



Managing Cisco Enhanced Services and Network Interface Modules

The router supports Cisco Enhanced Services Modules (SMs) and Cisco Network Interface Modules (NIMs). The modules are inserted into the router using an adapter, or carrier card, into various slots. For more information, see the following documents:

- [Hardware Installation Guide for the Cisco Catalyst 8300 Series Edge Platform.](#)
- [Hardware Installation Guide for Cisco Catalyst 8200 Series Edge Platforms](#)

The following sections are included in this chapter:

- [Information About Cisco Service Modules and Network Interface Modules, on page 1](#)
- [Modules Supported, on page 2](#)
- [Network Interface Modules and Enhanced Service Modules, on page 2](#)
- [Implementing SMs and NIMs on Your Platforms, on page 2](#)
- [Managing Modules and Interfaces, on page 10](#)
- [Configuration Examples, on page 10](#)

Information About Cisco Service Modules and Network Interface Modules

The router configures, manages, and controls the supported Cisco Service Modules (SMs), Network Interface Modules (NIMs) and PIM (Pluggable Interface Modules) using the module management facility built in its architecture. This new centralized module management facility provides a common way to control and monitor all the modules in the system regardless of their type and application. All Cisco Enhanced Service and Network Interface Modules supported on your router use standard IP protocols to interact with the host router. Cisco IOS software uses alien data path integration to switch between the modules.

- [Modules Supported, on page 2](#)
- [Network Interface Modules and Enhanced Service Modules, on page 2](#)

Modules Supported

For information about the interfaces and modules supported by the Cisco Catalyst 8000 Edge Platform, see [Hardware Installation Guide for Cisco Catalyst 8000 Series Edge Platform](#).

Network Interface Modules and Enhanced Service Modules

For more information on the supported Network Interface Modules and Service Modules, refer to the Cisco Catalyst 8300 Series Edge Platforms [datasheet](#).

Implementing SMs and NIMs on Your Platforms

- [Downloading the Module Firmware, on page 2](#)
- [Installing SMs and NIMs, on page 2](#)
- [Accessing Your Module Through a Console Connection or Telnet, on page 2](#)
- [Online Insertion and Removal, on page 3](#)

Downloading the Module Firmware

Module firmware must be loaded to the router to be able to use a service module. For more information, see [Installing a Firmware Subpackage](#).

The modules connect to the RP via the internal eth0 interface to download the firmware. Initially, the module gets an IP address for itself via BOOTP. The BOOTP also provides the address of the TFTP server used to download the image. After the image is loaded and the module is booted, the module provides an IP address for the running image via DHCP.

Installing SMs and NIMs

For more information, see "Installing and Removing NIMs and SMs" in the [Hardware Installation Guide for Cisco Catalyst 8300 Edge Platform](#) and [Hardware Installation Guide for Cisco Catalyst 8200 Series Edge Platforms](#).



Note Service modules are not supported on Cisco Catalyst 8200 Series Edge Platforms.

Accessing Your Module Through a Console Connection or Telnet

Before you can access the modules, you must connect to the host router through the router console or through Telnet. After you are connected to the router, you must configure an IP address on the Gigabit Ethernet interface connected to your module. Open a session to your module using the **hw-module session** command in privileged EXEC mode on the router.

To establish a connection to the module, connect to the router console using Telnet or Secure Shell (SSH) and open a session to the switch using the **hw-module session slot/subslot** command in privileged EXEC mode on the router.

Use the following configuration examples to establish a connection:

- The following example shows how to open a session from the router using the **hw-module session** command:

```
Router# hw-module session slot/card
Router# hw-module session 0/1 endpoint 0

Establishing session connect to subslot 0/1
```

- The following example shows how to exit a session from the router, by pressing **Ctrl-A** followed by **Ctrl-Q** on your keyboard:

```
type ^a^q
picocom v1.4

port is      : /dev/ttyDASH2
flowcontrol  : none
baudrate is  : 9600
parity is    : none
databits are : 8
escape is    : C-a
noinit is    : no
noreset is   : no
nolock is    : yes
send_cmd is  : ascii_xfr -s -v -l10
receive_cmd is : rz -vv
```

Online Insertion and Removal

The router supports online insertion and removal (OIR) of Cisco Enhanced Services Modules and Cisco Network Interface Modules. You can perform the following tasks using the OIR function:

- [Preparing for Online Removal of a Module, on page 3](#)
- [Deactivating a Module, on page 4](#)
- [Deactivating Modules and Interfaces in Different Command Modes, on page 5](#)
- [Deactivating and Reactivating an SSD/HDD Carrier Card NIM, on page 6](#)
- [Reactivating a Module, on page 7](#)
- [Verifying the Deactivation and Activation of a Module, on page 7](#)

Preparing for Online Removal of a Module

The router supports the OIR of a module, independent of removing another module installed in your router. This means that an active module can remain installed in your router, while you remove another module from one of the subslots. If you are not planning to immediately replace a module, ensure that you install a blank filler plate in the subslot.

Deactivating a Module

A module can be removed from the router without first being deactivated. However, we recommend that you perform a graceful deactivation (or graceful power down) of the module before removing it. To perform a graceful deactivation, use the **hw-module subslot slot/subslot stop** command in EXEC mode.



Note When you are preparing for an OIR of a module, it is not necessary to independently shut down each of the interfaces before deactivating the module. The **hw-module subslot slot/subslot stop** command in EXEC mode automatically stops traffic on the interfaces and deactivates them along with the module in preparation for OIR. Similarly, you do not have to independently restart any of the interfaces on a module after OIR.

The following example shows how to use the **show facility-alarm status** command to verify if any critical alarm is generated when a module is removed from the system:

```
Router# show facility-alarm status
System Totals  Critical: 18  Major: 0  Minor: 0

Source                               Time                               Severity  Description [Index]
-----                               -
Power Supply Bay 1                   Sep 28 2020 10:02:34  CRITICAL  Power Supply/FAN Module
Missing [0]
POE Bay 0                             Sep 28 2020 10:02:34  INFO      Power Over Ethernet Module
Missing [0]
POE Bay 1                             Sep 28 2020 10:02:34  INFO      Power Over Ethernet Module
Missing [0]
GigabitEthernet0/0/2                 Sep 28 2020 10:02:46  INFO      Physical Port Administrative
State Down [2]
GigabitEthernet0/0/3                 Sep 28 2020 10:02:46  INFO      Physical Port Administrative
State Down [2]
xcvr container 0/0/4                 Sep 28 2020 10:02:46  INFO      Transceiver Missing - Link
Down [1]
TenGigabitEthernet0/0/5              Sep 28 2020 10:02:54  CRITICAL  Physical Port Link Down [1]
TenGigabitEthernet0/1/0              Sep 28 2020 10:03:26  INFO      Physical Port Administrative
State Down [2]
GigabitEthernet1/0/0                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
GigabitEthernet1/0/1                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
GigabitEthernet1/0/2                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
GigabitEthernet1/0/3                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
GigabitEthernet1/0/4                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
GigabitEthernet1/0/5                 Sep 28 2020 10:07:35  CRITICAL  Physical Port Link Down [1]
TwoGigabitEthernet1/0/16             Sep 28 2020 10:07:35  INFO      Physical Port Administrative
State Down [2]
TwoGigabitEthernet1/0/17             Sep 28 2020 10:07:35  INFO      Physical Port Administrative
State Down [2]
TwoGigabitEthernet1/0/18             Sep 28 2020 10:07:35  INFO      Physical Port Administrative
State Down [2]
TwoGigabitEthernet1/0/19             Sep 28 2020 10:07:35  INFO      Physical Port Administrative
State Down [2]
xcvr container 1/0/20                 Sep 28 2020 10:04:00  INFO      Transceiver Missing - Link
Down [1]
xcvr container 1/0/21                 Sep 28 2020 10:04:00  INFO      Transceiver Missing - Link
Down [1]1]
```



Note A critical alarm (Active Card Removed OIR Alarm) is generated even if a module is removed after performing graceful deactivation.

Deactivating Modules and Interfaces in Different Command Modes

You can deactivate a module and its interfaces using the **hw-module subslot** command in one of the following modes:

- If you choose to deactivate your module and its interfaces by executing the **hw-module subslot slot/subslot shutdown unpowered** command in global configuration mode, you are able to change the configuration in such a way that no matter how many times the router is rebooted, the module does not boot. This command is useful when you need to shut down a module located in a remote location and ensure that it does not boot automatically when the router is rebooted.
- If you choose to use the **hw-module subslot slot/subslot stop** command in EXEC mode, you cause the module to gracefully shut down. The module is rebooted when the **hw-module subslot slot/subslot start** command is executed.

