



Getting Started with Cisco IOS XR Software

This chapter introduces the routers that support Cisco IOS XR software and the user interfaces you can use to manage routers that run Cisco IOS XR software. This chapter also describes how to bring up a new router that uses Cisco IOS XR software.

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- [Bringing Up the Cisco IOS XR Software on a Router for the First Time, page 1-4](#)

Supported System Configurations

The Cisco IOS XR software runs on the following systems:

- Cisco CRS-1 8-Slot Line Card Chassis
- Cisco CRS-1 16-Slot Line Card Chassis
- Cisco XR 12404 Router
- Cisco XR 12406 Router
- Cisco XR 12410 Router
- Cisco XR 12416 Router

Cisco XR 12000 Series Routers support the following hardware:

- Cisco XR 12000 and 12000 Series Performance Route Processor-2
- Cisco XR 12000 and 12000 Series Performance Route Processor-1
- Cisco XR 12000 and 12000 Series 4-Port OC-3c/STM-1c Packet-over-Sonet (PoS) ISE Line Card
- Cisco XR 12000 and 12000 Series 8-Port OC-3c/STM-1c PoS ISE Line Card
- Cisco XR 12000 and 12000 Series 16-Port OC-3c/STM-1c PoS ISE Line Card
- Cisco XR 12000 and 12000 Series 4-Port OC-12/STM-4 PoS ISE Line Card
- Cisco XR 12000 and 12000 Series 1-Port OC-48c/STM-16c PoS ISE Line Card

- Cisco XR 12000 and 12000 Series 4-Port Gigabit Ethernet ISE Line Card
- Cisco XR12000 and 12000 Series SPA Interface Processor (SIP)-600 and the following shared port adapters (SPAs):
 - 1-Port 10-Gigabit Ethernet SPA
 - 5-Port Gigabit Ethernet SPA
 - 10-Port Gigabit Ethernet SPA
 - 1-Port OC-192c/STM-64c PoS/RPR SPA

Router Management Interfaces

Because new routers are not yet configured for your environment, you must start configuration using the command-line interface (CLI). This guide provides instructions on using the CLI to configure basic router features. The Cisco IOS XR software supports the following router management interfaces, which are described in the following sections:

- [Command-Line Interface, page 1-2](#)
- [Craft Works Interface, page 1-2](#)
- [Extensible Markup Language API, page 1-3](#)
- [Simple Network Management Protocol, page 1-4](#)

Command-Line Interface

The CLI is the primary user interface for configuring, monitoring, and maintaining routers that run the Cisco IOS XR software. The CLI allows you to directly and simply execute Cisco IOS XR commands.

All procedures in this guide use the CLI. Before you can use other router management interfaces, you must first use the CLI to install and configure those interfaces. Guidelines for using the CLI are presented in the following chapters:

- [Chapter 2, “Configuring General Router Features”](#)
- [Chapter 3, “Configuring Additional Router Features”](#)
- [Chapter 4, “CLI Tips, Techniques, and Shortcuts”](#)

