CHAPTER 6

Troubleshooting the Cisco IOS XR Software

This chapter describes the tools and procedures used to identify the source of hardware and software problems. This chapter also provides instructions on gathering data for further analysis by Cisco customer support representatives.

Contents

Additional Sources for Information

For additional information on troubleshooting, see the following sources:

- If the Cisco IOS XR software does not start and display the EXEC mode prompt, see *Cisco ASR 9000 Series Aggregation Series Router ROM Monitor Guide*.
- Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.

  http://www.cisco.com/public/support/tac/home.shtml
- "Related Documents" section on page x.

Basic Troubleshooting Commands

The following sections describe some basic techniques used to determine connectivity to another device and display information on the configuration and operation of a router.

- Using debug Commands, page 6-133

Using show Commands to Display System Status and Configuration

Use the **show** commands to check the status of various Cisco IOS XR software subsystems and services. Table 6-1 lists some of the common **show** commands.

To display a complete list of the available show commands, enter the **show ?** command to access the on-screen help system.

Note Different **show** commands are available in different command modes, and the same **show** command can show different results in different command modes.

Table 6-1 Common show Commands in Cisco IOS XR Software

Command	Description
show variables boot (EXEC and administration EXEC modes)	Displays the boot variables.
show configuration (Global configuration and administration configuration modes)	Displays the uncommitted configuration changes made during a configuration session. This command can be entered in any configuration mode.
show context (and show exception) (EXEC and administration EXEC modes)	Displays context information about all recent reloads.
show controller (Administration EXEC mode)	Displays hardware controller information.
show controllers (EXEC mode)	Displays hardware controller information.
show debug (EXEC and administration EXEC modes)	Displays debug flags enabled from the current terminal.
show environment [*options*] (EXEC and administration EXEC modes)	Displays hardware information for the physical components and systems, including fans, LEDs, power supply voltage and current information, and temperatures. To view the command options, enter the **show environment ?** command.
show exception (EXEC and administration EXEC modes)	Displays all exception dump configurations.
show install (EXEC and administration EXEC modes)	Displays installed and active software packages.
show interfaces (EXEC mode)	Displays interface status and configuration.

Table 6-1 Common show Commands in Cisco IOS XR Software (continued)

Command	Description
show logging (EXEC and administration EXEC modes)	Displays the contents of logging buffers.
show memory (EXEC and administration EXEC modes)	Displays memory statistics.
show platform (EXEC and administration EXEC modes)	Displays information about node status on the router. To display the nodes assigned to an RSP, enter this command in EXEC mode. To display all the nodes in a router, enter this command in administration EXEC mode.
show processes blocked (EXEC and administration EXEC modes)	Displays blocked processes.
show redundancy (EXEC and administration EXEC modes)	Display the status of the primary (active) RP[1] and the standby (redundant) RP.
show running-config [*command*] (EXEC and administration EXEC modes)	Displays the current running configuration.
show tech-support (EXEC and administration EXEC modes)	Collects a large amount of system information for troubleshooting. The output should be provided to technical support representatives when a problem is reported. Because of the impact the command can have on a running system, it is reserved for users assigned to the cisco-support task ID.
show user [**group** | **tasks** | **all**] (EXEC mode)	Displays the username for the current logged-in user. Use this command to also display the groups and associated task IDs assigned to the account.
show version (EXEC and administration EXEC modes)	Displays basic system information.

1. RP stands for Route Processor

Using the ping Command

Use the **ping** command to diagnose network connectivity. In EXEC mode, enter a hostname or an IP address as an argument to this command. In administration EXEC mode, you can use the fabric or the control Ethernet network to ping other nodes.

The **ping** command sends an echo request packet to a destination, then awaits a reply. Ping output can help you evaluate path-to-destination reliability, delays over the path, and whether the destination can be reached or is functioning.

Each exclamation point (!) indicates receipt of a reply. A period (.) indicates the network server timed out while waiting for a reply. Other characters may appear in the ping output display, depending on the protocol type.