To deactivate a module and all of its interfaces before removing the module, use one of the following commands in global configuration mode.

Procedure

	Command or Action	Purpose
Step 1	hw-module subslot slot/subslot shutdown unpowered Example: Router# hw-module subslot 0/2 shutdown unpowered	Deactivates the module located in the specified slot and subslot of the router, where: <ul style="list-style-type: none"> • <i>slot</i>—Specifies the chassis slot number where the module is installed. • <i>subslot</i>—Specifies the subslot number of the chassis where the module is installed. • shutdown—Shuts down the specified module. • unpowered—Removes all interfaces on the module from the running configuration and the module is powered off.
Step 2	hw-module subslot slot/subslot [reload stop start] Example: Router# hw-module subslot 0/2 stop	Deactivates the module in the specified slot and subslot, where: <ul style="list-style-type: none"> • <i>slot</i>—Specifies the chassis slot number where the module is installed. • <i>subslot</i>—Specifies the subslot number of the chassis where the module is installed. • reload—Stops and restarts the specified module. • stop—Removes all interfaces from the module and the module is powered off. • start—Powers on the module similar to a physically inserted module in the specified slot. The module firmware reboots and the entire module initialization sequence is executed in the IOSd and Input/Output Module daemon (IOMd) processes.

Deactivating and Reactivating an SSD/HDD Carrier Card NIM

The following restrictions apply:

- Deactivating or reactivating an SSD/HDD Carrier Card NIM without an SSD or HDD disk is not supported.
- Only a single (SSD or HDD) Carrier Card NIM can be plugged into a bay. If you plug an additional (SSD or HDD) Carrier Card NIM into another bay, the module powers down and kernel, log, or error messages are displayed on the Cisco IOS console. In rare cases, the file system may get corrupted on the additional drive.



Caution Deactivation of an SSD/HDD Carrier Card NIM may cause loss of data.

To deactivate an SSD/HDD Carrier Card NIM, perform the following steps:

Procedure

	Command or Action	Purpose
Step 1	virtual-service <i>name</i> Example: Router(config)# virtual-service my-kwaas-instance	Identifies the kWAAS service (by name), supported on your router, in preparation for the router to be shut down by the no activate command. We recommend that you use this command before reseating or replacing an SSD or HDD.
Step 2	no activate Example: Router(config-virt-serv)# no activate	Shuts down the kWAAS instance on your router. kWAAS services remain installed. The service will have to be reactivated after the HDD/SSD NIM (module) is restarted.
Step 3	hw-module <i>subslot slot/subslot</i> [reload stop start] Example: Router# hw-module subslot 0/2 stop Proceed with stop of module? [confirm] Router# *Mar 6 15:13:23.997: %SPA_OIR-6-OFFLINECARD: SPA (NIM-SSD) offline in subslot 0/2 ...	Deactivates or reactivates the module in the specified slot and subslot. <ul style="list-style-type: none"> • <i>slot</i>—The chassis slot number where the module is installed. • <i>subslot</i>—The subslot number of the chassis where the module is installed. • reload—Deactivates and reactivates (stops and restarts) the specified module. • stop—Removes all interfaces from the module and the module is powered off. • start—Powers on the module similar to a physically inserted module in the specified slot. The module firmware reboots and the entire module initialization sequence is executed in the IOSd and IOMd processes.
Step 4	Wait for the EN (Enable) LED to turn off, and then remove the SSD/HDD Carrier Card NIM.	

Reactivating a Module

If, after deactivating a module using the **hw-module subslot slot/subslot stop** command, you want to reactivate it without performing an OIR, use one of the following commands (in privileged EXEC mode):

- **hw-module subslot slot/subslot start**
- **hw-module subslot slot/subslot reload**

Verifying the Deactivation and Activation of a Module

When you deactivate a module, the corresponding interfaces are also deactivated. This means that these interfaces will no longer appear in the output of the **show interface** command.

1. To verify the deactivation of a module, enter the **show hw-module subslot all oir** command in privileged EXEC configuration mode.

