Configuring General Router Features

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

Contents

Connecting and Communicating with the Router

To use a router running Cisco IOS XR Software, first connect to it using a terminal or a PC. Before you connect to the router, determine which entity to manage. You can manage router hardware or named RSPs.

Connections are made either through a direct physical connection to the console port or through management interfaces.

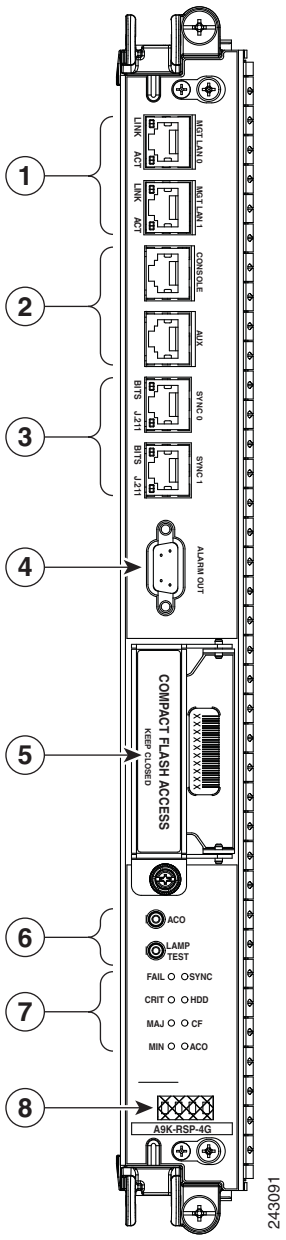
Figure 12 shows the RSP connections for a Cisco ASR 9000 Series Router.

The first time a router starts, use a direct connection to the Console port to type the configuration information. When the router is directly connected to the Console port, enter CLI commands at a terminal or at a computer running terminal emulation software. This direct Console port connection is useful for entering initial configurations and performing some debugging tasks.

This chapter describes some of the tasks 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 70. 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 also use the network connection.

You can use the modem connection for remote communications with the router. If the Management Ethernet interface fails, the modem connection serves as the alternate remote communications path.

Figure 12 Communication Ports on the RSP Card for a Cisco ASR 9000 Series Router



1	Management LAN Ports	**5**	Compact Flash type I/II
2	Console Port and Auxiliary Port	**6**	Alarm Cutoff (ACO) and Lamp Test push buttons
3	Sync (BITS and J.211) ports	**7**	Eight discrete LED indicators
4	Alarm Out DB9 Connector	**8**	LED Matrix display

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

- Establishing a Connection Through the Console Port, page 39
- Establishing a Connection Through a Terminal Server, page 41
- Establishing a Connection Through the Management Ethernet Interface, page 43

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 active RSP.
2. Connect a terminal to the Console port of the active RSP.
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 active RSP.	Identifies the RSP to which you must connect in the next step. There are two RSPs: RSP0 and RSP1. One is active RSP, the other is standby. • This step is not required when the router hosts only one RSP. • On a Cisco ASR 9000 Series Router, the active RSP is identified by the lighted Primary LED on the faceplate of the card.
Step 2	Connect a terminal to the Console port of the active RSP.	Establishes a communications path to the router. • During the initial setup, you can communicate with the router only through the console port of the active RSP. • Router console port is designed for a serial cable connection to a terminal or a computer that is running a terminal emulation program. • Terminal settings are: – Bits per second: 9600 (default value) – Data bits: 8 – Parity: None – Stop bit: 1 – 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 x.
Step 3	Start the terminal emulation program.	(Optional) Prepares a computer for router communications. • This 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 a terminal emulation program, see the hardware documentation listed in the "Related Documents" section on page x.

	Command or Action	Purpose
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:`. For more information on when a standalone router is starting up for the first time, see *Chapter 2, "Bringing Up Cisco IOS XR Software on the Router"*. 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 the username and password, as described in the "Logging In to a Router" section on page 43. • After you log in, the router displays the CLI prompt, which is described in the "CLI Prompt" section on page 44.

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 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 RSP.
3. Power on the router.
4. Identify the target RSP.
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 RSP they access. • For additional information on configuring terminal services, including terminal servers and templates, see *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*.
Step 2	Connect the terminal server to the Console port of the target RSP.	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 RSP. • 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(default value) – Data bits: 8 – Parity: None – Stop bit: 1 – 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 x.
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 x.
Step 4	Identify the target RSP.	Identifies the RSP to which you connect in the next step. • This step is not required when the router hosts only one RSP. • On a Cisco ASR 9000 Series Router, the active RSP is identified by the lighted primary LED on the faceplate of the card.
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 RSP Console port.

	Command or Action	Purpose
Step 6	Press **Enter**.	(Optional) Initiates communications with the RSP. • 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 72.

After it is 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 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 in global configuration mode.
- 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 in global configuration mode. The SSH server handles both Secure Shell Version 1 (SSHv1) and SSHv2 incoming client connections for both IPv4 and IPv6 address families. The SSHv2 client is enhanced and can now execute commands remotely without invoking a secure interactive session.

To start a Telnet network connection, 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" section on page 43.

Logging In to a 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.

After you log in to the router, you can manage the entire router.

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 that are configured
- Passwords configured for the router console and auxiliary ports (**password** or **secret** command in line configuration mode)
- RADIUS server
- 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 *Cisco ASR 9000 Series Aggregation Services Router 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/RSP0/CPU0:router#
```

Note Passwords are case sensitive. To log in to the router using a root-system username , enter the username in the following format: *username*@admin. To support admin login, local database authentication must be enabled with the **aaa authentication login remote local** command. For more information, see *Cisco ASR 9000 Series Aggregation Services Router System Security Configuration Guide*.

After you log in, the router displays the CLI prompt, which is described in the "CLI Prompt" section on page 44. 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 *Cisco ASR 9000 Series Aggregation Services Router System Security Configuration Guide*.

CLI Prompt

After you log in, you see the CLI prompt for the Cisco IOS XR software. This prompt identifies the 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*#. Table 2 describes the CLI prompt.

Table 2 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	Rack number. In a standalone router, the rack number is always "0".
slot	Slot in which the RSP is installed. In a Cisco ASR 9000 Series Router, the RSP physical slot number is "RSP0" or "RSP1".

Table 2 CLI Prompt Description (continued)

Prompt Syntax Components	Description
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. The hostname is usually defined during initial configuration of the router, as described in the "Configuring the RSP Hostname" section on page 70.

For example, the following prompt indicates that the CLI commands are executed on the RP in rack 0, slot RSP0, by the "CPU0" module on a router named "router":

```
RP/0/RSP0/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 Cisco IOS XR software ensures security by combining tasks a user wants to perform (task IDs) into groups, defining which router configuration and management functions users can perform. This policy is enabled by the definition of:

- User groups—Collection of users that share similar authorization rights on a router.
- Task groups—Definition of collection of tasks identified by unique task IDs for each class of action.
- Task IDs—Definition of permission to perform particular tasks; pooled into a task group that is then assigned to users.