Examples

In the following example, a successful ping attempt is shown:

```
RP/0/RSP0/CPU0:router# ping 10.233.233.233

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.233.233.233, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/7 ms
```

In the next example, an unsuccessful ping attempt is shown:

```
RP/0/RSP0/CPU0:router# ping 10.1.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

Using the traceroute Command

Use the **traceroute** command in EXEC mode to discover the routes that packets take when traveling to their destination. Enter a hostname or an IP address as an argument to this command.

This command works by taking advantage of the error messages generated by routers when a datagram exceeds its time-to-live (TTL) value.

The **traceroute** command starts by sending probe datagrams with a TTL value of 1, causing the first router to discard the probe datagram and send back an error message. The **traceroute** command sends several probes at each TTL level and displays the round-trip time for each.

The **traceroute** command sends one probe at a time. Each outgoing packet may result in one or two error messages. A *time exceeded* error message indicates that an intermediate router has seen and discarded the probe. A *destination unreachable* error message indicates that the destination node has received the probe and discarded it because it could not deliver the packet. If the timer times out before a response comes in, the **traceroute** command prints an asterisk (*).

The **traceroute** command terminates when the destination responds, the maximum TTL is exceeded, or the user interrupts the trace with the escape sequence.

Examples

In the following example, the route for an IP address appears:

```
RP/0/RSP0/CPU0:router# traceroute 10.233.233.233

Type escape sequence to abort.
Tracing the route to 10.233.233.233

 1  172.25.0.2 11 msec  2 msec  1 msec
 2  192.255.254.254 1 msec  *  2 msec
```

Using debug Commands

Debug commands are used to diagnose and resolve network problems. Use **debug** commands to troubleshoot specific problems or during troubleshooting sessions.

Use **debug** commands to turn on or off debugging for a specific service or subsystem. When debugging is turned on for a service, a debug message is generated each time the debugging code section is entered.

The following sections provide information on debugging:

Caution Debug commands can generate a very large amount of output and can render the system unusable. Use the **debug** commands to troubleshoot specific problems or during specific troubleshooting sessions on systems that are not in production.

Displaying a List of Debug Features

To display a list of the available debug features, enter the debug mode and enter a **?** for on-screen help. The set of debug mode features is different in EXEC and administration EXEC modes. In the following example, EXEC mode is the entry point to debug mode:

```
RP/0/RSP0/CPU0:router# debug
RP/0/RSP0/CPU0:router(debug)# ?

IntCtrlDebug IntCtrl Driver
MgmtMultilinkMgmtMultilink controller debugging
aaa                 AAA Authentication, Authorization and Accounting
  adjacency           Adjacency debug
  adjacency           platform AIB information
  aib                 AIB information
  alarm-logger        Turn on alarm debugging
  arm                 IP Address Repository Manager
  arp                 IP ARP transactions
  asic-errors         Debug ASIC erors
  asic-scan           Debug Asic Scan
--More--
```

In the next example, administration EXEC mode is the entry point to debug mode:

```
RP/0/RSP1/CPU0:router# admin
RP/0/RSP1/CPU0:router(admin)# debug
RP/0/RSP1/CPU0:router(admin-debug)# ?

  cctl          Chassis control driver process debug
  cetftp        Control ethernet TFTP (CE-TFTP) server process debug
  cpuctrl       Debug Cpuctrl Driver
  describe      Describe a command without taking real actions
  diagnostic    Diagnostic debugging
  dsc           dsc debug: all, fsm, table, cfg, and api
  dumper        Admin Debug Dumper
  exit          Exit from this submode
  fabric        Fabric debugging
  fabricq       Debug Fabric Queue Manager
  fia           Debug the Fabric Interface ASIC (FIA) driver
  gsp           Admin Debug gsp
  ingressq      Debug Ingress Queue Manager
  install       Install debug information
  inv           Inventory manager process debug
  invd          Inventory debug: all, trap, dll mem
  invmgr        Inventory Manager client API interface debug
  ntp           NTP information
  oird          oird all, event, message
  pair          DRP Pairing debug: Display debugging messages of drp_pairing
  shelfmgr      Shelfmgr debug: all, heartbeat, boot, fsm, init and eah
  sysdb         Configure SysDB debug settings
  upgrade-fpd   Debug upgrade fpd
 --More--
```

Enabling Debugging for a Feature

To enable debugging for a feature, type enter the **debug** command in EXEC or administration EXEC mode and then enable the feature for debugging. For example:

