



Connecting the Cisco ONS 15540 ESPx

Fiber optic cables are routed to the cable management tray at the bottom of the shelf. The Cisco ONS 15540 ESPx is powered using –48 VDC power. Positive and negative power terminals are accessible on the backplane. You can mount the Cisco ONS 15540 ESPx in a 19-inch or 23-inch rack.

This chapter describes how to connect the Cisco ONS 15540 ESPx to the network and contains the following sections:

- [Preparing for Network Connections, page 3-2](#)
- [Cleaning the Shelf and Connectors, page 3-2](#)
- [Connecting the Processor Card to a Network, page 3-4](#)
- [Connecting Mux/Demux Modules, page 3-6](#)
- [Connecting PSMs, page 3-9](#)
- [Connecting Transponder Modules, page 3-13](#)
- [Connecting the Cables, page 3-16](#)
- [Connecting the 2.5-Gbps Transponder Module, page 3-30](#)
- [Connecting the 10-GE Transponder Module, page 3-45](#)



Note

For power supply cable and alarm cable connecting information, see the [“Powering Up the Shelf”](#) section on page 2-40.

**Note**

To ensure that your hardware is supported by your release of Cisco IOS software, see the [“New and Changed Information” section on page xii](#). Also refer to the “Hardware Supported” section of the latest release notes for the Cisco ONS 15540 ESPx.

Preparing for Network Connections

When preparing your site for network connections to the Cisco ONS 15540 ESPx shelf, consider the following for each type of interface:

- Cabling required for each type
- Distance limitations for each signal type
- Additional interface equipment needed

Before installing the component, have all additional external equipment and cables on hand.

Cleaning the Shelf and Connectors

This document contains general cleaning tips and practices not specific to the kit mentioned above.

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

Fiber optic connectors are used to connect two fibers together. When these connectors are used in a communication system, proper connection becomes a critical factor. Fiber optic cable connectors can be damaged by improper cleaning and connection procedures. Dirty or damaged fiber optic connectors can result in not repeatable or inaccurate communication.

Fiber optic connectors differ from electrical or microwave connectors. In a fiber optic system, light is transmitted through an extremely small fiber core. Because fiber cores are often 62.5 microns or less in diameter, and dust particles range from a tenth of a micron to several microns in diameter, dust and any contamination at the end of the fiber core can degrade the performance of the connector interface where the two cores meet. Therefore, the connector must be precisely aligned and the connector interface must be absolutely free of trapped foreign material.

Connector, or insertion, loss is a critical performance characteristic of a fiber optic connector. Return loss is also an important factor. It specifies the amount of reflected light; the lower the reflection the better the connection. The best physical contact connectors have return losses better than -40 dB, although -20 to -30 dB is more common.

**Note**

MU terminators are shipped with the system. These are used to terminate the pass through ports of the OADM that are not used. For instance, the pass through in must be terminated if it is unused, otherwise the return loss at Trunk IN will be unacceptably high.

The connection quality depends on two factors: the type of connector and the proper cleaning and connection techniques. Dirty fiber 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, refer to *Cisco ONS 15540 ESPx Cleaning Procedures for Fiber Optic Connections* or go to:
<http://www.cisco.com/univercd/cc/td/doc/product/mels/15540x/15467kit.htm>.

When cleaning fiber components, procedures must be followed precisely and carefully with the goal of eliminating any dust or contamination. A clean component connects properly; a dirty component may transfer contamination to the connector, or it may even damage the optical contacts. Inspecting, cleaning, and re-inspecting are critical steps that must be done before making any fiber connection.

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.

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:

- 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.
- Cover the connectors and adapters to avoid the inside of the adapters or the surface of the connectors from getting dirty when not using the connectors.

**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.

Connecting the Processor Card to a Network

Before connecting the processor card to a network, consider the following types of cable required for each interface:

- Straight-through EIA/TIA for the DB-25 console port
- Aux port cable that ships with the shelf for the auxiliary port
- Straight-through RJ-45 for the NME (network management Ethernet) port

**Note**

The ASE (aggregation shelf Ethernet) port is not functional.

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.

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

-
- 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 into 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.
-

Connecting the Auxiliary Port

The auxiliary port supports hardware flow control and modem control and uses the Aux port cable that is shipped with the Cisco ONS 15540 ESPx.

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

-
- Step 1** Place the auxiliary port cable connector in front of the auxiliary port on the processor card faceplate.
 - Step 2** Align the keyed ridge of the cable connector with the receiving slot on the faceplate connection point.
 - Step 3** Gently push the cable connector into the faceplate connection point until the connector snaps into place.
 - 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.
-

Connecting the NME Port

The NME (network management Ethernet) port uses a straight-through RJ-45 cable connector.

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

-
- Step 1** Place the RJ-45 connector in front of the NME port on the processor card.
 - Step 2** Align the keyed ridge of the cable connector with the receiving slot on the processor card connection point.
 - Step 3** Gently push the RJ-45 cable connector into the faceplate connection point until the connector snaps into place.
 - 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.
-

Connecting Mux/Demux Modules

The Cisco ONS 15540 ESPx fiber optic mux/demux modules use MU connectors. To install fiber optic cables in the Cisco ONS 15540 ESPx, a fiber cable with the corresponding connector type must be connected to the transmit and receive ports on the modules. We recommend that you label the transmit, receive, and the working and protection fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance. Labels are shipped with the system that you can use to do this.

The Cisco ONS 15540 ESPx supports mux/demux modules with front panel optical filter connectors. Each mux/demux module supports a specific band of channels. Every 4-channel band on the mux/demux module has its own MTP connector. A 4-channel mux/demux module has one MTP connector, an 8-channel has two, and a 32-channel mux/demux module has eight.

**Caution**

Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.

**Note**

Clean all fiber connectors thoroughly. Dust particles can degrade performance. Put caps on any fiber connectors that are not in use.

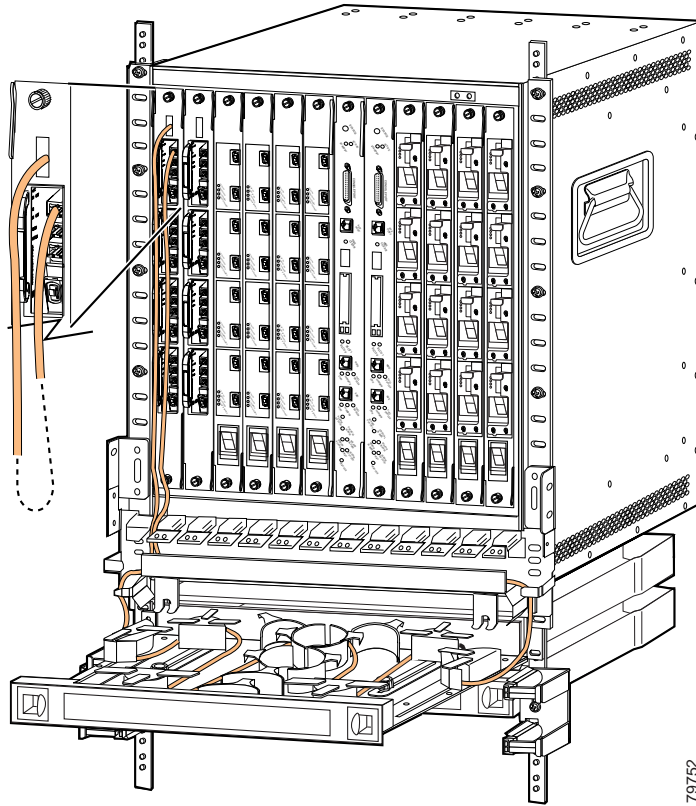
Cabling Mux/Demux Modules with OSC

There are three different cables you can use to cable the mux/demux modules. This section describes how to attach and route fiber optic cables between mux/demux modules.

For OSC connections on the motherboard and pass through OSC connections, follow these steps:

-
- Step 1** Route the fiber cable from the top OSC connector on the motherboard down through the cable management tray.
 - Step 2** Route the cable out of the left side of the tray, down the vertical cable guides and in through the left side of the cable storage drawer.
 - Step 3** Route the cable through the cable storage drawer and out the right side. Bring the cable up and into the right side of the cable management tray and continue to route the cable through until you come to the bottom of the desired mux/demux module. (See [Figure 3-1](#).)

Figure 3-1 OSC Cabling



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- Step 4** Bring the cable up to the desired connection point on the module and insert the connector.

Interconnecting Mux/Demux Modules

For mux/demux interconnections, use jumper cables to daisy chain the modules together and follow these steps:

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- Step 1** Insert one end of the cable in the third from the top connector on the module.
 - Step 2** Install the other end of the cable to the top connector of the mux/demux module installed directly below that module.
-

Connecting PSMs

The PSM (protection switch module) is a shelf replaceable unit, that plugs into any subslot in the mux/demux module. The unit has a front panel set of MU connectors that interface with the trunk fiber in a 1+1 protection scheme. The backside of the module provides an edge connector card, which interfaces with the mux/demux motherboard. The PSM can be connected to the mux/demux module or using a cross-connect drawer direct connections can be made from the ITU trunk cards, the 2.5-Gbps transponder module, or the 10-Gbps uplink card.

To install fiber optic cables in the Cisco ONS 15540 ESPx, a fiber cable with the corresponding connector type must be connected to the transmit and receive ports on the modules. We recommend that you label the transmit, receive, and the working and protection fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance. Labels are shipped with the system.



Warning

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



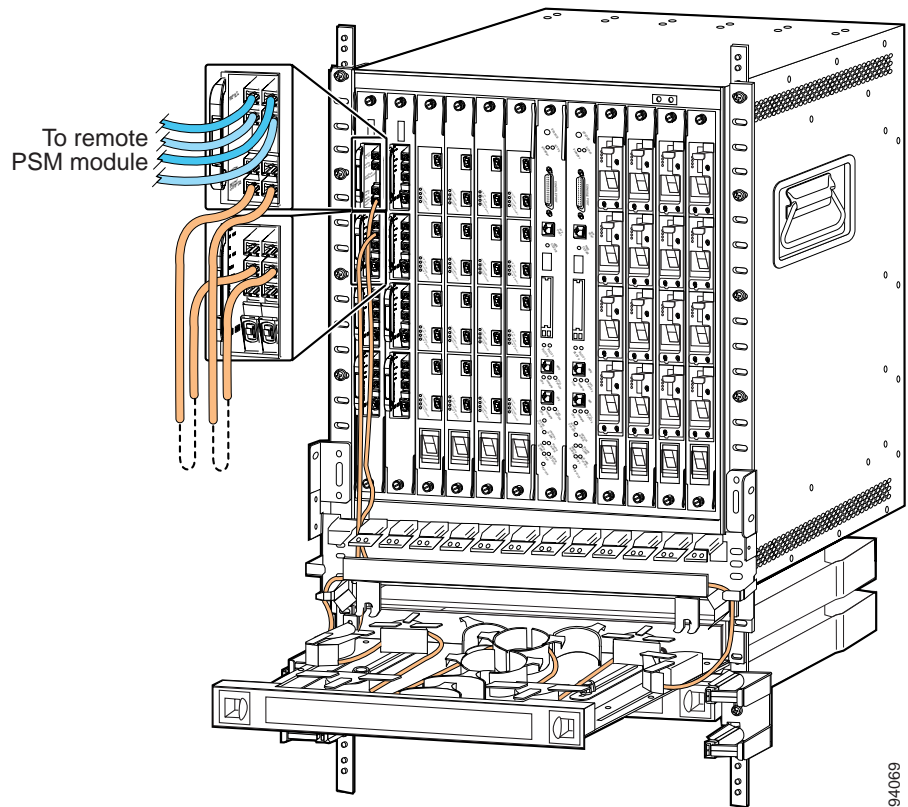
Note

Clean all fiber connectors thoroughly. Dust particles can degrade performance. Put caps on any fiber connectors that are not in use.

Cabling PSMs

To attach and route MU fiber optic cables for PSMs connected to mux/demux modules, follow these steps:

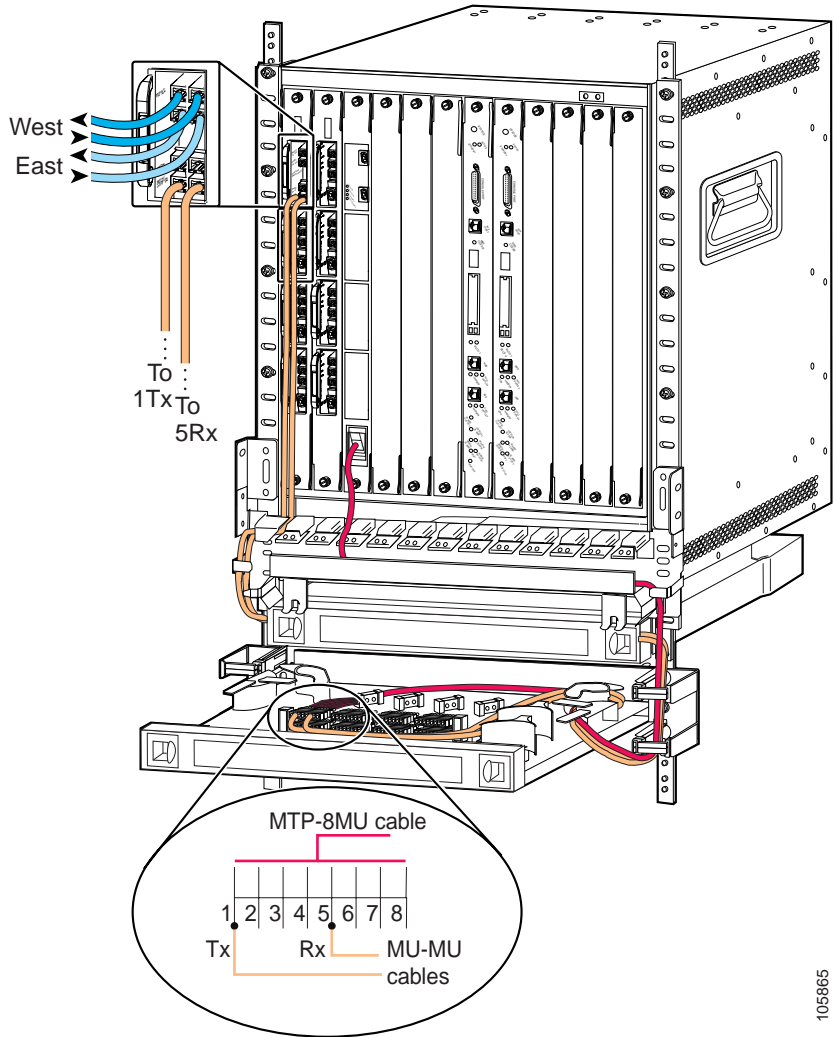
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- Step 1** Use MU connectors to make your east and west connections from the PSM to the equipment appropriate for your configuration.
 - Step 2** Attach MU connectors to the mux/demux OUT/IN connections on the PSM.
 - Step 3** Route the cables down through the vertical cable guides and in through the left side of the cable storage drawer.
 - Step 4** Continue to route the cable through the drawer around the round cable retainers to the right side.
 - Step 5** Pull the cable up out of the right side of the drawer and back up through the cable management tray.
 - Step 6** Insert the other end of the MU connectors into the trunk IN/OUT ports on the desired mux/demux module. [Figure 3-2](#) shows the connections described in these steps with the PSM in slot 0, subslot 0 and an 8-channel mux/demux module in slot 0, subslot 1.