The commands you can perform are defined by the user groups to which you belong. Within the Cisco IOS XR software, the commands for a particular feature, like access control lists, are assigned to tasks. Each task is uniquely identified by a task ID. To use a particular command, your 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 a logical container 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. Then, you can assign users to that 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. This 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.

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

Cisco IOS XR software includes a set of predefined user groups that meets the needs of most organizations. Table 3 describes predefined user groups.

Table 3 Predefined User Group Descriptions

User Group	Privileges
root-system	Display and execute all commands for all RSPs in the system.
root-lr	Display and execute all commands within a single RSP.
sysadmin	Perform system administration tasks for the router, such as maintaining where the core dumps are stored or setting up the NTP[1] clock.
serviceadmin	Perform service administration tasks for the router, such as configuring firewall.
netadmin	Configure network protocols, such as BGP[2] and OSPF[3] (usually used by network administrators).
operator	Perform day-to-day monitoring activities, and have limited configuration rights.
cisco-support	Debug and troubleshoot features (usually, used by Cisco Technical Support personnel).

1. NTP stands for Network Time Protocol
2. BGP stands for Border Gateway Protocol
3. Open Shortest Path First

For information on configuring user groups, see *Cisco ASR 9000 Series Aggregation Services Router System Security Configuration Guide.*

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 0-4 summarizes the options available for this command.

Table 0-4 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.
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

The following examples show how to view user privileges:

- show user Command: Example, page 47
- show user tasks Command: Example, page 47
- show user group Command: Example, page 48
- show aaa usergroup Command: Example, page 48

show user Command: Example

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

```
RP/0/RSP0/CPU0:router# show user

username1
```

show user tasks Command: Example

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

```
RP/0/RSP0/CPU0:router# show user tasks
Mon May 31 02:52:13.335 DST
Task:                  aaa  : READ    WRITE    EXECUTE    DEBUG
Task:                  acl  : READ    WRITE    EXECUTE    DEBUG
Task:                admin  : READ    WRITE    EXECUTE    DEBUG
Task:                 ancp  : READ    WRITE    EXECUTE    DEBUG
Task:                  atm  : READ    WRITE    EXECUTE    DEBUG
Task:       basic-services  : READ    WRITE    EXECUTE    DEBUG
Task:                 bcdl  : READ    WRITE    EXECUTE    DEBUG
Task:                  bfd  : READ    WRITE    EXECUTE    DEBUG
Task:                  bgp  : READ    WRITE    EXECUTE    DEBUG
Task:                 boot  : READ    WRITE    EXECUTE    DEBUG
Task:               bundle  : READ    WRITE    EXECUTE    DEBUG
Task:                  cdp  : READ    WRITE    EXECUTE    DEBUG
```

```
Task:                  cef  : READ    WRITE    EXECUTE    DEBUG
Task:                  cgn  : READ    WRITE    EXECUTE    DEBUG
Task:        cisco-support  : READ    WRITE    EXECUTE    DEBUG (reserved)
Task:          config-mgmt  : READ    WRITE    EXECUTE    DEBUG
Task:      config-services  : READ    WRITE    EXECUTE    DEBUG
Task:               crypto  : READ    WRITE    EXECUTE    DEBUG
Task:                 diag  : READ    WRITE    EXECUTE    DEBUG
Task:              drivers  : READ    WRITE    EXECUTE    DEBUG
Task:                 dwdm  : READ    WRITE    EXECUTE    DEBUG
Task:                  eem  : READ    WRITE    EXECUTE    DEBUG
Task:                eigrp  : READ    WRITE    EXECUTE    DEBUG
Task:    ethernet-services  : READ    WRITE    EXECUTE    DEBUG
```

show user group Command: Example

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

```
RP/0/RSP0/CPU0:router# show user group
Mon May 31 02:53:59.933 DST
root-system, cisco-support
```

show user all Command: Example

To display all user groups and task ID information for your account, enter the **show user all** command:

```
RP/0/RSP0/CPU0:router# show user all
Mon May 31 02:54:51.446 DST
Username: cisco
Groups: root-system, cisco-support
Authenticated using method local
User cisco has the following Task ID(s):

Task:                  aaa  : READ    WRITE    EXECUTE    DEBUG
Task:                  acl  : READ    WRITE    EXECUTE    DEBUG
Task:                admin  : READ    WRITE    EXECUTE    DEBUG
Task:                 ancp  : READ    WRITE    EXECUTE    DEBUG
Task:                  atm  : READ    WRITE    EXECUTE    DEBUG
Task:       basic-services  : READ    WRITE    EXECUTE    DEBUG
Task:                 bcdl  : READ    WRITE    EXECUTE    DEBUG
Task:                  bfd  : READ    WRITE    EXECUTE    DEBUG
Task:                  bgp  : READ    WRITE    EXECUTE    DEBUG
Task:                 boot  : READ    WRITE    EXECUTE    DEBUG
Task:               bundle  : READ    WRITE    EXECUTE    DEBUG
Task:                  cdp  : READ    WRITE    EXECUTE    DEBUG
Task:                  cef  : READ    WRITE    EXECUTE    DEBUG
Task:                  cgn  : READ    WRITE    EXECUTE    DEBUG
Task:        cisco-support  : READ    WRITE    EXECUTE    DEBUG (reserved)
Task:          config-mgmt  : READ    WRITE    EXECUTE    DEBUG
Task:      config-services  : READ    WRITE    EXECUTE    DEBUG
Task:               crypto  : READ    WRITE    EXECUTE    DEBUG
Task:                 diag  : READ    WRITE    EXECUTE    DEBUG
```

show aaa usergroup Command: Example

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

```
RP/0/RSP0/CPU0:router# show aaa usergroup root-system
Mon May 31 02:56:45.975 DST
User group 'root-system'
  Inherits from task group 'root-system'

User group 'root-system' has the following combined set
  of task IDs (including all inherited groups):
```

```
Task:                  aaa  : READ    WRITE    EXECUTE    DEBUG
Task:                  acl  : READ    WRITE    EXECUTE    DEBUG
Task:                admin  : READ    WRITE    EXECUTE    DEBUG
Task:                 ancp  : READ    WRITE    EXECUTE    DEBUG
Task:                  atm  : READ    WRITE    EXECUTE    DEBUG
Task:       basic-services  : READ    WRITE    EXECUTE    DEBUG
Task:                 bcdl  : READ    WRITE    EXECUTE    DEBUG
Task:                  bfd  : READ    WRITE    EXECUTE    DEBUG
Task:                  bgp  : READ    WRITE    EXECUTE    DEBUG
Task:                 boot  : READ    WRITE    EXECUTE    DEBUG
Task:               bundle  : READ    WRITE    EXECUTE    DEBUG
Task:                  cdp  : READ    WRITE    EXECUTE    DEBUG
Task:                  cef  : READ    WRITE    EXECUTE    DEBUG
Task:                  cgn  : READ    WRITE    EXECUTE    DEBUG
Task:          config-mgmt  : READ    WRITE    EXECUTE    DEBUG
Task:      config-services  : READ    WRITE    EXECUTE    DEBUG
Task:               crypto  : READ    WRITE    EXECUTE    DEBUG
Task:                 diag  : READ    WRITE    EXECUTE    DEBUG
```

