6500 Packet-Optical Platform

Installation - 4-slot Shelf

Release 15.6

What's inside...

See also:

Installation - General Information, 323-1851-201.0
Installation - 2-slot Shelf, 323-1851-201.1
Installation - 7-slot & 6500-7 packet-optical Shelves, 323-1851-201.2
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323-1851-201.8 - Standard Issue 1
September 2023

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Contents

New in this release and documentation roadmap

This technical publication contains information on how to install Release 15.6 of the 6500 Packet-Optical Platform 4-slot shelf assemblies (also called 6500 shelf in this technical publication) and related equipment. This technical publication supports the 6500 Packet-Optical Platform (6500) Release 15.6 software and subsequent maintenance releases for Release 15.6.

Use *Installation - 4-slot Shelf*, 323-1851-201.8 (this technical publication) in conjunction with *Installation - General Information*, 323-1851-201.0, which contains the following topics:

- Observing product and personnel safety guidelines
- Regulatory information
- Preparing for installation
- Installing equipment racks and power to the rack
- Cable and connector details

For installation information specific to other 6500 shelf types and, respectively, to 2150 Passive Optical Multiplexer Chassis (3 and 6 slot versions), refer to the following technical publications:

- *Installation - 2-slot Shelves,* 323-1851-201.1
- *Installation - 7-slot & 6500-7 packet-optical Shelves,* 323-1851-201.2
- *Installation - 14-slot Shelves,* 323-1851-201.3
- *Installation - 32-slot Shelves*, 323-1851-201.4
- *Installation - Passive Chassis (2150 & Photonics), Filters, and Modules*, 323-1851-201.5

Issue 1

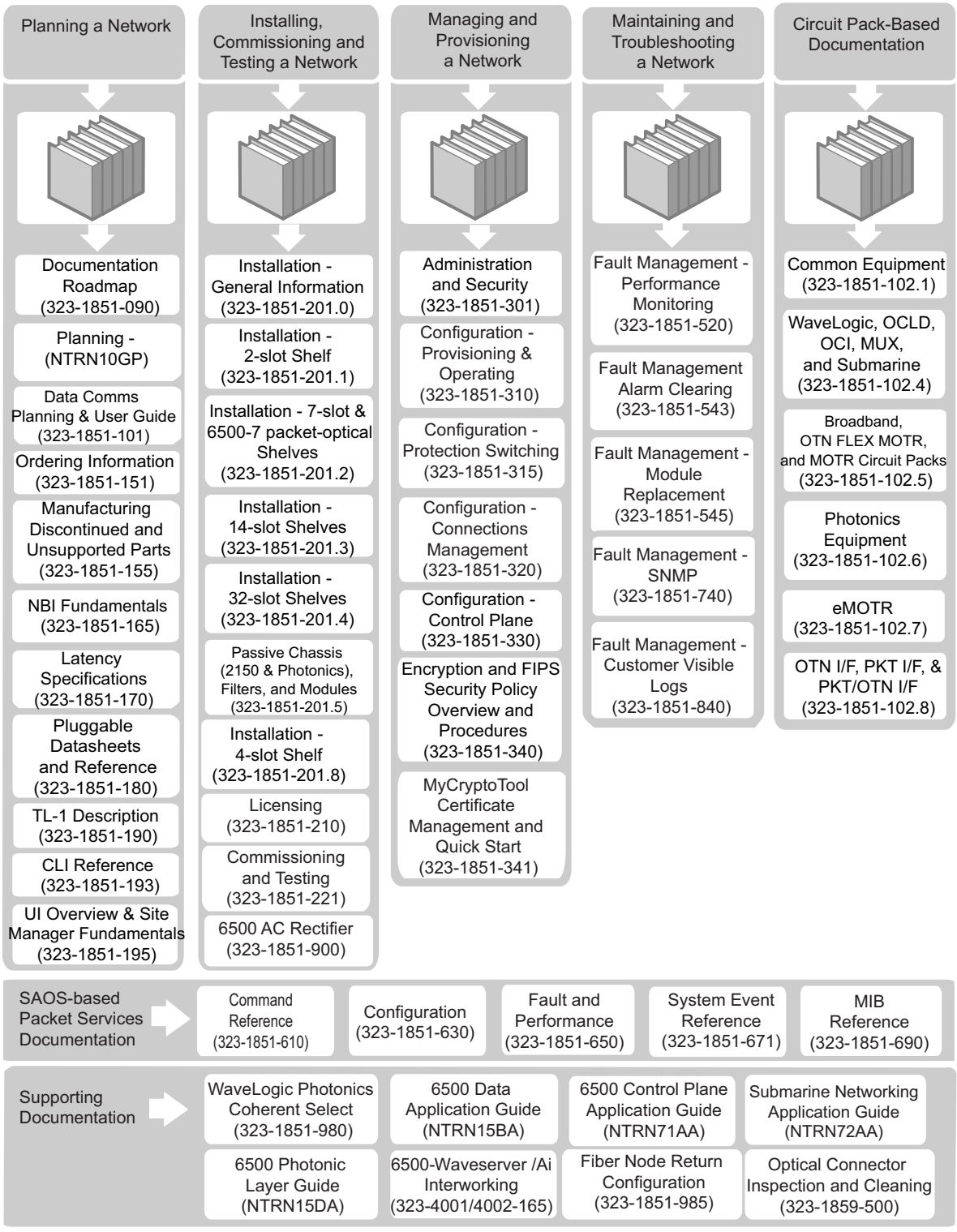
The “Cleaning connectors” chapter has been removed from *Installation - General Information*, 323-1851-201.0. This chapter is now replaced by the new comprehensive generic document:

Optical Connector Inspection and Cleaning, 323-1859-500

6500 technical publications

The following roadmap identifies the technical publications that support the 6500 Release 15.6.

6500 roadmap



Installing 6500 4-slot optical shelf

This section contains information on how to install the Ciena 6500 4-Slot Optical Shelf Assembly (NTK503HA) and related equipment, as applicable to your configuration, including:

- power cables
- control and communications cables
- power input cards
- circuit packs
- pluggable modules
- installing in the 6500 4-slot optical shelf:
  - Ethernet and optical fiber cables
  - shelf front cover
- locking and unlocking the 6500 4-slot optical shelf
- connecting a terminal to the 6500 4-slot optical shelf

Note 1: This section refers to the information in the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans. Ciena provides a custom service that can provide this documentation (contact your Ciena representative for details of this service). If not provided by Ciena, it is the responsibility of the user to obtain the necessary information (for example, from a PlannerPlus design file).

Note 2: The layout of the product identification labels may not look exactly as illustrated.

This section contains the following topics:

To install other related equipment, see “Installing OMX, fiber manager, and routing/connecting related cables”.

For installation procedures for the following passive equipment

- 2150 Passive Optical Multiplexer (6-slot)
- 2150 Passive Optical Multiplexer (3-slot)
- Passive Photonics Chassis (PPC6)

refer to *Installation - Passive Chassis (2150 & Photonics), Filters, and Modules*, 323-1851-201.5.

For more information that can be useful in preparing to install the shelf assembly, refer to the sections on the following topics in *Planning*, NTRN10GP, and *Planning - Ordering Information*, 323-1851-151, as applicable:

- bay/rack configurations—*Planning,* NTRN10GP, in the feature overview section
- bay equipping rules, including 6500 equipment rack space requirements and rack unit spacing—*Planning - Ordering Information*, 323-1851-151, in the configuration rules section
- shelf assemblies—*Planning,* NTRN10GP, in the shelf and equipment descriptions section
- 6500 shelf and equipment—*Planning - Ordering Information*, 323-1851-151, in the bays, shelf assemblies, and hardware section
- additional front exhaust considerations—*Planning,* NTRN10GP, the feature overview section
- engineering rules regarding the venting options—*Planning - Ordering Information*, 323-1851-151, in the configuration rules section and the circuit packs, modules, pluggable modules, and interface hardware section
- supported venting options on shelf variants—*Planning,* NTRN10GP, in the shelf and equipment descriptions section

- power specifications—*Planning,* NTRN10GP
- supported shelf processors—*Planning - Ordering Information*, 323-1851-151, in the circuit packs, modules, pluggable modules, and interface hardware section

For more information on the 6500 4-slot optical shelf, refer to the following technical publications:

- *Planning*, NTRN10GP
- *Planning - Ordering Information*, 323-1851-151

Before you begin the procedures in this section, make sure that you have

- determined your site prerequisites
- determined your equipment prerequisites
- all required tools and materials

  Refer to the section on preparing for installation in *Installation - General Information*, 323-1851-201.0, for information on the above.
- read the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0

Circuit packs with 90-degree SFPs

Adhere to the following recommendations if you use the shelf front cover circuit packs that have 90-degree SFPs:

- Use fibers with standard short 42.5 mm flexible boots.
- It is not recommended to use in-line plug attenuators on the circuit pack faceplate (recommend to install at the patch panel or far-end termination).
- However, if you want to use attenuators on circuit pack faceplates, see the following requirements:
  - Only current vintage optical circuit packs with angled optical ports (SFP, XFP and bulkhead adapters) can be used. This instruction does not constitute a requirement or imply that any new optical circuit packs will be able to use fixed pad attenuators at the faceplate. Fixed LC pad attenuators cannot be used on circuit packs with horizontal optical ports. Also, attenuators cannot be used on the faceplate of the CMD44 or other similar designed product. Attenuators cannot be used with fiber boot bending clips as they may result in an interference with the inside of the shelf front cover thereby imparting an unacceptable side load to the optical connector.
  - It is recommended for use on the receive port as they are generally oriented with more clearance between interface and the inside of the shelf door. (The Rx port is typically the lower port on SFPs and XFPs.)

  - — Ciena-supplied LC fixed pad attenuators must be used.
  - — Ciena-supplied and/or Ciena-approved equivalent LC fiber patchcords with 1.6 mm bend insensitive fiber and short, flexible LC boot must be used.
- Use MSA-compliant optical SFPs (standard body length).

  If using 2.0 mm diameter fibers, only the first (top) 14 SFPs can be used due to congestion in the shelf fiber manager. If using 1.6 mm diameter fibers, all 16 SFPs can be used. Bend-insensitive fibers are recommended.

Precautions

CAUTION
Risk of equipment damage
Make sure you know how to handle electronic components correctly before you begin installation procedures. Incorrect handling can cause damage to static-sensitive components.

CAUTION
Risk of shelf malfunction
Ciena recommends that you do not use cellular phones at any 6500 site. The use of cellular phones in proximity to 6500 equipment can cause shelf malfunction.

Abbreviations used in procedures

1U	one rack unit (1.75 in.)
BIP	breaker interface panel
CFP	C form-factor pluggable
CFP2	C form-factor pluggable generation 2
CFP2-DCO	C form-factor pluggable generation 2-Digital Coherent Optical transceiver
DVM	digital voltmeter
EDP	engineering documentation package
EEA	Extended Equipment Aperture
EIA	Electronics Industries Alliance
ESD	electrostatic discharge
ETSI	European Telecommunications Standards Institute
FIM	Fiber Interconnect Module

FOTR	flexible optical transponder
IDP	installation documentation package
MOTR	multiplexing optical transponder
OMX	optical multiplexer
PTE	Physical Telecommunication Environment
QSFP+	Enhanced quad (4-channel) small form-factor pluggable
QSFP28	Enhanced quad (4-channel) small form-factor pluggable 28
QSFP-DD	Quad (4-channel) small form-factor pluggable - double density
SFP	small form-factor pluggable
SFP28	small form-factor pluggable 28
XFP	large form-factor pluggable
ZTP	zero touch provisioning

Procedure list

The following table lists the procedures in this section.

ATTENTION

Make sure that you follow the recommendations described in “Circuit packs with 90-degree SFPs” on page 1-3 if you use the shelf front cover circuit packs that have 90-degree SFPs.

Note: After you installed all shelves, the system is ready for system line-up and testing (SLAT). Make sure the network element is powered down before you proceed to SLAT. See *Commissioning and Testing*, 323-1851-221.

Table 1-1
Installation procedures

Procedure title	Comment
“Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel” on page 1-8	Required for 6500 4-slot optical shelf (NTK503HA)
“Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL” on page 1-60	Required only if mounting a 6500 4-slot optical shelf (NTK503HA) on a wall
“Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)” on page 1-84	Required for 6500 4-slot optical shelf (NTK503HA)

Table 1-1
Installation procedures (continued)

Procedure title	Comment
"Testing power to the 6500 shelf" on page 1-100	Required
"Installing the shelf processor" on page 1-106	Required • Before you perform this procedure, make sure that the cooling fan module and applicable power input cards are installed and tested. • You must perform this procedure before installing any other circuit packs into the shelf. Otherwise, you risk damaging equipment.
"Connecting control and communication cables" on page 1-114	Required
"Installing circuit packs in the 6500 shelf" on page 1-128	Required Before you perform this procedure, make sure that • the shelf processor is installed in the shelf and operating correctly, and • no power-related and cooling fan module-related alarms exist on the system
"Inserting or removing circuit packs in the 6500 shelf" on page 1-140	Perform as required or when referred to from another procedure
"Installing and removing pluggable modules" on page 1-143	Perform as required or when referred to from another procedure
"Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module" on page 1-157	Perform as required or when referred to from another procedure
"Installing an OMC2 chassis and associated modules" on page 1-183	Perform as required or when referred to from another procedure
"Installing a Fiber Interconnect Module (FIM)" on page 1-192	Perform as required or when referred to from another procedure

Table 1-1
Installation procedures (continued)

Procedure title	Comment
“Routing fiber-optic cables to circuit packs in the 6500 shelf” on page 1-201	Required
“Guidelines for cable routing to electrical SFP and optical ports on the same shelf” on page 1-213	Perform as required or when referred to from another procedure
“Installation guidelines for QSFP28-QSFP28 DAC cable” on page 1-217	Perform as required or when referred to from another procedure
“Connecting or disconnecting fiber-optic cables to or from circuit packs” on page 1-222	Required
“Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ” on page 1-243	Perform as required or when referred to from another procedure
“Connecting a terminal to the 6500 4-slot optical shelf” on page 1-251	Perform as required or when referred to from another procedure

Procedure 1-1
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Use this procedure to install a 6500 4-slot optical shelf NTK503HA into a 19-inch, 21-inch, 23-inch, or ETSI equipment rack.

Do not install the shelf processors as part of this procedure.

If you are mounting the 6500 4-slot optical shelf on a wall, perform procedure "Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL" on page 1-60.

This procedure includes instructions on the following:

- unpacking and inspecting the shipment contents
- installing the bracket or bracket and air baffle kit
- installing the brush strips to the mounting brackets (as applicable for the NTK509NJ and NTK509NK kits only)
- converting to a front exhaust cooling fan module (with NTK509NJ only), if applicable
- installing hinges (if you plan to install a shelf front cover)
- installing the 6500 4-slot optical shelf into a rack
- grounding the 6500 4-slot optical shelf
- installing the cooling fan module
- installing the access panel (NTK505JA/NTK505JB)

Packs-in-place shelf

For a 6500 4-slot optical shelf shipped in a packs-in-place (PIP) kit (NTYY99ER), this procedure includes instructions on the following:

- unpacking and inspecting the shipment contents
- removing the shipping bracket
- installing hinges (if you plan to install a shelf front cover)
- installing the 6500 4-slot optical PIP shelf into a rack
- grounding the 6500 4-slot optical PIP shelf
- seating the cooling fan module
- seating the access panel (NTK505JA/NTK505JB)

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

CAUTION
Risk of equipment damage
Do not insert any circuit packs into an unpowered 6500 4-slot optical shelf. Otherwise, you risk damaging equipment. The figures in this procedure show various components installed in their slots, for illustration purposes only. Install only the components indicated in this procedure.

After completing this procedure, you must install the power input cards, connect power cables, power up the 6500 4-slot optical shelf, test the power input cards and cooling fan module, and install the shelf processors, before seating any circuit packs into the backplane.

Shipping options

Depending on your requirements, the 6500 4-slot optical shelf equipment is shipped in different packaging options.

If the 6500 4-slot optical shelf is shipped in a packs-in-place kit

The 6500 4-slot optical shelf may be shipped pre-fibered. All the components are pre-installed but not seated into the backplane. The bracket kit is also pre-installed. Insert only the cooling fan module as part of this procedure. For details related to other components, see the precautionary message “Risk of equipment damage”.