```
RP/0/RSP0/CPU0:router# debug
RP/0/RSP0/CPU0:router(debug)# aaa all
RP/0/RSP0/CPU0:router(debug)# exit
```

You can also enter the complete command from EXEC mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router# debug aaa all
```

Displaying Debugging Status

Enter the **show debug** command to display the debugging features enabled for your terminal session. The terminal session is labeled *tty* and represents your connection to the router through a specific port, which might be the console port, auxiliary port, or Management Ethernet interface. In the following example, the command display indicates that debugging is enabled for two features (AAA and ipv4 io icmp) from a terminal session on the console port of RSP1:

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

####  debug flags set from tty 'con0_RSP1_CPU0'  ####
aaa all flag is ON
ipv4 io icmp flag is ON

RP/0/RSP0/CPU0:router# no debug aaa all
RP/0/RSP0/CPU0:router# show debug
```

```
####  debug flags set from tty 'con0_RSP1_CPU0'  ####
ipv4 io icmp flag is ON
```

On a Cisco ASR 9000 Series Router, the slot number of the tty ID is 0 or 1 instead of RSP0 or RSP1.

Enter the **show debug conditions** command to display the conditional debugging status. For example:

```
RP/0/RSP0/CPU0:router# show debug conditions

####  debug conditions set from tty 'con0_RSP1_CPU0'  ####
interface  condition is ON for interface 'gi0/2/0/1'
```

Disabling Debugging for a Service

Use the **no** form of the **debug** command or the **undebug** command to turn off debugging for a service or subsystem.

In the following example, the **no debug** command disables debugging for the AAA feature:

```
RP/0/RSP0/CPU0:router# no debug aaa all
RP/0/RSP0/CPU0:router# show debug

####  debug flags set from tty 'con0_RSP1_CPU0'  ####
ipv4 io icmp flag is ON
```

You can also turn off debugging from the undebug mode, as shown in the following example:

```
RP/0/RSP0/CPU0:router# undebug
RP/0/RSP0/CPU0:router(undebug)# aaa all
RP/0/RSP0/CPU0:router(undebug)# exit
```

Disabling Debugging for All Services Started at the Active Terminal Session

Use the **undebug all** or **no debug all** command to turn off all debugging started by the active terminal session. For example, if you enter either of these commands while connected to the router through the console port on the active RP, all debug sessions started from that console port are disabled. In the following example, debugging for all services is disabled and then verified:

```
RP/0/RSP0/CPU0:router# undebug all
RP/0/RSP0/CPU0:router# show debug

No matching debug flags set
```

Disabling Debugging for All Services Started at All Terminal Sessions

Use the **undebug all all-tty** command to turn off debugging for all services that have been started from all terminal sessions. For example if you enter this command while connected to the router through the console port on the active RSP, all debug sessions started from all ports are disabled. In the following example, debugging for all services and ports is disabled and then verified:

```
RP/0/RSP0/CPU0:router# undebug all all-tty
RP/0/RSP0/CPU0:router# show debug

No matching debug flags set
```

Configuration Error Messages

The following sections contain information on configuration error messages:

Configuration Failures During a Commit Operation

A target configuration is added to the running configuration of a router when the **commit** command is entered. During this operation, the changes are automatically verified by the other components in the system. If successful, the configuration becomes part of the running configuration. If some configuration items fail, an error message is returned.

To display the configuration items that failed and see the cause of each failure, enter the **show configuration failed** command.

Note The **show configuration failed** command can be entered in either the EXEC mode or any configuration mode. In any mode, the configuration failures from the most recent **commit** operation are displayed.

In the following example, a configuration error occurs when an invalid commit operation is attempted:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# taskgroup alr
RP/0/RSP0/CPU0:router(config-tg)# description this is an example 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
```

To display the configuration items that failed, including a description of the error, enter the **show configuration failed** command:

```
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
```

