       0     0     0
ga020   9180  222.222.90/   222.222.90.3            0     0       0     0     0
ga021   9180  <link11>                              0     0       0     0     0
ga021   9180  222.222.91/   222.222.91.3            0     0       0     0     0
ga022   9180  <link13>                              0     0       0     0     0
ga022   9180  222.222.91.   222.222.91.67           0     0       0     0     0
ga023   9180  <link14>                              0     0       0     0     0
ga023   9180  222.222.92/   222.222.92.3            0     0       0     0     0
ga024   9180  <link15>                              0     0       0     0     0
ga024   9180  222.222.92.   222.222.92.67           0     0       0     0     0
ga025*  9180  <link16>                              0     0       0     0     0
ga026*  9180  <link17>                              0     0       0     0     0
ga027*  9180  <link18>                              0     0       0     0     0
ga028*  9180  <link19>                              0     0       0     0     0
ga029*  9180  <link20>                              0     0       0     0     0
ga02a*  9180  <link21>                              0     0       0     0     0
ga02b*  9180  <link22>                              0     0       0     0     0
ga02c*  9180  <link23>                              0     0       0     0     0
ga02d*  9180  <link24>                              0     0       0     0     0
ga02e*  9180  <link25>                              0     0       0     0     0
ga02f*  9180  <link26>                              0     0       0     0     0
ga0210* 9180  <link27>                              0     0       0     0     0
ga0211* 9180  <link28>                              0     0       0     0     0
ga0212* 9180  <link29>                              0     0       0     0     0
ga0280  9180  <link9>                               0     0       0     0     0
ga0280  9180  222.222.90.   222.222.90.67           0     0       0     0     0
gh030   65280 <link12>                              0     0       0     0     0
gh030   65280 204.221.156   204.221.156.33          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

This excerpt from **netstat -s** shows the statistics reported for the IP protocol:

```
# 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
```

netstat -g -n

This excerpt from **netstat -g -n** shows a multicast forwarding information base (FIB):

```
# netstat -g -n

Multicast Forwarding Cache
  Hash   Origin-Subnet    Mcastgroup    # pkts In-Vif   Out-Vifs/Forw-ttl
     4   193.167.64.154   224.42.42.2   4004250336   65535
     5   164.58.253.9     224.2.2.1        48m    65535
    16   128.223.156.117  224.2.231.173     1      0
    17   130.207.8.30     224.2.2.2       1024m   65535
    19   128.9.192.69     224.2.221.38    131k    65535
    22   128.9.192.69     224.2.134.250     0     65535
    27   204.123.13.69    224.2.144.67      0     65535
    27   132.236.77.25    224.0.14.1       24      0
    30   204.123.13.69    224.2.204.67      0     65535
    35   128.9.112.151    239.140.173.5    90m    65535
     •
     •
     •
   229   139.184.163.8    224.2.172.238     0     65535
   238   128.9.160.45     239.140.173.3   1316m   65535
   242   171.69.56.76     224.2.191.234     0     65535
   243   192.188.104.97   224.2.172.238   604m    65535
   245   139.88.39.110    224.2.167.198   140k    65535
   245   205.226.8.183    224.2.2.1         0     65535
   245   128.9.160.43     224.2.221.38      0     65535
   245   164.58.253.9     224.2.1.2         0     65535
   247   131.243.73.36    224.2.195.166    53m    65535
   247   130.240.64.47    224.2.213.97      1      0

Total no. of entries in cache: 94
```

GRF logs

This section provides examples of logged information for the GRF and its media cards.

The GRF logs to a PCMCIA device or remote **syslog** server rather than to its own system memory. The procedure to configure the PCMCIA device is in Chapter 3. Logs are maintained in the directory /var/logs.

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

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

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

The gr.console log is the most useful log. It contains status and events for the GRF system and all media cards. 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
```

Here are sample logs from the machine "box1.ascend.com".

Sample gr.console log

The gr.console log contains messages issued by the media cards and the control board. They include 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.

```
# more gr.console
Apr 12 05:18:10 box1 gritd: from 0:0x5:0:  dst=0:0x40:16, src=0:0x5:0, type=GRID
:  hwtype=FDDI_V2 cmd=MSGP 'arp info (8:0:69:4:4a:a0) overwritten for 192.168.4.
137 by 8:0:69:4:4c:e6\r\n'
Apr 12 05:18:30 box1 gritd: from 0:0x7:0:  dst=0:0x40:16, src=0:0x7:0, type=GRID
:  hwtype=ATM_OC3_V2 cmd=MSGP '[RX] sending last GRID rsp 62270\r\n'
Apr 12 05:19:44 box1 gritd: from 0:0x2:0:  dst=0:0x40:16, src=0:0x2:0, type=GRID
:  hwtype=ATM_OC3_V2 cmd=MSGP 'sending last GRID rsp 13632\r\n'
Apr 12 05:22:11 box1 gritd: from 0:0x9:0:  dst=0:0x40:16, src=0:0x9:0, type=GRID
:  hwtype=SONET_V1 cmd=MSGP '[RX] sending last GRID rsp 43328\r\n'
Apr 12 05:28:10 box1 gritd: from 0:0x5:0:  dst=0:0x40:16, src=0:0x5:0, type=GRID
:  hwtype=FDDI_V2 cmd=MSGP 'arp info (8:0:69:4:4c:e6) overwritten for 192.168.4.
137 by 8:0:69:4:4a:a0\r\n'
Apr 12 05:28:10 box1 gritd: from 0:0x5:0:  dst=0:0x40:16, src=0:0x5:0, type=GRID
:  hwtype=FDDI_V2 cmd=MSGP 'arp info (8:0:69:4:4a:a0) overwritten for 192.168.4.
137 by 8:0:69:4:4c:e6\r\n'
Apr 12 05:28:14 box1 gritd: from 0:0x2:0:  dst=0:0x40:16, src=0:0x2:0, type=GRID
:  hwtype=ATM_OC3_V2 cmd=MSGP 'sending last GRID rsp 45379\r\n'
```

Figure 5-2.   Sample entries in the gr.console log

sample gr.boot log

When a media card boots, information about its boot status is written to gr.boot. Here is a sample gr.boot log from a GRF with host name tester.site.com:

```
# more gr.boot
Apr 11 16:15:02 box1 grbootd[281]: 0:0xf:0 sent BOOTME
Apr 11 16:15:02 box1 grbootd[281]: dumping 0:0xf:0
Apr 11 16:15:02 box1 grbootd[281]: 0:0xf:0 sent LOADME
Apr 11 16:15:02 box1 log2[6993]: grdump.sh exec /usr/nbin/grdump  -b -i 3 -p 0:0 xf:0
Apr 11 16:15:02 box1 grdump[6982]: Grdump of 0:0xf:0 starting up ...
Apr 11 16:15:02 box1 grdump[6982]: grinch card pre-death state (2.12.2.16.5.3=0x 5)
Apr 11 16:15:09 box1 grdump[6982]: Dump of 0:0xf:0 finished.
Apr 11 16:15:09 box1 grbootd[281]: dump of 0:0xf:0 done, booting...
Apr1116:15:09box1grbootd[281]:2.1.4.3.12.4=/usr/libexec/portcards/atm-3.runhw=12proc=0
Apr 11 16:15:09 box1 grbootd[281]: Boot Image file is Zipped:
        /usr/libexec/portcards/atm-3.run
Apr 11 16:15:10 box1 grbootd[281]: read 881220 bytes from /usr/libexec/portcards /atm-12.run
Apr 11 16:15:10 box1 grbootd[281]: Ready to load 0:0xf:0 with
        /usr/libexec/portcards/atm-3.run (sending ACK)
Apr 11 16:15:15 box1 grbootd[281]: 5 boot images resident (1 max)
Apr 11 16:15:15 box1 grbootd[281]: boot image ager scheduled for 60s
Apr 11 16:15:15 box1 grbootd[281]: 0:0xf:0 loaded (1541 pkts, 0 re-xmits) 881220
        data + 24656 proto bytes in 4.59s (197.57 Kb/s)
Apr 11 16:15:59 box1 grbootd[281]: 0:0x5:0 sent BOOTME
```

Figure 5-3.   Sample entries in the gr.boot log

Sample messages log

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

This is a sample `messages` log from a GRF with host name `tester.site.com`.

