Power Up and Initial Configuration

This chapter guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

Checking Conditions Prior to System Startup

Ensure that all the card slots and compartments are closed. Install blank faceplates on empty slots. Always have power supply slots filled. If you leave a power supply slot uncovered, then you risk exposure to hazardous voltages on the power pins on the midplane.

Warning Blank faceplates and cover panels serve three important functions: they reduce the risk of electric shock and fire; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Note To view the boot sequence, you must have a console connection to the before it powers up.

Ensure that the following conditions are addressed before starting up the router:

- The network interface cable or the optional Management port cable is connected.

- The chassis is securely mounted and grounded.

- The power and interface cables are connected.

- Your PC with terminal emulation program (hyperTerminal or equivalent) is connected to the console port, powered up, and is configured for 9600 baud, 8 data bits, 1 stop bit, no parity, with flow control set to none.

- You have selected passwords for access control.

- Captive installation screws are tight on all removable components.

- The console terminal is turned on.

- You have determined the IP addresses for the network interfaces.

- The EPA and the NIM are inserted in their slots, if applicable.

- Empty card slots are filled with card blanks. This ensures proper air flow through the chassis and electromagnetic compatibility (EMC).

Powering Up the Router

You are now ready to power on the system for the first time. Follow these steps.

Before you begin

Before you power on, make sure that:

- The power supply cord is plugged into the power supply inlet.

- All cables are connected.

- Your computer is powered up and connected.

Procedure

Step 1 Move the chassis power switch to the ON position. Listen for the fans; you should immediately hear them operating. Ensure that the power supply LED OK is green and the FAIL LED is not illuminated.

The front-panel indicator LEDs provide power, activity, and status information useful during bootup. For more detailed information about the LEDs, see the "LEDs" section.

Step 2 Observe the initialization process. When the system boot is complete (the process takes a few seconds), the router begins to initialize.

Loading from ROMMON with a System Image in Bootflash

The following is an example of what is displayed during the system boot process:

```
Initializing Hardware ...

System integrity status: 00000610


System Bootstrap, Version 15.4(2r)S, RELEASE SOFTWARE (fc1)
```

```
Copyright (c) 1994-2014  by cisco Systems, Inc.

Current image running: Boot ROM0
Last reset cause: PowerOn

ASR1002-HX platform with 16777216 Kbytes of main memory

File size is 0x2b08ddf7
Located asr1000-universalk9.BLD_V163_THROTTLE_LATEST_20160728_000855.SSA.bin
Image size 722001399 inode num 277985, bks cnt 176270 blk size 8*512
################################################################################
################################################################################
############################
Validating dev_mode signature
done

Boot image size = 722001399 (0x2b08ddf7) bytes

ROM:RSA Self Test Passed
ROM:Sha512 Self Test Passed
Self Tests Latency: 58 mSec

Package header rev 1 structure detected
Calculating SHA-1 hash...done
validate_package_cs: SHA-1 hash:
        calculated ef1e9e3f:519cec63:1f14c20f:c3b39303:dbb4c3c5
        expected   ef1e9e3f:519cec63:1f14c20f:c3b39303:dbb4c3c5

RSA Signed DEVELOPMENT Image Signature Verification Successful.
Validating subpackage signatures
Image validated
Validating dev_mode signature
done


            Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

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



Cisco IOS Software, ASR1000 Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
Version Denali 16.2.20160120:005403 [v162_1_throttle-BLD-BLD_V162_1_THROTTLE_LATEST_
20160119_234422 127]
Copyright (c) 1986-2016 by Cisco Systems, Inc.
Compiled Tue 19-Jan-16 20:53 by mcpre


Cisco IOS-XE software, Copyright (c) 2005-2016 by cisco Systems, Inc.
All rights reserved.  Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0.  The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY.  You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
```

or the applicable URL provided on the flyer accompanying the IOS-XE
software.

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco ASR1002-HX (2KH) processor (revision 2KH) with 3724092K/6147K bytes of memory.
Processor board ID FXS1922Q0LL
Crypto Hardware Module present
26 Gigabit Ethernet interfaces
8 Ten Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
16777216K bytes of physical memory.
30056447K bytes of eUSB flash at bootflash:.
0K bytes of at webui:.

Press RETURN to get started!

*Jan 21 17:57:38.704: %SMART_LIC-6-AGENT_READY: Smart Agent for Licensing is initialized
*Jan 21 17:57:39.462: %LICENSE-6-EULA_ACCEPT_ALL: The Right to Use End User License Agreement
 is accepted
*Jan 21 17:57:39.482: %IOS_LICENSE_IMAGE_APPLICATION-6-LICENSE_LEVEL: Module name = asr1002hx

  Next reboot level = adventerprise and License = adventerprise
*Jan 21 17:57:54.438: %SPANTREE-5-EXTENDED_SYSID: Extended SysId enabled for type vlan
*Jan 21 17:57:54.493: ***** plat:0 0 flag:1 ****
*Jan 21 17:57:58.264: %VOICE_HA-7-STATUS: CUBE HA-supported platform detected.
*Jan 21 17:58:04.623: %LINK-3-UPDOWN: Interface Lsmpi0, changed state to up
*Jan 21 17:58:04.624: %LINK-3-UPDOWN: Interface EOBC0, changed state to up
*Jan 21 17:58:04.624: %LINEPROTO-5-UPDOWN: Line protocol on Interface VoIP-Null0, changed
state to up
*Jan 21 17:58:04.624: %LINEPROTO-5-UPDOWN: Line protocol on Interface LI-Null0, changed
state to up
*Jan 21 17:58:04.624: %LINK-3-UPDOWN: Interface GigabitEthernet0, changed state to down

.
.
.

