Router Recovery with ROM Monitor

This chapter describes the router recovery methods in ROM Monitor (ROMMON) mode of the router.

Information About Router Recovery

The standard way to install new software on the Designated Shelf Controller (DSC) is by using the **install** command in administration EXEC mode. However, if the DSC is unable to boot the Cisco IOS XR software or you want to completely replace the existing software, you can reinstall the software while the DSC is in ROM Monitor mode. When you install the Cisco IOS XR software from ROM Monitor mode, you must use a special software installation file with a vm file extension. These files are called vm files. You cannot install software in package installation envelope (PIE) files from ROM Monitor mode.

Note   Installation using a vm file in ROM Monitor mode should be performed only from the DSC of the system.

⚠

Caution   Reinstalling the Cisco IOS XR software from ROM Monitor mode replaces the currently installed router software and causes substantial router downtime. We recommend installing or upgrading software packages from administration EXEC mode using PIE files, as described in the *Upgrading and Managing Cisco IOS XR Software* module of the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.

About ROMMON Installation Files

This section includes the following topics:

Locating Installable Files

To obtain Cisco IOS XR software and version information, use the Cisco Software Delivery System (SDS), available at the following URL:

http://www.cisco.com/cisco/software/navigator.html?mdfid=279844343&flowid=2130

To locate Cisco IOS XR software images:

• Select any entry under Cisco XR 12000 Series Router.

• Select IOS XR software to see the image tar files, or choose any of the other categories to see the other files.

The table below lists the software packages that you can install from ROMMON.

Table 1: Downloadable Software for Installation from ROM Monitor

Software Package Name	Description
Cisco IOS XR IP/MPLS Core Software	This package contains two copies of the Cisco IOS XR Unicast Routing Core Bundle. One copy is in the Package Installation Envelope (PIE) file format and can be installed while Cisco IOS XR is running, as described in the*Upgrading and Managing Cisco IOS XR Software* module of the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*. The other copy is in a vm file that can be installed from ROM Monitor. This package also includes Cisco IOS XR MPLS, Manageability, and Multicast packages (in PIE files).
Cisco IOS XR IP/MPLS Core Software 3DES	This package contains everything in the Cisco IOS XR IP/MPLS Core Software package in addition to Cisco IOS XR Security package (in a PIE file).

The table above lists packages that are distributed in files with tar filename extensions (tar files are assembled with the UNIX tar utility). When you download a tar file, you must unpack the tar file with a software program before you can install any of the files in the package.

The files that you can install from ROM Monitor have a vm filename extension. These files contain the software included in the Cisco IOS XR Unicast Routing Core Bundle. The other files in the packages are PIE files.

Note The tar files contain both PIE files and vm files. If the router is operating properly, you can install the software using the appropriate PIE file with little or no interruption to router traffic, as described in the *Upgrading and Managing Cisco IOS XR Software* module of the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*. If the router is not booted with the Cisco IOS XR software, install the core software using the vm file first, and then install any additional packages using the PIE files after the router enters EXEC mode.

The table below describes packages that contain additional files for the Cisco XR 12000 Series Router.

Filename	Description
	This software is for all PRPs except the DSC and must be loaded on a PRP before it can communicate with the DSC.
bfprp_romupgrade-1.14.0.91	This software is for the ROM Monitor upgrade of the PRP cards, and later versions may display a different version number at the end of the filename.
c12kprp-boot-mz.120-32.S3	This software is the Boothelper for the PRP cards, and later versions may display a different version number at the end of the filename. c12kprp-boot-mz.120-33.S11 is the Boothelper version required for PRP-2 cards on Cisco IOS XR software release 4.3.1 and later.

tar Filenames and Version Numbers

The format for a tar filename is:

platform-bundle_name-major.minor.maintenance.tar

Table 2: tar Filename Components

Component	Description
platform	Identifies the platform for which the software package is designed. For packages designed for the Cisco XR 12000 Series Router, the platform designation is "XR12000."

Component	Description
bundle_name	Identifies a specific bundle. • *IOS XR* bundle name indicates a file that includes all packages in the Cisco IOS XR Unicast Routing Core Bundle and the Management, MPLS, and Multicast packages. These packages are described in the *Upgrading and Managing Cisco IOS XR Software* module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*. • IOS XR-k9 bundle name indicates a file that includes all packages in the iosxr bundle file plus the security package.
major	Identifies the major release of this package. • Major releases occur when there is a major architectural change to the product (for example, a major new capability is introduced). • All packages operating on the router must be at the same major release level. • Major release is the least frequent release and may require a router reboot.
minor	Identifies the minor release of this package. • Minor releases contain one or more of the following: 　◦ New features 　◦ Bug fixes • Minor release versions do not have to be identical for all software packages operating on the router, but the operating packages must be certified by Cisco as compatible with each other. • Minor releases may require a router reboot.
maintenance	Identifies the maintenance release of this package. • Maintenance releases contain a collection of bug fixes for a package. • Maintenance release versions do not have to be identical for all software packages operating on the router, but the major and minor versions of the maintenance release must match the those of the package being updated. • Maintenance releases usually do not require a router reboot.

vm Filenames and Version Numbers

The format for a vm filename for Cisco XR 12000 Series Routers is:

comp-platform-package_name.vm-major.minor.maintenance

The "comp" prefix indicates that the file is a composite of multiple packages.

The table below describes the other filename components.