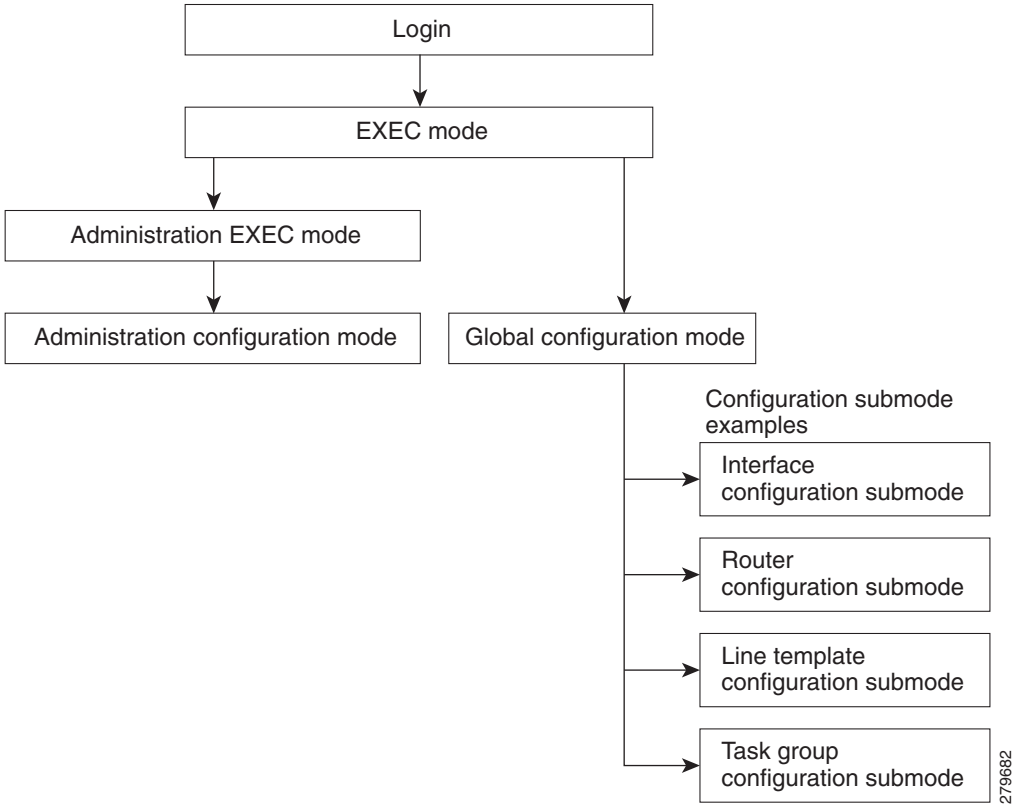
Navigating the Cisco IOS XR Command Modes

The Cisco IOS XR Software has 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:

- Identifying the Command Mode in the CLI Prompt, page 50
- Summary of Common Command Modes, page 51
- Entering EXEC Commands from a Configuration Mode, page 53
- Command Mode Navigation Example, page 54

Figure 13 illustrates the basic command mode navigation for the CLI. Only a small sample of the possible configuration modes is shown.

Figure 13 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.

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

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)#
```

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

```
RP/0/RSP0/CPU0:router(config)# interface tunnel-te 2
RP/0/RSP0/CPU0:router(config-if)#
```

Summary of Common Command Modes

Table 5 summarizes the most common command modes of the Cisco IOS XR software and the associated CLI prompts.

Table 5 Common Command Modes and CLI prompts

Command Mode	Description
EXEC	Automatically places the router in EXEC mode when logging in to an RSP running the Cisco IOS XR software. Example: `RP/0/RSP0/CPU0:router#` EXEC mode enables a basic set of commands to display the operational state of an RSP and the Cisco IOS XR software. Most CLI commands in EXEC mode do not change the RSP operation. The most common EXEC commands are **show** commands (to display RSP configuration or operational data) and **clear** commands (to clear or reset RSP counters). In EXEC mode, you can display the configuration of an RSP but not the configuration of the system. The difference is that RSPs are defined in administration configuration mode, which is a submode of administration EXEC mode. RSPs are configured in global configuration mode. 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.

Administration EXEC	Manages system resources. In administration EXEC mode, you can display the configuration of the system but not the configuration of an RSP. The difference is that RSPs are defined in administration configuration mode, which is a submode of administration EXEC mode. RSPs are configured in global configuration mode.
	Administration EXEC mode is used primarily to display system-wide parameters, configure the administration plane over the control Ethernet, and configure RSP. These operations are available only to users with the required root level access.
	From EXEC mode, use the **admin** command to enter administration EXEC mode:
	`RP/0/RSP0/CPU0:router# admin`
	`RP/0/RSP0/CPU0:router(admin)#`

Administration configuration	Allows you to assign system resources to RSPs. Multishelf systems are also configured in administration configuration mode.
	From administration EXEC mode, use the **configure** command to enter administration configuration submode:
	`RP/0/RSP0/CPU0:router(admin)# configure`
	`RP/0/RSP0/CPU0:router(admin-config)#`

Table 5 Common Command Modes and CLI prompts (continued)

Command Mode	Description

Global configuration	Global configuration mode is the starting point for RSP configuration. Commands entered in this mode affect the RSP 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/RSP0/CPU0:router# configure`
	`RP/0/RSP0/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/RSP0/CPU0:router# configure`
	`RP/0/RSP0/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.

Interface configuration	The interface configuration submode is used to select and configure a hardware 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/RSP0/CPU0:router#interface tunnel-te 2`
	`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 **router** *protocol* [*protocol_options*] command syntax is used for entering router configuration submode.
	Replace *protocol* with the keyword for the protocol to configure. Replace *protocol_options* with any keywords and arguments required for that protocol. In the following example, the router enters the router configuration mode for BGP:
	`RP/0/RSP0/CPU0:router# configure`
	`RP/0/RSP0/CPU0:router(config)# router bgp 140`
	`RP/0/RSP0/CPU0:router(config-bgp)#`

Table 5 Common Command Modes and CLI prompts (continued)

Command Mode	Description

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/RSP0/CPU0:router(config)# router ospf 100`
	`RP/0/RSP0/CPU0:router(config-ospf)# security ttl`
	`RP/0/RSP0/CPU0:router(config-ospf)#`
	
	For more information, see the following Cisco documents:
	• *Cisco ASR 9000 Series Aggregation Services Router Routing Configuration Guide*
	• *Cisco ASR 9000 Series Aggregation Services Router Routing Command Reference Guide*

ROM Monitor (ROMMON)	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. For information and instructions on using ROM Monitor mode, see *Cisco IOS XR ROM Monitor Guide* 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/RSP0/CPU0:router(config)# do show version


Mon May 31 03:06:25.111 DST

Cisco IOS XR Software, Version 4.2.0.29I[Default]
Copyright (c) 2010 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 1.4(20100216:021454) [ASR9K ROMMON],

PE44_ASR-9010 uptime is 2 weeks, 6 days, 11 hours, 12 minutes
System image file is "bootflash:disk0/asr9k-os-mbi-4.2.0/mbiasr9k-rp.vm"

cisco ASR9K Series (MPC8641D) processor with 4194304K bytes of memory.
MPC8641D processor at 1333MHz, Revision 2.2

2 Management Ethernet
12 TenGigE
40 GigabitEthernet
219k bytes of non-volatile configuration memory.
975M bytes of compact flash card.
```

```
33994M bytes of hard disk.
1605616k bytes of disk0: (Sector size 512 bytes).
1605616k bytes of disk1: (Sector size 512 bytes).

Configuration register on node 0/RSP0/CPU0 is 0x102
Boot device on node 0/RSP0/CPU0 is disk0:
Package active on node 0/RSP0/CPU0:
 --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_RSP0_CPU0 is now available


Press Enter to get started.


User Access Verification

Username: iosxr
Password:<secret>
RP/0/RSP0/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 Add **?** at the end of the prompt, or after a command, to display the available options:

```
RP/0/RSP0/CPU0:router# show ?

MgmtMultilink         Show trace data for the multilink controller component
  aaa                   Show AAA configuration and operational data
  access-lists          Access lists
  accounting            Show commands for the Accounting Server
  address-pool          Local address pool
  adjacency             Adjacency information
  af-ea                 AF-EA Platform details
  afmon-lib             (Realtime) App Flow Monitoring Library Tracing
  afmon-ma              Show commands for afmon_ma process
  aliases               Display alias commands
  ancp                  Access Node Control Protocol show commands
  app-obj               APP-OBJ Show Commands
  aps                   SONET APS information
  aqsm                  AQSM show commands
  aqsmlib               AQSMLIB show commands
  arm                   IP ARM information
  arp                   ARP show commands
  arp-gmp               ARP show commands
  asic-errors           ASIC error information
  atc                   Attractor Cache related
  atm                   ATM information
  atm-vcm               Show atm_vcm component
  attractor             Show commands for attractor process
  attribute             IM Attributes operations information
 --More--
```

Note The commands available 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/RSP0/CPU0:router# configure
RP/0/RSP0/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:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# mpls ldp
RP/0/RSP0/CPU0:router(config-ldp)#
```

In the following example, the router enters interface configuration mode and the user selects an MPLS Traffic Engineering Tunnel interface for configuration. The command syntax is **interface** *type rack/slot/module/port*.

```
RP/0/RSP0/CPU0:router(config)# interface tunnel-te
RP/0/RSP0/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.

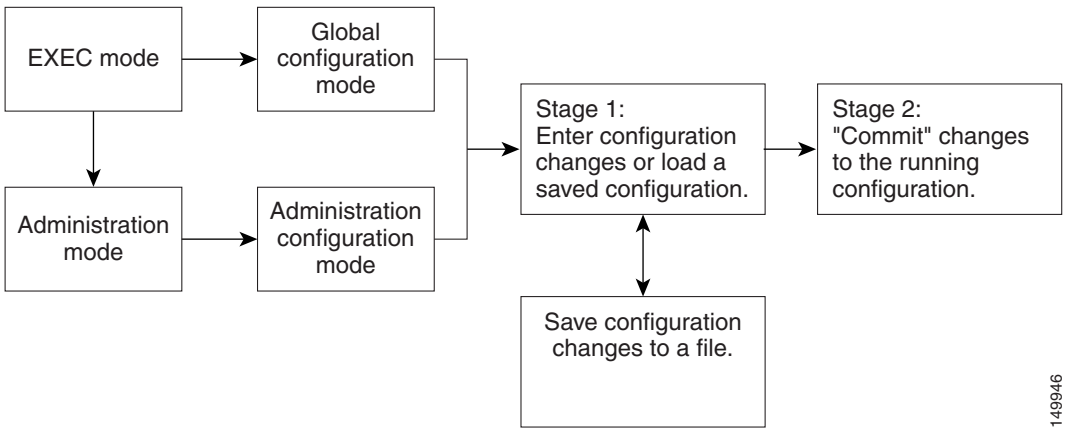
Step 5 To exit interface configuration mode and return to global configuration mode, enter the **exit** command. To return to EXEC mode, enter the **end** command.

Managing Configuration Sessions

In the Cisco IOS XR software, you cannot change the running (active) configuration directly. Enter configuration changes 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 you to make, edit, and verify configuration changes before impacting the actual running state of the router.

Figure 14 shows the two-stage configuration process.

Figure 14 Two-Stage Configuration Process



Global configuration mode is used to configure RSP-level features, such as routing protocols and interfaces. Administration configuration mode is used to assign hardware components to RSPs .

The following sections describe the management options for configuration sessions:

Entering Configuration Changes

You can make changes to a configuration and end up in one of two different modes, as follows:

1. Enter configuration changes.
2. Commit the changes when the system prompts you.
3. The system saves the changes to the running configuration and leaves you in configuration mode or in EXEC mode.

To remain in CONFIG mode after you commit changes, perform the following procedure:

SUMMARY STEPS

1. **configure**
2. Enter configuration changes.
3. **end**
   or
   commit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	Enter configuration changes.	Invokes the change you enter.

Step 3	**end**
	or
	commit
	
	Example:
	`RP/0/RSP0/CPU0:router(your-config-mode)# end`
	or
	`RP/0/RSP0/CPU0:router(your-config-mode)# commit`
		Saves configuration changes.
		• When you issue the **end** command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:`
		– Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		– Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		– Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

To make configuration changes and remain in CONFIG mode, perform the following procedure:

SUMMARY STEPS

1. **configure**
2. Enter configuration changes.
3. **commit**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	Enter configuration changes.	Invokes the change you enter.

	Command or Action	Purpose
Step 3	**commit** **Example:** `RP/0/RSP0/CPU0:router(your-config-mode)# commit`	Saves configuration changes.
Step 4	**end** **Example:** `RP/0/RSP0/CPU0:router(your-config-mode)# end`	Saves configuration changes. • When you issue the **end** command, the system prompts you to commit changes: `Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:` – Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode. – Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes. – Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.

Displaying the Active Configuration Sessions

Before you start a configuration session, you should check if there are other configuration sessions in progress. More than one user can open a target configuration session at a time, allowing multiple users to work on separate target configurations.

The procedure for viewing the active configuration sessions depends on the type of configuration session. For administration configuration sessions, which assign hardware components in RSPs , you must be in administration EXEC mode to view the active administration configuration sessions. For RSP configuration sessions, you must be in EXEC mode to view the active RSP configuration sessions.

To view the active administration configuration sessions, connect to the router and enter the **show configuration sessions** command in administration EXEC mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# show configuration sessions
```