Performing the Initial Configuration on the Router

Using the Cisco setup Command Facility

The **setup** command facility prompts you to enter the information that is needed to configure a router quickly. The facility takes you through an initial configuration, including LAN and WAN interfaces.

Note   The setup command facility is entered automatically if there is no configuration on the router when it is booted into Cisco IOS-XE.

For information on modifying the configuration after you create it, see the *Cisco IOS XE Configuration Guide* and the *Cisco IOS XE Command References*.

This section explains how to configure a host name for the router, set passwords, and configure an interface to communicate with the management network.

Note   If you make a mistake while using the setup command facility, you can exit and run the setup command facility again. Press Ctrl-C, and enter the setup command in privileged EXEC mode (Router#).

Procedure

Step 1   From the Cisco IOS-XE CLI, enter the setup command in privileged EXEC mode:

```
Router> enable
Password: <password>
Router# setup

        --- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]:
```

The prompts in the **setup** command facility vary depending on your router model, on the installed interface modules, and on the software image. The following steps and the user entries (in bold) are shown as examples only.

Step 2   To proceed using the setup command facility, enter **yes**.

```
Continue with configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.

Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

Step 3   Basic management setup configures only enough connectivity.

```
Would you like to enter basic management setup? [yes/no]: yes
```

Step 4 Enter a hostname for the router (this example uses myrouter):

```
Configuring global parameters:
Enter host name [Router]: myrouter
```

Step 5 Enter an enable secret password. This password is encrypted (for more security) and cannot be seen when viewing the configuration.

```
The enable secret is a password used to protect access to
privileged EXEC and configuration modes. This password, after
entered, becomes encrypted in the configuration.
Enter enable secret: cisco
```

Step 6 Enter an enable password that is different from the enable secret password. This password is not encrypted (and is less secure) and can be seen when viewing the configuration.

```
The enable password is used when you do not specify an
enable secret password, with some older software versions, and
some boot images.
Enter enable password: cisco123
```

Step 7 Enter the virtual terminal password, which prevents unauthenticated access to the router through ports other than the console port:

```
The virtual terminal password is used to protect
access to the router over a network interface.
Enter virtual terminal password: cisco
```

Step 8 Respond to the following prompts as appropriate for your network:

```
Configure SNMP Network Management? [no]: yes
    Community string [public]:
```

A summary of the available interfaces is displayed. The interface summary includes interface numbering, which is dependent on the router model and the installed modules and interface cards.

```
Current interface summary

Interface            IP-Address      OK? Method Status                Protocol

GigabitEthernet0/0/0  unassigned      YES unset  down                  down
GigabitEthernet0/0/1  unassigned      YES unset  up                    up
GigabitEthernet0/0/2  unassigned      YES unset  down                  down
GigabitEthernet0/0/3  unassigned      YES unset  up                    up
GigabitEthernet0/0/4  unassigned      YES unset  up                    up
GigabitEthernet0/0/5  unassigned      YES unset  down                  down
GigabitEthernet0/0/6  unassigned      YES unset  up                    up
GigabitEthernet0/0/7  unassigned      YES unset  up                    up
Te0/1/0               unassigned      YES unset  down                  down
Te0/1/1               unassigned      YES unset  down                  down
Te0/1/2               unassigned      YES unset  down                  down
Te0/1/3               unassigned      YES unset  down                  down
Te0/1/4               unassigned      YES unset  up                    up
Te0/1/5               unassigned      YES unset  down                  down
Te0/1/6               unassigned      YES unset  up                    up
Te0/1/7               unassigned      YES unset  down                  down
GigabitEthernet0      unassigned      YES unset  up                    up

Any interface listed with OK? value "NO" does not have a valid configuration
```

Step 9   Respond to the following prompts as appropriate for your network:

```
Configuring interface GigabitEthernet0/0/1:
  Configure IP on this interface? [yes]: yes
    IP address for this interface [10.10.10.12]:
    Subnet mask for this interface [255.0.0.0] : 255.255.255.0
    Class A network is 10.0.0.0, 24 subnet bits; mask is /24
```

The following configuration command script is created:

```
hostname myrouter
enable secret 5 $1$t/Dj$yAeGKviLLZNOBX0b9eifO0
enable password cisco123
line vty 0 4
password cisco
snmp-server community public
!
no ip routing

!
interface GigabitEthernet0/0/0
shutdown
no ip address
!
interface GigabitEthernet0/0/1
no shutdown
ip address 10.10.10.12 255.255.255.0
!
interface GigabitEthernet0/0/2
shutdown
no ip address
!
.
.
.
end
```

Step 10   Respond to the following prompts. Select [**2**] to save the initial configuration.

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]: 2
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.

Press RETURN to get started! RETURN
```

The following user prompt is displayed:

```
myrouter>
```

Completing the Configuration

When using the Cisco setup command facility, and after you have provided all the information requested by the facility as described in "Using the Cisco setup Command Facility" section, the final configuration appears. To complete your router configuration, follow these steps:

Procedure

Step 1   The facility prompts you to save the configuration.

