



Configuring the MGX RPM-PR

This chapter describes how to complete a basic configuration of the MGX Route Processor Module (RPM-PR). It provides procedures for configuring ATM, Ethernet, and Fast Ethernet interfaces, as well as, permanent virtual circuits (PVCs). It also details how to make connections between an RPM-PR and a PXM-45 and between other service modules or other RPM-PRs. The chapter contains the following sections:

- [Accessing the RPM-PR Command Line Interface](#)
- [Booting the RPM-PR](#)
- [Verifying the Configuration](#)
- [Establishing 1:N Redundancy Between Two or More RPM-PR Cards](#)

This chapter provides information necessary to get the RPM-PR up and running. Detailed command information is available in the Cisco IOS command reference publications.



Note

The back cards used in conjunction with the RPM-PR are equivalent to port adapters in Cisco routers.

Accessing the RPM-PR Command Line Interface

To configure the RPM-PR, you must access the command line interface (CLI) of the RPM-PR.

The RPM-PR CLI can be accessed using any of the following methods:

- Console port on the front of the RPM-PR

The RPM-PR has an RJ-45 connector on the front of the card module. If you configure the RPM-PR on site, connect a console terminal (an ASCII terminal or a PC running terminal emulation software) directly to the console port on your RPM-PR using an RS-232 to RJ-45 rollover cable for CLI access (see [Chapter 3, “Installing the MGX RPM-PR”](#)).

- `cc` from another MGX 8850 or MGX 8950 card

After initial configuration, you can also configure the RPM-PR through the PXM-45. You access the RPM-PR CLI by entering the `cc` (change card) command from any of the other cards in the switch.

- Telnet from a workstation, PC, or another router

After initial configuration, you can also configure the RPM-PR remotely via Telnet. After the RPM-PR is installed and has PVCs to other RPM-PRs or routers in the network, you can Telnet to access the RPM-PR CLI remotely from these other devices.

To connect a modem to the auxiliary port on the RPM-PR, see [Chapter 3, “Installing the MGX RPM-PR.”](#)

Booting the RPM-PR

When the RPM-PR is booted, the boot image must be the first file in the bootflash. If the bootflash does not have a valid boot image as a first file, the card may not be able to boot and can result in bootflash corruption. If the bootflash is corrupted, you will have to send the card back for an external burn with a valid boot image.

You can reboot the RPM-PR from the PXM by entering the command **resetcd** *<card_number>* from the switch CLI, where *card_number* is the slot number of the RPM-PR that is being rebooted.



Note

Omitting the card number resets the entire system.

Also, you can reboot the RPM-PR from the RPM-PR using the RPM-PR console port and entering the **reload** command.

Each time you turn on power to the RPM-PR, by inserting the RPM-PR into the MGX 8850 or the MGX 8950, it goes through the following boot sequence:

1. The RPM-PR runs diagnostics on the CPU, memory, and interfaces.
2. The system boot software, which is the boot image, executes and searches for a valid Cisco IOS image, which is the RPM-PR runtime software.

The source of the Cisco IOS image is determined by the configuration register setting. To verify this setting, you can enter either the **show version** or **show bootvar** command. (See the “[Viewing the Hardware Configuration](#)” section later in this chapter.)

- If the configuration register is set to the factory-default setting of **0x01**, RPM-PR will come up and stay in boot mode.
 - If the configuration register is **0x2**, the RPM-PR will look for the runtime image either in bootflash or on the PXM C:FW drive.
3. The search for runtime image is determined by which boot system command is entered.
 - Entering the **boot system x:<runtime_image_name>** command will result in a search for a runtime image on the PXM C:FW drive.
 - Entering the **boot system bootflash:<runtime_image_name>** command will result in a search for a run time image in the bootflash.
 4. If the runtime software is not found after three attempts, the RPM-PR reverts to the boot mode.
 5. If a valid Cisco IOS image is found, then the RPM-PR searches for a valid configuration, which can reside in NVRAM or as a configuration file either on the PXM hard disk x: drive or in bootflash.

If you want to load from a specific configuration file, you should enter either the **boot config bootflash:<config_file>** command or the **boot config x:<config_file>** command.

6. For normal RPM-PR operation, there must be a valid Cisco IOS image on the PXM-45 x: drive or in bootflash, and a configuration in NVRAM or configuration file in bootflash or on the PXM disk.

The first time you boot the RPM-PR, configure the RPM-PR interfaces and save the configuration to a file in NVRAM. Then follow the procedure described in “[Initializing the RPM-PR Card.](#)” For information on the Cisco IOS instructions, see [Appendix C, “IOS and Configuration Basics.”](#)

RPM-PR Bootflash Precautions

The RPM-PR bootflash is used to store boot image, configuration and “run time” files. The Flash stores and accesses data sequentially, and the RPM-PR boot image must be the first file stored to successfully boot the card. Erasing the boot image or moving it from the first position on the Flash will cause the card to not boot.