Figure 3-2 Cabling the PSM

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Figure 3-3 shows the MU fiber optic connections for a PSM directly connected to a 2.5-Gbps transponder module through the cross-connect drawer.

Figure 3-3 PSM Directly Connected to the 2.5-Gbps Transponder Module



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To cable the PSM, follow these steps:

-
- Step 1** Use MU cables to connect the west TX/RX ports from the PSM to the west side equipment appropriate for your configuration.
 - Step 2** Use MU cables to connect the east TX/RX ports from the PSM to the east side equipment appropriate for your configuration.
 - Step 3** Use an MTP cable to connect the 2.5-Gbps line card motherboard containing the transponder module to the cross-connect panel in the cross-connect drawer.
 - Step 4** Use an MU cable to connect the mux/demux OUT port from the PSM to pin 5 of the cross-connect panel.
 - Step 5** Use an MU cable to connect the mux/demux IN port from the PSM to pin 1 of the cross-connect panel.
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Connecting Transponder Modules

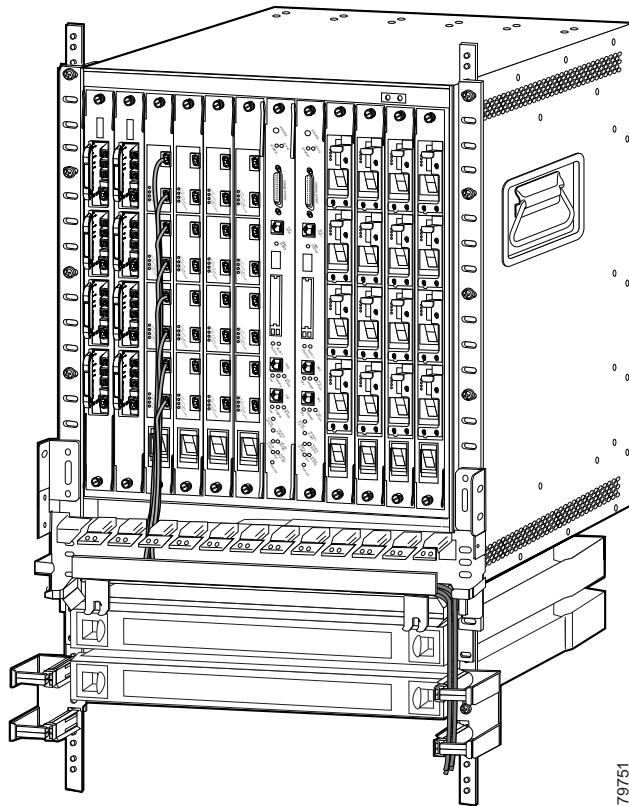
The Cisco ONS 15540 ESPx fiber optic transponder modules use MU connectors. To install fiber optic cables in the Cisco ONS 15540 ESPx, a fiber cable with the corresponding connector type must be connected to the transmit and receive ports on the modules. We recommend that you label the transmit, receive and the working and protection fibers at each end of the fiber span to avoid confusion with cables that are similar in appearance. Labels are shipped with the system that you can use to do this.

The line card motherboards and the mux/demux motherboards on the Cisco ONS 15540 ESPx connect to each other through the cross connect drawers using the MTP-to-MU breakout cables. The cable has one MTP connector at one end which is plugged either onto the MTP connector at the base of the line card motherboard or onto the MTP connectors on the mux/demux modules.

The motherboards can be installed in any of slots 2 to 5 and 8 to 11; however, the transponder modules in the motherboards, or the channels within the band, must be in increasing order from top to bottom.

To cable the SM and MM transponder module client equipment, follow these steps:

-
- Step 1** Place the cable connector in front of the connection point on the transponder module faceplate. Each transponder module supports 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.
 - Step 3** Gently push the cable connector into the faceplate connection point until the connector snaps into place.
 - Step 4** Route the fiber cables down through the cable management tray and out of the right side of the shelf assembly. (See [Figure 3-4](#).)

Figure 3-4 Cabling Transponder Modules

Step 5 Connect the cables to your equipment according to your configuration.

To cable the 2.5-Gbps transponder modules, see the [“Connecting the 2.5-Gbps Transponder Module”](#) section on page 3-30

To cable the 10-GE transponder modules, see the [“Connecting the 10-GE Transponder Module”](#) section on page 3-45.

Connecting the Cables

Optical components on the Cisco ONS 15540 ESPx can be cabled together in two different ways:

- Direct connections with an MTP cable storage drawer
- With cross connect drawers

MTP cables directly connect line card motherboards to optical mux/demux motherboards. One end of each MTP cable connector plugs into a line card motherboard MTP adapter. The other end of the cable plugs into a mux/demux motherboard MTP adapter.

When using the cross connect drawers, the line card motherboards and the mux/demux modules are separately connected to the cross connect panel. One end of a cable plugs into a line card motherboard or a mux/demux motherboard. The connections to the cross connect drawers are made using breakout cables. The cables break out to single fiber cables, which then plug into one end of a high density (octal-MU) adapter. The connections between line card motherboards and mux/demux modules are then made using single fiber cables (terminated in MU connectors at both ends). One end of each of these single fiber cables plugs into an adapter connected to a line card motherboard and the other end into another adapter connected to a mux/demux module.

Final connection between the line card motherboard and the mux/demux module is made using up to sixteen single fiber MU-to-MU cables. The MU connector on one end of the cable plugs into an octal-MU adapter connected to the line card motherboard. The other end of the connector plugs into an adapter connected to the mux/demux module.

**Note**

The cable storage drawer can accommodate attenuators that are available from optical component distributors.

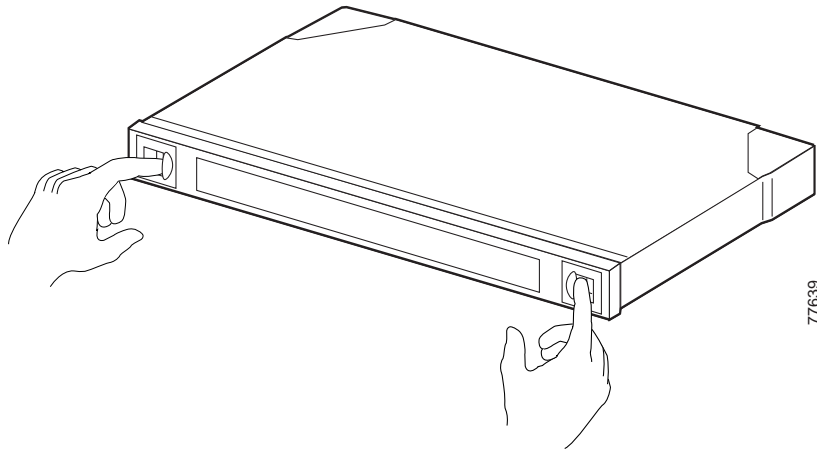
Direct Connections with Cable Storage Drawers

When you make direct connections in the Cisco ONS 15540 ESPx, you connect the line card motherboard MTP connections directly to the MTP connections on the mux/demux modules or mux/demux motherboards. This connection requires just one MTP cable storage drawer.

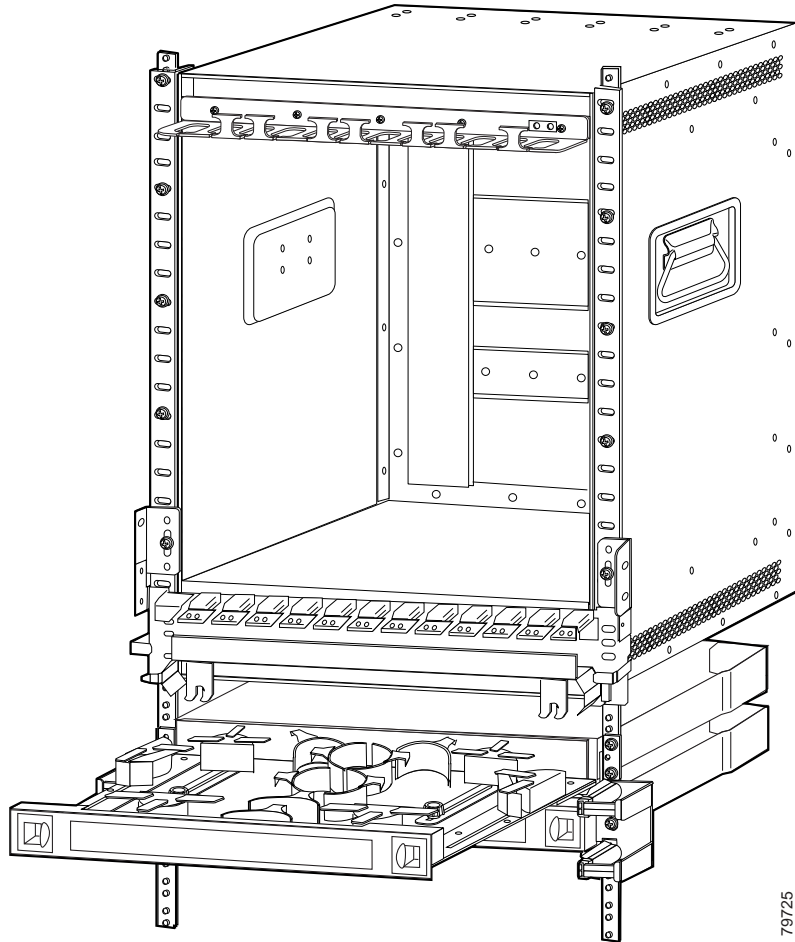
To connect the mux/demux motherboard and line card motherboards directly, follow these steps:

-
- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-5](#).)

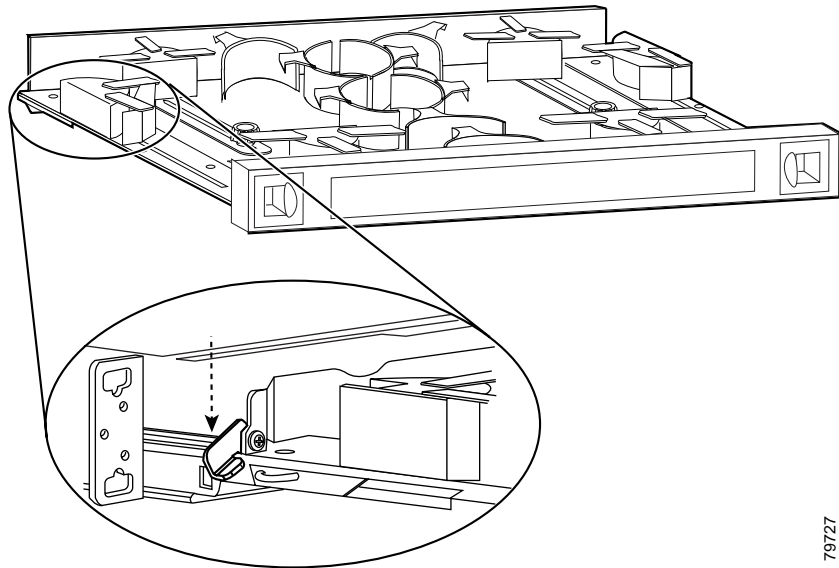
Figure 3-5 Opening the Cable Storage Drawer



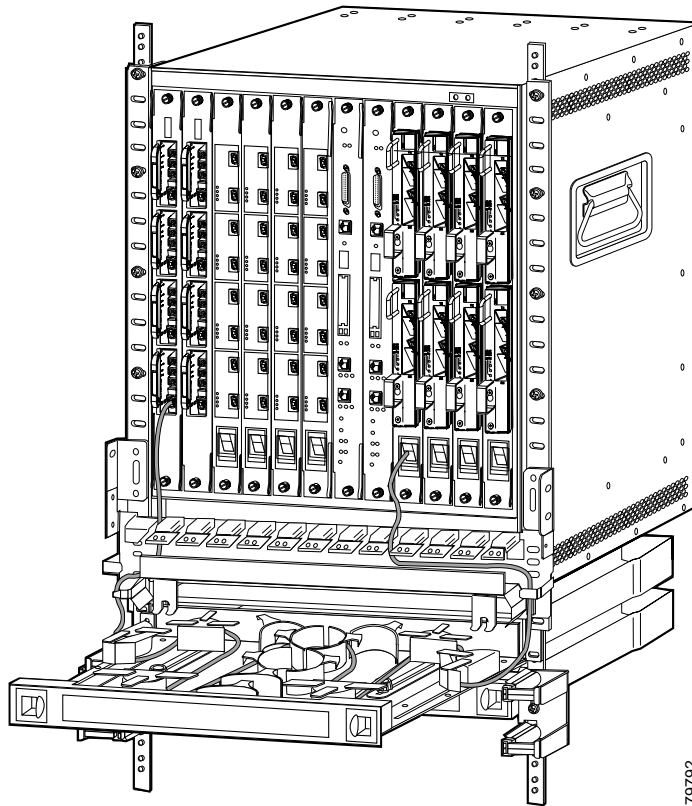
- Step 2** Pull out the cable storage drawer. (See [Figure 3-6](#).)