Table 3: vm Filename Components

Component	Description
platform	Identifies the platform for which the software package is designed. For packages designed for Cisco XR 12000 Series Routers, the platform designation is "c12k." The mbiprp platform name specifies a special file for the Cisco XR 12000 Series Router.
package_name	Identifies a specific package. • Mini package names indicate a composite package that includes all packages in the Cisco IOS XR Unicast Routing Core Bundle, which is described in the *Upgrading and Managing Cisco IOS XR Software* module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*. • Rp package names specify a special file for the Cisco XR 12000 Series Router.
major	Identifies the major release of this package. • A major release occurs when there is a major architectural change to the product (for example, a major new capability is introduced). • All packages operating on the router must be at the same major release level. • A major release is the least frequent release and may require a router reboot.

minor	Identifies the minor release of this package.
	
	• A minor release contains one or more of the following:
	  ◦ New features
	  ◦ Bug fixes
	
	• The minor release version does not have to be identical for all software packages operating on the router, but the operating packages must be certified by Cisco as compatible with each other.
	
	• A minor release may require a router reboot.

maintenance	Identifies the maintenance release of this package. • A maintenance release contains a collection of bug fixes for a package. • The maintenance release version does not have to be identical for all software packages operating on the router, but the major and minor versions of the maintenance release must match the those of the package being updated. • A maintenance release usually does not require a router reboot.

The following example shows a composite of multiple mini packages:

c12k-mini.vm-5.1.0

About the TURBOBOOT Variable

The TURBOBOOT environmental variable automates the software installation process in the ROM Monitor mode and determines the installation settings, such as the boot device (destination disk) for software installation. The following is the syntax for the TURBOBOOT environmental variable:

TURBOBOOT=on,{*boot-device*},[**format** | **clean**],[**nodisablebreak**]

In the preceding example, the TURBOBOOT variable is set to **on**, the boot device (destination disk) is the flash disk in **disk0:**, the installation process formats the disk, and the installation process can be terminated prematurely.

```
TURBOBOOT=on,disk0,format,nodisablebreak
```
There are four main arguments and keywords for the TURBOBOOT variable:

- **on**—Installs and activates the Cisco IOS XR software packages when the RP is booted with the *vm* image.

- *boot-device*—Selects the destination disk for software installation.

- [**format** | **clean**]: When the **clean** option is selected, the Cisco IOS XR software is completely replaced, but all other files on the disk are preserved, including configuration files for each secure domain router (SDR). When the **format** option is selected, the Cisco IOS XR software is completely replaced, and only the administration configuration is preserved. All other files on the disk, including all configuration files for the SDRs and all user files, are deleted. The administration configuration contains the configuration that determines SDR name and inventory. The SDR configurations include router configurations such as Border Gateway Protocol (BGP) and interface configurations.

- [**nodisablebreak**]: When the **nodisablebreak** flag is added, the installation process using the TURBOBOOT variable can be prematurely terminated by sending a break from the terminal. The default is to ignore breaks from the terminal.

Note
- Each argument is separated by a comma.

- The default boot device disk is disk0:.

About the Boot Device (Destination Disk)

The boot device determines the location where the Cisco IOS XR software is installed on all RPs. The system uses the boot-device to install the software to the other RP card in the system. Any additional software or software upgrades are automatically saved to the same boot device.

When you install Cisco IOS XR software using the Turboboot method in ROM Monitor mode, you must specify a *boot-device* for the router. The boot device is the local disk on the RP card where the Cisco IOS XR software is installed.

- MBI is always installed on the boot device.

- On the Cisco XR 12000 Series Router, the supported boot devices are disk0:, disk1:, and compact flash.

The boot-device determines the disk slot where all software is installed on all RPs and distributed route processors (DRPs) that act as the designated secure domain router shelf controllers (DSDRSCs). In other words, when you turboboot the Cisco IOS XR software to the DSC, all the other RPs in the system must include a disk in that same slot. The system uses these disks to distribute the software to each RP in the system. Any additional software or software upgrades are automatically saved to the same boot device.

After the Cisco IOS XR software is installed to the boot device using the TURBOBOOT method, all additional software and software upgrades are automatically installed and synchronized to that same boot device and cannot be changed. For example:

- If the Cisco IOS XR software is installed in the RP card using the TURBOBOOT variable, with disk0 (TURBOBOOT=on,disk0), all packages are installed to disk0: and the boot device is disk0:.

- If the Cisco IOS XR software is installed in the RP card using the TURBOBOOT variable, with disk1 (TURBOBOOT=on,disk1), all packages are installed to disk1: and the boot device is "disk1:".

- On a Cisco XR 12000 Series Router, you can also turboboot using compact flash disk as the boot device.

- After you boot the Cisco IOS XR software, you are not allowed to add packages to anywhere other than the boot-device. For example, you cannot boot the DSC to disk1: and decide to add your packages to disk0: or vice versa.

Note   We recommend using disk0: as the boot device. Disk0: is pre-installed in most RPs, which ensures that the correct disk is used to store the software packages on the entire system.

Reinstalling Cisco IOS XR Software on Cisco XR 12000 Series Router

Caution   Reinstalling Cisco IOS XR software from ROM Monitor mode replaces the currently installed router software and causes substantial router downtime. We recommend that you install or upgrade software packages from the Administration EXEC mode using package installation envelope (PIE) files, as described in the *Upgrading and Managing Cisco IOS XR Software* module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.

This section includes the following topics:

Cisco XR 12000 Series Router Router Installation Overview

When you reinstall the software from ROM Monitor mode, you can perform either of the following procedures:

- Load the Cisco IOS XR software from a vm file on a TFTP server to the DSC.

