



Quick Installation Procedures

This chapter describes procedures for installing essential hardware components. This section describes common hardware installation tasks. Refer to the *Cisco ONS 15540 ESP Hardware Installation Guide* for complete hardware installation instructions.

This chapter contains the following major sections:

- [Preparing to Install the Chassis, page 2-1](#)
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Preparing to Install the Chassis

The Cisco ONS 15540 ESP chassis is designed for rack-mounting in a cabinet rack. Use star-type lock washers on the rack screws to ensure a good conductive connection between the chassis and the rack. For information about installing the units in a customer cabinet, see the instructions from the cabinet manufacturer.

Three chassis fit in a standard rack. However, if you use the external AC-input power supply, you can install two chassis with the power supply.

Perform this procedure to install the Cisco ONS 15540 ESP chassis in a standard 19-inch rack:

-
- Step 1** Place the L brackets on the sides of the chassis.
- Step 2** Secure the L brackets to the chassis using the 14 M4 Phillips countersunk-head screws provided in the rack-mount kit. Use seven screws on each L bracket on the sides of the chassis.

- Step 3** Place the top cable guide over the top of the chassis. Ensure that the earth contact is visible through the cable guide.
 - Step 4** Secure the cable guide to the shelf with five 6-32 screws.
-

Installing the Chassis

To install the Cisco ONS 15540 ESP chassis in the rack, follow these steps:

- Step 1** Grasp the bottom edge of the chassis with one hand near the front and the other near the back. With one person at each side of the chassis, slowly lift the chassis in unison.
 - Step 2** Position the chassis in the rack.
 - Step 3** Align the mounting holes in the L bracket and the bottom cable management guide with the mounting holes in the equipment rack.
 - Step 4** Install the 12-24 or 10-32 screws through the elongated holes in the L bracket and into the threaded holes in the mounting post.
 - Step 5** Place the bottom cable guides over the fan assembly.
 - Step 6** Secure the cable guide to the rack with the 6-32 screws.
-

Installing Strain Relief Brackets

The Cisco ONS 15540 ESP system uses a power supply cable strain relief bracket for connections to its power supply and an alarm cable strain relief bracket for alarm cable connections. The strain relief brackets must be installed after the shelf is rack mounted and installed in the rack. The brackets are required for proper function of the power supply and alarm cables.

To install the strain relief brackets, follow these steps:

- Step 1** Place the strain relief bracket over the designated slots on the back panel.
 - Step 2** Use the two screws provided to secure the strain relief bracket to the shelf.
-

Installing the Processor Card

The mux/demux motherboards, line card motherboards, and processor cards are hot-swappable. We recommend installing the processor cards first and then filling the chassis from slots 0 to 11, left to right.

Perform the following procedure to install the processor card in the Cisco ONS 15540 ESP.

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- Step 1** Insert the processor card carefully into chassis slot 6. Guide the upper and lower edges of the motherboard or processor card in the tracks until its connectors come into contact with the backplane.
 - Step 2** Use your thumb and forefinger of each hand to simultaneously push the motherboard or processor card in until it is fully seated in the backplane connector.
 - Step 3** Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.
 - Step 4** If not installing a redundant processor card, insert a blank card into slot 7.
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[Table 2-1](#) lists the LEDs on the processor card faceplate, their default conditions, and what the conditions indicate.

Table 2-1 Processor Card LEDs

LED	Status	Description
Status	Red	A board resets or initially powers on.
	Orange	System initialization.
	Green	Full initialization and operational.
Active	Green	This board is the primary processor and is running IOS software.
Standby	Green	This board is the secondary processor.
Slot 0	Green	Flash PC Card is present.
Slot 1	Green	Flash PC Card is present.
NME ¹		
Full Duplex	Green	Full duplex is running.
	Off	Half duplex is running.
100 Mbps	Green	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.
Link	Green	Link is up.
	Off	Link is down.
ASE ²		
Full Duplex	Green	Full duplex is running.
	Off	Half duplex is running.
100 Mbps	Green	Operating at 100 Mbps.
	Off	Operating at 10 Mbps.
Link	Green	Link is up.
	Off	Link is down.
Critical Alarm	Yellow	A critical alarm condition exists.

Table 2-1 Processor Card LEDs (continued)

LED	Status	Description
Major Alarm	Yellow	A major alarm condition exists.
Minor Alarm	Yellow	A minor alarm condition exists.
Alarm Cutoff	Yellow	A major or minor alarm condition exists and the cutoff button has been pushed. Turns off by software when the original alarm clears or any new alarm occurs.
History	Yellow	A major or minor alarm occurred. Clears if the History Clear button is pushed and no alarm exists.