Observe the "Operational Status" field associated with the module that you want to verify. In the following example, the module located in subslot 1 of the router is administratively down.

```
Router# show hw-module subslot all oir
```

Module	Model	Operational Status
subslot 0/0	4x1G-2xSFP+	ok
subslot 0/1	C-NIM-1X	ok
subslot 1/0	SM-X-16G4M2X	ok

```
RadiumPP#
```

2. To verify activation and proper operation of a module, enter the **show hw-module subslot all oir** command and observe "ok" in the **Operational Status** field as shown in the following example:

```
Router# show hw-module subslot all oir
```

Module	Model	Operational Status
subslot 0/0	4x1G-2xSFP+	ok
subslot 0/1	C-NIM-1X	ok
subslot 1/0	SM-X-16G4M2X	ok

```
RadiumPP#
Router# show platform hardware backplaneswitch-manager R0 status
```

slot	bay	port	enable	link status	speed(Mbps)	duplex	autoneg	pause_tx
0	0	CP	True	Up	1000	Full	ENABLED	ENABLED
ENABLED		10240						
1	0	GE1	True	Up	1000	Full	DISABLED	ENABLED
ENABLED		10240						
1	0	GE0	True	Up	1000	Full	DISABLED	ENABLED
ENABLED		10240						
2	0	GE1	True	Up	1000	Full	DISABLED	ENABLED
ENABLED		10240						
2	0	GE0	True	Up	1000	Full	DISABLED	ENABLED
ENABLED		10240						
0	1	GE1	True	Down	1000	Full	DISABLED	ENABLED
ENABLED		10240						
0	1	GE0	True	Down	1000	Full	DISABLED	ENABLED
ENABLED		10240						
0	2	GE1	True	Down	1000	Full	DISABLED	ENABLED
ENABLED		10240						

Verifying the Deactivation and Activation of a Module

```

0      2      GE0      True      Down      1000      Full      DISABLED  ENABLED
ENABLED 10240
0      3      GE1      True      Down      1000      Full      DISABLED  ENABLED
ENABLED 10240
0      3      GE0      True      Down      1000      Full      DISABLED  ENABLED
ENABLED 10240
0      4      GE1      True      Down      1000      Full      DISABLED  ENABLED
ENABLED 10240
0      4      GE0      True      Down      1000      Full      DISABLED  ENABLED
ENABLED 10240
0      0      FFP      True      Up        10000     Full      ENABLED   DISABLED
DISABLED 10240

```

slot	bay	port	mac	vid	modid	flags - Layer 2
0	0	FFP	2c54.2dd2.661b	2351	1	0x20
0	0	FFP	2c54.2dd2.661b	2352	1	0x20
0	0	CP	2c54.2dd2.661e	2351	0	0xC60
0	0	CP	2c54.2dd2.661e	2352	0	0x20
1	0	GE0	58bf.ea3a.00f6	2350	0	0x460
0	0	FFP	2c54.2dd2.661b	2350	1	0x20
1	0	GE0	58bf.ea3a.00f6	2352	0	0x20
0	0	CP	2c54.2dd2.661e	2350	0	0x20
1	0	GE0	58bf.ea3a.00f6	2351	0	0xC60

Port block masks: rows=from port, columns=to port, u=unknown unicast, m=unknown multicast, b=broadcast, A=all

```

          CP      FFP  1/0/1  1/0/0  2/0/1  2/0/0  0/1/1  0/1/0  0/2/1  0/2/0  0/3/1
0/3/0  0/4/1  0/4/0 drops

```

CP	um	FFP	1/0/1	1/0/0	2/0/1	2/0/0	0/1/1	0/1/0	0/2/1	0/2/0	0/3/1
um	um	A	um	um	um	um	um	um	um	um	um
FFP	-	A	-	-	-	-	-	-	-	-	-
1/0/1	um	umb	umb	umb	umb	umb	umb	umb	umb	umb	umb
1/0/0	um	umb	umb	-	umb	umb	umb	umb	umb	umb	umb
2/0/1	um	umb	umb	umb	-	umb	umb	umb	umb	umb	umb
2/0/0	um	umb	umb	umb	umb	-	umb	umb	umb	umb	umb
0/1/1	um	umb	umb	umb	umb	umb	-	umb	umb	umb	umb
0/1/0	um	umb	umb	umb	umb	umb	umb	-	umb	umb	umb
0/2/1	um	umb	umb	umb	umb	umb	umb	umb	-	umb	umb
0/2/0	um	umb	umb	umb	umb	umb	umb	umb	umb	-	umb
0/3/1	um	umb	umb	umb	umb	umb	umb	umb	umb	umb	-
0/3/0	um	umb	umb	umb	umb	umb	umb	umb	umb	umb	umb
0/4/1	um	umb	umb	umb	umb	umb	umb	umb	umb	umb	umb
0/4/0	um	umb	umb	umb	umb	umb	umb	umb	umb	umb	umb

