



Managing Router Hardware

This chapter describes the concepts and tasks used to manage and configure the hardware components of a router running the Cisco IOS XR software.

This module contains the following topics:

- [NPU Power Optimization, on page 1](#)
- [Dynamic Power Management, on page 5](#)
- [Automatic FPD Upgrade for PSU, on page 12](#)
- [Storage Media Sanitization, on page 13](#)

NPU Power Optimization

Table 1: Feature History Table

Feature Name	Release Information	Description
NPU Power Optimization	Release 7.3.15	This feature lets you choose a predefined NPU power mode based on your network's individual requirements, and consequently reducing NPU power consumption. The hw-module npu-power-profile command is introduced for this feature.

Cisco 8000 series routers are powered by Cisco Silicon One Q200 and Q100 series processors. Cisco Silicon One processors offer high performance, flexible, and power-efficient routing silicon in the market.

NPU Power Optimization feature helps to reduce NPU power consumption by running a processor in a predefined mode. There are three NPU power modes—high, medium, and low. Based on your network traffic and power consumption requirements, you can choose to run the processor in any one of the three NPU power modes.



Note We recommend that you work with your Cisco account representatives before implementing this feature in your network.

On a Q200-based Cisco 8200 series chassis, you can configure an NPU power mode on the entire router.

On a Q200-based Cisco 8800 series chassis, you can configure an NPU power mode only on fabric cards and line cards.

The following table lists the supported hardware, and their default NPU power mode:

Table 2: Supported Hardware and Default Modes

Supported Hardware	Default NPU Power Mode
Cisco 8200 32x400 GE 1RU fixed chassis (8201-32FH)	High
88-LC0-36FH without MACSec, based on Q200 Silicon Chip	Medium
88-LC0-36FH-M with MACSec, based on Q200 Silicon Chip	Medium
8808-FC0 Fabric Card, based on Q200 Silicon Chip	Medium



Caution We recommend that you use the default NPU power mode on your router.

Limitation

This feature isn't supported on the Q100-based systems.

Configuring NPU Power Mode

Configuring NPU power mode on a fixed chassis:

The following example shows how to configure an NPU power mode on a fixed chassis:

```
RP/0/RP0/CPU0:ios(config)#hw-module npu-power-profile high
RP/0/RP0/CPU0:ios(config)#commit

RP/0/RP0/CPU0:ios(config)#reload
```



Note Note: Reload the chassis for the configurations changes to take effect.

Verifying NPU power mode configuration on a fixed chassis:

Use the **show controllers npu driver** command to verify the NPU power mode configuration:

```
RP/0/RP0/CPU0:ios#show controllers npu driver location 0/RP0/CPU0
Mon Aug 24 23:29:34.302 UTC
=====
NPU Driver Information
=====
Driver Version: 1
SDK Version: 1.32.0.1
```

```

Functional role: Active,      Rack: 8203, Type: lcc, Node: 0
Driver ready      : Yes
NPU first started : Mon Aug 24 23:07:41 2020
Fabric Mode:
NPU Power profile: High
Driver Scope: Node
Respawn count    : 1
Availability masks :
      card: 0x1,      asic: 0x1,      exp asic: 0x1
...

```

Configuring NPU power mode on a modular chassis

The following example shows how to configure an NPU power mode on a fabric card and a line card:

```

RP/0/RP0/CPU0:ios(config)#hw-module npu-power-profile card-type FC high
RP/0/RP0/CPU0:ios(config)#hw-module npu-power-profile card-type LC low location 0/1/cpu0
RP/0/RP0/CPU0:ios(config)#commit

```



Note For the configurations to take effect, you must:

- Reload a line card if the configuration is applied on the line card.
- Reload a router if the configuration is applied on a fabric card.