You can also display the failed configuration items without the error description by entering the **show configuration failed noerror** command:

```
RP/0/RSP0/CPU0:router(config-tg)# show configuration failed noerror

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

Configuration Errors at Startup

Configuration errors that occurred during system startup can be displayed with the **show configuration failed startup** command. For example:

```
RP/0/RSP0/CPU0:router# show configuration failed startup

!! CONFIGURATION FAILED DUE TO SYNTAX ERRORS
ntp
http server
```

Memory Warnings in Configuration Sessions

The Cisco IOS XR software automatically monitors and manages the system resources in a router. Under normal operating conditions, memory problems should not occur.

When a low-memory issue does occur, it is often in the form of a low-memory warning during a configuration session. Low-memory conditions can be caused by multiple, large configurations being added to the router at a single time. Users can remove the source of a problem by removing configurations.

The following sections describe the commands used to display memory usage in a router and what to do if a low-memory warning appears:

Understanding Low-Memory Warnings in Configuration Sessions

The Cisco IOS XR software monitors memory usage in the router. If system memory becomes low, an error message appears when you attempt to enter configuration mode.

An “out-of-memory” error message appears during one of the following situations:

- When a user attempts to enter configuration mode.
- During a configuration session when the memory shortage occurs.
- When a user attempts to load a target configuration from a large file that results in a memory shortage.
- During a commit operation that results in the low-memory warning message. The commit operation is denied and only lr-root users can perform commit operations to remove configurations.

Caution Never ignore a low-memory warning. These warnings indicate a memory state that could affect system operations if not addressed.

“WARNING! MEMORY IS IN MINOR STATE”

If the system memory begins to run low, the following minor memory warning appears when you enter a new configuration mode.

```
WARNING! MEMORY IS IN MINOR STATE
```

Although users are allowed to enter configuration mode, they should immediately reduce memory usage using the tools described in the "Removing Configurations to Resolve Low-Memory Warnings" section on page 6-139.

Failure to take action can result in a worsening situation and eventual impact to router operations.

"ERROR! MEMORY IS IN SEVERE (or CRITICAL) STATE"

When the memory is in a severe or critical state, router operation and performance is likely to be affected. Regular users are not allowed to enter configuration mode. Only lr-root owners can enter configuration mode to free memory by removing configurations.

In some situations, the **commit** command is not allowed. Users with lr-root access can still use the **commit force** command to apply configurations that reduce memory usage. Reducing memory usage normally means removing configurations, but a user can also add configurations that reduce memory usage. For example, configuring the **shutdown** command on an interface could cause numerous routes to be purged from Border Gateway Protocol (BGP), the Routing Information Base (RIB), and Forwarding Information Base (FIB) configurations.

Caution The **commit force** command should be used only to apply configurations that reduce memory usage. Adding configurations that increase memory usage could result in serious loss of router operation.

Displaying System Memory Information

To display a high level summary of system memory, enter the **show memory summary** command. Table 6-2 describes the meaning of each heading.

```
RP/0/RSP0/CPU0:router# show memory summary

Physical Memory: 2048M total (1509M available)
 Application Memory : 1787M (1509M available)
 Image: 132M (bootram: 132M)
 Reserved: 128M, IOMem: 0, flashfsys: 0
 Total shared window: 0
RP/0/RSP1/CPU0:router#
```

To display general memory usage for the device as a whole and by process, enter the **show memory** command. Table 6-2 describes the meaning of each heading.

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

Physical Memory: 2048M total
 Application Memory : 1787M (1510M available)
 Image: 132M (bootram: 132M)
 Reserved: 128M, IOMem: 0, flashfsys: 0
 Total shared window: 0

kernel: jid 1
Address         Bytes           What
000d2000        12288           Program Stack
00112000        12288           Program Stack
Total Allocated Memory: 0
Total Shared Memory: 0

pkg/bin/wd-mbi: jid 72
```

```
Address         Bytes           What
4817f000        4096            Program Stack (pages not allocated)
48180000        516096          Program Stack (pages not allocated)
481fe000        8192            Program Stack
48200000        8192            Program Text
 --More--
```

Table 6-2 Heading Descriptions for show memory Command Output

Heading	Description
Physical Memory	Amount of physical memory installed on the device.
Application Memory	Memory available for the system to use (total memory minus image size, reserved, IOMem, and flashfsys).
Image	Size of the bootable image.
Reserved	Reserved for packet memory.
IOMem	IO memory—Currently used as a backup for packet memory.
flashfsys	Flash file system memory.
Process and JID	Process and job ID.
Address	Starting address in memory.
Bytes	Size of memory block.
What	Block description.