The RPM boot image, which comes loaded on the Flash, will work for all RPM IOS images. Therefore, there is no reason to ever delete or move the factory installed boot image.



Note

Erasing or moving the boot image can cause RPM-PR boot failure. When this happens, the RPM must be returned to Cisco and reflashed.

In order to avoid this unnecessary failure, requiring card servicing, you should

- Never erase the boot file from the RPM Flash
- Never change the position of the boot file on the RPM Flash
- Use care when “squeezing” the Flash to clean it up.

As long as the boot file remains intact in the first position on the flash, the RPM will successfully boot.

Verifying the IOS Files on Bootflash

Enter the **show bootflash** command to verify the IOS files on the bootflash. The following screen displays the RPM-PR command sequence.

```
Router#show bootflash:
```

```

-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
1  .. image    AB6CF374 2BAFB4   11  2600756 Jul 25 2001 02:41:41 rpm-boot-mz
2  .. config   44E48EC2 34712C   18   573685 Aug 07 2001 23:03:42 auto_config_slot16
3  .. config   7B53E8DC 40E368   18   815547 Aug 08 2001 19:28:03 auto_config_slot15

```

```
28777624 bytes available (3990376 bytes used)
```

```
Router#
```

Verifying the IOS Files on the PXM-45 x: Drive

The IOS image can be stored on the PXM-45 hard drive. To confirm this, make sure you are in the C:FW directory. Enter the **ll** command to list the contents of the directory. You should see a file with a name beginning with **rpm-js-mz**, which is the IOS image.



Tip

Copy the RPM-PR Cisco IOS image into the RPM C: directory (not the E: directory) of the PXM-45 hard disk with the filename specified in the RPM-PR boot command.

The following screen displays the PXM C:FW content listing.

```
M8850_LA.8.PXM.a > cd FW
```

```
M8850_LA.8.PXM.a > ll
```

```
Listing Directory .:
```

```

drwxrwxrwx 1 0      0          13312 May 11 15:47 ./
drwxrwxrwx 1 0      0          13312 May 11 17:10 ../
-rwxrwxrwx 1 0      0          2253552 May 11 15:47 mpsm_t1e1_030.000.004.016-P2.fw
-rwxrwxrwx 1 0      0          10655280 Apr  2 08:46 rpm-js-mz.123-2.T5
-rwxrwxrwx 1 0      0          3350304 Apr  2 08:46 rpm-boot-mz.123-2.T5
-rwxrwxrwx 1 0      0          1431512 May 11 15:47 mpsm_t1e1_030.000.004.016-P1_bt.fw
-rwxrwxrwx 1 0      0          1030532 May 11 15:46 frsm_vhs_022.000.005.019-A.fw
-rwxrwxrwx 1 0      0          891552 May 11 15:46 frsm_8t1e1_022.000.005.019-A.fw
-rwxrwxrwx 1 0      0          303936 May 11 15:46 cesm_t3e3_CE8_BT_1.0.02.fw
-rwxrwxrwx 1 0      0          641312 May 11 15:46 cesm_t3e3_022.000.005.019-A.fw
-rwxrwxrwx 1 0      0          743136 May 11 15:46 cesm_8t1e1_022.000.005.019-A.fw
-rwxrwxrwx 1 0      0          826392 May 11 15:38 vxsm_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          10528336 May 11 15:38 vxsm_005.000.004.034-A.fw
-rwxrwxrwx 1 0      0          7939476 May 11 15:38 pxm45_005.000.004.034-A_mgx.fw
-rwxrwxrwx 1 0      0          1160328 May 11 15:37 pxm45_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          468388 May 11 15:46 frsm_vhs_VHS_BT_1.0.06.fw
-rwxrwxrwx 1 0      0          1245112 May 11 15:37 mpsm155_005.000.004.034-P1_bt.fw
-rwxrwxrwx 1 0      0          4069552 May 11 15:37 mpsm155_005.000.004.034-P1.fw
-rwxrwxrwx 1 0      0          737896 May 11 15:37 frsm12_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          2490064 May 11 15:37 frsm12_005.000.004.034-A.fw
-rwxrwxrwx 1 0      0          3674368 May 11 15:36 axsmxg_005.000.004.034-P1.fw
-rwxrwxrwx 1 0      0          838840 May 11 15:36 axsmxg_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          742168 May 11 15:36 axsme_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          297988 May 11 15:46 frsm_8t1e1_FR8_BT_1.0.02.fw
-rwxrwxrwx 1 0      0          264592 May 11 15:46 cesm_8t1e1_CE8_BT_1.0.02.fw
-rwxrwxrwx 1 0      0          3111904 May 11 15:36 axsme_005.000.004.034-A.fw
-rwxrwxrwx 1 0      0          744600 May 11 15:36 axsm_005.000.004.034-A_bt.fw
-rwxrwxrwx 1 0      0          3267520 May 11 15:36 axsm_005.000.004.034-A.fw
-rwxrwxrwx 1 0      0          248686 May 11 15:32 vism_8t1e1_VI8_BT_3.2.00.fw
-rwxrwxrwx 1 0      0          4135448 May 11 15:32 vism_8t1e1_003.053.103.007-I.fw
-rwxrwxrwx 1 0      0          4135000 May 11 15:32 vism_8t1e1_003.003.103.007-I.fw

```

```

In the file system :
  total space : 818961 K bytes
  free  space : 704028 K bytes

```

```
M8850_LA.8.PXM.a >
```

Initializing the RPM-PR Card

To initialize the RPM-PR card, please refer to the *Cisco MGX 8850 (PXM1E/PXM45), MGX 8950, MGX 8830, and MGX 8880 Configuration Guide, Release 5*.

