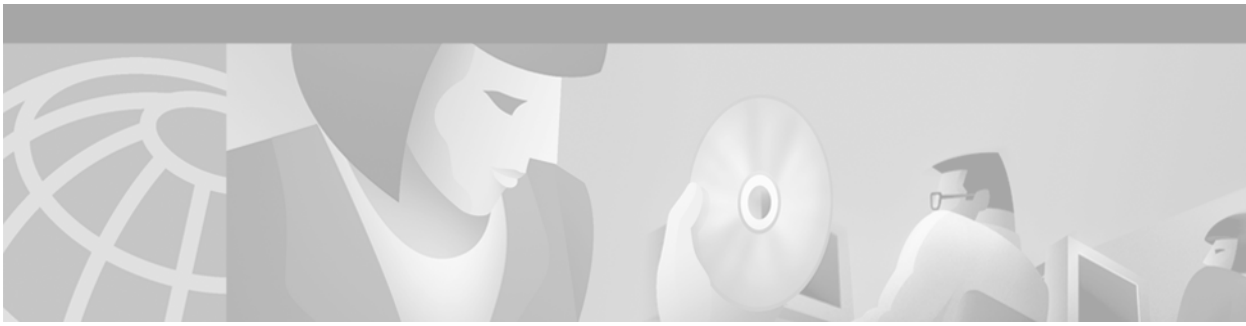

Release Notes for Cisco MGX Route Processor Module (RPM/B and RPM-PR) IOS Release 12.2(15)T4a for MGX Release 1.2.20 and MGX Release 4.0.00

Contents

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About These Release Notes (MGX 1.2.13)

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription.

Note that for Release 1.2.20, the user documentation (command reference, overview, and installation and configuration guides) were not updated. Use the Release 1.1.3 and 1.2.10 documents in addition to this release note.

Product documentation for MGX 8850 is available at the following URL:
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8850/1_1_31/index.htm

Product documentation for MGX 8250 is available at the following URL:
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8250/1_1_31/index.htm

Product documentation for MGX 8230 is available at the following URL:
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8230/1_1_31/index.htm

Product documentation for VISM 3.0(0) is available at the following URLs:
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8850/

Product documentation for RPM 1.1 and 1.2.10 is available at the following URLs:
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8850/rpm/index.htm
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8250/rpm/index.htm
http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8230/rpm/index.htm

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New Features

RPM in MGX 8800 Release 1.2.20 supports all new and existing features introduced in the Release 1.2.x baseline. There are four new features for RPM implementations using IOS Release 12.2(15)T4a:

- MPLS CoS Transparency – Configuration information can be found at http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122t/122t13/ftdtmode.htm
- cRTP with MQC – Configuration information can be found at http://lbj.cisco.com/push_targets1/ucdit/cc/td/doc/product/software/ios122/122newft/122t/122t13/fthdrcmp.htm
- LSC Redundancy
- MVPN

Previously Released Features

Automatic Cell Bus Clocking

To implement automatic cell bus clocking, a new *-autoClkMode* option has been added to the **xcnfcbclk** command. The default is disabled for backward compatibility. When the feature is enabled by entering the **xcnfcbclk -autoClkMode enable** command, the PXM scans the whole shelf to see whether there are any two RPMs residing on the same cell bus and changes that cell bus to be running at 42MHz clock rate. The clock rate for the rest of the cell buses are not changed. The active PXM updates the disk DB and sends the update to the standby PXM.

When the feature is enabled, the user will not be able to configure the cell bus clock rate manually for any of the cell buses. When disabled with **xcnfcbclk -autoClkMode disable** command, the PXM will not change the clock rate for any of the cell bus, but will still update the disk DB and send the update to the standby PXM.

Note The command to enable or disable the feature is on a per shelf basis.

Note The clock will be automatically changed to 21 MHz if one of the two RPM-PRs residing on the same cell bus is removed from the shelf.

Note After disabling the automatic cell bus clocking, you can manually configure the cell bus clock.

The output of **dspcbclk** command changes to reflect this new feature. A new column is added to show whether the feature is enabled or disabled on the cell buses.When the feature is enabled and an RPM card is inserted, the PXM checks whether the card that resides next to it on the same cell bus is also an RPM card. If both cards are RPM cards, and neither of them is in failed, reserved, unknown, self-test-fail, or no-card state, the cell bus clock rate is automatically set to 42MHz.

Conversely, when the feature is enabled, and an RPM card with a cell bus clock rate of 42MHz is removed or fails, the PXM sets the cell bus to 21MHz, as shown in the following example.

```
mgx574.1.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)     Slot     AutoClkMode
    ------------------------------------------------
       CB1         21           1, 2       disable
       CB2         21           3, 4       disable
       CB3         21           5, 6       disable
       CB4         21        17 - 22       disable
       CB5         21          9, 10       disable
       CB6         21         11, 12       disable
       CB7         21         13, 14       disable
       CB8         21        25 - 30       disable

mgx574.1.7.PXM.a > cnfcbclk 1 42

WARNING: Certain Service Modules will not operate at the clock rate you specified.
         Please check the Service Modules in the slots where the Cell Bus clock rate is
effected by this command.
```

```
mgx574.1.7.PXM.a > cnfcbclk 5 42

WARNING: Certain Service Modules will not operate at the clock rate you specified.
         Please check the Service Modules in the slots where the Cell Bus clock rate is
effected by this command.

mgx574.1.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)     Slot     AutoClkMode
    -------------------------------------------------
       CB1         42           1, 2       disable
       CB2         21           3, 4       disable
       CB3         21           5, 6       disable
       CB4         21         17 - 22      disable
       CB5         42           9, 10      disable
       CB6         21          11, 12      disable
       CB7         21          13, 14      disable
       CB8         21         25 - 30      disable

mgx574.1.7.PXM.a > xcnfcbclk
Not enough arguments (?)
xcnfcbclk "-cb <cellBus> -rate <clockRate> -autoClkMode <autoClkEnable>"
    -cb <cellBus>, where cellBus is a string CB1..CB8
    -rate <clockRate>, where clockRate is 21 or 42 (MHz)
    -autoClkMode <autoClkEnable>, where autoClkEnable is enable or disable

mgx574.1.7.PXM.a > xcnfcbclk -autoClkMode enable

mgx574.1.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)     Slot     AutoClkMode
    -------------------------------------------------
       CB1         42           1, 2       enable
       CB2         21           3, 4       enable
       CB3         21           5, 6       enable
       CB4         21         17 - 22      enable
       CB5         21           9, 10      enable
       CB6         42          11, 12      enable
       CB7         21          13, 14      enable
       CB8         21         25 - 30      enable
```

VISM-PR to RPM-PR Connectivity

VISM Release 3.0 introduces the new VISM-PR front cards for Cisco MGX Release 1.2.10 (and Cisco IOS Release 12.2(8)T4). The new VISM-PR-8E1 and VISM-PR-8T1 cards work in the MGX 8230, MGX 8250, and MGX 8850 Release 1 switches, in combination with the PXM1 Processor Module card. The VISM-PR card support 144 channels when used with the G.723.1 codec, whereas the current VISM card support supports 64 channels with the G.723.1 codec.

Setting connections between a VISM-PR card and a RPM-PR card in your MGX8000 Series switch chassis requires that you use the new VBR (NRT)3 connection type.

For more information, refer to the *Cisco VISM Installation and Configuration Guide*.

Configuring the Cell Bus Clock (CBC) Rate

As of Cisco MGX Release 1.2.10 and Cisco IOS Release 12.2(8)T4), when two RPM-PR cards are on the same cell bus, that is, they occupy adjacent slots (for example, slots 1 and 2 or slots 3 and 4), the cell bus clock (CBC) rate should be manually set to 42MHz. Correspondingly, if there is only one RPM on the cell bus, the clock should be at the default value of 21 MHz.

If, for any reason, one of the adjacent RPM-PRs goes to Failed or Empty state, the CBC for that cell bus must be reconfigured for the Traffic Shaping to work correctly on the active RPM. On MGX 1 switches with Release 1.2.10, the 42MHz to 21 MHz change must be explicitly performed using the **cnfcbclk** command. Use the **dspcbclk** command from the PXM1 to confirm the cell bus clock rate.

The following screen output displays the use of the **cnfcbclk** and **dspcbclk** commands used to change the clock on cell bus 1 (for slots 1 and 2) from 21 MHz to 42 MHz and confirm the change.

```
PXM> dspcbclk

     CellBus    Rate (MHz)    Slot
    -------------------------------
       CB1          21        1, 2
       CB2          21        3, 4
       CB3          21        5, 6
       CB4          21        17 - 22
       CB5          21        9, 10
       CB6          21        11, 12
       CB7          21        13, 14
       CB8          21        25 - 30

PXM> cnfcbclk CB1 42
WARNING: Certain Service Modules will not operate at the clock rate you specified.
         Please check the Service Modules in the slots where the Cell Bus clock rate is
effected by this command

mgx3.1.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)    Slot
    -------------------------------
       CB1          42        1, 2
       CB2          21        3, 4
       CB3          21        5, 6
       CB4          21        17 - 22
       CB5          21        9, 10
       CB6          21        11, 12
       CB7          21        13, 14
       CB8          21        25 - 30
```

RPM makes use of idle cells for Traffic Shaping and Scheduling. If there are two RPMs in adjacent slots on the same cell bus and one of the RPMs is put into a Failed state by the PXM, while that card is actually alive, then the “Failed” RPM must stop sending idle cells to avoid impacting the Traffic Shaping on the adjacent functional RPM. The command that implements the RPM support for this feature is **rpm-auto-cbclk-change.**

rpm-auto-cbclk-change enables the RPM to stop sending idle cells in the event of being put into a “FAILED” state by the PXM and thus prevent an impact on the Traffic Shaping on an adjacent functional RPM.

no rpm-auto-cbclk-change which disables the feature to stop sending of idle cells if the RPM is put into a FAILED state. This command may be used if Traffic Shaping is not required.

The following screen output displays an example of the **rpm-auto-cbclk-change** command.

```
RPM-11#config  terminal
```

```
  Enter configuration commands, one per line.  End with CNTL/Z.
  RPM-11(config)#int sw1
  RPM-11(config-if)#rpm-auto-cbclk-change
  RPM-11(config-if)#end
  RPM-11#write mem
  Building configuration...
  [OK]
  RPM-11#show run int sw1
Building configuration...

Current configuration :142 bytes
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 rpm-auto-cbclk-change
 switch autoSynch off
end
! rpm_tag_id Apr 04 2002 02:49:04
```

If Traffic Shaping is *not* a requirement, enter the **no rpm-cbclk-change** command, either manually or during card configuration. The following screen output displays an example of the **no rpm-auto-cbclk-change** command.

```
RPM-11#config  terminal
  Enter configuration commands, one per line.  End with CNTL/Z.
  RPM-11(config)#int sw1
  RPM-11(config-if)#no rpm-auto-cbclk-change
  RPM-11(config-if)#end
  RPM-11#write mem
  Building configuration...
  [OK]
  RPM-11#show run int sw1
Building configuration...

Current configuration :145 bytes
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 no rpm-auto-cbclk-change
 switch autoSynch off
end
! rpm_tag_id Apr 04 2002 02:49:57
```

Note By default on the RPM this feature is enabled.

LDP on RPM Running MGX Release 1.2.02 and Cisco IOS Release 12.2(8)T1

The MPLS label distribution protocol (LDP), as standardized by the Internet Engineering Task Force (IETF) and as enabled by Cisco IOS software, allows the construction of highly scalable and flexible IP Virtual Private Networks (VPNs) that support multiple levels of services.

LDP provides a standard methodology for hop-by-hop or dynamic label distribution in an MPLS network by assigning labels to routes that have been chosen by the underlying Interior Gateway Protocol (IGP) routing protocols. The resulting labeled paths, called label switch paths (LSPs), forward label traffic across an MPLS backbone to particular destinations. These capabilities enable service providers to implement Cisco's MPLS-based IP VPNs and IP+ATM services across multivendor MPLS networks.

From a historical and functional standpoint, LDP is a superset of Cisco's pre-standard Tag Distribution Protocol (TDP), which also supports MPLS forwarding along normally routed paths. For those features that LDP and TDP share in common, the pattern of protocol exchanges between network routing platforms is identical. The differences between LDP and TDP for those features supported by both protocols are largely embedded in their respective implementation details, such as the encoding of protocol messages, for example.

This software release of LDP provides the means for transitioning an existing network from a TDP operating environment to an LDP operating environment. Thus, you can run LDP and TDP simultaneously on any given router platform. The routing protocol that you select can be configured on a per-interface basis for directly-connected neighbors and on a per-session basis for non-directly-connected (targeted) neighbors. In addition, a label switch path (LSP) across an MPLS network can be supported by LDP on some hops and by TDP on other hops.

MPLS LDP offers the following features:

- IETF Standards-based label distribution protocol
- Multi-vendor interoperability
- TDP to LDP migration and interoperability

Multi-LVC on RPM Running MGX Release 1.2.02 and Cisco IOS Release 12.2(8)T1

This feature enables support for initiation of multiple label switched paths (LSPs) per destination on the RPM. Different label switched paths are established for different class of services. This feature enables interface level queueing rather than per-vc level on the RPM based on MPLS class of service policy. With Multi-LVC support, customers can deploy IP VPN services with Class of Service SLAs.

Bypass Feature for RPM in Cisco IOS Release 12.2(4)T

Note Information about the bypass feature and the IOS commands used to support it was not available at the time of the printing of the RPM documents; therefore, it is included in the these release notes.

RPM cards have a maximum storage of 128 KB for the NVRAM. This size limitation creates a problem for customers with large configurations, who find it impossible to store the complete configuration in the NVRAM, even with compression enabled.

In order to support storage of large configuration files, a new bypass feature is now available in the 12.2(4)T IOS Release. With the bypass feature enabled, the enhanced “write memory” is used to bypass the NVRAM and save the configuration on:

- For MGX Release 1, the file auto_config_slot## located in the C:/RPM directory on the PXM1.

Where ## represents the zero-padded slot number in which the RPM card is seated in the MGX chassis.

To enable the bypass feature, issue the command **rpmnvbypass** from the IOS run time image—not in the IOS boot image.

To disable the bypass feature, enter the command **no rpmnvbypass**.

To verify that the bypass feature is either enabled or disabled, enter the **show running-configuration** command. If the bypass feature is enabled, **rpmnvbypass** is seen on the display. If it is not seen, the feature is not enabled.

Note Because the bypass feature bypasses NVRAM, it is not necessary to compress the configuration file using the command **service compress-config**.

Table 1 contains cautions important to the successful usage of the bypass feature.

Table 1 Boot Cautions

Caution	Why is This Important?
When using the bypass feature, you can load the run time IOS image from the PXM hard-drive or from the boot flash.	In the case of an RPM module, the IOS image can be loaded in 3 ways: 1. From the PXM hard-drive. 2. From the boot flash. 3. From the network (for example, via TFTP) from the RPM backcard (Ethernet or Fast Ethernet). When the bypass feature is enabled, the **boot config** statement: `c:auto_config_slot##` is automatically generated. The NVRAM configuration is cleared upon entering a **write memory** command. In order to load from the network, the RPM must have an IP address for its backcard. This information is part of the NVRAM configuration, which was just cleared by enabling the bypass feature. Hence, it is not possible to load the IOS image from the network upon a reload of the RPM after the **rpmnvbypass** and **write memory** commands have been executed.
Do not execute the command **no boot config**. Doing so may prevent the bypass feature from working properly.	When the bypass feature is enabled, the **boot config** statement: `c:auto_config_slot##` is automatically generated, and the NVRAM configuration is cleared. Any writes are subsequently directed to the *boot config* file. This is essential, as a **write memory** command expects the **boot config** statement to be present. If the **boot config** statement is not present, entering the **write memory** command would write the configuration into the NVRAM, which is not desirable when the objective is to save a complete configuration when the configuration is large and requires more space.

Table 1 Boot Cautions (continued)

Caution	Why is This Important?
If the command **write memory** is issued with the bypass feature enabled, and is consequently followed by an RPM card reset, previous versions of the boot image will trigger the RPM card to go into boot mode (unable to load run-time IOS).	For safety purposes, the location of the system image is stored in a special area (called the ROMMON area) in the NVRAM. The ROMMON is always intact. The 12.2(4)T boot image accesses and reads ROMMON in order to load the IOS image. Boot images prior to 12.2(4)T do not read the ROMMON area. Generally, the IOS boot and run-time images are of the same versions. However, if you change the boot image to one prior to 12.2(4)T, on a reload, the boot image would see that the NVRAM configuration is empty, which is normal when the bypass feature is enabled. But because boot images prior to 12.2(4)T cannot access the ROMMON area, it cannot read the location of the IOS image. Unable to see the IOS image, it instead loads itself.

Example 1 through Example 5 illustrate how the bypass feature is enabled and disabled, and how to validate each of these actions from the configuration display.

Example 1 Running configuration without the bypass feature enabled

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 470 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
enable password cisco
!
ip subnet-zero
!
!
!
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
snmp-server community private RW
!
!
line con 0
line aux 0
```

```
line vty 0 4
 no login
!
end
```

Example 2 Enable the bypass feature (rpmnvbypass)

```
rpm_slot02#
rpm_slot02#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
rpm_slot02(config)#rpmnvbypass
The "boot config" statement has been (re)added to your
running configuration. Do not remove it else risk not
using the nvbypass feature

rpm_slot02(config)#end
rpm_slot02#
```

Example 3 Running configuration with bypass feature enabled (note rpmnvbypass at end of output)

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 515 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
boot config c:auto_config_slot02    <==== Line added as per output above
enable password cisco
!
ip subnet-zero
!
!
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
snmp-server community private RW
!
!
line con 0
line aux 0
line vty 0 4
 no login
!
rpmnvbypass
end
```

Example 4 Disable the bypass feature (no rpmnvbypass)

```
rpm_slot02#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
rpm_slot02(config)#no rpmnvbypass
rpm_slot02(config)#end
rpm_slot02#
```

Example 5 Running configuration after the bypass feature is disabled

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 503 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
boot config c:auto_config_slot02
enable password cisco
!
ip subnet-zero
!
!
!
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
snmp-server community private RW
!
!
line con 0
line aux 0
line vty 0 4
 no login
!
end