Figure 3-6 Pulling out the Cable Storage Drawer

- Step 3** Lock the drawer in the open position by pushing the latch at the back left of the drawer down into the lock position. (See [Figure 3-7](#).)

Figure 3-7 Locking the Drawer

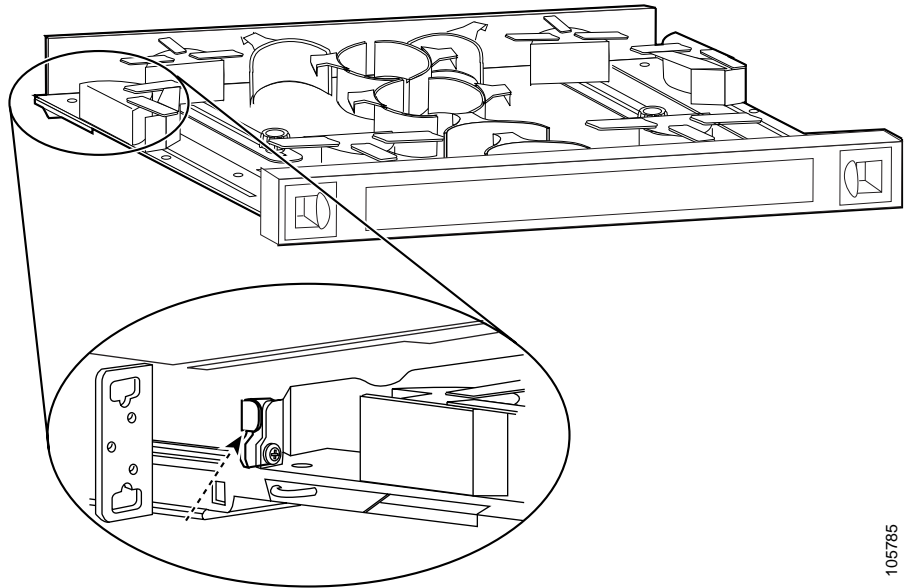
- Step 4** Use the MTP cable installation tool to push the MTP connector of the cable into the adapter on the line card motherboard until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Continue to route the cable through the drawer around the round cable retainers to the right side.
- Step 8** Pull the cable up out of the right side of the drawer and the back up through the cable management tray.
- Step 9** Insert the MTP connector into the MTP adapter on the desired line card motherboard. (See [Figure 3-8](#).)

Figure 3-8 Routing the Cable Storage Drawer

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Repeat Steps 1 through 4 to continue cabling the system without the cross connect panel.

- Step 10** Unlock the drawer by moving the latch back into an upright position and close the drawer. (See [Figure 3-9](#).)

Figure 3-9 Unlocking the Drawer

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**Note**

You can use the client clips shipped with the chassis to clip together cables for easy handling and organization.

Mux/Demux Module and Line Card Motherboard Cabling with Cross Connect Drawers

The line card motherboards and the mux/demux modules on the Cisco ONS 15540 ESPx connect to each other through the cross connect drawers using MTP-to-MU breakout cables. Each breakout cable has an MTP connector on one end and eight individual MU connectors on the other end called breakout cables.

Each cross connect drawer is an 8-channel drawer. To configure a 32-channel system you need four drawers and two cable storage drawers. All MTP and MTP-to-MU breakout cables are pulled out to the left of the chassis and enter the

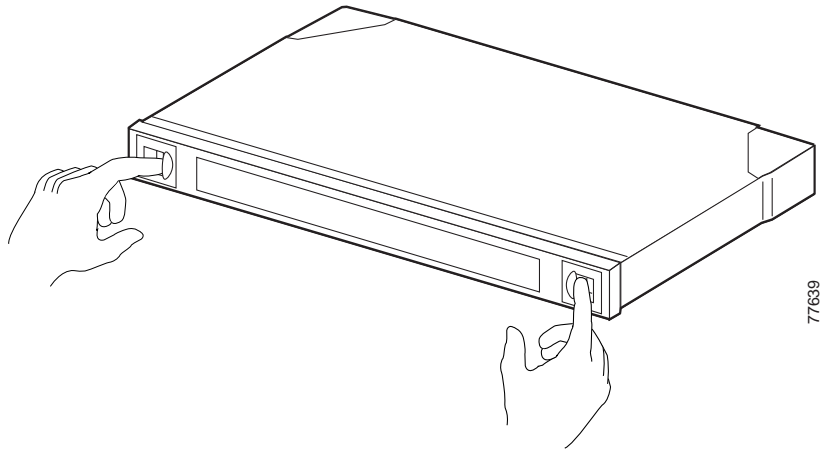
drawers on the left side of the cable storage drawers. They then route out of the right side of the cable storage drawer, enter the cross connect drawers through the right side, and connect to their destination connector. The breakout cables are color coded and should be matched to its corresponding color on the cross connect panel inside the drawer.

The cabling route inside the drawers described in this document is suggested cabling only. Use your own judgement as to how to best route your cable in the drawer according to your configuration and cable length.

To connect cables on the Cisco ONS 15540 ESPx mux/demux modules and line card motherboards using the cross connect drawer, follow these steps:

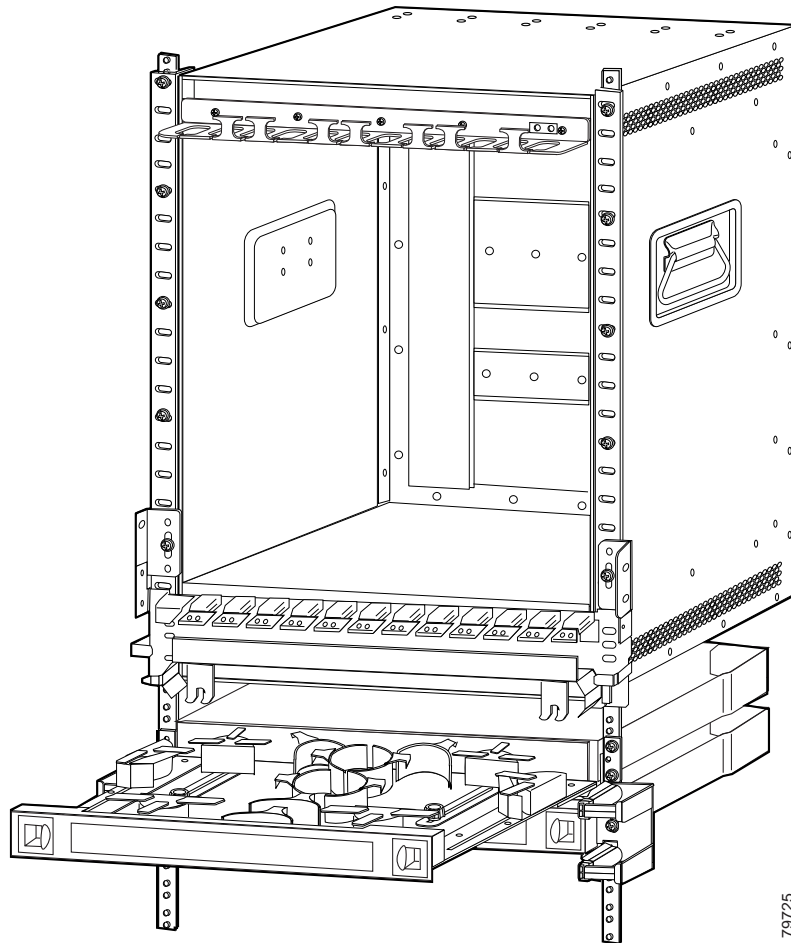
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- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-10](#).)

Figure 3-10 Opening the Cable Storage Drawer

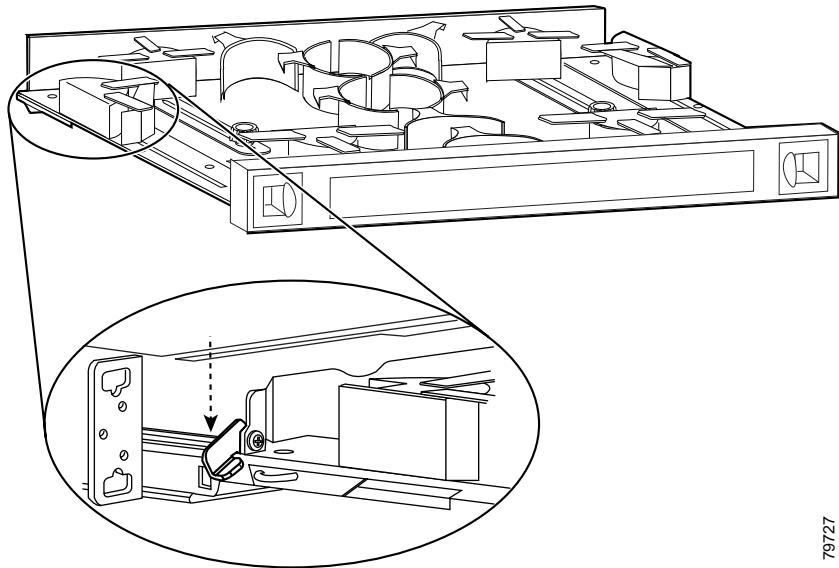


- Step 2** Pull out the cable storage drawer. (See [Figure 3-11](#).)

Figure 3-11 Pulling out the Cable Storage Drawer



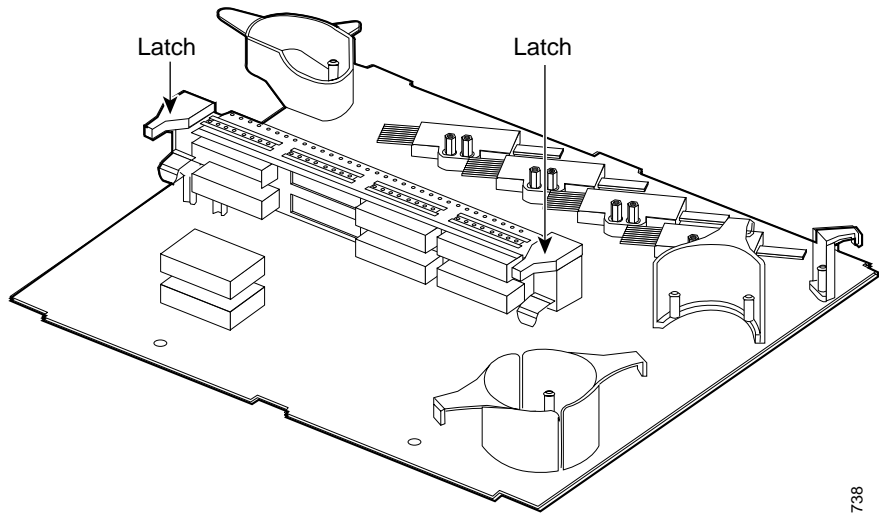
- Step 3** Lock the drawer in the open position by pushing the lever at the back left of the drawer down in the lock position. (See [Figure 3-12](#).)

Figure 3-12 Locking the Drawer

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- Step 4** Use the MTP cable installation tool to push the MTP connector of the cable into the adapter on the mux/demux module until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Pull the cable through the vertical cable guides on the side of the cable storage drawer.
- Step 8** Route the cables through the storage drawer as directed in Step 5 to Step 7 in the [“Direct Connections with Cable Storage Drawers”](#) section.
- Step 9** Close the cable storage drawer once the cables are routed out of the right side and you unlock the drawer.
- Step 10** Open the cross connect drawer appropriate for your system configuration. See Step 1 to Step 3 above for drawer opening details.
- Step 11** Flip the latches on the cross connect panel up and use them to pull the panel up. (See [Figure 3-13](#).)