Verifying the NPU power mode configuration on a modular chassis

Use the **show controllers npu driver location** command to verify the NPU power mode configuration:

```
RP/0/RP0/CPU0:ios#show controllers npu driver location 0/1/CPU0
```

```

Functional role: Active,      Rack: 8808, Type: lcc, Node: 0/RP0/CPU0
Driver ready      : Yes
NPU first started : Mon Apr 12 09:57:27 2021
Fabric Mode: FABRIC/8FC
NPU Power profile: High
Driver Scope: Rack
Respawn count    : 1
Availability masks :
      card: 0xba,      asic: 0xcfcc,      exp asic: 0xcfcc
Weight distribution:
      Unicast: 80,      Multicast: 20

```

Process	Connection	Registration	Connection	DLL
/Lib	status	status	requests	registration
FSDB	Active	Active	1	n/a
FGID	Active	Active	1	n/a
AEL	n/a	n/a	n/a	Yes
SM	n/a	n/a	n/a	Yes

Asics :

HP - HotPlug event, PON - Power On reset
 HR - Hard Reset, WB - Warm Boot

Asic inst.	fap	HP	Slice	Asic	Admin	Oper	Asic state	Last	PON	HR	FW
(R/S/A)	id		state	type	state	state		init	(#)	(#)	Rev

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
0/FC1/2	202	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC1/3	203	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC3/6	206	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC3/7	207	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC4/8	208	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC4/9	209	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC5/10	210	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC5/11	211	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC7/14	214	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
0/FC7/15	215	1	UP	s123	UP		UP	NRML		PON	1 0 0x0000
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											

SI Info :

+-----+-----+-----+-----+-----+-----+-----+-----+							
Card	Board	SI Board	SI Param	Retimer SI	Retimer SI	Front Panel	
	HW Version	Version	Version	Board Version	Param Version	PHY	
+-----+-----+-----+-----+-----+-----+-----+-----+							
FC1	0.22	1	6	NA	NA	NA	
FC3	0.21	1	6	NA	NA	NA	
FC4	0.21	1	6	NA	NA	NA	
FC5	0.21	1	6	NA	NA	NA	
FC7	0.21	1	6	NA	NA	NA	
+-----+-----+-----+-----+-----+-----+-----+-----+							

Functional role: Active, Rack: 8808, Type: lcc, **Node: 0/1/CPU0**

Driver ready : Yes

NPU first started : Mon Apr 12 09:58:10 2021

Fabric Mode: FABRIC/8FC

NPU Power profile: Low

Driver Scope: Node

Respawn count : 1

Availability masks :

card: 0x1, asic: 0x7, exp asic: 0x7

Weight distribution:

Unicast: 80, Multicast: 20

+-----+-----+-----+-----+-----+-----+					
Process	Connection	Registration	Connection	DLL	
/Lib	status	status	requests	registration	
+-----+-----+-----+-----+-----+-----+					
FSDB	Active	Active	1	n/a	
FGID	Inactive	Inactive	0	n/a	
AEL	n/a	n/a	n/a	Yes	
SM	n/a	n/a	n/a	Yes	
+-----+-----+-----+-----+-----+-----+					

Asics :

HP - HotPlug event, PON - Power On reset

HR - Hard Reset, WB - Warm Boot

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
Asic inst.	fap HP	Slice	Asic	Admin	Oper	Asic state	Last	PON HR	FW		
(R/S/A)	id	state	type	state	state		init	(#) (#)	Rev		
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											
0/2/0	8	1	UP	npu	UP		UP	NRML		PON	1 0 0x0000
0/2/1	9	1	UP	npu	UP		UP	NRML		PON	1 0 0x0000
0/2/2	10	1	UP	npu	UP		UP	NRML		PON	1 0 0x0000
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+											

SI Info :

Card	Board	SI Board	SI Param	Retimer SI	Retimer SI	Front Panel
	HW Version	Version	Version	Board Version	Param Version	PHY
LC2	0.41	1	9	NA	NA	DEFAULT

Dynamic Power Management

Table 3: Feature History Table

Feature Name	Release Information	Description
Dynamic Power Management	Release 7.3.15	<p>The Dynamic Power Management feature considers certain dynamic factors before allocating power to the fabric and line cards.</p> <p>This feature has the following benefits:</p> <ul style="list-style-type: none"> • Reduces number of PSUs required by accurately representing the maximum power consumption • Improves PSU efficiency by providing more accurate power allocation <p>This feature thus optimizes power allocation and avoids overprovisioning power to a router.</p>
Dynamic Power Management	Release 7.3.2	<p>Previously available for fabric and line cards, this feature that helps avoid excess power allocation by considering dynamic factors before allocating power to them is now available for optical modules.</p> <p>To view the power allocation on a per port basis, a new command “show environment power allocated [details]” is introduced.</p>
Dynamic Power Management	Release 7.3.3	<p>The Dynamic Power Management feature is now supported on the following Cisco 8100 and 8200 series routers:</p> <ul style="list-style-type: none"> • Cisco 8201 • Cisco 8202 • Cisco 8201-32-FH • Cisco 8101-32-FH