To view the active RSP configuration sessions, connect to the appropriate RSP and enter the **show configuration sessions** command in EXEC mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router# show configuration sessions
Current Configuration Session  Line       User     Date                     Lock
00000041-006d60d3-00000000     vty0       merenenre Wed Dec  3 00:33:32 2008
```

If an asterisk (*) appears in the Lock column, the user is using an exclusive configuration session and you cannot start a configuration session until the exclusive configuration session closes. For more information, see the "Starting an Exclusive Configuration Session" section on page 59.

Note Configuration sessions for administration configuration and each RSP are managed independently. For example, if a user locks the administration configuration, you can still configure an RSP if other users have not locked a configuration session for that RSP.

Starting a Configuration Session

When you place the router in global configuration mode or administration 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. It has only the configuration commands entered during the target configuration session.

While in configuration mode, you can enter all Cisco IOS XR software commands supported in that 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 66.

You can save target configurations 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 the Target Configuration to a File" section on page 64.

Starting an Exclusive Configuration Session

An exclusive configuration session allows you to configure the administration configuration or an RSP and lock out all users from committing configuration changes until you are done. Other users can still create and modify a target configuration, but they cannot commit those changes to the running configuration until you exit your exclusive configuration session.

During regular configuration sessions, 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.

To start an exclusive configuration session for an RSP, connect to that RSP and enter the **configure exclusive** command:

```
RP/0/RSP0/CPU0:router# configure exclusive
RP/0/RSP0/CPU0:router(config)#
```

Note If the configuration is already locked by another user, the **configure exclusive** command fails. To view locked and unlocked configuration sessions, see the "Displaying the Active Configuration Sessions" section on page 58.

To start an exclusive configuration session for the administration configuration, connect to the RSP and enter the **configure exclusive** command in administration EXEC mode:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure exclusive
RP/0/RSP0/CPU0:router(admin-config)#
```

The running configuration is unlocked when the user who started the exclusive configuration session exits the configuration mode, as described in the "Ending a Configuration Session" section on page 69.

Displaying Configuration Details with show Commands

The following sections describe the following tasks:

Displaying the Running Configuration

The running configuration is the committed configuration that defines the router operations, and it is divided into the administration configuration and an RSP configuration for each RSP. The portion of the running configuration that you can view depends on the current CLI mode and RSP connection.

In EXEC mode and global configuration mode, you can view the RSP configuration for the RSP to which you are connected. When you are connected to the RSP and operating in administration EXEC and administration configuration mode, you can view the administration configuration, which includes hardware assignments for RSPs.

To display the RSP portion of the running configuration, connect to the appropriate RSP and enter the **show running-config** command in EXEC or global configuration mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config)# show running-config
Building configuration...
!! Last configuration change at Tue Dec  2 20:29:51 2008 by cisco
!
hostname router
clock timezone PST 8
clock summer-time DST recurring 2 sunday march 02:00 first sunday november 02:00
logging console informational
telnet vrf default ipv4 server max-servers no-limit
domain lookup disable
explicit-path name GE_Path_to_P19
 index 1 next-address strict ipv4 unicast 10.114.4.44
 index 2 next-address strict ipv4 unicast 10.114.4.11
 index 3 next-address strict ipv4 unicast 10.119.4.11
 index 4 next-address strict ipv4 unicast 10.119.4.19
 index 5 next-address strict ipv4 unicast 10.19.19.19
!
explicit-path name 10GE_Path_to_P19
 index 1 next-address strict ipv4 unicast 10.114.8.44
 index 2 next-address strict ipv4 unicast 10.114.8.11
 index 3 next-address strict ipv4 unicast 10.119.8.11
 index 4 next-address strict ipv4 unicast 10.119.8.19
 index 5 next-address strict ipv4 unicast 10.19.19.19
!
```

```
line console
```

To display the administration portion of the running configuration, connect to the RSP and enter the **show running-config** command in administration EXEC or administration configuration mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(admin)# show running-config
Building configuration...
username username1
 group root-system
 group cisco-support
 secret 5 $1$2dx.$/AGxtYJYRWhajo4INlAVa0
--More--
```

Displaying a Sanitized Version of the Running Configuration

A sanitized running configuration report displays the contents of the 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.

In EXEC and global configuration mode, you can view the sanitized RSP configuration for the RSP to which you are connected. When you are connected to the RSP and operating in administration EXEC and administration configuration mode, you can view the sanitized administration configuration, which includes hardware assignments for RSPs.

To display the sanitized RSP portion of the running configuration, enter the **show running-config sanitized** command in EXEC or global configuration mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config)# show running-config sanitized
Building configuration...
!! Last configuration change at Tue Dec  2 20:29:51 2008 by <removed>
!
hostname <removed>
clock timezone <removed> 8
clock summer-time <removed> recurring 2 sunday march 02:00 first sunday november 02:00
logging console informational
telnet vrf <removed> ipv4 server max-servers no-limit
domain lookup disable
explicit-path name <removed>
 index 1 next-address strict ipv4 unicast 10.0.0.0
 index 2 next-address strict ipv4 unicast 10.0.0.0
 index 3 next-address strict ipv4 unicast 10.0.0.0
 index 4 next-address strict ipv4 unicast 10.0.0.0
 index 5 next-address strict ipv4 unicast 10.0.0.0
!
explicit-path name <removed>
 index 1 next-address strict ipv4 unicast 10.0.0.0
 index 2 next-address strict ipv4 unicast 10.0.0.0
 index 3 next-address strict ipv4 unicast 10.0.0.0
 index 4 next-address strict ipv4 unicast 10.0.0.0
 index 5 next-address strict ipv4 unicast 10.0.0.0
!
line console
 --More--
```

To display the sanitized administration portion of the running configuration, connect to the RSP and enter the **show running-config sanitized** command in administration EXEC or administration configuration mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(admin)# show running-config sanitized
Mon May 31 21:35:14.902 DST
```

```
Building configuration...
!! IOS XR Admin Configuration 4.2.0
sdr <removed>
 location 0/1/*
 location 0/4/* primary
!
username <removed>
 group root-system
 group cisco-support
 secret 5 <removed>
!
end
```

Displaying the Target Configuration

The target configuration includes the configuration changes that have been entered but not yet committed. These changes are not yet part of the running configuration.

You can view the target configuration in global configuration and administration configuration modes. You cannot view the target configuration in EXEC modes because the target configuration must be committed or abandoned before returning to EXEC or administration EXEC mode.