- Transfer the vm file to a local storage device and then load the Cisco IOS XR software from that storage device to the DSC.

Installation from a TFTP Server

To install the Cisco IOS XR software from a TFTP server, perform the following procedures:

1. Start the DSC Boothelper and either configure or verify the configuration of the Management Ethernet interface on the PRP to which you are installing the software.

2. Place the DSC in ROM Monitor mode.

3. Clear any environment variables that might interfere with the installation.

4. Configure the TURBOBOOT environment variable to either clean or format the boot device during the installation.

5. Boot the Cisco IOS XR software from a *vm* file on the TFTP server. After you boot the Cisco IOS XR software, the Turboboot process either cleans or formats the boot device based on the TURBOBOOT environment variable setting.

6. Boot the standby DSC and all other PRPs with the MBI.

⚠

Caution   If the TURBOBOOT variable is set to format the boot device, all SDR configurations are deleted. Only the administration configuration is preserved.

✎

Note   This procedure describes how to install the Cisco IOS XR software on a router that previously ran the Cisco IOS XR software. If you are upgrading a Cisco XR 12000 Series Router that is currently running Cisco IOS software, you need to upgrade the router to Cisco IOS XR software, as described in the document Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router.

Installation from a Local Storage Device

To install the Cisco IOS XR software from a local storage device, perform the following tasks:

1. Copy the new Cisco IOS XR software to the local storage device on the DSC. We recommend disk1.

2. Place the router in ROM Monitor mode.

3. Clear any environment variables that might interfere with the installation.

4. Configure the TURBOBOOT environment variable to either clean or format the boot device during the installation.

5 Boot the new Cisco IOS XR software from the image on the local storage device. After you boot the Cisco IOS XR software, the Turboboot process either cleans or formats the boot device based on the TURBOBOOT environment variable setting.

6 Boot the standby DSC and all other PRPs with the MBI.

⚠

Caution If the TURBOBOOT variable is set to format the boot device, all SDR configurations are deleted. Only the administration configuration is preserved.

About Boothelper in Cisco XR 12000 Series Routers

Boothelper software is additional software that extends the capabilities of ROM Monitor on a Cisco XR 12000 Series Router. With Boothelper, ROM Monitor can load images from compact flash and TFTP servers. Without Boothelper, ROM Monitor can only load images from a local storage device (disk0, disk1, and bootflash).

Before you can use Boothelper to connect to remote devices, such as a TFTP server, you must configure the Management Ethernet interface in the Boothelper software. After Boothelper is configured, you do not need to load the software. When the configuration register is set to load software (setting 0x102), the software is loaded in the following sequence:

1 ROM Monitor

2 Boothelper

3 Cisco IOS XR software

If the Boothelper software cannot load, the ROM Monitor prompt appears. If the Cisco IOS XR software cannot load, the Boothelper prompt appears as follows:

```
router(boot)>
```
If all the software loads correctly, the Cisco IOS XR software prompt appears.

✎

Note Before installing Cisco IOS XR software from a TFTP server, ensure that the router has the latest Boothelper image, **c12kprp-boot-mz.iox.120-33.S11**, in its bootflash and that the ROMMON environmental variable, **BOOTLDR**, is set to this particular image. This is applicable to Cisco IOS XR software release 4.3.1 and later. For upgrading Boothelper, refer Upgrading or Downgrading Boothelpersection.

Boothelper Procedures

This section provides the following procedures for use on Cisco XR 12000 Series Routers:

Starting the Router with Boothelper

In normal operating conditions, it should not be necessary to start the router with Boothelper. If you want to reinstall software from a vm image on a remote server, you must start Boothelper to verify or configure the Management Ethernet interface.

SUMMARY STEPS

1. Restart the router in ROM Monitor mode.
2. **confreg 0x0**
3. **reset**
4. **unset BOOT**
5. **unset BOOTLDR=**or**set BOOTLDR=bootflash:**/*filename*
6. **sync**
7. **boot**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Restart the router in ROM Monitor mode.	Restarts the router in ROM Monitor mode.
Step 2	**confreg 0x0** **Example:** `rommon 1 > confreg 0x0`	Configures the router to restart in ROM Monitor mode. • This step and the next are not necessary if you have already set the configuration register to 0x0 in Step 1.
Step 3	**reset** **Example:** `rommon 2 > reset`	Activates the configuration change made in Step 2.
Step 4	**unset BOOT** **Example:** `rommon 3 > unset boot`	Clears the setting of the BOOT environment variable. • If the router has been running Cisco IOS XR software, the BOOT variable is probably set to load that software.

Step 5	**unset BOOTLDR=**or**set BOOTLDR=bootflash:**/*filename*
	
	Example:
	
	`rommon 2 > unset BOOTLDR=`
	`or`
	`rommon 2 > set`
	`BOOTLDR=bootflash:/c12kprp-boot-mz`
		Configures ROM Monitor to load the Boothelper software.
		
		• **unset BOOTLDR=** If the Boothelper file is the first file in bootflash (dir bootflash:), it will automatically be loaded when the **boot** command is run. Unset the Boothelper if the Boothelper file is the first file in bootflash.
		
		• **set BOOTLDR=bootflash:**/*filename* If the Boothelper file is not the first file in bootflash, set the bootflash variable to specify the name and location of the Boothelper file.

Step 6	**sync** **Example:** `rommon 3 > sync`	Saves the configuration change in Step 4.

	Command or Action	**Purpose**
Step 7	**boot** **Example:** `rommon 3 > boot`	Boots the Boothelper software.

