Configuring General Router Features

This chapter describes how to communicate with the router using the command-line interface (CLI), and it describes basic Cisco IOS XR software configuration management.

Contents

The chapter contains the following sections:

Logical Routers

Cisco XR 12000 Series Routers can be partitioned into multiple, independent routers known as *logical routers* (LRs). Every router ships with a default LR, which is called the owner LR because, by default, it owns all RPs and line cards installed in the routing system. To build an LR, you must create the LR using configuration commands on the owner LR, assign RP and line cards to the LR, and then configure the interfaces on the line cards on the new LR. An LR is a group of cards within a Cisco XR 12000 Series Router that is configured to operate as an independent router.

Logical routers perform routing functions in the same manner as a physical router, but share some chassis resources with the rest of the system. For example, the applications, configurations, protocols, and routing tables assigned to an LR belong to that LR only, but other functions, such as chassis control, switch fabric, and partitioning, are shared with the rest of the system.

To manage an owner LR, you must connect to the RP for the owner LR. When you are connected to the owner LR, you have control over the entire system and all cards assigned to the owner LR. Although you can reassign cards from one LR to another, you cannot configure and manage cards assigned to an LR. To manage cards assigned to an LR, you must connect to the appropriate LR.

When you manage an LR, you must connect to the RP for that LR. You can connect to the LR using any of the connection methods you use for the owner LR (for example, you can connect through the console port or the Management Ethernet interface), and you have control over only the cards assigned to that LR. For example, you cannot configure and manage interfaces on line cards assigned to the owner LR or other LRs unless you connect to those LRs.

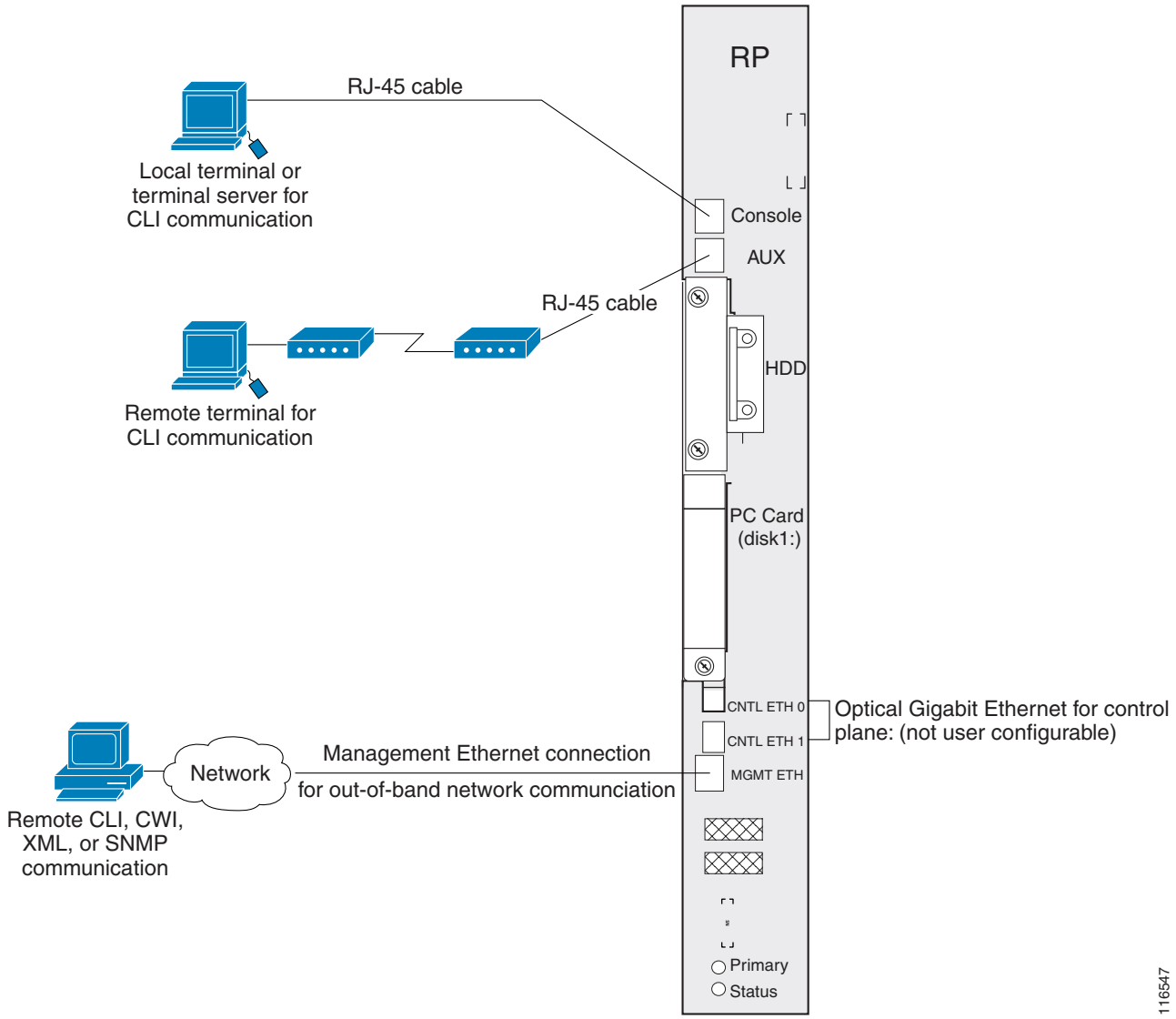
Note Cisco IOS XR Software Releases 2, 3, and 3.2 support only one logical router on the Cisco CRS-1. Cisco IOS XR Software Release 3.2 supports multiple logical routers on Cisco XR 12000 Series Routers. For more information, see the *Cisco IOS XR Interface and Hardware Component Configuration Guide.*

Connecting and Communicating with the Router

To manage or configure a router running the Cisco IOS XR software, you must first connect to the router using a terminal or a PC. Connections are made either through a direct physical connection to the Console port of the primary route processor (RP) or from a remote location using a modem or an Ethernet connection.

- Figure 2-1 shows the RP connections on the Cisco CRS-1 16-Slot Line Card Chassis, and Figure 2-2 shows the RP connections on the Cisco CRS-1 8-Slot Line Card Chassis.
- Figure 2-3 shows the performance route processor 2 (PRP-2) connections for a Cisco XR 12000 Series Router.

Figure 2-1 Communication Ports on the RP for a Cisco CRS-1 16-Slot Line Card Chassis



The first time a router is started, you must use a direct connection to the Console port to connect to the router and enter the initial configuration. When you use a direct connection to the Console port, CLI commands are entered at a terminal or at a computer running terminal emulation software. A direct Console port connection is useful for entering initial configurations and performing some debugging tasks.

This chapter describes some of the tasks you might want to perform during your initial configuration. One of those tasks is the configuration of the Management Ethernet interface, which is described in the "Configuring the Management Ethernet Interface" section on page 2-33. After the Management Ethernet interface is configured, most router management and configuration sessions take place over an Ethernet network connected to the Management Ethernet interface. SNMP agents and the CWI also use the network connection.

The modem connection can be used for remote communications with the router and serves as an alternate remote communications path if the Management Ethernet interface fails.

Figure 2-2 Communication Ports on the RP for a Cisco CRS-1 8-Slot Line Card Chassis