- If you answer no, the configuration information you entered is *not* saved, and you return to the router enable prompt (Router#). Enter **setup** to return to the System Configuration dialog box.
- If you answer yes, the configuration is saved, and you are returned to the user EXEC prompt (Router>).

```
Use this configuration? {yes/no} : yes
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.


%LINK-3-UPDOWN: Interface GigabitEthernet0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1/0, changed state to up

<Additional messages omitted.>
```

Step 2   When messages stop appearing on your screen, press **Return** to get the Router> prompt.

Step 3   The Router> prompt indicates that you are now at the command-line interface (CLI) and you have just completed an initial router configuration. Note that this is not a complete configuration. At this point, you have two choices:

- Run the setup command facility again, and create another configuration:

```
Router> enable
Password: password
Router# setup
```

- Modify the existing configuration or configure additional features by using the CLI:

```
Router> enable
Password: password
Router# configure terminal
Router(config)#
```

Using the Cisco IOS-XE CLI—Manual Configuration

This section shows you how to access the CLI to perform the initial configuration on the router.

If the system configuration message does not appear, it means a default configuration file was installed on the router prior to shipping. Follow these steps to configure the router.

Procedure

Step 1   Enter **no** when the following system message appears on the router:

```
--- System Configuration Dialog ---
```

```
Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2   Press **Return** and continue with the manual configuration:

Several log messages are displayed.

Step 3   Press **Return** to bring up the `Router>` prompt.

Step 4   Type **enable** to enter privileged EXEC mode:

```
Router> enable
Router#
```

Configuring the Router Hostname

The hostname is used in CLI prompts and default configuration filenames. If you do not configure the router hostname, the router uses the factory-assigned default hostname **Router**.

Procedure

	Command or Action	**Purpose**
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. **Note** Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**hostname** *name* **Example:** `Router(config)# hostname myrouter`	Specifies or modifies the hostname for the network server.
Step 4	**end** **Example:** `myrouter# end`	(Optional) Returns to privileged EXEC mode.

Configuring the Enable and Enable Secret Passwords

To provide an additional layer of security, particularly for passwords that cross the network or are stored on a TFTP server, you can use either the **enable password** command or **enable secret** command. Both commands accomplish the same thing—they allow you to establish an encrypted password that users must enter to access privileged EXEC (enable) mode.

We recommend that you use the **enable secret** command because it uses an improved encryption algorithm.

> **Note** If you configure the **enable secret** command, it takes precedence over the **enable password** command; the two commands cannot be in effect simultaneously.

For more information, see the "Configuring Passwords and Privileges" chapter in the *Cisco IOS Security Configuration Guide*. Also see the *Cisco IOS Password Encryption Facts* tech note and the *Cisco Guide to Harden Cisco IOS Devices* tech note.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> `**`enable`**	Enables privileged EXEC mode. **Note** Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# `**`configure terminal`**	Enters global configuration mode.
Step 3	**enable secret** *password* **Example:** `Router(config)# `**`enable secret greentree`**	Specifies an additional layer of security over the **enable password** command.
Step 4	**end** **Example:** `Router(config)# `**`end`**	Returns to privileged EXEC mode.
Step 5	**enable** **Example:** `Router> `**`enable`**	Enables privileged EXEC mode. Verify that your new enable or enable secret password works.
Step 6	**end** **Example:** `Router(config)# `**`end`**	(Optional) Returns to privileged EXEC mode.

Configuring the Console Idle Privileged EXEC Timeout

By default, the privileged EXEC command interpreter waits 10 minutes to detect user input before timing out.

When you configure the console line, you can also set communication parameters, specify autobaud connections, and configure terminal operating parameters for the terminal that you are using. For more information on configuring the console line, see the Cisco IOS Configuration Fundamentals and Network Management Configuration Guide. In particular, see the "Configuring Operating Characteristics for Terminals" and "Troubleshooting and Fault Management" chapters.

Procedure

	Command or Action	**Purpose**
Step 1	**enable** **Example:** Router> **enable**	Enables privileged EXEC mode. **Note** Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# **configure terminal**	Enters global configuration mode.
Step 3	**line console 0** **Example:** Router(config)# **line console 0**	Configures the console line and starts the line configuration command collection mode.
Step 4	**exec-timeout** *minutes* [*seconds*] **Example:** Router(config-line)# **exec-timeout 0 0**	Sets the idle privileged EXEC timeout, which is the interval that the privileged EXEC command interpreter waits until user input is detected. The example shows how to specify no timeout. Setting the exec-timeout value to 0 will cause the router to never log out once logged in. This could have security implications if you leave the console without manually logging out using the disable command.
Step 5	**end** **Example:** Router(config)# **end**	Returns to privileged EXEC mode.
Step 6	**show running-config** **Example:** Router# **show running-config**	Displays the running configuration file. Verify that you have configured the idle privileged EXEC timeout correctly.

Example

The following example shows how to set the console idle privileged EXEC timeout to 2 minutes 30 seconds:

```
line console
 exec-timeout 2 30
```

The following example shows how to set the console idle privileged EXEC timeout to 30 seconds:

```
line console
 exec-timeout 0 30
```

Gigabit Ethernet Management Interface Overview

The router provides an Ethernet management port named GigabitEthernet0.

The purpose of this interface is to allow users to perform management tasks on the router; it is an interface that should not, and often cannot, forward network traffic, but can be used to access the router via Telnet and SSH to perform management tasks on the router. The interface is most useful before a router has begun routing, or in troubleshooting scenarios when other forwarding interfaces are inactive.

The following aspects of the management Ethernet interface should be noted:

- The router has one management Ethernet interface named GigabitEthernet0.

- IPv4, IPv6, and ARP are the only routed protocols supported for the interface.

- The interface provides a way to access the router even if forwarding interfaces are not functional, or the Cisco IOS is down.

- The management Ethernet interface is part of its own VRF. See the *Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide* for more details.

Default Gigabit Ethernet Configuration

By default, a forwarding VRF is configured for the interface with a special group named Mgmt-intf. This cannot be changed. This isolates the traffic on the management interface away from the forwarding plane. Otherwise, the interface can be configured like other Gigabit Ethernet interfaces for most functions.

For example, the default configuration is as follows:

```
interface GigabitEthernet0
vrf forwarding Mgmt-intf
ip address 172.18.77.212 255.255.255.240
negotiation auto
```

Configuring Gigabit Ethernet Interfaces

This sections shows how to assign an IP address and interface description to an Ethernet interface on your router.

For comprehensive configuration information on Gigabit Ethernet interfaces, see the "Configuring LAN Interfaces" chapter of the Cisco IOS Interface and Hardware Component Configuration Guide.

For information on interface numbering, see the software configuration guide pertaining to your router.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> **enable**	Enables privileged EXEC mode. **Note** Enter your password if prompted.
Step 2	**show ip interface brief** **Example:**	Displays a brief status of the interfaces that are configured for IP.

	Command or Action	Purpose
	Router# **show ip interface brief**	Learn which type of Ethernet interface is on your router.
Step 3	**configure terminal** **Example:** Router# **configure terminal**	Enters global configuration mode.
Step 4	**interface gigabitethernet 0** **Example:** Router(config)# **interface gigabitethernet 0**	Specifies the Ethernet interface and enters interface configuration mode.
Step 5	**ip address** *ip-address mask* **Example:** Router(config-if)# **ip address 172.16.74.3 255.255.255.0**	Sets a primary IP address for an interface.
Step 6	**no shutdown** **Example:** Router(config-if)# **no shutdown**	Enables an interface.
Step 7	**end** **Example:** Router(config)# **end**	Returns to privileged EXEC mode.
Step 8	**show ip interface brief** **Example:** Router# **show ip interface brief**	Displays a brief status of the interfaces that are configured for IP. Verify that the interfaces are up and configured correctly.

Note For comprehensive configuration information about IP routing and IP routing protocols, see the Configuring IP Routing Protocol-Independent Feature on Cisco.com.

Saving Your Router Configuration

This section describes how to avoid losing your configuration at the next system reload or power cycle by saving the running configuration to the startup configuration in NVRAM. The NVRAM provides 32 MB of storage on the router.

Note To aid file recovery and minimize downtime in case of file corruption, we recommend that you save backup copies of the startup configuration file and the Cisco IOS-XE software system image file on a server.

Note To avoid losing work you have completed, be sure to save your configuration occasionally as you proceed. Use the **copy running-config startup-config** command to save the configuration to NVRAM.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> `enable`	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**copy running-config startup-config** **Example:** Router# `copy running-config` `startup-config`	Saves the running configuration to the startup configuration.

Verifying the Initial Configuration

Enter the following commands in Cisco IOS-XE to verify the initial configuration on the router:

- **show version**—Displays the system hardware version, the installed software version, the names and sources of configuration files, the boot images, and the amount of installed DRAM, NVRAM, and flash memory.

- **show diag**—Lists and displays diagnostic information about the installed controllers, interface processors, and port adapters.

- **show interfaces**— Shows if interfaces are operating correctly and if interfaces and line protocols are in the correct state, either up or down

- **show ip interface brief**—Displays a summary of the interfaces configured for IP protocol.

- **show configuration**—Helps verify if you have configured the correct hostname and password.

After you have completed and verified the initial configuration, the specific features and functions are ready to be configured. See the Cisco ASR 1000 Series Aggregation Services Routers Software Configuration Guide.

Powering Off the Router Safely

Before you begin

We recommend that before turning off all power to the chassis, you issue the reload command. This ensures that the operating system cleans up all the file systems.

Procedure

Step 1   Slip on the ESD-preventive wrist strap included in the accessory kit.

Step 2   Enter the **reload** command.

Step 3   Confirm the reload command:

```
Router# reload

Proceed with reload? [confirm]
Apr 21 03:42:45.619 EDT: %SYS-5-RELOAD: Reload requested by console. Reload Reason:
Reload Command.Apr 21 03:42:59.920 R0/0: %PMAN-5-EXITACTION: Process manager is
exiting: process exit with reload chassis code
```

Step 4   After confirming the reload command, wait until the system bootstrap message is displayed before powering
off the system:

```
System Bootstrap, Version 15.4(2r)S, RELEASE SOFTWARE (fc1)
Copyright (c) 1994-2014  by cisco Systems, Inc.