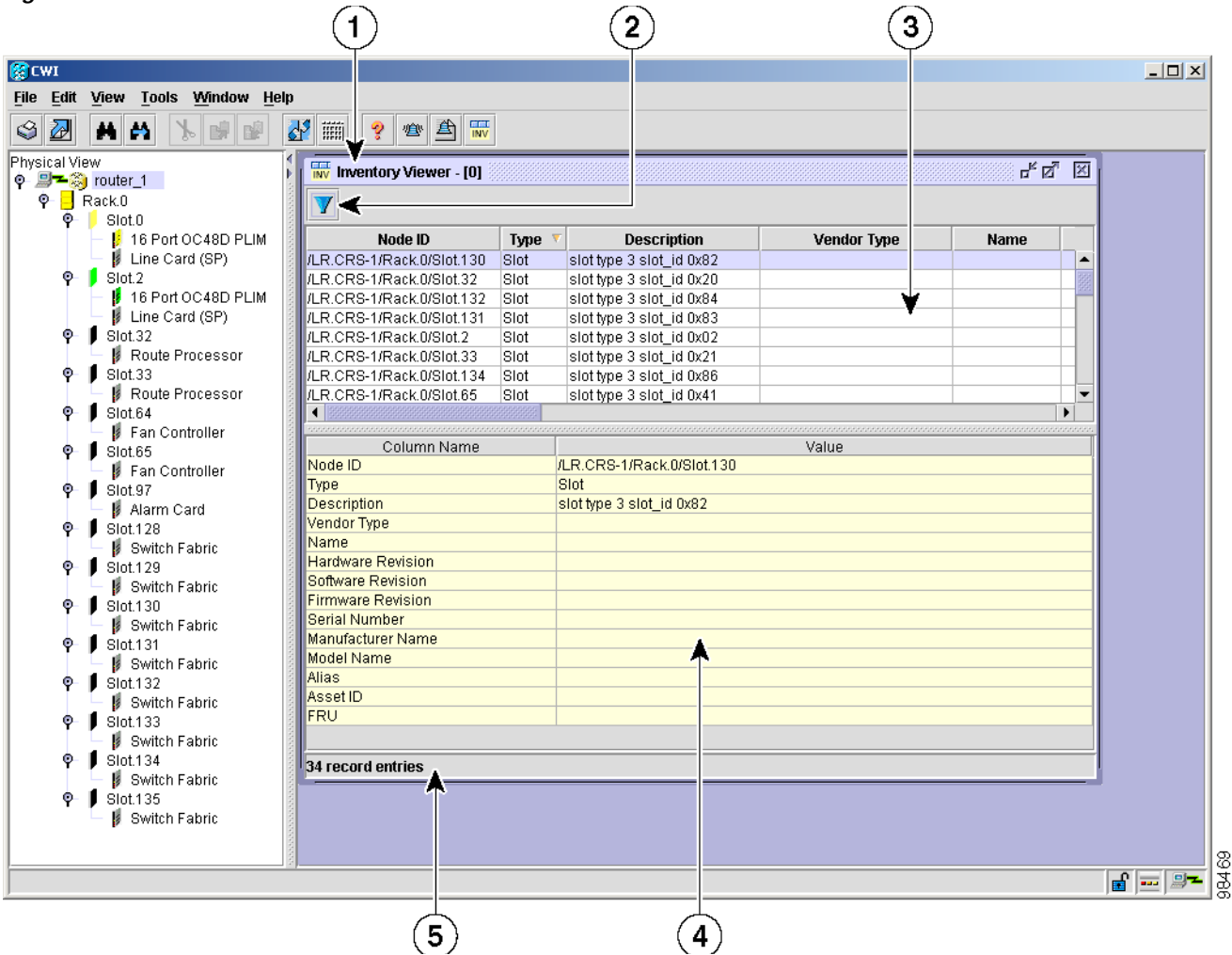
For information on CLI procedures for other procedures, such as hardware interface and software protocol management, see the Cisco IOS XR software documents listed in the [“Related Documents” section on page xv](#).

Craft Works Interface

The Craft Works Interface (CWI) is a client-side application used to configure and manage routers that run the Cisco IOS XR software. CWI includes advanced CLI features and a graphical user interface (GUI, see [Figure 1-1](#)), and it is included with the Cisco IOS XR Manageability package.

The CWI is a desktop used to launch management and configuration applications. The management and configuration features include fault management, configuration management, performance management, security management, and inventory management, with an emphasis on speed and efficiency. For more information, see the Cisco IOS XR software documents listed in the [“Related Documents” section on page xv](#).

Figure 1-1 Craft Works Interface Browser Screen



Extensible Markup Language API

The Extensible Markup Language (XML) application programming interface (API) is an XML interface used for rapid development of client applications and perl scripts to manage and monitor the router. Client applications can be used to configure the router or request status information from the router by encoding a request in XML API tags and sending it to the router. The router processes the request and sends the response to the client in the form of encoded XML API tags. The XML API supports readily available transport layers, including Telnet, Secure Shell (SSH), and Common Object Request Broker Architecture (CORBA). The Secure Socket Layer (SSL) transport is also supported by the XML API.

For more information, see the Cisco IOS XR software documents listed in the [“Related Documents” section on page xv](#).

Simple Network Management Protocol

Simple Network Management Protocol (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. By using SNMP-transported data (such as packets per second and network error rates), network administrators can more easily manage network performance, find and solve network problems, and plan for network growth.