If the 6500 4-slot optical shelf is not shipped in a packs-in-place kit

Install only the bracket kit or bracket and air baffle kit, as applicable, and the cooling fan module and access panel as part of this procedure. Do not install the power input cards, shelf processors, interface circuit packs, or filler cards. For details related to other components, see the precautionary message “Risk of equipment damage”.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

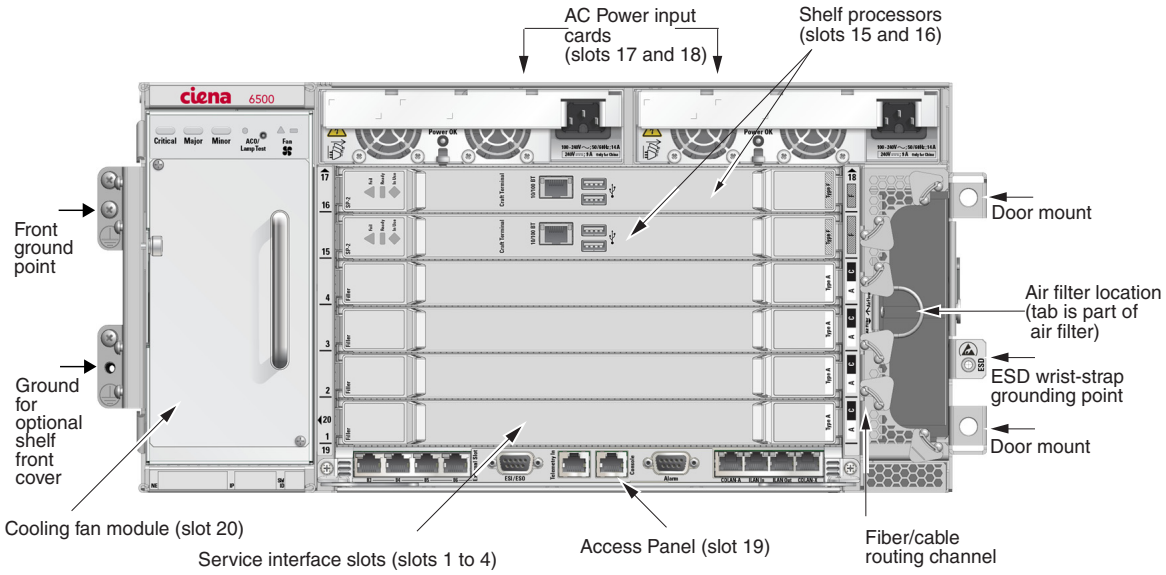
NTK503HA

"Example of the NTK503HA with two AC Power Input Cards (100-240 Vac) NTK505UN" on page 1-10 shows various components installed in their respective slots in the 6500 4-slot optical shelf

"Example of the NTK503HA with two Power Input Cards (Max 30A), NTK505UD" on page 1-11 shows various components installed in their respective slots in the 6500 4-slot optical shelf

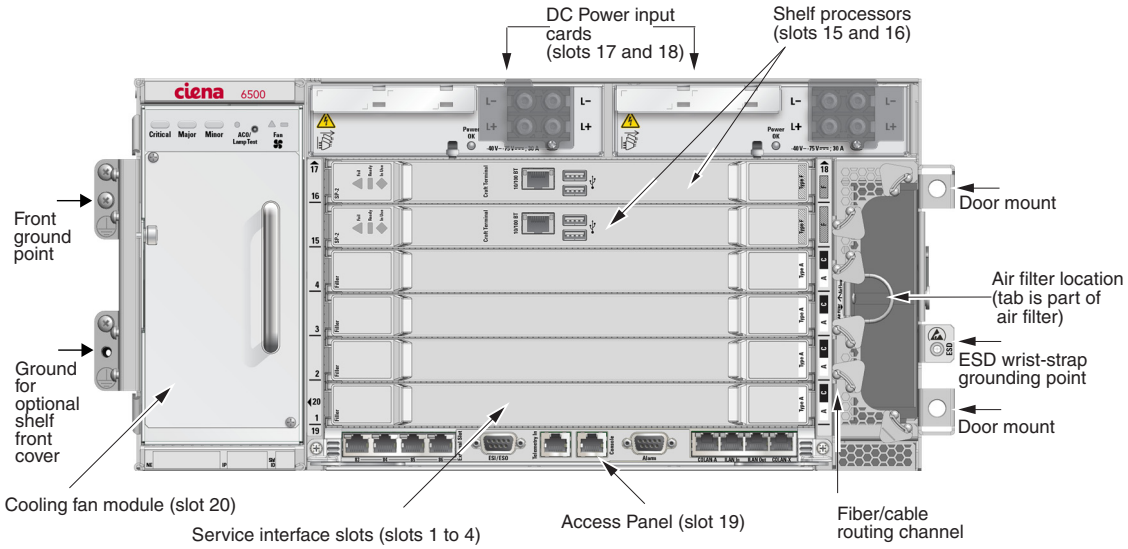
For related details, see *Planning*, NTRN10GP.

Figure 1-1
Example of the NTK503HA with two AC Power Input Cards (100-240 Vac) NTK505UN



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Figure 1-2
Example of the NTK503HA with two Power Input Cards (Max 30A), NTK505UD



Prerequisites

Make sure that

- The equipment rack is installed, secured, and grounded according to manufacturer instructions.
- For power disconnection after installation, the male end of each AC power cable must remain accessible at the socket-outlet connection to the power source.
- The position of existing cables is such that the addition of the 6500 4-slot optical shelf to the rack will not damage cables or interfere with traffic.
- You have two persons available to install the 6500 4-slot optical shelf. However, one person is sufficient if the keyhole feature in the mounting brackets is used.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

- You have the following tools and materials:
  - Phillips screwdriver
  - 7-mm socket
  - 10-mm nut driver
  - 5/16 in. torque wrench
  - the installation kit, which includes the miscellaneous hardware required for shelf mounting (bolts, lock washers, alignment studs, and screws)
  - No. 6 AWG (16 mm^2), 7-strand copper insulated conductor grounding wire and grounding lugs (included in the installation kit)
  - crimping tool, No. 6 AWG (16 mm^2) - #1/0 AWG
  - cable ties, lacing twine, or small hook and loop tape (such as Velcro) according to your company's practice to secure the left-side expanding duct in a fully-open position (see step 59)

CAUTION
Risk of traffic loss
Shelves that are configured to exclusively exhaust air out the front may affect the inlet air temperature of nearby shelves. If front exhaust is required and a 6500 shelf is equipped in the same rack as one or more other shelves configured for front exhaust, refer to front exhaust considerations in the Bay/rack configurations section in *Planning*, NTRN10GP.

- For installations above shoulder level, have a secure ladder.

ATTENTION
When CPL modules are co-located with a 6500 shelf in a cabinet with a door or panel facing the shelf exhaust, the 6500 shelf must be located above the CPL modules and the cabinet door/panel must be perforated with at least 73% open area. The inlet air temperature to CPL modules must not exceed 40°C for long-term (normal) operation when measured at a distance of 2 inches from the module faceplate.

- You observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0.
- You have the appropriate personal grounding device to dissipate electrostatic charges.
- You have the correct mounting bracket kit (one kit for each shelf). You will install one bracket or bracket and air baffle, as required, to each side of the 6500 4-slot optical shelf.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

See “Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1)” on page 1-14 for details that specify the mounting bracket designed to fit a specific rack type and setback (that is, the distance from the front of the shelf, cooling fan module, to the front edge of the rack plate).

For related details, see the following sections in *Installation - General Information*, 323-1851-201.0, the section on preparing for installation:

— Standard frame hole opening and spacing

— 6500 cooling—air flow direction terminology

For more information, see the ordering information section, the configuration rules section, and the hardware section in *Ordering Information*, 323-1851-151.

- If the shelf being installed is a replacement of a previously commissioned shelf and if the initial shelf being replaced is part of a node managed by MCP:

  — ensure you de-enroll the node in question before the shelf installation activity. The node can be re-enrolled in MCP after the newly installed shelf is successfully commissioned.

  — be aware that the MAC address that the network element will report for the replacement shelf will be different than the MAC address of the shelf you replaced.

  For more information, refer to MCP documentation.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1)

<table>
<tr><th rowspan="2">Mounting Type</th><th rowspan="2">Air Flow Options</th><th colspan="2">Setback</th><th colspan="2">Mounting Panel Width</th><th colspan="2">Mounting Hole Center-to-Center</th><th colspan="2">Mounting Aperture Width</th></tr>
<tr><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th></tr>
<tr><td>19-inch EIA

21-inch/ ETSI

23-inch EIA</td><td>• front-to-rear (in racks/cabinets with space for the left-side expanding duct)
• other options with right side air intake and/or left side exhaust
• front-to-rear
• front-to-front (except when equipped with AC power input cards)
• other options with right side air intake and/or left side exhaust
• front-to-rear
• contact Ciena is other options are required</td><td colspan="8">NTZF99XP: This kit includes multiple bracket kits (which are also separately orderable). Select and use one of the bracket kits as applicable. You can order this kit if you do not know which frame type will be used or if you want to have all the brackets on site to accommodate different frame types.
To mount the 4-slot optical shelf NTK503HA into
• a 19-inch rack, use NTK509NH (Note 2)
• a 21-inch or ETSI rack, use NTK509NJ (Note 3, Note 4, and Note 5)
• an 23-inch rack, use NTK509NK (Note 5 and Note 6)
For details about a specific bracket and air baffle kit (that is, setback, mounting panel width, mounting hole, mounting aperture width), see the related kit ordering code in this table.</td></tr>
<tr><td colspan="10">Description: Bracket and Air Baffle Kit, 6500 4-slot shelf (NTK503HA) includes brackets for installation in 19in, 21in, 23in EIA and ETSI racks</td></tr>
<tr><td>19-inch/ /23-inch</td><td>• right-to-left (19-inch)
• front-to-rear (23-inch)</td><td colspan="8">NTZF99VP: This kit includes multiple bracket kits (which are also separately orderable). Select and use one of the bracket kits as applicable. You can order this kit if you do not know which 19-inch or 23-inch frame type will be used or if you want to have both the 19-inch and 23-inch the brackets on site to accommodate different frame types.
To mount the 4-slot shelf (NTK503HA) into
• a 19-inch rack, use NTK509NH (Note 2)
• a 23-inch rack with front-to-rear air flow, use NTK509NK (Note 5 and Note 6)</td></tr>
<tr><td colspan="10">Description: Bracket and Air Baffle Kit, 6500 4-slot shelf (NTK503HA), includes brackets for installation in 19in and 23in EIA racks.</td></tr>
</table>

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1) (continued)

<table>
<tr><th rowspan="2">Mounting Type</th><th rowspan="2">Air Flow Options</th><th colspan="2">Setback</th><th colspan="2">Mounting Panel Width</th><th colspan="2">Mounting Hole Center-to-Center</th><th colspan="2">Mounting Aperture Width</th></tr>
<tr><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th></tr>
<tr><td rowspan="5">19-inch EIA</td><td rowspan="5">• front-to-rear (in racks/cabinets with space for the left-side expanding duct)
• other options with right side air intake and/or left side exhaust</td><td>127</td><td>5</td><td rowspan="4">482.6</td><td rowspan="4">19</td><td rowspan="4">465.1</td><td rowspan="4">18.31</td><td rowspan="4">450.0 (Note)</td><td rowspan="4">17.72 (Note)</td></tr>
<tr><td>100</td><td>4</td></tr>
<tr><td>77</td><td>3</td></tr>
<tr><td>50</td><td>2</td></tr>
<tr><td colspan="8">NTK509NH: This kit includes the following:
• a right-side air blocking plate and left-side expanding duct that can be used for GR-63-CORE NEBS compliant front-to-back air flow configurations in 4-post racks/cabinets that have space behind the front mounting flanges/uprights (includes mounting at a 50 mm [2 in] setback in 2-post racks with 77 mm [3 in] deep uprights with the specified mounting aperture width).
• EIA mounting brackets that can also be used for 19-inch mounting with no side plates/ducts (with right side air intake and left side exhaust).
Note: All bracket configurations will fit in the EIA-310-D mounting aperture width as specified. The 19-inch brackets can be used without the side plates/ducts at the 77 mm (3 in) and 127 mm (5 in) in a 445.5 mm (17.50 in) mounting aperture. The 19-inch brackets can also be used without side plates/ducts at the 50 mm (2 in) and 100 mm (4 in) setback in a mounting aperture that is at least 447.1 mm (17.60 in) wide.</td></tr>
<tr><td colspan="10">Description: Bracket and Air Baffle Kit for 6500 4-Slot Shelf, 19-inch, 465 mm center-to-center mounting holes, 50/77/100/127 mm setback, EIA hole pitch</td></tr>
</table>

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1) (continued)

<table>
<tr><th rowspan="2">Mounting Type</th><th rowspan="2">Air Flow Options</th><th colspan="2">Setback</th><th colspan="2">Mounting Panel Width</th><th colspan="2">Mounting Hole Center-to-Center</th><th colspan="2">Mounting Aperture Width</th></tr>
<tr><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th></tr>
<tr><td rowspan="4">21-inch</td><td rowspan="9">• front-to-rear
• front-to-front (except when equipped with AC power input cards)
• other options with right side air intake and/or left side exhaust</td><td>127</td><td>5</td><td rowspan="4">533.4</td><td rowspan="4">21</td><td rowspan="4">515.8</td><td rowspan="4">20.31</td><td>495.3</td><td>19.50</td></tr>
<tr><td>100</td><td>4</td><td>500.0</td><td>19.69</td></tr>
<tr><td>77</td><td>3</td><td>495.3</td><td>19.50</td></tr>
<tr><td>50</td><td>2</td><td>500.0</td><td>19.69</td></tr>
<tr><td rowspan="4">ETSI</td><td>127</td><td>5</td><td rowspan="4">535</td><td rowspan="4">21.06</td><td rowspan="4">515.0</td><td rowspan="4">20.28</td><td rowspan="4">500.0</td><td rowspan="4">19.69</td></tr>
<tr><td>100</td><td>4</td></tr>
<tr><td>77</td><td>3</td></tr>
<tr><td>50</td><td>2</td></tr>
<tr><td colspan="10">NTK509NJ: This kit includes the following:
• reversible left-side and right-side air ducts that can be oriented for front-to rear and front-to-front airflow
• fan rear exhaust blocking plate (410-0181-001)
• brackets for ETSI mounting (25 mm vertical hole pitch) and EIA (1.75 in per rack unit) with a 21-inch mounting panel width. The included EIA brackets can also be used for 19-inch mounting with no ducts (with right side air intake and left side exhaust).
• corner cable pass-through brushes for cold/hot air zone separation
(Note 3, Note 4, and Note 5)</td></tr>
<tr><td colspan="10">Description: Bracket and Air Baffle Kit for 6500 4-slot optical shelf, 21-inch/ETSI, front or rear exhaust, 516/515 mm center-to-center mounting holes, 50/77/100/127 mm setback, EIA/25 mm hole pitch.</td></tr>
</table>

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1) (continued)

<table>
<tr><th rowspan="2">Mounting Type</th><th rowspan="2">Air Flow Options</th><th colspan="2">Setback</th><th colspan="2">Mounting Panel Width</th><th colspan="2">Mounting Hole Center-to-Center</th><th colspan="2">Mounting Aperture Width</th></tr>
<tr><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th><th>mm</th><th>in</th></tr>
<tr><td rowspan="5">23-inch EIA</td><td rowspan="5">• front-to-rear
• contact Ciena if other options are required</td><td>127</td><td>5</td><td rowspan="4">584.2</td><td rowspan="4">23</td><td rowspan="4">566.7</td><td rowspan="4">22.31</td><td>546.1</td><td>21.50</td></tr>
<tr><td>100</td><td>4</td><td>547.7</td><td>21.56</td></tr>
<tr><td>77</td><td>3</td><td>546.1</td><td>21.50</td></tr>
<tr><td>50</td><td>2</td><td>547.7</td><td>21.56</td></tr>
<tr><td colspan="8">NTK509NK: This kit includes
• left and right-side air ducts that can be oriented for front-to-rear airflow. This mounting and cooling configuration complies with the GR-63-CORE (NEBS) operating requirements.
• The included EIA brackets can also be used for 19-inch mounting with no ducts (with right side air intake and left side exhaust).
• corner cable pass-through brushes for cold/hot air zone separation.
(Note 5 and Note 6)</td></tr>
<tr><td colspan="10">Description: Bracket and Air Baffle Kit for 6500 4-slot optical shelf, 23-inch, rear exhaust, 567 mm center-to-center mounting holes, 50/77/100/127 mm setback, EIA hole pitch. The NTK509NK bracket in this kit is reversible and can also be used for 19-inch (465 mm distance between mounting holes).</td></tr>
</table>

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1) (continued)

Mounting Type	Air Flow Options	Setback		Mounting Panel Width		Mounting Hole Center-to-Center		Mounting Aperture Width	
		mm	in	mm	in	mm	in	mm	in

Note 1: Your order includes one bracket kit as listed in this table.

Note 2: The 4-slot shelf air intake with bracket kit NTK509NH is from the front-right and additionally the right-side if the included right-side air blocking plate is not used. With this bracket kit, the exhaust is through the rear and left side of the cooling fan module (equipped on the left side of the shelf). In compatible racks 4-post racks/cabinets that have space behind the front mounting flanges/uprights, the left side expanding duct can be used to direct the left exhausting air to the rear (used for GR-63-CORE NEBS compliant front-to-back air flow configurations). If the front air flow deflection plate is removed from the front of the cooling fan module, air will also exhaust out through the front.

Note 3: Bracket and air baffle kit NTK509NJ consists of air ducts (one for each side of the shelf), a blocking plate (for the rear of the cooling fan module), mounting brackets (one for each side of the shelf). The air duct (plenum) is attached to the right side of the shelf, providing front-only air intake. The exhaust duct is attached to the left side of the shelf and is reversible (providing either front-only or rear-only exhaust) when used in conjunction with the rear exhaust air blocking plate (N0211255) that is attached to the rear of the cooling fan module. After the right and left air baffles are attached to the shelf, attach the mounting brackets to the air baffles at the required setback. For a front-in, rear-out shelf cooling configuration, do not remove the front-exhaust air blocking plate installed on the cooling fan module and do not install the rear exhaust block plate. For a front-in, front-out shelf cooling configuration, remove and discard the plate from the front of cooling fan module and install the rear exhaust air blocking plate (N0211255) to the rear of the cooling fan module. If the shelf is configured for front-only exhaust but is equipped with AC Power Input Cards (NTK505UN), the Power Input Cards/Modules will still exhaust air out the back of the shelf and at least 50 mm (2 inches) of unrestricted exhaust space is required at the back of the shelf. The use of this kit is the only way of mounting a 4-slot shelf assembly (NTK503HA) in an ETSI frame or 21-inch frame with an EIA hole pitch. The included EIA brackets can also be used for 19-inch mounting with no ducts (with right-side air intake and left-side exhaust).