Prior to Cisco IOS XR Release 7.3.15, when Cisco 8000 series routers were powered on or reloaded, the power management feature reserved power to fabric cards and allocated maximum power to line cards. The power management feature wouldn't consider dynamic factors, such as the type of fabric or line cards in the chassis, or whether a fabric or line card was present in a slot.

The Dynamic Power Management feature considers such dynamic factors before allocating power to the fabric and line cards.

This feature has the following benefits:

- Reduces number of PSUs required by accurately representing the maximum power consumption
- Improves PSU efficiency by providing more accurate power allocation

This feature thus optimizes power allocation and avoids overprovisioning power to a router.

This feature is supported on the following Cisco 8000 series routers:

- Cisco 8804, 8808, 8812, and 8818 routers
- Cisco 8201, 8202, 8201-32-FH routers
- Cisco 8101-32-FH

By default, this feature is enabled on the router.

The Dynamic Power Management feature allocates the total power to a router and its fabric card or line card based on the following parameters:

- Number and type of fabric cards installed on the router
- Fabric cards operating modes (5FC or 8FC)
- Number and type of line cards installed on the router
- Combination of line card and fabric card types installed
- NPU power mode configured on a fabric card
- Number and type of optics installed (supported in Cisco IOS XR Software Release 7.3.2 and later)
- MACSec-enabled ports (supported from Cisco IOS XR Software Release 7.3.3 and later)

For details, see *Dynamic Power Management for MACSec-Enabled Ports* section in the *Configuring MACSec* chapter in the *System Security Configuration Guide for Cisco 8000 Series Routers*.



Note We recommend you work with your Cisco account representatives to calculate power requirements for the Cisco 8000 series router.

Power Allocation to Empty Card Slot

This feature allocates a minimum required power for all empty LC or FC slots. This minimum power is required to boot the CPU and FPGAs immediately when a card is inserted. The feature doesn't control booting up the CPU and FPGAs. Also, the minimum power is required to detect the card type before the feature decides if there's enough power to power up the data path.

For example, the following **show environment power** command output displays various LC or FC card statuses, and also shows allocated and used power.



Note The allocated power capacity shown in the following **show** command output isn't standard capacity. The allocated power capacity varies depending on various other factors.

```
Router# show environment power
Thu Apr 22 12:03:06.754 UTC
=====
CHASSIS LEVEL POWER INFO: 0
=====
Total output power capacity (N + 1)      : 9600W + 6300W
Total output power required              : 9241W
Total power input                        : 6146W
Total power output                       : 5826W
=====
```

Power Module	Supply Type	-----Input----- Volts A/B	Amps A/B	-----Output--- Volts	Amps	Status
0/PT0-PM0	PSU6.3KW-HV	245.5/245.7	5.1/5.0	54.7	43.1	OK
0/PT0-PM1	PSU6.3KW-HV	0.0/245.2	0.0/7.4	54.3	31.7	OK
0/PT0-PM2	PSU6.3KW-HV	0.0/246.9	0.0/7.5	54.1	32.3	OK

```
Total of Power Modules:      6146W/25.0A      5826W/107.1A
=====
```