rpm_slot02#
```

Features Not Supported in This Release

The following features are not supported on RPM:

- MPLS inter AS
- MPLS TE

RPM Redundancy Support

RPM 1:N redundancy is used to switch configuration and traffic from one RPM card to another. The main benefits are:

- Route processing continues even if an RPM fails and there is no operator or direct access to swap the failed card or fix the problem.
- An RPM card with hardware problems can be fixed while the redundant standby card takes over its functionality.
- Software upgrades are easier and can be done with less downtime.

SNMP MIB

SNMP MGX Release 1 MIB are provided with the delivery of this release. The MIB is in standard ASN.1 format and is located in the same directory within the release bundle on CCO. These files may be compiled with most standards-based MIB compilers. The tar file for MIB contains the file release notes that contains the MIB release notes.

For changes in this MIB from the previous release, please refer to the MIB release notes.

Note The old_mib_Format is discontinued as of this release.

Notes and Cautions

The following notes and cautions should be reviewed before using this release.

Special Upgrade Procedure for Cisco IOS Release 12.1(5.3)T_XT

Use the following procedure when upgrading from your current RPM/IOS runtime image 12.1(5.3)T_XT and MGX version for MGX Release 1.2.02 and 1.2.10:

Step 1 RPM IOS boot and runtime images should be upgraded before MGX images are upgraded. Please follow the RPM/IOS image upgrade procedure as specified in the "Upgrade Procedures for RPM Cards in MGX Release 1 (PXM-1) Switches" as described in later sections of this Release Notes Document.

Step 2 MGX software should be upgraded next as illustrated in the following steps.

a. **install** <*image-name*>

b. **newrev** <*image-name*>

c. **commit** <*image-name*>

For more detail on the MGX upgrade procedures, refer to the *Release Notes for Cisco MGX 8230, MGX 8250, and MGX 8850 (PXM1), Software Version 1.2.10*.

UPC Connection Parameters

In Release 1.1.40 and higher, the default PCR is 50 cps, and the default for policing is "enabled." These settings are insufficient for running RPM ISIS protocol over the connection, and with such settings, the ISIS protocol will fail. *The PCR value needs to be increased, depending upon the number of interfaces configured for ISIS on the RPM.*

Depending upon your connection type, you can use the following CLIs to modify the PCR parameter.

- **cnfupccbr**
- **cnfupcvbr**
- **cnfupcabr**
- **cnfupcubr**

Booting the RPM-PR

Refer to Chapter 5, "Configuring the MGX RPM" in the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1*, (DOC-7812278=) and for complete details on configuring the RPM-PR cards. (See the "Obtaining Documentation" section on page 135 for information on how to order a printed copy of this manual or locate the manual online.) A summary of the booting and upgrading procedures is presented here for your convenience.

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.

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, 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. (Refer to the "Viewing the Hardware Configuration" section of the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1* (DOC-7812278=).

   a. If the configuration register is set to the factory-default setting of **0x01**, RPM-PR will come up and stay in boot mode.

   b. If the configuration register is **0x2**, the RPM-PR will look for the runtime image either in bootflash or on the PXM1 C:/RPM drive.
3. The search for runtime image is determined by which boot system command is entered.

   a. Entering the **boot system c:**<*runtime_image_name*> command will result in a search for a runtime image in the C:/RPM directory on the PXM1 hard disk.

b. Entering the **boot system bootflash:**<*runtime_image_name*> will result in a search for a run time image in the bootflash.

c. If the **boot system bootflash:**<*runtime_image_name*> is not entered, it will result in loading of the first available IOS image from C:/RPM, if one such image is present.

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 C:/RPM 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 c:**<*config_file*> command.

6. For normal RPM-PR operation, there must be a valid Cisco IOS image on the PXM-1 C:/RPM 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, refer to Appendix C, "IOS and Configuration Basics"of the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1* (DOC-7812278=)

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.

Caution Erasing or moving the boot image can cause RPM-PR boot failure. When this happens, the RPM card 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.

CLI Modifications in the MGX Release 1.2.20

There are no new or modified RPM/B or RPM-PR CLI commands for MGX Release 1.2.20.

Limitations and Restrictions

CWM Recognition of RPM-PR and MGX-RPM-128M/B Back Cards

CWM does not distinguish between the Ethernet back card versions installed with the MGX-RPM-128M/B or RPM-PR. There is no functionality difference.

RPM/B and RPM-PR Front Card Resets on the Back Card Removal

The RPM front card may reset on an MGX 8250 and MGX8850 switches with PXM1 as controller card, when the ethernet back card is removed or inserted.

This reset problem can be easily avoided if “shut” interface is executed before the removal of the back card.

RPM/B and RPM-PR Back Ethernet Card Support

For Ethernet connectivity with the RPM-PR, the model “/B” four-port Ethernet back card is required (order number: MGX-RJ45-4E/B).

MGX-RPM-128M/B Ethernet Back Card Support

The model “/B” four-port Ethernet back card can be used with the MGX-RPM-128M/B module only in combination with IOS 12.2(2)T2 or higher. The model “/B” back card will not work on the MGX-RPM-128M/B with earlier versions of the IOS.

The order number is order number: MGX-RJ45-4E/B.

Older back cards can be used with any version of the IOS.

4-port Ethernet back card used with MGX-RPM-128M/B	Required IOS
model “/B” back card	12.2(2)T2
earlier back card models	Min. IOS for MGX-RPM-128M/B on MGX 8250 is 12.0(7)T

RPM/B and RPM-PR Limitations and Restrictions (MGX Release 1.2.20)

The RPM/B and RPM-PR limitations and restrictions that apply to this release are as follows:

- The MGX-RPM-128M/B is a NPE-150 based router card capable of sustaining 150,000 pps. The RPM-PR is an NPE-400 based router capable of sustaining over 350,000 pps. The RPM-PR will only operate with IOS 12.1(5.3)T_XT or later. For the following section “RPM” refers to both the MGX-RPM-128M/B and the RPM-PR, (unless specifically called out). Some software versions and limitations are not applicable to the RPM-PR because it does not support IOS versions before 12.1(5.3)T_XT.

- With MGX-RPM-128M/B versions earlier than 12.0.7T1, some limitations in Inter-Process Communication when the MGX-RPM-128M/B is at high loads can cause the PXM to declare that the MGX-RPM-128M/B has Failed. To avoid this with MGX-RPM-128M/B, software releases earlier than 12.0.7T1, throughput is limited to 62,000 pps, and it is recommended that MPLS configurations are limited to 100 interfaces. With RPM software releases from 12.0.7T1, those limitations are removed. In a separate limitation, the number of directly connected OSPF networks supported by an RPM is currently limited to 27. This means that any or all of the subinterfaces supported by the RPM can run OSPF, but the number of distinct OSPF networks supported is limited to 27. (A work around is available and is discussed below.) The limit of 27 arises because of the overheads of supporting separate link-state databases for separate networks.
- In an application where the RPM is a Provider Edge Router in an MPLS Virtual Private Network service, a much better solution in any case is to use a distance-vector routing protocol between the customer routers and the RPM. A distance-vector routing protocol provides exactly the information required for this application: reachability information, and not link-state information. The distance-vector routing protocols supported by the RPM are BGP, RIP v1 and RIP v2, as well as static routing. With RPM software releases from 12.0.7T1, distance-vector routing protocols can be used with as many different networks as subinterfaces.
- Note that if the RPM is acting as a Provider Edge Router in an MPLS Virtual Private Network service, and even if OSPF is running in a customer network, it is not necessary to run OSPF between the customer router and the RPM. If the customer edge devices run Cisco IOS, they can redistribute OSPF routing information into RIP using the IOS commands, redistribute RIP in the OSPF configuration, and redistribute OSPF in the RIP configuration. Similar configurations are possible for BGP. (For more information on re advertisement, see the “Configuring IP Routing Protocol-Independent Features” chapter in the Cisco IOS Release 12.0 Network Protocols Configuration Guide, Part 1). Redistribution is not unique to Cisco CPE, and other vendors' equipment also supports redistribution.
- Whenever there are 2 RPM cards on adjacent slots, driven by the same cell bus clock, the clock rate should be set to 42 MHz for traffic shaping, using the command **cnfcbclk**. This configuration will be lost if the node rebuilds due to **resetsys** or a power cycle. The user will have to manually re-configure the cell bus clock rate after the rebuild, using the **cnfcbclk** command.
- On an MGX 8850 node, when the chassis is loaded with 6 or more RPM-PR cards, and if every card is configured to download the IOS runtime image from the PXM-1 hard disk, occasionally, upon entering a **resetsys** command or after a power cycle, some of the RPM-PR cards may go into the failed state. To reset the failed RPM-PR cards, enter the **resetcd** <*slot #*> command for each failed card.
- A single RPM-PR can only function as either an Edge LSR or as an LSC, but not as both.
- Total of (OC12 minus T3) Mbps intrashelf traffic for Cell bus based modules are supported.
- To configure redundancy, the primary and secondary RPM-PR cards need to be in the Active state and the secondary card should not have any configuration.
- Removing a back card does not cause RPM-PR switchover.
- After establishing redundancy between two RPM-PR cards with the **addred** command, you must enter the **copy run start** command on the primary RPM-PR card to save the configuration change.
- If a secondary RPM-PR card is redundant to primary cards x and y, you cannot delete redundancy for only card x.
- If you need to enter the **switchredcd** and **switchcc** commands, Cisco Systems recommends that you wait at least 5 seconds after issuing the **switchredcd** command, and then enter the **switchcc** command**.**

- IOS software images on primary and secondary RPM-PR cards do not have to be compatible, but the IOS software on a secondary card should be at the same level as the primary card or higher.
- Whenever the RPM-PR configuration is changed and a user wants to store that configuration, the user must enter the **copy run start** command on the RPM-PR. If this is not done, the changed configuration will be lost on RPM-PR card reboot or RPM-PR switchover in case of redundancy.
- Even though RPM-PR can have 1999 sub interfaces, the usage of sub interfaces should be planned in such a way that it does not cross a safe limit of 1985. This is because each sub interface takes one IDB (interface descriptor block) and the number of IDBs available in the card is 2000. Further, a user might need some IDBs for the RPM-PR back card and its ports.
- For RPM/B and RPM-PR PVC dax connections, the slave end must be deleted before the master endpoint.

Open Caveats in Release 12.2(15)T4a

Table 2 lists the open caveats in Cisco IOS Release 12.2(15)T4a.

Table 2 Open Caveats in Cisco IOS Release 12.2(15)T4a

Caveat Number	Description
CSCec16481	**Symptom:** A Cisco device running Internetwork Operating System (IOS) and enabled for the Open Shortest Path First (OSPF) Protocol is vulnerable to a Denial of Service (DoS) attack from a malformed OSPF packet. The OSPF protocol is not enabled by default. **Conditions:** The vulnerability is only present in IOS release trains based on 12.0S, 12.2, and 12.3. Releases based on 12.0, 12.1 mainlines and all IOS images prior to 12.0 are not affected. Refer to the Security Advisory for a complete list of affected release trains. **Workaround:** Further details and the workarounds to mitigate the effects are explained in the Security Advisory which is available at the following URL: http://www.cisco.com/warp/public/707/cisco-sa-20040818-ospf.shtml.
CSCin22433	**Symptom:** While trying to modify the connection parameters via SNMP, one may find that the modified values are not reflected in the RPM. RPM still shows default values when queried using CLI. **Conditions:** This issue is found whenever one tries to modify certain connection parameters: cwrChanAalEncapType , cwrChanOamManage , cwrChanOamRetryUpCount and cwrChanOamRetryDownCount via SNMP and then check the same using RPM CLI. Switch CLI command: Router#sho atm pvc 0/50 **Workaround:** 1. These parameters can be modified through CLI instead of SNMP 2. The parameter modification can be accomplished through DelConn and AddConn which is equivalent to ModConn for this purpose.
CSCdz32991	**Symptom:** RPM-PR on the MGX8850 with PXM45 as controller card, occasionally drops ping packets due to CRC error. **Conditions:** RPM-PR on the MGX8850 with PXM45 as controller card, occasionally drops ping packets due to CRC error. The ping packets came from the 7200 router on BPX. **Workaround:** None

Table 2 Open Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdz33457	**Symptom:** RPM-PR card reloaded after reporting Traceback messages on console; also generated crashinfo file. **Condition:** This happened after "ip rtp compression-connection 300" command was issued on the RPM-PR card, which resulted in reload/reset of the said card. **Workaround:** None
CSCdz48135:	**Symptom:** On an RPM-PR running IOS 12.2(8)T4 / 12.2(13)T, service policy command can be configured under the PVC on a switch1 interface. **Conditions:** Service policy command can be configured under the PVC on a subinterface for the Switch1 interface on RPM-PR installed in MGX8230 / MGX8850 node (w/ PXM45 and/or PXM1E controller card). Although the service policy command is accepted, the queueing strategy remains FIFO. **Workaround:** None
CSCdz79827	**Symptom:** While performing MIB walk on the whole CISCO-IP-STAT-MIB MIB, cipPrecedenceEntry goes through a loop. **Conditions:** While performing MIB walk on CISCO-IP-STAT-MIB MIB, cipPrecedenceEntry loops around and does not exit out of the mib walk. **Workaround:** None
CSCdz87255	**Symptom:** RPM-XF resets if an incorrect name is specified in the "mic rel pxf " command **Conditions:** In the "microcode reload pxf" command, the file name specified is not present in the "C:FW" directory on the PXM. **Workaround:** Make sure the correct filename is specified.
CSCea59731	**Symptom:** When querying on the ifName , the output does not follow the desired format.As a result , SNMP dependent tools will fail due to unexpected result. **Conditions:** This symptom is observed while issuing snmpwalk on the node for ifName. **Workaround:** None

Table 2 Open Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea77841	**Symptom:** Trace back error: "rpm_red_copy_file_to_dev: copy failed" observed after RPM-PR card reload. **Conditions:** Not enough free space left on the bootflash. **Workaround:** None
CSCdx04380	**Symptom:** Status field of an RPM interface shows unknown(3).Database schema says it can be only 1 or 2 **Workaround:** None
CSCdz56476	**Symptom:** Traceback errors - "%SYS-2-BADSHARE: Bad refcount in retparticle" were observed on RPM-PR (Route Processor Module) **Conditions:** After clearing the arp table and resetting the IXIA FE ports, traceback error messages appeared on the console. **Workaround:** None
CSCea22766	**Symptom:** PXM1 Controller card got reset due to starved tChStats task. **Conditions:** While connection proxy and show command scripts were running in the back ground and lots of BGP routes were also being updated, during this setup, PXM1 controller card got reset. PXM1 logs suggested tChStats task was starved, which caused tRootTask to reset PXM1. **Workaround:** None
CSCea26869	**Symptom:** IPC Low Buffer traceback observed on PE. **Conditions:** After running the multiple show commands and injecting & withdrawing VRF routes from CE, PE kept getting IPC low buff trace back messages. **Workaround:** None

Resolved Caveats in Release 12.2(15)T4a

Table 3 lists the resolved caveats in Cisco IOS Release 12.2(15)T4a.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a

Caveat Number	Description
CSCdx53734	**Symptom:** In MGX1, Standby RPM-PR card is put in BLOCKED state after removal of backcard. **Conditions:** In RPM 1:N redundancy scenario, when back card is removed on the standby card, PXM1 controller card puts the RPM-PR card in BLOCKED state. **Workaround:** None
CSCdy11654	**Symptom:** User can neither "cc" nor "ccc" (high Pri) to any slot with an RPM seated in it. "cc" to any other slot containing any other card type succeeds. **Condition:** IOS IPC memory buffer leaked for 21 days, zero resource were available for IPC, when this situation occurred. The MGX shelf is operating in simplex mode. **Workaround:** "switchcc" with duplex shelf "resetcd" with simplex shelf
CSCdz37489	**Symptoms:** Traffic Shaping may not be working properly. **Conditions:** This symptom is observed when an RPM card is inserted and booted in the same cell bus that contained the now replaced RPM. The clock get sets to 42 MHz and idle cells are generated from both RPMs. **Workaround:** None
CSCdz68310	**Symptom:** RPM-PR card did not come back to Active state after "resetcd" was executed from PXM Controller card. **Conditions:** While the traffic was being pumped through Fast Ethernet back card of RPM/PR card through pvc to another RPM/PR card. Card got reset (from PXM or resetcd), it didn't up into Active state. **Workaround:** Stop the traffic, wait till card comes.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCin17591	**Symptom:** The administrative state of the subinterface is not getting populated in config upload for RPM-PR. **Conditions:** Create a new subinterface on a RPM-PR card with an PXM1E controller card. Then do a cold start of CWM which does a configuration upload from the switch. After this data is uploaded to the CWM database, it was realized that subinterface administrative status is missing. **Workaround :** Check the subinterface administrative status via the CLI.
CSCin22433	**Symptoms:** You may not be able to modify the connection parameters : rpmEndPointOAMmanage, rpmEndPointSpvcEncapType, rpmEndPointOAMRetryDownCount, and rpmEndPointOAMRetryUpCount by running a ModConn script via Simple Network Management Protocol (SNMP) request. **Conditions:** This symptom is observed on a Cisco MGX 8800 series Route Processor Module (RPM). After executing a connection modification script via SNMP, the script reports that the connection parameters have been successfully modified, but the values of the connection parameters are not changed on the RPM, which can be verified in the output of the show ATM PVC. **Workaround:** Modify the parameters using command-line interface (CLI) instead of making the said change via SNMP OR modify the parameters using a DelConn or AddConn script instead of a ModConn script.
CSCdt50053	**Symptoms:** Router might get reloaded abnormally. **Conditions:** While deleting "ip vrf" entry from config file, the router might get reset with a taceback. **Workaround:** There is no work around for this problem.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdw22050	**Symptoms:** The crashinfo file is incomplete, and memory block information is not dumped. Multiple traceback messages may be displayed in the crashinfo file. **Conditions:** This symptom is observed on a Route Processor Module (RPM) card that has 512 MB of memory when the card dumps the crashinfo file. **Workaround:** There is no workaround.
CSCdw71180	**Symptom:** RPM-PR may display the following Error: %RPM_VIRTUAL_PORT-3-IPCERR: switch_vport_send_pxm_with_reply : Vport request rejected by PXM. Error String = %Error:GenErr:Disk update failed. Error Code = 306 **Conditions:** Upon execution of PXM command "switchcc", while there is large configuration on RPM, user may observe this error message. This error may hinder RPM to share its configuration with PXM database. **Workaround:** None
CSCdw78622	**Symptom:** Observed %FAILED: connections exist when allocating vci range on MPLS partition **Condition:** This vci range was previously allocated to PNNI partition but not used. MPLS partition previously specified different vci range. **Workaround:** Delete MPLS partition and then re-add it
CSCdx00680	**Symptom:** RPM-PR is not shaping traffic according to SCR value. adtech receiver shows different value than expected. **Condition:** While pumping the traffic on egress pvc. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
	CSCdx15458 **Symptom:** Large file copy fails in direction of RPM to PXM hard drive (C:\RPM). **Condition:** Copying an image (approx 9MB) from the RPM's bootflash to the PXM when there are 2 PXMs running in the chassis (redundant mode). **Workaround:** Remove PXM redundancy or copy to a tftp server instead of the PXM hard drive.
CSCdx16909	**Symptom:** RPM-PR connection parameters, connection percent utilization (util) and remote percent utilization (rutil) could be set to zero. **Conditions:** The connection parameters percent utilization value (util) and remote percent utilization value (rutil) could be set to zero through CLI or SNMP. The rutil and util values should be within the range 1 - 100. The value zero should not be allowed for these parameters. **Workaround:** None
CSCdx26224	**Symptom:** The cache l3 bypass global configuration command is missing from the running configuration of an active Route Processor Module (RPM) **Condition:** When a RPM softswitch command is executed on Active RPM card, the Standby (now Active) card is missing l3 bypass global configuration command from the running config. **Workaround:** None
CSCdx33453	**Symptom:** One time data hit of around 10% of per second data when back card is OIR (Online Insertion and Removal). **Condition:** During OIR (Online Insertion and Removal) of RPM-PR back card, a one time data hit of approximately 10% of per second data was observed. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdx43364	**Symptom:** SNMP queries (get or getnext) on ifName returns "Sw1" for all rows in the ifTable, rather than returning correct value of ifName for each row in the ifTable. **Conditions:** Configure "Sw1" and a few more subinterfaces (Sw1.x) on the RPM card. In the ifTable, the value of ifName is set to "Sw1.x" for each subinterface; where "x" is a unique number chosen by the user at the time of configuration of the port. Do "snmpgetnext" or "snmpget" for each row of the ifTable for ifName. **Workaround:** None
CSCdx54209	**Symptoms:** CRC error counters in Switch1 interface and/or subinterfaces doesn't show the correct number of corrupted/dropped AAL5 frames **Conditions:** While pumping corrupted AAL5 frames into RPM one would expect that the router will drop such frames based on the AAL5 CRC-32 calculation and report drops incrementing CRC counter. Test results showed that CRC counter does not report all the corrupted frames although they were correctly dropped. Hence, RPM does not report correct number of AAL5 CRC errors. **Workaround:** None
CSCdx74340	**Symptoms:** Traffic shaping may be affected when a Route Processor Module (RPM) in an adjacent slot boots up. **Conditions:** This symptom is observed on a Cisco MGX RPM that has traffic shaping configured when another RPM is inserted in the adjacent slot. Traffic shaping is affected until the Processor Switch Module (PXM) recognizes the card and changes the cell-bus clock speed. **Workaround:** There is no workaround.
CSCdx84595	**Symptom:** Turning on CEF will cause the policy routing to stop forwarding packets. Condition: When policy based routing is enabled and CEF turned on, policy routing stops forwarding packets. **Workaround:** Turn off CEF and policy routing will begin forwarding packets again.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdx92691	**Symptoms:** A Route Processor Module (RPM) ingress virtual circuit locks up and stops forwarding traffic. **Conditions:** This symptom is observed when there is a sudden, large increase in the ingress traffic (such as 145 Mbps of traffic or more with packet sizes of 384 bytes). **Workaround:** Clear the ingress switch subinterface by entering the <CmdBold>shutdown<noCmdBold> interface configuration command followed by the <CmdBold>no shutdown<noCmdBold> interface configuration command.
CSCdy13821	**Symptoms:** When a Route Processor Module version B (RPM/B) card is switched with a Route Processor Module-PRemium (RPM-PR) card, short flaps may be observed on the provider-edge-to-provider-edge (PE-PE) connections on a network. **Conditions:** This symptom is observed on the RPM-PR card when a permanent virtual circuit (PVC) is configured by entering the <cmdbold>oam-pvc manage 1<nocmdbold> VC-class configuration command. **Workaround:** Stop Operation, Administration, and Maintenance (OAM) loopback cells from being generated by entering the <cmdbold>oam-pvc manage 0<nocmdbold> VC-class configuration command.
CSCdy14830	**Symptoms:** When the <cmdbold>switchredcd<nocmdbold> command is entered on a Processor Switch Module (PXM) card, the primary active Route Processor Module (RPM) card is reset and remains in the boot mode instead of coming up in the standby mode. A similar behavior is observed when the <cmdbold>resetcd<nocmdbold> command is entered on the PXM card. **Conditions:** When the <cmdbold>switchredcd<nocmdbold> command or the resetcd command is entered on the PXM card to switch from the primary RPM card to the secondary standby RPM card, the secondary RPM will take over as the active card and the primary interface is reset and comes up in the standby state. When the primary card is reloaded, it may not load the image from the PXM card because of an ?error sending request? error. Instead, the primary card will load the bootloader image and cause the primary card to come up in the boot mode. **Workaround:** Reset the primary RPM card that has paused indefinitely in the boot state.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdy29969	**Symptoms:** RPM-PR card reloaded with the service-policy configured **Conditions:** When configuration such as: "int point-to-point" gets configured on wrong config menu/subcommand mode, user can see abnormal behavior where RPM-PR card can get reset. In this case, subinterface level command was configured at connection level menu, which resulted in card getting reset. **Workaround:** Remove policy map statement if RPM getting reloaded with config file download. Or correct the interface config "int point-to-point" with valid subinterface.
CSCdy43187	**Symptom:** A virtual channel connection (VCC) partition was created after failing to create an invalid VPC partition on RPM-PR card. **Conditions:** While attempting to create an invalid virtual path connection (VPC) partition with a minimum virtual path identifier (VPI) value that is greater than 255, this problem is observed. **Workaround:** Remove the VCC partition by entering the no switch partition vpc command on the interface on which the VCC partition was created. And then recreate partition with all required parameters.
CSCdy43191	**Symptom:** The "no boot system" global configuration command does not work when it is executed on a Active RPM-PR which is configured as part of 1:N redundancy. **Condition:** RPM-PR with Runtime image 12.2(11)T does not let the user to modify the runtime image, while the card is part of 1:N Redundancy group. **Workaround:** There is no workaround.
CSCdy44040	**Symptom:** The Route Processor Module (RPM-PR) of a Cisco MGX 8850 that has a PXM1 controller card may fail, reload, and display the SAR reload message with dump information. **Conditions:** This symptom is observed on an RPM-PR that has a PXM1 controller card. The Open Shortest Path First (OSPF) Protocol and the Border Gateway Protocol (BGP) may go down when this symptom occurs, and traffic may be affected. **Workaround:** Reset the PXM1 controller card.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdz61616	**Symptom:** The access control list (ACL) information of a Simple Network Management Protocol (SNMP) server community may be lost. **Conditions:** This symptom is observed after a RPM-PR is reset while it is configured with ACL along with the community string configuration. **Workaround:** After the RPM-PR is reset, configure the snmp-server community global configuration command along with ACL as required on the RPM-PR.
	CSCdz61661 **Symptom:** After a RPM-PR reset or a PXM45 reset or PXM45 switchcc the RPM-PR loses the access list pointer at the end of the snmp community statement **Conditions:** This symptom is observed after a RPM-PR reset or PXM45 reset or PXM switchcc **Workaround:** Re-configure the desired community string along with the ACL on RPM-PR after reset.
CSCdz82166	**Symptoms:** A Cisco Route Processor Module (RPM) may pause indefinitely when it is waiting for a bootup acknowledgement from a remote router. **Conditions:** This symptom is observed after the RPM has gone through a power cycle. **Workaround:** Reset the card from the Processor Switch Module (PXM). **Alternate Workaround:** Physically reset the RPM.
CSCea39815	**Symptom:** "show interface switch1" displays the incorrect amount of input errors when CRC errors are generated on interface **Conditions:** CRC errors observed on interface switch1 Observed CRC errors into an RPM interface. Executing "show interface switch1, commands shows the number of CRC errors is much greater then the input errors. **Workaround:** The correct input error value for interface switch1 can be obtained by polling the MIB (1.3.6.1.2.1.2.2.1.14) via SNMP.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCin13744	**Symptom:** The output of SNMP "get" query for ifType and ifName mib objects for the subinterfaces is incorrect. The display of ifType and IfName for the ATM subinterface does not reflect the type of interface. **Conditions:** If SNMP "get" request is executed on ifType and IfName mib objects, the output corresponding to the ATM subinterface is incorrect as it lists the subinterface type as "other" and ifName does not provide accurate information. **Workaround:** None
CSCin30541	**Symptom:** Traffic shaping is affected on RPM when adjacent slot is present. **Conditions:** When adjacent slot is seemed not sending idle cells due to loss in PXM-RPM communication. **Workaround:** None
CSCea00417	**Symptom:** RPM-PR (Router Processor module) in redundant configuration, when switched to the standby RPM-PR, an error message with bad shelf slot was observed. **Conditions:** Upon execution of Softswitch from Active card to the redundant RPM card, an error message - "RED-7-BAD_SHLF_SLOT" related to bad shelf was observed. Consecutive Softswitch's causes the STDBY RPM to get stuck in Reserved state. **Workaround:** No workaround for the error RED-7-BAD_SHLF_SLOT. Remove/reseat the RPM-PR stuck in Reserved state will clear the issue and return the card back into STDBY state
CSCea02713	**Symptoms:** A router may unexpectedly reload if it is unable to allocate enough memory for Weighted Random Early Detection (WRED). This unexpected reload may also be seen when the interface is already configured for WRED by using modular quality of service (QoS) and when an access group is added to the interface. **Conditions:** This symptom is observed on a router that is running Cisco IOS software that is being configured for WRED on a Frame Relay interface via the modular QoS. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea32775	**Symptoms:** A Cisco MGX 8000 series Route Processor Module-PRemium (RPM-PR) may reload. **Conditions:** This symptom is observed when the RPM-PR is configured as an Edge Label Switch Router (ELSR) and you enter the "show queue [interface-name interface-number]" privileged EXEC command with "switch" for the [interface-name] argument and "1" for the [interface-number] argument on the RPM-PR subinterface that has Multiprotocol Label Switching (MPLS) enabled. **Workaround:** None
CSCdz76166	**Symptoms:** A Cisco router may reload after execution of the "show atm vc [vcd]" EXEC command. **Conditions:** This symptom is observed on a Cisco router that is running Cisco IOS Release 12.2(15) or a later release and that has an ATM interface.The vcd value should correspond to a switched virtual circuit (SVC). **Workaround:** None
CSCea11344	**Symptoms:** The "atm abr rate-factor" interface configuration command cannot be configured on an interface. **Conditions:** This symptom is observed when an available bit rate (ABR) connection is added to a Route Processor Module-PRemium (RPM-PR) card on a Cisco MGX 8850 Processor Switch Module (PXM1) card that has Cisco WAN Manager (CWM) carrier module (CM) or when you configure the "atm abr rate-factor" interface configuration command under the interface. **Workaround:** Use the command-line interface to add an ABR connection to the RPM-PR on the Cisco MGX 8850 PXM1 card.
CSCdz88368	**Symptoms:** A nonexistent policy map that is configured as the input or output service policy of an ATM virtual circuit (VC) causes a router to be unable to display or save its configuration. **Conditions:** This symptom is observed only on Cisco Route Processor Module (RPM) routers. **Workaround:** Do not specify nonexistent policy maps as an ATM VC service policy.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdy11064	**Symptoms:** When using multipath with a vrf, BGP may leave an old multipath route in the routing table. **Workaround:** The work-around is to clear the route in order to remove the old path.
CSCea16719	**Symptoms:** One of two redundant route reflectors (RRs) that are part of the same cluster may reload and may cause a Virtual Private Network (VPN) routing/forwarding (VRF) table to contain incomplete routes. Routes that originated elsewhere in network are in the Route Descriptor table but not in the VRF table, despite import statements and the fact that the routes were in the VRF table previously. **Conditions:** This symptom is observed in a cell mode Multiprotocol Label Switching (MPLS) VPN network. **Workaround:** To restore the missing routes, reset the Border Gateway Protocol (BGP) neighbor session to the RR that did not reload.
CSCea36682	**Symptoms:** A service policy may be removed from a multilink interface after the router reloads or after you enter the <CmdBold>shutdown<noCmdBold> interface configuration command followed by the <CmdBold>no shutdown<noCmdBold> interface configuration command on the multilink interface. **Conditions:** This symptom is observed only when the sum of the total bandwidth in the service policy is equal to 100 percent of the total available bandwidth. **Workaround:** Remove bandwidth from the class default, as indicated in the following command output: policy-map generic class Voice_MPLS priority percent 20 class LowDelay_MPLS bandwidth remaining percent 30 class BestEffort_MPLS bandwidth remaining percent 35 class class-default bandwidth remaining percent 35 <---- Remove this bandwidth configuration. By default, class-default receives the remaining 35% anyway.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea25707	**Symptoms:** A Cisco router may reload because of a software condition when running the LDP-MIB MIB. The router reloads because of a process watchdog timeout in the "SNMP ENGINE" process and logs an entry similar to the following one and logs a traceback: %SYS-2-WATCHDOG: Process aborted on watchdog timeout, process = SNMP ENGINE. %Software-forced reload Unexpected exception, CPU signal 23, PC = 0x606F1FC4 . . . Cause 00000024 (Code 0x9): Breakpoint exception **Conditions:** This symptom is observed after the router ID has been changed and when Label Distribution Protocol (LDP) sessions have been added or removed. **Workaround:** Do not change the router ID. If the router ID has been changed, do not run the LDP-MIB MIB.
CSCea42500	**Symptoms:** If the "default-information originate" router configuration command is entered on the Virtual Private Network (VPN) routing/forwarding (VRF) o instance of a Cisco 12000 series that has the "address-family ipv4 vrf" command configured using the Border Gateway Protocol (BGP), the default route is learned correctly but the default route is entered incorrectly in the BGP routing table. This behavior may result in unexpected behavior on the other router if the other router does not have a correct default route. The default static route of the VRF is not advertised by BGP after the default static route is configured under the VRF, and BGP may advertise the incorrect default route that is in the BGP routing table. **Conditions:** This symptom is observed on a Cisco 12000 series that is running BGP. **Workaround:** Perform either of the following steps: - Enter a static default route under the VRF configuration. - Configure an access control list (ACL).

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea01405	**Symptom:** PE does not advertise itself as next hop to CE. **Conditions:** After upgrading PE from IOS software 12.2(8)T4 to 12.2(15)T, PE stopped advertising itself as next hop to its eBGP neighbor CE. Hence the routes are getting rejected by the CE. **Workaround:** Configure "next-hop-self" under the address family in router bgp config.
CSCdz88636	With topology: ---- PE1--RR1-- CE1--| \/ | |--PE3--CE2 | /\ | | ---- PE2--RR2-- CE1 and CE2 both inject bgp route (prefix A) into PE. PE1, PE2& PE3 has different rd but same rt in vrf. After all routers converge, clear ip bgp on different routers, will lead to different result in PE's bgp vrf table. PE1 may show 3, 5 or 2 paths of prefix A. **Workaround:** clear ip bgp on both CEs.
CSCea25144	**Symptoms:** RPM-PR card reset by PXM due to heartbeat failure Condition : PXM stops receiving heartbeat responses from RPM-PR. This may be due to: Messages lost due to high traffic resulting in cell loss, or Messages not picked up due to IOS receive ring problems, or Messages not sent to IOS because of SAR problems. **Workaround:** None
CSCea33321	**Symptom:** Difference in the timestamps in the PXM and RPM logs. **Condition:** This timestamp difference is observed when the RPM has been up for an extended period of time (more than 1 week). RPM gets the ToD information at boot-up time only. Manual time changes and Daylight savings on the PXM are also not reflected on RPM due to the absence of periodic updates. **Workaround:** Use NTP server connected to the RPM through the backcard. This server will give periodic updates to the RPM and thus keep it in sync with PXM.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea32118	**Symptom:** Router does not recover from SAR exception, heartbeat polling may fails thus resetting the router. **Condition:** This may happen under conditions of heavy traffic where the SAR is being stressed. Under such circumstances the SAR receives an exception and hangs. The router might not be able to recover from this exception. As a result the heartbeat response may not received by the controller card, which in this kind of scenario will reset the router. **Workaround:** None
CSCea61938	**Symptoms:** Two users may not be able to simultaneously display the output of the "show policy-map" user EXEC or privileged EXEC command. **Conditions:** This symptom is observed when the first user displays the first screen of the command output while the second page is pending. However, the second user may successfully display the command output after the first user presses the Enter key and gets the user prompt back. **Workaround:** None
CSCea67430	**Symptoms:** Customers of a service provider may be able to display all routes of all Virtual Private Networks (VPNs) by walking a MIB from a network management station (NMS) on their own VPN. **Conditions:** This symptom is observed when Simple Network Management Protocol (SNMP) MIB variables are available without restriction to VPN routing/forwarding (VRF) interfaces on a Cisco MGX 8000 series Route Processor Module (RPM) that is running Cisco IOS Release 12.2(8)T4. Provider edge (PE) router access for control traffic that is associated with VRF interfaces should be limited to Internet Control Message Protocol (ICMP), Border Gateway Protocol (BGP), and Address Resolution Protocol (ARP). **Workaround:** Create an access control list (ACL) that filters out all User Datagram Protocol (UDP) packets on the SNMP port using the "access-list <access-list-number> deny udp any any eq snmp" global configuration command, and apply this ACL to the interface on which the VRF is configured.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCdy40742	**Symptoms:** After a Border Gateway Protocol (BGP) neighbor resets, CPU utilization may run very high. **Conditions:** This symptom is observed when the "default-metric" router configuration command is enabled in the BGP router configuration. **Workaround:** None
CSCea06056	**Symptoms:** Data transfer might stop when the traffic bandwidth on a Route Processor Module-PRemium (RPM-PR) card is increased to 45 Mbps. The data transfer is normal when the traffic bandwidth is at 30 Mbps. **Conditions:** This symptom is observed while there are multiple active Virtual Private Network (VPN) routing/forwarding (VRF) instances configured on the RPM-PR card. **Workaround:** None
CSCeb02520	**Symptoms:** RPM-PR router configured as eLSR might reset upon execution of "show queue sw1.[subinterface]" command where interface is of mpls type. **Conditions:** Multiple-vc enabled under mpls interface **Workaround:** None
CSCea73441	**Symptoms:** Memory corruption in RPM-PR, followed by a router reload. **Conditions:** In a cell-based MPLS setup, if RPM-PR is receiving very high (99% OC3) traffic, the path check feature, which runs periodically may cause a memory corruption. **Workaround:** None
CSCea63209	**Symptom:** With dual LSCs and 1:N redundancy configured. one might experience a 10+ sec data disruption when a resetcd is issued for the active/primary LSC. **Conditions:** The redundant RPM-PR card should be available which is not covering for another RPM-PR redundant card. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea74222	**Symptom:** IGP label rewrite information for remote PE is lost from CEF table on a local PE. **Conditions:** MPLS network is running in ATM cell-mode using multi-VC. Two or more local PEs are each connected to two separate LSC-controlled ATM switches, or to separately controlled partitions of a single ATM switch. The problem is induced by injecting a failure or route flap (for example: switchcc, reset LSC hot redundancy, shut/no shut mpls interface). **Workaround:** "clear ip route <prefix>" can be used to recover from this condition, where <prefix> is the loopback address of the remote PE whose rewrite information is lost on the local PE.
CSCea84387	**Symptom:** Multiple simultaneous operators utilizing Modular QoS CLI (MQC) related commands may cause the system to become unresponsive. **Conditions:** Multiple simultaneous users utilizing Modular QoS CLI (MQC) commands. **Workaround:** Allow only one operator at a time.
CSCdx08292	**Symptom:** 'no auto-summary' & 'no sync' do not nvgen properly by default Also, the 'bgp suppress-inactive' command is not nvgenned in address-family mode. **Workaround:** None
CSCea72272	**Symptom:** Startup-config file might become corrupted. **Conditions:** This condition may occur when via multiple telnet sessions, user simultaneously executes "write memory" command. **Workaround:** startup-config file may be re-written by executing a "write memory" from single telnet session at one time.

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCea78687	**Symptom:** The LDP protocol flaps affecting data throughput on RPM-PR acting as an eLSR. Lots of input errors, CRC errors and output drops are observed on the router switch interface 1. **Conditions:** This issue was observed on the RPM-PR when it was acting as an eLSR in a large-scale cell-based MPLS VPN network (400 LVCs per LSC, Dual LSC configuration). Traffic was being sent to cause congestion on all the 200+ egress PVCs on the eLSR. RPM-PR was in a state of severe traffic congestion. **Workaround:** None
CSCeb02097	**Symptom:** SAR auto-recovery triggers while saving config **Conditions:** While trying to save configuration on one of the RPM-PR cards the card took around 60 to 90 minutes to save the config, and auto-recovery kicked in during that time and were unable to access the C:drive it hangs and gives an error message **Workaround:** None
CSCea91135	**Symptoms:** If due to an error condition all traffic throughput from the RPM-PR stops and SAR Auto Recovery is disabled, the router will stay in the error state and will not be reloaded by PXM. **Conditions:** RPM SAR Auto Recovery disabled. The heartbeat messages are processed in a priority fashion compared to regular data. Due to possible SAR or IOS errors if the data stops flowing through the RPM-PR, all protocols will go down. The heartbeat messages will still be responded to by the RPM-PR, so it will not be reloaded by the PXM. **Workaround:** Enable SAR Auto Recovery.
CSCea75235	A Cisco 7200/7500 router running 12.3/12.0S/12.2S images in a MPLS VPN environment and a LC-ATM core with multiple paths to the egress PE, may drop VPN traffic for a certain duration when one of the LSCs along a path is reset. The duration is dictated by the time needed for LCATM to reestablish the ATM LVC using downstream-on-demand mode. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCeb07595	**Symptom:** A Cisco 7200 or Cisco RPM box configured as "Provider Edge (PE)" box might reload after modifying mpls partition vci range on an ATM interface. **Conditions:** Reducing or increasing vci range under the ATM interface partition several times on a "Provider Edge (PE)" box in a cell-based MPLS-VPN network might reload the box. **Workaround:** Shutting down the ATM interface before making any change in configuration (like changing vci range) would save the box from reloading.
CSCeb07534	**Symptom:** Reset of Dual LSC in node-a Results in Tailend LVCs created on PE in node-b. **Condition:** Requires LSC redundancy network configuration *or* node w/ 2 or more PEs, each homed to 2 or more LSCs, with equal cost paths to some remote prefix. Impact: No data outage occurs as a result. However this can cause LVC depletion. **WorkAround:** None
CSCea21186	**Symptoms:** A Cisco router may reload when you enter the "tacacs-server host" global configuration command. **Conditions:** This symptom is observed when TACACS is already logging commands to a server. This problem does not occur in 12.2(13)T5 or earlier releases. **Workaround:** None
CSCeb10053	**Symptoms:** On the RPM-PR, SAR rx_no_buffers count incrementing and IOS rx_count is very high. The control protocols flap and data throughput is affected. **Conditions:** If the input data rate to the router is much higher than what can be drained out of the system, then the IOS would eventually run out od data buffers causing SAR to run out of buffers as well. This situation could result when there are high speed ingress VCs feeding to low speed egress VCs resulting in severe congestion on the router. **Workaround:** None

Table 3 Resolved Caveats in Cisco IOS Release 12.2(15)T4a (continued)

Caveat Number	Description
CSCeb04048	**Symptom:** After upgrading/reloading IOS on a router processor, OSPF interfaces may be marked as "down" while interface/line protocol states are "up". The end result is missing OSPF neighbor adjacencies on the "down" interfaces. **Condition:** This symptom is observed after system restart or microcode reload on certain platforms with large number of active interfaces. **Workaround:** Any one of the methods below can be used to recover the OSPF interface: - Issue "clear ip ospf proc" - Issue "clear ip route <route>", where the <route> is the IP address of the problem interface. - Perform a "shut" and then "no shut" on the problem interface.
CSCin45640	**Symptom:** Lot of "interface info was deleted by another session" messages seen on the router console. **Conditions:** While sending traffic on PA-A3 on RPM platform if ATM interface is reset then there will be lot of messages on the console and PA-A3 will loose rx buffers. **Workaround:** None

Compatibility Notes

RPM Boot File and Firmware File Names and Sizes

The following table displays the RPM boot and firmware file names and sizes for this release.

Table 4 RPM Boot and Firmware File Names and Sizes

	File Name	File Size (in bytes)
Boot File	rpm-js-mz.122-15.T4a	9976016
Firmware File	rpm-boot-mz.122-15.T4a	3202728

RPM Compatibility Matrix

MGX SW version	1.1.32	1.1.34	1.1.40
IOS Version	12.1(5.3)T_XT	12.2(2)T2	12.2(4)T
CWM	10.4.01	10.4.01 Patch 1	10.5

MGX SW version	1.2.00 / 2.1.70	1.2.02 / 2.1.76	1.2.10 / 3.0.00	1.2.11 / 3.0.10	1.2.13 / 3.0.20
IOS Version	12.2(4)T1	12.2(8)T1[1]	12.2(8)T4	12.2(11)T1	12.2(11)T2
CWM	10.5.10	10.5.10 Patch 1	11.0.00	11.0.10	11.0.10 Patch 1

1. MGX 1.2.02 has also been certified with IOS 12.2(4)T3.

MGX SW version	1.2.20
IOS Version	12.2(15)T4a
CWM	11.0.11

MGX RPM/B and RPM-PR Hardware

Table 5 shows the front card and back card compatibility for the RPM/B and RPM-PR hardware supported in this release. The table lists the card model/ name, part numbers, the minimum version and the minimum revisions of each card supported. Note that there may be more than one 800 level part numbers for the same front cards. The minimum version is identified by the last 2 digits of the 800 level numbers.

Table 5 Hardware Compatibility Matrix

Front Cards	Part Number/ Min. Version	Rev.	Back Cards	Part Number/ Min. Version	Rev.
MGX-RPM-128M/B	800-05743-01	A0	MGX-RJ45-FE	800-02735-02	A0
			MGX-MMF-FE	800-03202-02	A0
			MGX-RJ45-4E	800-02737-02	A0
			MGX-MMF-FDDI	800-02857-01	A0
			MGX-MMF-FDDI/FD	800-03820-01	A0
			MGX-SMF-FDDI	800-02736-01	A0
			MGX-SMF-FDDI/FD	800-03822-01	A0
MGX-RPM-PR-256	800-07178-02	A0	MGX-RJ45-FE	800-02735-02	A0
			MGX-MMF-FE	800-03202-02	A0
			MGX-RJ45-4E/B	800-12134-01	A0
MGX-RPM-PR-512	800-07656-02	A0	MGX-RJ45-FE	800-02735-02	A0
			MGX-MMF-FE	800-03202-02	A0
			MGX-RJ45-4E/B	800-12134-01	A0

Special Installation and Upgrade Requirements

Existing customers should use the upgrade procedures Upgrade Procedures for RPM Cards in MGX Release 1 (PXM1) Switches, page 46 and Historical Information From 1.2.x Baseline, page 58 to upgrade. A graceful upgrade from any release previous to the current release is supported. For new customers, the image will be pre-installed and should use the PXM installation procedure to upgrade to future maintenance releases.

Cisco IOS Release Compatibility Information

This section describes the installation requirements and guidelines for RPM modules installed with this release.

All IOS firmware can be downloaded from CCO from the following location:

http://www.cisco.com/kobayashi/sw-center/sw-ios.shtml

About the Cisco IOS 12.2(11)T1 Release

The Cisco IOS 12.2(11)T1 supports existing features on the MGX-RPM-PR and MGX-RPM-128M/B cards.

About the Cisco IOS 12.2(8)T4 Release

The Cisco IOS 12.2(8)T4 supports existing features on the MGX-RPM-PR and MGX-RPM-128M/B cards.

About the Cisco IOS 12.2(8)T1 Release

The Cisco IOS 12.2(8)T1 supports existing features on the MGX-RPM-PR and MGX-RPM-128M/B cards and the CBC clock rate configuration feature described in "Features Not Supported in This Release" section on page 13.

About the Cisco IOS 12.2(4)T3 Release

The Cisco IOS 12.2(4)T3 supports existing features on the MGX-RPM-PR and MGX-RPM-128M/B cards.

About the Cisco IOS 12.2(4)T1 Release

The Cisco IOS 12.2(4)T1 or higher is used with MGX Release 1.2.00. This IOS release supports new RPM features and continues to support existing features on the RPM-PR and MGX-RPM-128M/B cards.

Note that MPLS inter AS and MPLS TE are not supported features on RPM for this release.

About the Cisco IOS 12.2(4)T Release

The Cisco IOS 12.2(4)T or higher is used with MGX Release 1.1.40. This IOS release supports new RPM features and continues to support existing features on the RPM-PR and MGX-RPM-128M/B cards.

Note that MPLS inter AS and MPLS TE are not supported features on RPM for this release.

About the Cisco IOS 12.2(2)T2 and 12.2(2)T3 Release

The Cisco IOS 12.2(2)T2 and the 12.2(2)T3 Releases are used with MGX Releases 1.1.34 and 1.1.40. This IOS release does not support new RPM features, but has been tested with 1.1.34 and continues to support existing features on the RPM-PR and MGX-RPM-128M/B cards.

Please note the following anomaly in IOS Release 12.2(2)T2:

Problem Description:

Customers upgrading to 12.2(2)T2 image with RPMs might see some e-BGP sessions not coming up when the CE router is running an older version of IOS (12.0, 12.0.xT). This issue was first encountered with CE running 12.0(7)T image. In such cases, the CEs running old IOS versions were not able to create BGP sessions to PEs with the newer image (12.2(2)T2).

The issue is fixed in 12.2(2)T3. Customers who face the problems described with the 12.2(2)T2 image, may upgrade to 12.2(2)T3 image.

Symptom:

MPLS PE doesn't advertise BGP network to CE router running an older IOS image

Conditions:

A Cisco router that is running Cisco IOS Release 12.2(3.1)T or 12.2(2)T and is configured as a provider edge (PE) router may not support Label Distribution Protocol (LDP). This defect might cause the PE router not to advertise any Border Gateway Protocol (BGP) routes to a Cisco 2600 series customer edge (CE) router that is running Cisco IOS Release 12.0(18). However, the CE router will advertise routes to the PE router. Entering the neighbor ce-ipaddress don-capability-negotiate command on the PE router does not correct this defect.

Workaround:

Upgrade the CE router from Cisco IOS Release 12.0(18) to Cisco IOS Release 12.2(2)T3.

About the Cisco IOS 12.1(5.3)T_XT Release

The Cisco IOS 12.1(5.3)T_XT or higher is used with MGX Release 1.1.32 and provides support for:

- RPM-PR in any MGX chassis
  (Note: RPM-PR is FCS with Release 1.1.32; and General Availability with Release 1.1.34.)
- MGX-RPM-128M/Bs in an MGX 8230 chassis
- Multiple RPM card types
- Cisco IOS 12.1(5.3)T_XT offers no other software features for the RPM.

Note To locate IOS-related anomalies or problems fixed, please refer to IOS release notes.

Problems Fixed with Cisco IOS 12.1(5.3)T_XT

Refer to the Cisco IOS Release 12.1 Release Notes at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121relnt/index.htm

Upgrading from an MGX-RPM-128M/B Card to an RPM-PR Card

To replace an MGX-RPM-128M/B card with an RPM-PR card, the PXM must be running MGX Software Release 1.1.34 or later, and the RPM must be running IOS release 12.2(4)T or later. Then perform the following procedure.

Step 1 Insert the RPM-PR in a test node.

Step 2 Copy the new RPM-PR boot image to the flash. Verify that the boot image is the first file in the flash.

Step 3 Modify the configuration of the file to use the latest IOS image on the c: drive by entering the **boot system c:**<*IOS_filename*> command.

Step 4 Enter the **write memory** command to save the configuration file in NVRAM.

Step 5 Enter the **show bootvar** command to check the **BOOT** variable and to verify that the card us configured to boot from the latest image.

Now the RPM-PR card is ready to replace an MGX-RPM-128M/B card.

Step 6 Verify the following before inserting the RPM-PR in the node:

- PXM must be running a minimum firmware release of 1.1.34.
- PXM disk contains the latest IOS image specified for the RPM-PR.

Caution Once an MGX-RPM-128M/B card is replaced with a RPM-PR card, the MGX-RPM-128M/B card can not be re-installed. If an attempt is made to re-install the MGX-RPM-128M/B, the module will be put into 'Mismatch'.

Caution After installing the RPM-PR card, be sure not to mix card redundancy.

Upgrade Procedures for RPM Cards in MGX Release 1 (PXM1) Switches

The following sections describe how to upgrade boot and runtime software on RPM cards in detail.

Upgrading RPM Boot Software

At the factory, a boot file is installed in the bootflash on the RPM card and is used to boot the card. The runtime software is updated more frequently than the boot software. However, the boot software is updated occasionally. When you are updating runtime software, check Table 4 to see if a boot software upgrade is required.

The boot software is stored in bootflash memory on the RPM card. To manage the software in bootflash, you access it as if it were a hard disk. For example, in copy and delete file commands, files are identified as bootflash:*filename* (which is similar to *c:filename*).

The following example shows a directory of bootflash contents:

```
Router(boot)#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .D config   D4F7352A   40330   18      686 Jan 30 2001 18:18:41 auto_config_slot09
2   .D config   CBF007C1   40660    9      688 Feb 22 2001 15:33:11 slot9.cnf
3   .. image    F596869A  2973E8   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.202
```

Note Although you can display directory contents with the **dir bootflash:** command, the **show flash:** command provides more detail. Also, although bootflash and flash are separate entities on other Cisco Systems Routers, both terms refer to the same entity on the RPM.

In the example above, the numbers in the left column indicate the order in which the RPM card will try to load software. The second column shows that the first two files are marked for deletion (D). The last column lists the names of the files stored in bootflash.

When managing the bootflash, you need to keep in mind the following:

- When the RPM card is reset, it tries to load the first undeleted bootable image in bootflash.
- Files are not removed from bootflash until the **squeeze flash:** command is entered.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 56. If this does not work, the card must be returned to the factory to be reprogrammed.

Upgrading RPM Runtime Software

The runtime software on the RPM can be loaded from the following sources:

- The C:RPM directory on the PXM1 hard disk
- Bootflash
- A TFTP server on a LAN to which an RPM back card is connected.

Cisco Systems recommends that you configure the RPM card to load from the C:RPM directory on the PXM1 hard disk. Note that images will load much faster from bootflash, but if you are using multiple RPM cards, it takes longer to complete an upgrade because the runtime software must be copied to each RPM card's bootflash instead of to a single location.

At startup, the RPM card attempts to load the software in the order listed in the startup-config file. The following example shows an excerpt from a startup-config file:

```
!
boot system c:rpm-js-mz.122-4.T
boot system bootflash:rpm-js-mz.122-4.T
boot config c:auto_config_slot09
logging rate-limit console 10 except errors
enable password cisco
!
```

In the startup-config file example, the RPM card attempts to load the runtime software from the PXM1 card (C:rpm-js-mz.122-4.T) first, and if that fails, it attempts to load the image copy stored in bootflash. This configuration takes longer to upgrade, but it assures the card can reboot if someone accidentally removes the file on the PXM1 hard disk.

Note The convention is lowercase *c* for RPM commands and uppercase *C* for switch commands.

To configure the RPM to load upgraded runtime software from the PXM1 hard disk, you need to do the following:

- Copy the upgraded file to the PXM1 hard disk
- Update the boot system variable in the router startup-config file to load the new file.
- Reset the RPM card so that it loads the new file.

RPM cards can be configured for 1:N redundancy as well as for non-redundant configurations. The procedures for both types of configuration are in the sections that follow.

Tip To simplify runtime software updates, copy the runtime file in the C:RPM directory and rename it to a generic name such as rpm-js-mz. The production runtime filenames have version numbers appended to them, but you can change this. This approach allows you to perform future upgrades by copying the file to the hard disk, renaming a copy of the file to your generic name, and resetting each card. The approach eliminates the need to reconfigure IOS on each card to recognize the new filename.

Upgrade Procedure for Boot Software and Runtime Software for Non-Redundant Cards

The following procedure describes how to upgrade boot software and runtime software.

Note The first part of this procedure describes boot software upgrade and the second part describes runtime software upgrade. RPM boot software can be upgraded either in boot mode or in runtime mode. The procedure described here shows an example for runtime mode. The same commands are applicable for upgrading boot software in boot mode.

Step 1 Copy the new boot software file for the RPM card to the switch (C:RPM).

Step 2 Establish a configuration session using any valid user name.

Step 3 Use the **cc** command to select the RPM card to update.

```
8850_LA.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 4 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 5 To verify router access to the PXM1 hard disk and display the boot file name, enter **dir c:** command.

```
Router#dir c:
Directory of c:/

65539  -rw-         815   Sep 13 2001 23:51:10  auto_config_slot09
65540  -rw-     2588780   Mar 22 2001 19:06:54  rpm-boot-mz_002.001.070.201
84611  -rw-     2452768   Apr 05 2001 05:34:44  rpm-boot-mz.122-4.T
66805  -rw-     8529104   Mar 22 2001 19:09:00  rpm-js-mz_002.001.070.201
85809  -rw-     7936012   Apr 05 2001 06:28:54  rpm-js-mz.122-4.T

104857600 bytes total (83068928 bytes free)
```

Step 6 To display the files in the bootflash, enter the **show flash:** command.

```
Router#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    F596869A  296D88   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.201

30315128 bytes available (2452872 bytes used)
```

Step 7 To copy new boot software to the bootflash, use the **copy** command.

```
Router#copy c:rpm-boot-mz.122-4.T bootflash:
Destination filename [rpm-boot-mz.122-4.T]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
2334044 bytes copied in 35.768 secs (66686 bytes/sec)
```

Tip When prompted for the destination filename, press enter to use the source filename shown in the prompt. To change the destination filename, type a new filename after the prompt.

Step 8 To verify that the file was copied, enter the **show flash:** command.

Step 9 To mark an older boot file for deletion from the bootflash, use the **del bootflash:** command as shown in the following example:

```
Router#del bootflash:
Delete filename []? rpm-js-mz
Delete bootflash:rpm-js-mz? [confirm]
Router#
```

Tip To unmark a bootflash file so that it won't be deleted when the **squeeze flash:** command is run, enter the undelete <*number*> command, where *number* is the file number displayed in the left-most column of the *show flash:* command display.

Step 10 To delete all files that are marked for deletion from bootflash, enter the **squeeze flash:** command as shown in the following example:

```
Router(boot)#squeeze flash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]

Squeeze of bootflash complete
```

Step 11 Enter the **show flash:** command to verify that the bootflash files are as you want them.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 56 and restart the RPM card. If this does not work, the card must be returned to the factory to be reprogrammed. When you are done managing the bootflash, the **show flash:** command should display at least one bootable image, and **the image you want the card to boot from must be the first bootable image in the list.**

Tip If the **show flash:** command does not display a bootable image, copy a bootable image to bootflash as described earlier in this procedure. You can continue to manage the bootflash, even when there are no files in bootflash, until the router is restarted.

Tip If the bootflash contains bootable images and the sequence is such that the card will not start, you can enter rommon mode and load the bootable image. To get into rommon mode, establish a console connection to the RPM card, reset the RPM card using the **resetcd** <*slot*> command from the active

PXM1 card, then quickly enter the **CTRL-[**, **Break** sequence at the RPM console. The command to send a **Break** depends on the computer platform and software you are using. It may take a couple of attempts to successfully get into rommon mode. When you are in rommon mode, the RPM card displays the *rommon 1 >* prompt.

Once in rommon mode, you can enter the **dir bootflash:** command to display the images in bootflash. To boot one of the images, enter a **boot** command the following format: **boot bootflash:***filename*.

See Using XModem to Download Flash to RPM Cards, page 56.

This ends the boot software upgrade procedure. The following steps are for upgrading the runtime software. If you do not want to upgrade the runtime software, you need to restart the RPM card by entering the reload command.

Step 12 Copy the new runtime software file for the RPM card to the switch (C:RPM).

Step 13 Establish a configuration session using any valid user name.

Step 14 If you are using a generic filename for your runtime images, copy the file on the PXM1 hard disk and rename the copied file. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz.122-4.T rpm-js-mz
```

Step 15 If your RPM is already configured to use a file with a generic name, skip to Step 24.

Step 16 Use the **cc** command to select the RPM card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 17 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 18 Configure the RPM card to store its configuration on the PXM1 hard disk by entering the following command:

```
Router> boot config c:auto_config_slot#
```

Step 19 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = c:rpm-js-mz.122-4.T,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is C:rpm-js-mz.122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 20 Enter the router global configuration mode.

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

Step 21 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 22 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system c:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the C:RPM directory on the switch. For example:

```
Router(config)# boot system c:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM1 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz.122-4.T
```

Note Before the RPM card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM1 hard disk to bootflash is described in a previous section.

Step 23 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 24 To verify the change, enter the **show bootvar** or **show run** commands.

Step 25 Switch to the active PXM1 card and reset the RPM card. For example:

```
Router#cc 8

(session redirected)

8850_LA.8.PXM.a > resetcd 9
The card in slot number 9, will be reset. Please confirm action
resetcd: Do you want to proceed (Yes/No)? y
```

Upgrading RPM Boot Software and Runtime Software for 1:N Redundancy

Redundancy must be established before you use the procedure in this section. If redundancy has not been established, upgrade each RPM card using the procedure in the next section, “Upgrading Without Redundancy”.

To upgrade the RPM runtime software for 1:N redundancy, use the following procedure. (Note that the directory on the PXM1 card uses (C:) and the directory within the router card uses (c:).)

The following procedure describes how to upgrade boot software and runtime software.

Note The first part of this procedure describes boot software upgrade and the second part describes runtime software upgrade. RPM boot software can be upgraded either in boot mode or in runtime mode. The procedure described here shows an example for runtime mode. The same commands are applicable for upgrading boot software in boot mode.

Step 1 Copy the new boot software file for the RPM card to the switch (C:RPM).

Step 2 Establish a configuration session using any valid user name.

Step 3 Use the **cc** command to select the RPM card to update.

```
8850_LA.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 4 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 5 To verify router access to the PXM1 hard disk and display the boot file name, enter **dir c:** command.

```
Router#dir c:
Directory of c:/

65539  -rw-         815   Sep 13 2001 23:51:10  auto_config_slot09
65540  -rw-     2588780   Mar 22 2001 19:06:54  rpm-boot-mz_002.001.070.201
84611  -rw-     2452768   Apr 05 2001 05:34:44  rpm-boot-mz.122-4.T
66805  -rw-     8529104   Mar 22 2001 19:09:00  rpm-js-mz_002.001.070.201
85809  -rw-     7936012   Apr 05 2001 06:28:54  rpm-js-mz.122-4.T

104857600 bytes total (83068928 bytes free)
```

Step 6 To display the files in the bootflash, enter the **show flash:** command.

```
Router#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    F596869A  296D88   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.201

30315128 bytes available (2452872 bytes used)
```

Step 7 To copy new boot software to the bootflash, use the **copy** command.

```
Router#copy c:rpm-boot-mz.122-4.T bootflash:
```

```
Destination filename [rpm-boot-mz.122-4.T]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
2334044 bytes copied in 35.768 secs (66686 bytes/sec)
```

Tip When prompted for the destination filename, press enter to use the source filename shown in the prompt. To change the destination filename, type a new filename after the prompt.

Step 8 To verify that the file was copied, enter the **show flash:** command.

Step 9 To mark an older boot file for deletion from the bootflash, use the **del bootflash:** command as shown in the following example:

```
Router#del bootflash:
Delete filename []? rpm-js-mz
Delete bootflash:rpm-js-mz? [confirm]
Router#
```

Tip To unmark a bootflash file so that it won't be deleted when the **squeeze flash:** command is run, enter the undelete <*number*> command, where *number* is the file number displayed in the left-most column of the *show flash:* command display.