Note 4: Shelves that are configured to exclusively exhaust air out the front may affect the inlet air temperature of nearby shelves. Telcordia GR-63-CORE (NEBS) specifies that shelves be configured for rear exhaust in order to avoid the mixing of hot air with cool inlet air. If the site provides the minimal clearance as specified in the standard between the back of the shelf and any other shelf, wall or obstruction, it is recommended to configure the shelf for rear exhaust. If front exhaust is required and a 6500 shelf is equipped in the same rack as one or more other shelves configured for front exhaust, see 6500 *Planning*, NTRN10GP, for details.

Note 5: For any shelf that is configured for rear-only exhaust in a Telcordia GR-63-CORE (NEBS) operating environment, provide the minimal clearance as specified in the standard between the back of the shelf and any other shelf, wall or obstruction.

Table 1-2
Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1) (continued)

Mounting Type	Air Flow Options	Setback		Mounting Panel Width		Mounting Hole Center-to-Center		Mounting Aperture Width	
		mm	in	mm	in	mm	in	mm	in
Note 6: Bracket and air baffle kit NTK509NK consists of air ducts (one for each side of the shelf), mounting brackets (one for each side of the shelf). The air duct (plenum) is attached to the right side of the shelf, providing front-only air intake. The exhaust duct attaches to the left side of the shelf, providing rear-only exhaust. For a front-in, rear-out shelf cooling configuration, do not remove the front-exhaust air blocking plate installed on the cooling fan module. The use of this kit is the only way of mounting a 4-slot optical shelf assembly (NTK503HA) in an EIA 23-inch frame. ***Note 7:*** Wall mount kit NTK509NL is used to install the 4-slot shelf on a wall. When you use this kit, the shelf bottom is parallel to the mounting surface and the air flow is bottom to top through the 4-slot shelf with the inlet air ports at the bottom front and left side and air exhaust ports at the top front and right side. Access to the modules and circuit packs is on the left side when the shelf is wall-mounted. This kit includes upper and lower air ducts with integrated fiber and cable management features. To provide sufficient clearance for operating the shelf cover on the left side and for circuit pack installation/replacement, the vertical mounting surface should be at least 864 mm (34.0 in) wide by 657 mm (25.9 in) tall. For the installation procedure, see Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL on page 1-60.									

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Guidelines and precautions

For a raised floor (through-floor) application, install the 6500 shelves from the bottom of the rack up to maximize space for routing cables coming through the floor. For an overhead application, install the 6500 shelves from the top of the rack down to maximize space for routing cables that come off the cable racks.

Make sure that you understand the following information for ETSI or front-only exhaust applications when the 6500 4-slot optical shelf is to be equipped with two AC Power Input Cards (100 - 240 Vac) (NTK505UN).

ATTENTION
The AC Power Input Card (100 - 240 Vac) (NTK505UN) has integrated air intake fans at the front and exhaust ports at the rear of the shelf that cannot be restricted. If the shelf is equipped with AC Power Input Cards and configured for front exhaust, at least 50 mm (2 in.) of unrestricted exhaust space is required at the rear of the shelf.

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet or wall-mounted shelf is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Risk of equipment damage
Make sure that your hands or tools do not come into contact with the circuitry of the shelf processor (SP), access panel, (AP), shelf ID (SID) modules, or backplane pins. Avoid contact until the 6500 shelf is grounded to the rack.

CAUTION
Risk of equipment damage and traffic loss
Install the 6500 shelf over a non-inflammable surface only.

CAUTION
Risk of equipment damage
The 6500 shelf is suitable for connection to intrabuilding or unexposed wiring or cabling only.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 1-20.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on another shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

3

CAUTION
Risk of equipment damage
Make sure that your hands or tools do not come into contact with the circuitry of the shelf processor (SP), access panel, (AP), shelf ID (SID) modules, or backplane pins. Avoid contact until the 6500 shelf is grounded to the rack.

4 Select your next step.

If the 6500 4-slot optical shelf	**Then**
was shipped in a packs-in-place kit	• unpack the contents of the shipping container. • perform a visual inspection for any signs of damage that can occur during shipping. • then go to step 45.
was not shipped in a packs-in-place kit	go to step 5

Unpacking and inspecting the content of the shipping containers

5 Unpack the contents of each shipping container.

6 Perform a visual inspection of the contents of the following shipping containers for any signs of damage that can occur during shipment.

- empty 6500 4-slot optical shelf (5U card cage)
- cooling fan module
- 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ, if applicable

  In this procedure you will only install the hinges for the shelf front cover.

Unpacking components

7 Unpack the following components for each shelf and perform a visual inspection of the contents of the containers (as applicable to the configuration you ordered):

- common equipment, as applicable:
  - — two AC Power Input Cards (100-240 Vac) NTK505UN
  - — two DC Power Input Cards (Max 30A) (breakered) NTK505UD
  - — two Shelf Processors
  - — Access Panel

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

- bracket and air baffle kit
- interface circuit packs and filler cards, as applicable, to the configuration you ordered

Preparing to install brackets and air baffle kit

8 Review the details in "Bracket kits for 6500 4-slot optical shelf NTK503HA (Note 1)" on page 1-14 for the details related to the bracket and air baffle kit that you ordered.

9 Familiarize yourself with the instructions listed before you install the bracket and air baffle kit.

- The 6500 4-slot optical shelf is shipped without the bracket kit assembled, but has features on which to assemble the bracket kit.

ATTENTION
Use the screws provided with the bracket and air baffle kit. Using different screws can block or damage the cooling fan module.

- Install the required bracket and air baffle kit in the applicable orientation and setback position onto the 6500 4-slot optical shelf. Then install the 6500 4-slot optical shelf into the applicable rack in the correct position.

  or

  Install the required bracket and air baffle kit as applicable in
  - — the required setback or
  - — the required orientation for air flow and setback
- Make sure that you use a torque wrench to verify that torque for the brackets to the shelf has been applied correctly:

  .56 N-m (5 lb-in) for installation and 45 N-m (4 lb-in) for inspection.

10 Determine the correct position for the 6500 4-slot optical shelf in the equipment rack.

Installing the bracket and air baffle kit

11 Select your next step based on the applicable bracket or bracket and air baffle kit.

If you are using bracket and air baffle kit	**Then** go to
NTK509NH (for 19-inch rack)	step 12
NTK509NJ (for ETSI/21-inch rack)	step 20
NTK509NK (for 23-inch rack)	step 32

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

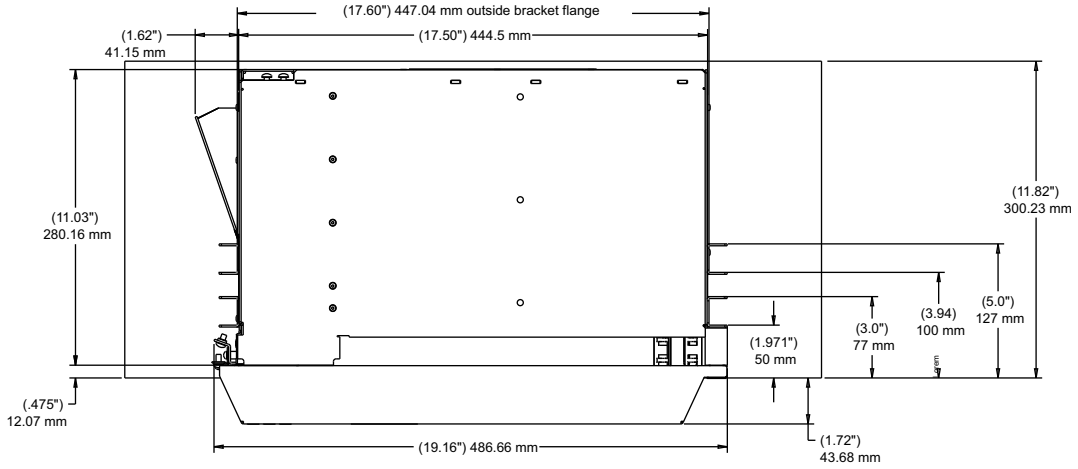
Step	Action

Installing NTK509NH, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, 19-inch rack

12 Continue with this step to attach bracket and air baffle kit NTK509NH based on the required setback and airflow configuration.

See the following illustrations.

Figure 1-3
NTK509NH mounting options—19-inch rack



ATTENTION

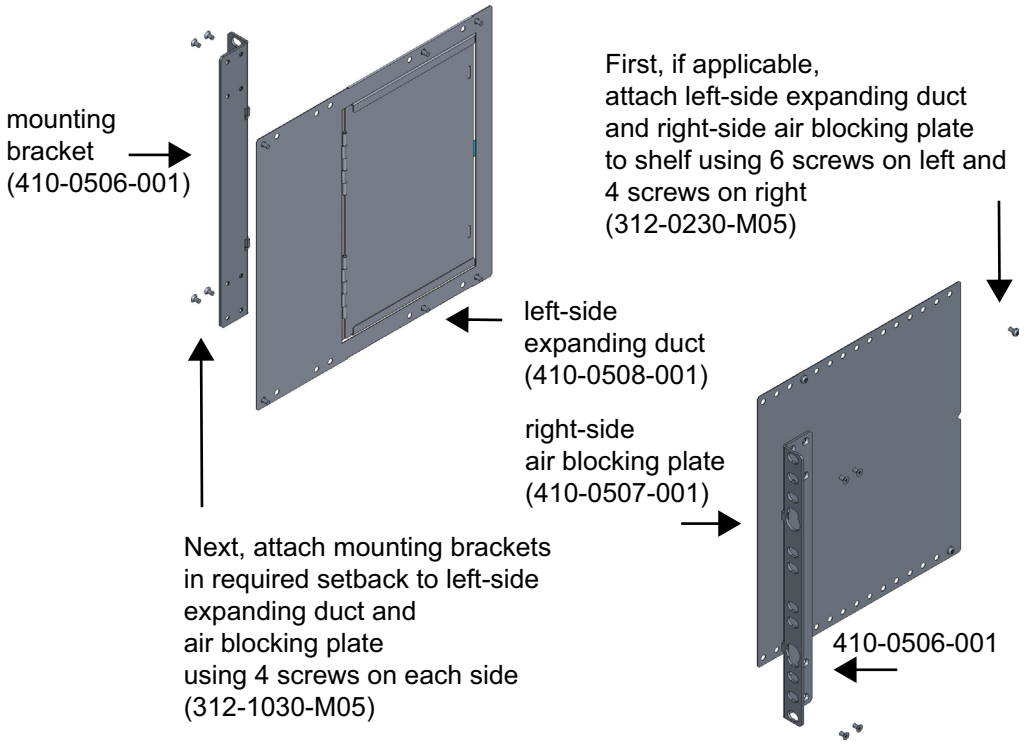
Use the left-side expanding duct and right-side air blocking plate for the GR-63-CORE NEBS compliant front-to-rear air flow configuration in 4-post racks/cabinets that have space behind the front mounting flanges/uprights. (This includes some 2-post racks with 77 mm [3 inch] deep uprights used with a 50 mm [2 inch] bracket setback.)

Otherwise, do not use the left-side expanding duct and right-side air blocking plate in NTK509NH. Use only the mounting brackets, which provides side-to-side airflow. Unless there is rear aisle exhaust clearance behind the shelf, remove the front exhaust air blocking plate on the fan module.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

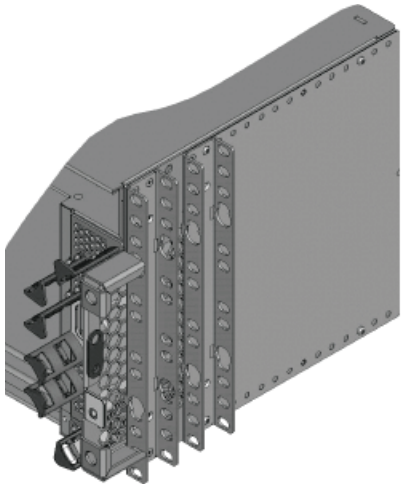
Figure 1-4
NTK509NH, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, 19-inch rack



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

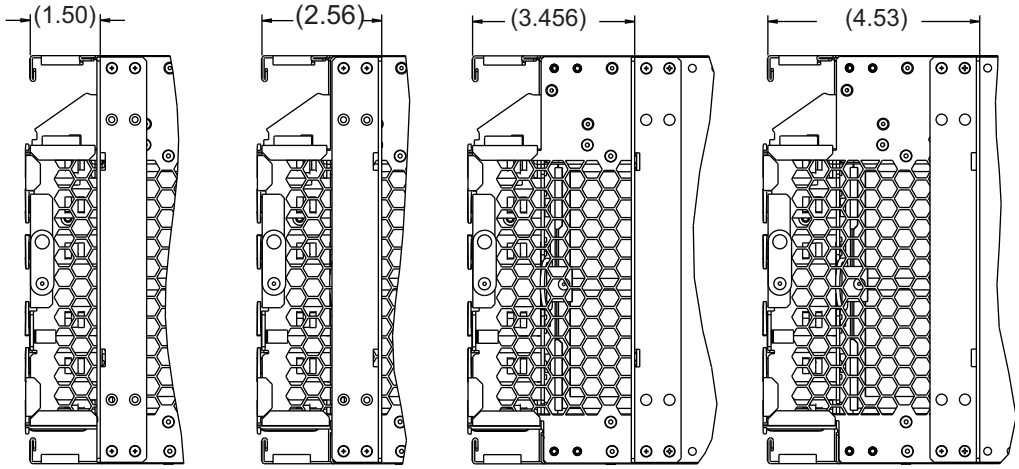
Step	Action
	For overviews of the different setbacks, see the two following illustrations.

Figure 1-5
Overview—all bracket mounting setbacks—19-inch rack—view A (right side)



This view includes the right-side air blocking plate. Use the right-side air blocking plate only if applicable.

Figure 1-6
Overview—all bracket mounting setbacks—19-inch rack—view B (right side)



These views do not include the right-side air blocking plate under the bracket. If applicable, make sure that you attach the right-side air blocking plate on the shelf before attaching the bracket.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-7
NTK509NH, left-side expanding duct

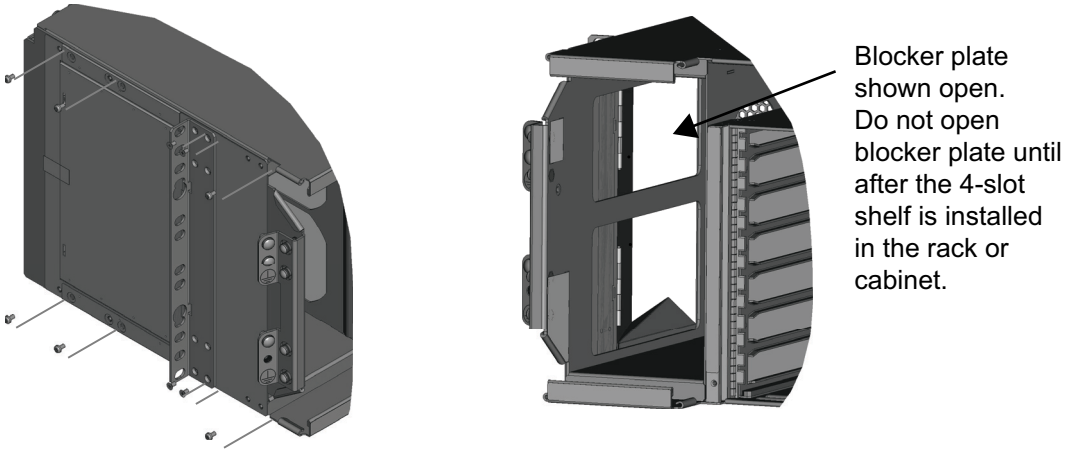
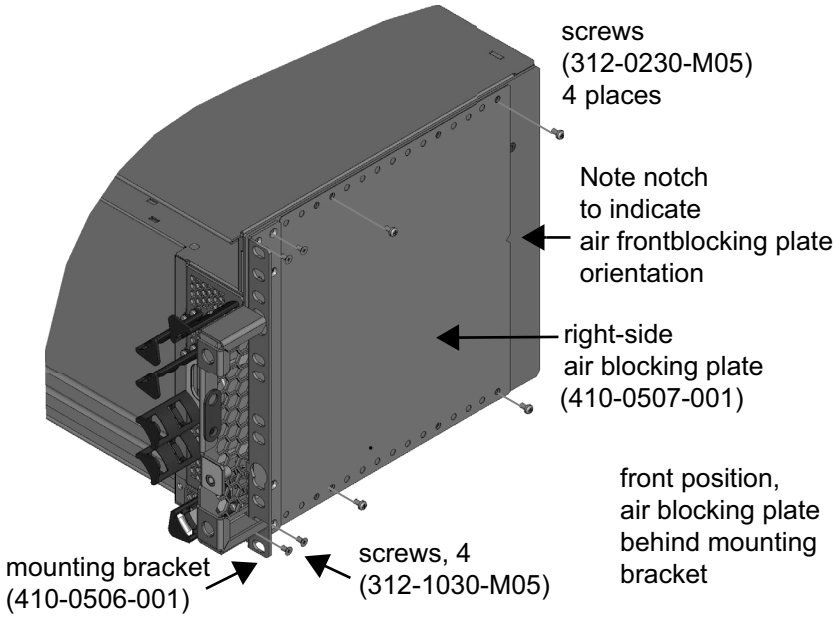