1. NME = network management Ethernet
2. ASE = aggregation shelf Ethernet

To install a redundant processor card, perform the next procedure.

For more details about using the Console Ports, NME Ports, and Auxiliary Ports of the processor card, refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Installing a Redundant Processor Card

Perform the following procedure to install the redundant processor card:

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- Step 1** Insert the processor card carefully into chassis slot 7. Guide the upper and lower edges of the motherboard or processor card in the tracks until its connectors come into contact with the backplane.
 - Step 2** Use your thumb and forefinger of each hand to simultaneously push the motherboard or processor card in until it is fully seated in the backplane connector.
 - Step 3** Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.
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For more details on redundant processors refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference*.

Connecting the Console Port

The console port is a female, DCE (data communications equipment), DB-25 receptacle used for connection to a console terminal or modem. There is a console port on both processor cards.

To connect cables to the console port, follow these steps:

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- Step 1** Place the DB-25 connector in front of the console port on the processor card faceplate.
 - Step 2** Align the male DB-25 connector with the female console port.

- Step 3** Gently push the DB-25 connector into the console port and secure it in place by tightening the side screws on the DB-25 connector.
- Step 4** Route the fiber cables down through the cutout holes on the cable management tray out of the right side of the shelf assembly.
-

Installing Mux/Demux Motherboards and Mux/Demux Modules

The Cisco ONS 15540 ESP chassis uses one optical mux/demux motherboard for unprotected operation or two per system for protected operation.

Installing Mux/Demux Motherboards

You can install up to two motherboards into slot 0 and slot 1. Perform the following procedure to install a mux/demux motherboard.

**Note**

In Cisco ONS 15540 ESP systems, there are additional rules for slot placement of mux/demux modules and line cards. Refer to the *Cisco ONS 15540 ESP Planning Guide*.

- Step 1** Remove the backplane side dust covers and transponder side dust covers from the motherboards, and clean the optical connectors. See the [“Cleaning Optical Connectors” section on page 2-11](#).
- Step 2** Insert the card carefully into the chassis slot. Guide the upper and lower edges of the motherboard or processor card in the tracks until its connectors come into contact with the backplane.
- Step 3** Use your thumb and forefinger of each hand to simultaneously push the card in until it is fully seated in the backplane connector.
- Step 4** Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.
- Step 5** Install blank covers into the unused motherboard slots.

**Note**

Mux/demux motherboards without OSC have no LEDs.

Table 2-2 Mux/Demux Motherboard LEDs

LED	Status	Description
Status	Blinking green	Motherboard has a good system clock from the primary processor and is out of the reset state.
	Solid green	Software initialization is successful.
	Orange	System clock is not present. Board is unavailable.
	Off	Board failure
Tx	Solid green	OSC is present and the optical laser output is enabled.
	Off	OSC is not present and the optical laser output is disabled.
Rx	Solid green	OSC is present and the receiver is enabled.
	Off	OSC is not present and the receiver is disabled.

Installing 4-Channel or 8-Channel Mux/Demux Modules

This section describes the procedure for installing a 4-channel or 8-channel mux/demux module in the Cisco ONS 15540 ESP. To install the module, follow these steps:

- Step 1** Remove the dust covers from the module, and clean the optical connectors. See the [“Cleaning Optical Connectors”](#) section on page 2-11.



Caution Wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.

- Step 2** Insert the module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.

[Table 2-2](#) lists the LEDs on the mux/demux motherboard with OSC faceplate, their default conditions, and what the conditions indicate.

Installing 16-Channel Mux/Demux Modules

This section describes the procedure for installing 16-channel mux/demux modules in the Cisco ONS 15540 ESP. To install the 16-channel mux/demux module, follow these steps:

- Step 1** Remove the dust covers from the module, and clean the optical connectors. See the [“Cleaning Optical Connectors”](#) section on page 2-11.

- Step 2** Insert the correct inset tray for the 16-channel mux/demux module and secure the tray to the motherboard by tightening the screws.

- Step 3** Insert the 16-channel mux/demux module with OSC carefully into the top motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.
- Step 4** If you are installing a second 16-channel mux/demux module, insert the module without OSC carefully into the bottom motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.
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Installing Line Card Motherboards and Transponder Modules

You can install up to eight hot-swappable line card motherboards in slots 2 to 5 and 8 to 11 of the Cisco ONS 15540 ESP chassis.