To display the target configuration changes you have entered for an RSP, enter the **show configuration** command in global configuration mode or in any submode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config-if)# show configuration
Building configuration...
interface tunnel-te2
 description faq
!
end
```

To display the target administration configuration changes you have entered, enter the **show configuration** command in administration configuration mode or in any submode, as shown in the following example:

```
RP/0/RSP0/CPU0:router(admin-config-sdr:test)# show configuration

Building configuration...
sdr test
 location 0/1/SP
!
end
```

Displaying a Combined Target and Running Configuration

Although the target and running configurations remain separate until the target configuration is committed, you can preview the combined target and running configuration without committing the changes. The combined 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.

You can preview the combined configuration in global configuration and administration configuration modes. You cannot preview the combined configuration in EXEC modes because the target configuration must be committed or abandoned before returning to EXEC or administration EXEC mode.

To display the combined target and running configuration, enter the **show configuration merge** command in any configuration mode.

Note The **merge** option does not appear in command help until the target configuration contains at least one configuration change.

The following example shows how to display the active RSP configuration (**show running-config**), configure an interface, and display the merged configuration:

```
RP/0/RSP0/CPU0:router(config)# show configuration merge
Building configuration...
!! Last configuration change at Tue Dec  2 20:29:51 2008 by cisco
!
hostname router
clock timezone PST 8
clock summer-time DST recurring 2 sunday march 02:00 first sunday november 02:00
logging console informational
telnet vrf default ipv4 server max-servers no-limit
domain lookup disable
explicit-path name GE_Path_to_P19
 index 1 next-address strict ipv4 unicast 10.114.4.44
 index 2 next-address strict ipv4 unicast 10.114.4.11
 index 3 next-address strict ipv4 unicast 10.119.4.11
 index 4 next-address strict ipv4 unicast 10.119.4.19
 index 5 next-address strict ipv4 unicast 10.19.19.19
!
explicit-path name 10GE_Path_to_P19
 index 1 next-address strict ipv4 unicast 10.114.8.44
 index 2 next-address strict ipv4 unicast 10.114.8.11
 index 3 next-address strict ipv4 unicast 10.119.8.11
 index 4 next-address strict ipv4 unicast 10.119.8.19
 index 5 next-address strict ipv4 unicast 10.19.19.19
!
line console
```

Displaying Configuration Error Messages and Descriptions

Configuration changes are automatically verified during the commit operation, and a message appears if one or more configuration entry fails. To display an error message and description for a failed configuration, enter the **show configuration failed** command.

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.

In the following example, an error is introduced in global configuration mode and the error information appears after the commit operation fails:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# taskgroup alr
RP/0/RSP0/CPU0:router(config-tg)# description this is a test of an invalid taskgroup
RP/0/RSP0/CPU0:router(config-tg)# commit
% Failed to commit one or more configuration items. Please use 'show configuration failed'
to view the errors
RP/0/RSP0/CPU0:router(config-tg)# show configuration failed
!! CONFIGURATION FAILED DUE TO SEMANTIC ERRORS
taskgroup alr
!!% Usergroup/Taskgroup names cannot be taskid names
```

Displaying Configuration Error Messages Without Descriptions

Configuration changes are automatically verified during the commit operation, and a message appears if one or more configuration entry fails. To display only the error message (without a description) for a failed configuration, enter the **show configuration failed noerror** command, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config-tg)# show configuration failed noerror
!! CONFIGURATION FAILED DUE TO SEMANTIC ERRORS
taskgroup alr
!
```

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.

Displaying Configuration Error Messages Produced While Loading a Configuration

To display any syntax errors found in a configuration loaded with the **load** command, enter the **show configuration failed load** command.

Saving the Target Configuration to a File

Target configurations can be saved to a separate file without committing them to the running configuration. Target configuration files can then be loaded at a later time and further modified or committed.

To save the configuration changes in the target configuration to a file, enter the **save configuration** *device***:** command. Replace the *device* argument with the name of the device on which you want to store the file (for example, disk0). After you enter this command, the router prompts you to enter a filename. If you enter only a filename, the file is stored in the root directory of the device. To store the file in a directory, enter the directory path and filename when prompted. We recommend that you specify the cfg file extension for easy identification. This suffix is not required, but it can help locate target configuration files, for example:

```
myconfig.cfg
```

The following example shows a target configuration file saved to the usr/cisco directory of disk0:

```
RP/0/RSP1/CPU0:router(admin-config)# save configuration disk0:

Mon May 31 21:52:13.237 DST
Destination file name (control-c to abort): [/running-config]?/usr/cisco/test.cfg
Building configuration.
1 lines built in 1 second
[OK]
```

You can also save a configuration to a file using the **show configuration | file** *filename* command.

```
RP/0/RSP1/CPU0:router(config)#show configuration | file abc.cfg
Thu Jul 22 23:03:04.722 DST
Building configuration...

[OK]
```

Loading the Target Configuration from a File

To populate the target configuration with the contents of a previously saved configuration file, go to global configuration or administration configuration mode and enter the **load** *filename* command. Consider the following when entering the *filename* argument:

- Specifies the configuration file to be loaded into the target configuration.
- If the full path of the file is not specified, the router attempts to load the file from the root directory on the device.

The following example shows a target configuration file loaded into the current configuration session. The current configuration session is populated with the contents of the file.

```
RP/0/RSP1/CPU0:router(config)# load disk0:/usr/cisco/test.cfg

Loading.
77 bytes parsed in 1 sec (76)bytes/sec
```

Loading an Alternative Configuration at System Startup

When a router is reset or powered on, the last running configuration is loaded and used to operate the router.

You can load an alternative configuration during system boot. For information and instructions on this process, see the *Cisco ASR 9000 Series Aggregation Services Router ROM Monitor Guide*.

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 or administration 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Gi 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# description this is my interface
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RSP0/CPU0:router(config-if)# shutdown
RP/0/RSP0/CPU0:router(config-if)# exit

RP/0/RSP0/CPU0:router(config)# show configuration

Building configuration...
interface Gi0/3/0/1
 description this is my interface
 ipv4 address 10.1.1.1 255.0.0.0
 shutdown
end

RP/0/RSP0/CPU0:router(config)# clear
RP/0/RSP0/CPU0:router(config)# show configuration
Building configuration...
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.

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. For more information, see the "Ending a Configuration Session" section on page 69.

To commit target configuration changes to the running configuration, enter the **commit** command by itself or with one or more of the options described in Table 6.

Table 6 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 appears 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 confirmed *seconds*	(Optional) Commits the configuration in global configuration mode on a trial basis for a minimum of 30 seconds and a maximum of 300 seconds (5 minutes). • During the trial configuration, enter **commit** to confirm the configuration. If you do not enter the **commit** command, the router reverts to the previous configuration when the trial time period expires. • The **confirmed** option is not available in administration configuration mode.
commit label *line*	(Optional) Assigns a meaningful label. This label appears 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.

Table 6 Commit Command Options (continued)

Command	Description
commit force	(Optional) Merges the target configuration with the running configuration and allows a configuration commit 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.

Examples

The following examples illustrate how to commit a configuration:

- Committing a Configuration from Global Configuration Mode: Example, page 67
- Committing a Configuration from Administration Configuration Mode: Example, page 67

Committing a Configuration from Global Configuration Mode: Example

In the following example, the default **commit** command is entered in global configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/2
RP/0/RSP0/CPU0:router(config-if)# description faq
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RSP0/CPU0:router(config-if)# commit

RP/0/0/0:Aug  6 09:26:17.781 : %LIBTARCFG-6-COMMIT Configuration committed by user
'cisco'.   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.

Committing a Configuration from Administration Configuration Mode: Example

In the following example, the **commit** command is entered with the **label** and **comment** keywords in administration configuration mode:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# sdr test
RP/0/RSP0/CPU0:router(admin-config-sdr:test)# location 0/1/* primary
RP/0/RSP0/CPU0:router(admin-config-sdr:test)# commit label test comment This is a test
RP/0/RSP0/CPU0:router(admin-config)# show configuration commit list detail

   1) CommitId: 2000000018                Label: test
```

```
      UserId:   user1                       Line:  vty1
      Client:   CLI                         Time:  23:45:40 UTC Wed Dec 02 2008
      Comment:   This is a test
.
.
.
```

Note Configuration files are stored on the same flash disk as the boot image. 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.