Starting the Router with Boothelper: Example

The following example shows how to start the router with Boothelper:

```
rommon 1 > confreg 0x0

rommon 2 > reset

System Bootstrap, Version 12.0(20040624:164256) [assafb-misc1 1.14dev(0.91)] DEE
Copyright (c) 1994-2004 by cisco Systems, Inc.

DRAM DIMM Slot 1: 512M found, Slot 2: 1024M found
MPC7450 platform with 1572864 Kbytes of main memory

rommon 1 > unset BOOT
rommon 2 > unset BOOTLDR=
rommon 3 > sync
rommon 4 > boot

Self decompressing the image : BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB [OK]

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            cisco Systems, Inc.
            170 West Tasman Drive
            San Jose, California 95134-1706

Cisco Internetwork Operating System Software
IOS (tm) GS Software (C12KPRP-BOOT-M), Version 12.0(31)S, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Sat 16-Apr-05 22:45 by kellythw
Image text-base: 0x00010000, data-base: 0x0095D000

cisco 12410/PRP (MPC7450) processor (revision 0x00) with 1572864K bytes of memo.
MPC7450 CPU at 665Mhz, Rev 2.1, 256KB L2, 2048KB L3 Cache
Last reset from sw reset

3 Route Processor Cards
2 Clock Scheduler Cards
5 Switch Fabric Cards
1 8-port OC3 POS controller (8 POS).
1 four-port OC12 POS controller (4 POS).
1 OC48 POS controller (1 POS).
2 Four Port Gigabit Ethernet/IEEE 802.3z controllers (8 GigabitEthernet).
2 Ethernet/IEEE 802.3 interface(s)
8 GigabitEthernet/IEEE 802.3 interface(s)
13 Packet over SONET network interface(s)
```

```
2043K bytes of non-volatile configuration memory.

1000944K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
65536K bytes of Flash internal SIMM (Sector size 256K).
.
.
.
Press RETURN to get started!

router(boot)>
```

Configuring the Management Ethernet Interface

To enable network communications when the Cisco IOS XR software is not loaded, you must configure the Management Ethernet interface in Boothelper. The Boothelper configuration is most often used to enable access to TFTP servers when reinstalling software from vm files.

Prerequisites
Before you begin, collect the following information:

- IP address of the Management Ethernet interface for your RP

- Subnet mask of the Management Ethernet interface for your RP

- IP address of the default gateway that serves your RP

SUMMARY STEPS

1. Start the Boothelper software.
2. **enable**
3. Enter the password.
4. **show interface ethernet** *interfaceNumber*
5. **configure terminal**
6. **interface ethernet** *interfaceNumber*
7. **ip address** *ipaddress subnetmask*
8. **mac-address** *macaddress*
9. **no ip directed-broadcast**
10. **no ip route-cache**
11. **no shutdown**
12. **end**
13. **ip default-gateway** *ipAddress*
14. **reload**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Start the Boothelper software.	Starts the Boothelper.

	Command or Action	Purpose
Step 2	**enable** **Example:** `router(boot)> enable`	Places the router in privileged EXEC mode.
Step 3	Enter the password. **Example:** `Password:`	Submits the password for authentication. **Note** The password is not displayed on the screen.
Step 4	**show interface ethernet** *interfaceNumber* **Example:** `router(boot)# show interface ethernet 0`	Displays the current interface configuration and statistics for the specified interface. • Enter 0 for Ethernet Interface 0 or 1 for Ethernet Interface 1. • If the current configuration is correct, skip to Step 13.
Step 5	**configure terminal** **Example:** `router(boot)# configure terminal`	Places the router in configuration mode.
Step 6	**interface ethernet** *interfaceNumber* **Example:** `router(b(config)# interface ethernet 0`	Selects an interface to configure. • Enter 0 for Ethernet interface 0 or 1 for Ethernet interface 1. **Note** The Ethernet ports correspond to the Management Ethernet interfaces in the Cisco IOS XR software. For example, Ethernet 0 corresponds to MgmtEth0/x/CPU0/0 in the Cisco IOS XR software.
Step 7	**ip address** *ipaddress subnetmask* **Example:** `router(b(config-if)# ip address 10.8.28.103 255.255.0.0`	Configures the IP address and subnet mask for the interface. • Replace *ipaddress* with the IP address for the interface. • Replace *subnetmask* with the subnet mask for the interface.
Step 8	**mac-address** *macaddress* **Example:** `router(b(config-if)# mac-address 0007.b39b.a7ff`	Configures the MAC address for the interface. • Replace *macaddress* with the MAC address for the interface. • This MAC address applies only while the node is running Boothelper.
Step 9	**no ip directed-broadcast** **Example:** `router(b(config-if)# no ip directed-broadcast`	Disables the translation of a directed broadcast to physical broadcasts.

	Command or Action	Purpose
Step 10	**no ip route-cache** **Example:** `router(b(config-if)# no ip route-cache`	Disables all switching options supported by the **ip route-cache** command.
Step 11	**no shutdown** **Example:** `router(b(config-if)# no shutdown`	Brings up the interface.
Step 12	**end** **Example:** `router(b(config-if)# end`	Exits interface configuration mode.

Step 13	**ip default-gateway** *ipAddress*
	
	Example:
	`router(b(config)# ip default-gateway`
	`10.10.0.1`
		Defines the IP address for the default gateway.

Step 14	**reload**
	
	Example:
	`router(boot)# reload`
	
	`System configuration has been modified.`
	`Save? [yes/no]: y`
	`Building configuration...`
	`[OK]`
	`Proceed with reload? [confirm]`
		Restarts the RP.
		