```
# more messages
Mar 25 03:30:17 box1 grinchd[122]: sendto: No buffer space available
Mar 25 03:30:47 box1 last message repeated 3 times
Mar 25 03:32:47 box1 last message repeated 8 times
Mar 25 03:42:47 box1 last message repeated 40 times
Mar 26 10:49:57 box1 kernel: de0: framing error
Mar 27 10:45:39 box1 su: scottsw to root on /dev/ttyp1
Mar 27 10:45:58 box1 kernel: gh070:  GigaRouter HIPPI, GRIT address 0:7:0
Mar 27 10:46:00 box1 kernel: gh030:  GigaRouter HIPPI, GRIT address 0:3:0
Mar 27 11:23:26 box1 kernel: gh070:  GigaRouter HIPPI, GRIT address 0:7:0
Mar 27 11:23:27 box1 kernel: gh030:  GigaRouter HIPPI, GRIT address 0:3:0
Mar 27 15:57:39 box1 kernel: uid 26 on /usr: file system full
Mar 27 15:57:54 box1 last message repeated 2 times
Mar 27 12:57:13 box1 login: ROOT LOGIN (root) ON ttyp1 FROM summa
Mar 27 13:00:43 box1 login: ROOT LOGIN (root) ON ttyp1 FROM othermac
```

Figure 5-4.   Sample entries in the messages log

Managing media card dumps

The GRF control board provides limited file system space for dumps. This section tells you how the system manages dumps and describes site management options.

grdump

grdump is the background program that captures memory dump images. This program acts according to variables set in the DUMP profile. Each dump image is stored in a file named with the convention: grdump.n.x.gz
where n is the card slot number and x is the number of the saved dump. The first dump of the day is labeled grdump.n.old.gz to distinguish the first dump from any other dumps that might occur during reboot or other event.

grdump runs on the fly, it uses the **gzip** utility to compress dumps and save space. Compressed files are appended with .gz.

Reset and dump card

grreset -D *slot* is a user command that causes a media card to be reset and **grdump** to dump its memory. This command needs the boot = field to be set. Refer to the *GRF Reference Guide* for more information about **grreset**.

Panic dumps sent to external flash device

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

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

DUMP profile

Settings in the Dump profile manage media card dumps.

Default settings enable dumps to be collected and two dumps saved daily per media card. The default settings will automatically manage the available space so that the file system does not fill and cause a crash. Change defaults carefully.

Access the Dump profile from the CLI:

```
prompt> read dump
DUMP read

prompt> get DUMP
hw-table = < { hippi 20 /var/portcards/grdump 0 }{ fddi 20 /var/portcards/grdu+
dump-vector-table = < { 2 fddi "FDDI default dump vectors" <{ 1 "fddi core mem+
config-spontaneous = 0
boot = 0
keep-count = 2
```

Here is a quick overview of main-level Dump file fields.

The `hw-table` field specifies the filename where dumps are sent. The default is `/var/portcards/grdump`.

The `dump-vector-table` field describes the specific area to be dumped.

The `config-spontaneous =` field controls dumps taken at panics, resets, or hangs.

The `boot = 0` field sets dump at boot on (1) or off (0).

The number of dumps to keep in addition to the first dump of the day (`.old`) and the current dump is specified by `keep-count`. The recommended value and default is 2.

If you change dump parameters, you must save them with a **write** command:

```
prompt> set keep-count = 3
prompt> write dump
DUMP read
```

The Dump profile is described in more detail in the *GRF Configuration Guide*.

System monitoring functions

System software performs a variety of monitoring and reporting functions, including the following:

- The kernel tracks communications bus packets sent by the media cards. If no packet is seen from a media card for a specified period (according to a timer), the kernel forwards an echo request packet once per second until a response is received. The timer period can be specified, its default is five seconds.

- If the media card does not respond to the echo request after the specified time, the kernel determines the card is hung and begins an automatic card reset.

- By default at start-up, the system initializes every media card with a snapshot of the current routes and configuration of GRF interfaces.

- During normal operations, any change to the state of a GRF interface or to the system route table is sent to each media card. This also enables the system to synchronize the system configuration.

- When a media card panics, the system resets the card. media cards: After a media card has reported configuration errors, the card may need to be held in reset rather than be rebooted.

- When a media card reports configuration errors as it is being configured, the system resets the card.

grdebug options

The **grdebug** command enables/disables the set of monitoring functions listed in Table 5-1. The command `grdebug -p 3 off` disables all monitoring of the media card in slot 3.

Table 5-1.   Enable/disable options for grdebug

Option:	Function enabled / disabled:
grdebug -C	the configuration reset for a specific media card
grdebug -E	the timed echo request for a specific media card
grdebug -H	hold in reset for a specific media card
grdebug -I	automatic initiation for a specific media card
grdebug -P	the panic reset for a specific media card
grdebug -p	with "on" or "off", turns off all monitoring of a specific media card
grdebug -R	automatic reset for a specific media card that the system assumes is hung
grdebug -T	the kernel "watch" timer for a specific media card
grdebug -U	automatic updating of a specific media card's route table

Refer to the *GRF Reference Guide* for more information.

Using the threshpoll program

threshpoll is configured to check various statistics and/or states and then to compare the value against a specified threshold. If the threshold is exceeded or not reached, a specific trap signaling the problem is sent to a target SNMP manager/gateway.
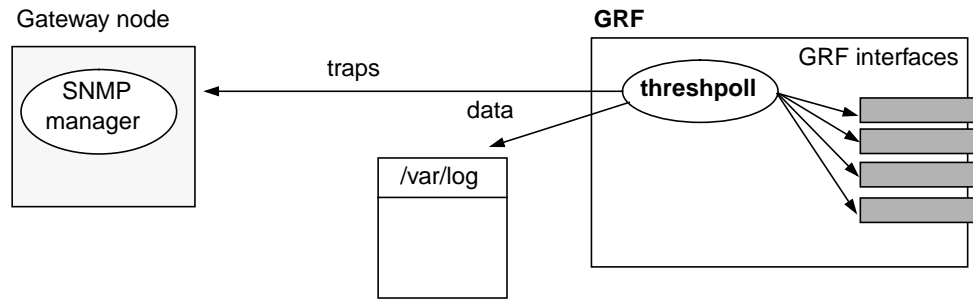
Figure 5-5.   Basic interactions

threshpoll monitors the configured items and logs the results to a log file in /var/log. It also compares the values and sends a trap signalling that a particular threshold is exceeded or not met.

The intent of this tool is to gather information that will help you see what is happening at the interface level. This type of information can help determine where to redirect traffic or fine-tune a congested area. For example, you can determine if a specific GRF interface is receiving more than or less than 500 octets in a 5 minute period.

These are the some of the statistics and states that can be monitored:
- length of time system has been up
- octets received or transmitted
- unicast packets received or transmitted
- packets dropped on receive side
- packets dropped on transmit side
- errors occurring on receive side
- errors occurring on transmit side

Poll group

A poll group is a list of items you want to monitor. Each poll group is a /etc configuration file, and has the same name with a different number. Poll group 1 is threshpollPoll.1, group 2 is threshpollPoll.2, group 3 is threshpollPoll.3, and so on.

Here is the list of items to monitor:

SNMP OID	if Index	
sysUpTime	1.3.6.1.2.1.1.3.0	(required)
ifInOctets	1.3.6.1.2.1.2.2.1.10	
ifInUcastPkts	1.3.6.1.2.1.2.2.1.11	
ifInDiscards	1.3.6.1.2.1.2.2.1.13	
ifInErrors	1.3.6.1.2.1.2.2.1.14	