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. While you remain in global configuration mode or administration configuration mode, you can load the configuration changes into the target configuration, correct the errors, and commit the changes.

To load a failed configuration, go to global configuration or administration configuration mode and enter the **load configuration failed commit** command, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config)# load configuration failed commit
RP/0/RSP0/CPU0:router(config)# show configuration
Building configuration...
taskgroup alr
!
end
```

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

Note The failed configuration is discarded if you exit global configuration mode or administration configuration mode without recovering the configuration. After recovery, correct and commit the configuration or save it to a file to avoid losing it.

Exiting a Configuration Submode

When you have finished configuration changes in a configuration submode, such as the interface or RSP configuration submodes, you can return to the previous configuration mode and continue making configuration changes. To exit a configuration submode, enter the **exit** command, as shown in the following example:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Gi 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# description this is my interface
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)#
```

Note If you use the **exit** command to exit global configuration or administration configuration mode, the router prompts you to save changes, discard changes, or cancel the action, as described in the next section.

Returning Directly to Configuration Mode from a Submode

When you have finished configuration changes in a configuration submode, such as the interface or RSP configuration submodes, you can skip all intermediate submodes and return to the top-level configuration mode and continue making configuration changes. To return to configuration mode, enter the **root** command, as shown in the following example:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# router static
RP/0/RSP0/CPU0:router(config-static)# address-family ipv4 unicast
RP/0/RSP0/CPU0:router(config-static-afi)# root
RP/0/RSP0/CPU0:router(config)#
```

Ending a Configuration Session

You can use any of the following methods to end a configuration session:

- Enter the **exit** command in global configuration or administration configuration mode
- Enter the **end** command in any configuration mode or submode
- Press **Ctrl-Z**

Note If you enter the **exit** command in a configuration submode, the command returns you to the parent configuration level.

If you end a configuration session without committing the configuration changes, the router prompts you to save changes, discard changes, or cancel the action, as shown in the following example:

```
RP/0/RSP0/CPU0:router(config-if)# end

Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:
```

Respond to the prompt by entering 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 logs the user out of the system.

Aborting a Configuration Session

When you abort a configuration session, any changes are discarded and the configuration session ends. No warning is given before the configuration changes are deleted.

The **abort** command in global configuration mode, discards configuration changes and returns to EXEC mode. In administration configuration mode, the **abort** command discards configuration changes and returns to administration EXEC mode. To abort a configuration session, enter the **abort** command, as shown in the following example:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# hostname host1
RP/0/RSP0/CPU0:router(config)# interface Gi 0/2/0/2
```

```
RP/0/RSP0/CPU0:router(config-if)# description this is my interface
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
RP/0/RSP0/CPU0:router(config-if)# shutdown
RP/0/RSP0/CPU0:router(config-if)# abort
RP/0/RSP0/CPU0:router#
```

Configuring the RSP Hostname

The hostname identifies an RSP 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 RSP on the network.

To configure the hostname, enter the **hostname** command with the RSP name as shown in the following example:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# hostname SDR_SJ
RP/0/RSP0/CPU0:router(config)# commit

RP/0/RSP0/CPU0:Apr  7 00:07:33.246 : config[65669]: %LIBTARCFG-6-COMMIT : Configuration
committed by user 'user_a'.   Use 'show configuration commit changes 1000000067' to view
the changes.
RP/0/RSP0/CPU0:SDR_SJ(config)#
```

The preceding example sets the RSP name to SDR_SJ.

Note No blanks or spaces are permitted as part of a name. Do not expect case to be preserved. Uppercase 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 RSPs is used to connect the router to a network for remote management using a Telnet client, 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

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 7 describes the Management Ethernet interface name syntax.

Table 7 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-shelf system, the *rack* is always "0".
slot	Physical slot of the RSP on which the interface is located. For a Cisco ASR 9000 Series Router, the RSP *slot* is "RSP0" or "RSP1".
module	On an RSP, the module is "CPU0". RSPs have two processors, so the *module* is either "CPU0" and "CPU1".
port	On a Cisco ASR 9000 Series Router, one Ethernet port labeled MGMTETH exists on each RSP. Specify 0 for the MGMT ETH interface on an RSP.

Table 8 shows examples of Management Ethernet interface names for a single-shelf system. The Management Ethernet interfaces are listed with the prefix Mg in the Intf Name column.

Table 8 Management Ethernet Interface Names

Management Interface Name	Example
MgmtEth0/RSP0/CPU0/0	router(config)# **interface MgmtEth0/RSP0/CPU0/0**
MgmtEth0/RSP0/CPU0/1	router(config)# **interface MgmtEth0/RSP0/CPU0/1**
MgmtEth0/RSP1/CPU0/0	router(config)# **interface MgmtEth0/RSP1/CPU0/0**
MgmtEth0/RSP1/CPU0/1	router(config)# **interface MgmtEth0/RSP1/CPU0/1**

Displaying the Available Management Ethernet Interfaces

To display the router interfaces, enter the **show interfaces brief** command in EXEC mode.

```
RP/0/RSP0/CPU0:router# show interfaces brief
Mon May 31 22:01:42.919 DST

               Intf       Intf        LineP              Encap  MTU        BW
               Name       State       State               Type (byte)    (Kbps)
--------------------------------------------------------------------------------
               BE16         up          up                ARPA  9216    1000000
          BE16.160          up          up 802.1Q Virtual LAN  9220    1000000
          BE16.161          up          up 802.1Q Virtual LAN  9220    1000000
          BE16.162          up          up 802.1Q Virtual LAN  9220    1000000
          BE16.163          up          up 802.1Q Virtual LAN  9220    1000000
               Lo0          up          up            Loopback  1500          0
               Nu0          up          up                Null  1500          0
            tt44190         up          up              TUNNEL  1500          0
```