Current image running: Boot ROM0
Last reset cause: LocalSoft

ASR1002-HX platform with 16777216 Kbytes of main memory

rommon 1 >
```

Step 5   Move the chassis power switch to the Standby position.

Note   The fans in the power supply modules will continue to run even if the chassis power switch is in
the Standby position.

Note   After powering off the router, wait for a minimum of 30 seconds before powering it on again.

Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions allow you to maintain normal system operation by identifying
and resolving adverse conditions prior to loss of operation.

⚠

Caution   To prevent overheating of the chassis, ensure that your system is drawing cool inlet air. Over temperature
conditions may occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance
around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust
air exits the chassis and is not drawn into the inlet vent of another device.

Alarm Monitoring

The displays the CRIT, MAJ, and MIN alarm indicator LEDs. The three system alarm LEDs on the Cisco ASR 1002-HX Router provide visual alarm notification in the router. These LEDs indicate router status at all times, but you must directly observe these LEDs to become aware of a router alarm condition. Additionally, you can use the **show facility-alarm status** command to view the alarms.

```
Router# show facility-alarm status

System Totals  Critical: 2  Major: 0  Minor: 0

Source                 Time                     Severity   Description [Index]
------                 ------                   --------   ------------------
Power Supply Module 0  Jan 21 2016 18:06:16     CRITICAL   Power Supply Failure [0]
Power Supply Bay 1     Jan 21 2016 18:06:15     CRITICAL   Power Supply/FAN Module Missing
 [0]
GigabitEthernet0/0/0   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
GigabitEthernet0/0/1   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
xcvr container 0/0/2   Jan 21 2016 18:08:21     INFO       Transceiver Missing [0]
GigabitEthernet0/0/3   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
GigabitEthernet0/0/4   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
GigabitEthernet0/0/5   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
GigabitEthernet0/0/6   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
GigabitEthernet0/0/7   Jan 21 2016 18:08:21     INFO       Physical Port Administrative
State Down [2]
TenGigabitEthernet0/1/0 Jan 21 2016 18:08:21    INFO       Physical Port Administrative
State Down [36]
xcvr container 0/1/1   Jan 21 2016 18:08:21     INFO       Transceiver Missing [0]
TenGigabitEthernet0/1/2 Jan 21 2016 18:08:21    INFO       Physical Port Administrative
State Down [36]
xcvr container 0/1/3   Jan 21 2016 18:08:21     INFO       Transceiver Missing [0]
.
.
.
```

✎ **Note** There is no external alarm monitoring facility on the Cisco ASR 1002-HX Router.

To clear a visual alarm, you must resolve the alarm condition. The **clear facility-alarm** command does not clear an alarm LED on the . For example, if a critical alarm LED is illuminated because an active EPA was removed without a graceful deactivation of the EPA, the only way to resolve that alarm is to replace the EPA.

Environmental Monitoring

The environmental monitoring functions use sensors to monitor the temperature of the cooling air as it moves through the chassis.

The local power supplies provide the ability to monitor:

- Input and output voltage

- Output current

- Outlet temperature

The is expected to meet the following environmental operating conditions:

- Operating Temperature Nominal: 32° to 104° (0° to 40°C)

- Operating Temperature Short Term: 32° to 131° (0° to +55°C)

- Operating Humidity Nominal (relative humidity): 10 to 90% relative

- Operating Humidity Short Term: 5 to 90% relative

- Operating Altitude: –500 to 10,000 feet (–152.4 to 3048 meters)

- DC Input Range: –40 to –72 VDC

- AC Input Range: 85 to 264 VAC

In addition, the power supplies monitor internal power supply temperatures and voltages. A power supply is either within tolerance (normal) or out of tolerance (critical). If an internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

The environmental monitoring functions use the following levels of status conditions to monitor the system:

- Normal—All monitored parameters are within normal tolerances.

- Warning—The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.

- Critical—An out-of-tolerance temperature or voltage condition exists. The system continues to operate, but the system is approaching shutdown. Immediate operator action is required.

- Shutdown—Before any shutdown, the system logs the status of monitored parameters in NVRAM so that you can retrieve it later to help determine the cause of the problem.

- Power supply shutdown—The power supply detected an internal out-of-tolerance overvoltage, overcurrent, or temperature condition and shut itself down. All DC power remains disabled until you toggle the chassis power switch.

Fan Failures

Four internal fans draw cooling air in through the front of the chassis and across internal components to maintain an acceptable operating temperature. The fans are located at the rear of the chassis. When the system power is on, all fans should be operational. However, the system continues to operate even if a fan fails.

Use the **show platform hardware slot** *slot* **fan status** command to view the status of the fans, for example:

```
Router# show platform hardware slot P2 fan status
Fan group 1 speed: 60%
Fan 0: Normal
Fan 1: Normal
Fan 2: Normal
Fan 3: Fail
```

Reporting Functions

The chassis manager on the forwarding engine control processor manages the local resources of the forwarding processor. The displays warning messages on the console if the chassis interface-monitored parameters exceed a threshold. You can also retrieve and display environmental status reports with the following commands:

- **show environment all**

- **show version**

- **show inventory**

- **show platform**

- **show platform software status control-processor**

- **show diag**

Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.

show environment all Command

The **show environment all** command displays temperature, voltage, fan, and power supply information.

The following is sample output from the **show environment all** command.