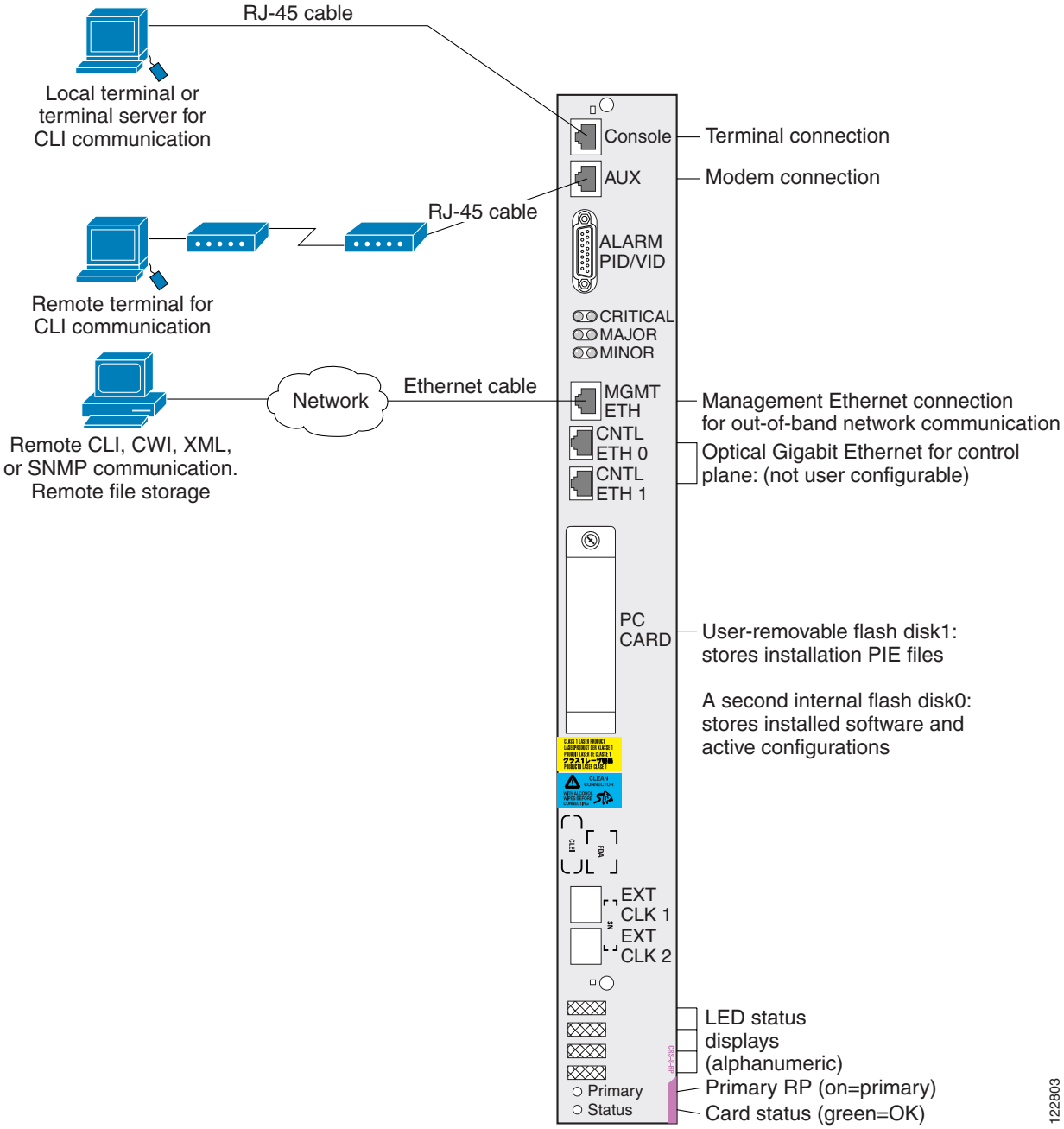
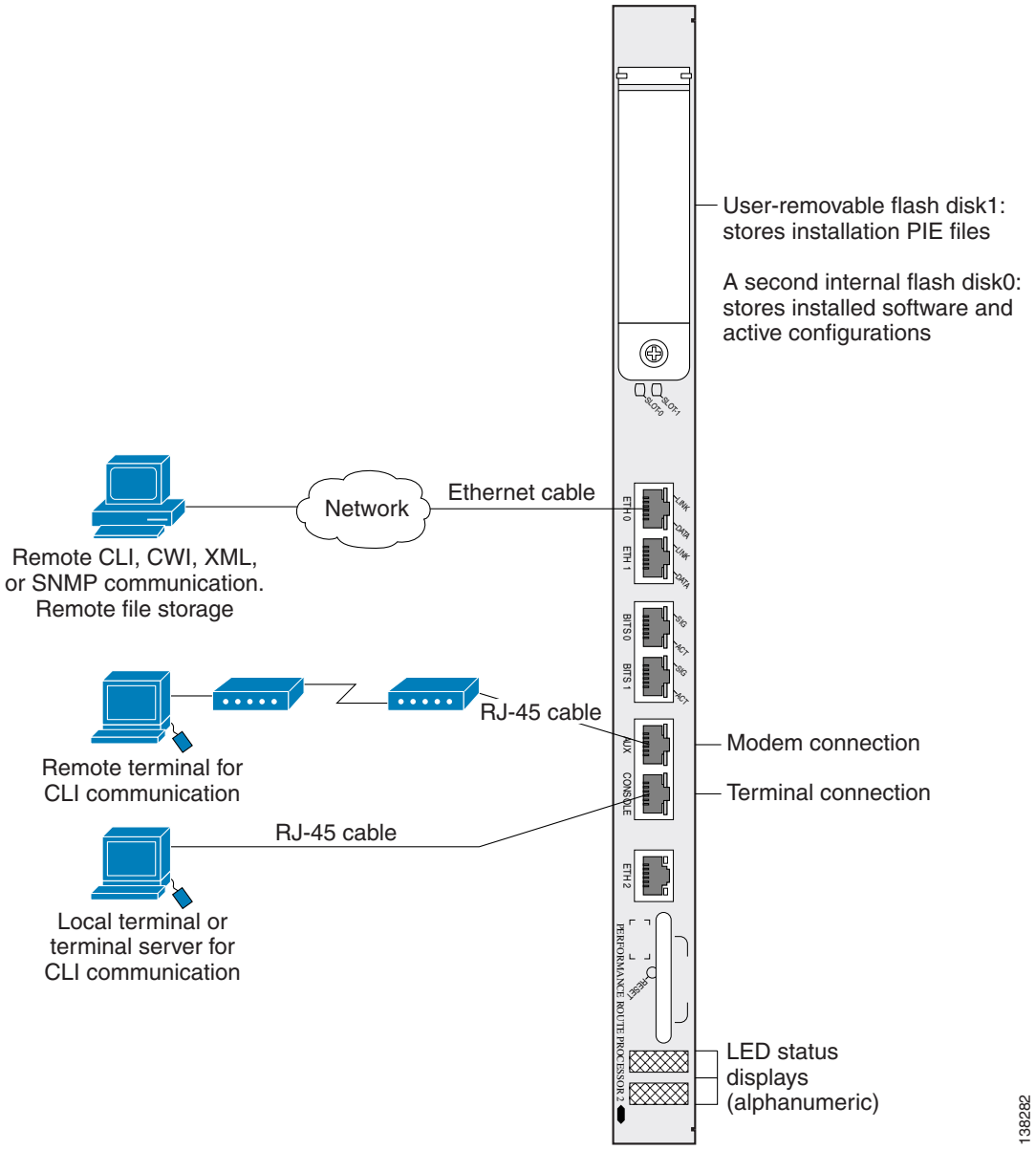


Figure 2-3 Communication Ports on the PRP-2 for a Cisco XR 12000 Series Router



The following sections describe three ways to connect to the router:

- Establishing a Connection Through the Console Port, page 2-6
- Establishing a Connection Through a Terminal Server, page 2-7
- Establishing a Connection Through the Management Ethernet Interface, page 2-9

Establishing a Connection Through the Console Port

To connect to the router through the console port, perform the following procedure.

SUMMARY STEPS

1. Identify the primary RP.
2. Connect a terminal to the Console port of the primary RP.
3. Start the terminal emulation program.
4. Press **Enter**.
5. Log in to the router.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Identify the primary RP.	Identifies the RP to which you must connect in the next step. • This step is not required when the router hosts only one RP. • On a Cisco CRS-1 router, the primary RP is identified by a lighted Primary LED on the RP front panel. • On a Cisco XR 12000 Series Router, the primary RP is identified by the alphanumeric display: PRI RP.
Step 2	Connect a terminal to the Console port of the primary RP.	Establishes a communications path to the router. • During the initial setup, you can communicate with the router only through the Console port of the primary RP. • The router Console port is designed for a serial cable connection to a terminal or a computer that is running a terminal emulation program. • The terminal settings are: – Bits per second: 9600/9600 – Data bits: 8 – Parity: None – Stop bit: 2 – Flow control: None • For information on the cable requirements for the Console port, see the hardware documentation listed in the "Related Documents" section on page xv.

	Command or Action	Purpose
Step 3	Start the terminal emulation program.	(Optional.) Prepares a computer for router communications. • The step is not required if you are connecting through a terminal. • Terminals send keystrokes to and receive characters from another device. If you connect a computer to the Console port, you must use a terminal emulation program to communicate with the router. For instructions on using the terminal emulation program, see the documentation for that program.
Step 4	Press **Enter**.	Initiates communication with the router. • If no text or router prompt appears when you connect to the console port, press **Enter** to initiate communications. • If no text appears when you press **Enter** and the router has been started recently, give the router more time to complete the initial boot procedure, then press **Enter**. • If the router has no configuration, the router displays the prompt: `Enter root-system username:`. If the router is starting up for the first time, see the "Bringing Up the Cisco IOS XR Software on a Router for the First Time" section on page 1-4. • If the router has been configured, the router displays the prompt: `Username:`
Step 5	Log in to the router.	Establishes your access rights for the router management session. • Enter your username and password as described in the "Logging In to a Router or Logical Router" section on page 2-10. • After you log in, the router displays the CLI prompt, which is described in the "CLI Prompt" section on page 2-11.

Establishing a Connection Through a Terminal Server

A terminal server connection provides a way to access the Console port from a remote location. It is less expensive to connect to the router through the Management Ethernet interface (because you do not have the additional cost of a terminal server). However, if you need to perform tasks that require Console port access from a remote location, a terminal server is the best connection method.

The procedure for connecting to the router through a terminal server is similar to the procedure for directly connecting through the Console port. For both connection types, the physical connection takes place through the Console port. The difference is that the terminal server connects directly to the Console port, and you must use a Telnet session to establish communications through the terminal server to the router.