Removing Configurations to Resolve Low-Memory Warnings

To resolve most low-memory problems, you should remove the configurations from the router that are consuming the most memory. Often, memory problems occur when a large new configuration is added to the system. The following sections provide information to resolve low-memory issues:

- Clearing a Target Configuration, page 6-139
- Removing Committed Configurations to Free System Memory, page 6-140
- Rolling Back to a Previously Committed Configuration, page 6-140
- Clearing Configuration Sessions, page 6-140

Clearing a Target Configuration

A low-memory warning can occur when a large configuration file is loaded into a target configuration session. To remove the target configuration, enter the **clear** command to discard the changes. For example:

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

Caution Committing a target configuration that has caused a low-memory warning can make the system unstable. Clearing a target configuration is a preventive measure to not let the system go into a worse memory state due to additional configuration. In addition, all other active configuration sessions can be closed to minimize the churn.

Removing Committed Configurations to Free System Memory

You can reduce memory usage by removing configurations from the router, as shown in the following procedure:

Step 1 Enter the **show memory summary** command in EXEC mode to display the overall system memory:

```
RP/0/RSP0/CPU0:router# show memory summary

Physical Memory: 2048M total
 Application Memory : 1787M (1511M available)
 Image: 132M (bootram: 132M)
 Reserved: 128M, IOMem: 0, flashfsys: 0
 Total shared window: 0
```

Step 2 Enter the **show configuration commit list** command in EXEC or administration EXEC mode to list the configurations you can remove.

Note To display the details of a configuration, enter the **show configuration commit changes** command followed by a commitID number. To display additional configuration history information, enter the **show configuration history ?** command, and use the command options to display additional information.

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

Step 4 Remove configurations as needed to free memory.

For more information, see Managing Configuration History and Rollback, page 4-79.

Rolling Back to a Previously Committed Configuration

You can roll back the system to a previous committed configuration, as described in Managing Configuration History and Rollback, page 4-79.

Clearing Configuration Sessions

Active configuration sessions and their associated target configurations can consume system memory. Users with the appropriate access privileges can display the open configuration sessions of other users and terminate those sessions, if necessary (see Table 6-3).

Table 6-3 Session Commands

Command	Description
show configuration sessions	Displays the active configuration sessions.
clear configuration sessions *session-id*	Clears a configuration session.

In the following example, the open configuration sessions are displayed with the **show configuration sessions** command. The **clear configuration sessions** command is then used to clear a configuration session.

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

```
Session                   Line        User      Date                      Lock
00000211-002c409b-00000000  con0_RSP1_CPU0  UNKNOWN   Mon Feb  2 01:02:09 2004

RP/0/RSP0/CPU0:router# clear configuration sessions 00000211-002c409b-00000000

session ID '00000211-002cb09b-00000000' terminated
```

Contacting TAC for Additional Assistance

If you remove configurations and the low-memory condition remains, you may need to contact TAC for additional assistance. See the "Additional Sources for Information" section on page 6-129.

Interfaces Not Coming Up

The router interfaces are directly used in processing network traffic, so their status information is crucial to understanding how the device is functioning. This section contains information on the EXEC mode commands used to verify that the router interfaces are operational. The basic commands used in this process are summarized in Table 6-4.

Table 6-4 show interface Commands

Command	Description
show interfaces	Displays detailed information about all interfaces installed or configured on the device, whether or not they are operational.
show interfaces *type instance*	Specifies a particular interface, rather than displaying information for all interfaces, as in the following example: `show interface gi0/1/0/0`
show ipv4 interface **show ipv6 interface**	Displays basic, IP-related information for all available interfaces.
show ipv4 interface brief **show ipv6 interface brief**	Quickly displays the most critical information about the interfaces, including the interface status (up or down) and the protocol status.