```
Router# show environment all

Sensor List:  Environmental Monitoring
 Sensor          Location        State           Reading
 Vin             P0              Normal          0 V AC
 Iin             P0              Normal          0 A
 Vout            P0              Normal          0 V DC
 Iout            P0              Normal          1 A
 Temp1           P0              Normal          18 Celsius
 Temp2           P0              Normal          21 Celsius
 Temp3           P0              Normal          24 Celsius
 VPPB1: VX1      R0              Normal          1003 mV
 VPPB1: VX2      R0              Normal          6937 mV
 VPPB1: VX3      R0              Normal          758 mV
 VPPB1: VX4      R0              Normal          1049 mV
 VPPB1: VP1      R0              Normal          1784 mV
 VPPB1: VP2      R0              Normal          1517 mV
 VPPB1: VP3      R0              Normal          1510 mV
 VPPB1: VP4      R0              Normal          5057 mV
 VPPB1: VH       R0              Normal          11982 mV
 VPPB2: VX2      R0              Normal          818 mV
 VPPB2: VX3      R0              Normal          856 mV
 VPPB2: VP2      R0              Normal          3312 mV
 VPPB2: VH       R0              Normal          11977 mV
 VPPB3: VX1      R0              Normal          969 mV
 VPPB3: VX2      R0              Normal          1004 mV
 VPPB3: VP1      R0              Normal          2500 mV
 VPPB3: VP2      R0              Normal          1207 mV
 VPPB3: VP3      R0              Normal          1518 mV
 VPPB3: VP4      R0              Normal          1518 mV
 VPPB3: VH       R0              Normal          11987 mV
 Temp: PPB IN    R0              Normal          21 Celsius
 Temp: PPB OUT   R0              Normal          37 Celsius
```

```
Temp: Yoda 0    R0                 Normal            48 Celsius
Temp: Yoda 1    R0                 Normal            49 Celsius
Temp: CPU Die   R0                 Normal            27 Celsius
Temp: FC FANS   R0                 Fan Speed 60%     21 Celsius
VLIB1: VX1      R0                 Normal            1001 mV
VLIB1: VX2      R0                 Normal            7070 mV
VLIB1: VX3      R0                 Normal            949 mV
VLIB1: VP1      R0                 Normal            1796 mV
VLIB1: VP2      R0                 Normal            2508 mV
VLIB1: VP3      R0                 Normal            3309 mV
VLIB1: VH       R0                 Normal            5033 mV
VLIB2: VX2      R0                 Normal            752 mV
VLIB2: VX3      R0                 Normal            751 mV
VLIB2: VP1      R0                 Normal            1010 mV
VLIB2: VP2      R0                 Normal            986 mV
VLIB2: VP3      R0                 Normal            1195 mV
VLIB2: VP4      R0                 Normal            1517 mV
VLIB2: VH       R0                 Normal            11977 mV
Temp: LIB IN    R0                 Normal            22 Celsius
Temp: LIB OUT   R0                 Normal            32 Celsius
```

show version Command

The **show version** command displays the system hardware configuration, software version, and names and sources of configuration files and boot images.

The following is sample output from the **show version** command:

```
Router# show version

Cisco IOS XE Software, Version BLD_V162_1_THROTTLE_LATEST_20160119_234422_V16_2_0_259
Cisco IOS Software, ASR1000 Software (X86_64_LINUX_IOSD-UNIVERSALK9-M), Experimental
Version Denali 16.2.20160120:005403 [v162_1_throttle-BLD-BLD_V162_1_THROTTLE_LATEST_
20160119_234422 127]
Copyright (c) 1986-2016 by Cisco Systems, Inc.
Compiled Tue 19-Jan-16 20:53 by mcpre


Cisco IOS-XE software, Copyright (c) 2005-2016 by cisco Systems, Inc.
All rights reserved.  Certain components of Cisco IOS-XE software are
licensed under the GNU General Public License ("GPL") Version 2.0.  The
software code licensed under GPL Version 2.0 is free software that comes
with ABSOLUTELY NO WARRANTY.  You can redistribute and/or modify such
GPL code under the terms of GPL Version 2.0.  For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.


ROM: IOS-XE ROMMON

ASR1002-HX uptime is 6 minutes
Uptime for this control processor is 7 minutes
System returned to ROM by reload
System image file is "bootflash:asr1002hx-universalk9.BLD_V162_1_THROTTLE_LATEST_
20160119_234422_V16_2_0_259.SS"
Last reload reason: Reload Command
```

```
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

License Type: EvalRightToUse
License Level: adventerprise
Next reload license Level: adventerprise

cisco ASR1002-HX (2KH) processor (revision 2KH) with 3724092K/6147K bytes of memory.
Processor board ID FXS1922Q0LL
Crypto Hardware Module present
26 Gigabit Ethernet interfaces
8 Ten Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
16777216K bytes of physical memory.
30056447K bytes of eUSB flash at bootflash:.
0K bytes of  at webui:.