Location	Card Type	Power Allocated Watts	Power Used Watts	Status
0/RP0/CPU0	8800-RP	95	69	ON
0/RP1/CPU0	-	95	-	RESERVED
0/0/CPU0	88-LC0-36FH	796	430	ON
0/1/CPU0	-	102	-	RESERVED
0/2/CPU0	88-LC0-36FH	796	430	ON
0/3/CPU0	-	102	-	RESERVED
0/4/CPU0	-	102	-	RESERVED
0/5/CPU0	-	102	-	RESERVED
0/6/CPU0	-	102	-	RESERVED
0/7/CPU0	-	102	-	RESERVED
0/8/CPU0	-	102	-	RESERVED
0/9/CPU0	88-LC0-36FH	102	-	OFF
0/10/CPU0	-	102	-	RESERVED
0/11/CPU0	-	102	-	RESERVED
0/FC0	-	26	-	RESERVED
0/FC1	-	26	-	RESERVED
0/FC2	-	26	-	RESERVED
0/FC3	8812-FC	784	509	ON
0/FC4	8812-FC	784	503	ON
0/FC5	8812-FC	26	-	OFF
0/FC6	8812-FC	26	-	OFF
0/FC7	8812-FC	26	-	OFF
0/FT0	8812-FAN	1072	1000	ON
0/FT1	8812-FAN	1072	1012	ON
0/FT2	8812-FAN	1072	861	ON
0/FT3	8812-FAN	1072	1033	ON

This table describes the card slot statuses:

Table 4: Router Card Slot Status

Status	Description
RESERVED	When a slot is empty
OFF	When a card is inserted in a slot but power isn't allocated to the card
ON	When a card is allocated power and the card is in operational state

Low-Power Condition

When you insert an LC or FC in a card slot at the time when the router doesn't have enough power available to allocate to the new card, the dynamic power management feature doesn't provision power to the card. It raises the `ev_power_budget_not_ok` alarm, and gracefully shuts down the card.

In the following **show** command output, an FC inserted in the card slot location 0/FC6 is gracefully shut down due to lack of power:

```
Router# show shelfmgr history events location 0/FC6
Thu Apr 22 12:03:11.763 UTC
NODE NAME      : 0/FC6
CURRENT STATE  : CARD_SHUT_POWERED_OFF
TIME STAMP     : Apr 20 2021 16:49:52
-----
DATE           TIME (UTC)  EVENT                                STATE
-----
Apr 20 2021 16:49:52  ev_powered_off             CARD_SHUT_POWERED_OFF
Apr 20 2021 16:49:52  ev_device_offline          STATE_NOT_CHANGED
Apr 20 2021 16:49:52  ev_unmapped_event          STATE_NOT_CHANGED
Apr 20 2021 16:49:48  transient_condition         CARD_SHUTDOWN
Apr 20 2021 16:49:48  ev_check_card_down_reaso    CHECKING_DOWN_REASON
Apr 20 2021 16:49:48  ev_timer_expiry            CARD_SHUTDOWN_IN_PROGRESS
Apr 20 2021 16:48:46  ev_power_budget_not_ok      CARD_SHUTDOWN_IN_PROGRESS
Apr 20 2021 16:48:45  transient_condition         POWER_BUDGET_CHECK
Apr 20 2021 16:48:45  ev_fpd_upgrade_not_reqd     CARD_STATUS_CHECK_COMPLETE
Apr 20 2021 16:47:45  ev_card_status_check        CARD_STATUS_CHECK
Apr 20 2021 16:47:45  ev_card_info_rcvd           CARD_INFO_RCVD
Apr 20 2021 16:47:44  ev_device_online            DEVICE_ONLINE
Apr 20 2021 16:47:43  ev_timer_expiry            CARD_POWERED_ON
Apr 20 2021 16:47:33  ev_powered_on               CARD_POWERED_ON
Apr 20 2021 16:47:33  init                        CARD_DISCOVERED
-----
```

However, after an LC, FC, or chassis reload, the dynamic power management feature can't ensure that the same LCs, FCs, optics, or interfaces, which were operational earlier (before the reload), would become active again.



Note During a low-power condition, this feature doesn't borrow power from a redundant power supply.

Power Allocation to Optics

From Cisco IOS XR Release 7.3.2 onwards, power requirement for optics is also considered before allocating power to them.

To identify the power allocated for a particular interface, use the **show environment power allocated [details] location location** command.