The Cisco IOS XR software supports SNMP v1, v2c, and v3. SNMP is part of a larger architecture called the Internet Network Management Framework (NMF), which is defined in Internet documents called RFCs. The SNMPv1 NMF is defined by RFCs 1155, 1157, and 1212, and the SNMPv2 NMF is defined by RFCs 1441 through 1452.

SNMP is a popular protocol for managing diverse commercial internetworks and those used in universities and research organizations. SNMP-related standardization activity continues even as vendors develop and release state-of-the-art, SNMP-based management applications. SNMP is a relatively simple protocol, yet its feature set is sufficiently powerful to handle the difficult problems presented in trying to manage the heterogeneous networks of today.

For more information, see the Cisco IOS XR software documents listed in the [“Related Documents” section on page xv](#).

Bringing Up the Cisco IOS XR Software on a Router for the First Time

This section provides instructions for bringing up the Cisco IOS XR software on a router for the first time. This section applies to routers that are delivered with Cisco IOS XR software installed.



Note

If you are upgrading a Cisco 12000 Series Router from Cisco IOS software to Cisco IOS XR software, see the Cisco IOS XR software document titled *Upgrading from Cisco IOS to Cisco IOS XR Software on the Cisco 12000 Series Router*.

The following sections provide information related to bringing up a system:

- [Hardware Prerequisites and Documentation, page 1-4](#)
- [Connecting to the Router Through the Console Port, page 1-5](#)
- [Verifying the System After Initial Bring-Up, page 1-12](#)

Hardware Prerequisites and Documentation

The Cisco IOS XR software runs on the routers listed in the [“Supported System Configurations” section on page 1-1](#). Before a router can be started, the following hardware management procedures must be completed:

- Site preparation
- Equipment unpacking
- Router installation

For information on how to complete these procedures for your router equipment, see the hardware documents listed in the [“Related Documents” section on page xv](#).

**Note**

If you are upgrading a Cisco 12000 Series Router from Cisco IOS software to Cisco IOS XR software, you must first prepare the router. Refer to *Upgrading from Cisco IOS to Cisco IOS XR Software on the Cisco 12000 Series Router* for more information. See the [“Related Documents” section on page xv](#) for a complete listing of available documents.

Connecting to the Router Through the Console Port

The first time you connect to a new router with Cisco IOS XR software, you must connect through the Console port on the active route processor (RP) or PRP card. Although typical router configuration and management take place using an Ethernet port on the RP or PRP, this port must be configured for your local area network before it can be used.

[Figure 1-2](#) shows the RP connections on the Cisco CRS-1 16-Slot Line Card Chassis, and [Figure 1-3](#) shows the RP connections on the Cisco CRS-1 8-Slot Line Card Chassis. [Figure 1-4](#) shows the PRP-2 connections on the Cisco XR 12000 Series Router.