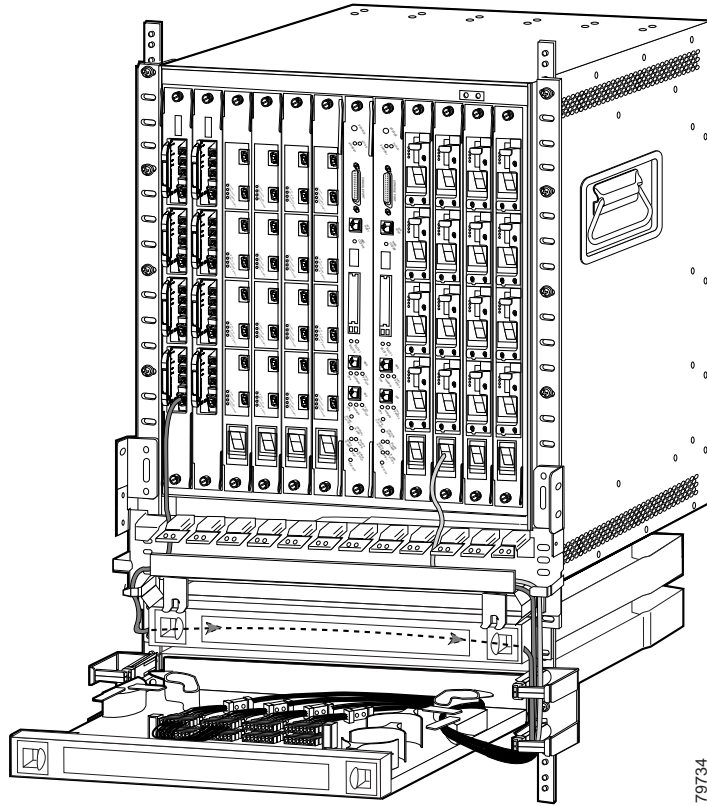
Figure 3-13 Pulling Up the Cross Connect Panel



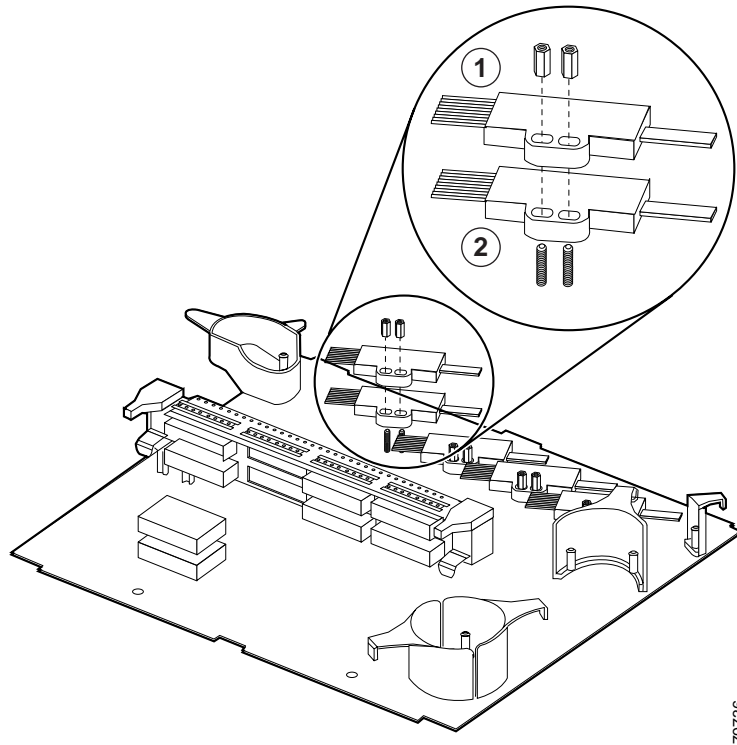
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- Step 12** Route the MU breakout end of the cable in through the left side of the drawer. (See [Figure 3-14](#).)

Figure 3-14 Routing the Cross Connect Cables



Step 13 Mount the transition box as shown in [Figure 3-15](#).

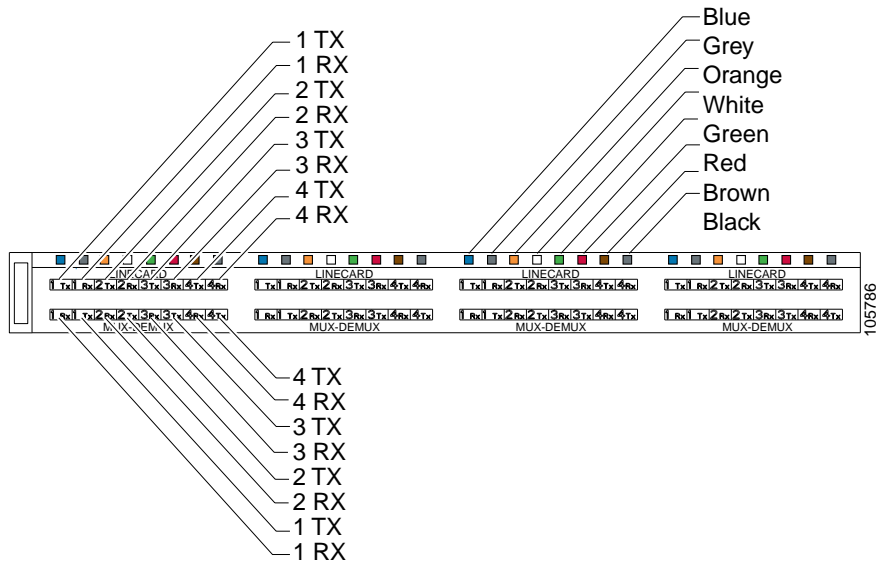
Figure 3-15 Mounting the Transition Box

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1	Line card motherboard connections	2	Mux/demux motherboard connections
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- Step 14** Connect the cables to the bottom half of the desired adapter mux/demux connections on the inner side of the cross connect panel. These are color coded and should be connected by matching the color on the panel to the colored wires out of the transition box. (See [Figure 3-16](#).)

Figure 3-16 Cross Connect Panel



Connecting Mux/Demux Motherboards Land Line Card Motherboards with Cross Connect Drawers

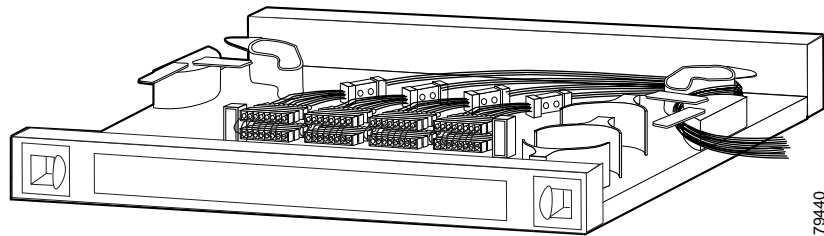
The mux/demux motherboards and the line card motherboards on the Cisco ONS 15540 ESPx connect to each other through the cross connect drawers using MTP-to-MU breakout cables. Each breakout cable has an MTP connector on one end and eight individual MU connectors on the other end.

Each cross connect drawer is an 8-channel drawer. To configure a 32-channel system you need four drawers and two cable storage drawers. All MTP and MTP-to-MU breakout cables are pulled out to the left of the chassis and enter the drawers on the left side of the cable storage drawers. They then route out of the right side of the cable storage drawer, enter the cross connect drawers through the right side, and connect to their destination connector.

To connect the mux/demux and transponders in the Cisco ONS 15540 ESPx, use the MU to MU cables and follow these steps:

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- Step 1** Make the mux/demux motherboard and line card motherboard connections. See the “[Mux/Demux Module and Line Card Motherboard Cabling with Cross Connect Drawers](#)” section.
 - Step 2** Connect one end of the MU to MU cable to the top half of the desired mux/demux motherboard connections on the outside of the cross connect panel.
 - Step 3** Connect the other end of the same MU to MU cable to the bottom half of the desired line card motherboard connection on the outside of the cross connect panel. (See [Figure 3-17](#).)

Figure 3-17 Cross Connect Panel Connections



- Step 4** Push the panel down and lock it by pushing the tabs down.
 - Step 5** Push the drawer in when you are done making all of your connections.
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For more information about different configurations, see the *Cisco ONS 15540 ESPx Planning Guide*.

Connecting the 2.5-Gbps Transponder Module

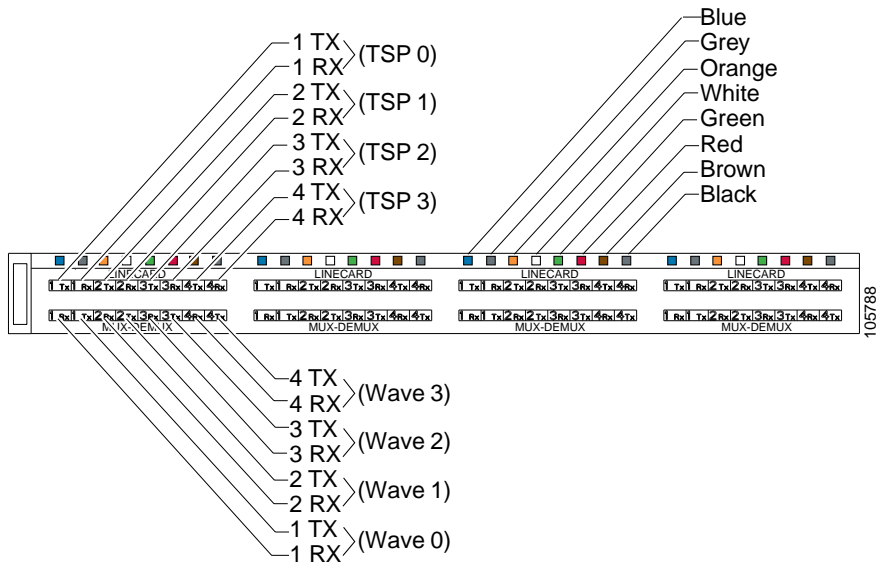
The 2.5-Gbps transponder module requires the following cables:

- MTP to MTP connectors used for direct connections (blue)
- MTP to 8 MU connectors used on OADM modules (gray)
- MTP to 8 MU connectors used on line card motherboards (green)
- MU to MU connectors (yellow)

When you make direct connections in the Cisco ONS 15540 ESPx, you connect the line card motherboard MTP connections directly to the MTP connections on the mux/demux modules or mux/demux motherboards. This connection requires just one MTP cable storage drawer.

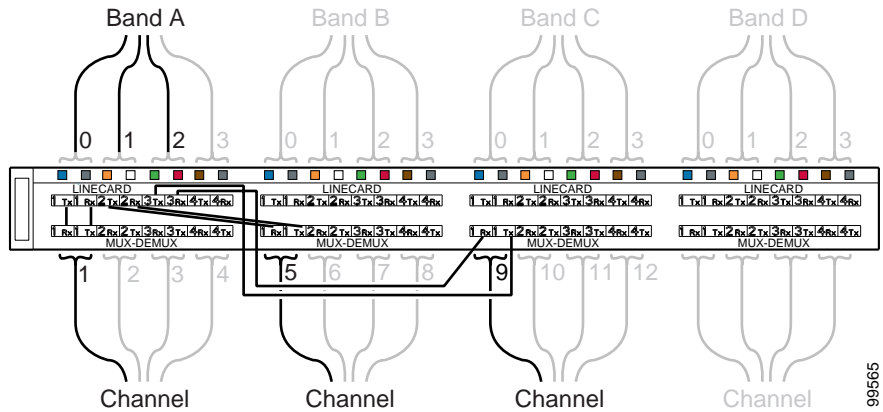
The line card motherboards and the mux/demux modules on the Cisco ONS 15540 ESPx connect to each other through the cross connect drawers using the MTP-to-8 MU breakout cables. The cable has one MTP connector at one end that is plugged either onto the MTP connector at the base of the line card motherboard or onto the MTP connectors on the mux/demux modules. The cable then runs down into the cross connect drawer and connects to the cross connect panel with the 8 MU cables. The motherboards can be installed in any of slots 2 to 5 and 8 to 11; however, the transponder modules in the line card motherboards, or the channels within the band, must be in increasing order from top to bottom. [Figure 3-18](#) shows an example of the transponder modules (TSP) to wavelength connection through the cross connect panel.

Figure 3-18 Transponder Module to Wavelength Connection



The Cisco ONS 15540 ESPx allows channels from different bands in the same slot. With the cross connect drawer, the system allows for use of an application where it is possible to use only certain channels in a given node. [Figure 3-19](#) shows the connections you would make if you wanted to use only channels 1, 5, and 9.

Figure 3-19 Channels from Different Bands



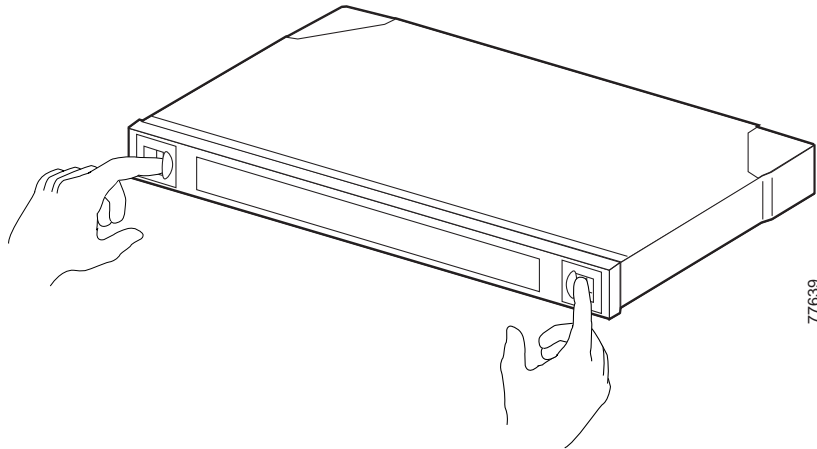
Band A 0 to 2 would extend from your mux/demux module. Using your cross connect drawer, channels 1, 5, and 9 would extend to your transponder modules. Use the MU-to-MU connectors to connect from band A to channels 1, 5, and 9.

Using MTP Cables for Direct Connections

To connect the mux/demux motherboards and line card motherboards directly using an MTP-to-MTP cable, follow these steps:

-
- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-20](#).)