To establish a connection through a terminal server, perform the following procedure:

SUMMARY STEPS

1. Install and configure the terminal server.
2. Connect the terminal server to the Console port of the target RP.
3. Power on the router.
4. Identify the target RP.
5. **telnet** *access-server-address port*
6. Press **Enter**.
7. Log in to the router.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Install and configure the terminal server.	Prepares the terminal server for communications with the router and with Telnet clients. • This step is usually preformed once. • For router access, users need the Telnet server IP address and port number for each RP they access. • For additional information on configuring terminal services, including terminal servers and templates, see the *Cisco IOS XR System Management Configuration Guide*.
Step 2	Connect the terminal server to the Console port of the target RP.	Establishes a communications path between the terminal server and the router. • During the initial router setup, you can communicate with the router only through the Console port of the primary RP. • The router Console port is designed for a serial cable connection to a terminal or terminal server. • The terminal settings are: – Bits per second: 9600/9600 – Data bits: 8 – Parity: None – Stop bit: 2 – Flow control: None • For information on the cable requirements for the Console port, see the hardware documentation listed in the "Related Documents" section on page xv. • To enable terminal server connections to the Console ports on two RPs, install a cable between each Console port and the terminal server.

	Command or Action	Purpose
Step 3	Power on the router.	Starts the router. • This step is required only if the router power is not on. • For information on power installation and controls, see the hardware documentation listed in the "Related Documents" section on page xv.
Step 4	Identify the target RP.	Identifies the RP to which you connect in the next step. • This step is not required when the router hosts only one RP. • On a Cisco CRS-1 router, the primary RP is identified by a lighted Primary LED on the RP front panel. • On a Cisco XR 12000 Series Router, the primary RP is identified by the alphanumeric display: PRI RP. • If you cannot look at the RPs, use a Management Ethernet interface connection to determine which RP is active, or establish terminal server connections to both RPs and then try both.
Step 5	**telnet** *access-server-address port*	Establishes a Telnet session with the terminal server. • Replace *access-server-address* with the IP address of the terminal server, and replace *port* with the terminal server port number that connects to the target RP Console port.
Step 6	Press **Enter**.	(Optional.) Initiates communications with the router. • If no text or router prompt appears when you start the Telnet session, press **Enter** to initiate communications. • If the router has no configuration, the router displays the prompt: `Enter root-system username:` Enter the root-system username and password when prompted. • If the router has been configured, the router displays the prompt: `Username:`
Step 7	Log in to the router.	Establishes your access rights for the router management session. • Enter a username and password when prompted.

Establishing a Connection Through the Management Ethernet Interface

The Management Ethernet interface allows you to manage the router using a network connection. Before you can use the Management Ethernet interface, the interface must be configured, as described in the "Configuring the Management Ethernet Interface" section on page 2-35.

Once configured, the network connection takes place between client software on a workstation computer and a server process within the router. The type of client software you use depends on the server process you want to use. The Cisco IOS XR software supports the following client and server services:

- Telnet clients can connect to a Telnet server in the router. The Telnet server is disabled by default and can be enabled with the **telnet ipv4 server** or **telnet ipv6 server** command.
- Secure Shell (SSH) clients can connect to an SSH server in the router. The SSH server is disabled by default and can be enabled with the **ssh server** command. The SSH server handles both Secure Shell Version 1 (SSHv1) and SSHv2 incoming client connections for both IPv4 and IPv6 address families.

Note IPv6 is not supported on Cisco XR 12000 Series routers.

To start a Telnet network connection, you start the Telnet client software with a command similar to the following:

telnet *ManagementEthernetInterfaceIPaddress*

For specific instructions on connecting to the router through a Telnet or SSH client, see the instructions for that software.

Ask your system administrator for the IP address of the Management Ethernet interface.

When the Telnet session is established, the router prompts you to log in, as described in the "Logging In to a Router or Logical Router" section on page 2-10.

Logging In to a Router or Logical Router

The login process can require users to enter a password or a username and password before accessing the router CLI. The user groups to which your username is assigned determine which commands you can use.

If you log into a router with a single logical router configured (this is the default configuration), you can manage the entire router. If you log into the owner LR on a system with multiple logical routers, you can manage general features that apply to the entire system and the interfaces assigned to the owner LR. If you log into an LR, you can manage only that logical router. For more information on logical routers, see the "Logical Routers" section on page 2-1.

When you log in, the username and password may be validated by any of the following services:

- Usernames configured on the router (**username** command in global configuration mode)
- Root-system usernames configured on the owner LR.
- Passwords configured for specific lines on the router (**password** or **secret** command in line configuration mode)
- A RADIUS server
- A TACACS+ server

The username and password validation method that your router uses is determined by the router configuration. For information on configuring username and password validation methods, see the *Cisco IOS XR System Security Configuration Guide*. For information on which username and password to use, see your system administrator.

To log in to the router, enter your username and password when prompted. For example:

```
User Access Verification

Username: iosxr
Password: password
RP/0/RP0/CPU0:router#
```

Note Passwords are case sensitive. If you want to log into an LR using a root-system username from the owner LR, enter the username in the following format: *username*@admin.

After you log in, the router displays the CLI prompt, which is described in the "CLI Prompt" section on page 2-11. The command set that you can use is determined by the privileges assigned to your username. For information on how privileges are assigned to usernames, see the *Cisco IOS XR Task ID Reference Guide*.

CLI Prompt

After you log in, you see the CLI prompt for the Cisco IOS XR software. This prompt identifies the router or logical router to which you are issuing commands. The CLI prompt represents the path, through the router, to the CPU that executes the commands you enter. The syntax for the CLI prompt is: *type*/*rack*/*slot*/*module*: *router-name*#. The CLI prompt is described in Table 2-1.

Table 2-1 CLI Prompt Description

Prompt Syntax Components	Description
type	Type of interface or card with which you are communicating. For most user communication tasks, the type is "RP."
rack	Chassis number of the rack. In a single-chassis system, the rack is always "0."
slot	Slot in which the RP is installed. In a Cisco CRS-1, the physical slot number is "RP0" or "RP1." In a Cisco XR 12000 Series Router, the physical slot number can be 0 to 15, and there can be multiple logical routers, each of which is represented by an RP.
module	Entity on a card that executes user commands or communicates with a port (interface). For executing commands from the EXEC prompt, the module is the "CPU0" of the RP. "CPU0" also controls the forwarding and operating system (OS) functions for the system.
router-name	Hostname of the router or logical router. The hostname is usually defined during initial configuration of the router, as described in the "Verifying the System After Initial Bring-Up" section on page 1-12.

For example, the following prompt indicates that the CLI commands are executed on the RP in rack 0, slot RP0, by the "CPU0" module on a router named "router:"

```
RP/0/RP0/CPU0:router#
```

User Access Privileges

When you log in to the router, your username and password are used to determine if you are authorized to access the router. After you successfully log in, your username is used to determine which commands you are allowed to use. The following sections provide information on how the router determines which commands you can use:

User Groups, Task Groups, and Task IDs

The commands that each user can use are defined by the user groups to which he or she belongs. Within the Cisco IOS XR software, the commands for a particular feature, such as access control lists, are assigned to tasks, which are uniquely identified by task IDs. If a user wants to use a particular command, his or her username must be associated with the appropriate task ID.

The association between a username and a task ID takes place through two intermediate entities, the user group and task group.

The user group is basically a logical container that can be used to assign the same task IDs to multiple users. Instead of assigning task IDs to each user, you can assign them to the user group, and then assign users to the user group. When a task is assigned to a user group, you can define the access rights for the commands associated with that task. These rights include “read,” “write,” “execute,” and “notify.”

The task group is also a logical container, but it is used to group tasks. Instead of assigning task IDs to each user group, you assign them to a task group, which allows you to quickly enable access to a specific set of tasks by assigning a task group to a user group.

To summarize the associations, usernames are assigned to user groups, which are then assigned to task groups. Users can be assigned to multiple user groups, and each user group can be assigned to one or more task groups. The commands that a user can execute are all those commands assigned to the tasks within the task groups that are associated with the user groups to which the user belongs.

Users are not assigned to groups by default and must be explicitly assigned by an administrator.

You can display all task IDs available on the system with the **show task supported** command. For example:

```
RP/0/RP0/CPU0:router# show task supported
bgp
ospf
hsrp
isis
route-map
route-policy
static
vrrp
cef
lpts
iep
rib
multicast
mpls-te
mpls-ldp
mpls-static
ouni
```

```
fabric
bundle
network
transport
ppp
hdlc
 --More--
```

Note Only the root-system users, root-lr users, or users associated with the WRITE:AAA task ID can configure task groups.

Predefined User Groups

The Cisco IOS XR software includes a set of predefined user groups that meets the needs of most organizations. The predefined user groups are described in Table 2-2.

Table 2-2 Predefined User Group Descriptions

User Group	Privileges
root-system	Display and execute all commands for all logical routers (LRs) in the system.
root-lr	Display and execute all commands within a single LR.
sysadmin	Perform system administration tasks for the router, such as maintaining where the core dumps are stored or setting up the Network Time Protocol (NTP) clock.
netadmin	Configure network protocols, such as Border Gateway Protocol (BGP) and Open Shortest Path First (OSPF) (usually network administrators).
operator	Perform day-to-day monitoring activities, and have limited configuration rights.
cisco-support	Debug and troubleshoot features (usually Cisco support personnel).