When the optical modules are inserted, power is automatically allocated for that interface. If power has been allocated to the interface, then use the “**no shut**” command to enable the interface.

```
Router# show environment power allocated location 0/3/CPU0
Thu Oct 7 22:27:35.732 UTC
```

Location	Components	Power Allocated Watts
0/3/CPU0	Data-path	772
	OPTICS	138
	Total	910

```
Router# show environment power allocated details location 0/3/CPU0
Thu Oct 7 22:27:42.221 UTC
```

Location	Components	Power Allocated Watts
0/3/CPU0	Data-path	772
	0/3/0/0	3
	0/3/0/1	3
	0/3/0/2	3
	0/3/0/3	3
	0/3/0/4	3
	0/3/0/5	3
	0/3/0/6	3
	0/3/0/7	3
	0/3/0/8	3
	0/3/0/9	3
	0/3/0/10	3
	0/3/0/11	3
	0/3/0/12	3
	0/3/0/13	3
	0/3/0/14	3
	0/3/0/15	3
	0/3/0/16	3
	0/3/0/17	3
	0/3/0/18	3
	0/3/0/19	3
	0/3/0/20	3
	0/3/0/21	3
	0/3/0/22	3
	0/3/0/23	3
	0/3/0/24	3
	0/3/0/25	3
	0/3/0/26	3
	0/3/0/27	3
	0/3/0/28	3
	0/3/0/29	3
	0/3/0/30	3

0/3/0/31	3
0/3/0/32	3
0/3/0/33	3
0/3/0/34	3
0/3/0/35	3
0/3/0/36	3
0/3/0/37	3
0/3/0/38	3
0/3/0/39	3
0/3/0/40	3
0/3/0/41	3
0/3/0/42	3
0/3/0/43	3
0/3/0/44	3
0/3/0/46	3
=====	
Total	910

When the power is not allocated to the interface, the following syslog error and alarms are displayed

```
!<--Syslog Error-->!  
#LC/0/3/CPU0:Oct 7 22:46:48.114 UTC: optics_driver[165]: %PKT_INFRA-FM-3-FAULT_MAJOR :  
ALARM_MAJOR :POWER ALLOCATION FAIL :DECLARE :0/3/CPU0: Optics0/3/0/44  
LC/0/3/CPU0:Oct 7 22:46:48.114 UTC: optics_driver[165]:  
%L2-OPTICS-2-QSFP_POWER_ALLOCATION_FAILURE : Not enough power available to enable Optics  
0/3/0/44
```

```
!<--Alarm-->!  
Router#show alarms brief system active  
Thu Oct 7 22:47:19.569 UTC
```

```
-----  
Active Alarms  
-----
```

Location	Severity	Group	Set Time	Description

0/3/CPU0 hw_optics:	Major	Software	10/07/2021 22:46:48 UTC	Optics0/3/0/44 - Lack of available power to enable the optical module
0/3/CPU0 hw_optics:	Major	Software	10/07/2021 22:47:06 UTC	Optics0/3/0/46 - Lack of available power to enable the optical module

If power is not allocated to an interface and you attempt to enable that interface using the “**no shut**” command, the following syslog error is displayed:

```
LC/0/2/CPU0:Aug 30 18:01:14.930 UTC: eth_intf_ea[262]: %PLATFORM-VEEA-1-PORT_NOT_ENABLED :  
Power not allocated to enable the interface HundredGigE0_2_0_6.
```

Power Allocation to Fixed-Port Routers

The following **show environment power** command output displays power information for fixed-port routers and components.

```
Router# show environment power  
Wed Feb 16 21:05:10.001 UTC  
=====
```

CHASSIS LEVEL POWER INFO: 0		
=====		
Total output power capacity (Group 0 + Group 1) :	1400W +	1400W

```

Total output power required      :    1033W
Total power input                :     390W
Total power output               :     255W

```

Power Group 0:

```

=====
Power      Supply      -----Input-----      -----Output-----      Status
Module     Type        Volts      Amps      Volts      Amps
=====
0/PM0      PSU1.4KW-ACPE      244.5      0.8      12.0      11.1      OK

```

```

Total of Group 0:                195W/0.8A      133W/11.1A

```

Power Group 1:

```

=====
Power      Supply      -----Input-----      -----Output-----      Status
Module     Type        Volts      Amps      Volts      Amps
=====
0/PM1      PSU1.4KW-ACPE      244.2      0.8      12.0      10.2      OK