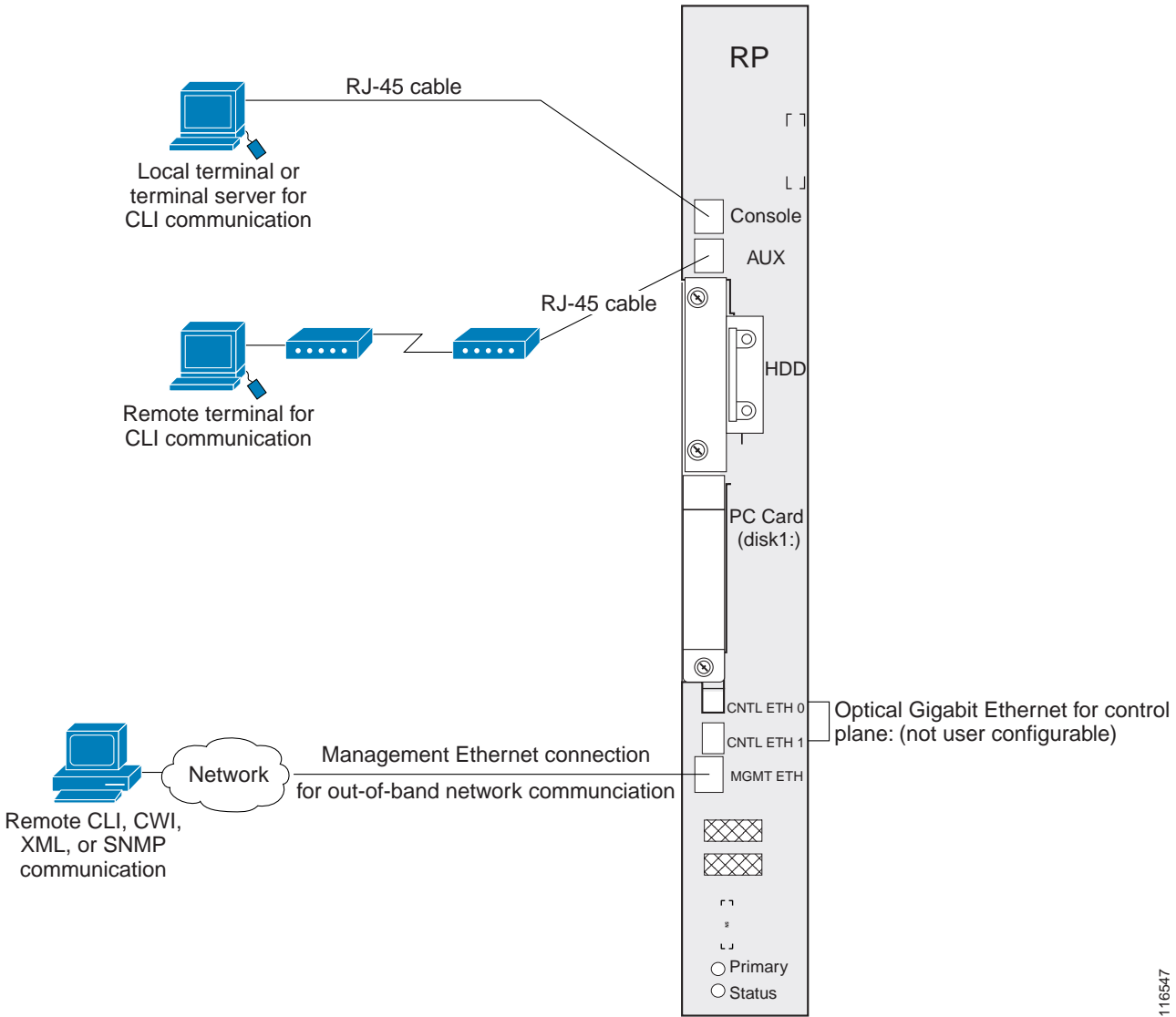
**Note**

Cisco IOS XR software does not support the PRP-1.