Although the predefined user groups are sufficient for the needs of most organizations, administrators can configure their own groups. For more information, see *Cisco IOS XR System Security Configuration.*

Displaying the User Groups and Task IDs for Your User Account

To display the user groups and task IDs associated with your account, enter the **show user** command in EXEC mode. Table 2-3 summarizes the options available for this command.

Table 2-3 Options to Display Information About Your Account

Command	Description
show user	Displays your user name.
show user group	Displays the user groups assigned to your account.
show user tasks	Displays the task IDs assigned to your account.

Table 2-3 Options to Display Information About Your Account (continued)

Command	Description
show user all	Displays all user groups and task ID information for your account.
show aaa usergroup *group-name*	Displays the task IDs assigned to a user group.

Examples

To display your username, enter the **show user** command:

```
RP/0/RP0/CPU0:router# show user

Username: crs
```

To display the tasks assigned to your account and your rights to those tasks, enter the **show user tasks** command:

```
RP/0/RP0/CPU0:router# show user tasks

Task:       basic-services  : READ    WRITE    EXECUTE    NOTIFY
Task:                 cdp   : READ
Task:                diag   : READ
Task:          ext-access   : READ             EXECUTE
Task:             logging   : READ
```

To display the user groups assigned to your user account, enter the **show user group** command:

```
RP/0/RP0/CPU0:router# show user group

  User group operator
```

To display the rights assigned to a user group, enter the **show aaa usergroup** *group-name* command*:*

```
RP/0/RP0/CPU0:router# show aaa usergroup operator

User group 'operator'
  Inherits from task group 'operator'

User group 'operator' has the following combined set
  of task IDs (including all inherited groups):
Task:       basic-services  : READ    WRITE    EXECUTE    NOTIFY
Task:                 cdp   : READ
Task:                diag   : READ
Task:          ext-access   : READ             EXECUTE
Task:             logging   : READ
```

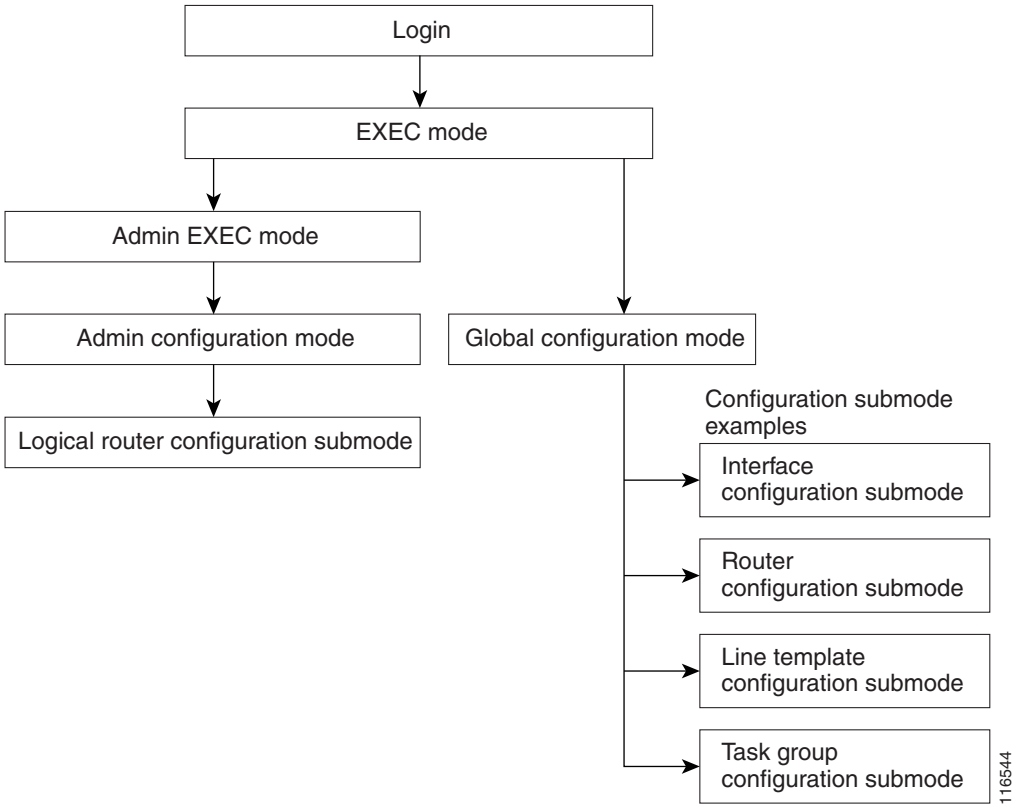
Navigating the Cisco IOS XR Command Modes

The CLI for the Cisco IOS XR software is divided into different command modes. Each mode provides access to a subset of commands used to configure, monitor, and manage the router. Access to a mode is determined by your user group assignments. The following sections describe the navigation of the command modes:

- Entering EXEC Commands from a Configuration Mode, page 2-18
- Command Mode Navigation Example, page 2-19

Figure 2-4 illustrates the basic command mode navigation for the CLI. Only a small sample of the possible configuration submodes is shown.

Figure 2-4 Example of Command Mode Navigation in Cisco IOS XR software



Identifying the Command Mode in the CLI Prompt

The command mode is identified in the CLI prompt after the router name.

For example, when the router enters global configuration mode from the EXEC mode, the CLI prompt changes to include "`(config)`" after the router name:

```
RP/0/RP0/CPU0:routername# configure
RP/0/RP0/CPU0:routername(config)#
```

When the router enters interface configuration submode, the prompt changes to include "`(config-if)`" after the router name:

```
RP/0/RP0/CPU0:routername(config)# interface POS 0/2/0/0
RP/0/RP0/CPU0:routername(config-if)#
```

Summary of Common Command Modes

Table 2-4 summarizes the most common command modes of the Cisco IOS XR software and the associated CLI prompts.

Table 2-4 Common Command Modes and CLI prompts

Command Mode	Description
EXEC	Logging in to a router running the Cisco IOS XR software automatically places the router in EXEC mode. Example: `RP/0/RP0/CPU0:router#` EXEC mode enables a basic set of commands to display the operational state of the router and examine the state of an operating system. Most CLI commands in EXEC mode do not change the system operation. The most common EXEC commands are **show** commands (to display router configuration or operational data) and **clear** commands (to clear or reset system counters). Additional commands are available depending on the access privileges (user groups) assigned to your username. Minimal privileges also include a small set of EXEC commands for connecting to remote devices, changing terminal line settings on a temporary basis, and performing basic tests.

Global configuration	Global configuration mode is the starting point for system configuration. Commands entered in this mode affect the system as a whole, rather than just one protocol or interface. Global configuration mode is also used for entering configuration submodes to configure specific elements, such as interfaces or protocols.
	To enter global configuration mode, enter the **configure** command at the EXEC command prompt:
	`RP/0/RP0/CPU0:router# configure`
	`RP/0/RP0/CPU0:router(config)#`
	Note The system prompt changes to "`router(config)`" to indicate that the router is now in global configuration mode.

Configuration submodes	From the global configuration mode, you can also enter other, more specific command modes. These modes are available based on your assigned access privileges and include protocol-specific, platform-specific, and feature-specific configuration modes.
	In the following example, MPLS LDP configuration mode is entered from global configuration mode. The prompt for MPLS LDP configuration submode appears as config-ldp. The following command syntax is used for entering configuration MPLS LDP submode:
	`RP/0/RP0/CPU0:router#`
	`RP/0/RP0/CPU0:router# configure`
	`RP/0/RP0/CPU0:router(config)# mpls ldp`
	`RP/0/RP0/CPU0:router(config-ldp)`
	Note The availability of any particular mode depends on the router features and the access rights of the individual user. For example, a configuration mode for configuring access servers is not available on most routers.

Table 2-4 Common Command Modes and CLI prompts (continued)

Command Mode	Description

Interface configuration	The interface configuration submode is used to select and configure a hardware interface, such as a Packet-over-SONET (PoS) interface. To enter interface configuration mode from global configuration mode, use an **interface** command. An interface configuration command always follows an interface global configuration command, which defines the interface type. The following command syntax is used for entering interface configuration submode:
	`RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/0`
	`RP/0/RP0/CPU0:router(config-if)#`

Router configuration	The router configuration submode is used to select and configure a routing protocol, such as BGP, OSPF, or IS-IS. The following command syntax is used for entering router configuration submode:
	`RP/0/RP0/CPU0:router# configure`
	`RP/0/RP0/CPU0:router(config)# router` *<protocol>*
	`RP/0/RP0/CPU0:router(config-`*protocol*`)#`
	In the following example, the router enters the router configuration mode for BGP:
	`RP/0/RP0/CPU0:router# configure`
	`RP/0/RP0/CPU0:router(config)# router bgp 140`
	`RP/0/RP0/CPU0:router(config-bgp)#`

Router submode configuration	Router configuration submodes are accessed from router configuration mode. The following command syntax is used for entering router address family configuration submode:
	`RP/0/RP0/CPU0:router(config)# router bgp 140`
	`RP/0/RP0/CPU0:router(config-bgp)# address-family ipv4 multicast`
	`RP/0/RP0/CPU0:router(config-bgp-af)#`
	For more information, see the following Cisco Systems documents:
	• *Cisco IOS XR Routing Configuration Guide*
	• *Cisco IOS XR Routing Command Reference*

