



CHAPTER 5

Installing and Removing a Shared Port Adapter

Release 12.0(33)S, OL-8831-01, Rev. G9

This chapter describes how to install or remove SPAs on the Cisco 12000 Series Router. This chapter contains the following sections:

- [Handling SPAs, page 5-1](#)
- [SPA Installation and Removal, page 5-2](#)
- [SPA Installation and Removal, page 5-2](#)
- [Optical Device Installation and Removal, page 5-3](#)
- [Checking the Installation, page 5-4](#)

Handling SPAs

Each SPA circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage. Before you begin installation, read “[Preparing to Install a SPA Interface Processor or a Shared Port Adapter](#)” for a list of parts and tools required for installation.

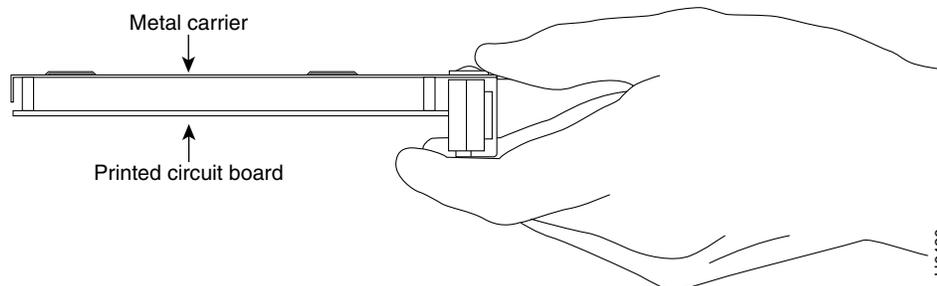


Caution

Always handle the SPA by the carrier edges and handle; never touch the SPA components or connector pins. (See [Figure 5-1](#).)

When a slot is not in use, a SPA blank filler plate must fill the empty slot to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a SPA in a slot that is not in use, you must first remove the SPA blank filler plate.

Figure 5-1 Handling a SPA



SPA Installation and Removal

This section provides step-by-step instructions for removing and installing a SPA in an SIP.

**Warning**

When performing the following procedures, wear a grounding wrist strap to avoid ESD damage to the SPA. Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.

Installing a SPA in a SIP

To install a SPA in a SIP, refer to [Figure 5-2](#) and do the following:

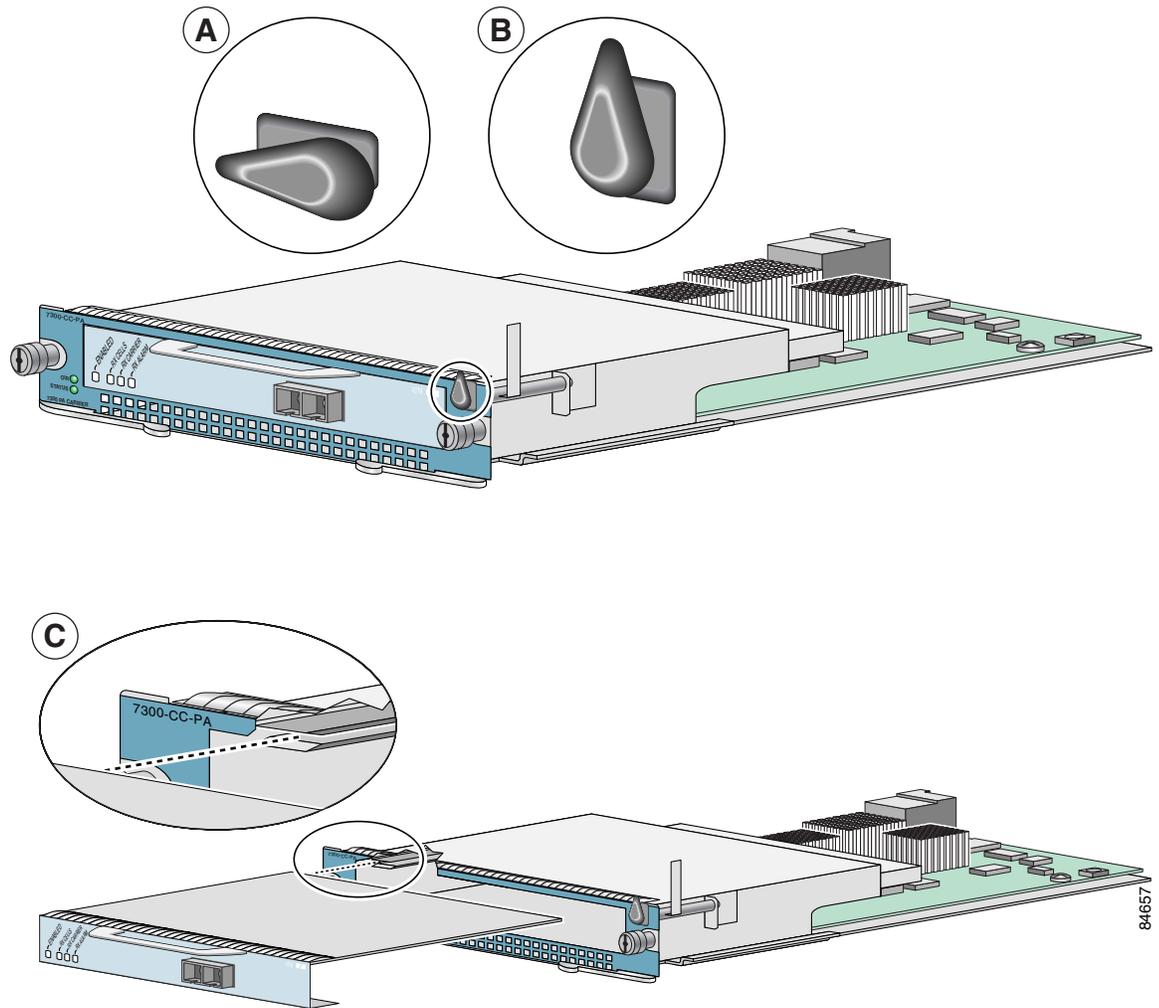
-
- Step 1** To insert the SPA in the SIP, locate the guide rails inside the SIP that hold the SPA in place. They are at the top left and top right of the SPA slot and are recessed about an inch, as shown in C of [Figure 5-2](#).
 - Step 2** Carefully slide the SPA all the way in the SIP until the SPA is firmly seated in the SPA interface connector. When fully seated, the SPA might be slightly behind the SIP faceplate.
 - Step 3** After the SPA is properly seated, turn the SPA lock to its locked and horizontal position, as shown in A of [Figure 5-2](#).
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Removing a SPA from a SIP