To verify the version, enter the **show version** or **show bootvar** commands. See the [“Verifying the Configuration”](#) section later in this chapter.

Assigning an IP Address to the Switch Interface

You need to assign an IP address for the RPM-PR on the ATM switch. This procedure tells you how to configure the ATM switch interface with the IP address.



Timesaver

Obtain the correct IP and ATM network addresses for your RPM-PR on the ATM switch from your system administrator or consult your network plan to determine correct addresses before you continue to configure the RPM-PR.

Step 1 Enter **show ip int brief** to display your router IP interfaces.

```
Router#show ip int brief
Interface          IP-Address      OK? Method Status      Protocol
Switch1            unassigned     YES NVRAM  up          up
```

Note that the switch does not have an assigned IP address.

Step 2 Enter **conf terminal** to enter global configuration mode.

```
Router#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

Step 3 To enter interface configuration mode for the ATM interface, enter **interface switch1** at the prompt.

```
Router(config)#interface switch1
```

Step 4 Enter **ip address** followed by the IP address to be assigned to the ATM switch.

```
Router(config-if)#ip address 1.1.1.1 255.255.255.0
```

Step 5 Enter **end** or press **Ctrl-Z** to exit the configuration interface mode.

```
Router(config-if)#end
```

Step 6 Enter **show ip int brief** to display the IP address assigned to the ATM switch. The following screen is an example.

```
Router#show ip int brief
Interface          IP-Address      OK? Method Status      Protocol
Switch1            1.1.1.1         YES manual up          up
```

Note that the newly added interface address appears in the display.

Step 7 Enter **show run** to verify the configuration of the RPM-PR, as shown in the following example screen.

```
Router#show run
Building configuration...

Current configuration : 729 bytes
!
version 12.1
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
boot system x:rpm-js-mz_002.001.000.057
boot config c:auto_config_slot11
logging rate-limit console 10 except errors
enable password cisco
!
ip subnet-zero
no ip finger
!
no ip dhcp-client network-discovery
!
!
!
interface Switch1
 ip address 1.1.1.1 255.255.255.0
 no atm ilmi-keepalive
```

```

switch autoSynch off
!
ip kerberos source-interface any
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  no login
!
end

```

Step 8 Enter **copy run start** at the prompt to write the configuration to the router NVRAM memory.

```

Router#copy run start
Building configuration...
[OK]

```

The IP address is now active and ready to use.



Note

The ATM interface can be further configured with logical subinterfaces as needed. To see how to configure subinterfaces on the ATM switch interface, see [Chapter 6, “Configuring PNNI Communications,”](#) the “[Creating and Configuring a Switch Subinterface](#)” section.

Booting RPM-PR Using TFTP from a TFTP Server

Once you add the IP address, you can configure the RPM-PR card to load runtime software from a TFTP server.



Note

This procedure is optional. The preferred procedure for loading the runtime software from the PXM-45 hard drive is described earlier in “[Initializing the RPM-PR Card.](#)”

Use the following procedure to configure the RPM-PR card to load runtime software from a TFTP server:

Step 1 Enter **cc <RPM-PR card slot #>** to access the router card.

The router prompt (>) appears.

Step 2 Enter **enable** and your password, when prompted, so that you can enter privileged commands.

Step 3 Enter **config terminal** to enter global configuration mode.

Step 4 Enter **boot system tftp** followed by the address of the server from which you want to download the boot file as shown in this example.

```
Router(config)#boot system tftp /tftpboot/balbalas/rpm-js-mz 171.69.1.129
```

Step 5 Enter **end** or press **Ctrl-Z** to exit configuration mode.

```
Router(config)#end
```

Step 6 Enter **show run** to view your configuration. The configuration is similar to the one shown here.

```
Router#show run
Building configuration...

Current configuration : 710 bytes
!
version 12.1
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
boot system tftp /tftpboot/balbalas/rpm-js-mz 171.69.1.129
boot config c:auto_config_slot11
logging rate-limit console 10 except errors
enable password cisco
!
ip subnet-zero
no ip finger
!
no ip dhcp-client network-discovery
```

Step 7 Enter **copy run start** at the prompt to write the configuration to the router NVRAM memory.

```
Router#copy run start
Building configuration...
[OK]
```

Step 8 To load the runtime image from the TFTP server, enter the **reload** command on the RPM-PR.