		• Type **y** and press **Return** to save the configuration.
		
		• Press **Return** when asked to confirm that you want to reload the router.
		
		• Because the configuration register is still set to 0x0, the router reloads ROM Monitor.

Configuring Management Ethernet Interface: Example

The following example shows how to configure Management Ethernet interface 0 on a PRP in Boothelper:

```
router(boot)> enable

Password:

router(boot)# show interface ethernet 0

Ethernet0 is administratively down, line protocol is down
  Hardware is 10/100 Ethernet, address is 0007.b39b.a7ff (bia 0007.b39b.a7ff)
  Internet address is 12.8.28.103/16
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
       Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
```

```
        0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
        0 input packets with dribble condition detected
        0 packets output, 0 bytes, 0 underruns
        0 output errors, 0 collisions, 1 interface resets
        0 babbles, 0 late collision, 0 deferred
        1 lost carrier, 0 no carrier
        0 output buffer failures, 0 output buffers swapped out
```

router(boot)# **configure terminal**

```
Enter configuration commands, one per line.  End with CNTL/Z.
```
router(b(config)# **interface ethernet 0**
router(b(config-if)# **ip address 10.8.28.103 255.255.0.0**
router(b(config-if)# **mac-address 0007.b39b.a7ff**
router(b(config-if)# **no ip directed-broadcast**
router(b(config-if)# **no ip route-cache**
router(b(config-if)# **no shutdown**
router(b(config-if)# **end**
router(boot)# **reload**

```
System configuration has been modified. Save? [yes/no]: y
Building configuration...
[OK]
Proceed with reload? [confirm]

System Bootstrap, Version 12.0(20040624:164256) [assafb-misc1 1.14dev(0.91)] DEE
Copyright (c) 1994-2004 by cisco Systems, Inc.

DRAM DIMM Slot 1: 512M found, Slot 2: 1024M found
MPC7450 platform with 1572864 Kbytes of main memory
rommon 1 >
```

Exiting Boothelper and Starting ROM Monitor

If an RP is running Boothelper software and you want to return to ROM Monitor mode, use the following procedure.

SUMMARY STEPS

1. **enable** router(boot)> **enable**
2. Enter the password.
3. **configure terminal**
4. **config-register 0x0**
5. **exit**
6. **reload**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** router(boot)> **enable**	Places the router in privileged EXEC mode.

	Command or Action	Purpose
Step 2	Enter the password. **Example:** Password:	Submits the password for authentication. The password is not displayed on the screen.
Step 3	**configure terminal** **Example:** router(boot)# **configure terminal**	Places the RP in configuration mode.
Step 4	**config-register 0x0** **Example:** router(b(config)# **config-register 0x0**	Configures the RP to start in ROM Monitor mode when the next reload occurs.
Step 5	**exit** **Example:** router(b(config)# **exit**	Exits configuration mode.
Step 6	**reload** **Example:** router(boot)# **reload** System configuration has been modified. Save? [yes/no]: **y** Building configuration... [OK] Proceed with reload? [confirm]	Restarts the RP. • Type **y** and press **Return** to save the configuration. • Press **Return** when asked to confirm that you want to reload the router. • Because the configuration register is set to 0x0, the router reloads ROM Monitor.

Exiting Boothelper and Starting ROM Monitor: Example

The following example shows how to exit Boothelper and start ROM Monitor on an RP:

```
router(boot)> enable

Password:

router(boot)# configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

router(b(config)# config-register 0x0

router(b(config)# exit

router(boot)# reload

System configuration has been modified. Save? [yes/no]: y
Building configuration...
[OK][OK][OK]
Proceed with reload? [confirm]
```

```
System Bootstrap, Version 12.0(20040624:164256) [assafb-misc1 1.14dev(0.91)] DEVELOPMENT
SOFTWARE
Copyright (c) 1994-2004 by cisco Systems, Inc.

DRAM DIMM Slot 1: 512M found, Slot 2: 1024M found
MPC7450 platform with 1572864 Kbytes of main memory

rommon 1 >
```

Reinstalling to a Cisco XR 12000 Series Router from a TFTP Server Image

The Cisco IOS XR software can be reinstalled directly from a vm file located on a TFTP server. Complete the instructions in this section exactly as described.

Restrictions for TFTP Services

TFTP services by some vendors (such as Sun Solaris) may not support files larger than 32 MB. Because most Cisco IOS XR vm images are larger than 32 MB, you may need to use one of the following options:

- Use a third-party or freeware TFTP server that supports file sizes larger than 32 MB.

- Download a patch from Sun Microsystems to correct this limitation (http://www.sun.com).

- Install the Cisco IOS XR software from a vm image located on the local flash disk.

Prerequisites

The following hardware and software are required:

- ROM Monitor firmware on the Cisco XR 12000 Series Router router is compatible with the Cisco IOS XR software image that you are installing.