```

```

Total of Group 1:                195W/0.8A      122W/10.2A

```

```

=====
Location   Card Type                Power      Power      Status
                Allocated   Used
                Watts      Watts
=====
0/RP0/CPU0  8201                893        -          ON
0/FT0       FAN-1RU-PE          28         -          ON
0/FT1       FAN-1RU-PE          28         -          ON
0/FT2       FAN-1RU-PE          28         -          ON
0/FT3       FAN-1RU-PE          28         -          ON
0/FT4       FAN-1RU-PE          28         -          ON

```

To identify the power allocated for a particular interface, use the **show environment power allocated [details] location location** command.

```
Router# show environment power allocated location 0/RP0/CPU0
```

```
Wed Feb 16 21:05:21.360 UTC
```

```

=====
Location   Components                Power
                Allocated
                Watts
=====
0/RP0/CPU0  Data-path                858
                OPTICS                35
=====
Total                893

```

```
Router# show environment power allocated details location 0/RP0/CPU0
```

```
Wed Feb 16 21:05:36.142 UTC
```

```

=====
Location   Components                Power
                Allocated
                Watts
=====
0/RP0/CPU0  Data-path                858
                0/0/0/19                21
                0/0/0/18                14
=====
Total                893

```

Disabling Dynamic Power Management

By default, the dynamic power management is enabled on a router. The following example shows how to disable dynamic power management:

```
RP/0/RP0/CPU0:ios(config)#power-mgmt action disable
RP/0/RP0/CPU0:ios(config)#commit
```

**Caution**

After disabling the dynamic power management feature, you must manage the router power on your own. So, use this command with caution.

**Note**

To reenable dynamic power management, use the **no power-mgmt action disable** command.

Automatic FPD Upgrade for PSU

During the installation and Power Supply Unit (PSU) insertion process, the Field-Programmable Devices (FPD) associated with the PSUs are automatically upgraded.

**Note**

The PSUs are upgraded sequentially, hence the PSU FPD upgrades take longer. You can choose to exclude PSUs from the auto upgrade flow. This restricts the PSUs from being upgraded either upon insertion, or during system upgrade.

To exclude the PSU FPDs from auto upgrading, use the following CLI:

fpd auto-upgrade exclude pm

```
RP/0/RSP0/CPU0:router# show running-config fcd auto-upgrade
Wed Mar 30 20:52:55.079 UTC
fpd auto-upgrade enable
fpd auto-upgrade exclude pm
```

**Note**

When you upgrade from an earlier unsupported version to a version that supports Automatic FPD upgrade for PSU, the PSU upgrade might happen on bootup.

Storage Media Sanitization

Table 5: Feature History Table

Feature Name	Release Information	Feature Description
Storage Media Sanitization	Release 7.3.4	<p>To comply with NIST SP 800-88 guidelines for Media Sanitization, it is important that your organization ensures that no easily reconstructible data is stored in the router and associated devices after it has left the control of your organization or is no longer protected by confidentiality categorization.</p> <p>With this feature, you can erase and overwrite any sensitive data, configuration, or keys present in the route processor or line card, ensuring media sanitization and preventing unauthorized data retrieval.</p>

When you identify an RP or line card for RMA, or you require to ship it outside your organization, a service personnel may not be available on-site to remove the card immediately. However, you can reset your RP or line card to erase customer-sensitive data and let the RP or line card remain in the slot.

Use the **factory-reset** command for erasing the following folders of RP or line card:

- /misc/disk1
- /misc/scratch
- /var/log
- /misc/config

Guidelines and restrictions

- We recommend using **factory-reset** without performing **commit replace** for securely removing the files from the misc/config folder.
- The RP or line card shuts down automatically if the factory reset takes more than 30 minutes, you can perform the factory reset again. The console displays the following log message during automatic shutdown:

```
[ TIME ] Timed out starting Power-Off.  
[ !! ] Forcibly powering off as result of failure.
```
- If your router has dual RPs, and to perform the factory reset on both the RPs, first reset the standby RP from the active RP. After the reset is complete, you can then reset the active RP.