```
ifOutOctets                 1.3.6.1.2.1.2.2.1.16
ifOutUcastPkts              1.3.6.1.2.1.2.2.1.17
ifOutDiscards               1.3.6.1.2.1.2.2.1.19
ifOutErrors                 1.3.6.1.2.1.2.2.1.20
grGatedStatus               1.3.6.1.4.1.1080.1.1.1.6
ifHCInOctets                1.3.6.1.2.1.31.1.1.1.6
ifHCInUcastPkts             1.3.6.1.2.1.31.1.1.1.7
ifHCInMulticastPkts         1.3.6.1.2.1.31.1.1.1.8
ifHCInBroadcastPkts         1.3.6.1.2.1.31.1.1.1.9
ifHCOutOctets               1.3.6.1.2.1.31.1.1.1.10
ifHCOutUcastPkts            1.3.6.1.2.1.31.1.1.1.11
ifHCOutMulticastPkts        1.3.6.1.2.1.31.1.1.1.12
ifHCOutBroadcastPkts        1.3.6.1.2.1.31.1.1.1.13
```

In any pool group, the first poll value must always be `sysUpTime`.

Trap type

For each item in a group, you must specify the trap type you want sent when the threshold is broken.

These traps send no variables:

```
grGatedDown         35
grSnmpReset         36
```

The following traps send two variables:

```
grIfInOctetsHigh    19
grIfInOctetsLow     20
grIfOutOctetsHigh   21
grIfOutOctetsLow    22
grIfInUcastPktsHigh  23
grIfInUcastPktsLow   24
grIfOutUcastPktsHigh 25
grIfOutUcastPktsLow  26
grIfInErrorsHigh    27
grIfInErrorsLow     28
grIfOutErrorsHigh   29
grIfOutErrorsLow    30
grIfInDiscardsHigh  31
grIfInDiscardsLow   32
grIfOutDiscardsHigh 33
grIfOutDiscardsLow  34
```

The variables are:

`grTPPreviousCount`
- this is the value of the item being polled the previous time it was polled.
`grTPCurrentCount`
- this is the value of the item being polled at the time it was most recently polled.

The following traps send four variables:

```
grIfHCInOctetsHig          37
grIfHCInOctetsLo           38
grIfHCInUcastPktsHigh      39
grIfHCInUcastPktsLow       40
grIfHCInMulticastPktsHigh41
grIfHCInMulticastPktsLow   42
grIfHCInBroadcastPktsHigh  43
grIfHCInBroadcastPktsLow   44
grIfHCOutOctetsHigh        45
grIfHCOutOctetsLow         46
grIfHCOutUcastPktsHigh     47
grIfHCOutUcastPktsLow      48
grIfHCOutMulticastPktsHigh 49
grIfHCOutMulticastPktsLow  50
grIfHCOutBroadcastPktsHigh 51
grIfHCOutBroadcastPktsLow  52
```

The variables are:

`grTPPreviousCount`
- this is the lower 32 bits of the item being polled the last time it was polled.

`grTPCurrentCount`
- this is the lower 32 bits of the item being polled at the time it was most recently polled.

`grTPPreviousCount:`
- the upper 32 bits of the item being polled the last time it was polled.

`grTPCurrentCount`
- the upper 32 bits of the item being polled at the time it was most recently polled.

Logs

All logging is done in `/var/log`. Errors are logged to:

```
NSM.threshpoll.errlog.M.D.Y.h:m:s.i
```

(Month Day Year Hour Minute Second Instance-running)

```
$ more NSM.threshpoll.errlog.12.15.97.12:35:13.100

Starting Application threshpoll @ 12.15.97.12:35:13
log directory = /var/log/NSM.threshpoll.msglog.12.15.97.12:35:13.100
device configuration file = /etc/threshpollDevice.100
poll configuration file = /etc/threshpollPoll.100
threshold configuration file = /etc/threshpollThreshold.100
polling interval = 5
/usr/nbin/threshpoll -x 1
Mon Dec 15 12:36:38 1997, error = 32, Proc: Sigterm received.
$
```

The error log file should be monitored by **grclean** to make sure it does not get too large. Add the following lines to `/etc/grclean.logs.conf` in the "`of some interest`" section:

```
size = 25000
logfile=/var/log/NSM.threshpoll.errlog.*
```

Configuring threshpoll

There are four steps to configure **threshpoll**. Once established, it runs automatically, and can be set to run in the background.

1. Specify the gateway SNMP manager to which you want the traps to be sent. Edit the /etc/snmpd.conf file.

2. Create a poll group file for each set of items to be monitored

A poll group file contains the list of items you want to monitor and specifies which trap type or types are to be sent. A poll group file name is /etc/threshpollPoll.*number* where *number* distinguishes between groups. Group 36 is defined in /etc/threshpollPoll.36.

3. Specify the threshold for each item listed in the poll group.

These are specified in the /etc/threshpollThreshold.*number* file.

4. Specify the gateway device / SNMP managers to which the traps are sent. These are listed in the /etc/threshpollDevice.*number* file.

Steps

1 Specify the SNMP manager gateway or gateways where you would like the traps sent.

To send traps to a gateway named 'batman', add the following entry to /etc/snmpd.conf:

```
MANAGER    batman
           SEND ALL TRAPS
```

To send traps to a Gateway at 192.168.0.22, enter:

```
MANAGER    192.168.0.22
           SEND ALL TRAPS
```

Now send **snmpd** a HUP signal to re-read snmpd.conf and restart with the changes.

2 Create the poll group files that list the items you want monitored and the trap type you want sent when the threshold is broken.

Groups are defined in an /etc configuration file with the name /etc/threshpollPoll.*number*. *number* is the unique number given the group.

In any pool group, the first poll value must always be sysUpTime.

Here is how an entry is structured:

```
OID index:poll group name:oid|general trap-type|specific trap-type:
                          oid|general trap-type|specific trap-type:
                          oid|general trap-type|specific trap-type:
             END
```

– OID index is the unique *number* to identify the group: 0, 1, 2, the OID index is used in the traps sent to the Gateway.

– Poll group name is how you want to identify this group in log files.

– Object ID (oid) of the item you wish to poll.

– General trap type - should always be 6

– Specific trap type - the number given a certain type of trap

Use that structure to assemble an entry that creates group 100 with 4 items to monitor:

```
/etc/threshpollPoll.100

100:grf_atm1rx:.1.3.6.1.2.1.1.3.0|6|0:
                .1.3.6.1.2.1.31.1.1.1.6.x|6|37:
                .1.3.6.1.2.1.31.1.1.1.7.x|6|39:
                .1.3.6.1.2.1.31.1.1.1.8.x|6|41:
               END
```

This is an ATM card and its transmission rates requires the HC (high count, 64-bit) items and traps. Here is each item that will be monitored and its assigned trap:

```
sysUpTime                  - none
ifHCInOctets               - grIfHCInOctetsHigh        (37)
ifHCInUcastPkts            - grIfHCInUcastPktsHigh      (39)
ifHCInMulticastPkts        - grIfHCInMulticastPktsHigh  (41)
```

However, in the file, you will remove the spaces between the entries and it will look like this:

```
100:grf_atm1rx:.1.3.6.1.2.1.1.3.0|6|0:.1.3.6.1.2.1.31.1.1.1.6.x|6|37:.1.
3.6.1.2.1.31.1.1.1.7.x|6|39:.1.3.6.1.2.1.31.1.1.1.8.x|6|41:END
```

Colons separate the individual items, bars separate item and trap parts.

Note: the "x" in the OID is the if index available from the link number in **netstat -in** output.

Refer to the /etc/threshpollPoll.1.template file for more information.

3   Specify a threshold for each item listed in the poll group.

Thresholds are specified in the `/etc/threshpollThreshold.`*number* file where *number* is the same as the referenced poll group.

Here is how an entry is structured:
```
poll group name:threshold operation and value:
                threshold operation and value:
                threshold operation and value:
                threshold operation and value:
                END
```

–   Poll group name

–   Threshold operation is the action taken against the threshold level: less than, greater than, equal to, and so on.

–   Value is the actual size of the threshold expressed in an integer

These are the assigned operations and values for each item in the group:
```
sysUpTime                  - I

ifHCInOctets               - > 4000

ifHCInUcastPkts            - > 2500

ifHCInMulticastPkts        - < 1000
```

Use that structure to assemble an entry that assigns thresholds to group 100:
```
/etc/threshpollThreshold.100
grf_atm1rx:I:
            >4000:
            >2500:
            <1000:
            END
```

However, in the file, you will remove the spaces between the entries and it will look like this:
```
        grf_atm1rx:NA:>4000:>2500:<1000:END
```

Colons separate the individual items, bars separate item and threshold parts.

Refer to the `/etc/threshpollThreshold.1.template` file for more information.

4 Assign the poll group or groups to a device. Typically there is only one device, the GRF on which this program is running.

Here is how an entry is structured:

```
gateway:enterprise oid:device:community:poll group|threshold flag:END
```

– Gateway where the trap is to be sent (ignored, configured in `snmpd.conf`).
– Enterprise, the vendor object identifier. This is .1.3.6.1.3.1.1080 for a GRF.
– Device is the name of the device to be polled (ignored).
– Community is the community to be set in the trap, typically 'public'.
– Poll group is the name of the group of items being monitored.
– Threshholding turns monitoring on (0) or off (1) for the named group.

Use that structure to assemble an entry for the administrative node that monitors thresholds against group 100 operations:

```
/etc/threshpollDevice.100
gateway:.1.3.6.1.3.1.1080:site_admin:public:grf_atm1rx|1:END
```

Colons separate the individual items, bars separate device descriptors and threshold switch settings.

Refer to the `/etc/threshpollDevice.1.template` file for more information.

Starting threshpoll

Start **threshpoll** using the **start_threshpoll** program**.**

This script sets up the appropriate environment variables and starts the **threshpoll** program with the appropriate options. The **start_threshpoll -x** *number* **-i** *interval* command has two optional arguments. The first specifies the instance number to start. If no instance number is given, instance 1 is always started.

To create a additional instances of **threshpoll**, set up another configuration in `threshpollPoll.2`, `threshpollDevice.2`, and `threshpollThreshold.2` files.

The second specifies the period of time (in seconds) that **threshpoll** waits before polling again. The default interval is 5 minutes. If *interval* is specified, *number* must also be specified.

Once started, threshold polling continues until a **stop_threshpoll** command is executed and terminates all necessary processes in the appropriate order.

Refer to the **threshpoll** man page for more information.

Using the pinglog program

The **pinglog** program is used to ping GRF interfaces and attached devices to see if the interfaces are alive and responding. If an interface does not respond, a trap is sent to the configured gateway.
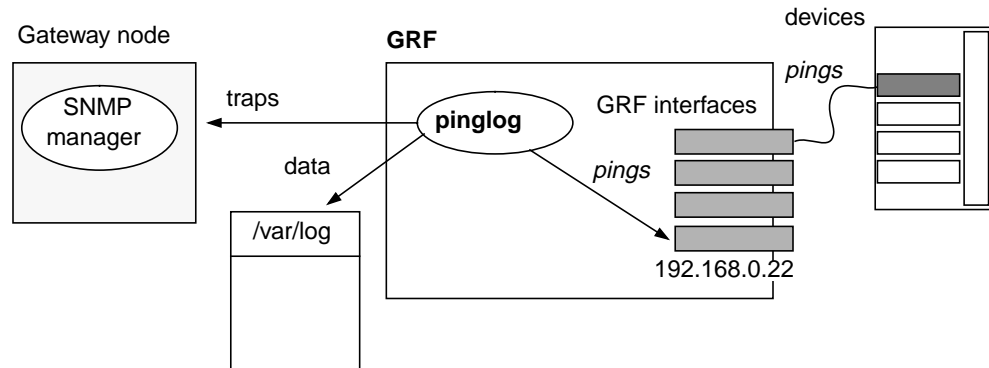
Figure 5-6.   Basic components in pinglog operation

Starting pinglog

Start **pinglog** using the **start_pinglog** command. The **start_pinglog -x** *number* **-i** *interval* command has two optional arguments. The first specifies the instance number to start. If no instance number is given, instance 1 is always started.

To create a additional instances of **pinglog**, set up another configuration in mpingBackbone.1.2, mpingBackbone.1.3, and mpingBackbone.1.4 files.

The second specifies the period of time (in seconds) that **pinglog** waits before polling again. The default interval is 5 minutes. If *interval* is specified, *number* must also be specified.

Once started, pinging continues until a **stop_pinglog** command is executed and terminates all necessary processes in the appropriate order.

Refer to the **pinglog** man page for more information.

Configuring pinglog

There are two steps to configure **pinglog**. Once established, it runs automatically.

1   Specify the SNMP manager gateway or gateways where you would like the traps sent.

To send traps to a gateway named 'batman', add the following entry to /etc/snmpd.conf:

```
MANAGER   batman
          SEND ALL TRAPS
```
To send traps to a Gateway at 192.168.0.22, enter:
```
MANAGER   192.168.0.22
          SEND ALL TRAPS
```
Now send **snmpd** a HUP signal to re-read snmpd.conf and restart with the changes.

2   Set up the addresses of the interfaces and devices to be pinged regularly in the /etc/mpingBackbone.1 file.

Here is how an entry is structured:
```
IP address:interface name:description of interface
```
–   IP address of device/interface to be pinged.

–   GRF interface name in the format gx0yz.

–   Description is a string that will appear in the trap messages.

Use that structure to assemble an entry for ATM logical interface gx0yz:
```
/etc/mpingBackbone.1
192.168.0.22:gx0yz:ATM card to NAP
```

Refer to the /etc/mpingBackbone.1.template file for more information.

Logs

Logging is done in /var/log. Ping results are logged in mpingLog.msglog.M.D.Y.h:m:s.i
pinglog monitors this log file and sends a trap when it detects that one of the devices has gone down. Errors are sent to NSM.pinglog.errlog.M.D.Y.h:m:s.i.

(Month Day Year Hour Minute Second Instance-running)

```
$ more mpingLog.msglog.12.15.97.12:59:41.1
Dec 15 12:59:41 Reading 1 hosts...
Dec 15 12:59:41 ga010 went down (192.168.0.22) ATM card to NAP
Dec 15 12:59:41 1 of 1 hosts down
```

The error log file should be monitored by **grclean** to make sure it does not grow too big. Add the following lines to /etc/grclean.logs.conf in the "of some interest" section:

```
size = 25000
logfile=/var/log/NSM.pinglog.errlog.*
size=25000
logfile=/var/log/mpingLog.msglog.*
```

Powering off or rebooting the system

Reboot or shut down system using grms

Use the **grms** command to halt, reboot, or shut down the system locally.

grms performs the same function as **shutdown** but does not require the user to be logged in as root. However, it can only be used from the control board VT-100 terminal. Use **shutdown** and its corresponding options if you manage the GRF from a remote terminal.

The **grms** command performs an orderly shutdown, saving memory and allowing any transfers to complete. When the reboot option is specified, the system is rebooted and all media cards are reset.

1 Attach a keyboard to the VT-100 terminal and log in. You do not have to be root.

2 Enter the **grms** command with one of its options:
With the **-h** option, **grms** halts the system (like **shutdown -h now**).
With the **-r** option, **grms** performs an orderly reboot of the system (like **shutdown -r now**).
With the **-s** option, **arms** performs an orderly shutdown of the system. To restart, enter the **reboot** command.

Reboot or shut down system remotely using shutdown

If you manage the GRF from a remote station, use the **shutdown** command to reset the system.

The **shutdown** command performs an orderly shutdown, saving memory and allowing any transfers to complete. When the reboot option is specified, the system is rebooted and all media cards are reset.

1 Log in as root.

2 Enter the **shutdown -r** command.

With the **-r** option, the command performs an orderly reset of the system. It also issues a special command to the control board indicating that the GRF is to be restarted immediately.

Enter:
```
# shutdown -r now