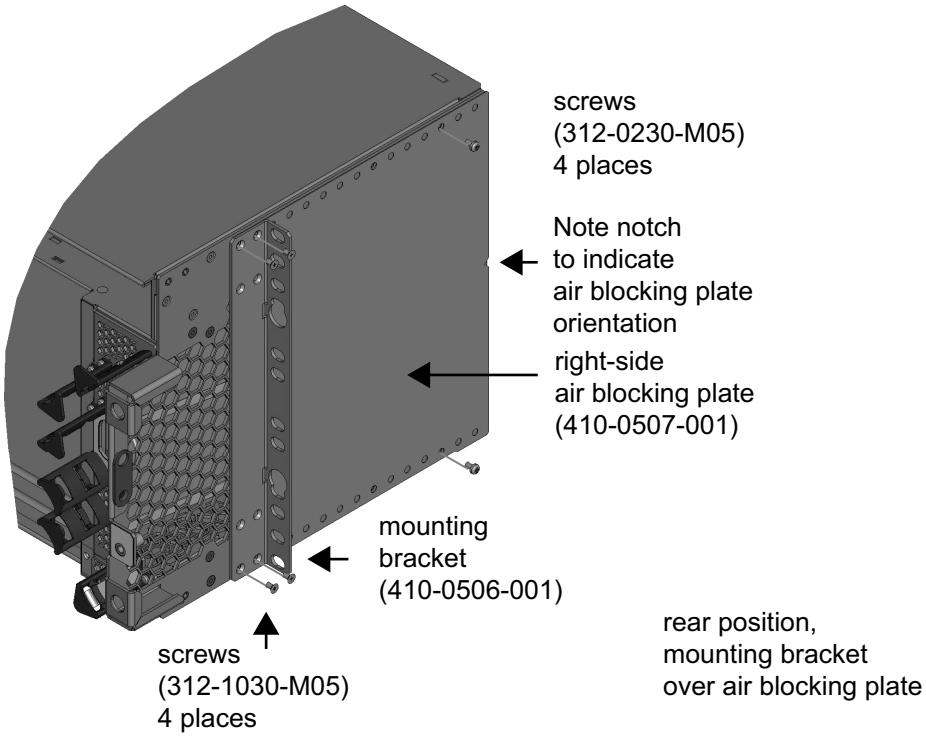
Figure 1-8
NTK509NH, air blocking plate—front position configuration—50 mm and 77 mm setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

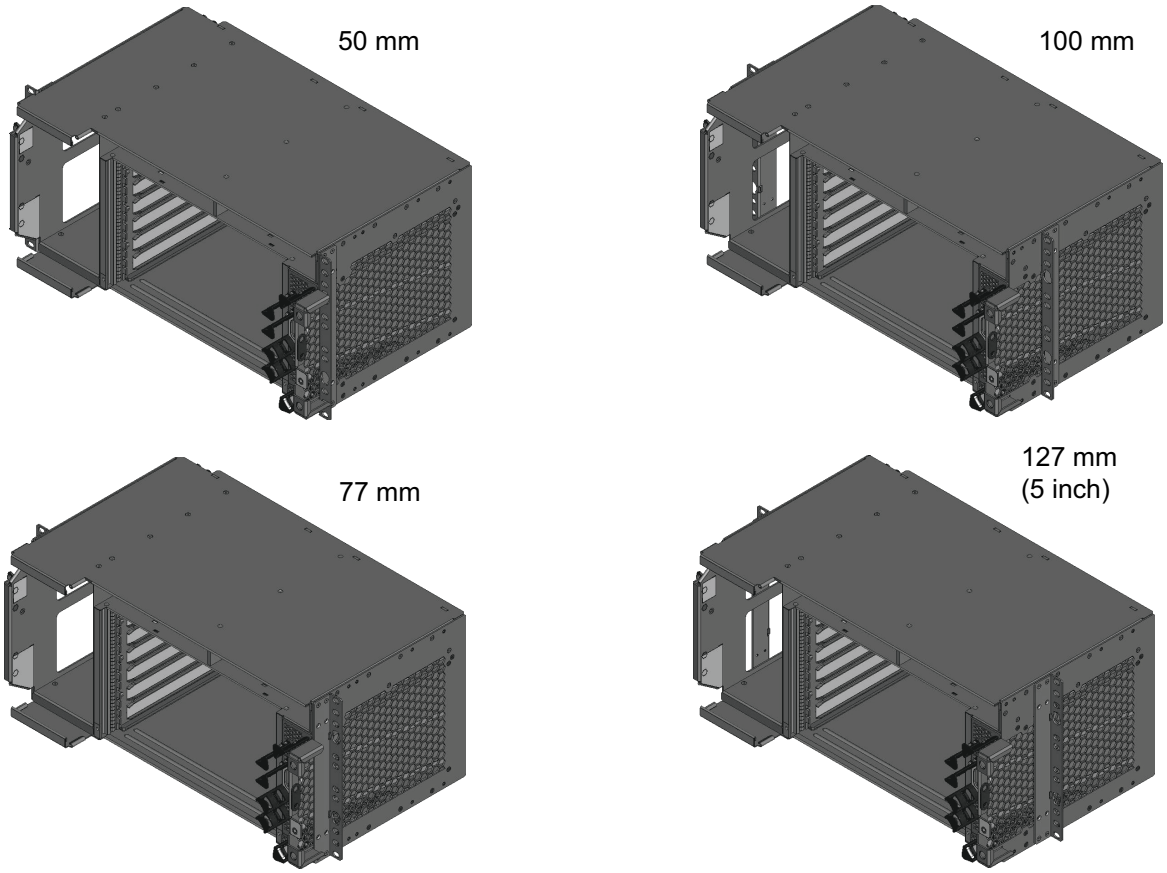
Figure 1-9
NTK509NH, air blocking plate—rear position configuration—100 mm and 127 mm setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-10
NTK509NH, mounting brackets setbacks—without air blocking plate or expanding duct—side-to-side airflow and 2-post racks



13 Select your next step.

If you require	**Then** go to
only the mounting brackets	step 14
the left-side expanding duct and right-side air blocking plate for a GR-63-CORE NEBS compliant front-to-rear air flow configuration	step 16

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
14	Assemble the mounting bracket to the left side of the shelf using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting bracket differs depending on the setback selected.
15	Assemble the mounting bracket to the right side of the shelf using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting bracket differs depending on the setback selected. Then go to step 50.
16	Assemble the left-side expanding duct air baffle to the left side of the shelf using the screws supplied: three for the top and three for the bottom. Torque to 5 in-lb (.56 n-M).
17	Assemble the mounting bracket to the left-side expanding duct air baffle using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting bracket differs depending on the setback selected.
18	Assemble the right-side air blocking plate to the right side of the shelf—with the notch facing the rear—using the screws supplied: two for the top and two for the bottom. Torque to 5 in-lb (.56 n-M).
19	Assemble the mounting bracket to the right-side air blocking plate using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting bracket differs depending on the setback selected. Then go to step 50.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

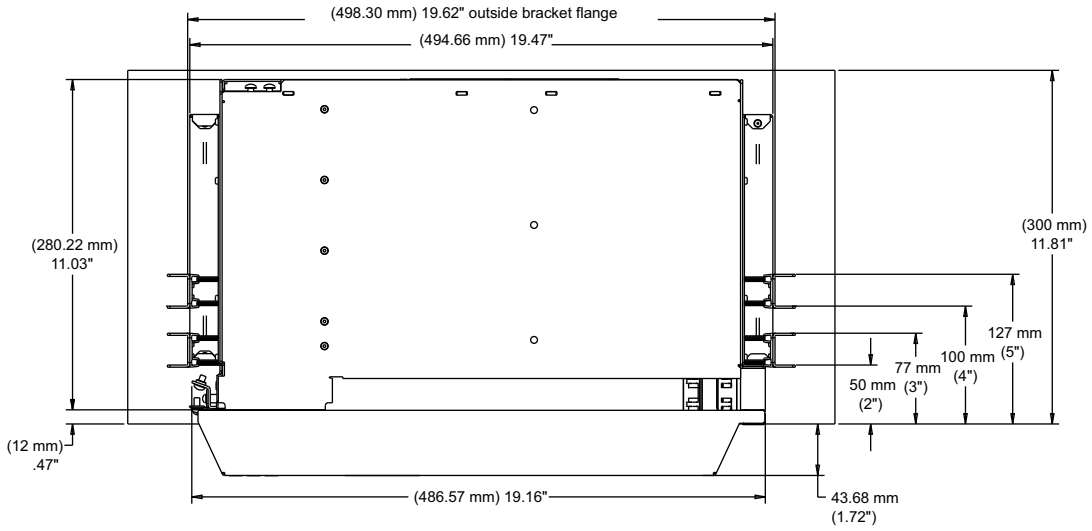
Step	Action

Installing NTK509NJ, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, ETSI/21-inch rack, front or rear exhaust

20 Continue with this step to attach bracket and air baffle kit NTK509NJ based on the required front or rear exhaust configuration and setback.

See the following illustrations.

Figure 1-11
NTK509NJ mounting options—ETSI/21-inch rack



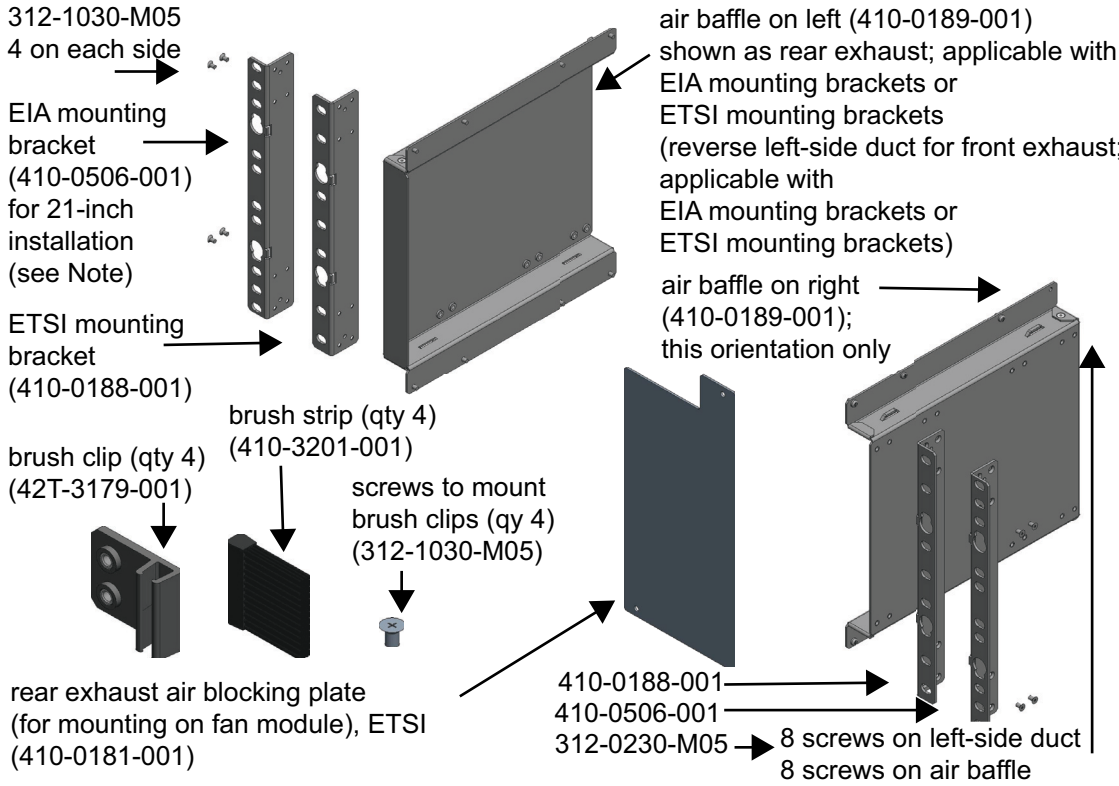
ATTENTION

Use the air baffle on the left for rear or front exhaust as required and the EIA or ETSI mounting brackets in the applicable setback. The air baffle on the left is reversible. The air baffle on the right is not reversible; use it as shown in the following illustration. For all ETSI and 21-inch applications you must use the air baffle on the left for rear or front exhaust, the air baffle on the right for front exhaust, and the applicable mounting bracket.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-12
NTK509NJ, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, ETSI/21-inch rack, front or rear exhaust

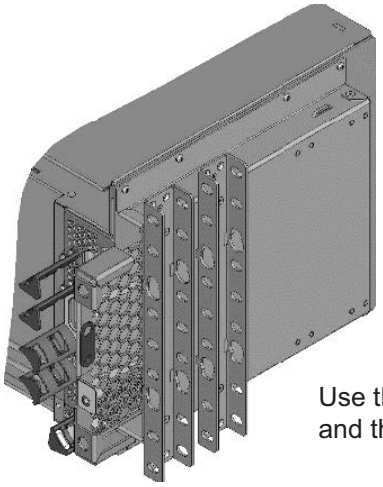


(Note: Mounting bracket 410-0506-001 can also be used in 19-inch mounting with no air baffle on the right or left [for right-side air intake and left-side exhaust]. For details, see related instructions for the NTK509NH kit.)

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

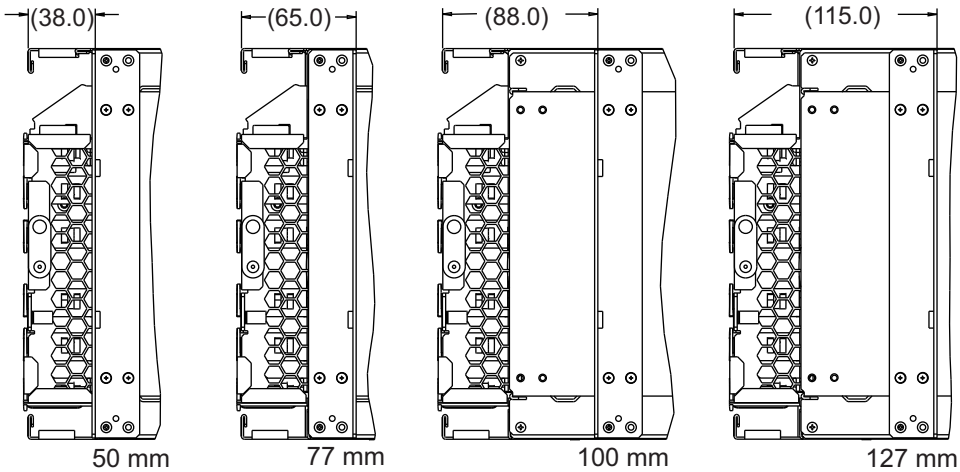
Step	Action
	For overviews of the different setbacks, see the two following illustrations.

Figure 1-13
Overview—all bracket mounting setbacks—ETSI/21-inch rack—view A (right side)



Use the air baffle—in this orientation only—and the applicable mounting bracket.

Figure 1-14
Overview—all bracket mounting setbacks—ETSI/21-inch rack—view B (right side)



These views include the right-side air baffle under the bracket. You must attach the right-side air baffle on the shelf before attaching the EIA or ETSI bracket.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-15
NTK509NJ, left air baffle—rear exhaust configuration

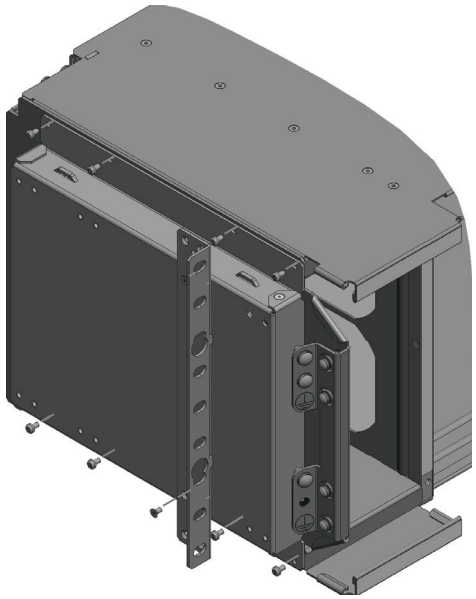
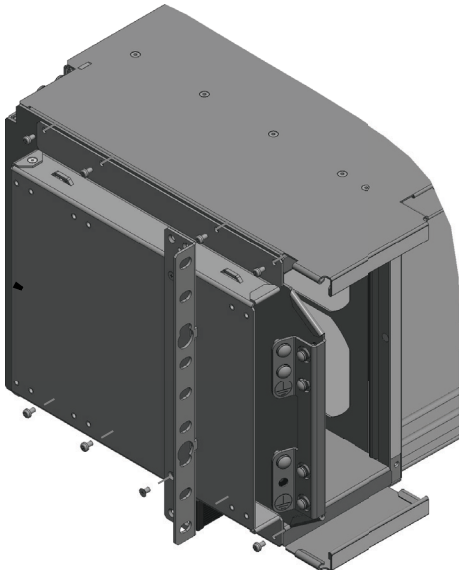


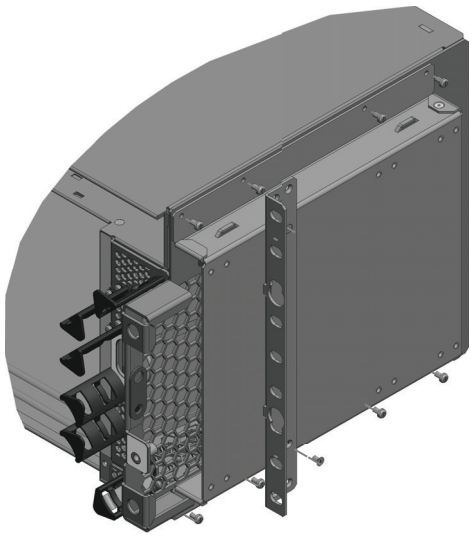
Figure 1-16
NTK509NJ, left air baffle—front exhaust configuration