```
Router#reload
```

Configuring Ethernet Interfaces

Once back card cable connections are made (see [Chapter 4, “Cabling the MGX RPM-PR Back Cards”](#) for connector descriptions and cable attachment instructions) and basic configuration on the RPM-PR is completed, you can configure Ethernet and Fast Ethernet interfaces.

Preparing to Configure Ethernet Interfaces

To configure interfaces in a new RPM-PR or change the configuration of an existing interface, you need to know the following information:

- Internet protocol (IP) address for each interface
- Network mask for each interface
- Full or half-duplex connection
- MGX-RJ45-FE connectors—MII or RJ-45
- MGX-MMF-FE connectors—MII or SC

Back Card Bay and Interface Port Numbers

This section describes how to identify the back card bay and interface port numbers on the RPM-PR for all back card interface types.

Physical port addresses specify the physical location of each interface port, regardless of the type, on the RPM-PR. In the RPM-PR, this address is composed of a two-part number in the form *<interface bay number/interface port number>*, as follows:

- *<interface bay number>* identifies the bay in which the back card is installed, either upper (1) or lower (2) bay.
- *<interface port number>* identifies the interface port(s) on the back card. FE cards have one interface number. 4E/B cards have four numbered interfaces.

For example, the following command specifies interface port 1 of the upper Ethernet back card in the RPM-PR. You need to enter this information to select a specific port on a back card or ATM interface.

```
Router(config)#interface fastEthernet 1/1
```

Also, you can identify interface ports by checking the bay/interface port location on the body of the RPM-PR or by using **show** commands to display information about a specific interface or all interfaces in the RPM-PR.

Configuring IP Addresses and Starting Ethernet Interfaces

The following steps describe how to configure IP address on the 4E/B Ethernet and the FE Fast Ethernet interfaces and how to start them up. Press **Return** after each step unless otherwise noted.



Note

RPM-PR no longer supports the MGX-RJ45-4E Ethernet interface back card. You must use an MGX-RJ45-4E/B Ethernet card with Release 2.1 or later.

Step 1

At the privileged-level prompt, enter the command global configuration mode as follows:

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

Step 2

To specify the interface to be configured, enter the following interface subcommand at the prompt.

```
interface <ethernet / fastethernet> <bay>/<port>
```

| Parameter | Description |
|----------------------------------------|---------------------------------------------------|
| <i><ethernet / fastethernet></i> | Interface type to be configured. |
| <i><bay></i> | Back card location; 1=upper and 2=lower back card |
| <i><port></i> | Port number on the back card |



Note

The 4E/B interfaces are numbered 1, 2, 3, 4, not 0, 1, 2, 3 as in other IOS platforms.

This example is for the upper (1) Ethernet back card in the RPM-PR in slot 11 of the switch. In this example, we configure a Fast Ethernet interface. The procedure you use to configure an Ethernet interface is identical except for specifying the **Ethernet** interface type.


```
Router(config)#interface fastEthernet 1/1
```

- Step 3** You can assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand, as in the following example.

```
Router(config-if)#ip address 172.29.54.166 255.255.255.0
```

- Step 4** Enter any additional configuration subcommands required to enable routing protocols and set the interface characteristics.

- Step 5** Start up the Ethernet interface by entering the following command:

```
Router(config-if)# no shutdown
```

- Step 6** Configure additional interfaces as required.

- Step 7** When you have included all of the configuration subcommands to complete the configuration, type **end** or press **Ctrl-Z** to exit configuration mode.

- Step 8** Save your configuration changes as follows:

```
Router#copy run start
```

Selecting Half-duplex or Full-duplex Ethernet Communications

Half-duplex operation is the default transmission mode for the FE back cards. The following steps describe how to configure full-duplex ethernet communications.

- Step 1** Enter the **full-duplex** command to configure full-duplex operation for the FE back cards.

```
Router>enable
Password:
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 1/1
Router(config-if)#full-duplex
Router(config-if)#end
```

- Step 2** Enter the **show interfaces fastethernet** command to verify that the 2/1 Fast Ethernet interface is now configured for full-duplex operation.

```
Router#show interface fastethernet 1/1
FastEthernet1/1 is administratively down, line protocol is down
  Hardware is DEC21140, address is 0050.54ad.7c80 (bia 0050.54ad.7c80)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 252/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 1d00h, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
```

```

    0 input packets with dribble condition detected
    5 packets output, 300 bytes, 0 underruns(0/0/0)
    5 output errors, 0 collisions, 0 interface resets
    0 babbles, 0 late collision, 0 deferred
    6 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
Router#logout
Logged out

```

Step 3 Enter the **no full-duplex** command to return the interface to half-duplex operation.

```

Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastEthernet 1/1
Router(config-if)#no full-duplex
Router(config-if)#end

```

Step 4 Enter the **show interfaces fastethernet** command to verify that the 2/1 Fast Ethernet interface is now configured for half-duplex operation.