Step 10 To delete all files that are marked for deletion from bootflash, enter the **squeeze flash:** command as shown in the following example:

```
Router(boot)#squeeze flash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]

Squeeze of bootflash complete
```

Step 11 Enter the **show flash:** command to verify that the bootflash files are as you want them.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 56 and restart the RPM card. If this does not work, the card must be returned to the factory to be reprogrammed. When you are done managing the bootflash, the **show flash:** command should display at least one bootable image, and **the image you want the card to boot from must be the first bootable image in the list.**

Tip If the **show flash:** command does not display a bootable image, copy a bootable image to bootflash as described earlier in this procedure. You can continue to manage the bootflash, even when there are no files in bootflash, until the router is restarted.

Tip If the bootflash contains bootable images and the sequence is such that the card will not start, you can enter rommon mode and load the bootable image. To get into rommon mode, establish a console connection to the RPM card, reset the RPM card using the **resetcd** <*slot*> command from the active PXM1 card, then quickly enter the **CTRL-[**, **Break** sequence at the RPM console. The command to send a **Break** depends on the computer platform and software you are using. It may take a couple of attempts to successfully get into rommon mode. When you are in rommon mode, the RPM card displays the *rommon 1 >* prompt.

Once in rommon mode, you can enter the **dir bootflash:** command to display the images in bootflash. To boot one of the images, enter a **boot** command the following format: **boot bootflash:***filename*.

See Using XModem to Download Flash to RPM Cards, page 56.

This ends the boot software upgrade procedure for the primary card. The following steps are for upgrading the runtime software. If you do not want to upgrade the runtime software for the primary card, skip steps 12 through 24 and go to step 25 to upgrade the boot software on the secondary card.

Step 12 Copy the new runtime software file for the RPM card to the switch (C:RPM).

Step 13 If you are using a generic filename for your runtime images, copy the file on the PXM1 hard disk and rename the copied file. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz.122-4.T rpm-js-mz
```

Step 14 Establish a configuration session using any valid user name.

Step 15 If your RPM is already configured to use a file with a generic name, skip to Step 25.

Step 16 Use the **cc** command to select the RPM card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 17 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 18 Configure the RPM card to store its configuration on the PXM1 hard disk by entering the following command:

```
Router> boot config c:auto_config_slot#
```

Step 19 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = c:rpm-js-mz.122-4.T,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is c:rpm-js-mz.122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 20 Enter the router global configuration mode.

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

Step 21 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 22 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system c:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the C:RPM directory on the switch. For example:

```
Router(config)# boot system c:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM1 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz.122-4.T
```

Note Before the RPM card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM1 hard disk to bootflash is described in a previous section.

Step 23 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 24 To verify the change, enter the **show bootvar** or **show run** commands.

Step 25 Switch to the active PXM1 card. For example:

```
Router#cc 8

(session redirected)
```

Step 26 Switch to the secondary card using the **switchredcd** command as follows:

```
8850_LA.8.PXM.a > switchredcd <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the primary card. Replace <*toSlot*> with the slot number of the secondary card.

This step makes the secondary card active and resets the primary RPM card. When the Primary card resets, it loads the upgraded software.

Step 27 **cc** to the secondary slot.

Step 28 Repeat steps 1through 11.

This ends the boot software upgrade on the secondary card. If you do not want to upgrade the runtime software, go to step 30.

The following steps are for upgrading runtime software on the secondary card.

Step 29 Repeat steps 12through 24.

Step 30 Switch back to the primary card using the **switchredcd** command as follows:

```
8850_LA.8.PXM.a > switchredcd <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the secondary card. Replace <*toSlot*> with the slot number of the primary card.

This step makes the primary card active and resets the secondary RPM card. When the reset is complete, the secondary card is ready to run the upgraded software.

Step 31 To verify that the router reboot is complete, enter the **dspcds** or **dspcd** <*slot*> commands. The reboot is complete when the card state displays as *Active*. Another way to verify router operation is to use the **cc** slot command. If you can access the router from the switch prompt, the router reboot is complete.

Step 32 If there are other primary cards with redundant (secondary) cards, repeat this procedure for each primary card.

Using XModem to Download Flash to RPM Cards

Use the xmodem feature to download the flash to an RPM/B or RPM-PR card. During this process, the card should be connected to a target machine through HyperTerminal with settings of 9600, n, 8, and 1.

Note This feature is only available for ROMMON image version 12.2(4r)T1 or greater. Use the **show version** command to the verify the ROMMON version installed on an RPM card.

Step 1 Put the node in monitor mode by entering the **priv** command to gain access to the privileged commands as follows:

```
rommon 1> priv
You now have access to the full set of monitor commands. Warning:
some commands will allow you to destroy your configuration and/or
system images and could render the machine unbootable.
```

Step 2 The xmodem command becomes available and the general syntax of this command and availability of this can be checked by giving xmodem command without any parameters on the CLI, as follows:

```
rommon 2 > xmodem
usage: xmodem [-cys]
-c  CRC-16
-y  ymodem-batch protocol
-s<speed> Set speed of download, where speed may be
          1200|2400|4800|9600|19200|38400
rommon 3 >
```

The command line options for xmodem are as follows:

Option	Definition
–c	xmodem performs the download using CRC-16 error checking to validate packets. Default is 8-bit CRC.

Option	Definition
–y	xmodem uses Ymodem-batch protocol for downloading, which uses CRC-16 error checking.
–s	Specifies the download speed. Default is 9600 bps.

Note If you do not find the xmodem commands, then the xmodem feature is not available on this rommom version. In that case, you must return the card to Cisco.

Note The rommon "xmodem/ymodem" transfer only works on the console port. You can only download files to the router. You cannot use "xmodem/ymodem" to get files from the router.

For example:

```
rommon 4> xmodem -cys 38400
Do not start sending the image yet...
Invoke this application for disaster recovery. Do you wish to
continue? y/n [n]: y
Note, if the console port is attached to a modem, both the
console port and the modem must be operating at the same baud
rate. Use console speed 38400 bps for download [confirm]
```

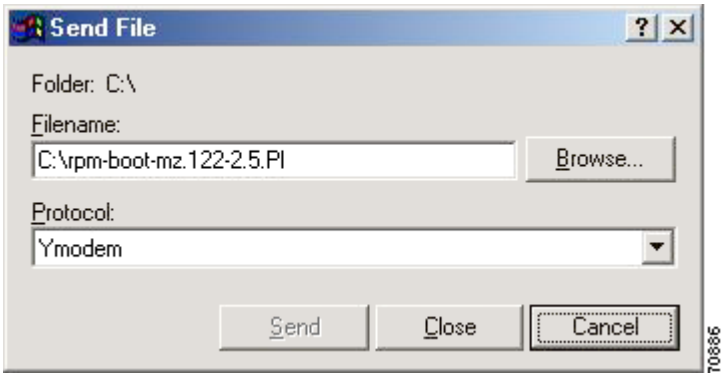
Step 3 At this point, change the preferences in HyperTerminal and adjust the speed from 9600 to 38400.

Note You can continue at the speed of 9600 as well by either not specifying the –s option in the command, or by specifying 9600 explicitly, but it will take longer.

The console will display the following message:

```
Download will be performed at 38400. Make sure your terminal
emulator is set to this speed before sending file. Ready to
receive file ...
```

Step 4 Use the Transfer-->Send File option in HyperTerminal to start the image transfer.



In the Filename box, browse and choose the image file to be downloaded. Also since we used the "y" option while invoking the xmodem, set the transfer protocol to ymodem or use Xmodem protocol by not specifying the –y option on the command line.

The transfer screen comes up and transfer starts. (The transfer may not start immediately; wait for some time and it should start.)

After the transfer is completed (it should typically take about 10-15 minutes), the following messages are displayed on HyperTerminal console:

```
Returning console speed to 9600.

Please reset your terminal emulator to this speed...
```

Step 5 Return the console speed back to 9600 baud through HyperTerminal's Preferences menu option.

Usually, due to time lag between changing HyperTerminal speed back to 9600 baud, you might see a bunch of garbage. To avoid this, disconnect and reconnect the HyperTerminal to get the console back again.

The system will reset itself from here and will boot with new software image.

Historical Information From 1.2.x Baseline

Problems Fixed in Release 1.2.11

The following is the list of problems fixed in the RPM service module firmware and software for this release. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdw22050	Symptom: Crashinfo is always incomplete, not dumping the memory block information. Also observed multiple tracebacks in the crashinfo file. Conditions: This happens whenever MGX-RPM-PR-512 (do "**show version**" to verify this) dumps the crashinfo. Workaround: None

CSCdw70376	Symptom:
	On MGX8850 with PXM1 controller card platform, tftp of the config file by the CWM NMS application from the RPM-PR card takes a long time to complete.
	Condition:
	Happens under almost all conditions. Bigger configuration files take longer.
	Workaround:
	An alternate method to do tftp - fetches the file successfully.
	The steps are as follows:
	`bodc-xdm1% tftp mig1pop1`
	`tftp> bin`
	`tftp> trace`
	`Packet tracing on.`
	`tftp> get RPM/auto_config_slot03`

CSCdw70993	Symptom: Newly Active RPM-PR does not take over configuration from previously Active card. It has the password of the Standby card. Condition: Standby PXM is performing a disk sync with active PXM. A "**write memory**" is issued from Active RPM Once the write is complete, Reload the Active RPM so that the Standby RPM takes over. OR Do a switchredcd from active RPM to Standby RPM Workaround: Use the Standby password to get into the new active card. From the new active card, "**copy c:auto_config_slot*##* running**" once the Standby PXM disk sync is over. *##* is the zero padded slot number of the Primary card in the RPM Redundancy group. During this period there may be a temporary file (e.g. of the form **auto_config_slot05MGX**) in E:\RPM directory which would go away once the Standby PXM disk sync is complete.
CSCdw71199	Symptoms: `<node name deleted> 4: *Feb 11 14:32:38.418: %RPM_VIRTUAL_PORT-3-IPCERR: switch_vport_send_pxm_with_reply: RPC failed. Error String = timeout. Error Code = 6` Conditions: This condition occurs due to the fact that RPC messages were getting blocked on the PXM side for DB to be ready. RPC messages get blocked on PXM for a maximum of 25 seconds and by this 25 seconds DB is not ready "**%Error:GenErr:Disk update failed. Error Code = 306**" error is returned to RPM. But RPM used to timeout early. Workaround: None

CSCdw73714	Symptom: IOS version and bootloader version needs to be reported to the PXM. The "**dspcd**" cli command on the PXM will be used to see the results. In addition, following should be reported to the PXM for the Front card and Backcards: **Serial Number** **800 Part number** **73 Part Number** **CLEI code** Conditions: These RPM changes is introduced to report the above information to PXM so that "**dspcd**" cli command on PXM will display the same. Workaround: None.
CSCdw82519	Symptom: SNMP requests get timed out but there's no error message logged. Condition: Busy Network, High Control/Data traffic through IPC. Consequent SNMP, CLI, TFTP and statistics traffic with big configuration causes very high control traffic. As all these control applications share data, SNMP may timeout if access to data is delayed due to other applications. Workaround: None
CSCdw86244	Symptom: cwaChanCDVT value is not provided in Config Upload file. Condition: When a CWM NMS application tries to sync with the node and tries to upload the RPM config file, it was realized that values of few mib objects were not getting listed in the config upload file though they were getting listed in mib walk. These missing mib objects were from Atm Connection Mib and RPM Subif Mib. Due to these missing values, CWM NMS application Db was depicting wrong info to the users. Workaround: None

CSCdw87231	Symptom: MAC address changes during RPM switch over to redundant RPM card. Condition: With 1:N RPM redundancy configured, switching over from active RPM to standby card via "**resetcd**" or "**reload**" on RPM console, or reseat the active RPM from the chassis will reassign a new MAC address to newly active RPM card instead of using the previously Active RPM's MAC address. Workaround: Configure the MAC address in the interface config. Save the config and reload the RPM. MAC address will not change.
CSCdw88886	Symptom: 1. Configuration of Active RPM cards [using 1:N redundancy] may get overwritten by Standby RPM cards. 2. RPM in boot state may overwrite its **auto_config_slot**## file Condition: 1. When user logs into Standby RPM and configures "**boot config c:auto_config_slot**##" where ## is the slot number of the primary RPM card and then performs a "**write memory**" 2. When the user logs into an RPM in boot state and configures "**boot config c:auto_config_slot**##" where ## is the slot number of the RPM card and then performs a "**write memory**" Workaround: 1. Desist from doing "**boot config c:auto_config_slot**##" on Standby RPM cards where ## is the slot number of the primary RPM. If there is one on the standby, do a "**no boot config**" 2. Desist from doing "**boot config c:auto_config_slot##**" while in boot state where ## is the slot number of the RPM. If there is one, do a "**no boot config**"
CSCdw91197	Symptom: Observed "Error While reserving the SRM slot" error while configuring 1:N redundancy for RPM-PR cards. Conditions: Observed an error while configuring 1:N redundancy for RPM-PR cards via PXM CLI command "addred". Configuration of 1:N redundancy succeeded. Workaround: None.

CSCdx06106	Symptom: SNMP requests to copy running config to memory fails for certain slots. Conditions: SNMP script issued from CWM 10.5.10 machine. Script copies three card configs per node, for four nodes. A total of (12) copies in scripts. It appears that failures occur/timeout during attempt on cards with large configuration. Workaround: Asked customer to modify script such that either there is a longer sleep between sequential cards in same shelf, or target cards with large configuration in different transaction.
CSCdx06855	Symptom: Configuration is getting corrupted after wr mem in 12.2(4)T, 12.2(4)T1, 12.2(4)T2, and 12.2(4)T3 IOS images. Conditions: When "**wr mem**" is performed, using copy <*src*> <*dst*>. If <*src*> is running configuration and <*dst*> is PXM disk, the corruption will occur. If <*src*> is running configuration and <*dst*> is other than PXM disk, corruption will not occur. Workaround: Instead of using "**wr mem**", the following 2 steps are the procedure to save configuration properly on the PXM disk. 1. issue " **copy run bootflash:**<*dummy-file*>" We recommend the dummy-file is named "**start-up**" to make it more readable. Since we are not writing to the disk, the tag is not added. 2. issue "**copy bootflash:**<*dummy-file*> **start**" Since we are saving a file from bootflash to the start-up, this works fine too. Addition Information: Note, the problem is seen with 1.2.01 and IOS versions 12.2(4)T3 or lower only. The problem is not seen with MGX 1.2.00 or lower.
CSCdx09566	Symptoms: After executing "**switchredcd**" command, the RPM-PR card didn't switch over. Conditions: Executed PXM command "**switchredcd**" to switch over from active to standby RPM-PR cards which were configured as 1:N redundant of each other. But the switch over of the RPM-PR cards did not occur. Workaround: Reset the standby card and try again the "**switchredcd**" from active to standby.

CSCdx30607	Symptom: Whenever VC is activated or deactivated on RPM, the following error messages are logged: `02:43:07: %RPM_VIRTUAL_PORT-3-IPCERR: switch_vport_send_pxm_with_reply: Vport request rejected by PXM. Error String = enErr:Input parameters are InCorrect.Error Code = 1869756999` Conditions: On MGX8850 with PXM1 as controller card, it was observed that whenever a VC is activated/deactivated on RPM card - an error message is displayed stating that Vport request is rejected by PXM. Investigation revealed that CONN_STATE_UPDT request is not supported for MGX8850 with PXM1 controller card platform. These conn state/update requests should not be sent if it is MGX8850 with PXM1 controller card. A VC can be activated/deactivated under the following scenarios: 1. Whenever the interface (the VC is bounded to) goes down/up. 2. Whenever the interface (the VC is bounded to) is administratively downed or upped (i.e., using **shut/no shut** commands). Workaround: None.
CSCdx33333	Symptom: RPM fails to check the health of IOS image on the MGX hard disk via "**debug rpm check_image now c:**<*image_name*>". Same command is successfully executed against the image in the bootflash. Conditions: This condition was observed after successfully upgrading the RPM card to internally released IOS image. Issue "**debug rpm check_image now c:**<*image_name*>". Workaround: Copy the IOS image to bootflash and issue "**debug rpm check_image now bootflash:**<*image_name*>".
CSCdx33763	Symptoms: Subinterfaces can be successfully deleted while connections configured existed under that subinterface. Conditions: Through CLI, subinterface deletion is not allowed if connections are configured under that subinterface. SNMP subinterface deletion command does not behave the same way as it allows the deletion of the subinterface while connections are provisioned under it. After subinterface deletion, "**sh sw conn**" still shows the connections. Workaround: None

CSCdx37044	Symptom: Administratively shutting down an subinterface generates not only trap for the subinterface in question but also additional traps are generated related to other subinterfaces as well. Condition: Administratively shutdown an interface generated additional subinterface down traps related to other subinterfaces which are in "Administratively up" state. Workaround: None
CSCdx38360	Symptom: RPMs remain in discovering state after "**switchcc**" for a long time and eventually go into Failed state. Conditions: Ran a script to do a "**switchcc**" and then after a few minutes execute a "**switchredcd**" between slots 12 & 4. After a number of interactions we noticed that both slots 4 & 12 went into the following states listed in order. 1. Discovering State 2. Failed State 3. It looks like failed condition was removed after a "**switchcc**" 4. After a while slot 3 went into "Discovering " state Workaround: reset the RPM cards that is in failed state.
CSCdx39096	Symptom: Enable the feature of keeping both boot and runtime RPM images in C:\FW and E:/RPM directories; and accessing the these directories from RPM so that both RPM image files need not to be saved while "**saveallcnf**" is executed. Conditions: "**saveallcnf**" PXM command used to save all the files from E:/RPM directory in addition to saving files from other drives. Since this PXM command was not able to distinguish between the configuration file and image file, the saved configuration used to become too big and timeouts used to take place. The fix introduced here, will allow the user to download the RPM images to C:/FW directory (which is not considered by "**saveallcnf**" command) thus avoiding the timeout problem. C:/FW directory is mapped to "x:" drive from RPM card. The drive "x:" is only valid for MGX8850 with PXM45 and PXM1E controller card based platforms. The "c:" drive mapping will still work to retrieve the image/data from E:/RPM for MGX8850 with PXM45 controller card and C:/RPM for MGX8850 with PXM1 controller card. Workaround: None.

CSCdx43364	Symptom: SNMP queries (get or getnext) on ifName returns "Sw1" for all rows in the ifTable, rather than returning correct value of ifName for each row in the ifTable. Conditions: Configure "Sw1" and a few more subinterfaces (Sw1.x) on the RPM card. In the ifTable, the value of ifName is set to "Sw1.x" for each subinterface; where "x" is a unique number chosen by the user at the time of configuration of the port. Do "**snmpgetnext**" or "**snmpget**" for each row of the ifTable for ifName. Workaround: None.
CSCdx57456	Symptom: RPM-PR card stays in Boot/Active after issuing "**switchredcd**" command thru CLI. Conditions: Issuing "**switchredcd**" command for redundant RPM-PR cards on MGX8850 with PXM45 controller card platforms causes the card to stay in Boot/Active state. Workaround: Reset the card which is Boot/Active state.
CSCdx65132	Symptom: "**switchredcd**" from primary to secondary card will fail after the simultaneous "**reset**" on both primary and secondary RPM cards. Conditions: Please follow the below steps to get the problem. 1. "**resetcd**" on primary RPM card. 2. "**resetcd**" on secondary RPM card before primary goes to standby. 3. "**switchredcd**" from primary to secondary once primary and secondary comes up as Active and Standby respectively. Workaround: Subsequent resetting of the node (via resetsys) should remedy the situation.
CSCdx70819	Symptom: Core dump occurred while DBsync was taking place between Active and Standby PXM cards. Conditions: When standby PXM comes up, dbsync tries to sync the files from Active PXM to the Standby PXM. During the sync up, if RFS did not lock the config file and update it because of "write mem" request from RPM due to which dbsync failed the expected file size check. Upon the dbsynch failure, Active PXM reset Standby PXM which was in "Init" state. This process created a core dump. Workaround: None.

CSCdx74340	Symptom: Traffic shaping is affected. Conditions: If there is an RPM with traffic shaping configured on it and another RPM is inserted in the adjacent slot, Traffic shaping is affected till PXM recognizes the card and changes the cell-bus clock speed. Workaround: None.
CSCdx84595	Symptom: Turning on CEF will cause the policy routing to stop forwarding packets. Condition: When policy based routing is enabled and CEF turned on, policy routing stops forwarding packets. Workaround: Turn off CEF and policy routing will begin forwarding packets again.
CSCdx92691	Symptom: RPM ingress VC locks up and stops forwarding any traffic. Conditions: A sudden large increase in the ingress traffic (to the tune of 145+ Mbps with a packet size of 384 bytes) may result in this situation. Workaround: Clear the ingress switch sub-interface using **shut/no shut**
CSCdy04422	Symptom: When auto-synch feature is set to Off and Connection is in "notOnRpm" mismatch, the alarm state is not updated. Condition: Add connection, reset card or switchover without saving config will not update the alarm state. Workaround: Unknown
CSCdy11654	Symptom: User can neither "**cc**" nor "**ccc**" (high Pri) to any slot with an RPM seated in it. "**cc**" to any other slot containing any other card type succeeds. Condition: IOS IPC memory buffer leaked for 21 days, zero resource were available for IPC, when this situation occurred. The MGX shelf is operating in simplex mode. Workaround: "**switchcc**" with duplex shelf. "**resetcd**" with simplex shelf.

CSCdy14830	Symptoms: Upon execution of "**switchredcd**" on PXM card, Active RPM card got reset and stayed in "Boot" mode instead of coming up in Standby mode. Conditions: Whenever a switchredcd is issued on the PXM from primary Active RPM card to secondary Standby Card, secondary RPM will take over as active and primary will get reset and comes up as standby. In the process of reloading the primary card, sometimes it will not load the image from the PXM due to the error "Error Sending Request" and finally end up in loading the bootloader image and comes up in Boot mode. This is an intermittent problem. Workaround: Reset the primary RPM card that is stuck in boot state.
CSCdy43191	Symptom: "**no boot system**" didn't work on redundant primary Active RPM card. Condition: Issue '**no boot system**' on the redundant primary Active card and check the bootflash by "**sh bootvar**" command. The "BOOT variable" will still have the old configured value. Workaround: Rename the image file name on the PXM disk to the existing image which is specified in the boot sys variable.
CSCin13744	Symptom: The output of SNMP "get" query for ifType and ifName mib objects for the subinterfaces is incorrect. The display of ifType and IfName for the ATM subinterface does not reflect the type of interface. Conditions: If SNMP "get" request is executed on ifType and IfName mib objects, the output corresponding to the ATM subinterface is incorrect as it lists the subinterface type as "other" and ifName does not provide accurate information. Workaround: None

Problems Fixed in Release 1.2.00

The following is the list of problems fixed in the RPM service module firmware and software for Cisco MGX Release 1.2.00. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdw64591	Symptoms: A Cisco Route Processor Module (RPM) may pause indefinitely after the **clear ip ospf** is executed. Conditions: A Cisco Route Processor Module (RPM) may pause indefinitely after the **clear ip ospf** process EXEC command is issued and display the following message on the console: `%ATMPA-3-BADVCD: Switch1 bad vcd 1460 packet - 05B49847 000900FE 002021FE45000058 00010000 FE00C3A0` Workaround: Reset the RPM.
CSCdx01120	Symptoms: Several rpm-atm hybrid connections provisioned via CWM GUI interface are in “mismatch” state after RPM reload. Conditions: 1. Provision a rpm-atm hybrid vbr3/abr-1/ubr-1 thru CWM CM GUI 2. “MODIFY” the hybrid connections thru CMGUI 3. Wait for 2 to 3 minutes, they will go into “mismatch” state. Workaround: Reapply the same parameters again.
CSCdx11351	Symptom: When a permanent virtual circuit (PVC) is deleted from the Cisco WAN Manager (CWM), the Route Processor Module (RPM) resets and produces a flash file. Conditions: When a permanent virtual circuit (PVC) is deleted from the Cisco WAN Manager (CWM). This behavior occurs only when a service policy is configured on the connection. Workaround: Add the service policy to the PVC after a connection is added. Manually remove the service policy for a connection before deleting the connection and PVC from the CWM.

CSCdx20802	Symptoms: Memory fragmentation may cause 2 MB of memory allocation to fail. Conditions: This symptom affects edge routers that are configured for multi-virtual circuit (Multi-VC) and that have Label-Controlled ATM (LC-ATM) interfaces connected toward a Multiprotocol Label Switching (MPLS) core. Incremental memory leaks occur after the LC-ATM interface is toggled by issuing the **shutdown** interface configuration command followed by the **no shutdown** interface configuration command or after Cisco Express Forwarding (CEF) is enabled and later disabled on the router by issuing the **ip cef** global configuration command followed by the **no ip cef** global configuration command. Incremental memory leaks may also be seen when route flaps occur. If the incremental memory leaks continue, memory fragmentation may occur and traffic may stop passing through the LC-ATM interface. Workaround: None
CSCdx20814	Symptoms: LSC control channel doesn't come up due to VCD conflict Conditions: A freed virtual circuit descriptor (VCD) can be reused immediately after the associated virtual circuit (VC) is removed. If the driver fails to remove the VC promptly, a VC creation error may occur on the new VC to which the VCD has been reassigned. Workaround: None
CSCdx26224	Symptom: The cache l3 bypass global configuration command is missing from the running configuration of an active Route Processor Module (RPM). Condition: When a RPM softswitch command is executed on Active RPM card, the Standby (now Active) card is missing l3 bypass global configuration command from the running config. Workaround: None
CSCdx35197	Symptoms: A **write memory** request that is received via the Simple Network Management Protocol (SNMP) is rejected if there is already a **write memory** request in progress. Conditions: This symptom is observed on a Route Processor Module-PRemium (RPM-PR) card that is installed in a Cisco switch that is running Cisco IOS Release 12.2(8)T. Workaround: None

CSCdx36259	Symptoms: Traffic is dropped, and the following message may be displayed in the log: `%ATMPA-3-BADVCD: Switch1 bad vcd 25136 packet - 62308847 1F9DD0FE 000321FE 45000058 00010000 FE0001C2` Conditions: This symptom is observed on a network in which two provider edge (PE) routers are connected via a label switch controller (LSC). The Multi-virtual circuit (VC) feature is also enabled on the network by entering the **tag-switching atm multi-vc** ATM subinterface submode command. Workaround: None
CSCdx38578	Symptoms: An edge router that has the Multi-virtual circuit (VC) feature configured may reload when route flapping occurs. Conditions: An edge router that has the Multi-virtual circuit (VC) feature configured may reload when route flapping occurs. This symptom affects edge routers that have the Multi-VC feature configured and that have a label-controlled ATM (LC-ATM) interface that faces the Multiprotocol Label Switching (MPLS) core. Workaround: None
CSCin07419	Symptoms: After disabling the Cell Bus Clock rate via **no rpm auto cbclk**; it gets enabled after the card reload. Conditions: Route Processor Module (RPM) may return to the default \223ON\224 state and support automatic cell bus clock change after the **no rpm auto cbclk** change command is issued and the card is reloaded. This condition arises when RPM card is reload. Workaround: Issue the **no rpm auto cbclk** change command explicitly on the reloaded card after every reload.

Problems Fixed in Release 1.2.02

The following is the list of problems fixed in the service module firmware and the Release 1.2.02 software. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdx06855	Symptoms: Configuration is getting corrupted after wr mem in 12.2(4)T to T3 images. Conditions: When wr mem is performed, using copy <src> <dst>. If <src> is running configuration and <dst> is PXM disk, the corruption will occur. If <src> is running configuration and <dst> is other than PXM disk, corruption will not occur. Workaround: Instead of using wr mem, the following 2 steps are the procedure to save configuration properly on the PXM disk. 1. issue **copy run bootflash:**<*dummy-file*> We recommend the dummy-file is named “start-up” to make it more readable. Because we are not writing to the disk, the tag is not added. 2. issue **copy bootflash:**<*dummy-file*> **start** Because we are saving a file from bootflash to the start-up, this works fine too. Additional Information: Note, the problem is seen with 1.2.01 and IOS versions 12.2(4)T3 or lower only. The problem is not seen with MGX 1.2.00 or lower.

Problems Fixed in Release 1.2.01

The following is the list of problems fixed in the service module firmware and the Release 1.2.01 software. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Note Due to CSCdx06855, MGX 1.2.01 is no longer generally available and has been deferred. This DDTS has been resolved in MGX 1.2.02.

Bug ID	Description
CSCdw41946	Symptom: Loss of RPM configuration. Condition: The auto_config_slot<x> file size is set to zero resulting in an invalid con- figuration. Workaround: UNKNOWN
CSCdw55029	Symptom: Failed to CC to RPM card Conditions: Added sub interfaces and connection using scripts. Workaround: switchcc
CSCdw56886	An error can occur with management protocol processing. Please use the following URL for further information: http://www.cisco.com/cgi-bin/bugtool/onebug.pl?bugid=CSCdw65903

Problems Fixed in Release 1.2.00

The following is the list of problems fixed in the service module firmware and the Release 1.2.00 software. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdu14185	Symptom: Unable to add RPM connection Conditions: Condition was caused by using CM and adding the ATM(RPM) to ATM(RPM) connection from mgx8250 to mgx8230 and the error was: Connection add request to PXM failed. Workaround: Using CM to add 3-segment connection: ATM(RPM) - ATM(RPM).

Bug ID	Description
CSCdu34346	Condition: Issue the 'addred <primary> <secondary> 2' command. The primary and secondary RPM cards should have different (number or type) of backcards.This condition also applies to the case when each card has one backcard each, both of the same type, but in different slots. Result: The following warning is to be expected---- addred:Prim and Sec LineModule type Mismatch. Command will proceed for the card type.
CSCdv26571	Symptoms: Communication between PXM and all RPM in the shelf is very slow. **sho ipc queue** shows that the queue is full. Conditions: cc to RPM using two parallel sessions and run extended ping on each of the session. Workaround: Run extended pings from telnet sessions instead of cc to the card

About These Release Notes (MGX 3.0.20)

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription.

Note that for Release 4.0.00, the user documentation (command reference, overview, and installation and configuration guides) use the MGX Release 3 and Cisco IOS documents in addition to this release note.

For RPM-PR, use the *Cisco MGX Route Processor Module (RPM-PR) Installation and Configuration Guide, Release 2.1* (DOC-7812510=) along with this release note. The RPM-PR documentation can be found at the following MGX 8850 and MGX 8950 Release 2.1 URLs:

http://www.cisco.com/univercd/cc/td/doc/product/wanbu/8850r21/rpmpr/index.htm

http://www.cisco.com/univercd/cc/td/doc/product/wanbu/mgx8950/rel21/rpm/index.htm

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New Features

RPM in MGX 8000 Release 4.0.00 supports all new and existing features introduced in the Release 2.1 baseline. There are four new features for RPM implementations using IOS Release 12.2(15)T4a:

- MPLS CoS Transparency – Configuration information can be found at http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122t/122t13/ftdtmode.htm
- cRTP with MQC – Configuration information can be found at http://lbj.cisco.com/push_targets1/ucdit/cc/td/doc/product/software/ios122/122newft/122t/122t13/fthdrcmp.htm
- LSC Redundancy
- MVPN

Previously Released Features

RPM Image Directory Change From E:RPM to C:/FW

Until this release, all files used by RPM were stored in E:RPM. All other service modules, including PXM, stores their firmware files in C:/FW. You can now use C:/FW (or x: from RPM-PR card) directory to download the RPM images. As with all other service modules, by storing all the firmware files, including the RPM files in C:/FW, the router blades can more easily integrate with the shelf architecture.

Note This change is backward compatible. That is, you can still use E:RPM or (e:from RPM card) to access and configure RPM images.

Due to the large number and size of RPM images in the E:RPM directory, the **saveallcnf** command would timeout. By moving these large image files to the C:/FW directory, and leaving only the configuration files in the E:RPM directory, this change alleviates the timeouts incurred when executing the **saveallcnf** command.

Automatic Cell Bus Clocking

Auto Clock Setting feature is enabled using the **cnfndparms** command.

The CLI commands **dspcbclk** and **cnfcbclk** allow for manual setting of the cellbus clock rates, as shown in the following listing.