**Note**

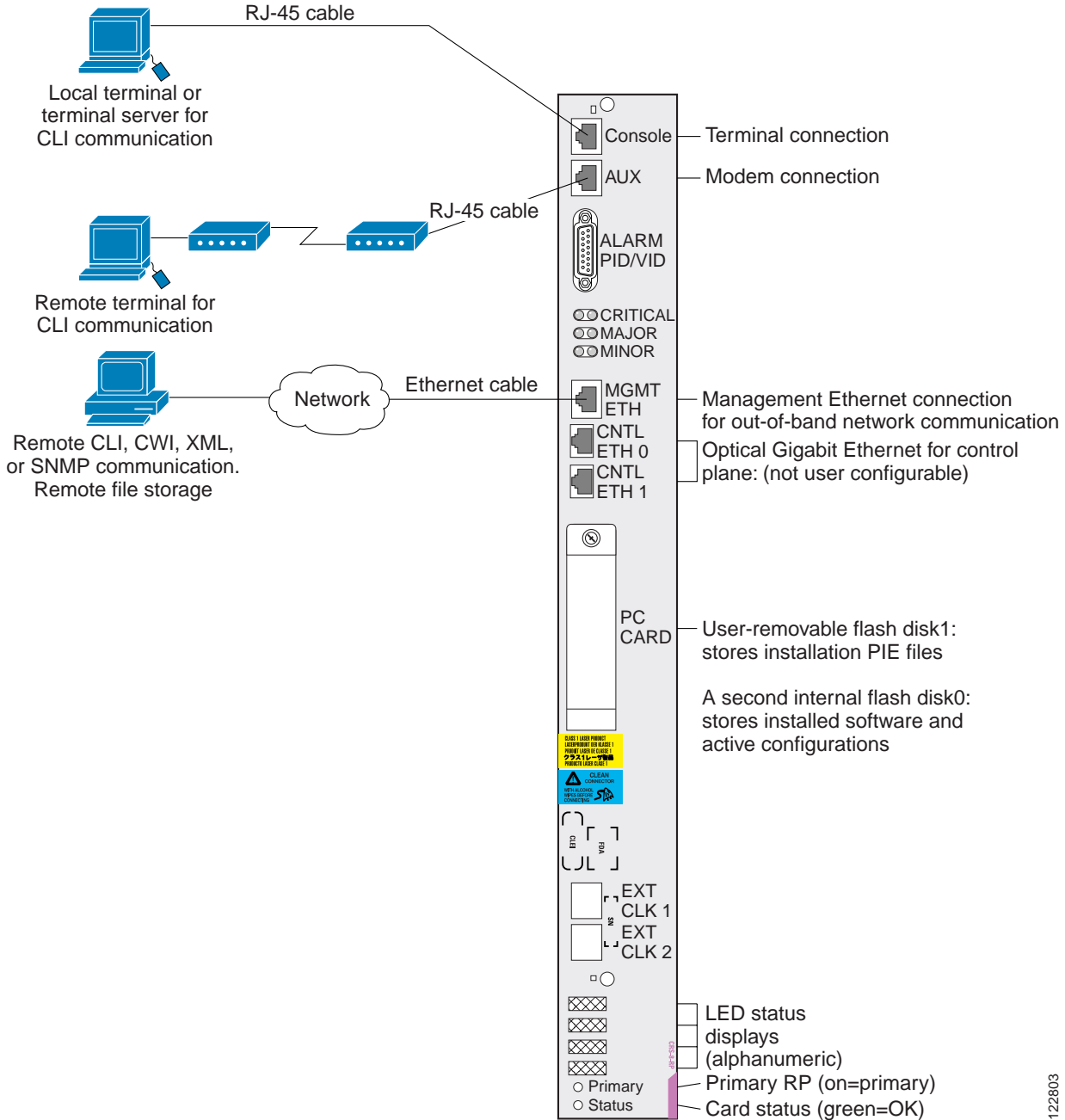
Throughout this guide, the term RP is used to refer to the RP cards supported on Cisco CRS-1s and the PRP cards supported on Cisco XR 12000 Series Routers. If a feature or an issue applies to only one platform, the accompanying text specifies the platform.