```

Router#show interface fastethernet 1/1
FastEthernet1/1 is administratively down, line protocol is down
Hardware is DEC21140, address is 0050.54ad.7c80 (bia 0050.54ad.7c80)
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 252/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Half-duplex, 100Mb/s, 100BaseTX/FX
ARP type: ARPA, ARP Timeout 04:00:00
Last input never, output 1d00h, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
    5 packets output, 300 bytes, 0 underruns(0/0/0)
    5 output errors, 0 collisions, 0 interface resets
    0 babbles, 0 late collision, 0 deferred
    6 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
Router#logout

```

Step 5 Save your configuration changes.

```

Router#copy run start

```

Selecting the MII Receptacle for Ethernet Communications

The RJ-45 receptacle is the default media type for the FE-TX back card. The SC receptacle (for fiber-optic connections) is the default media type for FE-FX back card. The following steps describe how to configure the MII for ethernet communications.

Step 1 Enter the **media-type mii** command to configure the MII receptacle as the media type for the FE back cards as follows.

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 1/1
Router(config-if)#media-type mii
Router(config-if)#end
```

Step 2 Enter the **show interface** command to check your configuration.

```
Router#show interface fastethernet 1/1
FastEthernet1/1 is administratively down, line protocol is down
  Hardware is DEC21140, address is 0050.54ad.7c80 (bia 0050.54ad.7c80)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 252/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Half-duplex, 100Mb/s, MII
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 1d00h, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
  5 packets output, 300 bytes, 0 underruns(0/0/0)
  5 output errors, 0 collisions, 0 interface resets
  0 babbles, 0 late collision, 0 deferred
  6 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out
```

Step 3 Save your configuration changes.

```
Router#copy run start
```

Selecting Media Type 100 for Fast Ethernet Communications

The following steps describe how to use the **media-type 100** command to return the media type for the FE back cards to the RJ-45 connector or SC connector.



Note Media Type 100 is the default for fast Ethernet communications.

Step 1 Enter the **media-type 100** command.

```
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fastethernet 1/1
Router(config-if)#media-type 100
Router(config-if)#end
```

Step 2 Enter the **show interface** command to check the configuration.

```
Router#show interface fastethernet 1/1
FastEthernet1/1 is administratively down, line protocol is down
  Hardware is DEC21140, address is 0050.54ad.7c80 (bia 0050.54ad.7c80)
```

```

MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 252/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
Half-duplex, 100Mb/s, 100BaseTX/FX
ARP type: ARPA, ARP Timeout 04:00:00
Last input never, output 1d00h, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
  0 watchdog
  0 input packets with dribble condition detected
  5 packets output, 300 bytes, 0 underruns(0/0/0)
  5 output errors, 0 collisions, 0 interface resets
  0 babbles, 0 late collision, 0 deferred
  6 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out

```

Step 3 Save your configuration changes.

```
Router#copy run start
```

Verifying the Configuration

Enter the **show** commands to display the status of the all interfaces.

Using the show Commands to Verify the New Interface Status

In the following procedure, enter the **show** commands to verify that interfaces are configured and operating correctly.

Step 1 Enter the **show interface <back card type> <bay/port>** command to specify one of the new interfaces. Verify that the first line of the display shows the correct slot number.

Verify that the interface is up. When the interface and line protocol are up, this indicates that you have a working interface as shown in this example.

```

Router#show interface fastethernet 1/1
FastEthernet1/1 is administratively up, line protocol is up
  Hardware is DEC21140, address is 0050.54ad.7c80 (bia 0050.54ad.7c80)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 252/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 1d00h, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec

```

```

5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes
  Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
  0 watchdog
  0 input packets with dribble condition detected
  5 packets output, 300 bytes, 0 underruns(0/0/0)
  5 output errors, 0 collisions, 0 interface resets
  0 babbles, 0 late collision, 0 deferred
  6 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out

```

Step 2 Enter the **show protocols** command to display the protocols configured for the entire system and for the specific interfaces.

If necessary, return to configuration mode to add or remove protocol routing on the system or specific interfaces.

Verify that the line protocol is up. When the interface and line protocol are up, this indicates that you have a working interface, as shown below.

```

Router>show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet1/1 is up, line protocol is up
Switch1 is up, line protocol is up
Switch1.1 is up, line protocol is up
  Internet address is 1.1.1.1/24
Switch1.2 is up, line protocol is up
  Internet address is 1.1.2.1/24
Switch1.1000 is up, line protocol is up

```

Step 3 Enter the **show running-config** command to display the running configuration file.

Step 4 Enter the **show startup-config** command to display the configuration stored in NVRAM.

Verify that the configuration is accurate for the system and that each interface is the same. If they are different from **running-config**, you may have forgotten to enter a **copy run start** command.

If the interface is down and you have configured it to be up, or if the displays indicate that the hardware is not functioning properly, be sure that the network interface is properly connected and terminated. If you still have problems bringing the interface up, contact a service representative for assistance.