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

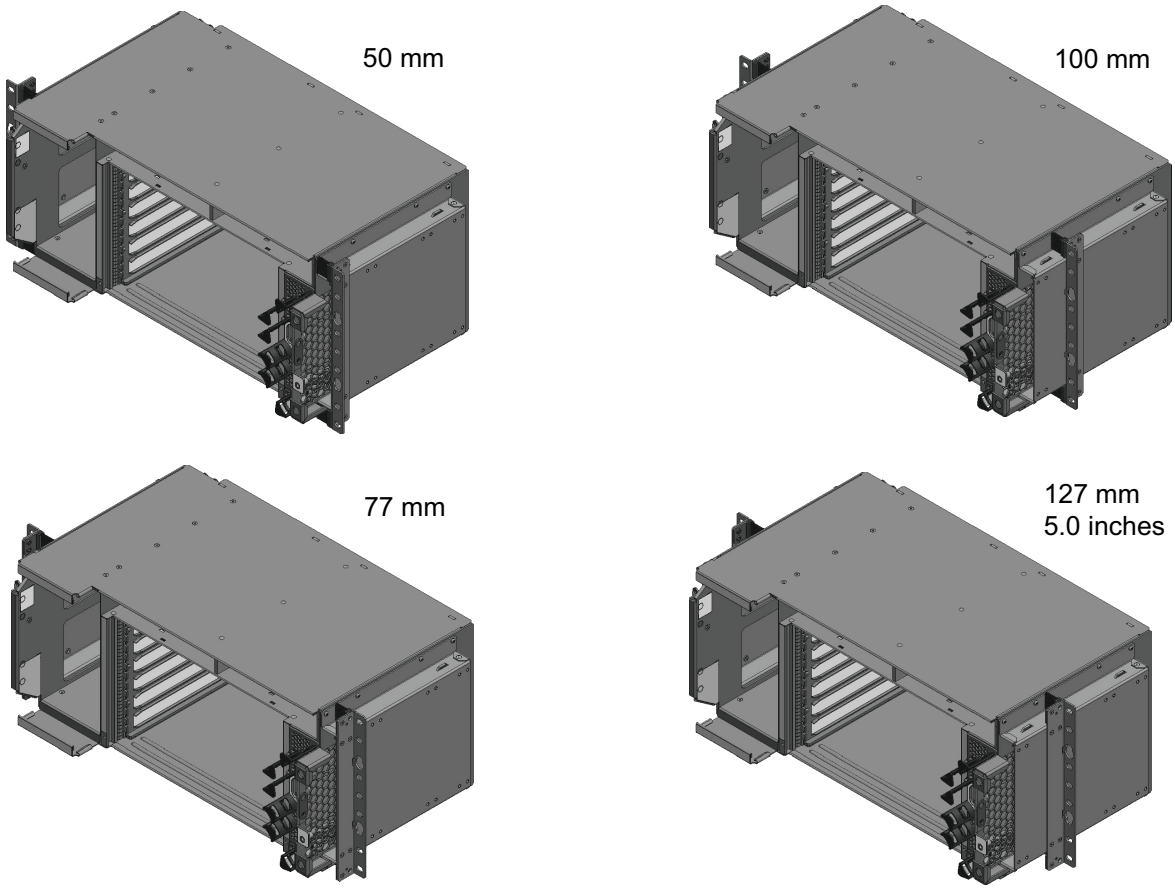
Figure 1-17
NTK509NJ, right side air baffle—air inlet configuration



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-18
NTK509NJ, mounting brackets setbacks—with left-side duct and air baffle—ETSI/21-inch racks



21 Orient the left-side duct in the required direction based on the required air flow.

The left-side duct is reversible to direct air flow as required.

- for rear exhaust, see Figure 1-12
- for front exhaust, reverse the left-side duct so that the front is open

22 Assemble the left-side duct (which you oriented in step 21) to the left side of the shelf using the screws supplied: four on the top and four on the bottom. Torque to 5 in-lb (.56 n-M).

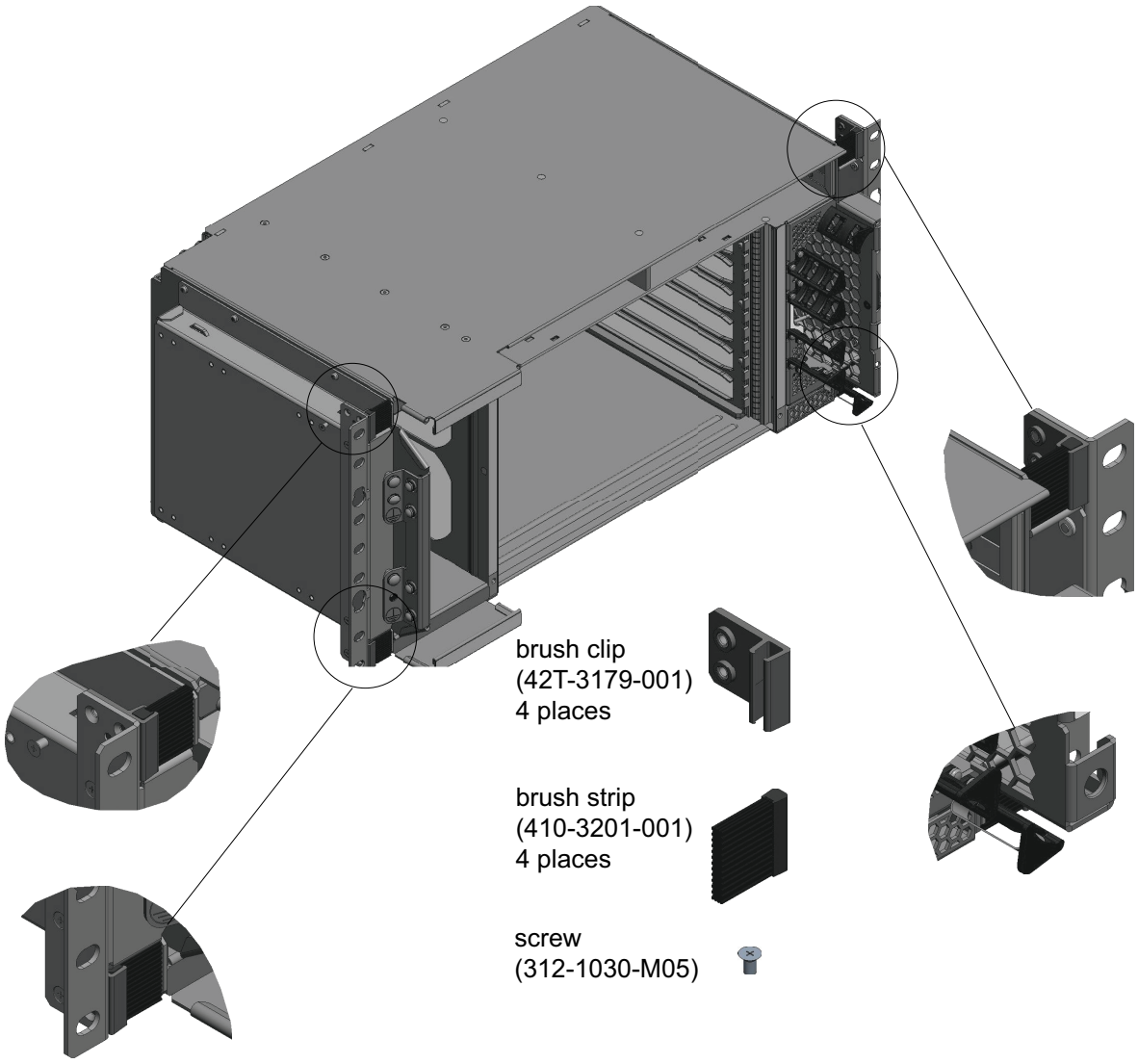
Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
23	Assemble the mounting bracket to the left-side duct using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting bracket differs depending on the setback selected.
24	Assemble the air baffle to the right side of the shelf using the screws supplied: four on the top and four on the bottom. Torque to 5 in-lb (.56 n-M).
25	Assemble the mounting bracket to the air baffle using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the mounting brackets differs depending on the setback selected.
Installing brush strips to mounting brackets—NTK509NJ	
26	Familiarize yourself with the brush strip clip and brush strip (see the following illustrations). You must install the brush strip clips and brush strips before installing the 4-slot optical shelf into the rack or cabinet.
27	Install a brush strip clip to the back of the mounting bracket (410-0188-001). Make sure that the brush strip clip is flush with the front face of the mounting bracket.
28	Align pin with pin holes on brackets and secure with M3 flathead screw. Torque to 5 in-lb (.56 N-m).
29	Slide a brush strip into the brush clip groove.
30	Repeat step 27 to step 29 for the three other positions, for a total of four: on top left and right, and at bottom left and right.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

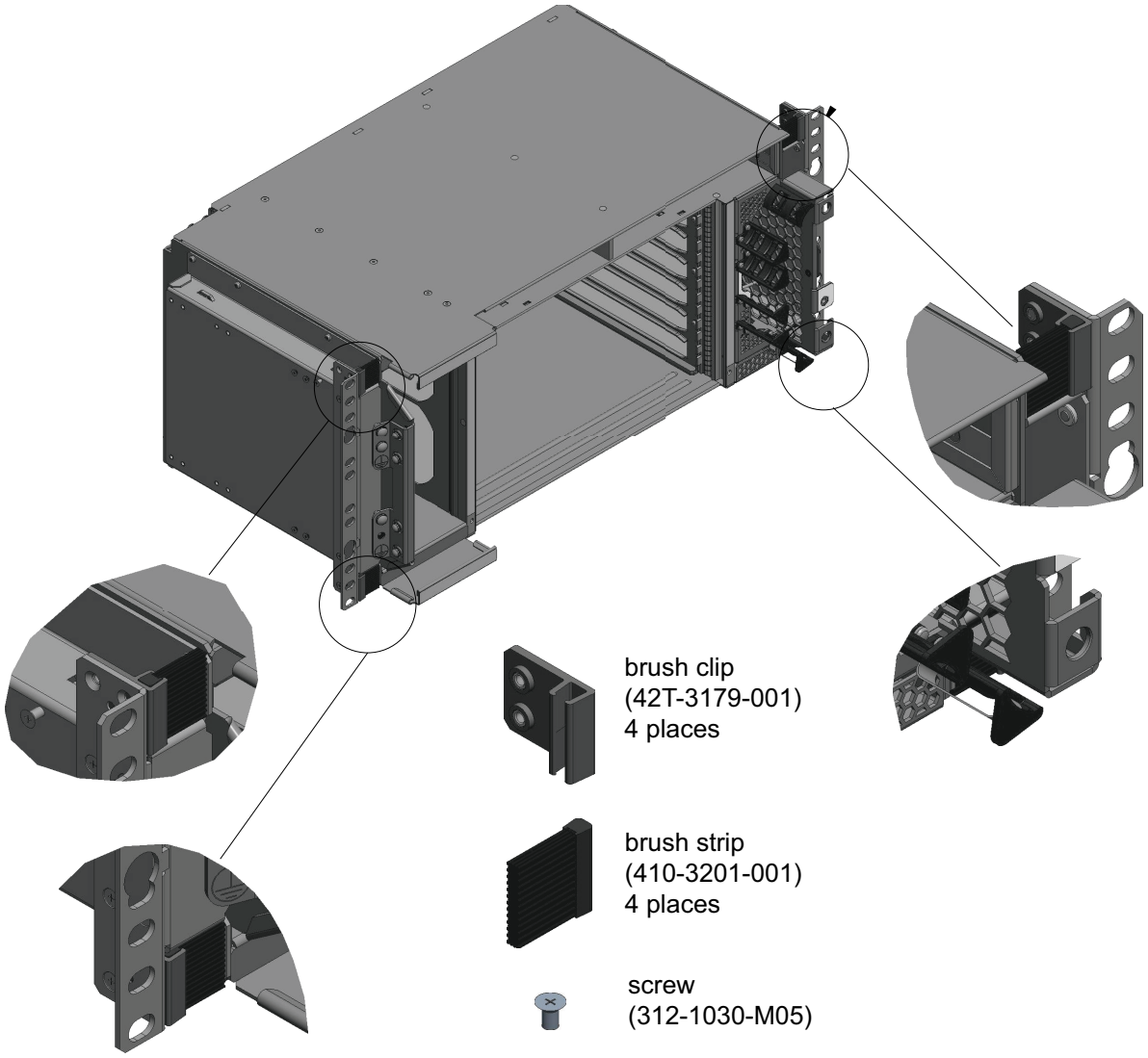
Figure 1-19
NTK509NJ, brush strips installation to mounting brackets—ETSI configuration, 50 mm setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-20
NTK509NJ, brush strips installation to mounting brackets—21-inch configuration, 50 mm setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
31	Select your next step.

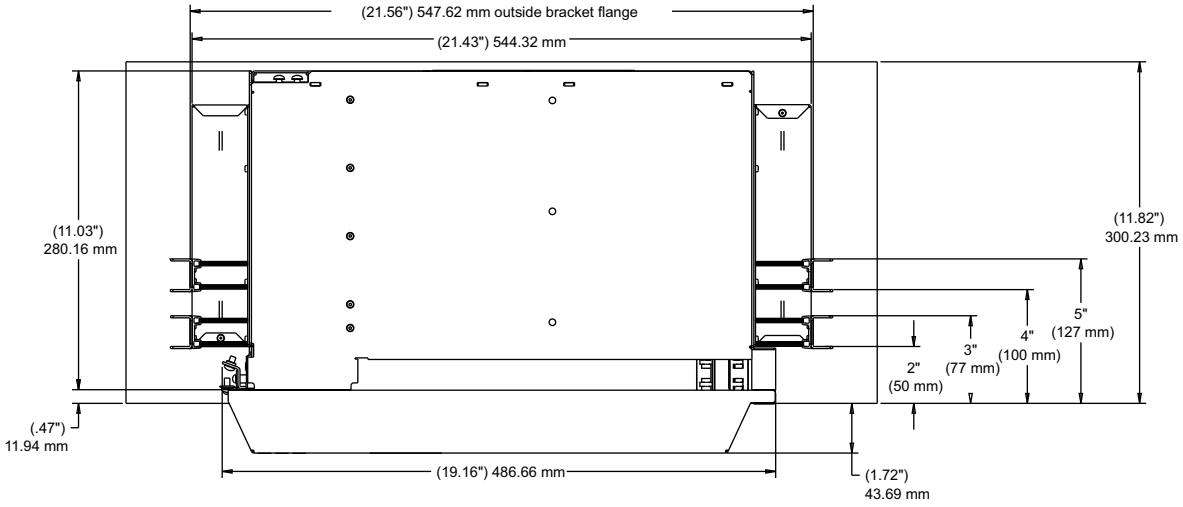
If	**Then** go to
you want to convert to a front exhaust cooling fan module (for front-to-front shelf airflow applications)	step 42
otherwise	step 50

Installing NTK509NK, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, 23-inch rack, rear exhaust

32 Continue with this step and attach bracket and air baffle kit NTK509NK based on the required setback.

See the following illustrations.

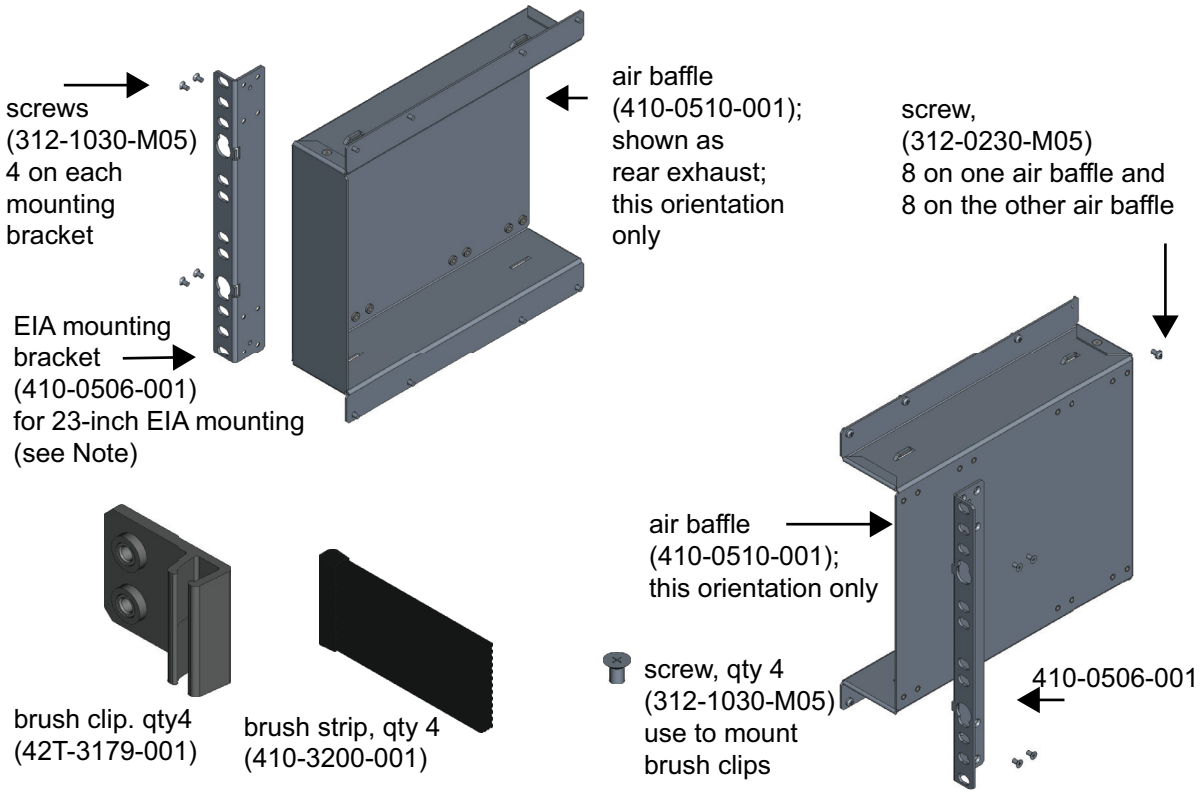
Figure 1-21
NTK509NK mounting options—23-inch rack



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-22
NTK509NK, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, 23-inch rack, rear exhaust

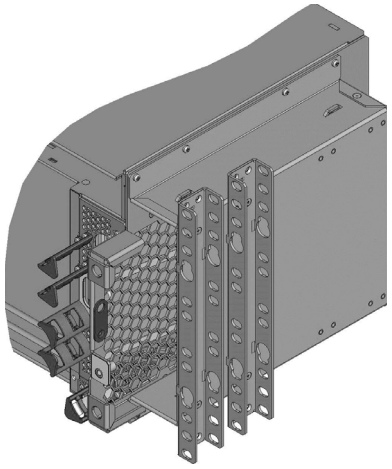


(Note: Mounting bracket 410-0506-001 can also be used in 19-inch mounting with no air baffles [for right-side air intake and left side exhaust]. For details, see related instructions for the NTK509NH kit.)