Table 2-4 Common Command Modes and CLI prompts (continued)

Command Mode	Description

admin EXEC and admin configuration modes	The Cisco IOS XR software provides a separate admin EXEC mode for users with the appropriate access permissions. This mode is used primarily to display system-wide parameters, configure the administration plane over the control Ethernet, and configure LRs on multiple-chassis systems. These operations are available only to users with the required root level access.
	From EXEC mode, use the **admin** command to enter admin EXEC mode. The following command syntax is used for entering admin EXEC and admin configuration submode:
	`RP/0/RP0/CPU0:router# admin`
	`RP/0/RP0/CPU0:router(admin)#`
	`RP/0/RP0/CPU0:router(admin)# configure`
	`RP/0/RP0/CPU0:router(admin-config)#`

ROM Monitor (ROMMON) mode	The ROM Monitor is a bootstrap program that initializes the hardware and boots the system when a router is powered on or reset. ROM Monitor mode is also known as "ROMMON," which reflects the CLI prompt for the mode. `rommon B1>` During normal operation, users do not interact with ROMMON. This mode is accessed only by manually interrupting the boot process and placing the system in ROMMON. Once in ROMMON, you can perform ROM Monitor tasks, including reinstallation of the Cisco IOS XR software, password recovery, and other diagnostic tasks. The ROM Monitor CLI mode is accessible only from a terminal connected directly to the Console port of the primary RP, a terminal-modem connection to the AUX port, or through a terminal server. See Appendix A, "Router Recovery and Management with ROM Monitor," for information and instructions on using ROM Monitor mode.

Entering EXEC Commands from a Configuration Mode

EXEC commands can be executed from any configuration mode by preceding the command with the **do** keyword. Executing EXEC commands from a configuration mode allows you to display the state of the system without exiting the configuration mode. For example:

```
RP/0/RP0/CPU0:router(config)# do show version

Cisco IOS-XR Software, Version 1.0.0
Copyright (c) 2004 by cisco Systems, Inc.

ROM: System Bootstrap, Version 1.15(20040120:002852) [ROMMON],

router uptime is 1 hour, 40 minutes
1000592k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).

Configuration register is 0x2

--More--
```

Command Mode Navigation Example

The following steps provide an example of command mode navigation:

Step 1 Start a session by logging in to the router and entering EXEC mode, as shown in the following example:

```
router con0_RP0_CPU0 is now available


Press RETURN to get started.


User Access Verification

Username: iosxr
Password:<secret>
RP/0/RP0/CPU0:router#
```

From EXEC mode you can issue EXEC commands or enter global configuration mode. Examples of EXEC commands are the **show** commands used to display system status and **clear** commands to clear counters or interfaces.

Step 2 Enter a question mark at the end of the prompt, or after a command, to display the available options:

```
RP/0/RP0/CPU0:router# show ?

  aaa                   Show AAA configuration and operational data
  adjacency             Adjacency information
  aliases               Display alias commands
  aps                   SONET APS information
  arm                   IP ARM information
  arp                   ARP table
  as-path-access-list   List AS path access lists
  asic-errors           ASIC error information
  auto-rp               Auto-RP Commands
  bgp                   BGP show commands
  buffer-manager        Show all buffer manager memory related information
  calendar              Display the system calendar
  cdp                   CDP information
  cef                   Cisco Express Forwarding
  cetftp                CRS-1 control plane ethernet TFTP server
  checkpoint            Show checkpoint services
  cinetd                Cisco inetd services
  clns                  Display CLNS related information
  clock                 Display the system clock
  commit                Show commit information
  community-list        List community-list
  configuration         Contents of Non-Volatile memory
--More--
```

Note The commands available to you depend on the router mode and your user group assignments.

Step 3 If you belong to a user group that has configuration privileges, you can place the router in the global configuration mode by entering the **configure** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#
```

Step 4 From global configuration mode, you can place the router in a configuration submode, such as interface configuration mode or a protocol-specific configuration mode.

In the following example, the router enters interface configuration mode and the user selects a Packet-over-SONET (PoS) interface for configuration. The command syntax is **interface** *type rack/slot/module/port*.

```
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/4
RP/0/RP0/CPU0:router(config-if)#
```

The command mode prompt changes from "`(config)`" to "`(config-if)`" and you can now enter configuration commands for the specified interface.

Step 5 To exit interface configuration mode and return to global configuration mode, enter the **exit** command. To return to EXEC mode, enter the **end** command.

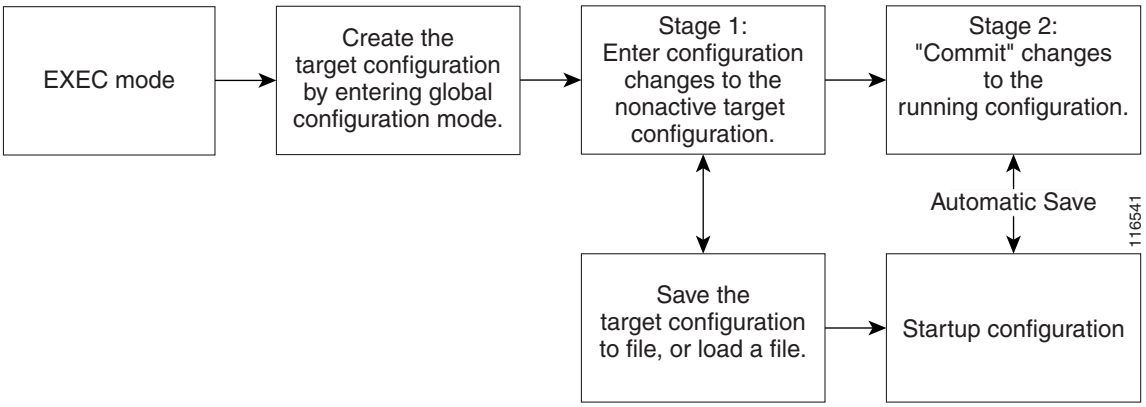
Managing Configuration Sessions

In the Cisco IOS XR software, the running (active) configuration can never be altered directly. All configuration changes are entered into an inactive target configuration. When the target configuration is ready for use, you can apply that configuration to the router with the **commit** command,. This two-stage process allows configuration changes to be made, edited, and verified before the actual running state of the router is impacted. The following sections describe the management options for configuration sessions:

- Entering Configuration Changes in the Nonactive Target Configuration, page 2-21
- Committing Changes to the Running Configuration, page 2-21
- Displaying Configuration Details with show Commands, page 2-23
- Displaying Configuration Errors, page 2-28
- Reloading a Failed Configuration, page 2-29
- Clearing All Changes to a Target Configuration, page 2-29
- Ending a Configuration Session, page 2-30
- Locking and Unlocking the Running Configuration During Configuration Sessions, page 2-31

Figure 2-5 illustrates the two-stage configuration process.

Figure 2-5 Two-Stage Configuration Process



Entering Configuration Changes in the Nonactive Target Configuration

When you place the router in global configuration mode using the **configure** command, a new target configuration session is created. The target configuration allows you to enter, review, and verify configuration changes without impacting the running configuration.

Note The target configuration is not a copy of the running configuration; the target configuration contains only the configuration commands entered during the target configuration session.

While in configuration mode, you can enter all Cisco IOS XR software commands that are supported in configuration mode. Each command is added to the target configuration. You can view the target configuration by entering the **show configuration** command in configuration mode. The target configuration is not applied until you enter the **commit** command, as described in the "Committing Changes to the Running Configuration" section on page 2-21.

Target configurations can be saved to disk as nonactive configuration files. These saved files can be loaded, further modified, and committed at a later time. For more information, see the "Saving and Loading Target Configuration Files" section on page 3-9.

This example shows a simple configuration session in which the target configuration is created and previewed:

Step 1 To create a new target configuration session, enter global configuration mode using the **configure** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)#
```

Step 2 Make changes to the target configuration. These changes do not affect the running configuration. The CLI automatically verifies the syntax of your commands and allows only valid entries:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/1
RP/0/RP0/CPU0:router(config-if)# description faq
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.10.10.10 255.0.0.0
```

Step 3 To display the inactive changes, use the **show configuration** command:

```
RP/0/RP0/CPU0:router(config-if)# show configuration

Building configuration...
interface POS0/0/0/1
 description faq
 ipv4 address 10.10.10.10 255.0.0.0
end
```

Committing Changes to the Running Configuration

The changes in the target configuration do not become part of the running configuration until you enter the **commit** command. When you commit a target configuration, you can use the **commit** command to do either of the following:

- Merge the target configuration with the running configuration to create a new running configuration.
- Replace the running configuration with the target configuration.

To commit target configuration changes to the running configuration, enter the **commit** command by itself or with one of the options described in Table 2-5.

Table 2-5 Commit Command Options

Command	Description
commit	(Default) Merges the target configuration with the running configuration and commits changes only if all changes in the target configuration pass the semantic verification process. If any semantic errors are found, none of the configuration changes takes effect.
commit best-effort	Merges the target configuration with the running configuration and commits only valid changes (best effort). Some configuration changes might fail due to semantic errors.
commit comment *line*	(Optional) Assigns a comment to a commit. • This text comment is displayed in the commit entry displayed with the **show configuration commit list** [**detail**] command. • The *line* argument is the text for the optional comment or label. • The **comment** option must appear at the end of the command line. If multiple options are entered, all text after the **comment** option is treated as a comment.
commit label *line*	(Optional) Assigns a meaningful label. This label is displayed in the output for the **show configuration commit list** [**detail**] command instead of the numeric label. • The *line* argument is the text for the optional comment or label.
commit force	(Optional) Merges the target configuration with the running configuration and allows a logical router owner to commit the configuration in low-memory conditions. A low-memory warning occurs when a user attempts to commit a target configuration that exceeds the default capacity of the router. The recommended resolution to such a warning is to remove configurations using the **no** commands. **Caution** The **force** option can cause the router to experience severe problems if low-memory conditions occur. The **force** option should be used only to remove configurations.
commit replace	(Optional) Replaces the contents of the running configuration with the target configuration.

In the following example, the default **commit** option is entered:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/0/0/2
RP/0/RP0/CPU0:router(config-if)# description faq
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RP0/CPU0:router(config-if)# commit
```

Note If you try to end a configuration session without saving your changes to the running configuration with the **commit** command, you are prompted to save the changes. See the "Ending a Configuration Session" section on page 2-30 for more information.