Verifying the System Interfaces

Perform the following steps to verify the system interfaces.

Step 1 Enter the **show platform** command in administration EXEC to verify that all nodes are in the "IOS XR RUN" state:

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

Node            Type                      State            Config State
-------------------------------------------------------------------------------
0/RSP0/CPU0     A9K-RSP-4G(Active)        IOS XR RUN       PWR,NSHUT,MON
0/FT0/SP        FAN TRAY                  READY
0/FT1/SP        FAN TRAY                  READY
0/1/CPU0        A9K-40GE-B                IOS XR RUN       PWR,NSHUT,MON
0/4/CPU0        A9K-8T/4-B                IOS XR RUN       PWR,NSHUT,MON
0/6/CPU0        A9K-4T-B                  IOS XR RUN       PWR,NSHUT,MON
0/PM0/SP        A9K-3KW-AC                READY            PWR,NSHUT,MON
```

```
0/PM1/SP        A9K-3KW-AC                READY           PWR,NSHUT,MON
0/PM2/SP        A9K-3KW-AC                READY           PWR,NSHUT,MON
```

Step 2 Enter the **show ipv4 interface brief** command to verify IP address configuration and protocol status:

```
RP/0/RSP0/CPU0:router# show ipv4 interface brief

Interface                      IP-Address      Status                Protocol
gi0/1/0/0                      unassigned      Shutdown              Down
gi0/1/0/1                      unassigned      Shutdown              Down
gi0/1/0/2                      unassigned      Shutdown              Down
gi0/1/0/3                      unassigned      Shutdown              Down
gi0/1/0/4                      unassigned      Shutdown              Down
gi0/1/0/5                      unassigned      Shutdown              Down
gi0/1/0/6                      unassigned      Shutdown              Down
gi0/1/0/7                      unassigned      Shutdown              Down
gi0/1/0/8                      unassigned      Shutdown              Down
gi0/1/0/9                      unassigned      Shutdown              Down
gi0/1/0/10                     unassigned      Shutdown              Down
gi0/1/0/11                     unassigned      Shutdown              Down
gi0/1/0/12                     unassigned      Shutdown              Down
gi0/1/0/13                     unassigned      Shutdown              Down
gi0/1/0/14                     unassigned      Shutdown              Down
gi0/1/0/15                     unassigned      Shutdown              Down
gi0/2/0/0                      10.10.1.101     Down                  Down
gi0/2/0/1                      unassigned      Shutdown              Down
gi0/2/0/2                      unassigned      Shutdown              Down
gi0/2/0/3                      unassigned      Shutdown              Down
TenGigE0/3/0/0                 unassigned      Shutdown              Down
TenGigE0/3/0/2                 unassigned      Shutdown              Down
MgmtEth0/RSP0/CPU0/0           unassigned      Shutdown              Down
```

Step 3 Configure the interfaces, as shown in the following examples.

Note You must enter the **commit** command to make the new configuration part of the active running configuration. If you end the configuration session, you are automatically prompted to commit the changes, as shown in the second example:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gi0/2/0/1
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.1 255.0.0.0
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# configure
RP/0/RSP0/CPU0:router(config)# interface gi0/2/0/2
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.1.1.2 255.255.0.0
RP/0/RSP0/CPU0:router(config-if)# no shutdown
RP/0/RSP0/CPU0:router(config-if)# end
Uncommitted changes found, commit them? [yes]: yes
RP/0/RSP0/CPU0:router#
```