Prerequisites

The RP or line card must be operational.

Commands

Run the following command through the console port of the router to erase customer-sensitive data from the RP or line card:

factory-reset { reload | shutdown } location <location-id> - erases customer-sensitive data in the specified location. Use the reload option in the command to reload the RP or line card and use the shutdown option to shutdown the RP or line card.



Note Factory-reset logs are displayed on the console port of the node where the reset is performed.

The following steps explain how to reset your RP or line card to factory settings:

1. Erasing the folder contents: Execute the **factory-reset { reload | shutdown } location** command to erase the contents of the folders and delete the encryption keys in the RP or line card.

The following example shows the execution of factory-reset shutdown command on an RP:

```
Router#factory-reset shutdown location 0/RP1/CPU0
Factory reset requested
Started punching watchdog
Started cleaning up mount point: /misc/scratch
Started syncing folder: /misc/scratch
Finished syncing folder: /misc/scratch
Finished cleaning up mount point: /misc/scratch
factory_reset_stop.sh
+++++++
Started cleaning up mount point: /var/log
Started syncing folder: /var/log
Finished syncing folder: /var/log
Finished cleaning up mount point: /var/log
factory_reset_stop.sh
+++++++
Started cleaning up mount point: /misc/disk1
Started syncing folder: /misc/disk1
Finished syncing folder: /misc/disk1
Finished cleaning up mount point: /misc/disk1
factory_reset_stop.sh
+++++++
Started cleaning up folder: /misc/config
UTC 2022 Started syncing folder: /misc/config
Finished syncing folder: /misc/config
Finished cleaning up folder: /misc/config
factory_reset_stop.sh
+++++++
Started cleaning up folder: /var/xr/enc/misc/config
/var/xr/enc/misc/config not present
Finished cleaning up folder: /var/xr/enc/misc/config
factory_reset_stop.sh
+++++++
Started cleaning up folder: /mnt/rootfs/misc/config
/mnt/rootfs/misc/config not present
Finished cleaning up folder: /mnt/rootfs/misc/config
factory_reset_stop.sh
+++++++
```

```
Encrypted logical volume does not exist. Nothing to remove.
/usr/local/etc/fpga-functions: line 797: 10912 Terminated
/usr/local/etc/punch-wd.sh
Stopped punching watchdog
```

The following example shows the execution of factory-reset reload command on an RP:

```
Router#factory-reset reload location 0/RP1/CPU0
Factory reset requested
Started punching watchdog
Started cleaning up mount point: /misc/scratch
Started syncing folder: /misc/scratch
Finished syncing folder: /misc/scratch
Finished cleaning up mount point: /misc/scratch
+++++
Started cleaning up mount point: /var/log
Started syncing folder: /var/log
Finished syncing folder: /var/log
Finished cleaning up mount point: /var/log
+++++
Started cleaning up mount point: /misc/disk1
Started syncing folder: /misc/disk1
Finished syncing folder: /misc/disk1
Finished cleaning up mount point: /misc/disk1
+++++
Started cleaning up folder: /misc/config
Started syncing folder: /misc/config
Finished syncing folder: /misc/config
Finished cleaning up folder: /misc/config
+++++
Started cleaning up folder: /var/xr/enc/misc/config
/var/xr/enc/misc/config not present
Finished cleaning up folder: /var/xr/enc/misc/config
+++++
Started cleaning up folder: /mnt/rootfs/misc/config
/mnt/rootfs/misc/config not present
Finished cleaning up folder: /mnt/rootfs/misc/config
+++++
Encrypted logical volume does not exist. Nothing to remove.
/usr/local/etc/fpga-functions: line 790: 4137 Terminated
/usr/local/etc/punch-wd.sh
Stopped punching watchdog
```

2. Verifying factory reset: use the **show shelfmgr history events location** command to verify the successful completion of the factory-reset in the standby RP or line card.