```
unknown.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)    Slots     Allowable Rates (MHz)
    ----------------------------------------------------------
       CB1         21        1, 2            21, 42
       CB2         21        3, 4            21, 42
       CB3         21        5, 6            21, 42
       CB4         21        17 - 22         21
       CB5         21        9, 10           21, 42
       CB6         21        11, 12          21, 42
       CB7         21        13, 14          21, 42
       CB8         21        25 - 30         21
```

To enable automatic setting of cellbus clock rates, a node parameter must be turned on. The CLI commands **dspndparms** and **cnfndparms** manipulate the node parameters, as shown in the following listing.

```
unknown.7.PXM.a > dspndparms
unknown                          System Rev: 03.00   Oct. 02, 2002 13:42:53 PST
MGX8850                                              Node Alarm: MINOR
NODE CONFIGURATION OPTIONS
Opt#  Value       Type           Description
----  -----       ----           -----------
1     3600        16bit Decimal  SHM Card Reset Sliding Window (secs)
2     3           8bit Decimal   SHM Max Card Resets Per Window (0 = infinite)
3     Yes         Boolean        Core Redundancy Enabled
4     No          Boolean        Expanded Memory on PXM45B Enabled
5     0x0         8bit Hex       Required Power Supply Module Bitmap
6     0x0         8bit Hex       Required Fan Tray Unit Bitmap
7     0           8bit Decimal   Trap Manager Aging timeout value(Hour(s))
8     atm0        8bit Decimal   Primary IP interface for Netmgmt
9     lnPci0      8bit Decimal   Secondary IP interface for Netmgmt
10    No          Boolean        Auto Setting of Cellbus Clock Rate Enabled
11    Yes         Boolean        Inband Node-to-Node IP Connectivity Enabled
```

Turning node parameter 10 on allows for automatic setting of cellbus clock rates. After it is enabled, software immediately determines if any cellbus rates need to be changed. If, for example, two RPM-PR cards exist in one cellbus, that cellbus rate will be changed to 42MHz, as shown in the following listing.

```
unknown.7.PXM.a > cnfndparm 10 yes
NODE CONFIGURATION OPTIONS
Opt#  Value       Type           Description
----  -----       ----           -----------
10    Yes         Boolean        Auto Setting of Cellbus Clock Rate Enabled
```

Once enabled, **dspcbclk** shows that manual setting is no longer allowed, as displayed in the following listing.

```
unknown.7.PXM.a > dspcbclk

     CellBus    Rate (MHz)    Slots     Allowable Rates (MHz)
    ---------------------------------------------------------
       CB1         21        1, 2            21, 42 (Auto Setting Enabled)
       CB2         21        3, 4            21, 42 (Auto Setting Enabled)
       CB3         21        5, 6            21, 42 (Auto Setting Enabled)
       CB4         21        17 - 22         21
       CB5         21        9, 10           21, 42 (Auto Setting Enabled)
       CB6         21        11, 12          21, 42 (Auto Setting Enabled)
       CB7         21        13, 14          21, 42 (Auto Setting Enabled)
       CB8         21        25 - 30         21
```

If you attempt to manually configure cellbus clock rate while automatic cellbus rate changes are enabled, you will receive an error message similar to the shown in the following listing.

```
unknown.7.PXM.a > cnfcblclk 1 42
Err: Illegal value for option -rate
    -cb <cellBus>, where cellBus is a string CB1..CB8
    -rate <clockRate>, where clockRate is 21 or 42 (MHz)

unknown.7.PXM.a >
```

New Fields Added to dspcd

The **dspcd** cli command on the PXM now displays the following additional front and back card information:

- Serial Number
- 800 Part number
- 73 Part Number
- CLEI code

Prior to this release, the following information was displayed:

```
rswzen2.8.PXM.a > dspcd 3
rswzen2                          System Rev:03.00   Aug. 26, 2002 19:25:49 PDT
MGX8850                                              Node Alarm:MAJOR
Slot Number:  3    Redundant Slot:NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:      RPM_PR              FE_RJ45             ---
Reserved Card:      UnReserved          UnReserved          UnReserved
State:              Active              Active              Empty
Serial Number:                                              ---
Prim SW Rev:        ---                 ---                 ---
Sec SW Rev:         ---                 ---                 ---
Cur SW Rev:         ---                 ---                 ---
Boot FW Rev:        ---                 ---                 ---
800-level Rev:                                              ---
800-level Part#:    000-00000-00        000-00000-00        ---
CLEI Code:                                                  ---
```

```
Reset Reason:      On Reset From Shell
Card Alarm:        NONE
Failed Reason:     None
Miscellaneous Information:
```

As of Release 3.0.10, the following information is displayed:

```
rswzen2.8.PXM.a > dspcd 1
rswzen2                          System Rev:03.00   Aug. 26, 2002 19:24:24 PDT
MGX8850                                              Node Alarm:MAJOR
Slot Number:  1    Redundant Slot:NONE

                    Front Card          Upper Card          Lower Card
                    ----------          ----------          ----------

Inserted Card:     RPM_PR              FE_RJ45             ---
Reserved Card:     UnReserved          UnReserved          UnReserved
State:             Active              Active              Empty
Serial Number:     SAG06041R16         SAG053355UV         ---
Prim SW Rev:       ---                 ---                 ---
Sec SW Rev:        ---                 ---                 ---
Cur SW Rev:        12.2(11)T1           ---                 ---
Boot FW Rev:       12.2(11)T1           ---                 ---
800-level Rev:     A0                  B2                  ---
800-level Part#:   800-07424-00        800-02560-00        ---
CLEI Code:         BA3AY30CAA          BAEIAAAAAA          ---
Reset Reason:      On Reset From Shell
Card Alarm:        NONE
Failed Reason:     None
Miscellaneous Information:

Type <CR> to continue, Q<CR> to stop:q
```

Using the switchredcd Command with RPM-PR Cards to Switch from Active to Standby Card

The MGX RPM-PR uses the **switchredcd** command to manually change the active card to the standby card as of Cisco MGX Release 3.0 and Cisco IOS Release 12.2(8)T4) , similar to other MGX service modules. The **switchredcd** command replaces the **softswitch** command that was previously used and is now obsolete.

Be sure to execute the **switchredcd** command before removing an active RPM-PR card from the MGX 8000 series switch shelf.

See "Upgrade Procedures for RPM-PR Cards in MGX 8000 Release 2.1 and Release 3 (PXM45 and PXM1E) Switches" section on page 104 and "Upgrading RPM-PR Boot Software and Runtime Software for 1:N Redundancy" section on page 109.

For more information on the **switchredcd** command, refer to the *Cisco MGX 8850, MGX 8950, and MGX 8830 Command Reference (PXM45/B and PXM1E), Release 3.*

VISM-PR to RPM-PR Connectivity

The VISM-PR card supports 144 channels when used with the G.723.1 codec, whereas the current VISM card support supports 64 channels with the G.723.1 codec.

The following VISM Release 3.0 features require either the PXM1E or PXM45 card in your MGX 8000 Series switch chassis:

- Expanded Clock Source Selection
- Private Network-to-Network Interface Priority Routing
- Specify a Connection Up or Down
- AAL1 and AAL2 Switched Virtual Circuits

As of Cisco MGX Release 3.0 and Cisco IOS Release 12.2(8)T4), setting connections between a VISM-PR card and a RPM-PR card in your MGX 8000 Series switch chassis requires that you use the new VBR (NRT) 3 connection type.

If you are using a VISM-PR card in combination with either a PXM1E or PXM45 card, you must use the VBR (NRT) 3 selection when adding a connection. Use the modified **addcon** or **cnfcon** commands to configure this connection type.

For more information, refer to the *Cisco VISM Installation and Configuration Guide, Release 3*.

Configuring the Cell Bus Clock (CBC) Rate

As of Cisco MGX Release 3.0 and Cisco IOS Release 12.2(8)T4), when two RPM-PR cards are on the same cell bus, that is, they occupy adjacent slots (for example, slots 1 and 2, slots 3 and 4), the cell bus clock (CBC) rate will be automatically set to 42MHz. Correspondingly, if there is only one RPM on the cell bus, the clock should be at the default value of 21 MHz.

If, for any reason, one of the adjacent RPM-PRs goes to Failed or Empty state, the CBC for that cell bus must be reconfigured for the Traffic Shaping to work correctly on the active RPM. On MGX Release 3, reconfiguration of CBC rate from 42MHz to 21 MHz is done *automatically.*

RPM makes use of idle cells for Traffic Shaping and Scheduling. If there are two RPMs in adjacent slots on the same cell bus and one of the RPMs is put into a Failed state by the PXM, while that card is actually alive, then the “Failed” RPM must stop sending idle cells to avoid impacting the Traffic Shaping on the adjacent functional RPM. The command that implements the RPM support for this feature is **rpm-auto-cbclk-change**

rpm-auto-cbclk-change will enable the RPM to stop sending idle cells in the event of being put into a “FAILED” state by the PXM and thus prevent an impact on the Traffic Shaping on an adjacent functional RPM.

no rpm-auto-cbclk-change will disable the feature to stop sending of idle cells if the RPM is put into a FAILED state. This command may be used if Traffic Shaping is not required.

The following screen output displays an example of the **rpm-auto-cbclk-change** command.

```
RPM-11#config  terminal
  Enter configuration commands, one per line.  End with CNTL/Z.
  RPM-11(config)#int sw1
  RPM-11(config-if)#rpm-auto-cbclk-change
  RPM-11(config-if)#end
  RPM-11#write mem
  Building configuration...
  [OK]
  RPM-11#show run int sw1
Building configuration...

Current configuration :142 bytes
!
interface Switch1
 no ip address
```

```
 no atm ilmi-keepalive
 rpm-auto-cbclk-change
 switch autoSynch off
end
! rpm_tag_id Apr 04 2002 02:49:04
```

If Traffic Shaping is **not** a requirement, enter the **no rpm-cbclk-change** command, either manually or during card configuration. The following screen output displays an example of the **no rpm-auto-cbclk-change** command.

```
RPM-11#config  terminal
  Enter configuration commands, one per line.  End with CNTL/Z.
  RPM-11(config)#int sw1
  RPM-11(config-if)#no rpm-auto-cbclk-change
  RPM-11(config-if)#end
  RPM-11#write mem
  Building configuration...
  [OK]
  RPM-11#show run int sw1
Building configuration...

Current configuration :145 bytes
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 no rpm-auto-cbclk-change
 switch autoSynch off
end
! rpm_tag_id Apr 04 2002 02:49:57
```

Note By default on the RPM this feature is enabled.

LDP on RPM-PR in MGX 8850 and MGX 8950

The MPLS label distribution protocol (LDP), as standardized by the Internet Engineering Task Force (IETF) and as enabled by Cisco IOS software, allows the construction of highly scalable and flexible IP Virtual Private Networks (VPNs) that support multiple levels of services.

LDP provides a standard methodology for hop-by-hop, or dynamic label, distribution in an MPLS network by assigning labels to routes that have been chosen by the underlying Interior Gateway Protocol (IGP) routing protocols. The resulting labeled paths, called label switch paths or LSPs, forward label traffic across an MPLS backbone to particular destinations. These capabilities enable service providers to implement Cisco's MPLS-based IP VPNs and IP+ATM services across multivendor MPLS networks.

From an historical and functional standpoint, LDP is a superset of Cisco's pre-standard Tag Distribution Protocol (TDP), which also supports MPLS forwarding along normally routed paths. For those features that LDP and TDP share in common, the pattern of protocol exchanges between network routing platforms is identical. The differences between LDP and TDP for those features supported by both protocols are largely embedded in their respective implementation details, such as the encoding of protocol messages, for example.

This software release of LDP provides the means for transitioning an existing network from a TDP operating environment to an LDP operating environment. Thus, you can run LDP and TDP simultaneously on any given router platform. The routing protocol that you select can be configured on a per-interface basis for directly connected neighbors and on a per-session basis for non directly connected (targeted) neighbors. In addition, a label switch path (LSP) across an MPLS network can be supported by LDP on some hops and by TDP on other hops.

MPLS LDP offers the following features:

- IETF Standards-based Label distribution protocol
- Multi-Vendor Interoperability
- TDP to LDP migration and interoperability

Multi-LVC on RPM in MGX 8850 and MGX 8950 Release 2.1.76 Running Cisco IOS Release 12.2(8)T1

This feature enables support for initiation of Multiple label switched paths (LSPs) per destination on the RPM. Different label switched paths are established for different class of services. This feature enables interface level queueing rather than per-vc level on the RPM based on MPLS class of service policy. With Multi-LVC support, customers can deploy IP VPN services with Class of service SLAs.

Multiprotocol Label Switching (MPLS) over ATM using VC Merge in MGX 8850 and MGX 8950 Release 2.1.76 Running Cisco IOS Release 12.2(8)T

The virtual circuit (VC) merge facility allows a switch to aggregate multiple incoming flows with the same destination address into a single outgoing flow. Wherever VC merge occurs, several incoming labels are mapped to one single outgoing label. Cells from different virtual channel identifiers (VCIs) going to the same destination are transmitted to the same outgoing VC using multipoint-to-point connections. This sharing of labels reduces the total number of VCs required for label switching.

Without VC merge, each path consumes one label VC on each interface along the path. VC merge reduces the label space shortage by sharing labels for different flows with the same destination. Therefore, VC-Merge connections are unidirectional, and furthermore, all merged connections must be of the same service type.

Note To support VC-merge, the ATM switch requires that AXSM cards allow multiple VC frames to be merged into a single VC without interleaving cells inside AAL5 frames. The RPM is the control point, where LSC resides.

VC Merge is enabled by default when the MPLS over ATM network is configured and is only used when the RPM is used as an LSC (Label Switch Controller). Because it is enabled by default, the only commands necessary are:

no tag-switching atm vc-merge to disable VC Merge

and

tag-switching atm vc-merge to enable VC Merge

For more information, see MPLS Label Switch Controller and Enhancements at the following URL:
http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122t/122t8/ftlsc.htm#xtocid15

Bypass Feature for RPM in Cisco IOS Release 12.2(4)T

Note Information about the bypass feature and the IOS commands used to support it was not available at the time of the printing of the RPM documents; therefore, it is included in the these release notes.

RPM cards have a maximum storage of 128 KB for the NVRAM. This size limitation creates a problem for customers with large configurations, who find it impossible to store the complete configuration in the NVRAM, even with compression enabled.

In order to support storage of large configuration files, a new bypass feature is now available in the 12.2(4)T IOS Release. With the bypass feature enabled, the enhanced **write memory** command is used to bypass the NVRAM and save the configuration on the file *auto_config_slot##* located in E:/RPM, where ## represents the zero-padded slot number in which the RPM-PR card is seated in the MGX chassis.

To enable the bypass feature, issue the command **rpmnvbypass** from the IOS run time image—not in the IOS boot image.

To disable the bypass feature, issue the command **no rpmnvbypass**.

To verify that the bypass feature is either enabled or disabled, issue the **show running-configuration** command. If the bypass feature is enabled, **rpmnvbypass** is seen on the display. If it is not seen, the feature is not enabled.

Note Because the bypass feature bypasses NVRAM, it is not necessary to compress the configuration file using the command **service compress-config**.

Table 6 contains cautions important to the successful usage of the bypass feature.

Table 6 Boot Cautions

Caution	Why is This Important?
When using the bypass feature, you can only load the run time IOS image from the PXM hard-drive or from the boot flash.	In the case of an RPM module, the IOS image can be loaded in 3 ways: 1. From the PXM hard-drive. 2. From the boot flash. 3. From the network (for example, via TFTP) from the RPM back card (Ethernet or Fast Ethernet). When the bypass feature is enabled, the **boot config** statement: `c:auto_config_slot##` is automatically generated. The NVRAM configuration is cleared upon a **write memory**. In order to load from the network, the RPM has to have an IP address for its backcard. This information is part of the NVRAM configuration, which was just cleared by enabling the bypass feature. Hence, it is not possible to load the IOS image from the network upon a reload of the RPM after the **rpmnvbypass** and **write memory** have been executed.

Table 6 Boot Cautions

Caution	Why is This Important?
Do not execute the command **no boot config** because doing so may prevent the bypass feature from working properly.	When the bypass feature is enabled, the "boot config" statement: `c:auto_config_slot##` is automatically generated, and the NVRAM configuration is cleared. Any writes now are directed to the **boot config** file. This is essential, as a **write memory** expects the **boot config** statement to be present. If the **boot config** statement isn't present, it would write the configuration into the NVRAM, which of course, is not desirable when the objective is to save a complete configuration when the configuration is large and requires more space.
If the command **write memory** is issued with the bypass feature enabled, and is consequently followed by an RPM card reset, previous versions of the boot image will trigger the RPM card to go into boot mode (unable to load run-time IOS).	For safety purposes, the location of the system image is stored in a special area (called the ROMMON area) in the NVRAM. The ROMMON is always intact. The 12.2(4)T boot image accesses and reads ROMMON in order to load the IOS image. Boot images prior to 12.2(4)T do not read the ROMMON area. Generally, the IOS boot and run-time images are of the same versions. However, if the user changed his boot image to one prior to 12.2(4)T, on a reload, the boot image would see that the NVRAM configuration is empty (of course, this is normal when the bypass feature is enabled). However, since boot images prior to 12.2(4)T cannot access the ROMMON area, it cannot read there the location of the IOS image. Unable to see the IOS image, it instead loads itself.

Example 6 through Example 10 illustrate how the bypass feature is enabled and disabled, and how to validate each of these actions from the configuration display.

Example 6 Running configuration without the bypass feature enabled

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 470 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
enable password cisco
!
ip subnet-zero
!
!
```

```
!
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
snmp-server community private RW
!
!
line con 0
line aux 0
line vty 0 4
 no login
!
end
```

Example 7 Enable the bypass feature (rpmnvbypass)

```
rpm_slot02#
rpm_slot02#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
rpm_slot02(config)#rpmnvbypass
The "boot config" statement has been (re)added to your
running configuration. Do not remove it else risk not
using the nvbypass feature

rpm_slot02(config)#end
rpm_slot02#
```

Example 8 Running configuration with bypass feature enabled (note rpmnvbypass at end of output)

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 515 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
boot config c:auto_config_slot02    <==== Line added as per output above
enable password cisco
!
ip subnet-zero
!
!
!
!
interface Switch1
 no ip address
```

```
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
snmp-server community private RW
!
!
line con 0
line aux 0
line vty 0 4
 no login
!
rpmnvbypass
end
```

Example 9 Disable the bypass feature (no rpmnvbypass)

```
rpm_slot02#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
rpm_slot02(config)#no rpmnvbypass
rpm_slot02(config)#end
rpm_slot02#
```

Example 10 Running configuration after the bypass feature is disabled

```
rpm_slot02#show running-config
Building configuration...