To remove a SPA from a SIP, refer to [Figure 5-2](#) and do the following:

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- Step 1** If attached, remove any cables from the SPA.
 - Step 2** To remove the SPA from the SIP, turn the SPA lock from its locked and horizontal position shown in A of [Figure 5-2](#) to its unlocked and vertical position shown in B of [Figure 5-2](#).
 - Step 3** Grasp the handle of the SPA and pull the SPA from the SIP. (Ensure that you have already disconnected the cables from the SPA before removing the SPA from the SIP).
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Figure 5-2 SPA Installation and Removal



Online Insertion and Removal

Cisco 12000 series router SIPs and SPAs support online insertion and removal (OIR). SPAs can be inserted or removed independently from the SIP. OIR of a SIP with installed SPAs is also supported.

Optical Device Installation and Removal

Any contamination of the fiber connection can cause failure of the component or failure of the whole system. A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. Inspection, cleaning, and reinspection are critical steps to take before making fiber-optic connections.

Cleaning Optical Devices

See the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document for information on cleaning optical devices.

Checking the Installation

This section describes the procedures you can use to verify the SIP and SPA installation, and includes information on the following topics:

- [Verifying the Installation, page 5-4](#)
- [Using show Commands to Verify SIP and SPA Status, page 5-5](#)
- [Using show Commands to Display SPA Information, page 5-6](#)
- [Using the ping Command to Verify Network Connectivity, page 5-8](#)

Verifying the Installation

This section describes how to verify the SIP and SPA installation by observing the SIP LED states, SPA LED states, and the information displayed on the console terminal.

When the system has reinitialized all interfaces, the SIP STATUS LED should be green (on) and the SPA STATUS LEDs should be green (on). The port LEDs (C/A and A/L) may be green (on), depending on your connections and configuration. The console screen also displays a message as the system discovers each interface during its reinitialization.



Note

A POS interface is used in the following examples for illustrative purposes.