- Boothelper c12kprp-boot-mz.120-32.S3 (For Cisco IOS XR software release 4.3.0 and below)

  Boothelper c12kprp-boot-mz.120-33.S11 (For Cisco IOS XR software release 4.3.1 and later)

- 256 MB or larger flash disk0:

Before you begin, collect the following information:

- IP address of the TFTP server from which the software will be downloaded

- Filename and directory of the vm installation file that will be installed on the router

Reinstalling to a Cisco XR 12000 Series Router from a TFTP Server Image

SUMMARY STEPS

1. Back up the router configuration while still in EXEC mode.
2. Place both the DSC and standby DSC in ROM Monitor mode.
3. Configure Boothelper for network access.
4. **set**
5. **unset BOOT**
6. **unset TFTP_FILE**
7. **unset CONFIG_FILE**
8. **TURBOBOOT=on**, *boot-device, options*
9. **sync**
10. **boot tftp:**//*server*/*directory*/*filename*
11. Boot all non-DSC PRPs with the MBI.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Back up the router configuration while still in EXEC mode.	(Optional) To preserve the current router configuration, copy it to another disk while still in EXEC mode. • For more information, see *Managing Configuration History and Rollback* section in the *Upgrading and Managing Cisco IOS XR Software* module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.
Step 2	Place both the DSC and standby DSC in ROM Monitor mode.	Places the PRPs in ROM Monitor mode.
Step 3	Configure Boothelper for network access.	Enables network access for the PRP in preparation for downloading the new software.
Step 4	**set** **Example:** `rommon1>` **set**	Displays the ROM Monitor environment variables.
Step 5	**unset BOOT** **Example:** `rommon2>` **unset BOOT**	Clears the setting for the BOOT variable. **Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 6	**unset TFTP_FILE**	Clears the setting for the TFTP_FILE variable.

	Command or Action	Purpose
	Example: rommon3> *unset TFTP_FILE*	**Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 7	**unset CONFIG_FILE** **Example:** rommon4> **unset CONFIG_FILE**	Clears the setting for the CONFIG_FILE variable. **Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 8	**TURBOBOOT=on**, *boot-device, options* **Example:** rommon5> **TURBOBOOT=on**, *disk0,format*	Sets the TURBOBOOT parameters. • Separate each parameter with a comma (,). • To enable the Turboboot process, specify **on**. • Specify a boot device where all software will be installed on the DSC and all DSDRSCs. We recommend disk0:. • To replace the existing software without formatting the boot device, replace *options* with **clean.** • To replace the existing software and format the boot device, replace *options* with **format.** • The default option is **clean**. • Any existing configuration is preserved.
Step 9	**sync** **Example:** rommon6> **sync**	Saves the new ROM Monitor variable settings.
Step 10	**boot tftp:**//*server*/*directory*/*filename* **Example:** rommon7> **boot** **tftp:**//*223.255.254.254*/*softdir*/*c12k-mini.vm-5.1.0*	Retrieves the file from the TFTP server and installs it on the boot device. • Execute this command on the active PRP and specify the vm installation file from the TFTP server. • This process removes any existing software packages, resets the configuration register to 0x2, and boots the system. • Allow the system to fully boot. The "Press RETURN to get started" message appears twice. The first occurrence appears when the software is loaded into memory. The second occurrence happens after the software has been installed on the disk. • The system is fully booted when the following message appears: SYSTEM CONFIGURATION COMPLETED • Do not wait for this step to complete before starting the next step.

	Command or Action	Purpose
Step 11	Boot all non-DSC PRPs with the MBI.	Prepares PRPs to communicate with the DSC.

Reinstalling to a Cisco XR 12000 Series Router from a TFTP Server Image: Examples

The following examples are provided:

Setting the TURBOBOOT Variable

The following example shows how to set the TURBOBOOT variable on the DSC and save the change:

```
rommon1> TURBOBOOT=on,disk0,format
rommon2> sync
```

Booting the vm Installation File

The following example shows how to boot the DSC using the specified vm file on the specified TFTP server:

```
rommon 2>

boot tftp://10.10.10.10/software/c12k-mini.vm-5.1.0

.
.
.
bios con0/RP1/CPU0 is now available

Press RETURN to get started.
```

Reinstalling to a Cisco XR 12000 Series Router from an Image on a Local Storage Device

This section describes the tasks required to install the Cisco IOS XR software on the boot device (such as disk0) using a vm image stored on a a local flash storage device (such as disk1). Complete the procedures exactly as described in this section.

> **Note** Before booting begins, a delay of 10 minutes or more may occur while the vm image is read to memory from the removable flash disk1.

Prerequisites

A valid vm image must be located on flash disk (disk1).

If this file is not present on disk1 or a different version is required, use one of the following options:

- While the router is still in EXEC mode, copy the necessary vm image from a TFTP, an FTP, or an rcp server to the local storage device. We recommend flash disk1. This process is described in the the

Upgrading and Managing Cisco IOS XR Software module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.

- Consult your system administrator for a flash disk containing the bootable vm file.

- Consult your Cisco representative for a flash disk containing the bootable vm file.

Note We recommend using the removable flash disk disk1 to store archives of vm and PIE files. The disk used to store the installable files cannot be used as a destination for installed software or configurations. Only the boot device can be used to store active software and configurations.

The following hardware and software are required:

- The ROM Monitor firmware on the Cisco XR 12000 Series Router router is compatible with the Cisco IOS XR software image that you are installing.

- Boothelper c12kprp-boot-mz.120-32.S3 (For Cisco IOS XR software release 4.3.0 and below)

  Boothelper c12kprp-boot-mz.120-33.S11 (For Cisco IOS XR software release 4.3.1 and later)

- 256 MB or higher flash disk0.