Current configuration : 503 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname rpm_slot02
!
boot system c:rpm-js-mz.<new_rel>
boot config c:auto_config_slot02
enable password cisco
!
ip subnet-zero
!
!
!
!
interface Switch1
 no ip address
 no atm ilmi-keepalive
 switch autoSynch off
!
ip classless
no ip http server
ip pim bidir-enable
!
!
snmp-server community public RO
```

```
snmp-server community private RW
!
!
line con 0
line aux 0
line vty 0 4
 no login
!
end

rpm_slot02#
```

Features Not Supported in This Release

- MPLS inter AS
- MPLS TE

RPM Redundancy Support

RPM 1:N redundancy is used to switch configuration and traffic from one RPM card to another. The main benefits are:

- Route processing continues even if an RPM fails and there is no operator or direct access to swap the failed card or fix the problem.
- An RPM card with hardware problems can be fixed while the redundant standby card takes over its functionality.
- Software upgrades are easier and can be done with less downtime.

SNMP MIB

SNMP MGX Release 3.0 MIB are provided with the delivery of this release. The MIB is in standard ASN.1 format and is located in the same directory within the release bundle on CCO. These files may be compiled with most standards-based MIB compilers. The tar file for MIB contains the file release notes that contains the MIB release notes.

For changes in this MIB from the previous release, please refer to the MIB release notes.

Note The old_mib_Format is discontinued as of this release.

Notes and Cautions

The following notes and cautions should be reviewed before using this release.

UPC Connection Parameters

In Release 2.1.60 and higher, the default PCR is 50 cps, and the default for policing is **enabled**. These settings are insufficient for running RPM ISIS protocol over the connection, and with such settings, the ISIS protocol will fail. *The PCR value needs to be increased, depending upon the number of interfaces configured for ISIS on the RPM.*

Depending upon your connection type, you can use the following CLIs to modify the PCR parameter.

- **cnfupccbr**
- **cnfupcvbr**
- **cnfupcabr**
- **cnfupcubr**

Booting the RPM-PR

Refer to Chapter 5, "Configuring the MGX RPM-PR" in the *Cisco MGX Route Processor Module RPM-PR) Installation and Configuration Guide, Release 2.1*, (DOC-7812510=) and for complete details on configuring the RPM-PR cards. (See the "Obtaining Documentation" section on page 135 for information on how to order a printed copy of this manual or locate the manual online.) A summary of the booting and upgrading procedures is presented here for your convenience.

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 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. (Refer to the "Viewing the Hardware Configuration" section of the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 2.1* (DOC-7812510=).

   a. If the configuration register is set to the factory-default setting of **0x01**, RPM-PR will come up and stay in boot mode.

   b. If the configuration register is **0x2**, the RPM-PR will look for the runtime image either in bootflash or on the PXM45/B E:RPM drive.
3. The search for runtime image is determined by which boot system command is entered.

a. Entering the **boot system e:**<*runtime_image_name*> command will result in a search for a runtime image in the E:RPM directory on the PXM45 hard disk.

b. Entering the **boot system bootflash:**<*runtime_image_name*> 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 E: 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 e:**<*config_file*> command.
6. For normal RPM-PR operation, there must be a valid Cisco IOS image on the PXM45 E: 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, refer to Appendix C, "IOS and Configuration Basics"of the *Cisco MGX Route Processor Module Installation and Configuration Guide, Release 2.1* (DOC-7812510=)

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.

Caution 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.

CLI Modifications in MGX Release 4.0.00

There are no new or modified RPM-PR CLI commands in Release 4.0.00.

Limitations and Restrictions

CWM Recognition of RPM-PR Back Card

CWM does not distinguish between the Ethernet back card versions installed with the RPM-PR. There is no functionality difference.

RPM Front Card Resets on the Back Card Removal

The RPM front card may reset on an MGX 8850 or MGX 8950 switch when the ethernet back card is removed or inserted.

This reset problem can be easily avoided if **shut** interface is executed before the removal of the back card.

RPM-PR Back Ethernet Card Support

For Ethernet connectivity with the RPM-PR, the model "/B" four-port Ethernet back card is required (order number: MGX-RJ45-4E/B).

RPM-PR Limitations and Restrictions (PXM45 and PXM1E)

The RPM-PR and MPLS limitations and restrictions that apply to this release are as follows:

- In an application where the RPM is a Provider Edge Router in an MPLS Virtual Private Network service, a much better solution in any case is to use a distance-vector routing protocol between the customer routers and the RPM. A distance-vector routing protocol provides exactly the information required for this application: reachability information, and not link-state information. The distance-vector routing protocols supported by the RPM are BGP, RIP v1 and RIP v2, as well as static routing. With RPM software releases from 12.0.7T1, distance-vector routing protocols can be used with as many different networks as subinterfaces.
- Note that if the RPM is acting as a Provider Edge Router in an MPLS Virtual Private Network service, and even if OSPF is running in a customer network, it is not necessary to run OSPF between the customer router and the RPM. If the customer edge devices run Cisco IOS, they can redistribute OSPF routing information into RIP using the IOS commands, redistribute RIP in the OSPF configuration, and redistribute OSPF in the RIP configuration. Similar configurations are possible for BGP. (For more information on re advertisement, see the "Configuring IP Routing Protocol-Independent Features" chapter in the Cisco IOS Release 12.0 Network Protocols Configuration Guide, Part 1). Redistribution is not unique to Cisco CPE, and other vendors' equipment also supports redistribution.
- Whenever there are 2 RPM cards on adjacent slots, driven by the same cell bus clock, the clock rate should be set to 42 MHz for traffic shaping, using the command **cnfcbclk**. This configuration will be lost if the node rebuilds due to **resetsys** or a power cycle. The user will have to manually re-configure the cell bus clock rate after the rebuild, using the **cnfcbclk** command.

- On PXM45-based switches, when the chassis is loaded with 6 or more RPM-PR cards, and if every card is configured to download the IOS runtime image from the PXM45 hard disk, occasionally, upon entering a **resetsys** command or after a power cycle, some of the RPM-PR cards may go into the failed state. To reset the failed RPM-PR cards, enter the **resetcd** <*slot #*> command for each failed card.
- RPM-PR cannot be configured as ELSR (Edge Label Switch Router) with PXM1E as controller card.
- **Saveallcnf** (issued on the PXM45/B card) captures configuration data saved by the RPM-PR card (as well as AXSM and PXM45 cards), and saves it on the active PXM45/B card's hard disk. Users must have configured RPM to store its configuration on the PXM45/B hard disk (E:/RPM). That is, on RPM, a user should have this line in its running configuration (**boot config e:auto_config_slot#**). To ensure that the saved file contains the latest RPM configuration, the user needs to execute the **copy run start** command on each RPM card prior to the **saveallcnf** command. This way, the RPM files on the active PXM45 hard disk will contain the latest configuration to be saved.
- A single RPM-PR can only function as either an Edge LSR or as an LSC, but not as both.
- Total of (OC12 minus T3) Mbps intrashelf traffic for Cell bus based modules are supported.
- To configure redundancy, the primary and secondary RPM-PR cards need to be in the Active state and the secondary card should not have any configuration.
- Removing a back card does not cause RPM-PR switchover.
- After establishing redundancy between two RPM-PR cards with the **addred** command, you must enter the **copy run start** command on the primary RPM-PR card to save the configuration change.
- If a secondary RPM-PR card is redundant to primary cards x and y, you cannot delete redundancy for only card x.
- If you need to enter the **switchredcd** (formerly **softswitch**) and **switchcc** commands, Cisco Systems recommends that you wait at least 5 seconds after issuing the **switchredcd** command, and then enter the **switchcc** command**.**
- IOS software images on primary and secondary RPM-PR cards do not have to be compatible, but the IOS software on a secondary card should be at the same level as the primary card or higher.
- For ELSR to LSC connectivity, default control vc used is 32. If PNNI partition exists with VCI 32 as part of its partition range, then when MPLS partition is added, there are two options to handle the situation:
  - Add MPLS controller and define its partition with available range. On ELSR, define control vc from any VCI value within the range defined in partition. The same VC should be defined on LSC on xTag interface.
  - Reconfigure PNNI partition to spare the control VC usage both on RPM-PR and AXSM, AXSM/B or AXSM-E APS Management Information.
- Whenever the RPM-PR configuration is changed and a user wants to store that configuration, the user must enter the **copy run start** command on the RPM-PR. If this is not done, the changed configuration will be lost on RPM-PR card reboot or RPM-PR switchover in case of redundancy.
- Even though RPM-PR can have 1999 sub interfaces, the usage of sub interfaces should be planned in such a way that it does not cross a safe limit of 1985. This is because each sub interface takes one IDB (interface descriptor block) and the number of IDBs available in the card is 2000. Further, a user might need some IDBs for the RPM-PR back card and its ports.

Problems Fixed in This Release

The following is the list of problems fixed in the RPM service module firmware and software for this release. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdy24232	Symptom: The following symptoms may be observed due to this defect: 1. "**dsplog**" indicates that a card does not exist. The log will look similar to the following (card 1 in this example): `01460 07/31/2002-18:32:10  SCM-4-NODEST tSCM  scmProcDataMsg Card 1 doesn't exist, 105 21` 2. (in conjunction with the above) Inability to "cc" to a narrow-band service module. Conditions: Symptom 1 will be seen after a PXM switchover. Symptom 2 will be seen after a PXM switchover, and if there have been 2 "**cc**" sessions active on the narrow-band service module when PXM switchovers have occurred (not necessarily the same switchover). This issue preferentially affects low-numbered slots; slot 1 is almost guaranteed to be affected, whereas slot 4 is almost never affected. Workaround: No workaround for Symptom 1. Unless coupled with Symptom 2, it is harmless. Symptom 2 can be prevented by: 1. moving narrow-band service modules to higher numbered slots, or 2. not having active "**cc**" sessions on the narrow-band service module during PXM switchover. If Symptom 2 already exists, the only recovery is to reset the narrow-band service module, switch to the redundant service module, or reset the node.
CSCdy42687	Symptom: Leakage of SSI-IPC buffers/IOS-IPC buffers. (Use dspmsgq 0xb 1 and check for the send timeout counter.) Conditions: Leakage of SSI-IPC/IOS-IPC buffers may occur only if enqueue message to MSGQ2RMM (Id: 0xb) fails. Workaround: None.

CSCea02713	**Symptoms:** A router may unexpectedly reload if it is unable to allocate enough memory for Weighted Random Early Detection (WRED). This unexpected reload may also be seen when the interface is already configured for WRED by using modular quality of service (QoS) and when an access group is added to the interface. **Conditions:** This symptom is observed on a router that is running Cisco IOS software that is being configured for WRED on a Frame Relay interface via the modular QoS. **Workaround:** None
CSCea32775	**Symptoms:** A Cisco MGX 8000 series Route Processor Module-PRemium (RPM-PR) may reload. **Conditions:** This symptom is observed when the RPM-PR is configured as an Edge Label Switch Router (ELSR) and you enter the "show queue [interface-name interface-number]" privileged EXEC command with "switch" for the [interface-name] argument and "1" for the [interface-number] argument on the RPM-PR subinterface that has Multiprotocol Label Switching (MPLS) enabled. **Workaround:** None
CSCdz76166	**Symptoms:** A Cisco router may reload after execution of the "show atm vc [vcd]" EXEC command. **Conditions:** This symptom is observed on a Cisco router that is running Cisco IOS Release 12.2(15) or a later release and that has an ATM interface.The vcd value should correspond to a switched virtual circuit (SVC). **Workaround:** None
CSCea11344	**Symptoms:** The "atm abr rate-factor" interface configuration command cannot be configured on an interface. **Conditions:** This symptom is observed when an available bit rate (ABR) connection is added to a Route Processor Module-PRemium (RPM-PR) card on a Cisco MGX 8850 Processor Switch Module (PXM1) card that has Cisco WAN Manager (CWM) carrier module (CM) or when you configure the "atm abr rate-factor" interface configuration command under the interface. **Workaround:** Use the command-line interface to add an ABR connection to the RPM-PR on the Cisco MGX 8850 PXM1 card.

CSCdz88368	**Symptoms:** A nonexistent policy map that is configured as the input or output service policy of an ATM virtual circuit (VC) causes a router to be unable to display or save its configuration. **Conditions:** This symptom is observed only on Cisco Route Processor Module (RPM) routers. **Workaround:** Do not specify nonexistent policy maps as an ATM VC service policy.
CSCdy11064	**Symptoms:** When using multipath with a vrf, BGP may leave an old multipath route in the routing table. **Workaround:** The work-around is to clear the route in order to remove the old path.
CSCea16719	**Symptoms:** One of two redundant route reflectors (RRs) that are part of the same cluster may reload and may cause a Virtual Private Network (VPN) routing/forwarding (VRF) table to contain incomplete routes. Routes that originated elsewhere in network are in the Route Descriptor table but not in the VRF table, despite import statements and the fact that the routes were in the VRF table previously. **Conditions:** This symptom is observed in a cell mode Multiprotocol Label Switching (MPLS) VPN network. **Workaround:** To restore the missing routes, reset the Border Gateway Protocol (BGP) neighbor session to the RR that did not reload.
CSCea36682	**Symptoms:** A service policy may be removed from a multilink interface after the router reloads or after you enter the <CmdBold>shutdown<noCmdBold> interface configuration command followed by the <CmdBold>no shutdown<noCmdBold> interface configuration command on the multilink interface. **Conditions:** This symptom is observed only when the sum of the total bandwidth in the service policy is equal to 100 percent of the total available bandwidth. **Workaround:** Remove bandwidth from the class default, as indicated in the following command output: policy-map generic class Voice_MPLS priority percent 20 class LowDelay_MPLS bandwidth remaining percent 30 class BestEffort_MPLS bandwidth remaining percent 35 class class-default bandwidth remaining percent 35 <---- Remove this bandwidth configuration. By default, class-default receives the remaining 35% anyway.

CSCea25707	**Symptoms:** A Cisco router may reload because of a software condition when running the LDP-MIB MIB. The router reloads because of a process watchdog timeout in the "SNMP ENGINE" process and logs an entry similar to the following one and logs a traceback: %SYS-2-WATCHDOG: Process aborted on watchdog timeout, process = SNMP ENGINE. %Software-forced reload Unexpected exception, CPU signal 23, PC = 0x606F1FC4 . . . Cause 00000024 (Code 0x9): Breakpoint exception **Conditions:** This symptom is observed after the router ID has been changed and when Label Distribution Protocol (LDP) sessions have been added or removed. **Workaround:** Do not change the router ID. If the router ID has been changed, do not run the LDP-MIB MIB.
CSCea42500	**Symptoms:** If the "default-information originate" router configuration command is entered on the Virtual Private Network (VPN) routing/forwarding (VRF) o instance of a Cisco 12000 series that has the "address-family ipv4 vrf" command configured using the Border Gateway Protocol (BGP), the default route is learned correctly but the default route is entered incorrectly in the BGP routing table. This behavior may result in unexpected behavior on the other router if the other router does not have a correct default route. The default static route of the VRF is not advertised by BGP after the default static route is configured under the VRF, and BGP may advertise the incorrect default route that is in the BGP routing table. **Conditions:** This symptom is observed on a Cisco 12000 series that is running BGP. **Workaround:** Perform either of the following steps: - Enter a static default route under the VRF configuration. - Configure an access control list (ACL).
CSCea01405	**Symptom:** PE does not advertise itself as next hop to CE. **Conditions:** After upgrading PE from IOS software 12.2(8)T4 to 12.2(15)T, PE stopped advertising itself as next hop to its eBGP neighbor CE. Hence the routes are getting rejected by the CE. **Workaround:** Configure "next-hop-self" under the address family in router bgp config.

CSCdz88636	With topology: ---- PE1--RR1-- CE1--| \/ | |--PE3--CE2 | /\ | | ---- PE2--RR2-- CE1 and CE2 both inject bgp route (prefix A) into PE. PE1, PE2& PE3 has different rd but same rt in vrf. After all routers converge, clear ip bgp on different routers, will lead to different result in PE's bgp vrf table. PE1 may show 3, 5 or 2 paths of prefix A. **Workaround:** clear ip bgp on both CEs.
CSCea25144	**Symptoms:** RPM-PR card reset by PXM due to heartbeat failure Condition : PXM stops receiving heartbeat responses from RPM-PR. This may be due to: Messages lost due to high traffic resulting in cell loss, or Messages not picked up due to IOS receive ring problems, or Messages not sent to IOS because of SAR problems. **Workaround:** None
CSCea33321	**Symptom:** Difference in the timestamps in the PXM and RPM logs. **Condition:** This timestamp difference is observed when the RPM has been up for an extended period of time (more than 1 week). RPM gets the ToD information at boot-up time only. Manual time changes and Daylight savings on the PXM are also not reflected on RPM due to the absence of periodic updates. **Workaround:** Use NTP server connected to the RPM through the backcard. This server will give periodic updates to the RPM and thus keep it in sync with PXM.
CSCea32118	**Symptom:** Router does not recover from SAR exception, heartbeat polling may fails thus resetting the router. **Condition:** This may happen under conditions of heavy traffic where the SAR is being stressed. Under such circumstances the SAR receives an exception and hangs. The router might not be able to recover from this exception. As a result the heartbeat response may not received by the controller card, which in this kind of scenario will reset the router. **Workaround:** None

CSCea61938	**Symptoms:** Two users may not be able to simultaneously display the output of the "show policy-map" user EXEC or privileged EXEC command. **Conditions:** This symptom is observed when the first user displays the first screen of the command output while the second page is pending. However, the second user may successfully display the command output after the first user presses the Enter key and gets the user prompt back. **Workaround:** None
CSCea67430	**Symptoms:** Customers of a service provider may be able to display all routes of all Virtual Private Networks (VPNs) by walking a MIB from a network management station (NMS) on their own VPN. **Conditions:** This symptom is observed when Simple Network Management Protocol (SNMP) MIB variables are available without restriction to VPN routing/forwarding (VRF) interfaces on a Cisco MGX 8000 series Route Processor Module (RPM) that is running Cisco IOS Release 12.2(8)T4. Provider edge (PE) router access for control traffic that is associated with VRF interfaces should be limited to Internet Control Message Protocol (ICMP), Border Gateway Protocol (BGP), and Address Resolution Protocol (ARP). **Workaround:** Create an access control list (ACL) that filters out all User Datagram Protocol (UDP) packets on the SNMP port using the "access-list <access-list-number> deny udp any any eq snmp" global configuration command, and apply this ACL to the interface on which the VRF is configured.
CSCdy40742	**Symptoms:** After a Border Gateway Protocol (BGP) neighbor resets, CPU utilization may run very high. **Conditions:** This symptom is observed when the "default-metric" router configuration command is enabled in the BGP router configuration. **Workaround:** None
CSCea06056	**Symptoms:** Data transfer might stop when the traffic bandwidth on a Route Processor Module-PRemium (RPM-PR) card is increased to 45 Mbps. The data transfer is normal when the traffic bandwidth is at 30 Mbps. **Conditions:** This symptom is observed while there are multiple active Virtual Private Network (VPN) routing/forwarding (VRF) instances configured on the RPM-PR card. **Workaround:** None

CSCeb02520	**Symptoms:** RPM-PR router configured as eLSR might reset upon execution of "show queue sw1.[subinterface]" command where interface is of mpls type. **Conditions:** Multiple-vc enabled under mpls interface **Workaround:** None
CSCea73441	**Symptoms:** Memory corruption in RPM-PR, followed by a router reload. **Conditions:** In a cell-based MPLS setup, if RPM-PR is receiving very high (99% OC3) traffic, the path check feature, which runs periodically may cause a memory corruption. **Workaround:** None
CSCea63209	**Symptom:** With dual LSCs and 1:N redundancy configured. one might experience a 10+ sec data disruption when a resetcd is issued for the active/primary LSC. **Conditions:** The redundant RPM-PR card should be available which is not covering for another RPM-PR redundant card. **Workaround:** None
CSCea74222	**Symptom:** IGP label rewrite information for remote PE is lost from CEF table on a local PE. **Conditions:** MPLS network is running in ATM cell-mode using multi-VC. Two or more local PEs are each connected to two separate LSC-controlled ATM switches, or to separately controlled partitions of a single ATM switch. The problem is induced by injecting a failure or route flap (for example: switchcc, reset LSC hot redundancy, shut/no shut mpls interface). **Workaround:** "clear ip route <prefix>" can be used to recover from this condition, where <prefix> is the loopback address of the remote PE whose rewrite information is lost on the local PE.
CSCea84387	**Symptom:** Multiple simultaneous operators utilizing Modular QoS CLI (MQC) related commands may cause the system to become unresponsive. **Conditions:** Multiple simultaneous users utilizing Modular QoS CLI (MQC) commands. **Workaround:** Allow only one operator at a time.

CSCdx08292	**Symptom:** 'no auto-summary' & 'no sync' do not nvgen properly by default Also, the 'bgp suppress-inactive' command is not nvgenned in address-family mode. **Workaround:** None
CSCea72272	**Symptom:** Startup-config file might become corrupted. **Conditions:** This condition may occur when via multiple telnet sessions, user simultaneously executes "write memory" command. **Workaround:** startup-config file may be re-written by executing a "write memory" from single telnet session at one time.
CSCea78687	**Symptom:** The LDP protocol flaps affecting data throughput on RPM-PR acting as an eLSR. Lots of input errors, CRC errors and output drops are observed on the router switch interface 1. **Conditions:** This issue was observed on the RPM-PR when it was acting as an eLSR in a large-scale cell-based MPLS VPN network (400 LVCs per LSC, Dual LSC configuration). Traffic was being sent to cause congestion on all the 200+ egress PVCs on the eLSR. RPM-PR was in a state of severe traffic congestion. **Workaround:** None
CSCeb02097	**Symptom:** SAR auto-recovery triggers while saving config **Conditions:** While trying to save configuration on one of the RPM-PR cards the card took around 60 to 90 minutes to save the config, and auto-recovery kicked in during that time and were unable to access the C:drive it hangs and gives an error message **Workaround:** None
CSCea91135	**Symptoms:** If due to an error condition all traffic throughput from the RPM-PR stops and SAR Auto Recovery is disabled, the router will stay in the error state and will not be reloaded by PXM. **Conditions:** RPM SAR Auto Recovery disabled. The heartbeat messages are processed in a priority fashion compared to regular data. Due to possible SAR or IOS errors if the data stops flowing through the RPM-PR, all protocols will go down. The heartbeat messages will still be responded to by the RPM-PR, so it will not be reloaded by the PXM. **Workaround:** Enable SAR Auto Recovery.

CSCea75235	A Cisco 7200/7500 router running 12.3/12.0S/12.2S images in a MPLS VPN environment and a LC-ATM core with multiple paths to the egress PE, may drop VPN traffic for a certain duration when one of the LSCs along a path is reset. The duration is dictated by the time needed for LCATM to reestablish the ATM LVC using downstream-on-demand mode. **Workaround:** None
CSCeb07595	**Symptom:** A Cisco 7200 or Cisco RPM box configured as "Provider Edge (PE)" box might reload after modifying mpls partition vci range on an ATM interface. **Conditions:** Reducing or increasing vci range under the ATM interface partition several times on a "Provider Edge (PE)" box in a cell-based MPLS-VPN network might reload the box. **Workaround:** Shutting down the ATM interface before making any change in configuration (like changing vci range) would save the box from reloading.
CSCeb07534	**Symptom:** Reset of Dual LSC in node-a Results in Tailend LVCs created on PE in node-b. **Condition:** Requires LSC redundancy network configuration *or* node w/ 2 or more PEs, each homed to 2 or more LSCs, with equal cost paths to some remote prefix. Impact: No data outage occurs as a result. However this can cause LVC depletion. **WorkAround:** None
CSCea21186	**Symptoms:** A Cisco router may reload when you enter the "tacacs-server host" global configuration command. **Conditions:** This symptom is observed when TACACS is already logging commands to a server. This problem does not occur in 12.2(13)T5 or earlier releases. **Workaround:** None
CSCeb10053	**Symptoms:** On the RPM-PR, SAR rx_no_buffers count incrementing and IOS rx_count is very high. The control protocols flap and data throughput is affected. **Conditions:** If the input data rate to the router is much higher than what can be drained out of the system, then the IOS would eventually run out od data buffers causing SAR to run out of buffers as well. This situation could result when there are high speed ingress VCs feeding to low speed egress VCs resulting in severe congestion on the router. **Workaround:** None

CSCeb04048	**Symptom:** After upgrading/reloading IOS on a router processor, OSPF interfaces may be marked as "down" while interface/line protocol states are "up". The end result is missing OSPF neighbor adjacencies on the "down" interfaces. **Condition:** This symptom is observed after system restart or microcode reload on certain platforms with large number of active interfaces. **Workaround:** Any one of the methods below can be used to recover the OSPF interface: - Issue "clear ip ospf proc" - Issue "clear ip route <route>", where the <route> is the IP address of the problem interface. - Perform a "shut" and then "no shut" on the problem interface.
CSCin45640	**Symptom:** Lot of "interface info was deleted by another session" messages seen on the router console. **Conditions:** While sending traffic on PA-A3 on RPM platform if ATM interface is reset then there will be lot of messages on the console and PA-A3 will loose rx buffers. **Workaround:** None

Known RPM/B and RPM-PR Anomalies

The following is the list of known anomalies in the RPM/B and RPM-PR software for this release. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCec16481	**Symptom:** A Cisco device running Internetwork Operating System (IOS) and enabled for the Open Shortest Path First (OSPF) Protocol is vulnerable to a Denial of Service (DoS) attack from a malformed OSPF packet. The OSPF protocol is not enabled by default. **Conditions:** The vulnerability is only present in IOS release trains based on 12.0S, 12.2, and 12.3. Releases based on 12.0, 12.1 mainlines and all IOS images prior to 12.0 are not affected. Refer to the Security Advisory for a complete list of affected release trains. **Workaround:** Further details and the workarounds to mitigate the effects are explained in the Security Advisory which is available at the following URL: http://www.cisco.com/warp/public/707/cisco-sa-20040818-ospf.shtml.
CSCin22433	Symptom: While trying to modify the connection parameters via SNMP, one may find that the modified values are not reflected in the RPM. RPM still shows default values when queried using CLI. Conditions: This issue is found whenever one tries to modify certain connection parameters: cwrChanAalEncapType , cwrChanOamManage , cwrChanOamRetryUpCount and cwrChanOamRetryDownCount via SNMP and then check the same using RPM CLI. Switch CLI command: Router#sho atm pvc 0/50 Workaround: 1. These parameters can be modified through CLI instead of SNMP 2. The parameter modification can be accomplished through DelConn and AddConn which is equivalent to ModConn for this purpose.
CSCdz32991	Symptom: RPM-PR on the MGX8850 with PXM45 as controller card, occasionally drops ping packets due to CRC error. Conditions: RPM-PR on the MGX8850 with PXM45 as controller card, occasionally drops ping packets due to CRC error. The ping packets came from the 7200 router on BPX. Workaround: None

Bug ID	Description
CSCdz33457	Symptom: RPM-PR card reloaded after reporting Traceback messages on console; also generated crashinfo file. Condition: This happened after "ip rtp compression-connection 300" command was issued on the RPM-PR card, which resulted in reload/reset of the said card. Workaround: None
CSCdz48135:	Symptom: On an RPM-PR running IOS 12.2(8)T4 / 12.2(13)T, service policy command can be configured under the PVC on a switch1 interface. Conditions: Service policy command can be configured under the PVC on a subinterface for the Switch1 interface on RPM-PR installed in MGX8230 / MGX8850 node (w/ PXM45 and/or PXM1E controller card). Although the service policy command is accepted, the queueing strategy remains FIFO. Workaround: None

Compatibility Notes

RPM Boot File and Firmware File Names and Sizes

The following table displays the RPM boot and firmware file names and sizes for this release.

Table 7 RPM Boot and Firmware File Names and Sizes

	File Name	File Size (in bytes)
Boot File	rpm-js-mz.122-15.T4a	9976016
Firmware File	rpm-boot-mz.122-15.T4a	3202728

RPM Compatibility Matrix

MGX SW version	1.1.32	1.1.34	1.1.40
IOS Version	12.1(5.3)T_XT	12.2(2)T2	12.2(4)T
CWM	10.4.01	10.4.01 Patch 1	10.5

MGX SW version	1.2.00 / 2.1.70	1.2.02 / 2.1.76	1.2.10 / 3.0.00	1.2.11 / 3.0.10	1.2.13 / 3.0.20
IOS Version	12.2(4)T1	12.2(8)T1[1]	12.2(8)T4	12.2(11)T1	12.2(11)T2
CWM	10.5.10	10.5.10 Patch 1	11.0.00	11.0.10	11.0.10 Patch 1

1. MGX 1.2.02 has also been certified with IOS 12.2(4)T3.

MGX SW version	4.0.00
IOS Version	12.2(15)T4a
CWM	11.0.11

MGX RPM-PR Hardware

Table 8 shows the front card and back card compatibility for RPM-PR hardware supported in this release. The table lists the card model/ name, part numbers, the minimum version and the minimum revisions of each card supported. Note that there may be more than one 800 level part numbers for the same front cards. The minimum version is identified by the last 2 digits of the 800 level numbers.

Table 8 Hardware Compatibility Matrix

Front Cards	Part Number/ Min. Version	Rev.	Back Cards	Part Number/ Min. Version	Rev.
MGX-RPM-PR-256	800-07178-02	A0	MGX-RJ45-FE	800-02735-02	A0
			MGX-MMF-FE	800-03202-02	A0
			MGX-RJ45-4E/B	800-12134-01	A0
MGX-RPM-PR-512	800-07656-02	A0	MGX-RJ45-FE	800-02735-02	A0
			MGX-MMF-FE	800-03202-02	A0
			MGX-RJ45-4E/B	800-12134-01	A0

Special Installation and Upgrade Requirements

Existing customers should use the upgrade procedures Upgrade Procedures for RPM-PR Cards in MGX 8000 Release 2.1 and Release 3 (PXM45 and PXM1E) Switches, page 104, Historical Information From 3.x Baseline, page 116, and Historical Information From 2.1.7x Baseline, page 122 to upgrade. A graceful upgrade from any release previous to the current release is supported. For new customers, the image will be pre-installed and should use the PXM installation procedure to upgrade to future maintenance releases.

Cisco IOS Release Compatibility Information

This section describes the installation requirements and guidelines for RPM modules installed with this release.

All IOS firmware can be downloaded from CCO from the following location:

http://www.cisco.com/kobayashi/sw-center/sw-ios.shtml

About the Cisco IOS 12.2(11)T1 Release

The Cisco IOS 12.2(11)T1 supports existing features on the MGX-RPM-PR card.

About the Cisco IOS 12.2(8)T4 Release

The Cisco IOS 12.2(8)T4 supports existing features on the MGX-RPM-PR card.

About the Cisco IOS 12.2(8)T1 Release

The Cisco IOS 12.2(8)T1 supports existing features on the MGX-RPM-PR card and the CBC clock rate configuration feature described in "Features Not Supported in This Release" section on page 85.

About the Cisco IOS 12.2(4)T3 Release

The Cisco IOS 12.2(4)T3 supports existing features on the MGX-RPM-PR card.

About the Cisco IOS 12.2(4)T1 Release

The Cisco IOS 12.2(4)T1 or higher is used with MGX Release 21.70. This IOS release supports new RPM features and continues to support existing features on the RPM-PR card.

Note that MPLS inter-AS and MPLS TE are not supported features on RPM for this release.

About the Cisco IOS 12.2(4)T Release

The Cisco IOS 12.2(4)T or higher is used with MGX Release 2.1.60. This IOS release supports new RPM features and continues to support existing features on the RPM-PR card.

Note that MPLS inter-AS and MPLS TE are not supported features on RPM for this release.

Upgrade Procedures for RPM-PR Cards in MGX 8000 Release 2.1 and Release 3 (PXM45 and PXM1E) Switches

The following sections describe how to upgrade boot and runtime software on RPM-PR cards in detail.

Upgrading RPM Boot Software

At the factory, a boot file is installed in the bootflash on the RPM-PR card and is used to boot the card. The runtime software is updated more frequently than the boot software. However, the boot software is updated occasionally. When you are updating runtime software, check Table 7 to see if a boot software upgrade is required.

The boot software is stored in bootflash memory on the RPM card. To manage the software in bootflash, you access it as if it were a hard disk. For example, in copy and delete file commands, files are identified as bootflash:*filename* (which is similar to *e*:*filename*).

The following example shows a directory of bootflash contents:

```
Router(boot)#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .D config   D4F7352A   40330   18      686 Jan 30 2001 18:18:41 auto_config_slot09
2   .D config   CBF007C1   40660    9      688 Feb 22 2001 15:33:11 slot9.cnf
3   .. image    F596869A  2973E8   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.202
```

Note Although you can display directory contents with the **dir bootflash:** command, the **show flash:** command provides more detail. Also, although bootflash and flash are separate entities on other Cisco Systems Routers, both terms refer to the same entity on the RPM.

In the example above, the numbers in the left column indicate the order in which the RPM-PR card will try to load software. The second column shows that the first two files are marked for deletion (D). The last column lists the names of the files stored in bootflash.

When managing the bootflash, you need to keep in mind the following:

- When the RPM card is reset, it tries to load the first bootable image in bootflash.
- Files are not removed from bootflash until the **squeeze flash:** command is entered.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 114. If this does not work, the card must be returned to the factory to be reprogrammed.

Upgrading RPM Runtime Software

The runtime software on the RPM can be loaded from the following sources:

- The E:RPM directory on the PXM45 hard disk
- Bootflash
- A TFTP server on a LAN to which an RPM back card is connected.

Cisco Systems recommends that you configure the RPM card to load from the E:RPM directory on the PXM45 hard disk. Note that images will load much faster from bootflash, but if you are using multiple RPM cards, it takes longer to complete an upgrade because the runtime software must be copied to each RPM card's bootflash instead of to a single location.

At startup, the RPM card attempts to load the software in the order listed in the startup-config file. The following example shows an excerpt from a startup-config file:

```
!
boot system e:rpm-js-mz.122-4.T
boot system bootflash:rpm-js-mz.122-4.T
boot config c:auto_config_slot09
logging rate-limit console 10 except errors
enable password cisco
!
```

In the startup-config file example, the RPM card attempts to load the runtime software from the PXM45 card (E:rpm-js-mz.122-4.T) first, and if that fails, it attempts to load the image copy stored in bootflash. This configuration takes longer to upgrade, but it assures the card can reboot if someone accidentally removes the file on the PXM45 hard disk.

Note The convention is lowercase *e* for RPM-PR commands and uppercase *E* for switch commands.

To configure the RPM to load upgraded runtime software from the PXM45 hard disk, you need to do the following:

- Copy the upgraded file to the PXM45 hard disk
- Update the boot system variable in the router startup-config file to load the new file.
- Reset the RPM card so that it loads the new file.

RPM-PR cards can be configured for 1:N redundancy as well as for non-redundant configurations. The procedures for both types of configuration are in the sections that follow.

Tip To simplify runtime software updates, copy the runtime file in the E:RPM directory and rename it to a generic name such as rpm-js-mz. The production runtime filenames have version numbers appended to them, but you can change this. This approach allows you to perform future upgrades by copying the file to the hard disk, renaming a copy of the file to your generic name, and resetting each card. The approach eliminates the need to reconfigure IOS on each card to recognize the new filename.

Upgrade Procedure for Boot Software and Runtime Software for Non-Redundant Cards

The following procedure describes how to upgrade boot software and runtime software.

Note The first part of this procedure describes boot software upgrade and the second part describes runtime software upgrade. RPM boot software can be upgraded either in boot mode or in runtime mode. The procedure described here shows an example for runtime mode. The same commands are applicable for upgrading boot software in boot mode.

Step 1 Copy the new boot software file for the RPM-PR card to the switch (E:RPM).

Step 2 Establish a configuration session using any valid user name.

Step 3 Use the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 4 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 5 To verify router access to the PXM45 hard disk and display the boot file name, enter **dir e:** command.

```
Router#dir e:
Directory of c:/

65539  -rw-        815   Sep 13 2001 23:51:10  auto_config_slot09
65540  -rw-    2588780   Mar 22 2001 19:06:54  rpm-boot-mz_002.001.070.201
84611  -rw-    2452768   Apr 05 2001 05:34:44  rpm-boot-mz.122-4.T
66805  -rw-    8529104   Mar 22 2001 19:09:00  rpm-js-mz_002.001.070.201
85809  -rw-    7936012   Apr 05 2001 06:28:54  rpm-js-mz.122-4.T

104857600 bytes total (83068928 bytes free)
```

Step 6 To display the files in the bootflash, enter the **show flash:** command.

```
Router#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    F596869A  296D88   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.201

30315128 bytes available (2452872 bytes used)
```

Step 7 To copy new boot software to the bootflash, use the **copy** command.

```
Router#copy c:rpm-boot-mz.122-4T bootflash:
Destination filename [rpm-boot-mz.122-4T]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
2334044 bytes copied in 35.768 secs (66686 bytes/sec)
```

Tip When prompted for the destination filename, press enter to use the source filename shown in the prompt. To change the destination filename, type a new filename after the prompt.

Step 8 To verify that the file was copied, enter the **show flash:** command.

Step 9 To mark an older boot file for deletion from the bootflash, use the **del bootflash:** command as shown in the following example:

```
Router#del bootflash:
Delete filename []? rpm-js-mz
Delete bootflash:rpm-js-mz? [confirm]
Router#
```

Tip To unmark a bootflash file so that it won't be deleted when the **squeeze flash:** command is run, enter the undelete <*number*> command, where *number* is the file number displayed in the left-most column of the *show flash:* command display.

Step 10 To delete all files that are marked for deletion from bootflash, enter the **squeeze flash:** command as shown in the following example:

```
Router(boot)#squeeze flash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]

Squeeze of bootflash complete
```

Step 11 Enter the **show flash:** command to verify that the bootflash files are as you want them.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 114 and restart the RPM card. If this does not work, the card must be returned to the factory to be reprogrammed. When you are done managing the bootflash, the **show flash:** command should display at least one bootable image, and **the image you want the card to boot from must be the first bootable image in the list.**

Tip If the **show flash:** command does not display a bootable image, copy a bootable image to bootflash as described earlier in this procedure. You can continue to manage the bootflash, even when there are no files in bootflash, until the router is restarted.

Tip If the bootflash contains bootable images and the sequence is such that the card will not start, you can enter rommon mode and load the bootable image. To get into rommon mode, establish a console connection to the RPM card, reset the RPM card using the **resetcd** <*slot*> command from the active PXM45 card, then quickly enter the **CTRL-[**, **Break** sequence at the RPM console. The command to send a **Break** depends on the computer platform and software you are using. It may take a couple of attempts to successfully get into rommon mode. When you are in rommon mode, the RPM card displays the *rommon 1* > prompt.

Once in rommon mode, you can enter the **dir bootflash:** command to display the images in bootflash. To boot one of the images, enter a **boot** command the following format: **boot bootflash:***filename*.

See Using XModem to Download Flash to RPM Cards, page 114.

Note This ends the boot software upgrade procedure. The following steps are for upgrading the runtime software. If you do not want to upgrade the runtime software, you need to restart the RPM card by entering the reload command.

Step 12 Copy the new runtime software file for the RPM-PR card to the switch (E:RPM).

Step 13 Establish a configuration session using any valid user name.

Step 14 If you are using a generic filename for your runtime images, copy the file on the PXM45 hard disk and rename the copied file. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz.122-4.T rpm-js-mz
```

Step 15 If your RPM is already configured to use a file with a generic name, skip to Step 24.

Step 16 Use the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this release note. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 17 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 18 Configure the RPM card to store its configuration on the PXM45 hard disk by entering the following command:

```
Router# boot config e:auto_config_slot#
```

Step 19 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = e:rpm-js-mz.122-4.T,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is E:rpm-js-mz.122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 20 Enter the router global configuration mode.

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

Step 21 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 22 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system e:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the E:RPM directory on the switch. For example:

```
Router(config)# boot system e:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM45 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz.122-4.T
```

Note Before the RPM card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM45 hard disk to bootflash is described in a previous section.

Step 23 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 24 To verify the change, enter the **show bootvar** or **show run** commands.

Step 25 Switch to the active PXM45 card and reset the RPM card. For example:

```
Router#cc 8

(session redirected)

8850_LA.8.PXM.a > resetcd 9
The card in slot number 9, will be reset. Please confirm action
resetcd: Do you want to proceed (Yes/No)? y
```

Upgrading RPM-PR Boot Software and Runtime Software for 1:N Redundancy

Redundancy must be established before you use the procedure in this section. If redundancy has not been established, upgrade each RPM-PR card using the procedure in the next section, “Upgrading Without Redundancy”.

To upgrade the RPM-PR runtime software for 1:N redundancy, use the following procedure. (Note that the directory on the PXM45 card uses (E:) and the directory within the router card uses (e:).)

The following procedure describes how to upgrade boot software and runtime software.

Note The first part of this procedure describes boot software upgrade and the second part describes runtime software upgrade. RPM boot software can be upgraded either in boot mode or in runtime mode. The procedure described here shows an example for runtime mode. The same commands are applicable for upgrading boot software in boot mode.

Step 1 Copy the new boot software file for the RPM-PR card to the switch (E:RPM).

Step 2 Establish a configuration session using any valid user name.

Step 3 Use the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9
```

```
(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this book. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 4 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 5 To verify router access to the PXM45 hard disk and display the boot file name, enter **dir e:** command.

```
Router#dir e:
Directory of c:/

65539  -rw-         815   Sep 13 2001 23:51:10  auto_config_slot09
65540  -rw-     2588780   Mar 22 2001 19:06:54  rpm-boot-mz_002.001.070.201
84611  -rw-     2452768   Apr 05 2001 05:34:44  rpm-boot-mz.122-4.T
66805  -rw-     8529104   Mar 22 2001 19:09:00  rpm-js-mz_002.001.070.201
85809  -rw-     7936012   Apr 05 2001 06:28:54  rpm-js-mz.122-4.T

104857600 bytes total (83068928 bytes free)
```

Step 6 To display the files in the bootflash, enter the **show flash:** command.

```
Router#show flash:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. image    F596869A  296D88   27  2452744 Feb 28 2001 03:16:05
rpm-boot-mz_002.001.070.201
30315128 bytes available (2452872 bytes used)
```

Step 7 To copy new boot software to the bootflash, use the **copy** command.

```
Router#copy c:rpm-boot-mz.122-4.T bootflash:
Destination filename [rpm-boot-mz.122-4.T]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCC
2334044 bytes copied in 35.768 secs (66686 bytes/sec)
```

Tip When prompted for the destination filename, press enter to use the source filename shown in the prompt. To change the destination filename, type a new filename after the prompt.

Step 8 To verify that the file was copied, enter the **show flash:** command.

Step 9 To mark an older boot file for deletion from the bootflash, use the **del bootflash:** command as shown in the following example:

```
Router#del bootflash:
Delete filename []? rpm-js-mz
Delete bootflash:rpm-js-mz? [confirm]
Router#
```

Tip To unmark a bootflash file so that it won't be deleted when the **squeeze flash:** command is run, enter the undelete <*number*> command, where *number* is the file number displayed in the left-most column of the *show flash:* command display.

Step 10 To delete all files that are marked for deletion from bootflash, enter the **squeeze flash:** command as shown in the following example:

```
Router(boot)#squeeze flash:
All deleted files will be removed. Continue? [confirm]y
Squeeze operation may take a while. Continue? [confirm]

Squeeze of bootflash complete
```

Step 11 Enter the **show flash:** command to verify that the bootflash files are as you want them.

Caution If all bootable images are deleted from bootflash, try to reinstall the bootflash file using the Xmodem download procedure found in Using XModem to Download Flash to RPM Cards, page 114 and restart the RPM card. If this does not work, the card must be returned to the factory to be reprogrammed. When you are done managing the bootflash, the **show flash:** command should display at least one bootable image, and **the image you want the card to boot from must be the first bootable image in the list.**

Tip If the **show flash:** command does not display a bootable image, copy a bootable image to bootflash as described earlier in this procedure. You can continue to manage the bootflash, even when there are no files in bootflash, until the router is restarted.

Tip If the bootflash contains bootable images and the sequence is such that the card will not start, you can enter rommon mode and load the bootable image. To get into rommon mode, establish a console connection to the RPM card, reset the RPM card using the **resetcd** <*slot*> command from the active PXM45 card, then quickly enter the **CTRL-[**, **Break** sequence at the RPM console. The command to send a **Break** depends on the computer platform and software you are using. It may take a couple of attempts to successfully get into rommon mode. When you are in rommon mode, the RPM card displays the *rommon 1 >* prompt.

Once in rommon mode, you can enter the **dir bootflash:** command to display the images in bootflash. To boot one of the images, enter a **boot** command the following format: **boot bootflash:***filename*.

See Using XModem to Download Flash to RPM Cards, page 114.

This ends the boot software upgrade procedure for the primary card. The following steps are for upgrading the runtime software. If you do not want to upgrade the runtime software for the primary card, skip steps 12 through 24 and go to step 25 to upgrade the boot software on the secondary card.

Step 12 Copy the new runtime software file for the RPM-PR card to the switch (E:RPM).

Step 13 If you are using a generic filename for your runtime images, copy the file on the PXM45 hard disk and rename the copied file. For example:

```
8850_LA.8.PXM.a > copy rpm-js-mz.122-4.T rpm-js-mz
```

Step 14 Establish a configuration session using any valid user name.

Step 15 If your RPM is already configured to use a file with a generic name, skip to Step 25.

Step 16 Use the **cc** command to select the RPM-PR card to update.

```
pop20two.7.PXM.a > cc 9

(session redirected)

Router>
```

The switch displays the IOS prompt for the router on the RPM-PR card. From this point on, all commands are Cisco IOS commands.

Note This procedure assumes that you are familiar with Cisco IOS, which is a topic that is beyond the scope of this release note. This procedure details only those commands that are unique to setting up RPM-PR on the switch. For general Cisco IOS commands, examples are given to show how to complete the task.

Step 17 Enter Enable mode for the router.

```
Router>enable
Password:
Router#
```

Step 18 Configure the RPM card to store its configuration on the PXM45 hard disk by entering the following command:

```
Router# boot config e:auto_config_slot#
```

Step 19 Display the startup runtime software filename by entering the **show bootvar** command.

```
Router#show bootvar
BOOT variable = e:rpm-js-mz,12;
CONFIG_FILE variable = c:auto_config_slot09
BOOTLDR variable does not exist
Configuration register is 0x2
```

In the example above, the startup runtime software file is e:rpm-js-mz.122-4.T, and it has a version number attached to it. Another way to view the boot list is to enter the **show startup-config** command and look for the **boot system** commands.

Step 20 Enter the router global configuration mode.

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

Step 21 If you need to change the boot system filenames, remove the existing boot list using the **boot system** command as follows:

```
Router(config)# no boot system
```

Step 22 Create a new boot list by entering one or more **boot system** commands as follows:

```
Router(config)# boot system e:filename
```

Replace the filename variable with the name of the new runtime file that was previously transferred to the E:RPM directory on the switch. For example:

```
Router(config)# boot system e:rpm-js-mz
```

If you want to enter additional boot system commands, enter them in the order in which you want the RPM card to use them. The following example adds a statement to load from bootflash if the runtime file is not found on the PXM45 hard disk:

```
Router(config)# boot system bootflash:rpm-js-mz.122-4.T
```

Note Before the RPM card can load runtime software from bootflash, you must copy the runtime software to the bootflash. The procedure for copying files from the PXM45 hard disk to bootflash is described in a previous section.

Step 23 Exit global configuration mode and save the new configuration.

```
Router(config)#^Z
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```

Step 24 To verify the change, enter the **show bootvar** or **show run** commands.

Step 25 Switch to the active PXM45 card. For example:

```
Router#cc 8

(session redirected)
```

Step 26 Switch to the secondary card using the **switchredcd** command as follows:

```
8850_LA.8.PXM.a > switchredcd <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the primary card. Replace <*toSlot*> with the slot number of the secondary card.

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

Step 27 **cc** to the secondary slot.

Step 28 Repeat steps 1through 11.

This ends the boot software upgrade on the secondary card. If you do not want to upgrade the runtime software, go to step 30.

The following steps are for upgrading runtime software on the secondary card.

Step 29 Repeat steps 12through 24.

Step 30 Switch back to the primary card using the **switchredcd** command as follows:

```
8850_LA.8.PXM.a > switchredcd <fromSlot> <toSlot>
```

Replace <*fromSlot*> with the slot number of the secondary card. Replace <*toSlot*> with the slot number of the primary card.

This step makes the primary card active and resets the secondary RPM-PR card. When the reset is complete, the secondary card is ready to run the upgraded software.

Step 31 To verify that the router reboot is complete, enter the **dspcds** or **dspcd** <*slot*> commands. The reboot is complete when the card state displays as *Active*. Another way to verify router operation is to use the **cc** slot command. If you can access the router from the switch prompt, the router reboot is complete.

Step 32 If there are other primary cards with redundant (secondary) cards, repeat this procedure for each primary card.

Using XModem to Download Flash to RPM Cards

Use the xmodem feature to download the flash to an RPM/B or RPM-PR card. During this process, the card should be connected to a target machine through HyperTerminal with settings of 9600, n, 8, and 1.

Step 1 Put the node in monitor mode by entering the **priv** command to gain access to the privileged commands as follows:

```
rommon 1> priv
You now have access to the full set of monitor commands. Warning:
some commands will allow you to destroy your configuration and/or
system images and could render the machine unbootable.
```

Step 2 The **xmodem** command becomes available and the general syntax of this command and availability of this can be checked by giving xmodem command without any parameters on the CLI, as follows:

```
rommon 2 > xmodem
usage: xmodem [-cys]
-c  CRC-16
-y  ymodem-batch protocol
-s<speed> Set speed of download, where speed may be
          1200|2400|4800|9600|19200|38400
rommon 3 >
```

The command line options for **xmodem** are as follows:

Option	Definition
–c	xmodem performs the download using CRC-16 error checking to validate packets. Default is 8-bit CRC.
–y	xmodem uses Ymodem-batch protocol for downloading, which uses CRC-16 error checking.
–s	Specifies the download speed. Default is 9600 bps.

Note If you do not find the xmodem commands, then the xmodem feature is not available on this rommom version. In that case, you must return the card to Cisco.

Note The rommon “xmodem/ymodem” transfer only works on the console port. You can only download files to the router. You cannot use “xmodem/ymodem” to get files from the router.

For example:

```
rommon 4> xmodem -cys 38400
Do not start sending the image yet...
Invoke this application for disaster recovery. Do you wish to
continue? y/n [n]: y
Note, if the console port is attached to a modem, both the
console port and the modem must be operating at the same baud
rate. Use console speed 38400 bps for download [confirm]
```

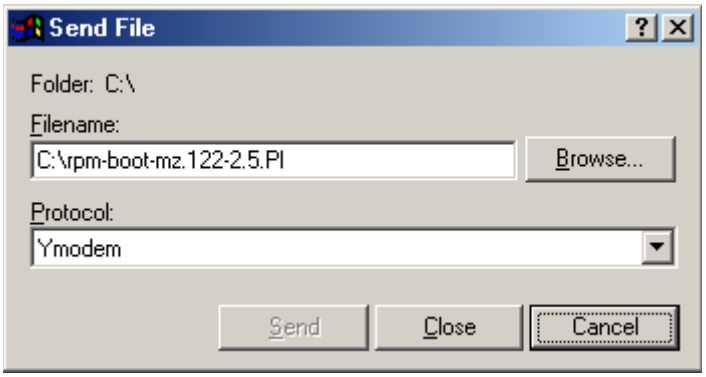
Step 3 At this point, change the preferences in HyperTerminal and adjust the speed from 9600 to 38400.

Note You can continue at the speed of 9600 baud as well by either not specifying the –s option in the command, or by specifying 9600 baud explicitly, but it will take longer.

The console will display the following message:

```
Download will be performed at 38400. Make sure your terminal
emulator is set to this speed before sending file. Ready to
receive file ...
```

Step 4 Use the Transfer-->Send File option in HyperTerminal to start the image transfer.



In the Filename box, browse and choose the image file to be downloaded. Also since we used the “y” option while invoking the xmodem, set the transfer protocol to ymodem or use Xmodem protocol by not specifying the –y option on the command line.

The transfer screen comes up and transfer starts. (The transfer may not start immediately; wait for some time and it should start.)

After the transfer is completed (it should typically take about 10-15 minutes), the following messages are displayed on HyperTerminal console:

```
Returning console speed to 9600.

Please reset your terminal emulator to this speed...
```

Step 5 Return the console speed back to 9600 through HyperTerminal's Preferences menu option.

Usually, due to time lag between changing HyperTerminal speed back to 9600, you might see a bunch of garbage. To avoid this, disconnect and reconnect the HyperTerminal to get the console back again.

The system will reset itself from here and will boot with new software image.

Historical Information From 3.x Baseline

Problems Fixed in 3.0.10

The following is the list of problems fixed in the RPM-PR service module firmware and software for this release. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdw22050	Symptom: Crashinfo is always incomplete, not dumping the memory block information. Also observed multiple tracebacks in the crashinfo file. Conditions: This happens whenever MGX-RPM-PR-512 (do "**show version**" to verify this) dumps the crashinfo. Workaround: None

CSCdw70376	Symptom:
	On MGX8850 with PXM1 controller card platform, tftp of the config file by the CWM NMS application from the RPM-PR card takes a long time to complete.
	Condition:
	Happens under almost all conditions. Bigger configuration files take longer.
	Workaround:
	An alternate method to do tftp - fetches the file successfully.
	The steps are as follows:
	`bodc-xdm1% tftp mig1pop1`
	`tftp> bin`
	`tftp> trace`
	`Packet tracing on.`
	`tftp> get RPM/auto_config_slot03`

CSCdw70993	Symptom: Newly Active RPM-PR does not take over configuration from previously Active card. It has the password of the Standby card. Condition: Standby PXM is performing a disk sync with active PXM. A "**write memory**" is issued from Active RPM Once the write is complete, Reload the Active RPM so that the Standby RPM takes over. OR Do a switchredcd from active RPM to Standby RPM Workaround: Use the Standby password to get into the new active card. From the new active card, "**copy c:auto_config_slot## running**" once the Standby PXM disk sync is over. *##* is the zero padded slot number of the Primary card in the RPM Redundancy group. During this period there may be a temporary file (e.g. of the form **auto_config_slot05MGX**) in E:\RPM directory which would go away once the Standby PXM disk sync is complete.
CSCdw71199	Symptoms: `<node name deleted> 4: *Feb 11 14:32:38.418: %RPM_VIRTUAL_PORT-3-IPCERR: switch_vport_send_pxm_with_reply: RPC failed. Error String = timeout. Error Code = 6` Conditions: This condition occurs due to the fact that RPC messages were getting blocked on the PXM side for DB to be ready. RPC messages get blocked on PXM for a maximum of 25 seconds and by this 25 seconds DB is not ready "**%Error:GenErr:Disk update failed. Error Code = 306**" error is returned to RPM. But RPM used to timeout early. Workaround: None
CSCdw73714	Symptom: IOS version and bootloader version needs to be reported to the PXM. The "**dspcd**" cli command on the PXM will be used to see the results. In addition, following should be reported to the PXM for the Front card and Backcards: **Serial Number** **800 Part number** **73 Part Number** **CLEI code** Conditions: These RPM changes is introduced to report the above information to PXM so that "**dspcd**" cli command on PXM will display the same. Workaround: None.

CSCdw82519	Symptom: SNMP requests get timed out but there's no error message logged. Condition: Busy Network, High Control/Data traffic through IPC. Consequent SNMP, CLI, TFTP and statistics traffic with big configuration causes very high control traffic. As all these control applications share data, SNMP may timeout if access to data is delayed due to other applications. Workaround: None
CSCdw86244	Symptom: cwaChanCDVT value is not provided in Config Upload file. Condition: When a CWM NMS application tries to sync with the node and tries to upload the RPM config file, it was realized that values of few mib objects were not getting listed in the config upload file though they were getting listed in mib walk. These missing mib objects were from Atm Connection Mib and RPM Subif Mib. Due to these missing values, CWM NMS application Db was depicting wrong info to the users. Workaround: None
CSCdw87231	Symptom: MAC address changes during RPM switch over to redundant RPM card. Condition: With 1:N RPM redundancy configured, switching over from active RPM to standby card via "**resetcd**" or "**reload**" on RPM console, or reseat the active RPM from the chassis will reassign a new MAC address to newly active RPM card instead of using the previously Active RPM's MAC address. Workaround: Configure the MAC address in the interface config. Save the config and reload the RPM. MAC address will not change.

CSCdw88886	Symptom: 1. Configuration of Active RPM cards [using 1:N redundancy] may get overwritten by Standby RPM cards. 2. RPM in boot state may overwrite its **auto_config_slot**## file Condition: 1. When user logs into Standby RPM and configures "**boot config c:auto_config_slot**##" where ## is the slot number of the primary RPM card and then performs a "**write memory**" 2. When the user logs into an RPM in boot state and configures "**boot config c:auto_config_slot**##" where ## is the slot number of the RPM card and then performs a "**write memory**" Workaround: 1. Desist from doing "**boot config c:auto_config_slot**##" on Standby RPM cards where ## is the slot number of the primary RPM. If there is one on the standby, do a "**no boot config**" 2. Desist from doing "**boot config c:auto_config_slot##**" while in boot state where ## is the slot number of the RPM. If there is one, do a "**no boot config**"
CSCdw91197	Symptom: Observed "Error While reserving the SRM slot" error while configuring 1:N redundancy for RPM-PR cards. Conditions: Observed an error while configuring 1:N redundancy for RPM-PR cards via PXM CLI command "addred". Configuration of 1:N redundancy succeeded. Workaround: None.