The following sample display shows the events logged by the system as a SIP with a POS SPA was removed from module slot 4 in the router. In this example, interface 0 (interface 4/0/0) on the POS SPA was up and active when the SIP was removed from the router. Note that the system logs that the SIP card was removed from slot 4 and that interface 4/0/0 is changed to *down*.

```
Router#
00:06:17:%WS_ALARM-6-INFO:ASSERT CRITICAL slot 4 Active Card Removed OIR Alarm
00:06:17:%OIR-6-REMCARD:Card removed from slot 4, interfaces disabled
00:06:18:%LINEPROTO-5-UPDOWN:Line protocol on Interface pos4/0/0, changed state to down
```

When you reinsert the SIP with the installed POS SPA, the system automatically brings up the interface that was changed to *down* when the SIP was removed.

```
Router#
00:07:29:%OIR-6-INSCARD:Card inserted in slot 4, interfaces administratively shut down
00:07:32:%WS_ALARM-6-INFO:CLEAR CRITICAL slot 4 Active Card Removed OIR Alarm
00:07:35:%LINK-3-UPDOWN:Interface pos4/0/0, changed state to up
00:07:36:%LINEPROTO-5-UPDOWN:Line protocol on Interface pos4/0/0, changed state to up
```

Use the following procedure to verify that a SIP and SPA are installed correctly:

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- Step 1** Observe the console display messages and verify that the system discovers the SIP, while the system reinitializes each interface, as follows:
- As a SIP is initialized, the STATUS LED will first be yellow, indicating that power is on, but the SIP is being configured. When the SIP is active, the STATUS LED will illuminate green.
 - SPAs will follow the same sequence once the SIP has completed its initialization. The SPA STATUS LEDs will illuminate amber, turning to green when the SPAs become active.
 - When the SIP and SPA STATUS LEDs are green, all associated interfaces are configurable.

Refer to the *Cisco 12000 Series Router SIP and SPA Software Configuration Guide (Cisco IOS)* for configuration instructions.

- If a SIP or SPA is replaced with a module of the same type (as in an OIR or hardware swap), the previous configuration will be reinstated when the SIP or SPA becomes active.
- If a SIP or SPA has not been previously installed in the same slot or subslot, then the configuration for all associated interfaces will be empty.



Note New interfaces are not available until you configure them.

- Step 2** If the SIPs and SPAs have not become active within three minutes, refer to the system console messages as follows:
- If a SIP or SPA is undergoing an FPD upgrade, then console messages will indicate that the FPD process has been initiated. The upgrade process might take several minutes. Use the **show fpd upgrade process** command to obtain information about the FPD process. SIPs or SPAs that undergo an FPD upgrade will automatically be rebooted. Return to [Step 1](#).
 - If there is no indication that an FPD upgrade is underway, see [Chapter 6, “Troubleshooting the Installation.”](#)
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Using show Commands to Verify SIP and SPA Status

The following procedure uses **show** commands to verify that the new SPAs are configured and operating correctly.

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- Step 1** Use the **show running-config** command to display the system configuration. Verify that the configuration includes the new SPA interfaces.
- Step 2** Display all of the current SPAs and a summary of their status using the **show hw-module subslot oir** command.
- Step 3** Display information about the installed SIPs using the **show diag** command.
- Step 4** Use the **show hw-module subslot fpd** command to verify the FPD version information of the SPAs installed in the system.



Note If a SPA does not meet the minimum FPD version required, it will be updated automatically. If the update fails, the failing module will be powered down and an error message will be reported on the system console.

For more information about FPD upgrades, refer to the “Upgrading Field-Programmable Devices” chapter of the *Cisco 7600 Series Router SIP, SSC, and SPA Software Configuration Guide*.

Step 5 Use the **show version** command to obtain a few details on the installed SIPs and interfaces available.

Using show Commands to Display SPA Information

Table 5-1 describes the **show** commands you can use to display SPA information.

Table 5-1 *show Commands to Display SPA Information*

Command	Type of Information Provided
show running-config	The router’s running configuration and interfaces available in the system.
show hw-module subslot all oir	The operational status of all SPAs in the system.
show diag	SPA type in that slot, number of ports, hardware revision, part number, and EEPROM contents.
show hw-module subslot all fpd	FPD version information of SPAs in the system.
show version	Cisco IOS software version, names and sources of configuration files, and boot images.

Table 5-2 *show Commands to Display SPA Information*

Command	Type of Information Provided	Example
show controllers <i>type slot/subslot/port</i>	Network link status, register contents, and controller chip errors.	show controllers pos 2/3/0
show interfaces <i>type slot/subslot/port</i>	Line status and data link protocol status for a particular SPA port. Statistics about data traffic sent and received by the port.	show interfaces pos 2/2/0
show diag <i>slot</i>	SPA type in that slot, number of ports, hardware revision, part number, and EEPROM contents.	show diag 4
show version	Cisco IOS software version, names and sources of configuration files, and boot images.	show version



Note

A Fast Ethernet interface is used in the following examples for illustrative purposes.