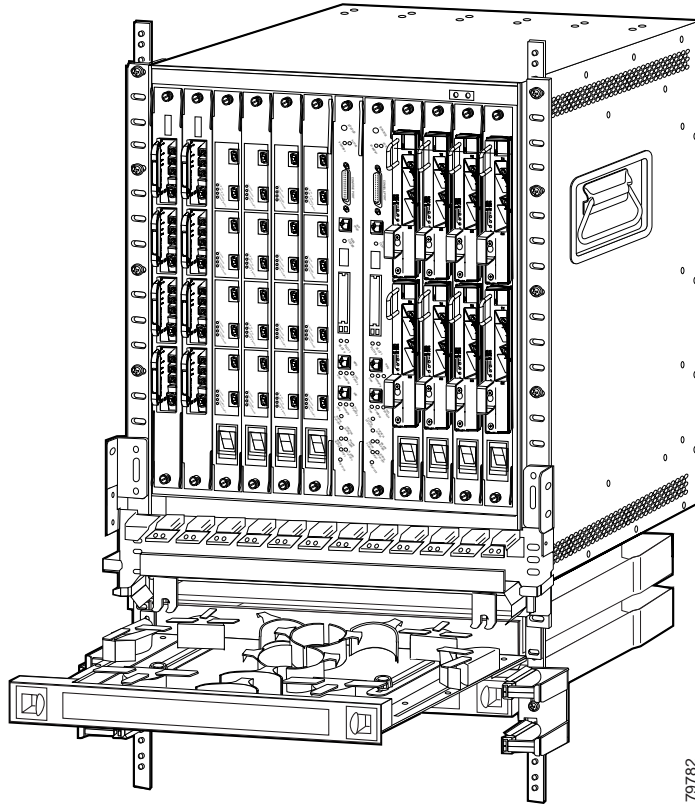
Figure 3-20 Opening the Cable Storage Drawer



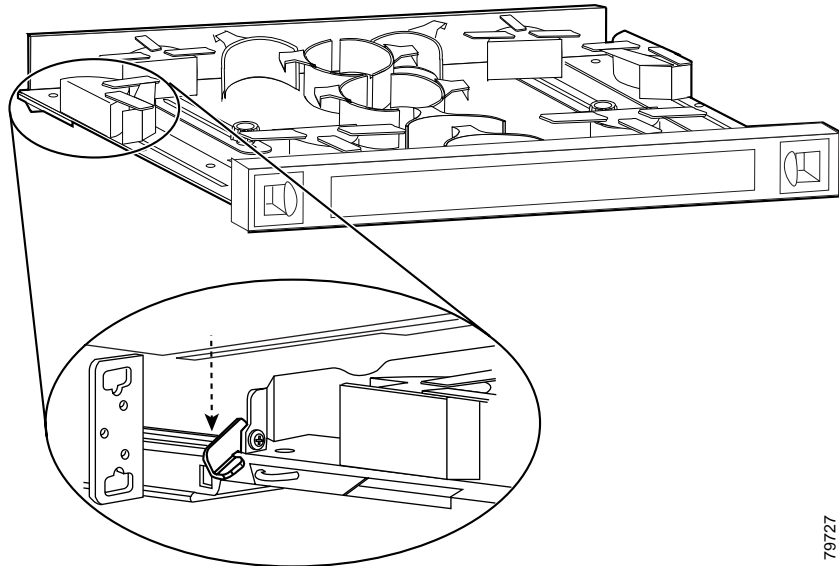
77639

- Step 2 Pull out the cable storage drawer. (See [Figure 3-21](#).)

Figure 3-21 Pulling Out the Cable Storage Drawer

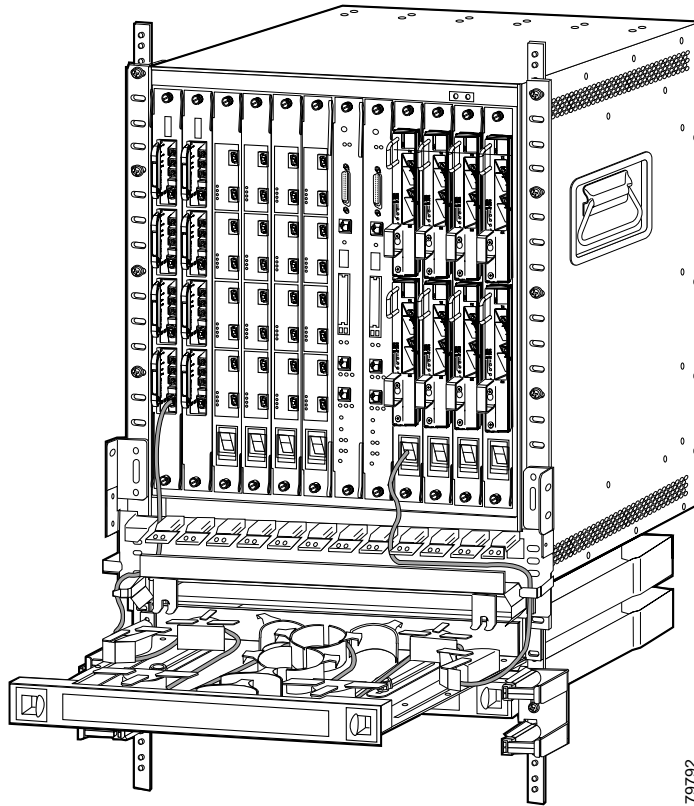


- Step 3 Lock the drawer in the open position by pushing the latch at the back left of the drawer down into the lock position. (See [Figure 3-22](#).)

Figure 3-22 Locking the Drawer

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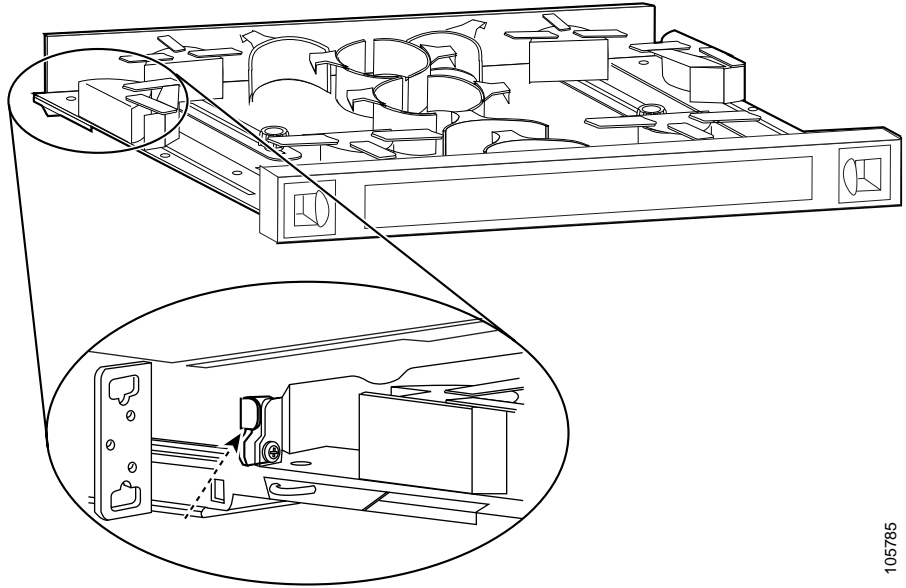
- Step 4** Use the MTP cable installation tool to push the MTP connector of the cable into the adapter on the line card motherboard until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Continue to route the cable through the drawer around the round cable retainers to the right side.
- Step 8** Pull the cable up out of the right side of the drawer and back up through the cable management tray.
- Step 9** Insert the MTP connector into the MTP adapter on the desired line card motherboard. (See [Figure 3-23](#).)

Figure 3-23 Routing the Cable Storage Drawer

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Repeat Steps 1 through 4 to continue cabling the system without the cross connect panel.

- Step 10** Unlock the drawer by moving the latch back into an upright position and close the drawer. (See [Figure 3-24](#).)

Figure 3-24 Unlocking the Drawer

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**Note**

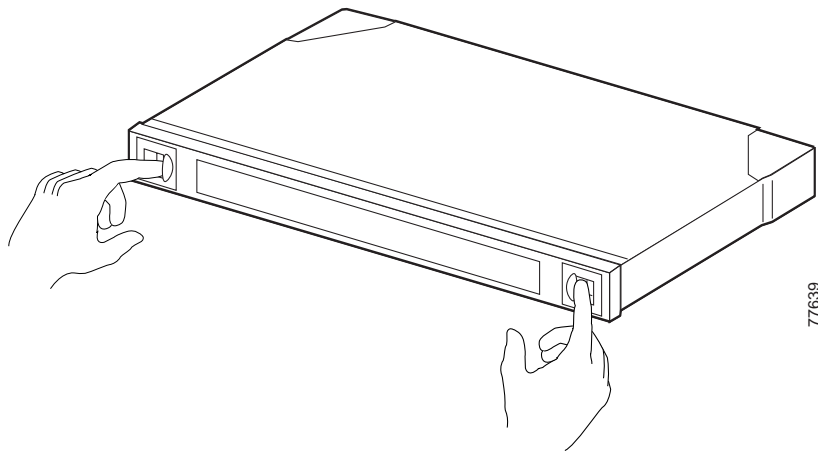
You can use the client clips shipped with the chassis to clip together cables for easy handling and organization.

Cabling 2.5-Gbps Transponder Modules with Cross Connect Drawers

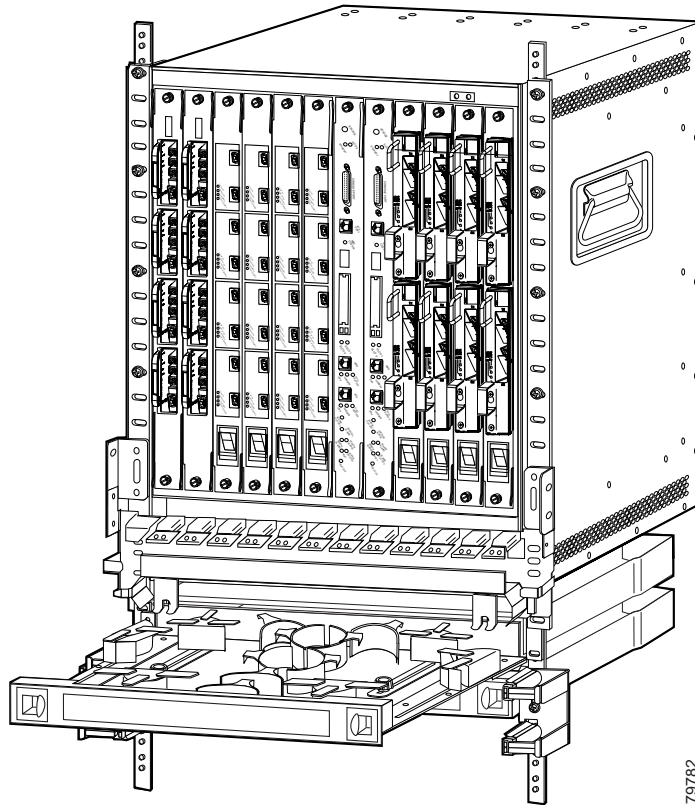
To connect cables on the Cisco ONS 15540 ESPx 2.5-Gbps transponder modules using the cross connect drawer, follow these steps:

- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-25](#).)

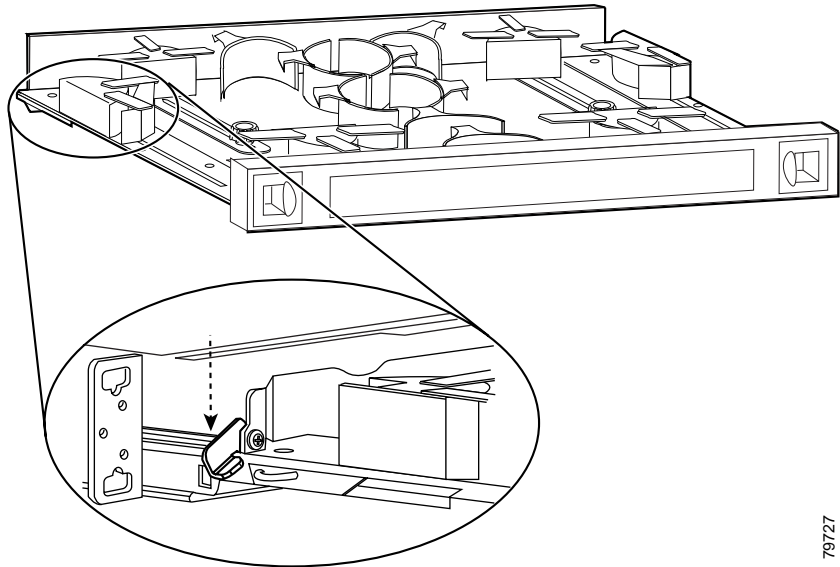
Figure 3-25 Opening the Cable Storage Drawer



- Step 2** Pull out the cable storage drawer. (See [Figure 3-26](#).)

Figure 3-26 Pulling out the Cable Storage Drawer

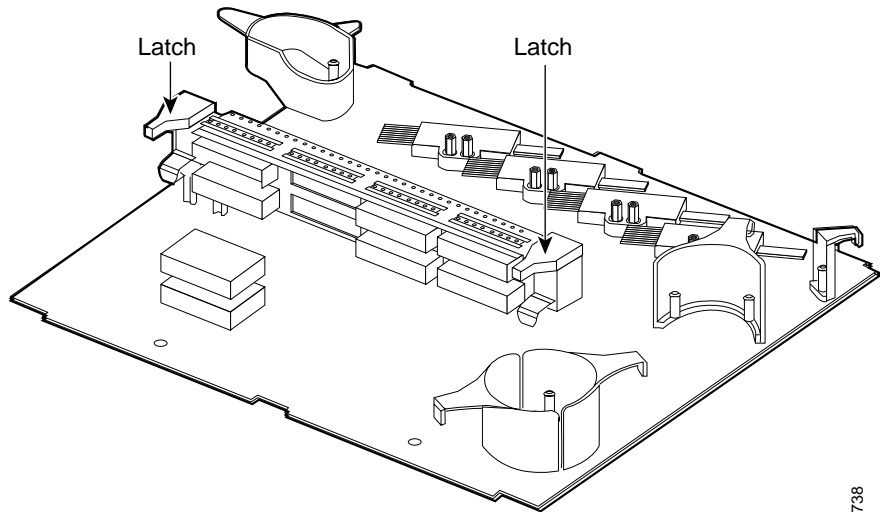
- Step 3** Lock the drawer in the open position by pushing the lever at the back left of the drawer down in the lock position. (See [Figure 3-27](#).)