  •
  •
  •
  #
```

After the shutdown completes, the prompt sign appears and you can log in again.

Upgrading system software

Software updates are available via ftp and are in the form of gzip (`.gz`) files. After the new software is downloaded, the **grfins** command looks for the specified release directory, extracts the files, and installs them.

Which files will be updated ?

grfins upgrades the configuration files as needed and replaces all other files. If the `.template` file for a configuration file changes in a new software release, **grfins** replaces the old `.template` file with a new template. When a file template changes, it is likely you will have to edit the new template to create a new.`conf` configuration file.

Check the software version

To check the version of currently-installed software, enter:

```
# getver
```

Here is what is displayed:
```
Current  Revision: 1.4.1  Version: default
```

Or, you can use the **cat** command: `# cat /etc/motd`

Check flash device capacity

If you are doing an ftp, at least 28000 blocks must be available for **grfins** to work. If you are loading from an NFS link, having already ftp'd the release, 14000 blocks must be available. Use the **vpurge** command to clean out old releases or use **snapshot** to archive them. The current binaries are about 10MB.

Use the **flashcmd** command to apply the **df** to the internal flash device:

```
# flashcmd df

Filesystem      1K-blocks      Used      Avail    Capacity   Mounted on

/dev/wd0a          78751      11543     63270      15%        /flash
```

Back up config files

Use the **grwrite** command to save the current configuration files in the `/etc` directory. Use **grsite --perm** to save the files across the upgrade and reboot. These commands are described in the *GRF Reference Guide*.

Installation command

The syntax of the **grfins** command to execute the installation script is:

```
#grfins--source=<source_location>--release=<release_name>--activate
```

where `<release_name>` is the actual release name as in `1.4.1` and `<source_location>` is usually `/flash/tmp`.

How to do the ftp and a software upgrade

To upgrade, ftp and download the new release to your site and then install the new software by running the **grfins** script.

Note: You must reboot after installing software. If you do not reboot after running **grfins**, the GRF will be in an unpredictable state. Remember that rebooting interrupts *all* GRF operations.

1 Log on and start the UNIX shell:

```
super> sh
#
```

2 Mount the internal flash device and create the directory to install from (`/flash/tmp`):

```
# mountf -w
# cd /flash
# mkdir tmp
# cd tmp
```

3 Do an ftp. For example, to download 1.4.8 software:

```
# ftp ftp.ascend.com
# ftp> cd releases
# ftp> cd A1_4_1
# ftp> prompt
# ftp> bin
# ftp> get 1.4.1.TAR.gz
# ftp> get 1.4.1.root.gz
# ftp> quit
```

This sequence has downloaded the new 1.4.1 release files on the internal flash device.

Note: For future software upgrades, please contact Ascend support for information on appropriate releases for your hardware. In the US call: 800-272-3634, from elsewhere call: 510-814-2333, or send email to support@ascend.com.

The GRF 400 and GRF 1600 require two installation binaries: `1.4.1.TAR.gz` and `1.4.1.root.gz` (RMS node systems require only the `TAR.gz` file).

4 Unmount the flash device

```
# cd /
# umountf
```

5 **grfins** decompresses the files, installs the new files, and replaces the configuration file templates as needed. The `activate` option ensures the installation will occur during the next boot:

```
# grfins --source=/flash/tmp --release=1.4.1 --activate
```

6 Remove the release files from the internal flash device and reboot to load RAM:

```
# flashcmd -w rm -rf /flash/tmp
# reboot
```

Sending dumps – put command

You can ftp memory and log dumps to customer support.

Process overview

- Go to the location of the files you want to send, for example, `/var/portcards`.
- Then ftp to the ftp server.
- Once on the server, you need to change to the `/incoming` directory and create a new directory with the name of your site.
- After a site directory is created, use the **put** command to send your collected files there.

ftp to the server

1 **cd** to the file directory and execute the ftp command:

```
# cd /var/portcards
# ftp ftp.ascend.com
```

The screen displays messages and a confirmation of connection similar to the following:

```
/usr/bin/ftp
/usr/ucb/ftp
ftp% /usr/bin/ftp ftp.ascend.com
Connected to ftp.ascend.com
220 ftp.ascend.com FTP server (Version...) ready
#  Name:
```

2 Type "anonymous" at the `Name:` prompt:

```
#  Name: anonymous
```

3 Enter your email address at the `Password:` prompt:

```
#  Password: someone@someplace.xxx
```

The screen displays a series of messages similar to the following:

```
Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

4 At the first ftp prompt, set the mode to binary:

```
#  ftp> bin
```

5 With the ftp connection established, go to the `incoming` directory and create a new directory to contain your site's files:

```
#  ftp> cd incoming
```

```
#  ftp> mkdir <site_name>
```

Make sure the name given the **<**site_name**>** directory clearly identifies your site or particular system:

```
#  ftp> cd <site_name>
```

6   Execute the **put** command at the ftp> prompt:

```
#  ftp> put <files>
```

7   Check that the files have been transferred:

```
#  ftp> ls incoming/<site_name>
```

8   Type "quit" to end the ftp session:

```
#  ftp> quit
```

Burning in media card flash memory

Customer Support may supply new code to be burned into media card flash memory. Use the **grflash** command under the direction of support staff.

Monitoring temperature and power

This section describes how system temperature and power supply output levels are monitored. Temperature is monitored directly by control board sensors and by the power supply module(s). Fan speed is also monitored.

⚠️ **Warning:** The temperature extremes and failures described here are considered serious. The GRF can recover only with human intervention.

Warnung: Die oben beschriebenen Versagensfälle und Abschaltvorgänge stellen ernsthafte Situationen dar. Der GRF kann nur durch persönliches Eingreifen wieder betriebsbereit gemacht werden.

Temperature monitoring

When the sensor on the control board detects that a temperature level has reached the warning level, a signal is sent to the control component. On the GRF 400 the control board's amber FAULT LED comes on and flashes. On the GRF 1600, the TEMP LED comes on. The control component triggers an audible alarm and a warning message is sent, logged into `/var/log/messages`, and displayed on the screen. The alarm will continue to sound until the temperature drops below a problematic level.

If the temperature stays above the set level for longer than five minutes, the control board shuts down power to media cards. The control boards continues to periodically print a message indicating the media cards are shut down and requesting a system reboot.

Keep the intake and outlet vents free of obstructions.

The network administrator can use the **temp** command to access temperature sensor data and determine the current board level temperature. **temp** is in the **grrmb** command set.

Power supply failure and shutdown

On the GRF 400 and GRF 1600, if a power supply fails, the PS1 or PS2 LED goes on, and a message is sent indicating a power supply failure.

One of the following messages are displayed:

```
"Power Supply PS1 Failure"
"Power Supply PS2 Failure"
```

The power supply module monitors its internal temperature, current, and voltage. Excessive heat and incorrect current and voltage readings can cause the power supply to shut down.

Fan monitoring – GRF 400

The GRF 400 is cooled by three fans that pull ambient air through one side of the chassis and push heated air out through the other side.