When a target configuration is committed to the running configuration, a configuration change message is logged, as shown in the following example:

```
RP/0/0/0:Aug  6 09:26:17.781 : %LIBTARCFG-6-COMMIT Configuration committed by user
'user_a'.   Use 'show configuration commit changes 1000000124' to view the changes.
```

Note The preceding message is stored in the log and appears only if logging is configured to display on screen.

Note Configuration files are stored on flash disk0:. Access these configurations only through the CLI commands for configuration management, history, and rollback. Direct modification or deletion of these files can result in lost router configurations.

Displaying Configuration Details with show Commands

Table 2-6 summarizes the commands used in global configuration mode to display the contents of the target configuration, the running configuration, or a combination of both.

Table 2-6 Configuration show Commands in Global Configuration Mode

Command	Description
show running-config	Displays the contents of the active running configuration. This is the committed configuration that defines the router operations.
show running-config sanitized	Displays the contents of the active running configuration without installation specific parameters. Some configuration details, such as IP addresses, are replaced with different addresses. The sanitized configuration can be used to share a configuration without exposing the configuration details.
show configuration	Displays the changes made to the target configuration. These are the changes that have been entered but not yet committed.
show configuration merge	Displays the combined contents of the target and running configuration without committing the changes.

Note You can use the **show running-config** command in the EXEC mode to display the contents of the running configuration.

The following sections provide examples of displaying configuration details:

Displaying the Current Running Configuration

To display the details of the currently running configuration, enter the **show running-config** command. The running configuration is the active configuration used to operate the router.

```
RP/0/RP1/CPU0:router(config)# show running-config

Building configuration...
!! Last configuration change at 11:05:38 UTC Mon May 02 2005 by lab
!
hostname router
logging console debugging
telnet ipv4 server max-servers 5
username iosxr
 password 7 011F0706
 group root-system
 group cisco-support
!
ntp
 interface Loopback99
  broadcast
 !
 interface Loopback999
  broadcast
 !
 interface Loopback9999
  broadcast
 !
 authenticate
 max-associations 2000
!
interface Loopback0
 ipv4 address 10.1.2.3 255.255.0.0
 load-interval 0
!
interface Loopback1
 ipv4 address 10.4.5.6 255.255.0.0
!
interface Loopback7
 load-interval 0
!
interface Loopback2000
 load-interval 0
!
interface Loopback2001
 load-interval 0
!
interface Loopback2003
 load-interval 0
!
interface MgmtEth0/RP1/CPU0/0
 ipv4 address 10.11.12.13 255.255.0.0
!
```

```
interface POS0/0/0/0
 shutdown
!
interface POS0/0/0/1
 shutdown
!
interface POS0/0/0/2
 shutdown
!
interface POS0/0/0/3
 shutdown
!
interface POS0/3/0/0
 shutdown
!
interface POS0/3/0/1
 shutdown
!
interface POS0/3/0/2
 shutdown
!
interface POS0/3/0/3
 shutdown
!
interface preconfigure MgmtEth0/RP0/CPU0/0
 shutdown
!
route ipv4 0.0.0.0/0 MgmtEth0/RP1/CPU0/0
end
```

Displaying the Sanitized Running Configuration

To display the sanitized version of the currently running configuration, enter the **show running-config sanitized** command.

```
RP/0/RP1/CPU0:router(config)# show running-config sanitized

Building configuration...
!! Last configuration change at 11:05:38 UTC Mon May 02 2005 by <removed>
!
hostname <removed>
logging console debugging
telnet ipv4 server max-servers 5
username <removed>
 password 7 <removed>
 group root-system
 group cisco-support
!
ntp
 interface Loopback99
  broadcast
 !
 interface Loopback999
  broadcast
 !
 interface Loopback9999
  broadcast
 !
 authenticate
 max-associations 2000
!
```

```
interface Loopback0
 ipv4 address 10.0.0.0 255.0.0.0
 load-interval 0
!
interface Loopback1
 ipv4 address 10.0.0.0 255.0.0.0
!
interface Loopback7
 load-interval 0
!
interface Loopback2000
 load-interval 0
!
interface Loopback2001
 load-interval 0
!
interface Loopback2003
 load-interval 0
!
interface MgmtEth0/RP1/CPU0/0
 ipv4 address 10.0.0.0 255.0.0.0
!
interface POS0/0/0/0
 shutdown
!
interface POS0/0/0/1
 shutdown
!
interface POS0/0/0/2
 shutdown
!
interface POS0/0/0/3
 shutdown
!
interface POS0/3/0/0
 shutdown
!
interface POS0/3/0/1
 shutdown
!
interface POS0/3/0/2
 shutdown
!
interface POS0/3/0/3
 shutdown
!
interface preconfigure MgmtEth0/RP0/CPU0/0
 shutdown
!
route ipv4 10.0.0.1/0 MgmtEth0/RP1/CPU0/0
end
```

Displaying the Target (Nonactive) Configuration Changes

To display the changes you have entered into the nonactive target configuration, enter the **show configuration** command. The target configuration includes changes that have not yet been committed, and are therefore not part of the active running configuration.

```
RP/0/RP0/CPU0:router(config-if)# show configuration

Building configuration...
interface POS0/3/0/3
 description faq
 ipv4 address 10.1.1.1 255.0.0.0
end
```

Displaying the Merged Configuration Before Committing the Changes

To display the currently running configuration combined with the nonactive changes from the target configuration, enter the **show configuration merge** command in any configuration mode.

In the following example, the user first displays the active configuration, then makes the necessary configuration changes, and displays the "merged" configuration. The merged configuration provides a preview of what the new active configuration will be after the **commit** command is executed.

Note The "merged" configuration shows what the new running configuration will look like after the changes from the target configuration are committed. It does not represent the actual running configuration.

Step 1 Display the currently running configuration:

```
RP/0/RP0/CPU0:router# show running-config

Building configuration...
!! Last configuration change at 16:52:49 UTC Sun March 10 2004 by lab
!
hostname router
shutdown
end
```

Step 2 Open a target configuration session and enter configuration changes:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/3
RP/0/RP0/CPU0:router(config-if)# description faq
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
```

Step 3 Display the "merged" configuration before committing the new settings:

```
RP/0/RP0/CPU0:router(config-if)# show configuration merge
Building configuration...
hostname router
interface POS0/3/0/3
 description faq
 ipv4 address 10.1.1.1 255.0.0.0
 shutdown
end
```

Displaying Configuration Errors

Configuration changes are automatically verified during the commit operation, and a configuration message is displayed if one or more configuration entries fail. To display the cause of each failure, enter the **show configuration failed** commands, as summarized in Table 2-7.

Note You can view configuration errors only during the current configuration session. If you exit configuration mode after the commit operation, the configuration error information is lost.

Table 2-7 Commands to Display Configuration Failure Details

Command	Description
show configuration failed	Displays commit error messages and descriptions generated during the last configuration commit.
show configuration failed load	Displays any syntax errors found in a configuration loaded with the **load** command.
show configuration failed noerror	Displays only commit error messages (without error descriptions).

In the following example, the configuration commit encounters an error:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# taskgroup bgp
RP/0/RP0/CPU0:router(config-tg)# description this is a test of an invalid taskgroup
RP/0/RP0/CPU0:router(config-tg)# commit

% Failed to commit one or more configuration items. Please use 'show configurati
on failed' to view the errors
```

To display the configuration items that failed, enter the **show configuration failed** command. The output from this command includes a description of the error:

```
RP/0/RP0/CPU0:router(config-tg)# show configuration failed

!! CONFIGURATION FAILED DUE TO SEMANTIC ERRORS
taskgroup bgp
!!% Usergroup/Taskgroup names cannot be taskid names
!
```

To display the configuration items that failed without error descriptions, enter the **show configuration failed noerror** command:

```
RP/0/RP0/CPU0:router(config-tg)# show configuration failed noerror

!! CONFIGURATION FAILED DUE TO SEMANTIC ERRORS
taskgroup bgp
!
```

Reloading a Failed Configuration

If the router displays a configuration failure message when you attempt to commit a configuration change, the configuration changes are not lost. You can load the configuration changes into the target configuration, correct the errors, and commit the changes. To load a failed configuration, enter the **load configuration failed** command, as shown in the following example:

```
RP/0/0/CPU0:router(config-tg)# load configuration failed

RP/0/0/CPU0:router(config)# show configuration

Building configuration...
taskgroup bgp
!
end
```

In the preceding example, the **show configuration** command displays the target configuration, which includes the failed configuration.