Each line card motherboard holds up to four transponder modules that have a single protocol-transparent and bit-rate transparent external interface to the client side network and an internal interface that connects over the system's backplane to the mux/demux modules. The transponder modules are hot-pluggable, allowing in-service upgrades and replacement.

Transponders are available in single-mode, and multimode. Line card motherboards are available with or without splitter protection.

**Note**

In Cisco ONS 15540 ESP systems, there are additional rules for slot placement of mux/demux modules and line cards. For more information on shelf rules, refer to the *Cisco ONS 15540 ESP Planning Guide*.

Installing Line Card Motherboards

Perform the following procedure to install the line card motherboard.

- Step 1** Remove the backplane side dust covers and the transponder side dust covers from the motherboard, and clean the optical connectors. See the [“Cleaning Optical Connectors”](#) section on page 2-11.
- Step 2** Insert the motherboard carefully into the chassis slot while guiding the upper and lower edges of the motherboard in the tracks until its connectors come into contact with the backplane.
- Step 3** Use the handles to push the line card motherboard in until it is fully seated in the backplane connector.

- Step 4** Use a 3/16-inch flat-blade screwdriver to tighten the captive installation screws.
- Step 5** Install blank covers into the unused motherboard slots.

[Table 2-3](#) lists the LEDs on the line card motherboard faceplate, their default conditions, and what the conditions indicate.

Table 2-3 Line Card Motherboard LEDs

LED	Status	Description
Status	Blinking green	Motherboard has a good system clock from the primary processor and is out of the reset state.
	Solid green	Software initialization is successful.
	Orange	System clock is not present. Board is unavailable.
	Off	Board failure

Installing SM Transponder Modules or MM Transponder Modules

Perform the following procedure to install SM transponder modules or MM transponder modules.

- Step 1** Remove the dust covers from the module, and clean the optical connectors. See the [“Cleaning Optical Connectors”](#) section on page 2-11.
- Step 2** Lift the latch handle on the transponder module and insert the module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.
- Step 3** Push the latch on the module down to secure the module in place.

[Table 2-4](#) lists the LEDs for the extended range transponder module.

Table 2-4 SM Transponder or MM Transponder Module LEDs

LED	Status	Description
LCL RX OK	Green	Data is received on the client side.
TRUNK RX OK	Green	Data is received on the trunk side.
LCL TX ENABLE	Green	Client side transmit laser is enabled.
TRUNK TX ENABLE	Green	Trunk side transmit laser is enabled.

Installing Extended Range Transponder Modules

Perform the following procedure to install extended range transponder modules.

- Step 1** Remove the dust covers from the module, and clean the optical connectors. See the [“Cleaning Optical Connectors” section on page 2-11](#).
- Step 2** Install the transceiver by inserting it into the extended range transponder. Push the transceiver until it is securely set in the module.
- Step 3** Lift the latch handle on the extended range transponder module and insert the module carefully into the motherboard slot while guiding the upper and lower edges of the module in the tracks until its connectors come into contact with the backplane connectors. You hear a click when it is connected.
- Step 4** Push the latch on the module down to secure the module in place.

[Table 2-5](#) lists the LEDs for the extended range transponder module.

Table 2-5 Extended Range Transponder Module LEDs

LED	Status	Description
CLIENT RX	Green	Data is received on the client side.
TRUNK RX	Green	Data is received on the trunk side.
CLIENT TX	Green	Client side transmit laser is enabled.
TRUNK TX	Green	Trunk side transmit laser is enabled.

Cabling Transponder Modules

To install fiber-optic cables in the Cisco ONS 15540 ESP, a fiber cable with the corresponding connector type must be connected to the transmit and receive ports on the modules. On Cisco ONS 15540 optical ports, the top connector is Transmit and the bottom connector is Receive. Label the transmit and receive and the working and protection fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance.

- Step 1** Place the connector in front of the connection point on the transponder module faceplate. Each transponder module has at least one transmit and one receive connector to create an optical carrier port.
- Step 2** Align the keyed ridge of the cable connector with the receiving slot on the faceplate connection point. Gently push the cable connector into the faceplate connection point until the connector snaps into place.
- Step 3** Route fiber cables through the cable retaining clips on the optical card faceplate into the cable management tray on the bottom of the shelf assembly.
- Step 4** Route the fiber cables from the cable management tray out of the right side of the shelf assembly through cutout holes from the cable management tray.

Cabling Mux/Demux Modules

This section describes the connections between pairs of mux/demux modules and between mux/demux modules and mux/demux motherboards in the Cisco ONS 15540 ESP. The assumption is made that the motherboard and modules are already installed and checked.