Figure 3-27 Locking the Drawer

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- Step 4** Use the MTP cable installation tool to push the MTP connector on the cable into the adapter on the 2.5-Gbps transponder module until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Pull the cable through the vertical cable guides on the side of the cable storage drawer.
- Step 8** Route the cables through the storage drawer as directed in Steps 5 to 7 in the [“Direct Connections with Cable Storage Drawers”](#) section on page 3-16.
- Step 9** Close the cable storage drawer once the cables are routed out of the right side and you unlock the drawer.
- Step 10** Open the cross connect drawer appropriate for your system configuration. See Step 1 to Step 3 above for drawer opening details.
- Step 11** Flip the latches on the cross connect panel up and use them to pull the panel up. (See [Figure 3-28](#).)

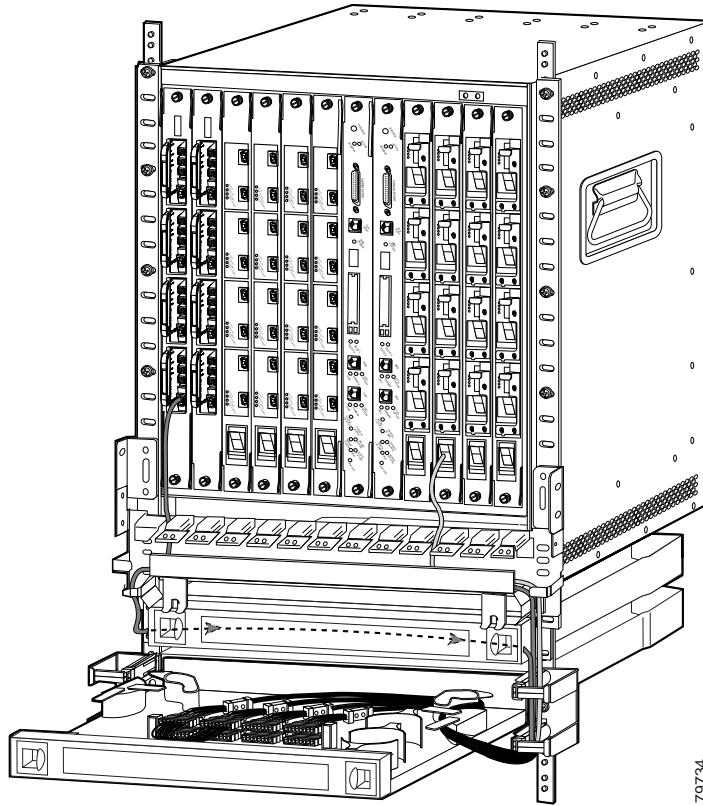
Figure 3-28 Pulling Up the Cross Connect Panel



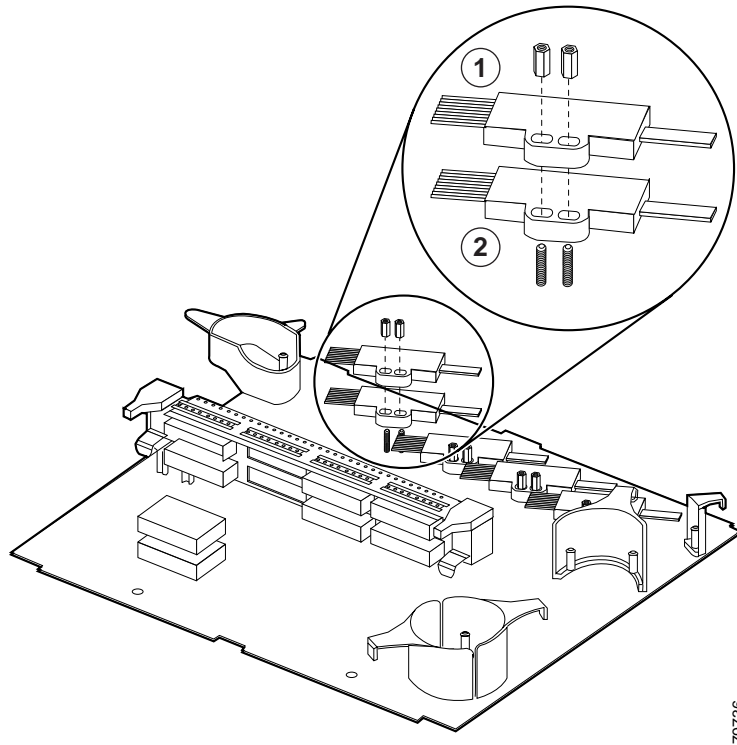
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- Step 12** Route the MU breakout end of the cable in through the right side of the drawer. (See [Figure 3-29](#).)

Figure 3-29 Routing the Cross Connect Cables



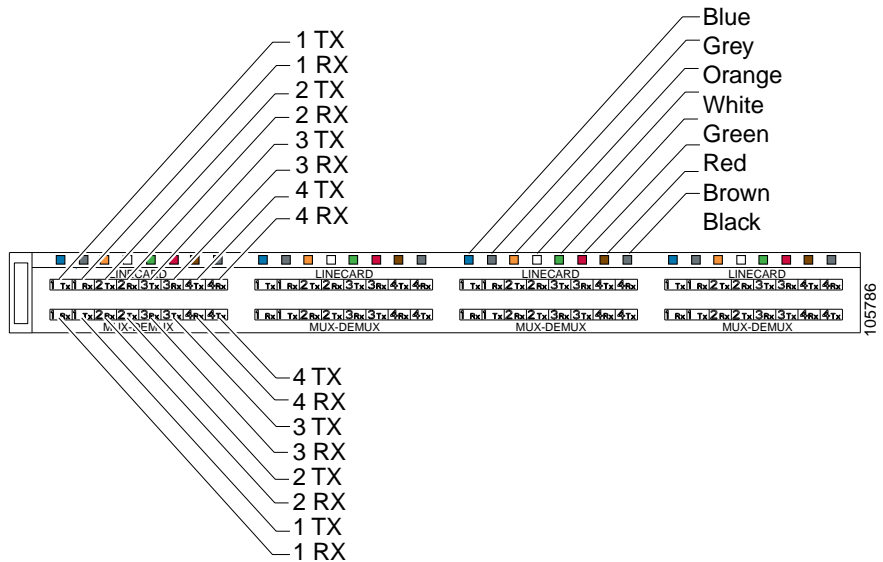
Step 13 Mount the transition box as shown in [Figure 3-30](#).

Figure 3-30 Mounting the Transition Box

1	2.5-Gbps line card motherboard connections	2	Mux/demux motherboard connections
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- Step 14** Connect the cables to the bottom half of the desired adapter mux/demux connections on the inner side of the cross connect panel. These are color coded and should be connected by matching the color on the panel to the colored wires out of the transition box. (See [Figure 3-31](#).)

Figure 3-31 Cross Connect Panel



- Step 15** Connect the MU connectors on the outer side of the panel. Connect the Tx from the line card motherboard to the Tx on the mux/demux motherboard side. Connect the Rx line card side to the Rx on the mux/demux motherboard side.

To connect the mux/demux motherboards to the line card motherboards, see the [“Connecting Mux/Demux Motherboards Land Line Card Motherboards with Cross Connect Drawers”](#) section on page 3-28.

Connecting the 10-GE Transponder Module

The 10-GE transponder module requires the following cables:

- MTP to 4 MU (aqua)
- MTP to 4 MU (rose)
- Y cable (blue)
- MTP to MTP

When you make direct connections in the Cisco ONS 15540 ESPx, you connect the line card motherboard MTP connections directly to the MTP connections on the mux/demux modules or mux/demux motherboards. This connection requires just one MTP cable storage drawer. There are two different cables you can use for direct connections depending on your configuration:

- MTP to MTP
- MTP to 2x MTP (y cable)

The line card motherboards and the mux/demux motherboards on the Cisco ONS 15540 ESPx connect to each other through the cross connect drawers using the MTP-to-MU breakout cables. The cable has one MTP connector at one end that usually is plugged either onto the MTP connector at the base of the line card motherboard or onto the MTP connectors on the mux/demux modules.

The motherboards can be installed in any of slots 2 to 5 and 8 to 11; however,, the transponder modules in the line card motherboards, or the channels within the band, must be in increasing order from top to bottom.

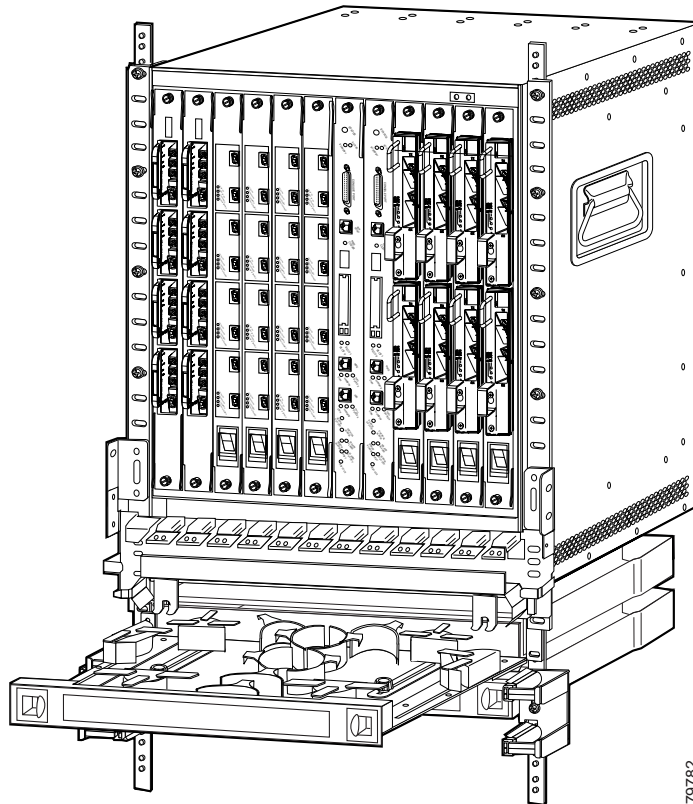


Note

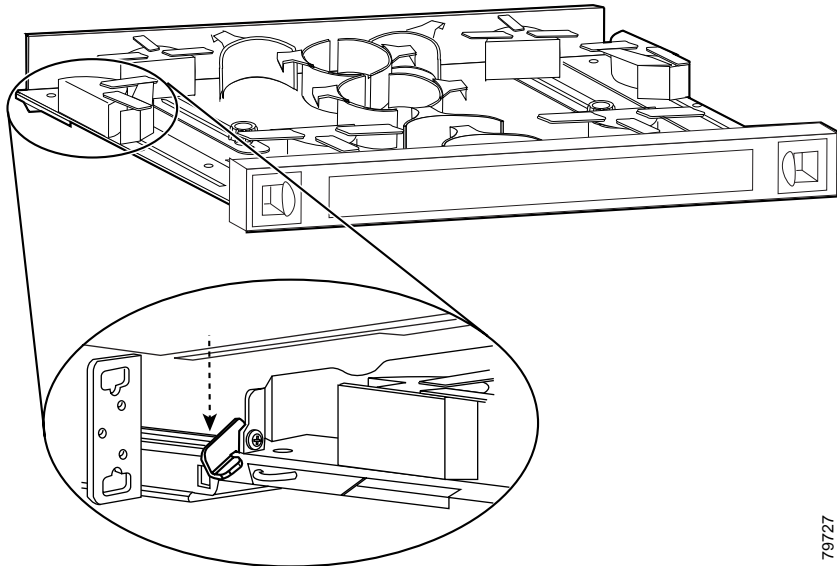
Allow two minutes for the 10-Gbps laser on the 10-GE transponder module to warm up before it transmits traffic.

- Step 2** Pull out the cable storage drawer. (See [Figure 3-33](#).)

Figure 3-33 Pulling out the Cable Storage Drawer

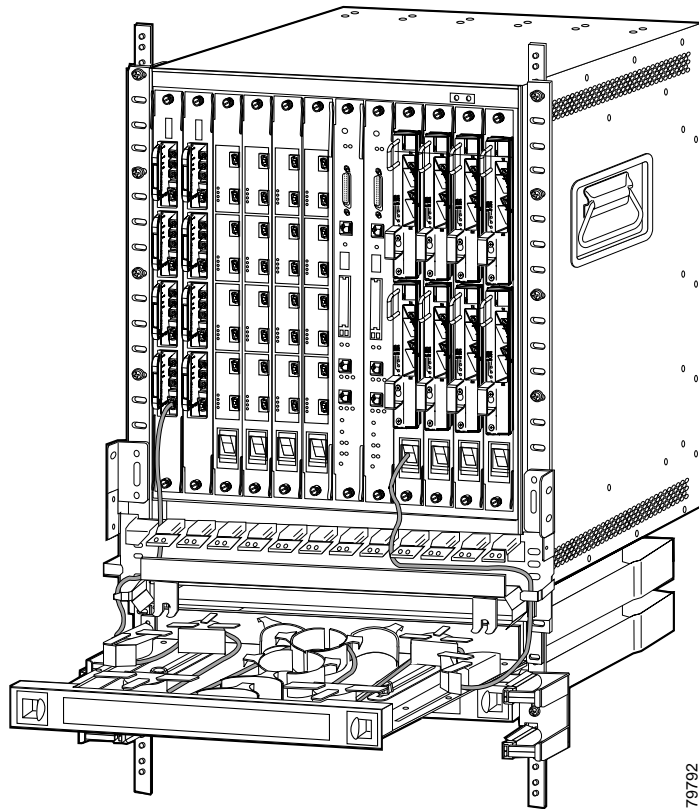


- Step 3** Lock the drawer in the open position by pushing the latch at the back left of the drawer down into the lock position. (See [Figure 3-34](#).)