Clearing All Changes to a Target Configuration

To clear changes made to the target configuration without terminating the configuration session, enter the **clear** command in global configuration mode. This command deletes any configuration changes that have not been committed.

In the following example, the user configures an interface, but does not commit it. After reviewing the changes to the target configuration with the **show configuration** command, the user decides to remove the changes and start over by entering the **clear** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# description this is my interface
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RP0/CPU0:router(config-if)# shutdown
RP/0/RP0/CPU0:router(config-if)# exit

RP/0/RP0/CPU0:router(config)# show configuration

Building configuration...
interface POS0/3/0/1
 description this is my interface
 ipv4 address 10.1.1.1 255.0.0.0
 shutdown
end

RP/0/RP0/CPU0:router(config)# clear
RP/0/RP0/CPU0:router(config)# show configuration
Building configuration...
end
```

Ending a Configuration Session

The commands used to end a configuration session are summarized in Table 2-8.

Table 2-8 Commands to End a Configuration Sessions

Command	Description
exit	Returns to the next highest mode, one step at a time. If you use this command to exit global configuration mode when uncommitted changes are present, the router prompts you to select one of the following options: • **yes**, commit the configuration changes and exit configuration mode • **no**, exit configuration mode without committing the configuration changes • **cancel**, remain in configuration mode without committing the configuration changes **Note** In EXEC mode, the **exit** command is used to log out of the system.
end	Returns directly to EXEC mode from any configuration mode. You are prompted to save any uncommitted changes to the target configuration.
abort	Discards any changes to the target configuration and returns directly to EXEC mode. No warning is given before the configuration changes are deleted.

The following sections provide examples of ending a configuration session:

- Exit Command Example, page 2-30
- End Command Example, page 2-31
- Abort Command Example, page 2-31

Exit Command Example

To return to the previous configuration mode without saving changes to the target configuration, use the **exit** command. When you use this command to return to the EXEC mode, you are prompted to commit any uncommitted changes.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0/CPU0:router(config-if)# description this is my interface
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RP0/CPU0:router(config-if)# exit
RP/0/RP0/CPU0:router(config)# exit
RP/0/RP1/CPU0:ios(config)#exit
Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:yes
RP/0/RP0/CPU0:router#
```

Note In EXEC mode, the **exit** command is used to log out of the system.

End Command Example

To return to EXEC mode without saving changes to the target configuration, use the **end** command. You are prompted to commit any uncommitted changes.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# hostname host1
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/2
RP/0/RP0/CPU0:router(config-if)# description this is my interface
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RP0/CPU0:router(config-if)# shutdown
RP/0/RP0/CPU0:router(config-if)# end
Uncommitted changes found, commit them? [yes]: no
RP/0/RP0/CPU0:router#
```

Tip You can also end a configuration session by pressing Ctrl-Z.

Abort Command Example

To discard any changes to the target configuration and return to EXEC mode, use the **abort** command. You are not prompted to commit any uncommitted changes:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# hostname host1
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/2
RP/0/RP0/CPU0:router(config-if)# description this is my interface
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RP0/CPU0:router(config-if)# shutdown
RP/0/RP0/CPU0:router(config-if)# abort
RP/0/RP0/CPU0:router#
```

Locking and Unlocking the Running Configuration During Configuration Sessions

When you place the router in global configuration mode with the **configure** command, a new target configuration is automatically created. More than one user can open a target configuration session at a time, allowing multiple users to work on separate target configurations.

By default, the running configuration is locked whenever a commit operation is being performed. This automatic locking ensures that each commit operation is completed before the next one begins. Other users receive an error message if they attempt to commit a target configuration while another commit operation is under way.

You can lock the running configuration for the duration of your own configuration session and use commands to display the other active configuration sections, as described in Table 2-9.

Table 2-9 Configuration Session Commands

Command	Description
show configuration sessions	Displays the other configuration sessions on the router.
configure	Enters global configuration mode and allows other users to commit target configurations.

Table 2-9 Configuration Session Commands (continued)

Command	Description
configure exclusive	Enters global configuration mode and denies other users the ability to commit changes while your configuration session is active. Other users can still enter global configuration mode and populate a target configuration, but they cannot commit those changes to the running configuration until you exit your exclusive configuration session. **Note** If the configuration is already locked by another user, the **configure exclusive** command fails.
exit or **end**	Unlocks the other configuration sessions by ending your configuration session and returning to EXEC mode.

To display the current configuration sessions, enter the **show configuration sessions** command in EXEC mode. Exclusive configuration sessions are noted by an asterisk (*), as shown in the following example:

```
RP/0/RP0/CPU0:router# show configuration sessions

Session                   Line        User      Date                     Lock
00000000-000650a4-00000000  dummy_line  root      Thu Oct  3 12:20:12 2003
00000000-0006a0a3-00000000  dummy_line  root      Thu Oct  3 12:24:23 2003 *
```

To lock the running configuration so that other users cannot commit changes while your configuration session is active, enter the **configure exclusive** command:

```
RP/0/RP0/CPU0:router# configure exclusive
RP/0/RP0/CPU0:router(config)#
```

The running configuration is unlocked when the user who entered the configuration mode using the **configure exclusive** command exits the configuration mode:

```
RP/0/RP0/CPU0:router(config)# exit
```

Configuring the Router Hostname

The hostname identifies a router on the network. Although devices can be uniquely identified by their Layer 2 and Layer 3 addresses (such as an IP address), it is often simpler to remember network devices by an alphanumeric “hostname.” This name is used in the CLI prompt and default configuration filenames, and to identify the router on the network.

To configure the hostname, perform the following procedure:

SUMMARY STEPS

1. **configure**
2. **hostname** *router-name*
3. **commit**

Example

The following example shows how to configure the hostname for the router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# hostname new_name
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:Apr  7 00:07:33.246 : config[65669]: %LIBTARCFG-6-COMMIT : Configu
ration committed by user 'user_a'.  Use 'show configuration commit changes 1000000067' to
view the changes.
RP/0/RP0/CPU0:new_name(config)#
```

Note No blanks or spaces are permitted as part of a name. Do not expect case to be preserved. Upper- and lowercase characters look the same to many Internet software applications. It may seem appropriate to capitalize a name the same way you might if you were writing, but conventions dictate that computer names appear all lowercase. For more information, see RFC 1178, *Choosing a Name for Your Computer*.

Configuring the Management Ethernet Interface

The Management Ethernet interface on the RPs is used to connect the router to a network for remote management using a Telnet client, the Craft Works Interface (CWI), the Simple Network Management Protocol (SNMP), or other management agents. The following sections provide information on the Management Ethernet interface:

- "Specifying the Management Ethernet Interface Name in CLI Commands"
- "Displaying the Available Management Ethernet Interfaces"
- "Configuring the Management Ethernet Interface"

Specifying the Management Ethernet Interface Name in CLI Commands

Before you can configure the Management Ethernet interface, you must know the Management Ethernet interface name, which is defined using the following syntax: *typerack/slot/module/port*. Table 2-10 describes the Management Ethernet interface name syntax.

Table 2-10 Management Ethernet Interface Name Syntax Description

Syntax Components	Description
type	Interface *type* for a Management Ethernet port is "MgmtEth."
rack	Chassis number of the rack. In a single-chassis system, the *rack* is always "0."
slot	Physical slot of the RP on which the interface is located. For a Cisco CRS-1 router, the *slot* is "RP0" or "RP1." For a Cisco XR 12000 Series Router, the PRPs may be installed in slots 0 through 15, depending on the router model.

Table 2-10 Management Ethernet Interface Name Syntax Description (continued)

Syntax Components	Description
module	On an RP, the *module* is "CPU0."
port	On Cisco XR 12000 Series Routers, there are three Ethernet ports on PRP-2 cards. The Ethernet ports are labeled ETH 0, ETH 1, and ETH 2. For the ETH 0 port, specify **0**, for the ETH 1 port, specify **1**, and for the ETH 2 port, specify **2**. On a Cisco CRS-1 router, one Ethernet port labeled MGMT ETH exists. Specify 0 for the MGMT ETH interface on a Cisco CRS-1 router.

Table 2-10 provides examples of Management Ethernet interface names for a single-chassis system.

Table 2-11 Management Ethernet Interface Names for Single-Chassis Systems

Management Interface	Interface Name	Example
Cisco CRS-1 RP in slot RP0	MgmtEth0/RP0/CPU0/0	router(config)# **interface MgmtEth0/RP0/CPU0/0**
Cisco CRS-1 RP in slot RP1	MgmtEth0/RP1/CPU0/0	router(config)# **interface MgmtEth0/RP1/CPU0/0**
Cisco XR 12000 Series Router PRP in slot 0, port ETH0	MgmtEth0/0/CPU0/0	router(config)# **interface MgmtEth0/0/CPU0/0**
Cisco XR 12000 Series Router PRP in slot 0, port ETH1	MgmtEth0/0/CPU0/1	router(config)# **interface MgmtEth0/0/CPU0/1**
Cisco XR 12000 Series Router PRP in slot 1, port ETH0	MgmtEth0/1/CPU0/0	router(config)# **interface MgmtEth0/1/CPU0/0**
Cisco XR 12000 Series Router PRP in slot 1, port ETH1	MgmtEth0/1/CPU0/1	router(config)# **interface MgmtEth0/1/CPU0/1**

Displaying the Available Management Ethernet Interfaces

To display the router interfaces, enter the **show interface brief** command in EXEC mode as follows:

```
RP/0/0/CPU0:router# show interface brief

               Intf        Intf         LineP              Encap  MTU       BW
               Name        State        State               Type (byte)   (Kbps)

--------------------------------------------------------------------------------

                Nu0           up           up               Null  1500   Unknown

       Mg0/0/CPU0/0           up           up               ARPA  1514    100000

       Mg0/0/CPU0/1   admin-down   admin-down               ARPA  1514     10000

          PO0/3/0/0   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/1   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/2   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/3   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/4   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/5   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/6   admin-down   admin-down               HDLC  4474    155520

          PO0/3/0/7   admin-down   admin-down               HDLC  4474    155520
.
.
.
```

The Management Ethernet interfaces are listed with the prefix Mg in the Intf Name column.

Configuring the Management Ethernet Interface

To use the Management Ethernet interface for system management and remote communication, you must configure an IP address and a subnet mask for the interface. If you want the interface to communicate with devices on other networks (such as remote management stations or TFTP servers), you need to configure a default route for the router.

Tip For information on additional configuration options for the Management Ethernet interface, see the *Cisco IOS XR Interface and Hardware Component Configuration Guide*.

Prerequisites

To configure the Ethernet Management port for network communications, you must enter the interface network addresses and subnet mask. Consult your network administrator or system planner for this information.

SUMMARY STEPS

1. **configure**
2. **interface MgmtEth0/***slot***/CPU0/***port*
3. **ipv4 address** *ipv4-address subnet-mask*
4. **no shutdown**
5. **exit**
6. **route ipv4 unicast 0.0.0.0/0** *default-gateway*
7. **commit**
8. **end**
9. **show interfaces MgmtEth0/***slot***/CPU0/***port*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface MgmtEth0/***slot***/CPU0/***port* **Example:** `RP/0/RP0/CPU0:router(config)# interface MgmtEth0/RP0/CPU0/0`	Enters interface configuration mode and specifies the Management Ethernet interface of the primary RP. • The syntax is **interface** *typerack/slot/module/port*: The command parameters are described in Table 2-10.
Step 3	**ipv4 address** *ipv4-address subnet-mask* **Example:** `RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0`	Assigns an IP address and subnet mask to the interface.
Step 4	**no shutdown** **Example:** `RP/0/RP0/CPU0:router(config-if)# no shutdown`	Places the interface in an “up” state.
Step 5	**exit**	Exits the Management Ethernet interface configuration mode.

	Command or Action	Purpose
Step 6	**route ipv4 unicast 0.0.0.0/0** *default-gateway*	Configures a default route to use for communications with devices on other networks. • Replace *default-gateway* with the IP address of the local gateway that can be used to reach other networks. • This default route applies to all interfaces. You might need to configure additional static routes to support your network. For more information on configuring static routes, see the *Cisco IOS XR Routing Configuration Guide*.
Step 7	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Commits the target configuration to the running configuration.
Step 8	**end** **Example:** `RP/0/RP0/CPU0:router(config-if)# end`	Ends the configuration session and returns to EXEC mode.
Step 9	**show interfaces MgmtEth0/***slot***/CPU0/***port* **Example:** `RP/0/RP0/CPU0:router# show interfaces MgmtEth0/RP0/CPU0/0`	Displays the interface details to verify the settings.

Examples

In the following example, the Management Ethernet interface on the RP in slot RP1 is configured with an IP address:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface MgmtEth0/RP1/CPU0/0
RP/0/RP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.255.255.0
RP/0/RP0/CPU0:router (config-if)# no shutdown
RP/0/RP0/CPU0:router (config-if)# commit
RP/0/RP0/CPU0:router (config-if)# end
RP/0/RP0/CPU0:router#
RP/0/RP0/CPU0:router# show interfaces MgmtEth 0/RP1/CPU0/0
MgmtEth0/RP1/CPU0/0 is up, line protocol is up
  Hardware is Management Ethernet, address is 0005.9a39.910c (bia 0005.9a39.910c
)
  Internet address is 10.1.1.1
  MTU 1514 bytes, BW 100000 Kbit
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA,
  Full-duplex, 100Mb/s
  loopback not set
  ARP type ARPA, ARP timeout 01:00:00
  Last clearing of "show interface" counters never
  30 second input rate 0 bits/sec, 0 packets/sec
```

```
 30 second output rate 0 bits/sec, 0 packets/sec
    15205 packets input, 7467959 bytes, 0 total input drops
    0 drops for unrecognized upper-level protocol
    Received 2352 broadcast packets, 0 multicast packets
             0 runts, 0 giants, 0 throttles, 0 parity
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    13528 packets output, 656060 bytes, 0 total output drops
    Output 56 broadcast packets, 0 multicast packets
    0 output errors, 0 underruns, 0 applique, 0 resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions

--More--
```

Related Documents

Related Topic	Document Title
Additional information on configuring management interfaces	*Cisco IOS XR Interface and Hardware Component Configuration Guide*

Manually Setting the Router Clock

Generally, if the system is synchronized by a valid outside timing mechanism, such as a Network Time Protocol (NTP) or VINES clock source, you need not set the software clock. Use the **clock set** command for initial configuration or if a network time source is not available.

The **clock timezone** command should be entered before the clock is set because it defines the difference between the system time and Coordinated Universal Time (UTC). When you set the time, you set the system time, and the router uses the **clock timezone** command setting to translate that time to UTC. The system internally keeps time in UTC. When you enter the **show tim**e command, the router displays the system time.

To manually set the router clock, complete the following steps:

SUMMARY STEPS

1. **configure**
2. **clock timezone** *zone hours-offset*
3. **commit**
4. **end**
5. **clock set** *hh*:*mm*:*ss dd mm yyyy*
6. **clock update-calendar**
7. **show clock**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**clock timezone** *zone hours-offset* **Example:** `RP/0/RP0/CPU0:router(config)# clock timezone pst -8`	Sets the time zone for the router clock. • The **clock timezone** command should be entered before the clock is set because it defines the difference between the system time and UTC. **Note** The system time is the time that appears when you enter the **show time** command. • *zone*: Name of the time zone to be displayed when standard time is in effect. • *hours-offset*: Difference in hours from UTC. • For detailed information about setting the system clock, including the configuration of a network time server, see the following Cisco documents: – *Cisco IOS XR System Management Configuration Guide* – *Cisco IOS XR System Security Command Reference*
Step 3	**commit** **Example:** `RP/0/RP0/CPU0:router(config-if)# commit`	Commits the target configuration to the running configuration.
Step 4	**end** **Example:** `RP/0/RP0/CPU0:router(config-if)# end`	Ends the configuration session and returns to EXEC mode.
Step 5	**clock set** *hh*:*mm*:*ss dd mm yyyy* **Example:** `RP/0/RP0/CPU0:router# clock set 14:12:00 10 feb 2004`	Sets the system software clock.

Step 6	**clock update-calendar** **Example:** `RP/0/RP0/CPU0:router# clock update-calendar`	Updates the hardware clock (calendar clock) with the new clock settings. • The hardware clock is battery operated and runs continuously, even if the router is powered off or rebooted.
Step 7	**show clock** **Example:** `RP/0/RP0/CPU0:router# show clock`	Displays the clock setting. • Use this command to verify the settings.

Examples

In the following example, the manual system clock is configured:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# clock timezone pst -8
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# end
RP/0/RP0/CPU0:router# clock set 14:12:00 10 feb 2004
14:12:00.090 PST Tue Feb 10 2004
RP/0/RP0/CPU0:router# clock update-calendar
RP/0/RP0/CPU0:router# show clock
14:12:00.090 PST Tue Feb 10 2004
```

Related Documents

Related Topic	Document Title
Descriptions of the clock commands available in the Cisco IOS XR software	*Cisco IOS XR System Management Command Reference*
Commands used to configure the NTP	*Cisco IOS XR System Management Command Reference*
Configuration of the NTP on the Cisco IOS XR software	*Cisco IOS XR System Management Configuration Guide*

Where to Go Next

When you have completed the configuration procedures in this chapter, consider the following resources for additional configuration documentation:

- For information on configuring additional general router features, see Chapter 3, “Configuring Additional Router Features.”
- For information on using the Cisco IOS XR software more efficiently, see Chapter 4, “CLI Tips, Techniques, and Shortcuts.”
- For information on configuring interfaces, see the hardware documents listed in the “Related Documents” section on page xv.