Configuration register is 0x2142


Router#
```

show inventory Command

The **show inventory** command displays an extended report that includes the product inventory listing of all the Cisco products installed in the networking device.

The following is sample output from the **show inventory** command:

```
Router# show inventory
NAME: "Chassis", DESCR: "Cisco ASR1002-HX Chassis"
PID: ASR1002-HX        , VID: V00  , SN: FXS1922Q0LL

NAME: "Power Supply Module 0", DESCR: "Cisco ASR1002-HX AC Power Supply"
PID: ASR1000X-AC-750W  , VID: V01  , SN: ART183011C

NAME: "Fan Tray", DESCR: "Cisco ASR1002-HX Fan Tray"
PID: ASR1002-HX-FANTRAY, VID:      , SN:

NAME: "module 0", DESCR: "Cisco ASR1002-HX Modular Interface Processor"
PID: ASR1002-HX        , VID:      , SN:

NAME: "SPA subslot 0/2", DESCR: "18-port Gigabit Ethernet Port Adapter"
PID: EPA-18X1GE        , VID: V00  , SN: JAE192700QL

NAME: "subslot 0/2 transceiver 17", DESCR: "GE SX"
PID: SFP-GE-S             , VID: 06   , SN: AGM1418P1TB

NAME: "SPA subslot 0/0", DESCR: "8-port Built-in Gigabit Ethernet Port Adapter"
```

```
PID: BUILT-IN-EPA-8x1G , VID: N/A   , SN: JAE12345678

NAME: "subslot 0/0 transceiver 0", DESCR: "GE SX"
PID: SFP-GE-S            , VID: 06   , SN: AGM1633P0R8

NAME: "subslot 0/0 transceiver 1", DESCR: "100BASE FX-GE"
PID: GLC-GE-100FX        , VID: A1A  , SN: OPT17501515

NAME: "subslot 0/0 transceiver 3", DESCR: "GE SX"
PID: SFP-GE-S            , VID: B    , SN: FNS16270V0S

NAME: "subslot 0/0 transceiver 4", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: 001  , SN: AGJ1825R4H0

NAME: "subslot 0/0 transceiver 5", DESCR: "GE SX"
PID: SFP-GE-S            , VID: B    , SN: FNS16270V1T

NAME: "subslot 0/0 transceiver 6", DESCR: "GE SX"
PID: FTRJ8519P1BNL-C5    , VID:      , SN: FNS0928K33L

NAME: "subslot 0/0 transceiver 7", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A    , SN: FNS170907MM

NAME: "SPA subslot 0/1", DESCR: "8-port Built-in 10-Gigabit Ethernet Port Adapter"
PID: BUILT-IN-EPA-8x10G, VID: N/A   , SN: JAE87654321

NAME: "subslot 0/1 transceiver 0", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: A    , SN: FNS17241B6A

NAME: "subslot 0/1 transceiver 2", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: A    , SN: SPC144701S6

NAME: "subslot 0/1 transceiver 4", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: G4.1 , SN: AVD1828A6PH

NAME: "subslot 0/1 transceiver 6", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: A    , SN: FNS16190YXT

NAME: "module R0", DESCR: "Cisco ASR1002-HX Route Processor"
PID: ASR1002-HX          , VID: V00  , SN: JAE1931098U

NAME: "module F0", DESCR: "Cisco ASR1002-HX Embedded Services Processor"
PID: ASR1002-HX          , VID:      , SN:

Router#
```

show platform Command

The **show platform** command displays platform information.

The following is sample output from the **show platform** command:

```
Router# show platform

Chassis type: ASR1001-HX

Slot       Type                State                 Insert time (ago)
---------  ------------------  --------------------  -----------------
0          ASR1001-HX          ok                    00:03:19
 0/0       BUILT-IN-EPA-8x1G   ok                    00:02:08
 0/1       BUILT-IN-8X10G/1G   ok                    00:02:10
R0         ASR1001-HX          ok                    00:03:19
```

```
 R0/0                            ok, active             00:03:19
 R0/1                            ok, standby            00:01:42
F0        ASR1001-HX            ok, active             00:03:19
P0        ASR1KX-AC-750W-R      ok                     00:03:00
P1        ASR1KX-AC-750W-R      ok                     00:03:00
P2        ASR1001HX-FAN        ok                     00:03:00

Slot      CPLD Version          Firmware Version
--------- ------------------- ---------------------------------------
0         15081816             16.2(2r)
R0        15081816             16.2(2r)
F0        15081816             16.2(2r)

Router#
```

show platform software status control-processor Command

The **show platform software status control-processor** command displays the average load, memory usage, and CPU utilization levels at which the router is running. The output also specifies whether the levels of these system health parameters are within defined thresholds.

The following is sample output from the **show platform software status control-processor** command:

```
Router# show platform software status control-processor

RP0: online, statistics updated 4 seconds ago
Load Average: healthy
1-Min: 1.67, status: healthy, under 8.00
5-Min: 0.95, status: healthy, under 8.00
15-Min: 0.50, status: healthy, under 10.00
Memory (kb): healthy
Total: 8058196
Used: 3077968 (38%), status: healthy
Free: 4980228 (62%)
Committed: 3993016 (50%), under 95%
Per-core Statistics
CPU0: CPU Utilization (percentage of time spent)
User: 0.89, System: 3.29, Nice: 0.00, Idle: 95.70
IRQ: 0.00, SIRQ: 0.09, IOwait: 0.00
CPU1: CPU Utilization (percentage of time spent)
User: 0.20, System: 2.10, Nice: 0.00, Idle: 97.69
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU2: CPU Utilization (percentage of time spent)
User: 1.10, System: 1.60, Nice: 0.00, Idle: 97.30
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU3: CPU Utilization (percentage of time spent)
User: 0.19, System: 0.19, Nice: 0.00, Idle: 99.60
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU4: CPU Utilization (percentage of time spent)
User: 0.60, System: 0.40, Nice: 0.00, Idle: 98.99
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU5: CPU Utilization (percentage of time spent)
User: 0.30, System: 0.30, Nice: 0.00, Idle: 99.40
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU6: CPU Utilization (percentage of time spent)
User: 0.70, System: 7.70, Nice: 0.00, Idle: 91.59
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
CPU7: CPU Utilization (percentage of time spent)
User: 0.30, System: 0.40, Nice: 0.00, Idle: 99.30
IRQ: 0.00, SIRQ: 0.00, IOwait: 0.00
```

show diag chassis eeprom detail Command

The **show diag chassis eeprom detail** command displays the configuration hardware information, including power or fan module P0 and P1 EPPROM data.

The following is sample output from the **show diag chassis eeprom detail** command:

```
Router#: show diag chassis eeprom detail
MIDPLANE EEPROM data:

        EEPROM version          : 4
        Compatible Type         : 0xFF
        Controller Type         : 3236
        Hardware Revision       : 0.3
        PCB Part Number         : 73-16562-03
        Board Revision          : 01
        Deviation Number        : 0-0
        Fab Version             : 03
        PCB Serial Number       : JAE1931098L
        RMA Test History        : 00
        RMA Number              : 0-0-0-0
        RMA History             : 00
        Top Assy. Part Number   : 68-5448-02
        CLEI Code               : SAMPL00XYZ
        Product Identifier (PID) : ASR1002-HX
        Version Identifier (VID) : V00
        Manufacturing Test Data : 00 00 00 00 00 00 00 00
        Field Diagnostics Data  : 00 00 00 00 00 00 00 00
        Chassis MAC Address     : 74a2.e624.fb00
        MAC Address block size  : 256
        Chassis Serial Number   : FXS1922Q0MJ
        Environment Monitor Data : 00 06 00 FA
        Asset ID                :
Power/Fan Module P0 EEPROM data:

        EEPROM version          : 4
        Compatible Type         : 0xFF
        Hardware Revision       : 0.1
        Version Identifier (VID) : V01
        Product Identifier (PID) : ASR1000X-AC-750W
        PCB Serial Number       : ART183011B
        Top Assy. Part Number   : 341-00714-01
        Board Revision          : A0
        Deviation Number        : 0-0
        RMA Test History        : 00
        RMA Number              : 0-0-0-0
        RMA History             : 00
        CLEI Code               : TBD
        Manufacturing Test Data : 00 00 00 00 00 00 00 00
        Field Diagnostics Data  : 00 00 00 00 00 00 00 00
        Unknown Field (type 00DA): 00 00 00 00 00 00 00 00
                                  00 00 00 00 00 00 00 00
        Asset ID                :
        Power Supply Type       : AC
        Environment Monitor Data : 00 08 00 F8
        Environment Monitor Data : 02 A5 2E E2 EE 00 5B
        Environment Monitor Data : 05 02 03 50 03 58 00 4B
        Platform features       : 00 00 03 56 1E 53 0F 2A
                                  00 00 00 00 00 00 00 00
                                  FD
Power/Fan Module P1 EEPROM data:

        EEPROM version          : 4
```

```
Compatible Type          : 0xFF
Hardware Revision        : 0.1
Version Identifier (VID) : V01
Product Identifier (PID) : ASR1000X-AC-750W
PCB Serial Number        : ART183011B
Top Assy. Part Number    : 341-00714-01
Board Revision           : A0
Deviation Number         : 0-0
RMA Test History         : 00
RMA Number               : 0-0-0-0
RMA History              : 00
CLEI Code                : TBD
Manufacturing Test Data  : 00 00 00 00 00 00 00 00
Field Diagnostics Data   : 00 00 00 00 00 00 00 00
Unknown Field (type 00DA): 00 00 00 00 00 00 00 00
                           00 00 00 00 00 00 00 00
Asset ID                 :
Power Supply Type        : AC
Environment Monitor Data : 00 08 00 F8
Environment Monitor Data : 02 A5 2E E2 EE 00 5B
Environment Monitor Data : 05 02 03 50 03 58 00 4B
Platform features        : 00 00 03 56 1E 53 0F 2A
                           00 00 00 00 00 00 00 00
                           FD
```