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



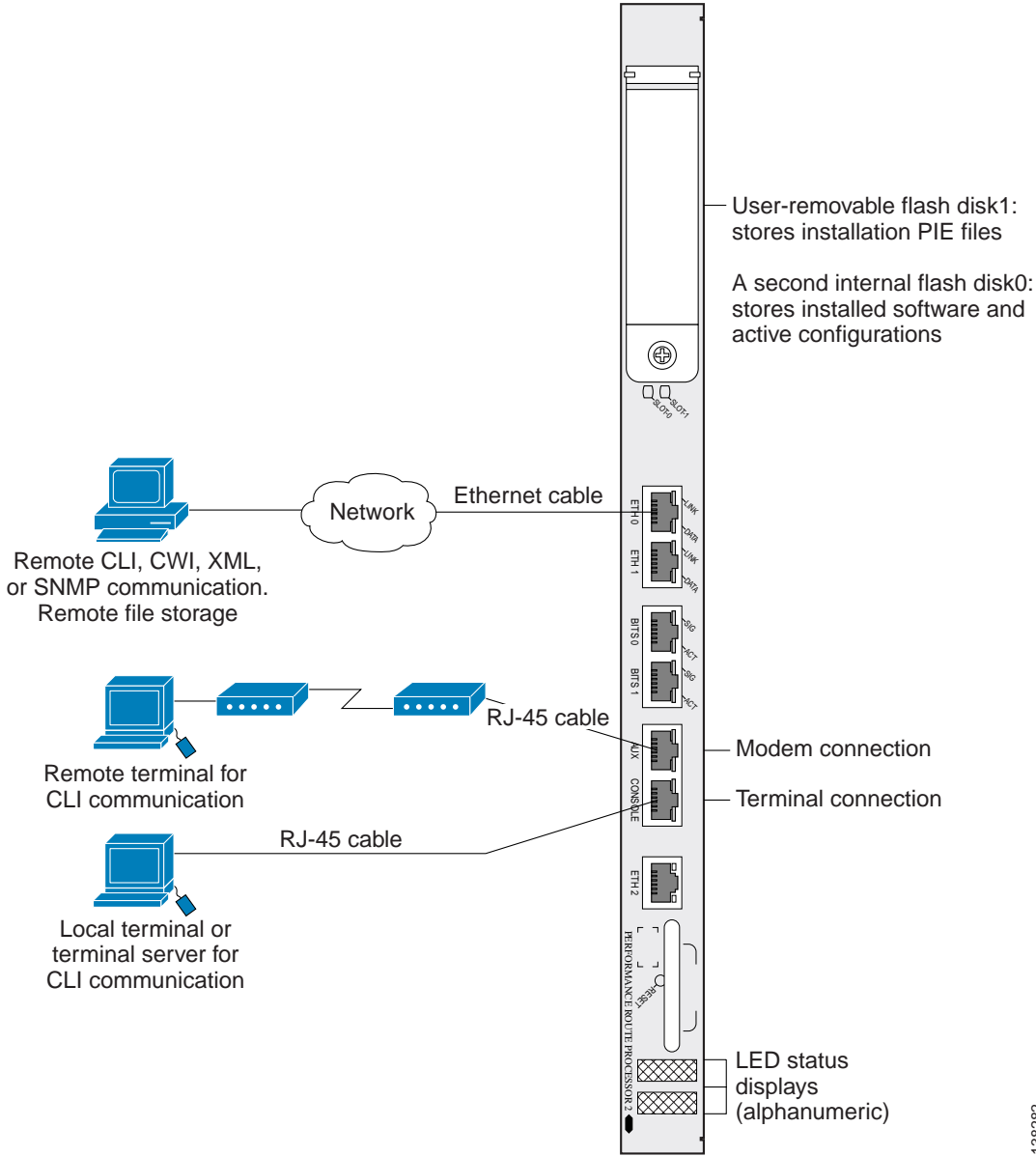
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Figure 1-3 Communication Ports on the RP for a Cisco CRS-1 8-Slot Line Card Chassis



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Figure 1-4 Communication Ports on the PRP-2 for a Cisco XR 12000 Series Router



To connect to the router, perform the following procedure.

SUMMARY STEPS

1. Power on the router.
2. Identify the primary RP.
3. Connect a terminal to the Console port of the primary RP.
4. Start the terminal emulation program.
5. Press **Enter**.
6. Type the username for the root-system login and press **Return**.
7. Type the password for the root-system login and press **Return**.
8. Log in to the router.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Power on the router.	<p>Starts the router.</p> <ul style="list-style-type: none"> • This step is required only if the router power is not on. • For information on power installation and controls, see the hardware documentation listed in the “Related Documents” section on page xv.
Step 2	Identify the primary RP.	<p>Identifies the RP to which you must connect in the next step.</p> <ul style="list-style-type: none"> • This step is not required when the router hosts only one RP. • On Cisco CRS-1 RPs, the primary RP is identified by a lighted Primary LED on the RP front panel. • On a Cisco XR 12000 Series Router, the primary RP is identified by the alphanumeric display: PRI RP. • If there are multiple RPs on a Cisco XR 12000 Series Router when it is first started, the default configuration selects the RP in the lowest numbered slot as the primary RP and the designated shelf controller (DSC). <p>Note To have an RP in a higher-numbered slot become the DSC, you must bring up the router with only that RP installed. Once the chosen RP becomes the DSC, it remains the DSC after subsequent restarts and you can add the other RPs.</p>