Each fan has a tachometer that measures fan speed in number of revolutions. The tachometer detects slowdowns in fan speed as well as failures. If a fan has failed and remains failed for 10 seconds, a message goes to the console and the fault LED lights. The fault LED remains lit unless the fan recovers and maintains speed for 10 seconds, the fan do not recover unless the GRF system is power cycled off/on.

Fan monitoring – GRF 1600

Two rotary fans cool the chassis, excluding the power supply compartment. The fans operate in tandem. At start-up, both fans operate at 100% of RPM capability. Gradually each fan slows down so that, in normal conditions, each fan operates at 50% speed. When the GRF is plugged in, you can hear the changes in fan speeds.

Tachometers on each fan unit ensure steady, sufficient airflow. When a tachometer detects that a fan is dropping below the 50% rate, it causes a signal to the other fan to speed up. When a problem occurs with either fan, the control board "FAN" LED lights.

The GRF 1600 fan tray is site replaceable, but must be returned to Ascend for service. The fan tray sits on a pair of guides and is held in place by two captured screws. While the fan tray is hot swappable, the amount of time the GRF can operate without a fan tray in place depends upon the number of installed media cards and the ambient air temperature. The temperature sensor on the control board shuts the GRF down if the operating temperature is exceeded.

Intervention

Intervention may require pushing the reset button on the control board or power cycling the chassis. If a temperature failure has been sensed, a problem exists in the GRF and you need to contact Customer Support.

GRF Specifications

A
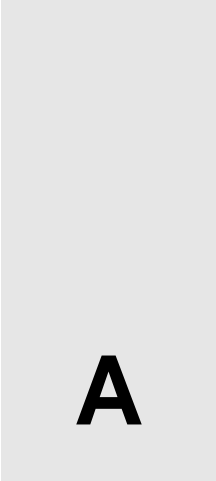
Appendix A contains the following specifications for the GRF 400 and 1600 routers:

General specifications

Configuration information is stored in non-volatile memory. When the GRF is turned off, configuration data is not lost.

Note: Use a protected AC power source, or add surge protection between the power source and the GRF chassis.

Environmental requirements

Operating temperatures:	32°–104°F (0°–40°C)
Operating humidity level:	10% – 90%, non-condensing
Altitude:	0 to 10,000 feet (0 to 3048 meters)

GRF 400 chassis specifications

Table A-1 lists the general characteristics of the GRF 400 chassis.

Table A-1.   GRF 400 chassis characteristics

Element	Value
Weight	26.5 pounds, chassis and one power supply (11.9 kg)
Dimensions	5.25 in (H) x 19 in (W) x 19 in(L) (13.34 cm x 48.26 cm x 48.26 cm)
Media cards	1–4 per chassis, multiple media types supported simultaneously
	Card dimensions: 9 in high x 16 in long (22.9 cm x 40.6 cm)
	Card weight: approximately 2 pounds each (0.9 kg)
	Hot-swap capability: all media cards are hot-swappable
AC power supply	400W, with an option for a redundant load-sharing unit - double-pole/neutral fusing - weighs 6 pounds (2.7 kg)
AC receptacle	Standard US 3-prong plug, 115 V grounded receptacle (international options available)
AC cord	- North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum
	- outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 10A, plug type suitable for country of use.

Table A-1.   GRF 400 chassis characteristics   (continued)

Element	Value
AC voltage	100–240 VAC, 6.0–3.0 Amp maximum
	Phase: single
	Frequency: 60/50 Hz
	Power usage: 400W (nominal)
DC power supply	400W, with an option for a redundant load-sharing unit - double-pole/neutral fusing - weighs 6 pounds (2.7 kg)

GRF 1600 chassis specifications

Table A-2 lists the general characteristics of the GRF 1600 chassis.

Table A-2.   GRF 1600 chassis characteristics

Element	Value
Weight	103.5 pounds, chassis and one power supply (46.6 kg)
Dimensions	23.0 in (H) x 19 in (W) x 21 in (L) (58.4 cm x 48.26 cm x 53.3 cm)
Media cards	1–16 per chassis, multiple media types supported simultaneously
	Card dimensions: 9 in high x 16 in long (22.9 cm x 40.6 cm)
	Card weight: approximately 2 pounds each (0.9 kg)
	Hot-swap capability: all media cards are hot-swappable
Fan tray	Single 48V unit with 2 motorized impeller fans - field replaceable module - weighs 13 pounds (5.85 kg)
AC power supply	1100W, with an option for a redundant load-sharing unit - double-pole/neutral fusing - weighs 21 pounds (9.45 kg)
AC receptacle	IEC320-C19 to NEMA 5-15P power cord (international options available)
AC power cord	- North America: UL listed, CSA certified, type SJT or SVT, 3-conductor, 18AWG minimum
	- outside of North America: Agency-approved for the country of use, cord type H05VVF3G1.0, 3-conductor, 1.0mm^2, rated 250V, 16A, plug type suitable for country of use.

Table A-2.   GRF 1600 chassis characteristics   (continued)

Element	Value
AC voltage	100–240 VAC, 85–264 VAC maximum
	Phase: single
	Frequency: 60/50 Hz
	Power usage: 1100W (nominal)

DC power requirements

Power requirements for individual GRF components are as follows:

Table A-3.   DC power requirement per individual components

Component	Max Amps/+5.0 V	Max Amps/-5.2 V	Watts/unit
HIPPI media card	8.8	0	44.0
FDDI/Q media card	9.4	0	47.0
ATM OC-3c/Q media card	9.0	0	45.0
ATM OC-12c media card	9.0	0	45.0
HSSI media card	10.0	0	50.0
4-port 10/100Base-T card	5.6	0	28.0
8-port 10/100Base-T card	8.0	0	40.0
SONET OC-3c media card	10.0	0	50.0
GRF 400 control board	5.0	0	25.0
GRF 1600 control board	3.0	0	15.0

GRF 400 control board specifications

The GRF 400 IP switch control board has the following characteristics:

Table A-4.   Characteristics of the GRF 400 control board

Element	Value
Processor	Intel Pentium 166 MHz
RAM	64MB basic, 256MB maximum (upgrade in 64MB increments) (8 SIMM sockets for 32MB SIMMs)
Flash memory, internal	85MB ATA flask device
Serial adapter	1 UART
100/10Base-T connector	1 autosensing, connects to PCI local bus
Temperature sensor	Senses system warning and shutdown temps, enables actual IC temperature to be read, reported on by **temp** command
Ethernet address PROM	System IP address memory (32 bytes)
Switch component	16 Gb TriQuint component
PCMCIA host adapter	2, one 85- or 175MB ATA flash device can be installed, PCMCIA modem card is another option

GRF 1600 control board specifications

The GRF 1600 switch control board has the following characteristics:

Table A-5.   Characteristics of the GRF 1600 control board

Element	Value
Processor	Intel Pentium 166 MHz
RAM	64MB basic, 256MB maximum (upgrade in 64MB increments) (8 SIMM sockets for 32MB SIMMs)
Flash memory, internal	85MB ATA flask device
Serial adapter	1 UART
100/10Base-T connector	1 autosensing, connects to PCI local bus
Temperature sensor	Senses system warning and shutdown temps, enables actual IC temperature to be read, reported on by **temp** command
Ethernet address PROM	System IP address memory (32 bytes)
PCMCIA host adapter	2, one 85- or 175MB ATA flash device can be installed, PCMCIA modem card is another option

Cable types

GRF media cards use the following industry-standard cables:

Table A-6.   Media card cable specifications

Cables/Card	Description
HSSI	25 twisted-pair shielded coax cables
ATM OC-3c multimode	62.5/125 micron fiber optic cables
ATM OC-3c single mode	9/125 micron fiber optic cables
ATM OC-12c multimode	62.5/125 micron fiber optic cables
ATM OC-12c single mode	9/125 micron fiber optic cables
4-port 10/100Base-T	Category 5 UTP cables
8-port 10/100Base-T	Category 5 UTP cables
SONET OC-3c multimode	62.5/125 micron fiber optic cables
SONET OC-3c single mode	9/125 micron fiber optic cables
FDDI multimode	62.5/125 micron fiber optic cables
HIPPI	Twisted-pair copper cables in 5-, 25-, or 51-meter lengths. Ascend certifies the viability of GRF-to-GRF connections using 51-meter cables and sells HIPPI cables directly.