Connecting Mux/Demux Module and OSC Ports

Perform the following steps to connect the motherboard and module. Use MU-MU connectors (short fiber length) to connect OSC ports of the motherboard to OSC In and OSC Out on the module.

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- Step 1 Connect OSC Tx from the motherboard to OSC In on the module.
 - Step 2 Connect OSC Rx from the motherboard to OSC Out on the module.
-

Connecting 4-Channel or 8-Channel Mux/Demux Modules

If you have more than one 4-channel or 8-channel mux/demux module, perform the following steps to cascade the modules. Use MU-MU connectors (short fiber length) to connect the modules.

-
- Step 1 Connect the Thru Out port of the module with the DWDM Trunk to Trunk In of the next module in slot 0.
 - Step 2 Connect the Thru Out of the remaining modules to Trunk In of the next module in slot 0.
 - Step 3 Perform the steps above for Thru In and Trunk Out in the same slot. Repeat the steps above for slot 1.
 - Step 4 Connect the trunk fiber to the mux/demux module.
-

Shelf Grounding Procedure

This section describes how to connect the Cisco ONS 15540 to earth ground. You must complete this procedure before connecting system power or powering up your shelf.



Tip

If you use the cable management guides, install the grounding equipment after you install the top cable management guide.

To ground the shelf, follow these steps:

-
- Step 1 Use a wire-stripping tool to remove approximately 0.75 inch (20 mm) of the covering from the end of the grounding wire.
 - Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug.
 - Step 3 Use the crimping tool to secure the grounding wire in place in the grounding lug.
 - Step 4 Locate the grounding receptacle on the chassis.

Step 5 Remove the label that covers the grounding receptacle.



Note Step 6 is optional if you are not using the top cable management guide.

Step 6 Place the lug mounting adapter against the grounding receptacle at the top of the chassis.

Step 7 Place the grounding lug against the lug mounting adapter.

Step 8 Insert two screws through the holes in the grounding lug and the grounding receptacle. Ensure that the grounding lug does not interfere with other hardware or rack equipment.

Step 9 Install the locking washers and nuts; tighten them to secure the grounding lug to the grounding receptacle.

Step 10 Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure adequate earth ground for the Cisco ONS 15540.

Cleaning the Shelf

Be careful with the airflow system when you clean the chassis. If the cleaning process must be done while the system is running, be aware that the airflow system is in operation. Clean the chassis with a damp cloth only and be careful of the following:

- Do not touch the airflow system while fans are operating.
- Do not use wet tissues for cleaning the chassis.
- Do not use any harsh or abrasive cleaning agents.



Warning

Invisible laser radiation might be emitted from the end of the fiber or connector. Do not stare into the beam or view directly with optical instruments.

Cleaning Optical Connectors

When installing your optical connectors, consider the following issues:

- Dirty optical connectors are a common source of light loss. Keep the connectors clean at all times and keep the dust cover installed when not in use.
- Before installing any type of cable or connector, use a lint-free alcohol pad from a cleaning kit to clean the ferrule, the protective white tube around the fiber, and the end-face surface of the fiber.
- As a general rule, whenever there is a significant, unexplained loss of light, clean the connectors.



Caution

Use extreme care when removing or installing connectors so you do not damage the connector housing or scratch the end-face surface of the fiber. Always install filler modules on unused or disconnected components to prevent contamination. Always clean fiber connectors before installing them.

Use a swab saturated with isopropyl alcohol to clean the end-surfaces. Use dry, oil-free compressed air after applying the isopropyl alcohol.

To clean the optical connectors, follow these steps:

-
- Step 1** Wipe the ferrules and end-face surfaces of the connector gently with an alcohol pad from the cleaning kit. Be sure that the pad makes full contact with the end-face surfaces. Wait five seconds for the surfaces to dry and repeat.
- Step 2** Blow dry the connectors with canned, dry, oil-free, compressed air.
- Step 3** Use a magnifying glass to inspect the ferrule.

The connectors used inside the system have been cleaned by the manufacturer and connected to the adapters in the proper manner. The operation of the system should be error free if the customer provides clean connectors on the application side, follows the previous directions, and ensures the following:

- Clean the connectors using lens tissues before connecting to the adapters. Use pure alcohol to remove soil.
- Do not clean the inside of the connector adapters. Do not use force or quick movements when connecting the fiber optic connectors in the adapters.
- Cover the connector adapters to avoid soiling or contaminating the inside of the adapters while cleaning the chassis. When not using the connectors, cover the connectors and adapters to avoid the inside of the adapters or the surface of the connectors from getting dirty.