For detailed software configuration information, refer to the Cisco IOS configuration and command reference publications. These publications are available on the Documentation CD-ROM that came with your RPM-PR, or you can order printed copies.

Viewing the Hardware Configuration

The **show version** (or **show hardware**) command displays the configuration of the system hardware, for example, the number of each back card type installed, the software version, the names and sources of configuration files, and the boot images.



Note You may not be able to view hardware configuration information using **show version** from a remote location.

The following is an example of the **show version** command output.

```

Router#show version
Cisco Internetwork Operating System Software
IOS (tm) RPM Software (RPM-JS-M), Version 12.2(3.3)T, MAINTENANCE INTERIM SOFTWARE
TAC Support:http://www.cisco.com/tac
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Fri 20-Jul-01 00:29 by ccai
Image text-base:0x600089C0, data-base:0x61462000

ROM:System Bootstrap, Version 12.1(20001003:080040) [swtools-rommon400 102], DE
VELOPMENT SOFTWARE
BOOTLDR:RPM Software (RPM-BOOT-M), Version 12.2(2.3)PI, MAINTENANCE INTERIM SOFTWARE

rpm9-PE1 uptime is 5 hours, 14 minutes
System returned to ROM by reload at 00:05:42 UTC Sat Jan 1 2000
System image file is "x:rpm-js-mz.122-3.3.T"

cisco RPM-PR (NPE400) processor with 491520K/32768K bytes of memory.
R7000 CPU at 350Mhz, Implementation 39, Rev 3.2, 256KB L2, 4096KB L3 Cache
Last reset from s/w peripheral
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
1 ATM network interface(s)
125K bytes of non-volatile configuration memory.

32768K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2102

```

Viewing the Boot Variable

The **show bootvar** command displays the boot variable, as shown in the following screen.

```

Router#show bootvar
BOOT variable = x:rpm-js-mz.122-3.3.T,12;
CONFIG_FILE variable = c:auto_config_slot13
BOOTLDR variable does not exist
Configuration register is 0x2102

```

Using show Commands to Display Back Card Information

To determine which type of back card is installed in your system, enter the **show rpm** command. In the following example, back card information is displayed for the RPM-PR card in slot 6.

```

Router>enable
Password:
Router#show rpm
RPM is in chassis slot 6
PXM has ip address 172.28.128.93
Network IO Interrupt Throttling:
  throttle count=0, timer count=0
  active=0, configured=0
  netint usec=3999, netint mask usec=200
  Top Assy. Part Number      :800-07178-02
  Part Number                :73-5008-02
  Board Revision             :B0
  PCB Serial Number          :SBK0445005E
  CLEI Code                  :BAA6PT0CAA
  Manufacturing Engineer     :00 00 00 00
  MA History                  :00

```

```

MA Test History          :00
MA Test History          :01
EPROM format version 4
EPROM contents (hex):
0x00:04 22 40 02 22 C0 46 03 20 00 1C 0A 02 82 49 13
0x10:90 02 42 42 30 C1 8B 53 42 4B 30 34 34 35 30 30
0x20:35 45 C6 8A 42 41 41 36 50 54 30 43 41 41 84 00
0x30:00 00 00 04 00 03 00 03 01 FF FF FF FF FF FF FF
0x40:04 00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x50:0A AA FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x60:46 D6 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x70:00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x80:44 03 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x90:42 82 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xA0:0C 83 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xB0:00 C0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xC0:40 41 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xD0:82 82 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xE0:2C AC FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0xF0:FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x100:02 40 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x110:63 51 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x120:42 42 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x130:00 20 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x140:B8 17 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x150:0C C2 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x160:0C 2C FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x170:FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x180:62 C0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x190:82 6C FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1A0:D1 CE FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1B0:00 C0 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1C0:92 C8 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1D0:21 00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1E0:0C 0C FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0x1F0:FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

```

See the next section, “[Verifying Ethernet Connectivity](#),” to verify that each interface port is functioning properly.