Media card specifications

FDDI specifications

The FDDI media card has the following characteristics:

Table A-7.   FDDI media card specifications

Element	Value
Interfaces per card	Four bi-directional interfaces, multimode
	All has unique IP and MAC addresses, are configurable as: - two dual-attach interfaces - one dual-attach interface and two single-attach interfaces - four single-attach interfaces
Media transfer rate	100 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB input, 4 MB output
Route table support	150K entries, with hardware-assisted route table lookup
Max transmission unit	4352 bytes
Connectors	MIC tranceivers
Connector requirements	Must meet ANSI X3.166 standards
Cables	Multi-mode cables: 62.5/125micron optical fibre
Optic components	Internally-produced 1,300 nm surface-emitting LEDs and photodiodes
Optical output	19 dBm minimum, 14 dBm minimum (avg.) (62.5/125 um)
Optical input sensitivity	33.5 dBm minimum, 14 dBm maximum
Optical wavelength	1,270 nm minimum, 1,330 nm typical, 1,380 nm maximum
Spectral width	130 nm maximum

ATM OC-3c specifications

The ATM OC-3c media card has the following characteristics:

Table A-8.   ATM OC-3c media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces - single mode card - multimode card
Media transfer rate	155 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 32.5 dBm minimum, 8 dBm maximum Multi-mode: 32.5 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 14 dBm minimum, 8 dBm maximum Multi-mode: 19 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

ATM OC-12c specifications

The ATM OC-12c media card has the following characteristics:

Table A-9.   ATM OC-12c media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces - single mode card - multimode card
Media transfer rate	622 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 32.5 dBm minimum, 8 dBm maximum Multi-mode: 32.5 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 14 dBm minimum, 8 dBm maximum Multi-mode: 19 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

10/100Base-T specifications

The 10/100Base-T media card has the following characteristics:

Table A-10. 10/100Base-T media card specifications

Element	Value
Interfaces per card: 4-port 8-port	Four auto-sensing bi-directional interfaces Eight auto-sensing bi-directional interfaces
Media transfer rate	10 or 100 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
Max transmission unit	1500 bytes
Connectors	RJ-45
Cables	STP and UTP Category 5
Transmission distance	100 meters

HSSI specifications

The HSSI media card has the following characteristics:

Table A-11. HSSI media card specifications

Element	Value
Interfaces per card	Two bi-directional interfaces
Media transfer rate	52 Mbps (OC-1), 45 Mbps (DS3), 34 Mbps (E3)
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries
Framing protocols	Frame Relay, PPP, HDLC
Max transmission units	Frame Relay-4352 bytes, PPP-1496 bytes, HDLC-4352 bytes
Connectors	2-row, 50-pin shielded tab connectors
Cables	Two 25 twisted-pair shielded coax cables
Cable receptacles	2-row, 50-pin receptacle heads

HIPPI specifications

The HIPPI media card has the following characteristics:

Table A-12. HIPPI media card specifications

Element	Value
Interfaces per card	One dual-simplex interface
Media transfer rate	800 Mbps
Processor	40-MHz TI C31
Data buffers	4 MB input, 4 MB output
Route table support	70K entries
Max transmission unit	65280 bytes
Transmission distance	Point-to-point and LAN, up to 25 meters (82 feet) Ascend certifies viability of GRF-to-GRF connections using 51-meter cables
Card connectors	2-row, 100-pin panel-mount receptacle as specified in HIPPI-PH
Cable connectors	2-row, 100-pin shielded tab connectors as specified in HIPPI-PH
Cables	Twisted-pair copper: 5, 25, and 51 meters, available from Ascend

SONET OC-3c specifications

The SONET OC-3c media card has the following characteristics:

Table A-13. SONET OC-3c media card specifications

Element	Value
Interfaces per card	One full duplex OC-3c SONET/STM-1 SDH - supports an APS 1+1 Architecture Switching - single mode, multimode
Media transfer rate	155 Mbps
Processors	40-MHz transmit processor, 40-MHz receive processor
Data buffers	4 MB on receive side, 4 MB on transmit side
Route table support	150K entries, with hardware-assisted route table lookup
SDH (STM-1)	Complies with Synchronous Digital Hierarchy standards
Max transmission unit	9180 bytes
Transmission distance	LAN, WAN distances with use of repeaters
Cables	Single-mode cables: 9/125 micron optical fibre Multi-mode cables: 62.5/125micron optical fibre
Physical connectors	Duplex SC transceivers
Connector requirements	Must meet JIS C 5973 standards
LASER components	Class 1, 1310 nm LASER diodes
Optical input	Single-mode: 32.5 dBm minimum, 8 dBm maximum Multi-mode: 32.5 dBm minimum, 14 dBm maximum
Optical output (avg.)	Single-mode: 14 dBm minimum, 8 dBm maximum Multi-mode: 19 dBm minimum, 14 dBm maximum
Optical wavelength	Single-mode: 1,261 nm min, 1,310 nm typical, 1,360 nm max Multi-mode: 1,270 nm min, 1,310 nm typical, 1,380 nm max
Spectral width	Single-mode: 7.7 nm maximum Multi-mode: 120 nm typical, 200 nm maximum

Warranty

B

This appendix contains warranty information for the GRF 400 (GRF-4-AC), the GRF 400 (GRF-4-DC), and the GRF 1600 (GRF-16-AC).

Product warranty

1   Ascend Communications, Inc. warrants that the GRF 400, GRF 1600, and GR-II will be free from defects in material and workmanship for a period of twelve (12) months from date of shipment.

2   Ascend Communications, Inc. shall incur no liability under this warranty if

– the allegedly defective goods are not returned prepaid to Ascend Communications, Inc. within thirty (30) days of the discovery of the alleged defect and in accordance with Ascend Communications, Inc.'s repair procedures; or

– Ascend Communications, Inc.'s tests disclose that the alleged defect is not due to defects in material or workmanship.

3   Ascend Communications, Inc.'s liability shall be limited to either repair or replacement of the defective goods, at Ascend Communications, Inc.'s option.

4   Ascend Communications, Inc. MAKES NO EXPRESS OR IMPLIED WARRANTIES REGARDING THE QUALITY, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE BEYOND THOSE THAT APPEAR IN THE APPLICABLE Ascend Communications, Inc. USER'S DOCUMENTATION. Ascend Communications, Inc. SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGE, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGES TO BUSINESS OR BUSINESS RELATIONS. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES.

Warranty repair

1   During the first three (3) months of ownership, Ascend Communications, Inc. will repair or replace a defective product covered under warranty within twenty-four (24) hours of receipt of the product. During the fourth (4th) through twelfth (12th) months of ownership, Ascend Communications, Inc. will repair or replace a defective product covered under warranty within ten (10) days of receipt of the product. The warranty period for the replaced product shall be ninety (90) days or the remainder of the warranty period of the original unit, whichever is greater. Ascend Communications, Inc. will ship surface freight. Expedited freight is at customer's expense.

2 The customer must return the defective product to Ascend Communications, Inc. within fourteen (14) days after the request for replacement. If the defective product is not returned within this time period, Ascend Communications, Inc. will bill the customer for the product at list price.

Out-of warranty repair

Ascend Communications, Inc. will either repair or, at its option, replace a defective product not covered under warranty within ten (10) working days of its receipt. Repair charges are available from the Repair Facility upon request. The warranty on a serviced product is thirty (30) days measured from date of service. Out-of-warranty repair charges are based upon the prices in effect at the time of return.