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

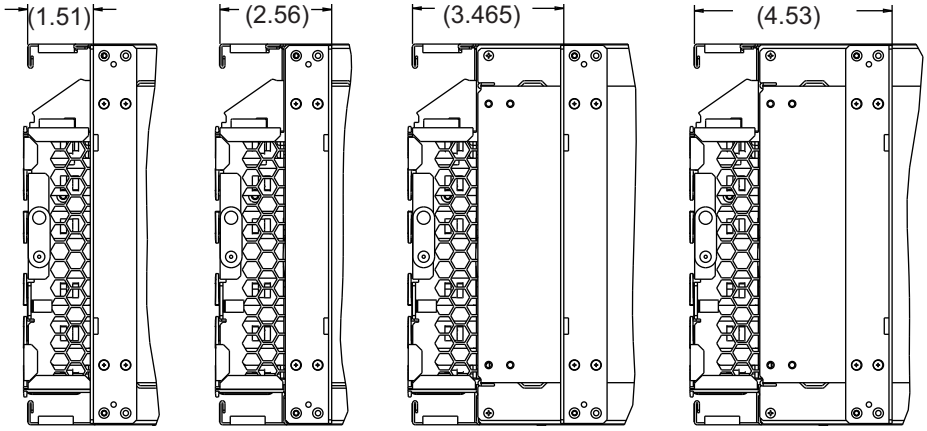
Step	Action
	For overviews of the different setbacks, see the two following illustrations.

Figure 1-23
Overview—all bracket mounting setbacks—23-inch rack—view A (right side)



Use the air baffle—in this orientation only—and the applicable mounting bracket.

Figure 1-24
Overview—all bracket mounting setbacks—23-inch rack—view B (right side)



These views include the right-side air baffle under the bracket. You must attach the right-side air baffle on the shelf before attaching the EIA bracket for 23-inch EIA mounting.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-25
NTK509NK, left air baffle—rear exhaust configuration—127 mm (5-in.) setback

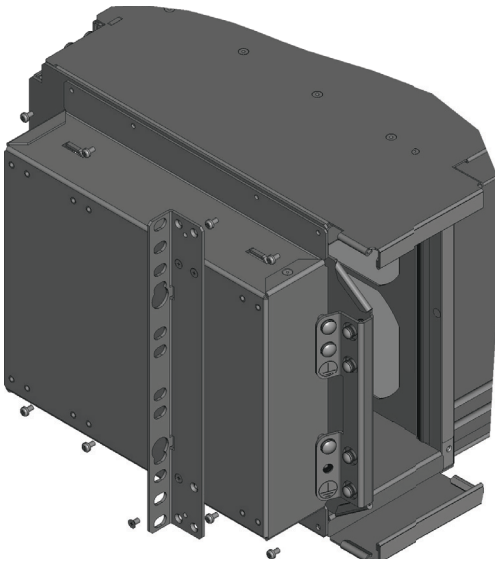
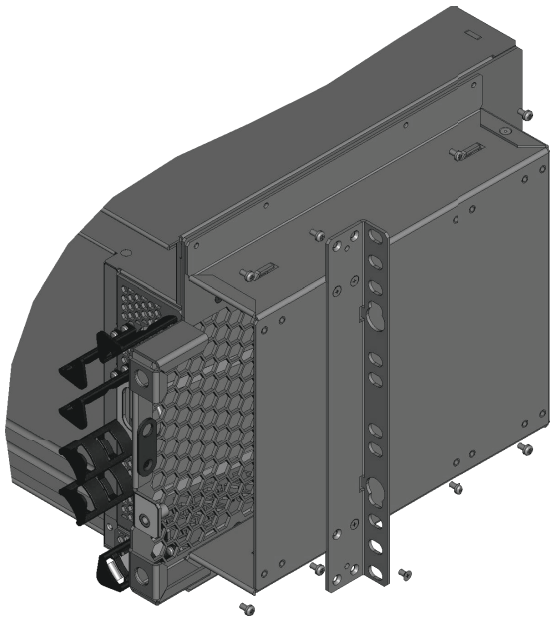


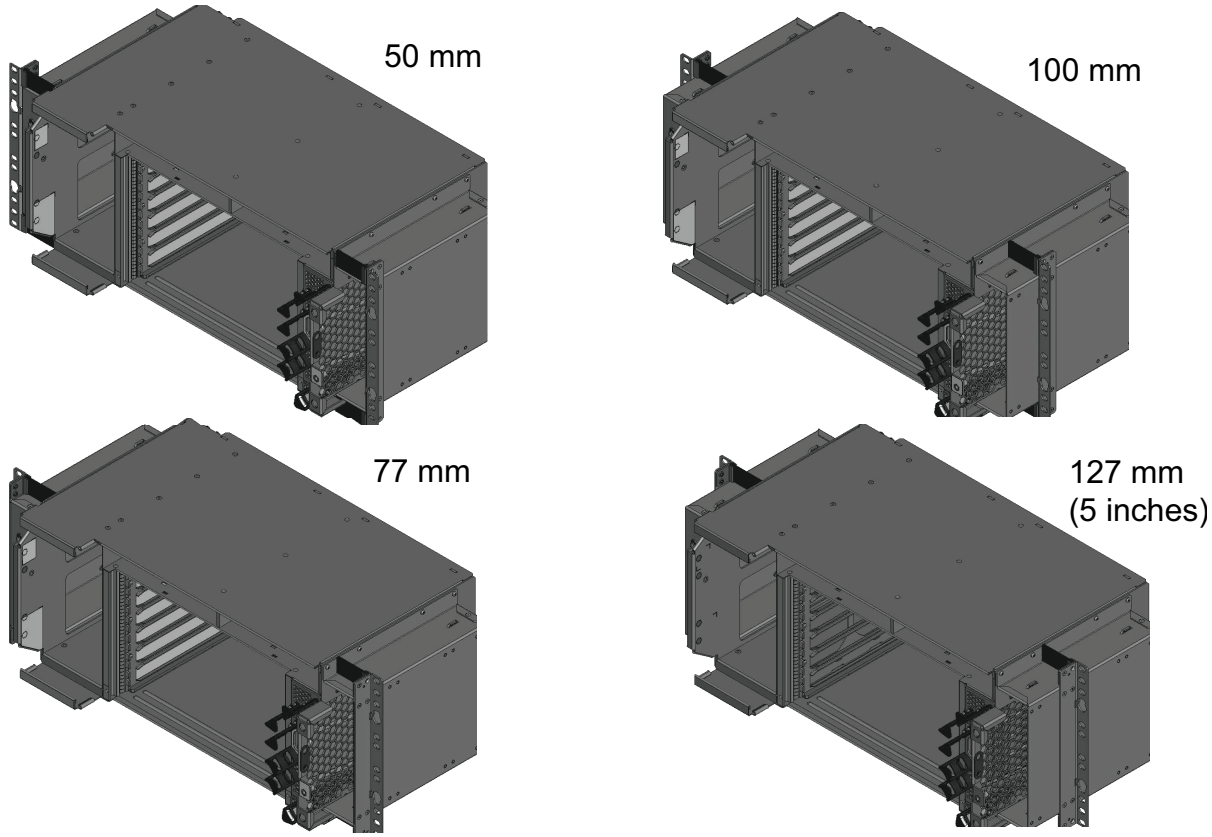
Figure 1-26
NTK509NK, right air baffle—air inlet configuration—127 mm (5-in.) setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-27
NTK509NK, mounting brackets setbacks—with right air baffle—23-inch rack



33 Orient an air baffle for the left side of the shelf for rear exhaust—with the opening facing the rear—see Figure 1-22.

34 Assemble the air baffle to the left side of the shelf using the screws supplied: four for the top and four for the bottom. Torque to 5 in-lb (.56 n-M).

35 Assemble the mounting bracket to the air baffle on the left side of the shelf using the four screws supplied. Torque to 5 in-lb (.56 n-M).

The position of the bracket on the air baffle differs depending on the setback selected.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
36	Assemble the other air baffle to the right side of the shelf—with the opening facing the front—using the screws supplied: four for the top and four for the bottom. Torque to 5 in-lb (.56 n-M).
37	Assemble the mounting bracket to the air baffle on the right side of the shelf using the four screws supplied. Torque to 5 in-lb (.56 n-M). The position of the bracket on the air baffle differs depending on the setback selected.

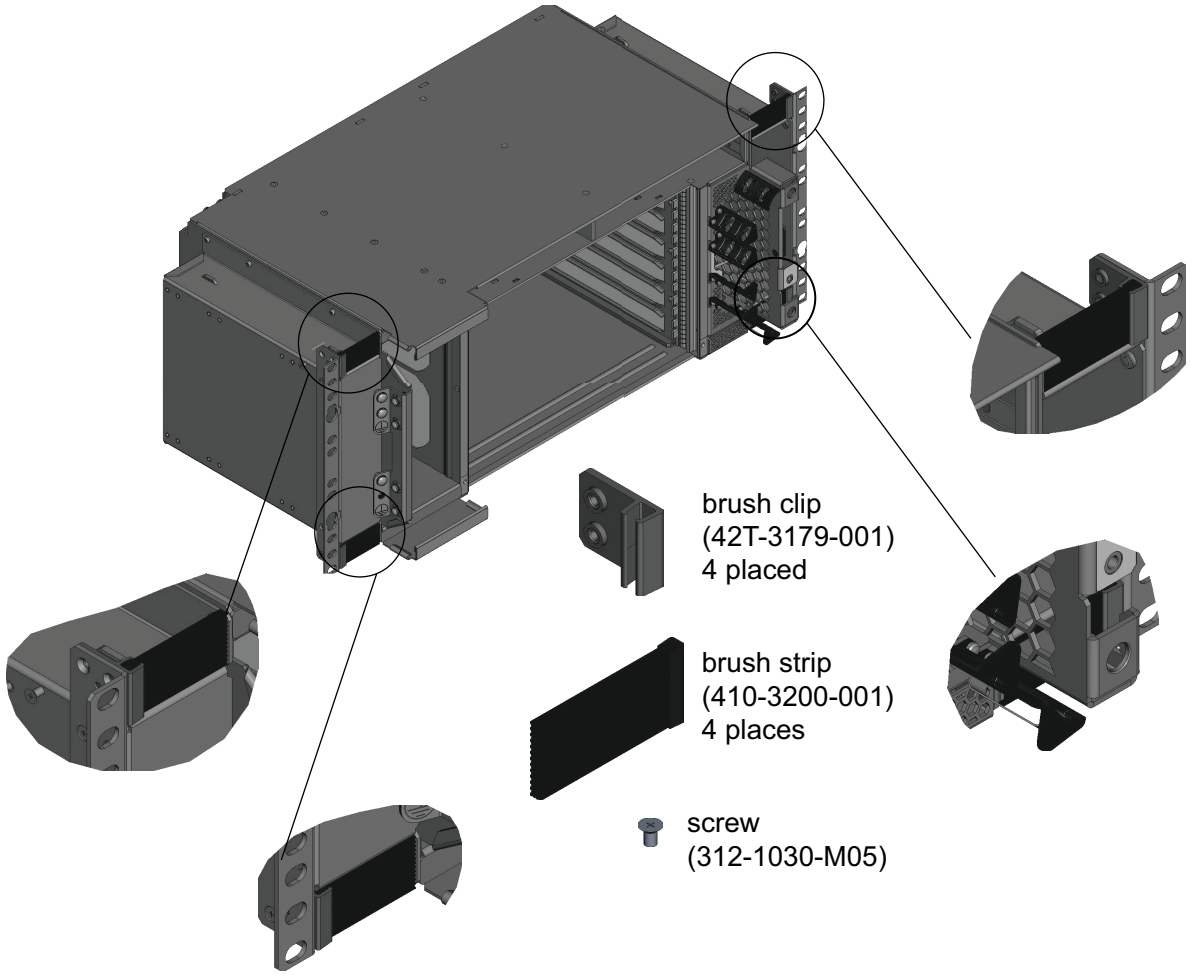
Installing brush strips to mounting brackets—NTK509NK

38	Familiarize yourself with the brush strip clip and brush strip (see the following illustration). You must install the brush strip clips and brush strips before installing the 4-slot optical shelf into the rack or cabinet.
39	Install a brush strip clip to the back of the mounting bracket (410-0506-001). Make sure that the brush is flush with the front face of the mounting bracket.
40	Align the pin with pin holes on the mounting bracket and secure with M3 flathead screw. Torque to 5 in-lb (.56 N-m).
41	Slide a brush strip into the brush clip groove. Repeat step 39 to step 41 for the three other positions, for a total of four: on top left and right, and at bottom left and right. Then go to step 50.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-28
NTK509NK, brush strips installation to mounting brackets—23-inch configuration, 50 mm setback



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Converting to a front exhaust cooling fan module, if applicable

42 The rear exhaust cooling fan module configuration is the standard configuration. See "NTK507HA—installation—rear exhaust cooling fan module standard configuration" on page 1-48.

NTK509NJ, Bracket and Air Baffle Kit for 6500 4-Slot Shelf, ETSI/21-inch rack, front or rear exhaust, includes a rear air blocking plate (410-0181-001).

For a front exhaust cooling fan module configuration, remove the two screws that hold the air blocking plate (410-0004-001) to the front of the cooling fan module. See "NTK509NJ—21 inch/ETSI bracket/air baffle installation—converting to front exhaust cooling fan module" on page 1-49.

43 Discard the plate that you removed in step 42.

Keep the two screws.

44 Install the rear air blocking plate (410-0181-001) to the rear of the cooling fan module using the two screws from step 43.

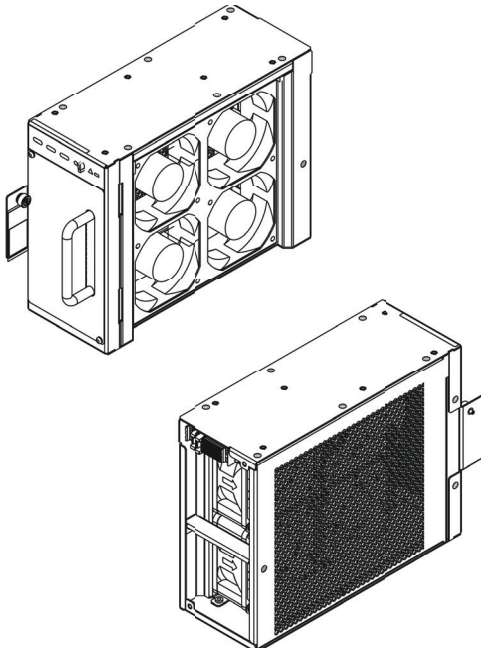
ATTENTION
Never use the cooling fan module with air blocking plates on both the front and rear.