The following example shows the verification of a successful factory-reset shutdown:

```
RP/0/RP0/CPU0:Router#show shelfmgr history events location 0/RP1/CPU0
Tue Mar 15 01:45:56.402 UTC
NODE NAME      : 0/RP1/CPU0
CURRENT STATE  : CARD_SHUT_POWERED_OFF
TIME STAMP     : Mar 15 2022 01:44:47
```

DATE	TIME (UTC)	EVENT	STATE
Mar 15 2022	01:44:47	ev_powered_off	CARD_SHUT_POWERED_OFF
Mar 15 2022	01:44:47	transient_condition	CARD_SHUTDOWN
Mar 15 2022	01:44:47	ev_check_card_down_reaso	CHECKING_DOWN_REASON
Mar 15 2022	01:44:47	ev_os_halted	OS_HALTED
Mar 15 2022	01:44:43	ev_factory_reset_done	FACTORY_RESET_DONE
Mar 15 2022	01:33:16	ev_factory_reset_started	FACTORY_RESET_IN_PROGRESS
Mar 15 2022	01:33:11	ev_os_halting	OS_HALT_IN_PROGRESS

```

Mar 15 2022 01:33:10    ev_xr_shut            START_OS_HALT
Mar 15 2022 01:33:09    ev_ack_ok             STATE_NOT_CHANGED
Mar 15 2022 01:33:09    ev_graceful_shut      CARD_SHUTDOWN_IN_PROGRESS
Mar 15 2022 00:55:31    ev_xr_ready           XR_RUN

```

The following example shows the verification of a successful factory-reset reload:

```

RP/0/RP0/CPU0:Router#show shelfmgr history events location 0/RP0/CPU0
Tue Mar 15 01:45:56.402 UTC
NODE NAME       : 0/RP0/CPU0
CURRENT STATE   : CARD_SHUT_POWERED_OFF
TIME STAMP      : Mar 15 2022 01:44:47
-----
DATE            TIME (UTC)  EVENT                                STATE
-----
Jun 29 2022 13:48:34    ev_xr_ready                    XR_RUN
Jun 29 2022 13:48:10    ev_card_info_rcvd              CARD_INFO_RCVD
Jun 29 2022 13:47:52    ev_xr_init                     XR_INITIALIZING
Jun 29 2022 13:47:44    ev_kernel_booting              STATE_NOT_CHANGED
Jun 29 2022 13:47:14    ev_kernel_booting              KERNEL_BOOTING
Jun 29 2022 13:46:53    ev_unmapped_event              STATE_NOT_CHANGED
Jun 29 2022 13:46:53    ev_bios_started                BIOS_STARTED
Jun 29 2022 13:46:51    ev_bios_ready                  BIOS_READY
Jun 29 2022 13:46:10    ev_unmapped_event              STATE_NOT_CHANGED
Jun 29 2022 13:46:10    ev_powered_on                  CARD_POWERED_ON
Jun 29 2022 13:46:05    ev_card_reset_done             CARD_RESET
Jun 29 2022 13:46:05    transient_condition            CARD_RESETTING
Jun 29 2022 13:46:05    ev_check_card_down_reaso       CHECKING_DOWN_REASON
Jun 29 2022 13:46:05    ev_os_halted                   OS_HALTED
Jun 29 2022 13:45:50    ev_factory_reset_done          FACTORY_RESET_DONE
Jun 29 2022 13:34:09    ev_factory_reset_started        FACTORY_RESET_IN_PROGRESS
Jun 29 2022 13:33:59    ev_os_halting                  OS_HALT_IN_PROGRESS
Jun 29 2022 13:33:58    ev_xr_shut                     START_OS_HALT
Jun 29 2022 13:33:56    ev_graceful_reload             CARD_SHUTDOWN_IN_PROGRESS
Jun 29 2022 09:18:43    ev_xr_ready                    XR_RUN
Jun 29 2022 09:17:37    ev_card_info_rcvd              CARD_INFO_RCVD
Jun 29 2022 09:17:32    ev_powered_on                  CARD_POWERED_ON
Jun 29 2022 09:17:31    init                           CARD_DISCOVERED

```



Note The RP or line card shuts down automatically if the factory reset takes more than 30 minutes and the console displays the following log message:

```

[ TIME ] Timed out starting Power-Off.
[ !! ] Forcibly powering off as result of failure.

```



Note Cisco recommends using **factory-reset** over **commit replace** for securely removing the files from the misc/config folder.