SUMMARY STEPS

1. Back up the router configuration while still in EXEC mode.
2. Copy the required vm file to the DSC local storage device (such as flash disk1). We recommend the usage of flash disk1. You can also use a flash disk that already has the correct image.
3. Place both the DSC and standby DSC in ROM Monitor mode.
4. **set**
5. **unset BOOT**
6. **unset TFTP_FILE**
7. **unset CONFIG_FILE**
8. **TURBOBOOT=on**, boot-device, options
9. **sync**
10. **boot** *device:/filename*
11. Boot all non-DSC PRPs with the MBI.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Back up the router configuration while still in EXEC mode.	(Optional) To preserve the current router configuration, copy it to another disk while still in EXEC mode.
		• See *Managing Configuration History and Rollback* section in the *Upgrading and Managing Cisco IOS XR Software* module of *Cisco IOS XR*

	Command or Action	Purpose
		System Management Configuration Guide for the Cisco XR 12000 Series Router.
Step 2	Copy the required vm file to the DSC local storage device (such as flash disk1). We recommend the usage of flash disk1. You can also use a flash disk that already has the correct image.	Places the software on the router in preparation for installation.
Step 3	Place both the DSC and standby DSC in ROM Monitor mode.	
Step 4	**set** **Example:** rommon1>**set**	Displays the ROM Monitor environment variables.
Step 5	**unset BOOT** **Example:** rommon2> **unset BOOT**	Clears the setting for the BOOT variable. **Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 6	**unset TFTP_FILE** **Example:** rommon3> **unset TFTP_FILE**	Clears the setting for the TFTP_FILE variable. **Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 7	**unset CONFIG_FILE** **Example:** rommon4> **unset CONFIG_FILE**	Clears the setting for the CONFIG_FILE variable. **Note** This step is not required if the **set** command display shows that no value is assigned to this variable.
Step 8	**TURBOBOOT=on**, boot-device, options **Example:** rommon5> **TURBOBOOT=on**, *disk0,format*	Sets the TURBOBOOT parameters. • Separate each parameter with a comma (,). • To enable the Turboboot process, specify **on**. • Specify a boot device where all software will be installed on the DSC and all DSDRSCs. We recommend disk0:. • To replace the existing software without formatting the boot device, replace *options* with **clean**. • To replace the existing software and format the boot device, replace *options* with **format**. • The default option is **clean**. • Any existing configuration is preserved.

	Command or Action	Purpose
Step 9	**sync** **Example:** rommon6> **sync**	Saves the new ROM Monitor variable settings.
Step 10	**boot** *device:/filename* **Example:** rommon7> boot disk1:/c12k-mini.vm-5.1.0	Boots the file located on the local storage device and installs it to the boot device. • This process removes any existing software packages, resets the configuration register to 0x2, and boots the system. • Allow the system to fully boot. The "Press RETURN to get started" message appears twice. The first occurrence appears when the software is loaded into memory. The second occurrence happens after the software has been installed on the disk. • The system is fully booted when the following message appears: SYSTEM CONFIGURATION COMPLETED **Note** A delay of 10 minutes or more occurs while the software is read from the flash disk.
Step 11	Boot all non-DSC PRPs with the MBI.	Prepares PRPs to communicate with the DSC. • For instructions on booting the non-DSC PRPs with the MBI, see the Bringing Up Non-DSC PRPs on Cisco XR 12000 Series Routers . • If the PRP is in a redundancy slot that is paired with an active PRP, the PRP starts as the standby for that PRP. The adjacent redundancy slots are as follows: Slot 0 and Slot 1 Slot 2 and Slot 3 Slot 4 and Slot 5 Slot 6 and Slot 7 Slot 8 and Slot 9 Slot 10 and Slot 11 Slot 12 and Slot 13 Slot 14 and Slot 15 • If the PRP is not in a redundancy slot that is paired with an active PRP, the PRP becomes available for assignment to SDRs. • Redundancy slot pairs are described in Managing the Router Hardware module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.

Reinstalling to a Cisco XR 12000 Series Router from an Image on a Local Storage Device: Examples

The following examples are provided:

Setting the TURBOBOOT Variable

The following example shows how to set the TURBOBOOT variable on the DSC and save the change:

```
rommon2> TURBOBOOT=on,disk0,format
rommon3> sync
```

Booting the vm Installation File

The following example shows how to boot the DSC using the specified vm file on flash disk1:

```
rommon4> boot disk1:/c12k-mini.vm-5.1.0
```

What to Do Next

After the system is up, it is in normal EXEC mode, and you can execute the full range of CLI commands.

Note If there was no previous router configuration, you must enter a root-system username and password when the boot process is complete.

After reinstalling the software, refer to the following additional instructions:

1 See *Verifying the System Interfaces* in the *Troubleshooting the Cisco IOS XR Software* module of *Cisco IOS XR Getting Started Guide for the Cisco XR 12000 Series Router* for instructions to verify that the interfaces are up and properly configured.

2 Install additional software from the PIE files, as necessary. For more information, see the *Upgrading and Managing Cisco IOS XR Software* module of the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router.*

Bringing Up Non-DSC PRPs on Cisco XR 12000 Series Routers

If the Cisco IOS XR software has not been previously installed on a PRP and the PRP is installed in a Cisco XR 12000 Series Router, the card state shown by the **show platform** command is Card Present. To bring up the card for use in the router, you must first install the minimum boot image (MBI) software on the card. This section describes how to install the MBI on non-DSC RPs.