Then go to step 50.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

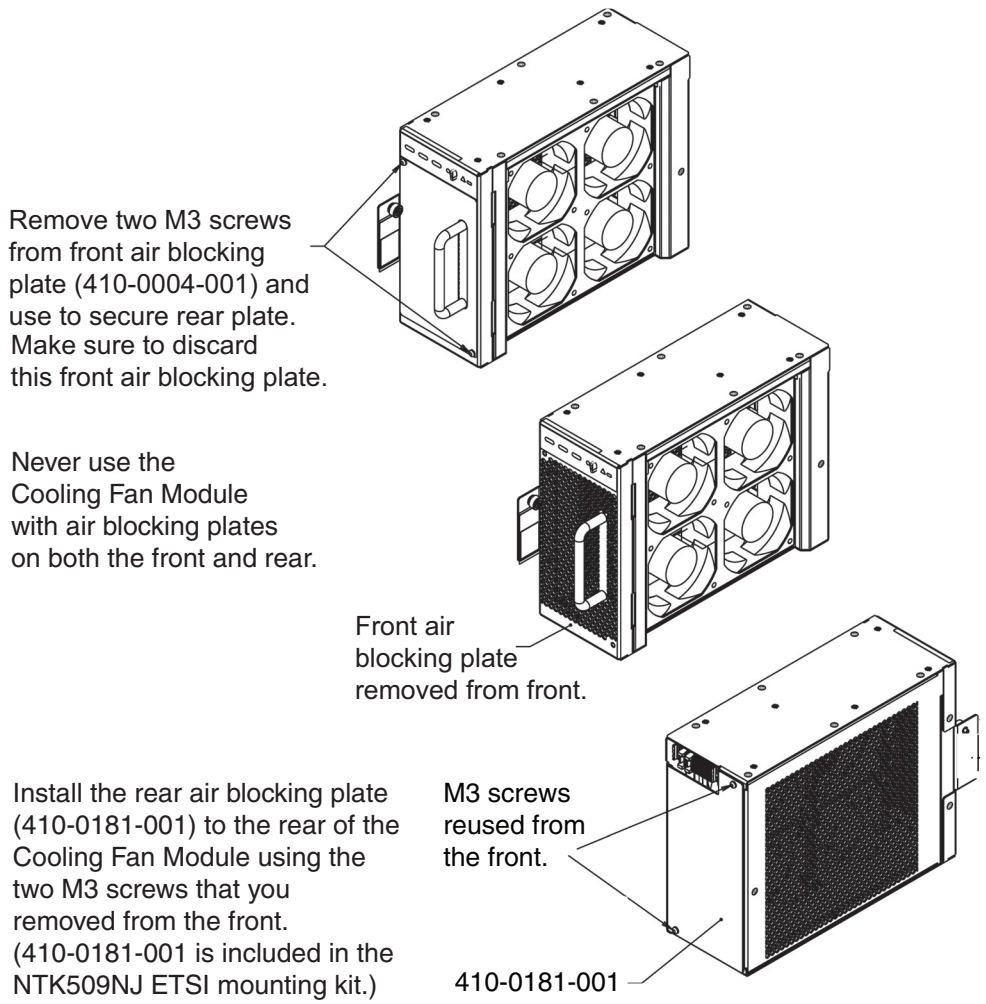
Figure 1-29
NTK507HA—installation—rear exhaust cooling fan module standard configuration



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-30
NTK509NJ—21 inch/ETSI bracket/air baffle installation—converting to front exhaust cooling fan module



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Removing the shipping bracket that secures components in place (if applicable)

45 Cut the cable ties that secure the cooling fan module on the left, the power input cards at the top, and the shipping bracket to the shelf on the right.

46 Loosen the four screws on the front left side of the shelf that secure the shipping bracket to the left side.

ATTENTION
Do not discard the screws. You will use them in step 52 to attach the shelf front cover hinges.

47 Remove the shipping bracket.

48 Remove the two standoffs that secure the access panel.

49 Do not engage any components into the backplane at this time. As part of this procedure, after grounding the shelf, you will install only the cooling fan module.

Installing hinges for the shelf front cover (optional)

ATTENTION
It is easier to install the shelf front cover hinges before you install the 6500 4-slot optical shelf into a rack rather than afterwards.

50 Locate the hinges that are supplied with NTK509CJ (6500 4-Slot Shelf Front Cover Kit w/Extended Depth).

This shelf front cover is optional. It is extended depth and protrudes at the front of the 6500 4-slot optical shelf.

This shelf front cover accommodates the use of fibers with boot lengths greater than 42.5 mm and/or in-line optical attenuators (fixed pads).

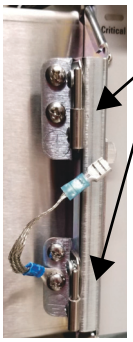
51 Remove the screws that are pre-installed on the left side wall of the shelf.

52 With the pin pointing upwards, attach the male portion of one hinge to the shelf using two of the screws that you removed (from the left side of the shelf). Repeat the same action for the second hinge. (See the following figure.)

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-31
Shelf front cover hinges installed on 4-slot optical shelf



Installing the 6500 4-slot optical shelf into a rack

53 Based on your rack type, select the mounting hardware from the shelf installation kit that you ordered. Use a minimum of four screws on each side.

If the rack type is	**Then** select
19-inch or 23-inch with tapped holes	the 12-24 SEM screws or machine screws with lock washers (from the shelf installation kit, ANSI [imperial hardware])
19-inch or 23-inch with untapped holes	the 12-24 thread-forming screws (from the shelf installation kit, ANSI [imperial hardware])
ETSI or 21-inch	the M6 SEM screws or machine screws with lock washers, and M6 cage nuts (from the shelf installation kit, ETSI [metric hardware])

54 Select your next step.

If	**Then** go to
you are installing into a 19-inch rack and have assembled the left-side expanding duct (in kit NTK509NH) on the shelf	step 55
otherwise	step 56

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

55

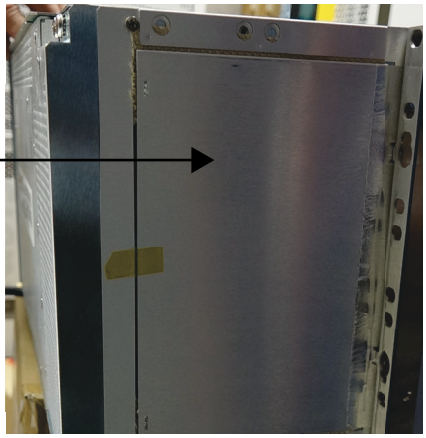
CAUTION
Risk of damaging equipment
Make sure that the left-side expanding duct is closed before you insert the 4-slot optical shelf into the mounting aperture of the 19-inch rack. Otherwise you will damage the duct.

Figure 1-32
Left-side expanding duct before installing into 19-inch rack—leave closed

Do not remove the tape until after the shelf is installed into the rack or cabinet.

Make sure that the left-side expanding duct is closed before you insert the 4-slot optical shelf into the mounting aperture of the 19-inch rack.

Otherwise you will damage the left-side expanding duct.



The left-side expanding duct directs left side exhaust to the rear of the bay.

When the fan module is operating, the left-side expanding duct will expand (open) into the space behind the front mounting flange. Before first use open the duct by reaching inside th exhaust area and push the hinged plate outwards; the tape will release on its own.

56

CAUTION
Risk of dropping the equipment
To prevent the shelf from tipping and falling, you must install the studs in the holes that match the bottom holes of the shelf.

The brackets for the 6500 4-slot optical shelf have keyholes to assist you to install the shelf into the rack. To install the shelf, locate the position of the screws on the rack. Install the screws loosely. (You will place the shelf on the keyholes and tighten the screws in the next steps.)

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

57

WARNING
Risk of personal injury
If you are installing the shelf higher than shoulder level, use a secure ladder to climb to the necessary level. For 6500 4-slot optical shelf, one person is enough to install the shelf.

Place the shelf on the keyholes and tighten the screws.

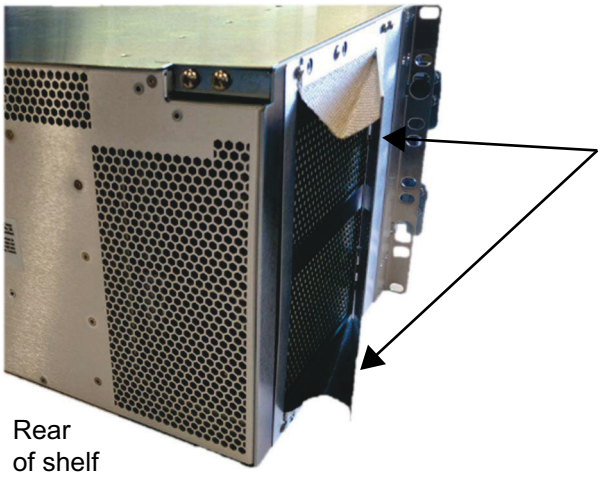
Tighten the appropriate mounting hardware in the top hole of each bracket. Tighten the mounting hardware to the rack manufacturer's torque specifications. Use a torque wrench to verify that torque has been applied correctly.

58 Select your next step.

If	**Then** go to
the shelf has a left-side expanding duct	step 59
otherwise	step 60

59 Secure the left-side expanding duct in a fully-open position using cable ties, lacing twine, or small hook and loop tape such as Velcro (according to your company's practice) attached to a rack or cabinet and the cutouts along the rear edge of the left-side expanding duct.

Figure 1-33
Left-side expanding duct in fully-open position (after shelf is installed in rack or cabinet)



Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
60	Route power cables and fiber (based on industry standards) to the rack.

Grounding the 6500 4-slot optical shelf

61 Make sure that you prepare ground lugs as follows.

ATTENTION
Use non-oxidizing compound before any crimp connections are made on bare conductors. For details, see the grounding guidelines in *Installation - General Information*, 323-1851-201.0, the section on preparing for installation.

CAUTION
Risk of improper grounding due to poor contact with a painted rack
If the rack is painted, follow company procedures to remove the paint from the area where you will fasten the bolt. Make sure that the bolt washer makes direct contact with the rack.

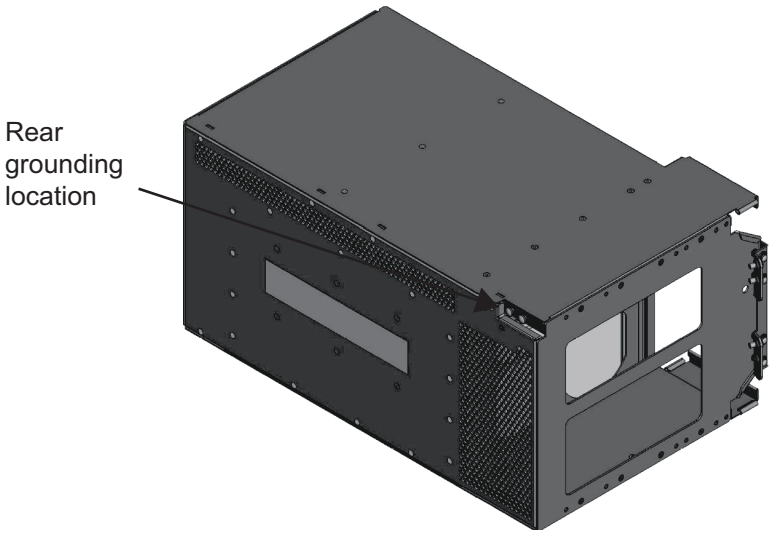
62 Fasten one lug end of the prepared ground cable (No. 6 AWG [16 mm^2]) to the rack or the equipment grounding bar as required.

- If the rear ground location is accessible, fasten the other lug end of the prepared ground cable to the ground screws located on the rear of the 6500 4-slot optical shelf (the location of the ground studs on the shelf is embossed with the ground symbol). See "Rear grounding location of a 6500 4-slot optical shelf NTK503HA" on page 1-55.

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-34
Rear grounding location of a 6500 4-slot optical shelf NTK503HA



ATTENTION
The rear ground location is recommended for the 6500 4-slot optical shelf.

If the rear ground location is not accessible, you can use the front top ground located on the left side of the 6500 4-slot optical shelf near the cooling fan module as follows.

Remove the two screws from the front top left grounding tab.Attach the other lug end of the prepared ground wire assembly, and fasten the screws.

The 4-slot optical shelf includes two front ground locations:

— The upper left location can be used to ground the shelf.

— The lower left location is used to ground the optional shelf front cover.

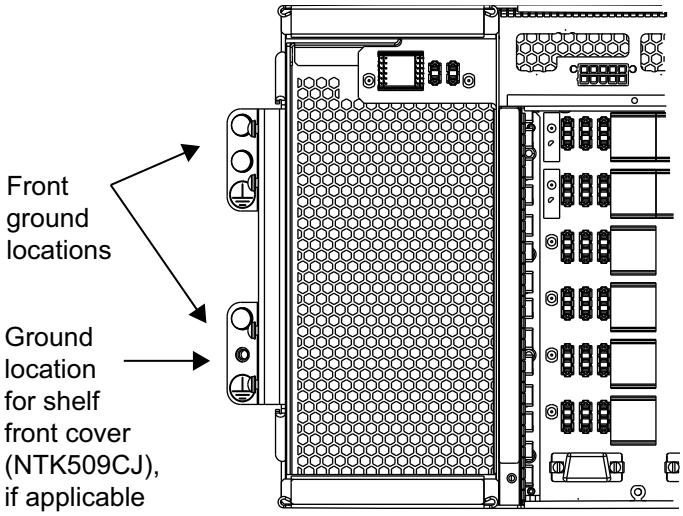
The ground studs on the shelf are embossed with the ground symbol.

If applicable you will later fasten a ground wire to the bottom front ground location if you plan to install the 6500 4-slot Shelf Front Cover Kit w/ Extended Depth (NTK509CJ).

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-35
Front grounding location of the 6500 4-slot optical shelf NTK503HA



Installing the cooling fan module

63 Slide cooling fan module NTK507HA all the way into the slot until it is fully seated into the backplane.

64 Fasten the cooling fan module to the left wall using a Phillips screwdriver to a torque value between 0.45 N-m and 0.68 N-m (between 4 lb-in. and 6 lb-in.).

Installing the access panel

65 Select your next step.

If	**Then** go to
the access panel was shipped as part of a packs-in-place kit	step 66
otherwise	step 69

66 Disengage the captive fasteners (or thumbscrews) from the two standoffs that secure the access panel.

67 Remove the access panel.

68 Remove the two standoffs from the bottom of the shelf cage.

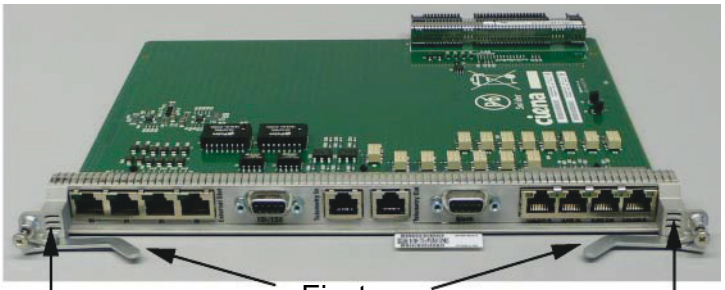
Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action
69	Insert the access panel into the lowest slot (slot 19) of the 4-slot optical shelf.
70	Ensure that the ejectors are closed and parallel to the faceplate. See the following illustration.

Figure 1-36
Access Panel for 6500-7 packet-optical and 4-slot optical shelves NTK505JA

Use ejectors only to remove the access panel from the shelf.

Do not use ejectors to install the access panel.



71 Press firmly on the left and right surfaces, located inside the latches, until the left and right flanges mate with the vertical members.

72

CAUTION
Risk of access panel not functioning
Make sure to fasten both sides of the access panel to the 6500 4-slot optical shelf using a Phillips driver. Otherwise, the access panel may not function correctly.

Fasten the captive fasteners on the left and right side of the faceplate of the access panel to a torque value between 0.45 N-m and 0.68 N-m (between 4 lb-in. and 6 lb-in.).

Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Installing a wire wrap adapter, if applicable

73 Select your next step.

If	**Then** go to
a wire wrap adapter is required	step 74
otherwise	step 76

74 Review "Wire wrap adapter NTK505JZ for Access Panel NTK505JA and NTK505JB" for details on the wire wrap adapter.

Table 1-3
Wire wrap adapter NTK505JZ for Access Panel NTK505JA and NTK505JB

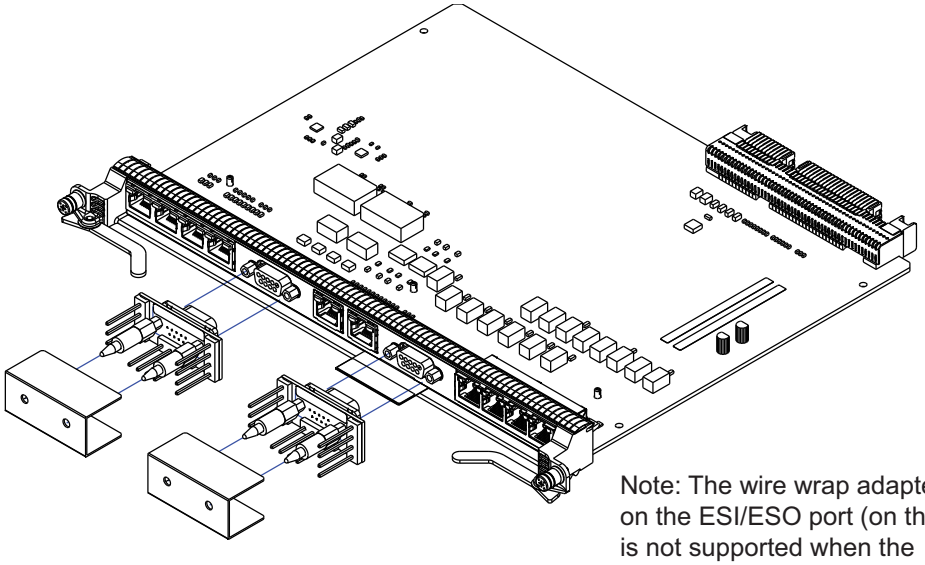
PEC	Description	Function	Quantity
NTK505JZ	Female DB9 to wire wrap adapter	Alarms	1

75 Attach the wire wrap adapter to the female DB9 alarms port, as applicable.

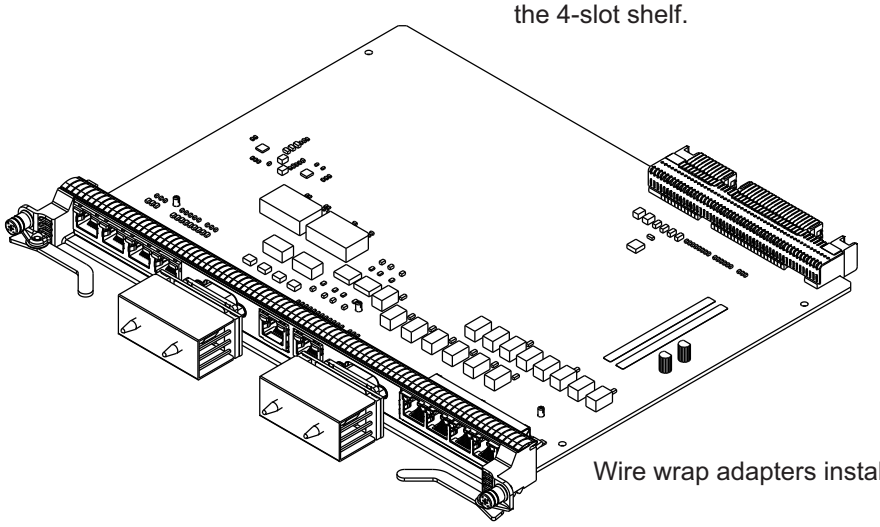
Procedure 1-1 (continued)
Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel

Step	Action

Figure 1-37
Installing wire wrap adapters NTK505JZ and covers on Access Panel NTK505JA or NTK505JB (example shows NTK505JA)



Note: The wire wrap adapter on the ESI/ESO port (on the left) is not supported when the Access Panel is used in the 4-slot shelf.