GRF 400 Agency Notices
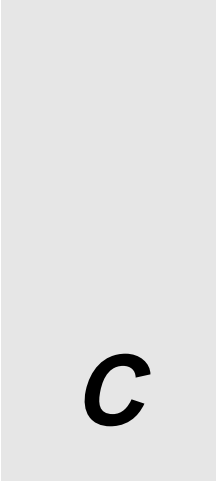
This appendix contains Agency information for the GRF-4-AC model.

GRF 400 agency regulatory notices

Agency status

Safety

UL	- ANSI/UL 1950
CUL	- CAN/CSA-C22.2 No. 950
TUV GS	- EN 60950

EMC

FCC Class A	(commercial or industrial environments)
CE Mark	EN 55022 (Class A emissions)
	EN 50082-2 (heavy industry immunity)

Canadian DOC Radio Interference Regulation, Class A

VCCI Class 1 (commercial or industrial environments)

Installation conditions and limitations

1 Enclosure must have all access panels in place and secured. All available slots must be filled with media cards or filler cards.

2 Substitution of unapproved or modified components, subassemblies, or modules may result in increased radiated emissions and/or increased susceptibility to radiated fields from other equipment.

3 All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for ethernet cables, fiber optic cables, and power cords, which are unshielded. Connectors with jackscrews should be securely tightened.

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

Canadian notice

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

European Union notice

Warning:
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

VCCI Class 1 notice

The GRF-4-AC conforms to Class 1 standards of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). Acceptance number: 44143

注意
　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Caution:
This is a Class 1 product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Non-telecommunication port

HERGESTELLT-VON:	Ascend Communications, Inc.
	High Performance Networking Division
	10250 Valley View Road
	Eden Prairie, MN 55344

MODELL:	GRF-4-AC

STROMAUFNAHME:	Voltage	100-240 VAC
	Frequency:	50-60 Hz
	Current:	6.0-3.0 A

The Manufacturer / Supplier:	Ascend Communications, Inc.
	High Performance Networking Division
	10250 Valley View Road
	Eden Prairie, MN 55344

Declares that: GRF-4-AC
are not intended to be connected to a public telecommunications network.

The connection of such equipment to a public telecommunications network in a European Community Member State will be in violation of the national law implementing Directive 91/263/EEC on the approximation of the laws of the Member States concerning telecommunication terminal equipment, including mutual recognition of their conformity.

Der Hersteiler / Lieferant:	Ascend Communications, Inc.
	High Performance Networking Division
	10250 Valley View Road
	Eden Prairie, MN 55344

erklärt daß: GRF-4-AC
nicht zum Anschluß an ein öffentliches Telekommunikationsnetz bestimmen sind.

Der Anschluß dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EG-Mitgliedstaaten verstößt gegen die jeweiligen einzeistaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angieichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einshließlich der gegenseitigen Anerkennung ihrer Konformität.

EC declaration

EC Declaration of Conformity

(g0101)

We   Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

declare under the sole responsibility that the

GRF-4-AC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

EN 55022 Class A
Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN 50082-2
Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

EN 60950
Safety requirements of information technology equipment including electrical machines

The GRF-4-AC complies with all safety relevant provisions referring to

- Protection against electrical hazards
- Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

CE

(g0102)

Mark Garver
V.P.& General Manager

GRF 1600 Agency Notices

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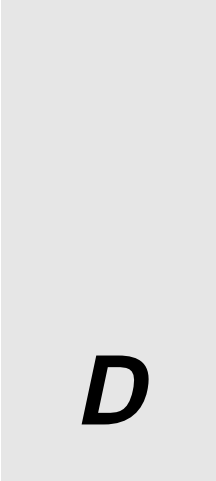
This appendix contains Agency information for the GRF-16-AC model.

GRF 1600 agency regulatory notices

Agency status

Safety

UL	- ANSI/UL 1950
CUL	- CAN/CSA-C22.2 No. 950
TUV GS	- EN 60950

EMC

FCC Class A   (commercial or industrial environments)

CE Mark   EN 55022   (Class A emissions)

                      EN 50082-2   (heavy industry immunity)

Canadian DOC Radio Interference Regulation, Class A

VCCI Class 1   (commercial or industrial environments)

Installation conditions and limitations

1   Enclosure must have all access panels in place and secured. All available slots must be filled with media cards or filler cards.

2   Substitution of unapproved or modified components, subassemblies, or modules may result in increased radiated emissions and/or increased susceptibility to radiated fields from other equipment.

3   All data, signal, and control cables connected to the equipment must be of the shielded type with metallic connector hoods, except for ethernet cables, fiber optic cables, and power cords, which are unshielded. Connectors with jackscrews should be securely tightened.

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

Canadian notice

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

European Union notice

Warning:

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Federal Communications Commission notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

VCCI Class 1 notice

The GRF-16-AC conforms to Class 1 standards of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). Acceptance number: 46264

注意
　　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨
害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう
要求されることがあります。

Caution:
This is a Class 1 product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Non-telecommunication port
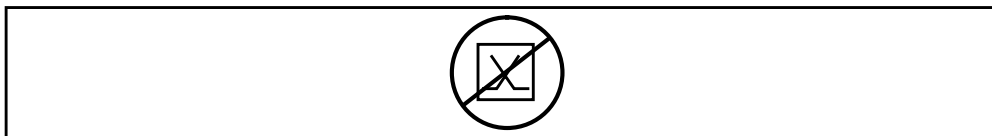
(g0100)

HERGESTELLT-VON:	Ascend Communications, Inc. High Performance Networking Division 10250 Valley View Road Eden Prairie, MN 55344

MODELL: GRF-16-AC

STROMAUFNAHME:	Voltage	100-240 VAC
	Frequency:	50-60 Hz
	Current:	12.0-6.0 A

The Manufacturer / Supplier: Ascend Communications, Inc.
                                High Performance Networking Division
                                10250 Valley View Road
                                Eden Prairie, MN 55344

Declares that: GRF-16-AC
are not intended to be connected to a public telecommunications network.

The connection of such equipment to a public telecommunications network in a European Community Member State will be in violation of the national law implementing Directive 91/263/EEC on the approximation of the laws of the Member States concerning telecommunication terminal equipment, including mutual recognition of their conformity.

Der Hersteiler / Lieferant: Ascend Communications, Inc.
                                High Performance Networking Division
                                10250 Valley View Road
                                Eden Prairie, MN 55344

erklärt daß: GRF-16-AC
nicht zum Anschluß an ein öffentliches Telekommunikationsnetz bestimmen sind.

Der Anschluß dieses Gerätes an ein öffentliches Telekommunikationsnetz in den EG-Mitgliedstaaten verstößt gegen die jeweiligen einzeistaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angieichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einshließlich der gegenseitigen Anerkennung ihrer Konformität.

EC declaration

EC Declaration of Conformity

We   Ascend Communications, Inc.
High Performance Networking Division
10250 Valley View Road
Eden Prairie, MN 55344

declare under the sole responsibility that the

GRF-16-AC

to which this declaration relates, meets the essential health, safety, and EMC requirements and is in conformity with the relative EC Directives and standards listed below:

EU EMC Directive 89/336/EEC
Essential health and safety requirements relating to electromagnetic compatibility

EN 55022 Class A
Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EN 50082-2
Electromagnetic compatibility - Generic immunity standard Part 2: Industrial environment

EC Low Voltage Directive 73/23/EEC
Essential health and safety requirements relating to electrical equipment

EN 60950
Safety requirements of information technology equipment including electrical machines

The GRF-16-AC complies with all safety relevant provisions referring to

- Protection against electrical hazards
- Protection against mechanical and fire hazards

The safety issues of this information technology equipment type have been evaluated by a government accredited European third party organization.

The CE marking has been affixed on the device according to article 10 of the EC Directive 89/336/EEC.

CE

Mark Garver
V.P.& General Manager

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