	Command or Action	Purpose
Step 3	Connect a terminal to the Console port of the primary RP.	<p>Establishes a communications path to the router.</p> <ul style="list-style-type: none"> • During the initial setup, you can communicate with the router only through the Console port of the primary RP. • The router Console port is designed for a serial cable connection to a terminal or a computer that is running a terminal emulation program. • The terminal settings are: <ul style="list-style-type: none"> – Bits per second: 9600/9600 – Data bits: 8 – Parity: None – Stop bit: 2 – Flow control: None • For information on the cable requirements for the Console port, see the hardware documentation listed in the “Related Documents” section on page xv.
Step 4	Start the terminal emulation program.	<p>(Optional.) Prepares a computer for router communications.</p> <ul style="list-style-type: none"> • The step is not required if you are connecting through a terminal. • Terminals send keystrokes to and receive characters from another device. If you connect a computer to the Console port, you must use a terminal emulation program to communicate with the router. For instructions on using the terminal emulation program, see the documentation for that program.
Step 5	Press Enter .	<p>Initiates communication with the router.</p> <ul style="list-style-type: none"> • 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, 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: <code>Enter root-system username:</code> • The root-system username is for a user who manages the router in the admin plane. All general router configuration takes place in the admin plan. (If the router is configured with more than one logical router, logical router configuration takes place outside the admin plane when a user logs in with a username defined for the logical router.) • If the router has been configured, the router displays the prompt: <code>Username:</code>

	Command or Action	Purpose
Step 6	Type the username for the root-system login and press Return .	Sets the root-system username, which is used to log in to the router.
Step 7	Type the password for the root-system login and press Return .	Creates an encrypted password for the root-system username.
Step 8	Log in to the router.	Establishes your access rights for the router management session. <ul style="list-style-type: none"> • Enter the root-system username and password that were created earlier in this procedure. • After you log in, the router displays the CLI prompt, which is described in the “CLI Prompt” section on page 2-11.

Examples

The following example shows the root-system username and password configuration for a new router, and it shows the initial log in:

```
--- Administration User Dialog ---
```

```
Enter root-system username: lab
```

```
Enter secret: lab
```

The following configuration command script was created:

```
username lab
 secret 5 $1$bo9D$L52cOe8Sa4PnlwJ/mVpwR1
 group cisco-support
 !
end
```

```
[0] Return back to the setup without saving this config.
```

```
[1] Save this configuration and exit.
```

```
Enter your selection [1]: 1
```

```
RP/0/0/CPU0:Feb  9 00:51:32.197 : exec[65697]: %MGBL-LIBTARCFG-6-SYSTEM_ADMIN_CO
```

```
MMIT : Administration configuration committed by system.
```

```
Use the 'configure' command to modify this configuration.
```

```
User Access Verification
```

```
Username: lab
```

```
Password:
```

```
RP/0/0/CPU0:ios#
```

The *secret* line in the configuration command script shows that the password is encrypted. When you enter the password during login, the password is hidden.

Verifying the System After Initial Bring-Up

To verify the status of the router, perform the following procedure:

SUMMARY STEPS

1. **show version**
2. **show platform** *[node-id]*
3. **show redundancy**
4. **show environment**

DETAILED STEPS

	Command or Action	Purpose
Step 1	show version RP/0/RP0/CPU0:router# show version	Displays information about the router, including image names, uptime, and other system information.
Step 2	show platform <i>[node-id]</i> RP/0/RP0/CPU0:router# show platform	Displays information about the status of cards and modules installed in the router. <ul style="list-style-type: none"> • Some cards support a CPU module and service processor (SP) module. Other cards support only a single module. • A card module is also called a node. When all nodes are working properly, the status of each node in the State column is IOS-XR RUN. • Type the show platform <i>node-id</i> command to display information for a specific node. Replace <i>node-id</i> with a node name from the show platform command Node column.
Step 3	show redundancy Example: RP/0/RP0/CPU0:router# show redundancy	Displays the state of the primary (active) and standby (inactive) RPs, including the ability of the standby to take control of the system. <ul style="list-style-type: none"> • If both RPs are working correctly, the <i>This node</i> row displays <i>active role</i>, the <i>Partner node</i> row displays <i>standby role</i>, and the <i>Standby node</i> row displays <i>Ready</i>.
Step 4	show environment Example: RP/0/RP0/CPU0:router# show environment	Displays information about the hardware attributes and status.