Problems Fixed in Release 3.0.00

The following is the list of problems fixed in the RPM-PR service module firmware and software for MGX Release 3.0.00. Included with each is a brief discussion of the problem. A more in-depth discussion is available in the Release Note enclosure of the problem record in Bug Navigator.

Bug ID	Description
CSCdw64591	Symptoms: A Cisco Route Processor Module (RPM) may pause indefinitely after the **clear ip ospf** is executed. Conditions: A Cisco Route Processor Module (RPM) may pause indefinitely after the **clear ip ospf** process EXEC command is issued and display the following message on the console: `%ATMPA-3-BADVCD: Switch1 bad vcd 1460 packet - 05B49847 000900FE 002021FE45000058 00010000 FE00C3A0` Workaround: Reset the RPM.
CSCdx01120	Symptoms: Several rpm-atm hybrid connections provisioned via CWM GUI interface are in “mismatch” state after RPM reload. Conditions: 1. Provision a rpm-atm hybrid vbr3/abr-1/ubr-1 thru CWM CM GUI 2. “MODIFY” the hybrid connections thru CMGUI 3. Wait for 2 to 3 minutes, they will go into “mismatch” state. Workaround: Reapply the same parameters again.
CSCdx11351	Symptom: When a permanent virtual circuit (PVC) is deleted from the Cisco WAN Manager (CWM), the Route Processor Module (RPM) resets and produces a flash file. Conditions: When a permanent virtual circuit (PVC) is deleted from the Cisco WAN Manager (CWM). This behavior occurs only when a service policy is configured on the connection. Workaround: Add the service policy to the PVC after a connection is added. Manually remove the service policy for a connection before deleting the connection and PVC from the CWM.

CSCdx20802	Symptoms: Memory fragmentation may cause 2 MB of memory allocation to fail. Conditions: This symptom affects edge routers that are configured for multi-virtual circuit (Multi-VC) and that have Label-Controlled ATM (LC-ATM) interfaces connected toward a Multiprotocol Label Switching (MPLS) core. Incremental memory leaks occur after the LC-ATM interface is toggled by issuing the **shutdown** interface configuration command followed by the **no shutdown** interface configuration command or after Cisco Express Forwarding (CEF) is enabled and later disabled on the router by issuing the **ip cef** global configuration command followed by the **no ip cef** global configuration command. Incremental memory leaks may also be seen when route flaps occur. If the incremental memory leaks continue, memory fragmentation may occur and traffic may stop passing through the LC-ATM interface. Workaround: None
CSCdx20814	Symptoms: LSC control channel doesn't come up due to VCD conflict Conditions: A freed virtual circuit descriptor (VCD) can be reused immediately after the associated virtual circuit (VC) is removed. If the driver fails to remove the VC promptly, a VC creation error may occur on the new VC to which the VCD has been reassigned. Workaround: None
CSCdx26224	Symptom: The cache l3 bypass global configuration command is missing from the running configuration of an active Route Processor Module (RPM). Condition: When a RPM softswitch command is executed on Active RPM card, the Standby (now Active) card is missing l3 bypass global configuration command from the running config. Workaround: None
CSCdx35197	Symptoms: A **write memory** request that is received via the Simple Network Management Protocol (SNMP) is rejected if there is already a **write memory** request in progress. Conditions: This symptom is observed on a Route Processor Module-PRemium (RPM-PR) card that is installed in a Cisco switch that is running Cisco IOS Release 12.2(8)T. Workaround: None

CSCdx36259	Symptoms: Traffic is dropped, and the following message may be displayed in the log: `%ATMPA-3-BADVCD: Switch1 bad vcd 25136 packet - 62308847 1F9DD0FE 000321FE 45000058 00010000 FE0001C2` Conditions: This symptom is observed on a network in which two provider edge (PE) routers are connected via a label switch controller (LSC). The Multi-virtual circuit (VC) feature is also enabled on the network by entering the **tag-switching atm multi-vc** ATM subinterface submode command. Workaround: None
CSCdx38578	Symptoms: An edge router that has the Multi-virtual circuit (VC) feature configured may reload when route flapping occurs. Conditions: An edge router that has the Multi-virtual circuit (VC) feature configured may reload when route flapping occurs. This symptom affects edge routers that have the Multi-VC feature configured and that have a label-controlled ATM (LC-ATM) interface that faces the Multiprotocol Label Switching (MPLS) core. Workaround: None
CSCin07419	Symptoms: After disabling the Cell Bus Clock rate via **no rpm auto cbclk**; it gets enabled after the card reload. Conditions: Route Processor Module (RPM) may return to the default \223ON\224 state and support automatic cell bus clock change after the **no rpm auto cbclk** change command is issued and the card is reloaded. This condition arises when RPM card is reload. Workaround: Issue the **no rpm auto cbclk** change command explicitly on the reloaded card after every reload.

Historical Information From 2.1.7x Baseline

Anomalies Resolved in Release 2.1.79

CSCdx31305; S1; Secondary RPM IPC seat gets deleted when it NAKs the GO-ACTIVE req

CSCdx38360; S1; RPM-PR went into failed/discovering state after multiple swithcc

CSCdx44536; S1; switchredcd for RPMs shouldn’t be allowed for cards in discovering

CSCdv76791; S3; dspcd command output does not display card information for RPM

CSCdw43588; S3; After switchover, RPM_PR red card data not exist in config file

Anomaly Status Changes in 2.1.79

Bug ID	Description
S3 Bugs	
CSCdu49855	JUP: Temporary IPC-error -- pxm45-RPM_PR related. Unreproducible

Anomaly Status Changes in Release 2.1.76

Table 9 lists anomalies that have changed status in Release 2.1.76.

Table 9 Anomalies that have changed status in Release 2.1.76

Anomaly ID	Description
S2 Anomalies	
CSCdw71214	**Switchredcd** cmd is not completely disallowed from RPM 1:N mode. Duplicate of CSCdt95815

Anomalies Resolved in Release 2.1.75

Table 10 lists the anomalies resolved in release 2.1.75.

Table 10 Anomalies Resolved in Release 2.1.75

Bug	Description
S2 Bugs	
CSCdu53234	Jup: RPM-PR back cards cannot be detected with dspcds
CSCdw13285	Jup & MGX: dspcds show RPM back cards active regardless they are empty
CSCdw26680	E:RPM directory does not sync between active & standby
CSCdw44751	Slot remap error possibly caused by RPM 1:n redundancy.
CSCdw53900	Softswitch failing from secondary to primary for RPM Cards
CSCdw70993	1:N new active RPM-PR not copying running config from old active
CSCdw75504	SLT: upg on node with RPMs caused PXM to go into FAILED state.
S3 Bugs	
CSCdu18220	RPM error msg when exceeding bw on abr cons states pcr/scr s/b mcr
CSCdu69875	JUP: replications error from RPM-PR while secondary pxm is in INIT
CSCdv91589	SLT: rpm-pr tries to create data base for standby/secondary rpm-pr
CSCdw27985	HMM CBC needs to ignore inval slotid to support RPM traffic shaping

Anomaly Status Changes in Release 2.1.75

Table 11 lists anomalies that have changed status in Release 2.1.75.

Table 11 Anomalies that have changed status in Release 2.1.75

Anomaly ID	Description
S1 Anomalies	
CSCdw00887	SLT: Some rpm-pr goes to FAIL state when switchcc!. Duplicate of CSCdt60558
S2 Anomalies	
CSCdv41385	Jup: One RPM failed on reload/resetcd randomly. Duplicate of CSCdv88233
CSCdw07374	up: Some of connections are missing in RPM with 2k cons after reload. Unreproducible
S3 Anomalies	
CSCdw06746	Incorrect status reported for failed RPM-PR module. Closed

Anomalies Resolved in Release 2.1.70

Table 12 lists the anomalies that have been resolved in Release 2.1.70.

Table 12 Anomalies Resolved in Release 2.1.70

Anomaly ID	Description
S1 Anomalies	
CSCdw00887	SLT: Some rpm-pr goes to FAIL state when switchcc!
CSCdw15710	SLT:in the rpm file status for the ok connections is failed
S2 Bugs	
CSCdv14066	RPM-PR CLI show subinterface existed, but not existed in the agent
CSCdv17888	JUP:redundant rpm(standby/primary) failed if switchcc/burnboot/runrev
CSCdv24248	Jup:All RPMs go to boot state for few seconds after PXM switch over
CSCdv25962	Unable to cc to RPM-PR Card (IPC port failure)
CSCdv32157	RPM 1:N Redundancy lost on setrev
CSCdv40509	rpm_port status on rpm card differs from PXM database
CSCdv40835	Jup: a active rpm (secondary) failed on softswitch to standby
CSCdv44062	Operational Status UNKNOWN trap generated after deleting RPM subif
CSCdv47189	delred does not work on RPM slot if prim & sec slots are EMPTY
CSCdv54801	RPM-PR cannot boot up after 1:N Redundancy
CSCdv72612	Cannot add redundancy on RPM cards
CSCdw13285	Jup&MGX:dspcds show RPM backcards active regardless they are empty
S3 Bugs	
CSCdu62578	Jup: RPM-PR backcards can not be detected with dspcds
CSCdv11854	clrallcnf works inconsistently on RPM slots

Anomaly Status Changes in Release 2.1.70

Table 13 lists anomalies that have changed status in Release 2.1.70.

Table 13 Anomalies that Have Changed Status in Release 2.1.70

Anomaly ID	Description
S2 Anomalies	
CSCdv12161	dspconinfo on pxm45 shows different count than RPM; Unreproducible
CSCdv45704	Connection count between PXM mib database and RPM doesn't match; Unreproducible
CSCdv47316	RPM Redundancy switchover generates sub-if deletion, conn alarm trap; Duplicated

Related Documentation

The following Cisco publications contain additional information related to the operation of this product and associated equipment in a Cisco WAN switching network.

Cisco WAN Manager Release 11

The product documentation for the Cisco WAN Manager (CWM) network management system for Release 11 is listed in Table 14.

Table 14 Cisco WAN Manager Release 11 Documentation

Title	Description
Cisco WAN Manager Installation Guide for Solaris 7, Release 11 DOC-7813567=	Provides procedures for installing Release 11 of the CWM network management system and Release 5.4 of CiscoView on a Solaris 7 platform.
Cisco WAN Manager Installation Guide for Solaris 8, Release 11 DOC-7814230=	Provides procedures for installing Release 11 of the CWM network management system and Release 5.4 of CiscoView on a Solaris 8 platform.
Cisco WAN Manager User's Guide, Release 11 DOC-7813568=	Describes how to use the CWM Release 11 software, which consists of user applications and tools for network management, connection management, network configuration, statistics collection, and security management.
Cisco WAN Manager SNMP Service Agent, Release 11 DOC-7813569=	Provides information about the CWM Simple Network Management Protocol Service Agent, an optional adjunct to CWM that is used for managing Cisco WAN switches using SNMP.
Cisco WAN Manager Database Interface Guide, Release 11 DOC-7813542=	Provides information about accessing the CWM Informix OnLine database that is used to store information about the network elements.

Table 15 WAN CiscoView Release 3 Documentation

Title	Description
WAN CiscoView Release 3 for the MGX 8220 Edge Concentrator, Release 5 DOC-7812768=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco MGX 8220 Edge Concentrator.
WAN CiscoView Release 3 for the MGX 8850 Edge Switch, Release 1 DOC-7811242=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco MGX 8850 Edge Switch.
WAN CiscoView Release 3 for the MGX 8250 Edge Concentrator, Release 1 DOC-7811241=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco MGX 8250 Edge Concentrator.
WAN CiscoView Release 3 for the MGX 8230 Multiservice Gateway, Release 1 DOC-7810926=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco MGX 8230 Multiservice Gateway.
WAN CiscoView for Release 2 of the MGX 8850 *DOC-7810349=*	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco MGX 8850 switch.
WAN CiscoView Release 3 for IGX 8400 Switches DOC-78111243=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco IGX 8400 switch.
WAN CiscoView Release 3 for BPX 8600 Switches DOC-7811244=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco BPX 8600 switch.
WAN CiscoView Release 3 for the BPX SES PNNI Controller DOC-7812303=	Provides instructions for using this network management software application that allows you to perform minor configuration and troubleshooting tasks for element management of the Cisco BPX SES[1] PNNI[2] Controller.

1. SES = Service Expansion Shelf Private Network-to-Network Interface
2. PNNI = Private Network-to-Network Interface

Cisco MGX 8850 (PXM45) Multiservice Switch Release 3

The product documentation for installing and operating the Cisco MGX 8850 (PXM45) Multiservice Switch Release 3 is listed in Table 16.

Table 16 Cisco MGX 8850 (PXM45) Multiservice Switch Release 3 Documentation

Title	Description
Cisco MGX 8850 (PXM45 and PXM1E) Hardware Installation Guide, Release 3 DOC-7814250=	Describes how to install the Cisco MGX 8850 switch. This guide explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8850 switch uses either a PXM45 or a PXM1E controller card and provides support for both broadband and narrowband service modules.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI[1] of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide, Release 3 DOC-7814788=	Describes how to configure the Cisco MGX 8850 (PXM45) and the Cisco MGX 8950 switches with a PXM45 controller to operate as ATM edge or core switches. This guide also provides some operation and maintenance procedures.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB[2] objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco Frame Relay Software Configuration Guide and Command Reference for the MGX 8850 FRSM12 Card, Release 3 DOC-7810327=	Describes how to use the high-speed Frame Relay (FRSM-12-T3E3) commands that are available in the CLI of the Cisco MGX 8850 (PXM45) switch.
Cisco AXSM Software Configuration Guide and Command Reference for MGX 8850 (PXM45) and MGX 8950, Release 3 DOC-7814257=	This guide explains how to configure the AXSM cards for operation and contains a command reference that describes the AXSM commands in detail. The AXSM cards covered in this manual are the AXSM, AXSM/B, AXSM-E, and AXSM-32-T1E1-E.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 Series Switch requires an SES[3] for PNNI route processing.
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 Release 3 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM[4] in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

1. CLI = command line interface
2. MIB = Management Information Base
3. SES = Service Expansion Shelf
4. VISM = Voice Interworking Service Module

Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3

The product documentation for installing and operating the Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3 is listed in Table 17.

Table 17 Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3 Documentation

Title	Description
Cisco MGX 8850 (PXM45 and PXM1E) Hardware Installation Guide, Release 3 DOC-7814250=	Describes how to install the Cisco MGX 8850 routing switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8850 switch uses either a PXM45 or a PXM1E controller card and provides support for both broadband and narrowband service modules.
Cisco MGX 8850 (PXM1E) and MGX 8830 Software Configuration Guide, Release 3 DOC-7814248=	Describes how to configure the Cisco MGX 8850 (PXM1E) and the Cisco MGX 8830 switches with PXM1E controller cards to operate as ATM edge switches. This guide also provides some operation and maintenance procedures.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco Frame Relay Software Configuration Guide and Command Reference for MGX Switches (PXM1E) DOC-7814255=	Provides software configuration procedures for provisioning connections and managing the FRSM cards supported in this release. Also provides command descriptions for all FRSM commands.
Cisco AUSM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814254=	Provides software configuration procedures for provisioning connections and managing the AUSM cards supported in this release. Also provides command descriptions for all AUSM commands.
Cisco CESM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814256=	Provides software configuration procedures for provisioning connections and managing the CESM cards supported in this release. Also provides command descriptions for all CESM commands.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 Series Switch requires an SES for PNNI route processing.

Table 17 Cisco MGX 8850 (PXM1E) Multiservice Switch Release 3 Documentation (continued)

Title	Description
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 Release 3 switch. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

Cisco MGX 8950 Multiservice Switch Release 3

The product documentation for installing and operating the Cisco MGX 8950 Multiservice Switch Release 3 is listed in Table 18.

Table 18 Cisco MGX 8950 Multiservice Switch Release 3 Documentation

Title	Description
Cisco MGX 8950 Hardware Installation Guide, Release 3 DOC-7814147=	Describes how to install the Cisco MGX 8950 core switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8950 switch uses a PXM45/B controller card and provides support for broadband service modules.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco MGX 8850 (PXM45) and MGX 8950 Software Configuration Guide, Release 3 DOC-7814788=	Describes how to configure the Cisco MGX 8850 (PXM45) and the Cisco MGX 8950 switches with a PXM45 controller to operate as ATM edge or core switches. This guide also provides some operation and maintenance procedures.
Cisco AXSM Software Configuration Guide and Command Reference for MGX 8850 (PXM45) and MGX 8950, Release 3 DOC-7814257=	This guide explains how to configure the AXSM cards for operation and contains a command reference that describes the AXSM commands in detail. The AXSM cards covered in this manual are the AXSM, AXSM/B, AXSM-E, and AXSM-32-T1E1-E.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.

Table 18 Cisco MGX 8950 Multiservice Switch Release 3 Documentation (continued)

Title	Description
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 Series Switch requires an SES for PNNI route processing.
Cisco MGX Route Processor Module (RPM-XF) Installation and Configuration Guide, Release 3 OL-2768-01 (online only)	Describes how to install and configure the Cisco MGX Route Processor Module (RPM-XF) in the Cisco MGX 8850 switch Release 3. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

SES PNNI Controller Release 3

The product documentation for installing and operating the Service Expansion Shelf (SES) Private Network-to-Network Interface (PNNI) Controller Release 3 is listed in Table 19.

Table 19 SES PNNI Controller Release 3 Documentation

Title	Description
Cisco SES PNNI Controller Software Configuration Guide, Release 3 DOC-7814258=	Describes how to configure, operate, and maintain the SES PNNI Controller.
Cisco SES PNNI Controller Command Reference, Release 3 DOC-7814260=	Provides a description of the commands used to configure and operate the SES PNNI Controller.
Cisco MGX and SES PNNI Network Planning Guide DOC-7813543=	Provides guidelines for planning a PNNI network that uses the Cisco MGX 8850 (PXM45 and PXM1E), Cisco MGX 8950, and the Cisco BPX 8600 switches. When connected to a PNNI network, each Cisco BPX 8600 Series Switch requires an SES for PNNI route processing.

Cisco MGX 8830 Multiservice Switch Release 3

The product documentation for installing and operating the Cisco MGX 8830 Multiservice Switch Release 3 is listed in Table 20.

Table 20 Cisco MGX 8830 Multiservice Switch Release 3 Documentation

Title	Description
Cisco MGX 8830 Hardware Installation Guide, Release 3 DOC-7814547=	Describes how to install the Cisco MGX 8830 edge switch. This documentation explains what the switch does and covers site preparation, grounding, safety, card installation, and cabling. The Cisco MGX 8830 switch uses a PXM1E controller card and provides PNNI support for narrowband service modules.
Cisco MGX 8850 (PXM1E) and MGX 8830 Software Configuration Guide, Release 3 DOC-7814248=	Describes how to configure the Cisco MGX 8850 (PXM1E) and the Cisco MGX 8830 switches with PXM1E controller cards to operate as ATM edge switches. This guide also provides some operation and maintenance procedures.
Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Command Reference, Release 3 DOC-7814789=	Describes the PXM commands that are available on the CLI of the Cisco MGX 8830, Cisco MGX 8850, and Cisco MGX 8950 switches.
Cisco SNMP Reference for MGX 8850 (PXM45 and PXM1E), MGX 8950, and MGX 8830, Release 3 DOC-7814747=	Provides information on all supported MIB objects, support restrictions, and traps for AXSM, AXSM-E, SRM-3T3, SRME, FRSM12, PXM45, PXM1E, RPM-PR, and RPM-XF.
Cisco AUSM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814254=	Provides software configuration procedures for provisioning connections and managing the AUSM cards supported in this release. Also provides command descriptions for all AUSM commands.
Cisco CESM Software Configuration Guide and Command Reference for MGX 8850 (PXM1E) and MGX 8830, Release 3 DOC-7814256=	Provides software configuration procedures for provisioning connections and managing the CESM cards supported in this release. Also provides command descriptions for all CESM commands.
Cisco Frame Relay Software Configuration Guide and Command Reference for MGX Switches (PXM1E) DOC-7814255=	Provides software configuration procedures for provisioning connections and managing the FRSM cards supported in this release. Also provides command descriptions for all FRSM commands.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Regulatory Compliance and Safety Information for the Cisco MGX 8830, MGX 8850 (PXM45 and PXM1E), and MGX 8950 Switches DOC-7814790=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco MGX 8830, Cisco MGX 8850 (PXM45 and PXM1E), and Cisco MGX 8950 switches.

Cisco WAN Switching Software Release 9.3

The product documentation for installing and operating the Cisco WAN Switching Software Release 9.3 is listed in Table 21.

Table 21 Cisco WAN Switching Software Release 9.3 Documentation

Title	Description
Cisco BPX 8600 Series Installation and Configuration, Release 9.3.30 DOC-7812907=	Provides a general description and technical details of the Cisco BPX broadband switch.
Cisco WAN Switching Command Reference, Release 9.3.30 DOC-7812906=	Provides detailed information on the general command line interface commands.
Cisco IGX 8400 Series Installation Guide, Release 9.3.30 OL-1165-01 (online only)	Provides hardware installation and basic configuration information for Cisco IGX 8400 Series Switches that are running Switch Software Release 9.3.30 or earlier.
Cisco IGX 8400 Series Provisioning Guide, Release 9.3.30 OL-1166-01 (online only)	Provides information for configuration and provisioning of selected services for the Cisco IGX 8400 Series Switches that are running Switch Software Release 9.3.30 or earlier.
9.3.42 Version Software Release Notes Cisco WAN Switching System Software OL-2911-01 (online only)	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.
Cisco IGX 8400 Series Regulatory Compliance and Safety Information DOC-7813227=	Provides regulatory compliance, product warnings, and safety recommendations for the Cisco IGX 8400 Series Switch.

Cisco MGX 8850 (PXM1) Edge Concentrator Switch Release 1

The product documentation for installing and operating the Cisco MGX 8850 (PXM1) Edge Concentrator Switch Release 1 is listed in Table 22.

Table 22 Cisco MGX 8850 (PXM1) Edge Concentrator Switch Release 1 Documentation

Title	Description
Cisco MGX 8850 Multiservice Switch Installation and Configuration, Release 1.1.3 DOC-7811223=	Provides installation instructions for the Cisco MGX 8850 (PXM1) Edge Concentrator Switch.
Cisco MGX 8800 Series Switch Command Reference, Release 1.1.3 DOC-7811210=	Provides detailed information on the general command line for the Cisco MGX 8850 (PXM1) Edge Concentrator Switch.
Cisco MGX 8800 Series Switch System Error Messages, Release 1.1.3 DOC-7811240=	Provides error message descriptions and recovery procedures.
Cisco MGX 8850 Multiservice Switch Overview, Release 1.1.3 OL-1154-01 (online only)	Provides a technical description of the system components and functionality of the Cisco MGX 8850 (PXM1) Edge Concentrator Switch from a technical perspective.

Table 22 Cisco MGX 8850 (PXM1) Edge Concentrator Switch Release 1 Documentation (continued)

Title	Description
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco MGX 8230, MGX 8250, and MGX 8850 (PXM1) Software Version 1.2.13 OL-2916-01 (online only)	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

Cisco MGX 8250 Edge Concentrator Switch Release 1

The documentation for installing and operating the Cisco MGX 8250 Edge Concentrator Switch Release 1 is listed in Table 23.

Table 23 Cisco MGX 8250 Edge Concentrator Switch Release 1 Documentation

Title	Description
Cisco MGX 8250 Edge Concentrator Installation and Configuration, Release 1.1.3 DOC-7811217=	Provides installation instructions for the Cisco MGX 8250 Edge Concentrator Switch.
Cisco MGX 8250 Multiservice Gateway Command Reference, Release 1.1.3 DOC-7811212=	Provides detailed information on the general command line interface commands.
Cisco MGX 8250 Multiservice Gateway Error Messages, Release 1.1.3 DOC-7811216=	Provides error message descriptions and recovery procedures.
Cisco MGX 8250 Edge Concentrator Overview, Release 1.1.3 DOC-7811576=	Describes the system components and functionality of the Cisco MGX 8250 Edge Concentrator Switch from a technical perspective.
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.

Table 23 Cisco MGX 8250 Edge Concentrator Switch Release 1 Documentation (continued)

Title	Description
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco MGX 8230, MGX 8250, and MGX 8850 (PXM1) Software Version 1.2.13 OL-2916-01 (online only)	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

Cisco MGX 8230 Edge Concentrator Switch Release 1

The documentation for installing and operating the Cisco MGX 8230 Edge Concentrator Switch Release 1 is listed in Table 24.

Table 24 Cisco MGX 8230 Edge Concentrator Switch Release 1 Documentation

Title	Description
Cisco MGX 8230 Edge Concentrator Installation and Configuration, Release 1.1.3 DOC-7811215=	Provides installation instructions for the Cisco MGX 8230 Edge Concentrator Switch.
Cisco MGX 8230 Multiservice Gateway Command Reference, Release 1.1.3 DOC-7811211=	Provides detailed information on the general command line interface commands.
Cisco MGX 8230 Multiservice Gateway Error Messages, Release 1.1.3 DOC-78112113=	Provides error message descriptions and recovery procedures.
Cisco MGX 8230 Edge Concentrator Overview, Release 1.1.3 DOC-7812899=	Provides a technical description of the system components and functionality of the Cisco MGX 8230 Edge Concentrator Switch from a technical perspective.
Cisco MGX Route Processor Module Installation and Configuration Guide, Release 1.1 DOC-7812278=	Describes how to install and configure the Cisco MGX Route Processor Module (RPM/B and RPM-PR) in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides site preparation, troubleshooting, maintenance, cable and connector specifications, and basic Cisco IOS configuration information.
Cisco VISM Installation and Configuration Guide, Release 3.0 OL-2521-01 (online only)	Describes how to install and configure VISM in the Cisco MGX 8850 (PXM1), Cisco MGX 8250, and Cisco MGX 8230 switches. Also provides troubleshooting, maintenance, cable and connector specifications, and Cisco CLI command configuration information.
Release Notes for Cisco MGX 8230, MGX 8250, and MGX 8850 (PXM1) Software Version 1,2.11 OL-2916-01 (online only)	Provides new feature, upgrade, and compatibility information, as well as known and resolved anomalies.

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:
- http://www.cisco.com/cgi-bin/order/order_root.pl
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
- http://www.cisco.com/go/subscription
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click **Leave Feedback** at the bottom of the Cisco Documentation home page. After you complete the form, print it out and fax it to Cisco at 408 527-0730.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

http://www.cisco.com/register/

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

This document is to be used in conjunction with the Cisco WAN Switching publications.