The following sample display shows the events logged by the system as an SIP with a Fast Ethernet SPA was removed from module slot 3; the system then reinitializes the remaining interface processors and marks as down the Fast Ethernet interface on the SIP that was removed from slot 3.

```
Router#
18:04:29: %OIR-6-REMCARD: Card removed from slot 3, interfaces disabled
18:04:30: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/0, changed state
to down
```

When you reinsert the SIP, the system automatically brings up the interfaces that were up when the SIP was removed.

```
Router#
18:05:00: %OIR-6-INSCARD: Card inserted in slot 3, interfaces administratively shut down
18:05:08: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/0, changed state
to up
```

**Note**

When a new SIP is inserted or when a SIP is moved to a new slot, the system recognizes the new interfaces but leaves them in the shutdown state until you configure them and change their state to up.

The following sample display shows the events logged by the system as you insert a *new* SIP in module slot 3.

```
Router#
18:05:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/1, changed state
to down
```

Use the following procedure to verify that the SIP is installed correctly:

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- Step 1** Observe the console display messages and verify that the system discovers the SIP, while the system reinitializes each interface, as follows:
- If you installed a new SIP, the STATUS LED should be on (green). The system should recognize all new interfaces but leave them configured as *down*.
 - If you replaced a SIP, the STATUS LED should be on (green). The system does not recognize each interface and places it in the administratively down state.
- Step 2** Verify that the ENABLED LED on the SPA goes on (is green) and remains on after the reinitialization is complete. If the ENABLED LED remains on, proceed to [Step 5](#). If the ENABLED LED does not remain on, proceed to [Step 3](#).
- Step 3** If the ENABLED LED on a SPA fails to go on, the SPA or the SIP might not be fully seated *even if the SPA lock is in the locked and horizontal position*. When a SPA is not recognized, the SIP is deactivated, and its OIR LED is yellow.
- Remove the SIP from the router.
 - Remove the SPA from the SIP.
 - Inspect the SIP and the SPA. Verify there are no bent pins or parts and that there is nothing lodged in the two devices that could prevent a good connection.
 - Insert the SPA in the SIP by sliding the SPA all the way in the SIP until the SPA is firmly seated in the SPA interface connector. When fully seated in the SIP, the SPA might be slightly behind the SIP faceplate.
 - Insert the SIP into the router.
 - After the system reinitialization, the ENABLED LED on the SPA should go on and remain on. If the ENABLED LED remains on, proceed to [Step 5](#). If it does not, proceed to [Step 4](#).
- Step 4** If the ENABLED LED on a SPA still fails to go on, remove the SIP and install it in another available slot on the router.
- If the ENABLED LED goes on, suspect a failed backplane port in the original slot.
 - If the ENABLED LED fails to go on, remove the SIP and ensure the SPA is firmly seated in its slot. Remove and reinstall it accordingly.

- If the ENABLED LED still fails to go on, but other LEDs on the SIP SPA go on to indicate activity, proceed to [Step 5](#) to resume the installation checkout; suspect that the ENABLED LED on the SPA has failed. Contact a service representative to report the problem and obtain further instructions.
- If no LEDs on the SPA go on:
 - Verify that the SPA is supported on the SIP and that it has the required hardware revision. If the SPA is not supported or has an old hardware revision, the **show diag** command indicates that the SIP is deactivated.
 - Suspect a faulty SIP. Contact a service representative to report the problem and obtain further instructions.

Step 5 If the SPA is new and not a replacement, configure the new SPA using the *Cisco 12000 Series Router SIP and SPA Software Configuration Guide (Cisco IOS)*.



Note New interfaces are not available until you configure them.

Step 6 If the SIP is a replacement, use the **show interfaces** *type slot-number/port-number* command or the **show controllers** command to verify the status of the SPAs. (See the “[Using show Commands to Verify SIP and SPA Status](#)” section on page 5-5.)

If you replaced a SIP with another SIP with a different SPA installed, the system recognizes the interfaces on the previously configured SPA but does not recognize the new SPA interfaces. The new interfaces remain in the shutdown state until you configure them.

Step 7 When the interfaces are up, check the activity of each SPA by observing the status LEDs.

Step 8 If an interface LED fails to go on and a cable is connected to the interface port, check the cable connection and make certain it is properly seated in the connector.

Step 9 Repeat [Step 1](#) through [Step 8](#) to verify that any additional MSCs are properly installed.