Verifying Ethernet Connectivity

The **ping** command lets you verify that an interface port is functioning and check the path between a specific port and connected network devices. This section provides brief descriptions of the **ping** command. After you verify that the system has booted successfully and is operational, you can use this command to verify the status of interface ports. The remote device can be a server, a router, or a PC.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified time-out is displayed as a period (.). A series of exclamation points (!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 1.1.1.10:

```
Router#ping 1.1.1.10
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 1.1.1.10, timeout is 2 seconds:
```

```
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the remote device and that the remote device is active (powered on). Then repeat the **ping** command.

Establishing 1:N Redundancy Between Two or More RPM-PR Cards

RPM-PR cards support 1:N redundancy, whereby one RPM-PR card can be configured as a redundant or secondary (backup) card for one or multiple primary RPM-PR cards, forming a redundant group. There can be multiple redundant groups in one shelf. RPM-PR 1:N redundancy is a cold redundancy, in which the configuration of a failed primary card is copied to the standby secondary card. All traffic to and from the primary RPM-PR card is switched to the secondary card after it becomes active. Because this is a cold redundancy solution, service interruption is expected. As with other service modules, the layer 2 state is restored when the secondary card becomes active. However, RPM-PR also performs layer 3 functionality, such as maintaining routing tables. The routing tables are created manually or by routing protocols, such as IGRP, BGP, or OSPF. Because routing protocols are used, the layer 3 state is restored within three to five minutes, depending on the protocol used.

RPM-PR 1:N redundancy supports the following features:

- Increases availability by decreasing the DPM of the network by reducing boot-up, switchover, and upgraded times.
- Supports L2 redundancy and restores L3 state via reconvergence.
- Support for up to 11 active (primary) RPM-PR cards per single redundant (standby or secondary) RPM-PR.
- Support for a maximum of 6 redundant groups per MGX 8850 or MGX 8950.

The redundant card must be present and active and must not have any connections configured. Any connection configuration will cause the **addred** command to be rejected.

To establish a backup card for an RPM-PR card, use the following procedure.

-
- Step 1** Logon to the switch.
- Step 2** If you have not done so already, initialize both cards as described earlier in this chapter in [“Initializing the RPM-PR Card.”](#)
- Step 3** Enter the **dspecds** command to verify that the primary and secondary RPM-PR card are in the “Active” state.
- Step 4** Enter the **addred** command.

```
Switch.7.PXM.a > addred <redPrimarySlotNum> <redSecondarySlotNum> <redType>
```

| Parameter | Description |
|-----------------------|----------------------------------------------------------------------------------------------------|
| <redPrimarySlotNum> | Slot number of the primary RPM-PR card. |
| <redSecondarySlotNum> | Slot number of the secondary RPM-PR card. |
| <redType> | 2 for 1:n redundancy. Note 1 is for 1:1 redundancy which is not supported. |



Note After you enter the **addred** command, the switch resets the secondary card; therefore, the secondary card will be unavailable for a few minutes.

- Step 5** When the reset is complete, enter the **dspecds** command to show the primary and secondary cards in the active and standby states, respectively.

The redundant RPM cards are shown in slots 2 and 11 with the standby card in slot 11.

```
Switch.7.PXM.a > dspecds
Switch                               System Rev: 02.01   Mar. 19, 2001 23:14:58 GMT
Chassis Serial No: SAA03230404 Chassis Rev: B0           GMT Offset: 0
Node Alarm: MAJOR

Card Front/Back      Card      Alarm      Redundant  Redundancy
Slot Card State       Type      Status     Slot       Type
---  -
01   Empty            ---      ---      ---      ---
02   Active/Empty     RPM-PR    NONE      11      PRIMARY SLOT
03   Empty            ---      ---      ---      ---
04   Empty            ---      ---      ---      ---
05   Empty            ---      ---      ---      ---
06   Failed/Empty    AXSM_10C48  MINOR     NA       NO REDUNDANCY
07   Active/Active   PXM45      NONE      08      PRIMARY SLOT
08   Empty Resvd/Empty ---      MAJOR     07      SECONDARY SLOT
09   Empty            ---      ---      ---      ---
10   Empty            ---      ---      ---      ---
11   Standby/Empty   RPM-PR    NONE      11      SECONDARY SLOT
12   Empty            ---      ---      ---      ---
13   Empty            ---      ---      ---      ---
14   Empty            ---      ---      ---      ---
```

- Step 6** To display the redundancy relationship between all cards in the switch, enter the **dspred** command. Redundant cards are displayed as shown below, indicating primary and secondary slot numbers, card types, card states, and redundancy type.

```
Switch.7.PXM.a > dspred
Switch System Rev: 02.01   Mar. 19, 2001 23:15:37 GMT
MGX8850 Node Alarm: MAJOR

Primary Primary Primary Secondary Secondary Secondary Redundancy
SlotNum Type State SlotNum Type State State Type
-----
2 RPM-PR Active 11 RPM-PR Standby 1-n
7 PXM45 Active 8 PXM45 Empty Resvd 1-1
```

- Step 7** Return to the primary RPM by entering the **cc** command, **cc <redPrimarySlotNum>**.

```
Unknown.7.PXM.a > cc 2
```

- Step 8** Enter **copy run start** to save the configuration to the PXM-45 hard disk E:RPM directory.

This file will be used as the configuration file. The name of the file is **auto_config_slot#** where # is the primary slot number.



Note This step is mandatory for redundancy to work.

**Note**

The standby card must not have any configurations and must not be configured. Therefore, do not provision the standby card.

Using Softswitch to Change the Active Card

Enter the **softswitch** command to manually change the active card to the standby card. You may want to do this if you need to remove the original active card from the MGX8850/8950 shelf. Before you begin this procedure, make sure that the destination card is in Standby mode. To change the active cards, follow the steps below, in which the primary or active card in slot 2 is switched to standby or secondary, and the standby card in slot 11 is switched to primary or active.

Step 1 Enter the **softswitch** command.