Examples of show Commands

The following sections provide examples of **show** commands:

- [show version Command, page 1-13](#)
- [show environment Command, page 1-13](#)
- [show platform Command, page 1-14](#)
- [show redundancy Command, page 1-15](#)

show version Command

To display basic information about the router configuration, type the **show version** command in EXEC mode, as shown in the following example:

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

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

ROM: System Bootstrap, Version 1.15(20040120:002852) ,

router uptime is 2 days, 1 hour, 59 minutes
System image file is "tftp://223.0.0.0/usr/comp-hfr-full.vm-1.0.0

cisco CRS-16/S (7450) processor with 2097152K bytes of memory.
7450 processor at 650Mhz, Implementation , Revision

4 Packet over SONET network interface(s)
4 SONET/SDH Port controller(s)
1 Ethernet/IEEE 802.3 interface(s)
2043k bytes of non-volatile configuration memory.
1000592k bytes of ATA PCMCIA card at disk 0 (Sector size 512 bytes).

Configuration register is 0x2

Package active on node 0/2/SP:
hfr-admin, V 1.0.0, Cisco Systems, at mem:hfr-admin-1.0.0
  Built on Fri Mar  5 19:12:26 PST 2004
  --More--
```

show environment Command

To display environmental monitor parameters for the system, use the **show environment** command in EXEC mode. The following command syntax is used:

show environment [options]

[Table 1-1](#) defines the **show environment** command options.

Table 1-1 *show environment Command Options*

Option	Displays
all	Information for all environmental monitor parameters.
last	Information measured in the prior measurement interval (Cisco XR 12000 Series Routers only).
table	Environmental parameter ranges.

Table 1-1 *show environment Command Options (continued)*

Option	Displays
temperatures	System temperature information.
voltages	System voltage information.

In the following example, temperature information for a Cisco CRS-1 is shown:

```
RP/0/RP0/CPU0:router# show environment temperatures

R/S/I  Modules          Inlet          Exhaust          Hotspot
      Temperature  Temperature    Temperature
      (deg C)      (deg C)        (deg C)

0/2/*  host              31, 27         43, 45           48
      cpu              31
      fabricq0         46
      fabricq1         44
      ingressq         34
      egressq           41             43
      ingresspse       35
      egresspse        42
      plimasic         30, 31         42
0/RP1/* host              38              44
      cpu              36
      ingressq         42
      fabricq0         43
0/SM0/* host              29, 29         41, 33
```

In the following example, LED status of the nodes in a Cisco CRS-1 is shown:

```
RP/0/RP0/CPU0:router# show environment leds

0/2/*: Module (host) LED status says: OK
0/2/*: Module (plimasic) LED status says: OK
0/SM0/*: Module (host) LED status says: OK
```

See the *Cisco IOS XR Interface and Hardware Component Command Reference* for more information.

show platform Command

The following is sample output from the **show platform** command for all nodes in a router:

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

Node          Type          PLIM          State          Config State
-----
0/0/SP        MSC(SP)       N/A           IOS-XR RUN     PWR, NSHUT, MON
0/0/CPU0      MSC           16OC48-POS/DPT IOS-XR RUN     PWR, NSHUT, MON
0/2/SP        MSC(SP)       N/A           IOS-XR RUN     PWR, NSHUT, MON
0/2/CPU0      MSC           16OC48-POS/DPT IOS-XR RUN     PWR, NSHUT, MON
0/RP0/CPU0    RP(Standby)   N/A           IOS-XR RUN     PWR, NSHUT, MON
0/RP1/CPU0    RP(Active)    N/A           IOS-XR RUN     PWR, NSHUT, MON
0/SM0/SP      FC/S(SP)      N/A           IOS-XR RUN     PWR, NSHUT, MON
```



Note

Line cards in Cisco CRS-1s are called modular services cards (MSCs). The **show platform** command output is different for Cisco CRS-1s and Cisco XR 12000 Series Routers.

In the following example, information is shown for a single node in a Cisco CRS-1:

```
RP/0/RP0/CPU0:router# show platform 0/2/cpu0
```

Node	Type	PLIM	State	Config State
0/2/CPU0	MSC	160C48-POS/DPT	IOS-XR RUN	PWR, NSHUT, MON

For more information on nodeID, see the [“Displaying Node IDs and Status”](#) section on page 6-3.

For more information on the **show platform** command, see the *Cisco IOS XR Interface and Hardware Component Command Reference*.

show redundancy Command

To display information about the primary (active) and standby (inactive) RPs, enter the **show redundancy** command as follows:

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

```
This node (0/RP0/CPU0) is in ACTIVE role
Partner node (0/RP1/CPU0) is in STANDBY role
Standby node in 0/RP1/CPU0 is ready
```