Figure 3-34 Locking the Drawer

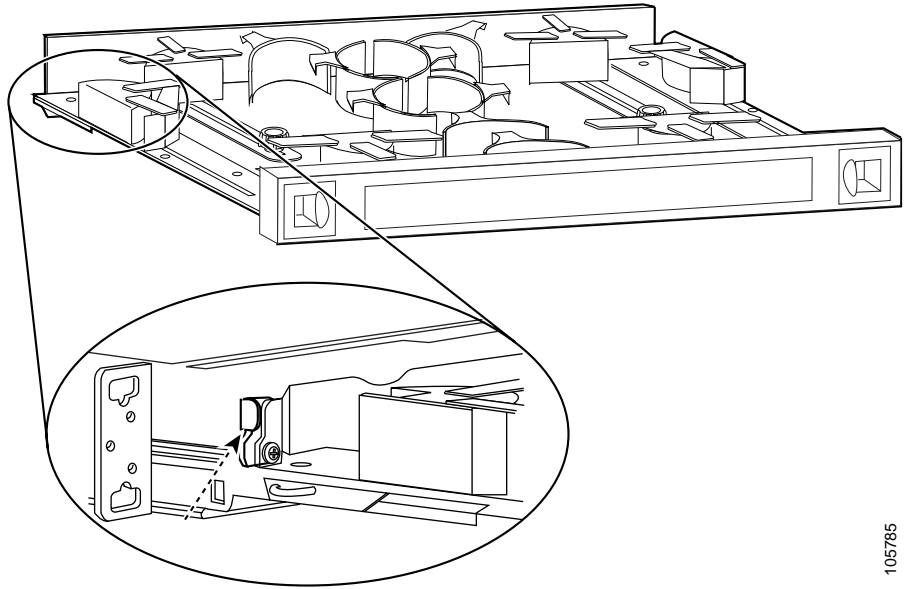
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- Step 4** Use the MTP cable installation tool to push the MTP connector of the cable into the adapter on the line card motherboard until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Continue to route the cable through the drawer around the round cable retainers to the right side.
- Step 8** Pull the cable up out of the right side of the drawer and back up through the cable management tray.
- Step 9** Insert the MTP connector into the MTP adapter on the desired line card motherboard. (See [Figure 3-35](#).)

Figure 3-35 Routing the Cable Storage Drawer

Repeat Steps 1 through 4 to continue cabling the system without the cross connect panel.

- Step 10** Unlock the drawer by moving the latch back into an upright position and close the drawer. (See [Figure 3-36](#).)

Figure 3-36 Unlocking the Drawer

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**Note**

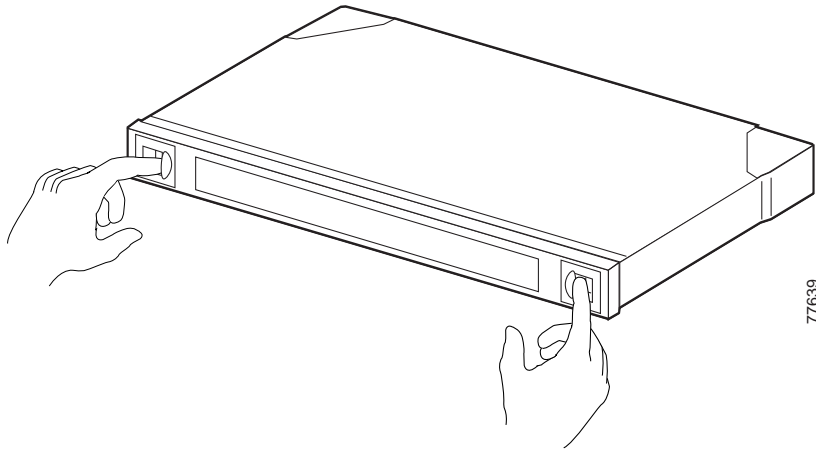
You can use the client clips shipped with the chassis to clip together cables for easy handling and organization.

Using Y Cables for 10-GE Direct Connections

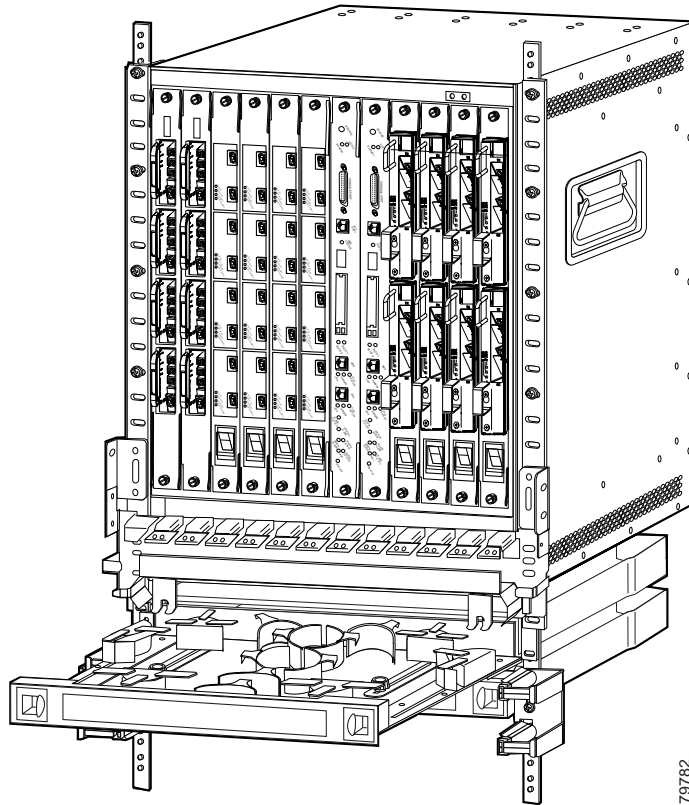
To connect the mux/demux motherboards and line card motherboards directly using a y cable, follow these steps:

-
- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-37](#).)

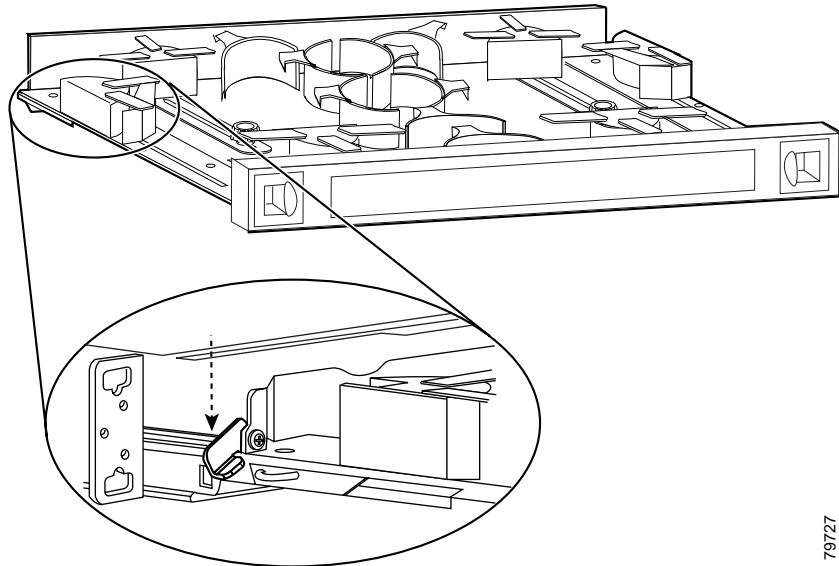
Figure 3-37 Opening the Cable Storage Drawer



- Step 2** Pull out the cable storage drawer. (See [Figure 3-38](#).)

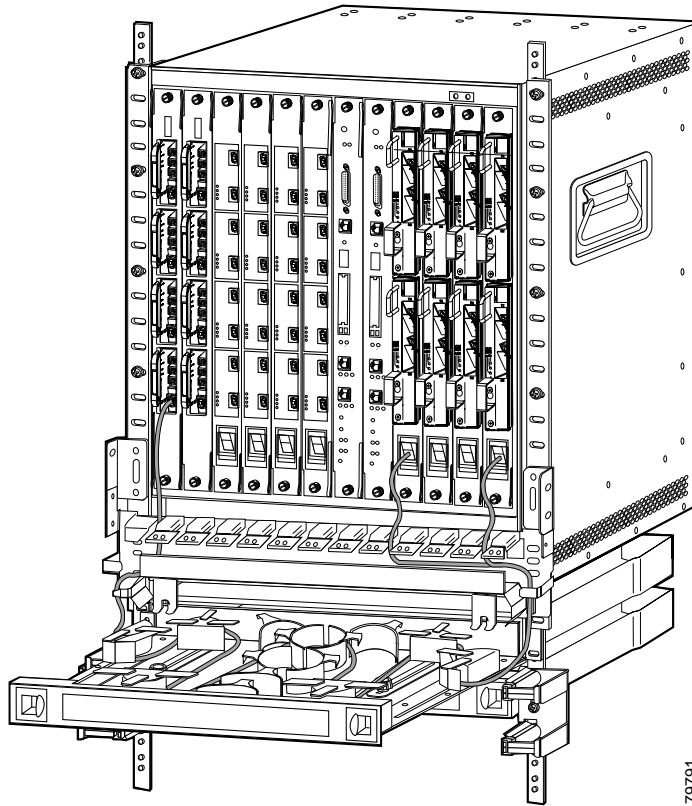
Figure 3-38 Pulling out the Cable Storage Drawer

- Step 3** Lock the drawer in the open position by pushing the latch at the back left of the drawer down into the lock position. (See [Figure 3-39](#).)

Figure 3-39 Locking the Drawer

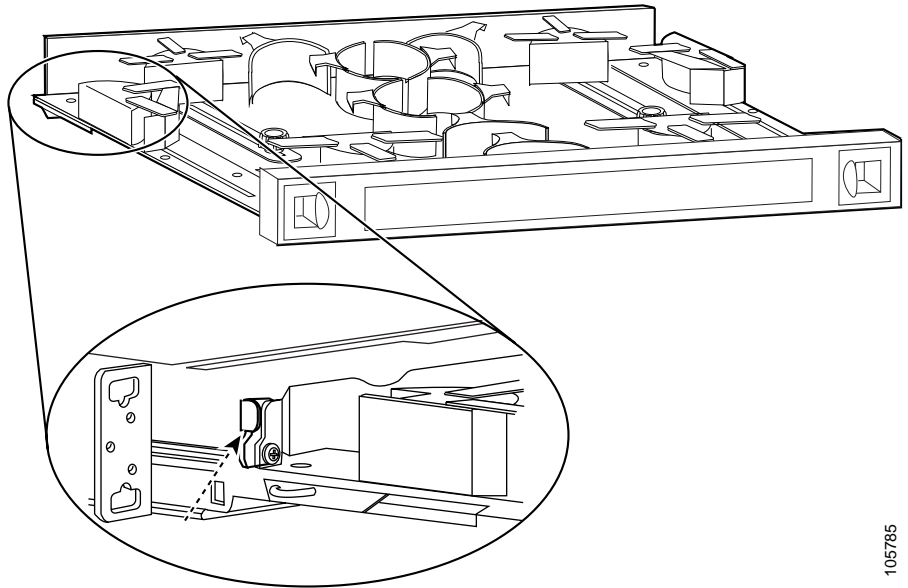
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- Step 4** Use the MTP cable installation tool to push the MTP connector of the cable into the adapter on the mux/demux module until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Continue to route the cable through the drawer around the round cable retainers to the right side.
- Step 8** Pull the cable up out of the right side of the drawer and the back up through the cable management tray.
- Step 9** Insert the MTP connectors into two different MTP adapters on the desired line card motherboards. (See [Figure 3-40](#).)

Figure 3-40 Routing the Cable Storage Drawer

Repeat Steps 1 through 4 to continue cabling the system without the cross connect panel.

- Step 10** Unlock the drawer by moving the latch back into an upright position and close the drawer. (See [Figure 3-41](#).)

Figure 3-41 Unlocking the Drawer

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**Note**

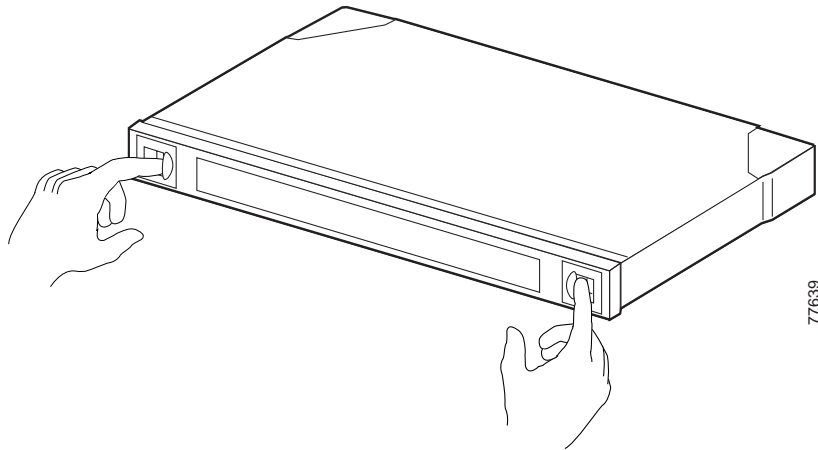
You can use the client clips shipped with the chassis to clip together cables for easy handling and organization.

Cabling 10-GE Transponder Modules with Cross Connect Drawers

To connect cables on the Cisco ONS 15540 ESPx 10-GE transponder modules using the cross connect drawer, follow these steps:

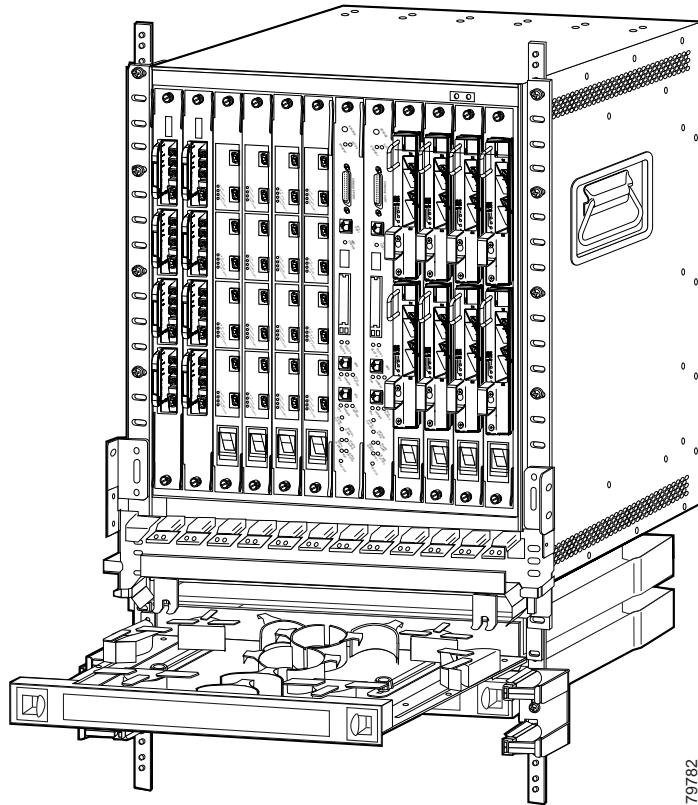
- Step 1** Open the cable storage drawer by pushing the tabs in to release the lock on the drawer. (See [Figure 3-42](#).)