```
Unknown.7.PXM.a > softswitch 2 11
softswitch: Do you want to proceed (Yes/No)? y
```

where 2 is the active or primary card and 11 is the standby or secondary card.

The card in slot 11 is now the active RPM-PR card, and the RPM-PR card in slot 2 is reset. It comes up in standby mode after a couple of minutes.

The new active card will not revert to standby mode automatically. Enter **softswitch** to manually switch over the active card back to standby mode. This is the only way the active card will switch over to standby, unless the active card fails.

Step 2 Enter the same command to switch the active card back to the original RPM-PR.

```
Unknown.7.PXM.a > softswitch 11 2
softswitch: Do you want to proceed (Yes/No)? y
```

where 11 is now the active card and 2 is now the standby/secondary card.

Deleting Redundancy

To delete card redundancy, the primary card must be active, otherwise this command will be rejected. Enter **delred** followed by the primary card's slot number, as shown here:

```
Switch.7.PXM.a > delred 2
Redundancy link is deleted
```

The secondary card is reset and comes back up as an active normal RPM-PR card (if it is the last primary card) that can be used for any other purpose. Note in the example below that the card in slot 11 is now active.

```
Switch.7.PXM.a > dsprcds
Switch                System Rev: 02.01   Mar. 20, 2001 00:00:01 GMT
Chassis Serial No:   SAA03230404 Chassis Rev: B0    GMT Offset: 0
                                     Node Alarm: MAJOR

Card  Front/Back      Card      Alarm      Redundant  Redundancy
Slot  Card State        Type      Status     Slot       Type
---  -
01    Empty             ---      ---      ---      ---
02    Active/Empty      RPM-PR   NONE     NA        NO REDUNDANCY
03    Empty             ---      ---      ---      ---
```

```

04  Empty          ---          ---          ---          ---
05  Empty          ---          ---          ---          ---
06  Failed/Empty  AXSM_10C48  MINOR       NA           NO REDUNDANCY
07  Active/Active  PXM45      NONE        08          PRIMARY SLOT
08  Empty Resvd/Empty ---          MAJOR       07          SECONDARY SLOT
09  Empty          ---          ---          ---          ---
10  Empty          ---          ---          ---          ---
11  Active/Empty  RPM-PR     NONE        NA           NO REDUNDANCY
12  Empty          ---          ---          ---          ---
13  Empty          ---          ---          ---          ---
14  Empty          ---          ---          ---          ---

```

```
Switch.7.PXM.a >
```

Adding Additional Primary Cards

You can add one or more additional RPM-PR cards as primary cards backed up by the secondary card. To do this, enter the **addred** command as follows.

```
Switch.7.PXM.a > addred <redPrimarySlotNum> <redSecondarySlotNum> <redType>
```

Repeat this step for each additional card you want to add to the secondary card backup protection. In the following example, the primary cards in slots 2, 3, and 4 are being backed up by the secondary RPM-PR in slot 11.

```

switch.7.PXM.a > addred 2 11 2
switch.7.PXM.a > addred 3 11 2
switch.7.PXM.a > addred 4 11 2

```

Upgrading Redundant RPM-PR Cards

The following procedure describes how to upgrade redundant RPM-PR cards.



Note Redundancy must be established as described above, before you use this procedure.

- Step 1** On the primary active RPM-PR card, modify the running configuration to boot from the new upgrade software.
- Step 2** Enter **WR MEM** to execute the **write memory** command, which saves the configuration.
- Step 3** Enter the **softswitch** command, as follows, to switch to the secondary card.

```
switch.7.PXM.a > softswitch <fromSlot> <toSlot>
```

This step makes the secondary card active and resets the primary RPM-PR card. When the primary card resets, it loads the upgraded software defined in Step 1.

- Step 4** Modify the configuration of the secondary card to boot from the new upgrade software and enter **WR MEM** to save the configuration.
- Step 5** Enter the **softswitch** command, as follows, to switch to the primary card from secondary card. This command is executed only after the primary card has booted and is in the standby state.

```
switch.7.PXM.a > softswitch <fromSlot> <toSlot>
```

This step makes the upgraded primary card active and resets the secondary card. When the reset is complete, the secondary card runs the upgrade software and is now in the standby state.

Step 6 Continue this procedure from Step 2 for all remaining cards.

Upgrading Non-redundant RPM-PR Cards

The following procedure describes how to upgrade non-redundant RPM-PR cards.

- Step 1 Configure the RPM-PR card to store its configuration on the PXM hard disk by entering the **boot configure:auto_config_<slot#>** command or by saving it in NVRAM by entering the **WR MEM** command.
 - Step 2 Modify the running configuration to boot from the new upgrade software by entering the **boot system** command.
 - Step 3 Enter **WR MEM** to save the configuration.
 - Step 4 Reset the RPM-PR card by entering the **reset** command from the PXM or the **reload** command from the RPM-PR.
-

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