Step 4 Enter the **show ipv4 interface brief** command to verify that the interfaces are “Up” in the Status column:

```
RP/0/RSP0/CPU0:router# show ipv4 interface brief

Interface                      IP-Address      Status                Protocol
```

```
gi0/1/0/0                   unassigned      Shutdown            Down
gi0/1/0/1                   unassigned      Shutdown            Down
gi0/1/0/2                   unassigned      Shutdown            Down
gi0/1/0/3                   unassigned      Shutdown            Down
gi0/1/0/4                   unassigned      Shutdown            Down
gi0/1/0/5                   unassigned      Shutdown            Down
gi0/1/0/6                   unassigned      Shutdown            Down
gi0/1/0/7                   unassigned      Shutdown            Down
gi0/1/0/8                   unassigned      Shutdown            Down
gi0/1/0/9                   unassigned      Shutdown            Down
gi0/1/0/10                  unassigned      Shutdown            Down
gi0/1/0/11                  unassigned      Shutdown            Down
gi0/1/0/12                  unassigned      Shutdown            Down
gi0/1/0/13                  unassigned      Shutdown            Down
gi0/1/0/14                  unassigned      Shutdown            Down
gi0/1/0/15                  unassigned      Shutdown            Down
gi0/2/0/0                   10.10.1.101     Up                  Up
gi0/2/0/1                   10.1.1.1        Up                  Up
gi0/2/0/3                   10.1.1.2        Shutdown            Down
gi0/2/0/3                   unassigned      Shutdown            Down
TenGigE0/3/0/0              unassigned      Shutdown            Down
TenGigE0/3/0/2              unassigned      Shutdown            Down
MgmtEth0/RSP0/CPU0/0        unassigned      Shutdown            Down
```

Step 5 If the interface is in the “Shutdown/Down” state, as shown in the previous example, perform the following tasks:

a. Verify that the status of the interface is “Shutdown”:

```
RP/0/RSP0/CPU0:router# show running-config interface gi0/2/0/3

interface gi0/2/0/3
 shutdown
 keepalive disable
!
```

b. Bring the interface up with the following commands:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/2/0/3
RP/0/RSP0/CPU0:router(config-sonet)# no shutdown
RP/0/RSP0/CPU0:router(config-sonet)# commit
RP/0/RSP0/CPU0:router(config-sonet)# exit

RP/0/RSP0/CPU0:router(config)# interface gi 0/2/0/3
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#
```

Step 6 If the interface state is still displayed as “Down”, verify that the physical cable connections are correctly installed. The following message indicates that the interface has either a bad connection or no connection:

```
LC/0/0/1:Sep 29 15:31:12.921 : plim_4p_oc192[183]: %SONET-4-
ALARM : SONET0_1_1_0: SLOS
```

Step 7 Verify again that the interface is up by entering the **show ipv4 interface brief** command:

```
RP/0/RSP0/CPU0:router# show ipv4 interface brief

Interface                   IP-Address      Status              Protocol
gi0/1/0/0                   unassigned      Shutdown            Down
gi0/1/0/1                   unassigned      Shutdown            Down
gi0/1/0/2                   unassigned      Shutdown            Down
gi0/1/0/3                   unassigned      Shutdown            Down
```

```
gi0/1/0/4                  unassigned      Shutdown            Down
gi0/1/0/5                  unassigned      Shutdown            Down
gi0/1/0/6                  unassigned      Shutdown            Down
gi0/1/0/7                  unassigned      Shutdown            Down
gi0/1/0/8                  unassigned      Shutdown            Down
gi0/1/0/9                  unassigned      Shutdown            Down
gi0/1/0/10                 unassigned      Shutdown            Down
gi0/1/0/11                 unassigned      Shutdown            Down
gi0/1/0/12                 unassigned      Shutdown            Down
gi0/1/0/13                 unassigned      Shutdown            Down
gi0/1/0/14                 unassigned      Shutdown            Down
gi0/1/0/15                 unassigned      Shutdown            Down
gi0/2/0/0                  10.10.1.101     Up                  Up
gi0/2/0/1                  10.1.1.1        Up                  Up
gi0/2/0/2                  10.1.1.2        Up                  Up
gi0/2/0/3                  unassigned      Shutdown            Down
TenGigE0/3/0/0             unassigned      Shutdown            Down
TenGigE0/3/0/2             unassigned      Shutdown            Down
MgmtEth0/RSP0/CPU0/0       unassigned      Shutdown            Down
```

Step 8 Repeat these steps for every interface, until every interface shows both Status and Protocol as “Up.”