```
          tt44192          up          up              TUNNEL  1500          0
          tt44194          up          up              TUNNEL  1500          0
          tt44196          up          up              TUNNEL  1500          0
   Mg0/RSP0/CPU0/0          up          up                ARPA  1514     100000
   Mg0/RSP0/CPU0/1  admin-down  admin-down                ARPA  1514      10000
         Gi0/1/0/0  admin-down  admin-down                ARPA  1514    1000000
         Gi0/1/0/1  admin-down  admin-down                ARPA  1514    1000000
         Gi0/1/0/2          up          up                ARPA  9014    1000000
         Gi0/1/0/3          up          up                ARPA  9014    1000000
     Gi0/1/0/3.160          up          up 802.1Q Virtual LAN  9022    1000000
     Gi0/1/0/3.161          up          up 802.1Q Virtual LAN  9018    1000000
--More--
```

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. To have the interface 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 *Cisco ASR 9000 Series Aggregation Services RouterInterface 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 MgmtEth** *rack*/*slot*/**CPU0/***port*
3. **ipv4 address** *ipv4-address subnet-mask*
4. **no shutdown**
5. **exit**
6. **router static address-family ipv4 unicast 0.0.0.0/0** *default-gateway*
7. **commit**
8. **end**
9. **show interfaces MgmtEth***rack*/*slot*/**CPU0/***port*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**interface MgmtEth***rack***/***slot***/CPU0/***port***** **Example:** `RP/0/RSP0/CPU0:router(config)# interface mgmtEth 0/RSP0/CPU0/0`	Enters interface configuration mode and specifies the Management Ethernet interface of the primary RSP. See Table 7 for command parameters.
Step 3	**ipv4 address** *ipv4-address subnet-mask* **Example:** `RP/0/RSP0/CPU0:(config-if)# ipv4 address 1.1.1.1 255.255.255.255`	Assigns an IP address and subnet mask to the interface.
Step 4	**no shutdown** **Example:** `RP/0/RSP0/CPU0:router(config-if)# no shutdown`	Enables the interface to carry traffic.

Step 5	**exit**
	
	Example
	`RP/0/RSP0/CPU0:RO-C(config)# sh config`
	`Building configuration...`
	`interface MgmtEth0/RSP0/CPU0/0`
	`  ipv4 address 1.1.1.1 255.255.255.255`
	`!`
	`end`
		Exits the Management Ethernet interface configuration mode.

Step 6	**router static address-family ipv4 unicast 0.0.0.0/0** *default-gateway* **Example:** `RP/0/RSP0/CPU0:router (config)# router static address-family ipv4 unicast 0.0.0.0/0 12.25.0.1`	Establishes a static route.
Step 7	**commit** **Example:** `RP/0/RSP0/CPU0:(config)# commit`	Commits the target configuration to the running configuration.

	Command or Action	Purpose
Step 8	**end** **Example:** `RP/0/RSP0/CPU0:router(config)# end`	Saves configuration changes. • When you issue the **end** command, the system prompts you to commit changes: `Uncommitted changes found, commit them before exiting(yes/no/cancel)? [cancel]:` • Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes. • Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
Step 9	**show interfaces MgmtEth***rack***/***slot***/CPU0/***port* **Example:** `RP/0/RSP0/CPU0:router(config)# show interfaces MgmtEth0/RP0/CPU0/0`	Displays interface details to verify the settings.

Examples

The following example shows how the Management Ethernet interface on the RSP in slot RSP1 is configured with an IP address:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface MgmtEth0/RSP1/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.255.255.0
RP/0/RSP0/CPU0:router(config-if)# no shutdown
RP/0/RSP0/CPU0:router(config-if)# commit
RP/0/RSP0/CPU0:router(config-if)# end
RP/0/RSP0/CPU0:router#
RP/0/RSP0/CPU0:router# show interfaces MgmtEth 0/RSP0/CPU0/0

MgmtEth0/RSP0/CPU0/0 is up, line protocol is up
Interface state transitions: 1
  Hardware is Management Ethernet, address is 0011.93ef.e8e6 (bia 0011.93ef.e8e6)
  Description: Connected to Lab LAN
  Internet address is 172.29.52.70/24
  MTU 1514 bytes, BW 100000 Kbit
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Half-duplex, 100Mb/s, 1000BASE-T, link type is autonegotiation
  output flow control is off, input flow control is off
  loopback not set,
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     31371 packets input, 1922996 bytes, 153 total input drops
     0 drops for unrecognized upper-level protocol
     Received 19457 broadcast packets, 0 multicast packets
              12 runts, 0 giants, 0 throttles, 0 parity
     61 input errors, 27 CRC, 12 frame, 0 overrun, 0 ignored, 0 abort
     12869 packets output, 878236 bytes, 0 total output drops
```

```
Output 5 broadcast packets, 0 multicast packets
0 output errors, 0 underruns, 0 applique, 0 resets
0 output buffer failures, 0 output buffers swapped out
1 carrier transitions
```

Related Documents

Related Topic	Document Title
Additional information about configuring management interfaces	*Cisco ASR 9000 Series Aggregation Services Router 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 do not need to 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 clock** command, the router displays the system time.

To manually set the router clock, follow these 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/RSP0/CPU0:router# configure`	Enters global configuration mode.
Step 2	**clock timezone** *zone hours-offset* **Example:** `RP/0/RSP0/CPU0:router(config)# clock timezone pst -8`	Sets the time zone for the router clock. • **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 clock** command. • *zone*—Name of the time zone to be displayed when standard time is in effect. • *hours-offset*—Difference in hours from UTC.
Step 3	**commit** **Example:** `RP/0/RSP0/CPU0:router(config-if)# commit`	Commits the target configuration to the running configuration.
Step 4	**end** **Example:** `RP/0/RSP0/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/RSP0/CPU0:router# clock set 14:12:00 10 dec 2008`	Sets the system software clock.
Step 6	**clock update-calendar** **Example:** `RP/0/RSP0/CPU0:router# clock update-calendar`	Updates the hardware clock (calendar clock) with the new clock settings. • It is battery operated and runs continuously, even if the router is powered off or rebooted.
Step 7	**show clock** **Example:** `RP/0/RSP0/CPU0:router# show clock`	Displays the clock setting. • Use this command to verify the settings.

Examples

The following example shows how the manual system clock is configured:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# clock timezone pst -8
RP/0/RSP0/CPU0:router(config)# commit
RP/0/RSP0/CPU0:router(config)# end
```

```
RP/0/RSP0/CPU0:router# clock set 14:12:00 10 dec 2008
14:12:00.090 PST Wed Dec 02 2008
RP/0/RSP0/CPU0:router# clock update-calendar
RP/0/RSP0/CPU0:router# show clock
14:12:00.090 PST Wed Dec 02 2008
```

Related Documents

Related Topic	Document Title
Descriptions of the clock commands	*Cisco ASR 9000 Series Aggregation Services Router System Management Command Reference*
Commands used to configure NTP	*Cisco ASR 9000 Series Aggregation Services Router System Management Command Reference*
Configuration of NTP	*Cisco ASR 9000 Series Aggregation Services Router 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 Configuring Additional Router Features.
- For information on using the Cisco IOS XR software more efficiently, see CLI Tips, Techniques, and Shortcuts
- For information on configuring interfaces, see the hardware documents listed in the "Related Documents" section on page x.