Prerequisites

The following hardware and software is required:

  • ROM Monitor 1.14 or later version

  • Boothelper c12kprp-boot-mz.120-32.S3 (For Cisco IOS XR software release 4.3.0 and below)

Boothelper c12kprp-boot-mz.120-33.S11 (For Cisco IOS XR software release 4.3.1 and later)

- 256 MB or larger flash disk0:

Before you begin, collect the following information:

- IP address of the TFTP server from which the software will be downloaded
- The filename and directory of the MBI file that will be installed on the PRP

SUMMARY STEPS

1. Restart the PRP in ROM Monitor mode.
2. **set**
3. **unset TURBOBOOT**
4. **unset BOOT**
5. **sync**
6. **boot tftp:**//*server*/*path*/**mbiprp-rp.vm**

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	Restart the PRP in ROM Monitor mode.	Restarts the PRP in ROM Monitor mode. • If the ROMMON prompt appears, the PRP is already in ROM Monitor mode. • If the boot prompt appears, the PRP is in Boothelper.
Step 2	**set** **Example:** rommon 1 > **set**	Displays the current setting of the ROM Monitor environment variables.
Step 3	**unset TURBOBOOT** **Example:** rommon 2 > **unset TURBOBOOT**	Clears any value assigned to the TURBOBOOT variable. • If the TURBOBOOT variable displays no value in Step 2, you can skip this step.
Step 4	**unset BOOT** **Example:** rommon 3 > **unset BOOT**	Clears the setting of the BOOT environment variable. • If the BOOT variable displays no value in Step 2, you can skip this step.
Step 5	**sync** **Example:** rommon 4 > **sync**	Saves any configuration changes you have made to the environment variables.

	Command or Action	Purpose
Step 6	**boot tftp://***server*/*path*/**mbiprp-rp.vm** **Example:** rommon 5 > **boot tftp://***server1*/*/path*/**mbiprp-rp.vm**	Boots the MBI software. • When the MBI is loaded, the **show platform** command displays the state as "MBI Running". • If the PRP is in a redundancy slot that is paired with a DSC or DSDRSC, the PRP synchronizes the configuration with the active PRP, and this takes some time. When the synchronization is complete, the **show platform** command displays the state as "IOS-XR RUN". • Redundancy slot pairs are described in the *Managing the Router Hardware* module of *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*.

Bringing Up a Non-DSC RP: Example

The following example shows how to bring up a non-DSC RP with the MBI:

```
rommon 1 > set
PS1=rommon ! >
IP_SUBNET_MASK=
TFTP_SERVER=
DEFAULT_GATEWAY=
IP_ADDRESS=
RET_2_RUTC=
IOX_ADMIN_CONFIG_FILE=
CONFIG_FILE=
BOOTLDR=
CONFGEN=
CHASSIS_SN=TBA07280054
IOX_CONFIG_FILE=
AUX_AUTHEN_LEVEL=0
TURBOBOOT=on,disk0,format
ReloadReason=79
BSI=0
RET_2_RCALTS=
BOOT=tftp://server1/path/file

rommon 2 > unset TURBOBOOT

rommon 3 > unset BOOT

rommon 4 > sync

rommon 5 > boot tftp://server1/path/mbiprp-rp.vm

Self decompressing the image : BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB [OK]

Loading path/mbiprp-rp.vm from server1 (via Ethernet0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
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!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 8726056 bytes]
Zø###############################################################
System page at phys:00023000 user:00023000 kern:00023000
Starting next program at v0022a188

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        San Jose, California 95134-1706

Cisco IOS XR Software for the Cisco XR c12000-mbiprp,
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```

PRP-3 ROMMON Changes

PRP-3 is the next-generation route processor for the Cisco XR 124xx and 128xx Router chassis running Cisco IOS XR software Release 3.8.0 or a later release. The PRP-3 is available as product number PRP-3 or PRP-3= for a primary route processor and is available as PRP-3/R for a redundant route processor. PRP-3 has significant improvements over PRP-2. These improvements include increased speed, improved scalability, higher system memory, faster packet processing. Because PRP-3 does not support Cisco IOS Software, the bootflash memory no longer exists in PRP-3. PRP-3 ROMMON has software intelligence to download a Cisco IOS XR image without the support of bootflash memory.

The table below differentiates the ROM Monitor behavior for the PRP-2 and PRP-3 cards.

PRP-2 Card	PRP-3 Card
The ROMMON of PRP-2 needs a boothelper image to reach TFTP and further download the Cisco IOS XR software image.	The ROMMON of PRP-3 has more software intelligence. It has inbuilt support to reach the TFTP server without a boothelper image.
Needs valid boothelper image to be present in the bootflash memory to load the Cisco IOS XR software image from the compactflash.	Has inbuilt support to boot from the compactflash memory. That means, PRP-3 doesn't have any boot image requirements.

For more information about PRP-3 ROMMON changes, see the *Performance Route Processor Installation and Configuration Guide*.

PRP-2 ROMMON Changes

ROMMON 2.2 has support for booting non-DSC PRPs from standby RPs and RPs of named SDRs.

A new command, **boot dsc** is added.

Note
- ROMMON 2.2 is applicable only for PRP-2s in the Cisco IOS XR software Release 4.1.0.
- The command **boot dsc** is available only on PRP-2.

Additional References

The following sections provide references related to the ROM Monitor.

Related Documents

Related Topic	Document Title
Contact a Cisco representative	*Obtaining Additional Publications and Information* in *What's New in Cisco Product Documentation* located at: http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html
Removable flash disk used to store archives of vm and PIE files Save current router configuration Verify that interfaces are up and properly configured Install or upgrade software packages from PIE files	*Upgrading and Managing Cisco IOS XR Software* chapter in the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*
Redundancy slot pairs	*Managing the Router Hardware* chapter in the *Cisco IOS XR System Management Configuration Guide for the Cisco XR 12000 Series Router*
Upgrade a Cisco XR 12000 Series Router that is running Cisco IOS software.	*Migrating from Cisco IOS to Cisco IOS XR Software on the Cisco XR 12000 Series Router*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support