If you experience other problems that you are unable to solve, contact TAC (see the “[Obtaining Documentation and Submitting a Service Request](#)” section on page -xviii in the [Preface](#)) or a service representative for assistance.

To configure the new interface, use the *Cisco 12000 Series Router SIP and SPA Software Configuration Guide (Cisco IOS)*.

Using the ping Command to Verify Network Connectivity

This section provides brief descriptions of the **ping** command. The **ping** command allows you to verify that a SPA port is functioning properly and to check the path between a specific port and connected devices at various locations on the network. After you verify that the system and the SIP have booted successfully and are operational, you can use this command to verify the status of the SPA ports. Refer to the publications listed in the “[Related Documentation](#)” section on page xviii for detailed command descriptions and examples.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

Following is an example of a successful **ping** command to a remote server with the IP address 10.1.1.60:

```
Router# ping 10.1.1.60 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.1.1.60, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the server and that the server is active (powered on), and repeat the **ping** command.

SPA Blank Filler Plates

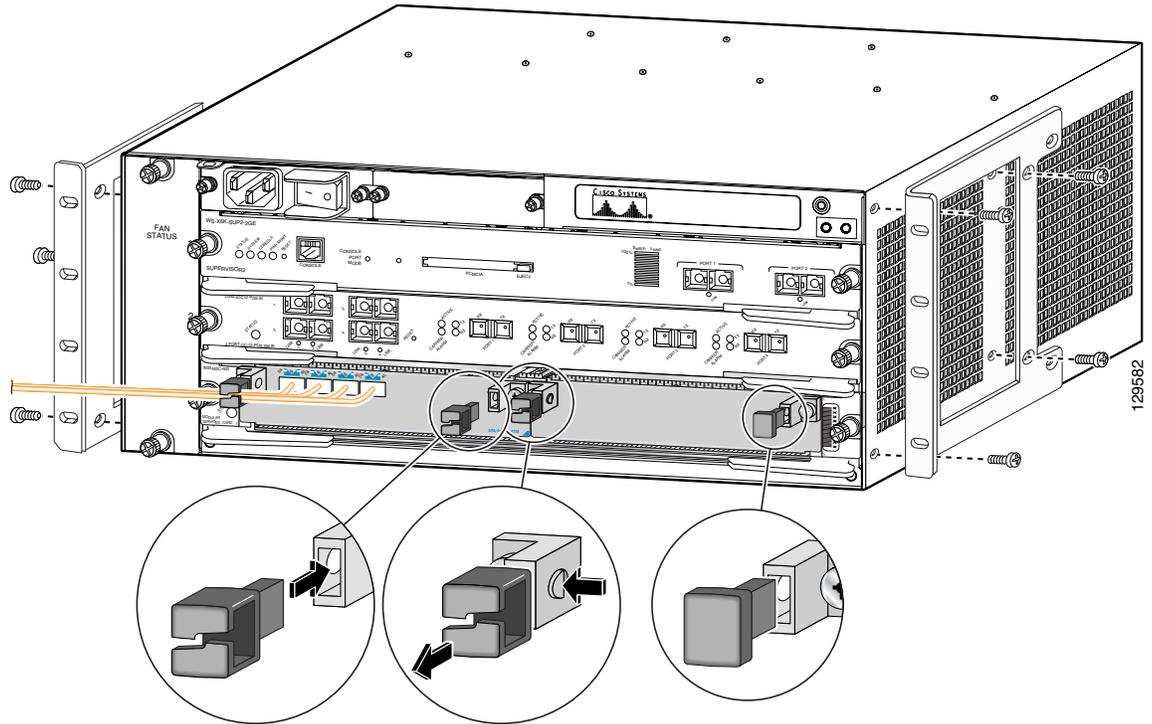
SPA blank filler plates are available to fill an unused SPA subslot.

When a SPA subslot is not in use, a SPA blank filler plate must be installed in the empty subslot to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the SPAs. If you plan to install a new SPA in a subslot that is not in use, you must first remove the SPA blank filler plate.

SPA Cable-Management Brackets

SPAs are shipped with an accessory kit that includes cable-management brackets. Figure 5-3 shows cable-management brackets installed in a SPA, as well as cable routing.

Figure 5-3 SPA Cable-Management Brackets



To install cable-management brackets on a SPA, perform the following steps:

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- Step 1** Screw the two pull assemblies into both sides of the SPA.
 - Step 2** Insert the cable-management clip into the slot.
 - Step 3** To remove the cable-management clip, depress the button on the clip and pull it out.
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Note

Blank filler plugs are provided if no cable-management clips are installed.