Note If the surface is not clean or does not have a uniform shine, repeat the process using a fresh surface of the alcohol pad.

Powering Up the Chassis

Before powering up the chassis, the following conditions must be met:

- The system is set for the correct AC (or DC) power voltages. Refer to the *Cisco ONS 15540 ESP Hardware Installation Guide* for power voltages.
- You must verify the rectifier status. Use a voltmeter on the DC output of the rectifier to verify the operational status of the rectifier.
- The power cables are connected to the system.
- A console terminal is connected to the system.

Verifying the Power Up

Once you have met the conditions in the “[Powering Up the Chassis](#)” section, power up the system. The CLI (command-line interface) prompts you to enter the initial configuration dialog. Answer no to this prompt:

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

You see the following user EXEC prompt:

Switch>

-
- Step 1** Verify that the Status LED is green.
 - Step 2** Verify that the Active LED on the primary processor and the Standby LED on the standby processor are both green.
 - Step 3** Verify that alarm LEDs are off.
 - Step 4** Verify that LEDs on mux/demux modules and line card modules are green.
 - Step 5** Perform a **show hardware** command to verify the status of both power supplies. The status for both power supplies should be OK.

Power-Supply Module

Power-Supply A is : OK

Power-Supply B is : OK

Verifying Installation of Hardware

Verify that all hardware is correctly installed by performing a **show hardware** command.

Verify that all modules in the chassis are reported in the proper slot. Verify that the modules have the correct hardware version and software version.

Example

The following example shows how to verify the hardware installation:

Switch# **show hardware**

```
-----
Manhattan_Backplane_PHASE_0 named Switch, Date: 00:46:49 UTC Thu Oct 24 2002
-----
```

```
-----
Back-Plane Information
-----
```

Model	Ver	Serial No.	MAC-Address	MAC-Size	RMA No	RMA Code	MFG-Date
Manhattan	3.0	TBC05031556	00-00-16-44-28-eD	16	0x00	0x00	02/16/2001

Slot	Orderable	Product No.	Part No.	Rev	Serial No.	Mfg. Date	H/W Ver.
0/*	15540-MMMB-0100=		73-5656-03	A0	CAB0608MMEX	03/08/2002	3.0
0/0	15540-MDXA-16AD		05-0893-01	2	402114	06/21/2001	1.0
0/2	15540-MDXA-16EH		05-0894-01	2	402273	06/21/2001	1.0
1/*	15540-MMMB-0100=		73-5656-03	A0	CAB0604MDBF	03/25/2002	3.0

1/0	15540-MDXB-08A0	30-1318-01 2	401394	06/21/2001	1.0
1/2	15540-MDXA-08C0=	74-2657-01 A1	ANX06040003	01/21/2002	1.0
1/3	MA-MDXA-08D0	30-1317-01 2	401118	06/21/2001	1.0
2/*	15540-LCMB-0100=	73-5813-05 02	CAB0525J5VB	02/15/2001	5.1
2/0	15540-TSP1-01B3=	68-XXXX-XX 02	CAB0537KE7Y	02/23/2001	3.0
2/1	15540-TSP1-01B3=	68-1510-02 02	CAB06190EWM	05/24/2002	2.1
2/2	15540-TSP1-03B3=	73-5757-02 02	sak04490026	02/23/2001	2.31
2/3	15540-TSP1-03B3=	68-1511-02 02	CAB06190EWL	05/24/2002	2.1
3/*	15540-LCMB-0100=	68-1372-02 C0	CAB0607MK5V	03/01/2002	5.0
5/*	15540-LCMB-0100=	68-1372-01 16	CAB0517HLSF	06/25/2001	5.1
5/3	15540-TSP1-15B3=	68-1429-01 B0	CAB0549LRNZ	01/04/2002	4.5
6/*	15540-CPU	73-5621-02 02	CAB0505GZH3	02/15/2001	2.5
7/*	15540-CPU	73-5621-02 03	CAB0510HATF	02/16/2001	2.3
11/*	15540-LCMB-0100=	73-5813-05 05	CAB0516HKE2	03/30/2001	5.1
11/0	15540-TSP1-29B3=	68-1436-01 B0	CAB0549LRP7	01/02/2002	2.5
11/3	15540-TSP1-31B3=	73-5757-02 10	CAB0518HN8Y	05/23/2001	2.3

Power-Supply Module

Power-Supply A is : OK
Power-Supply B is : OK