Port VLAN membership: [untagged vlan] U=untagged T=tagged <VLAN range begin>-<VLAN range end>

```

CP [2352] U:0001-0001 T:0002-2351 U:2352-2352 T:2353-4095
FFP [2352] T:0001-4095
1/0/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095

```



```

1/0/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
2/0/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095
2/0/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/1/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/1/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/2/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/2/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/3/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/3/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/4/1 [2352] T:0002-2351 U:2352-2352 T:2353-4095
0/4/0 [2352] T:0002-2351 U:2352-2352 T:2353-4095
    
```

show platform hardware backplaneswitch-manager rp active ffp statistics: Example

```

Router# show platform hardware backplaneswitch-manager rp active ffp statistics
Broadcom 10G port(e.g: FFP) status:
    
```

	Rx pkts	Rx Bytes	Tx Pkts	Tx Bytes
All	0	0	0	0
=64	0		0	
65~127	0		0	
128~255	0		0	
256~511	0		0	
512~1023	0		0	
1024~1518	0		0	
1519~2047	0		0	
2048~4095	0		0	
4096~9216	0		0	
9217~16383	0		0	
Max	0		0	
Good	0		0	
CoS 0			0	0
CoS 1			0	0
CoS 2			0	0
CoS 3			0	0
CoS 4			0	0
CoS 5			0	0
CoS 6			0	0
CoS 7			0	0
Unicast	0		0	
Multicast	0		0	
Broadcast	0		0	
Control	0		0	
Errored				
FCS	0		0	
Undersize	0		0	
Ether len	0		0	
Fragment	0		0	
Jabber	0		0	
MTU ck, good	0		0	
MTU ck, bad	0		0	
Tx underflow				0
err symbol	0		0	
frame err	0		0	
junk	0		0	
Drops				
CoS 0			0	0
CoS 1			0	0
CoS 2			0	0
CoS 3			0	0
CoS 4			0	0
CoS 5			0	0

```

CoS 6                                0                0
CoS 7                                0                0
STP                                  0
backpress                            0
congest                               0                0
purge/cell                            0
no destination                        0
Pause PFC                             0                0
CoS 0                                0
CoS 1                                0
CoS 2                                0
CoS 3                                0
CoS 4                                0
CoS 5                                0
CoS 6                                0
CoS 7                                0

```

Managing Modules and Interfaces

The router supports various modules. For a list of supported modules, see [Modules Supported, on page 2](#). The module management process involves bringing up the modules so that their resources can be utilized. This process consists of tasks such as module detection, authentication, configuration by clients, status reporting, and recovery.

For a list of small-form-factor pluggable (SFP) modules supported on your router, see the "Installing and Upgrading Internal Modules and FRUs" section in the [Hardware Installation Guide for Cisco Catalyst 8300 Edge Platform](#).

The following sections provide additional information on managing the modules and interfaces:

- [Managing Module Interfaces, on page 10](#)

Managing Module Interfaces

After a module is in service, you can control and monitor its module interface. Interface management includes configuring clients with **shut** or **no shut** commands and reporting on the state of the interface and the interface-level statistics.

Configuration Examples

This section provides examples of deactivating and activating modules.

Deactivating a Module Configuration: Example

You can deactivate a module to perform OIR of that module. The following example shows how to deactivate a module (and its interfaces) and remove power to the module. In this example, the module is installed in subslot 0 of the router.

```
Router(config)# hw-module slot 1 subslot 1/0 shutdown unpowered
```

Activating a Module Configuration: Example

You can activate a module if you have previously deactivated it. If you have not deactivated a module and its interfaces during OIR, then the module is automatically reactivated upon reactivation of the router.

The following example shows how to activate a module. In this example, the module is installed in subslot 0, located in slot 1 of the router:

```
Router(config)# hw-module slot 1 subslot 1/0 start
```