Figure 3-42 Opening the Cable Storage Drawer

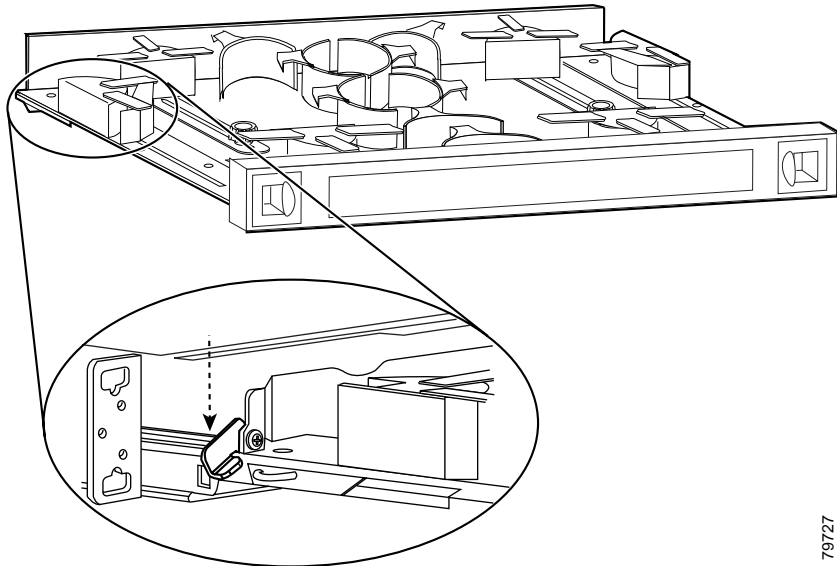


- Step 2** Pull out the cable storage drawer. (See [Figure 3-43](#).)

Figure 3-43 Pulling out the Cable Storage Drawer



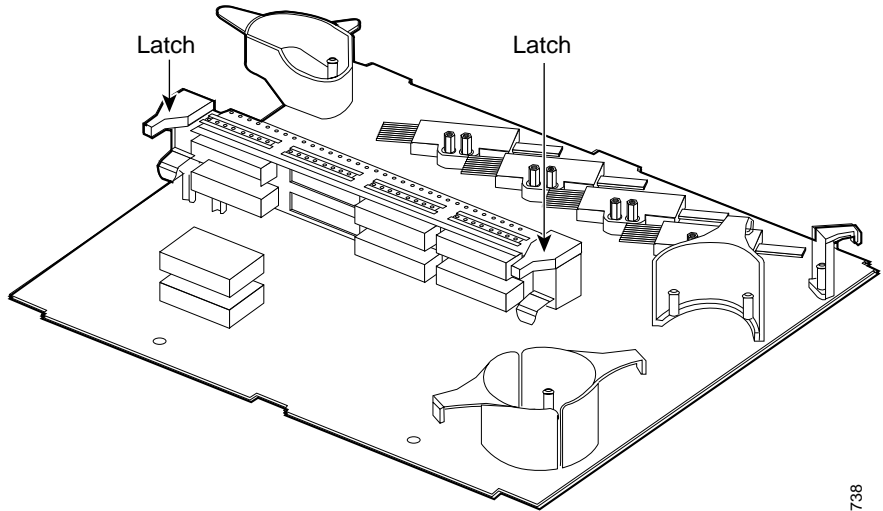
- Step 3** Lock the drawer in the open position by pushing the lever at the back left of the drawer down in the lock position. (See [Figure 3-44](#).)

Figure 3-44 Locking the Drawer

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- Step 4** Use the MTP cable installation tool to push the MTP connector on the cable into the adapter on the 10-GE transponder module until the connector snaps into place.
- Step 5** Route the MTP cable down through the cable management tray. Pull the cable out the left side of the tray.
- Step 6** Route the cable down the left side of the chassis and into the drawer.
- Step 7** Pull the cable through the vertical cable guides on the side of the cable storage drawer.
- Step 8** Route the cables through the storage drawer as directed in Steps 5 to 7 in the [“Direct Connections with Cable Storage Drawers”](#) section on page 3-16.
- Step 9** Close the cable storage drawer once the cables are routed out of the right side and you unlock the drawer.
- Step 10** Open the cross connect drawer appropriate for your system configuration. See Step 1 to Step 3 above for drawer opening details.
- Step 11** Flip the latches on the cross connect panel up and use them to pull the panel up. (See [Figure 3-45](#).)

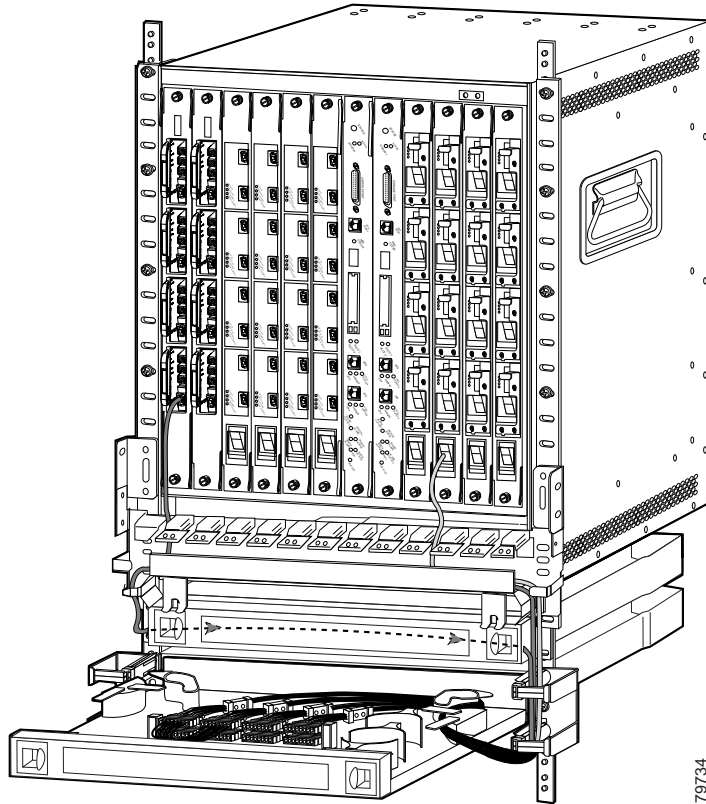
Figure 3-45 Pulling up the Cross Connect Panel



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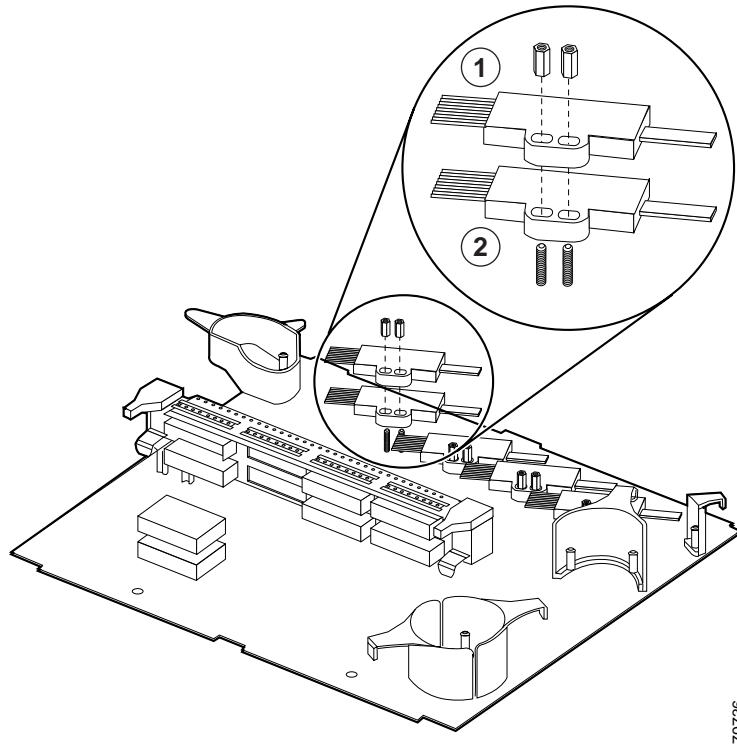
- Step 12 Route the MU breakout end of the cable in through the right side of the drawer. (See [Figure 3-46](#).)

Figure 3-46 Routing the Cross Connect Cables



Step 13 Mount the transition box as shown in [Figure 3-47](#).

Figure 3-47 Mounting the Transition Box

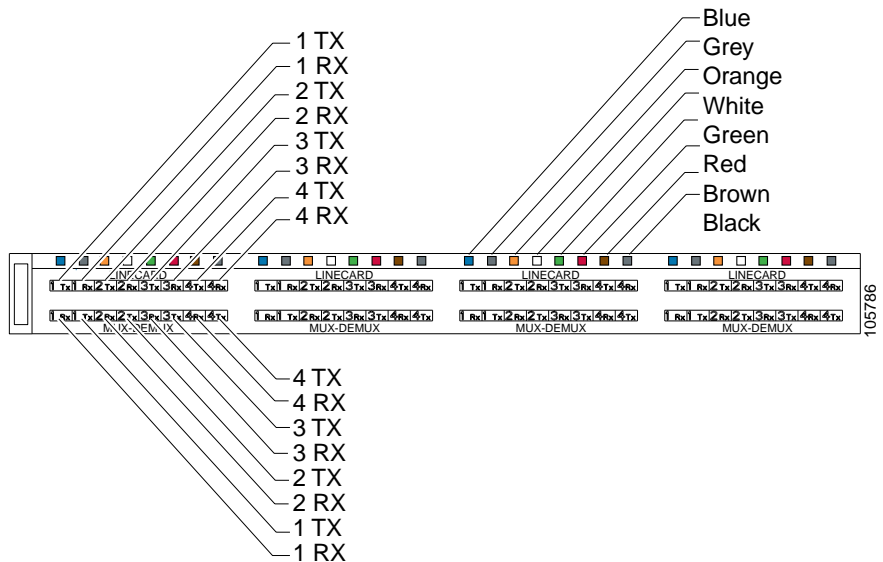


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1	10-Gbps line card motherboard connections	2	Mux/demux motherboard connections
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Step 14 Connect the cables to the bottom half of the desired adapter mux/demux connections on the inner side of the cross connect panel. (See [Figure 3-48](#).)

Figure 3-48 Cross Connect Panel



- Step 15** Connect the MU connectors on the outer side of the panel. Connect the Tx from the line card motherboard to the Tx on the mux/demux motherboard side. Connect the Rx line card side to the Rx on the mux/demux motherboard side.

The mux/demux expects the channels within the band boundary in a certain order, lowest to highest. Since the 10-Gbps line card motherboard holds only two 10-GE transponder modules, the module in subslot 0 always uses the first channel and the module in subslot 1 uses the second channel within the four possible channels.

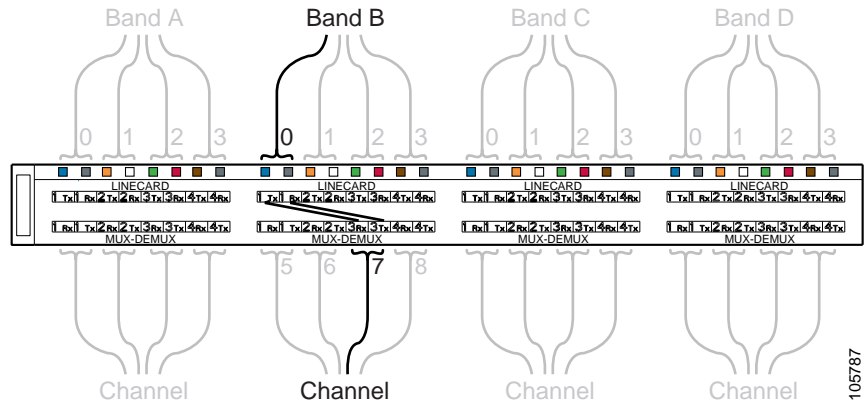
When you connect the MU connectors from the mux/demux motherboard to the 10-Gbps line card motherboard on the cross connect panel, you must know what channel the 10-GE transponder module represents and cross connect to the appropriate location.

For example, (see [Figure 3-49](#)) if the 10-GE transponder module installed in subslot 0 represents channel seven, then it corresponds with the third channel within band B (5, 6, 7, 8). You would use the MU connectors to connect the Tx and Rx of the subslot 0 line card motherboard port to the Tx and Rx of the third channel on the mux/demux motherboard port on the cross connect panel. If the

10-GE transponder module were installed in subslot 1, you would connect the Tx and Rx of the subslot 1 line card motherboard port to the Tx and Rx of the third channel on the mux/demux motherboard port on the cross connect panel.

Figure 3-49 10-GE Transponder to Channel Connection

Subslot 0, Channel 7



To connect the mux/demux motherboards to the line card motherboards, see the [“Connecting Mux/Demux Motherboards Land Line Card Motherboards with Cross Connect Drawers”](#) section on page 3-28.