Wire wrap adapters installed

76 You have completed this procedure. Next, perform "Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)" on page 1-84.

—end—

Procedure 1-2
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Use this procedure to wall mount a 6500 4-slot optical shelf NTK503HA.

If you want to install a 6500 4-slot optical shelf NTK503HA into a 19-inch, 21-inch, 23-inch, or ETSI equipment rack, perform procedure "Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel" on page 1-8.

Do not install the shelf processors as part of this procedure.

This procedure includes instructions on the following:

- unpacking and inspecting the shipment contents
- installing the Upper Bracket Assembly and Lower Bracket Assembly
- installing hinges (if you plan to install a shelf front cover)
- wall mounting the 6500 4-slot optical shelf
- grounding the 6500 4-slot optical shelf
- installing the cooling fan module
- installing the access panel (NTK505JA/NTK505JB)

CAUTION
Risk of equipment damage
Do not insert any circuit packs into an unpowered 6500 4-slot optical shelf. Otherwise, you risk damaging equipment. The figures in this procedure show various components installed in their slots, for illustration purposes only. Install only the components indicated in this procedure.

After completing this procedure, you must install the power input cards, connect power cables, power up the 6500 4-slot optical shelf, test the power input cards and cooling fan module, and install the shelf processors, before seating any circuit packs into the backplane.

The 6500 4-slot optical shelf is not shipped in a packs-in-place kit. Install only the Upper Bracket Assembly and Lower Bracket Assembly, the cooling fan module, and the access panel as part of this procedure. Do not install the power input cards, shelf processors, interface circuit packs, or filler cards. For details related to other components, see the precautionary message "Risk of equipment damage".

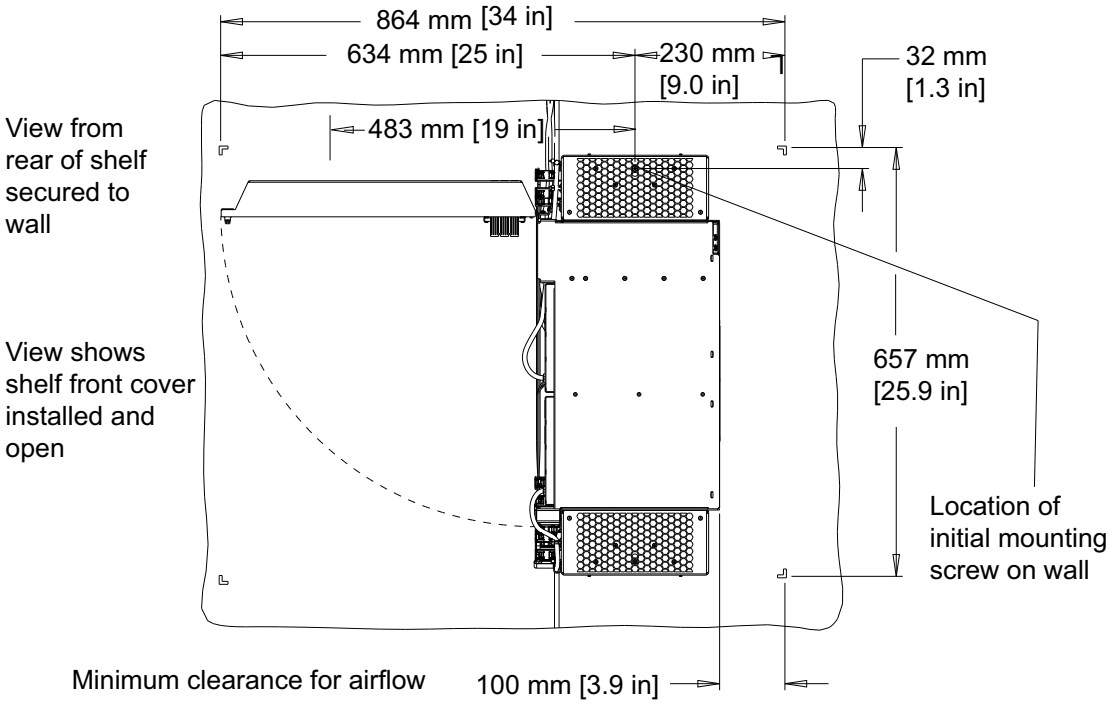
Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

The two following illustrations show the dimensions required to use the Wall Mount Kit to wall mount a 4-slot optical shelf (NTK503HA).

The envelope includes space for the optional shelf front cover.

This view—facing the wall—shows a wall-mounted 4-slot optical shelf with the shelf front cover in the open position.

Figure 1-38
Envelope required for wall mount—dimensions—height and width (view facing the wall)

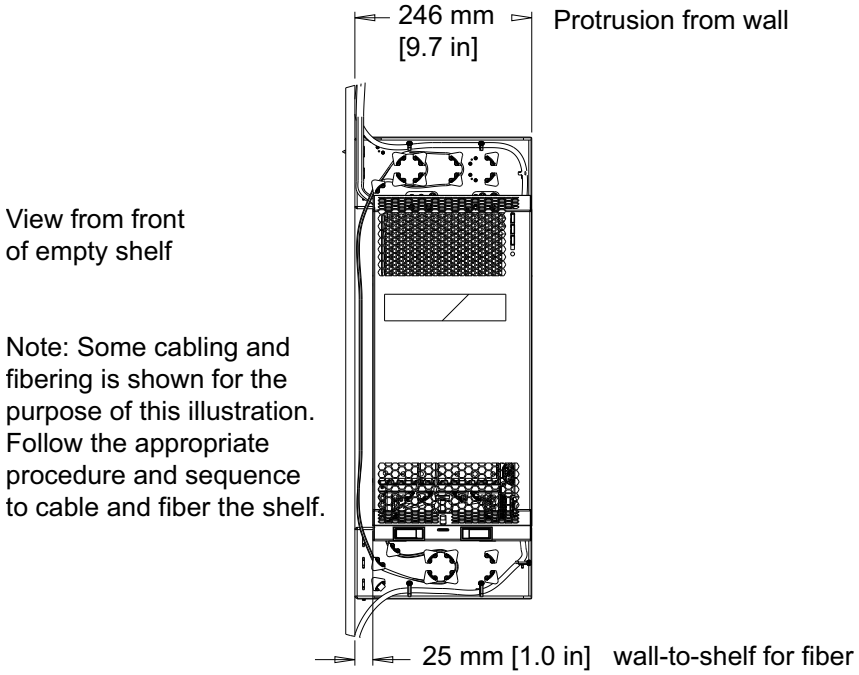


Note: For an installation without the optional shelf front cover, the required clearance is 483 mm (19 in).

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

This view—facing the empty shelf—shows the protrusion from the wall. This installation includes a gap to accommodate fiber, between the 4-slot optical shelf and the wall.

Figure 1-39
Envelope required for wall mount—dimensions—protrusion from wall



Perform this procedure only to

- wall mount the 4-slot optical shelf and
- install the cooling fan module and the access panel

After you have completed this procedure, as instructed perform the applicable procedures to:

- install the power input cards,
- install shelf processors.
- connect cables,
- install interface circuit packs or filler cards, pluggables, and
- route fiber

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

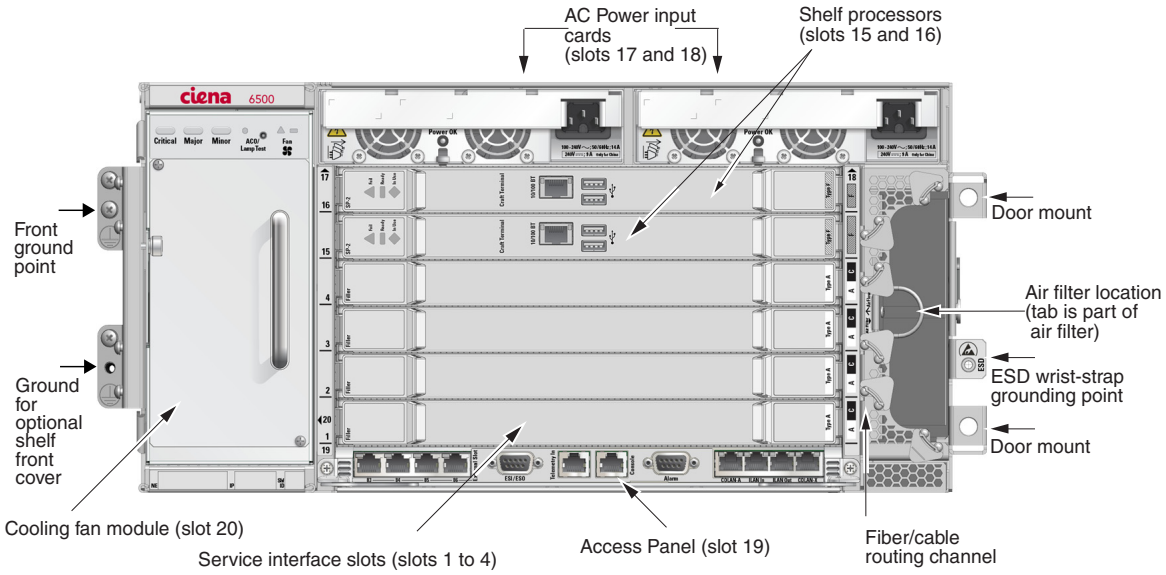
NTK503HA

"Example of the NTK503HA with two AC Power Input Cards (100-240 Vac) NTK505UN" on page 1-10 shows various components installed in their respective slots in the 6500 4-slot optical shelf.

"Example of the NTK503HA with two Power Input Cards (Max 30A), NTK505UD" on page 1-11 shows various components installed in their respective slots in the 6500 4-slot optical shelf

For related details, see *Planning*, NTRN10GP.

Figure 1-40
Example of the NTK503HA with two AC Power Input Cards (100-240 Vac) NTK505UN



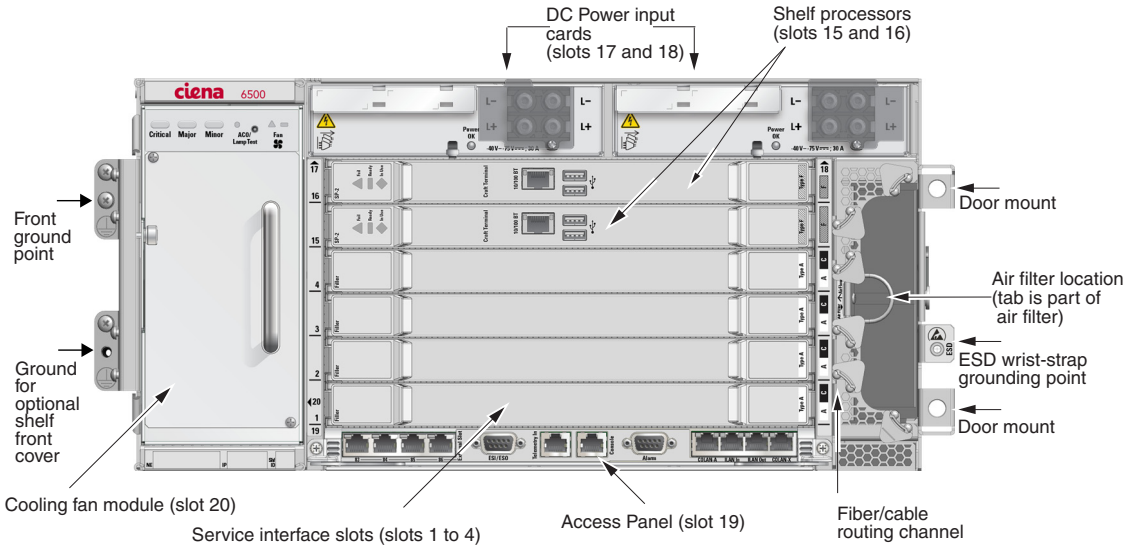
This illustration is included as reference only.

As part of this procedure you install only the cooling fan module and the access panel.

For the wall mount application, the 4-slot optical shelf is installed vertically, with the cooling fan module at the top.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Figure 1-41
Example of the NTK503HA with two Power Input Cards (Max 30A), NTK505UD



This illustration is included as reference only.

As part of this procedure you install only the cooling fan module and the access panel.

For the wall mount application, the 4-slot optical shelf is installed vertically, with the cooling fan module at the top.

Prerequisites

Make sure that

- The wall is ready for the wall mount installation.
  - — This procedure includes a step to fasten a mounting screw to the wall. You must have the appropriate mounting fastener for the wall type.
  - — If you are mounting on a plywood wall, use one of the 3/4-inch wood screws, which are supplied with the Wall Mount Kit NTK509NL.

    The plywood must be a minimum 3/4-inch 7 Ply Grade C Plywood.
- One person is sufficient to install the 6500 4-slot optical shelf. The keyhole feature in the Upper Bracket Assembly assists in the installation to the wall.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

- For power disconnection after installation, the male end of each AC power cable must remain accessible at the socket-outlet connection to the power source.
- You have the following tools and materials:
  - Phillips screwdriver
  - 7-mm socket
  - 10-mm nut driver
  - 5/16 in. torque wrench
  - level
  - the installation kit, which includes the miscellaneous hardware required for shelf mounting (bolts, lock washers, alignment studs, and screws)
  - No. 6 AWG (16 mm^2), 7-strand copper insulated conductor grounding wire and grounding lugs (included in the installation kit)
  - crimping tool, No. 6 AWG (16 mm^2) - #1/0 AWG
- For installations above shoulder level, have a secure ladder.
- You observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0.
- You have the appropriate personal grounding device to dissipate electrostatic charges.
- If the shelf being installed is a replacement of a previously commissioned shelf and if the initial shelf being replaced is part of a node managed by MCP:
  - ensure you de-enroll the node in question before the shelf installation activity. The node can be re-enrolled in MCP after the newly installed shelf is successfully commissioned.
  - be aware that the MAC address that the network element will report for the replacement shelf will be different than the MAC address of the shelf you replaced.

  For more information, refer to MCP documentation.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Guidelines and precautions

Make sure that you understand the following information for the wall mount option (which is a front-only exhaust application) when the 6500 4-slot optical shelf is to be equipped with two AC Power Input Cards (100 - 240 Vac) (NTK505UN).

ATTENTION

The AC Power Input Card (100 - 240 Vac) (NTK505UN) has integrated air intake fans at the front and exhaust ports at the rear of the shelf that cannot be restricted. If the shelf is equipped with AC Power Input Cards and configured for front exhaust, at least 50 mm (2 in.) of unrestricted exhaust space is required at the rear of the shelf.

DANGER

Risk of electrical shock and equipment damage

Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the shelf is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray, as applicable, as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Risk of equipment damage
Make sure that your hands or tools do not come into contact with the circuitry of the shelf processor (SP), access panel, (AP), shelf ID (SID) modules, or backplane pins. Avoid contact until the 6500 shelf is grounded to the office ground.

CAUTION
Risk of equipment damage and traffic loss
Install the 6500 shelf over a non-inflammable surface only.

CAUTION
Risk of equipment damage
The 6500 shelf is suitable for connection to intrabuilding or unexposed wiring or cabling only.

Step	Action
1	Ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 1-66.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, clip to a suitable ground point.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

3

CAUTION
Risk of equipment damage
Make sure that your hands or tools do not come into contact with the circuitry of the shelf processor (SP), access panel, (AP), shelf ID (SID) modules, or backplane pins. Avoid contact until the 6500 shelf is grounded to the office ground.

Unpacking and inspecting the content of the shipping containers

4 Unpack the contents of each shipping container.

5 Perform a visual inspection of the contents of the following shipping containers for any signs of damage that can occur during shipment.

- empty 6500 4-slot optical shelf (5U card cage)
- cooling fan module
- Wall Mount Kit NTK509NL
- 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ, if applicable

  In this procedure you will only install the hinges for the shelf front cover.

Unpacking components

6 Unpack the following components for each shelf and perform a visual inspection of the contents of the containers (as applicable to the configuration you ordered):

- common equipment, as applicable:
  - two AC Power Input Cards (100-240 Vac) NTK505UN
  - two DC Power Input Cards (Max 30A) (breakered) NTK505UD
  - two Shelf Processors
  - Access Panel
- interface circuit packs and filler cards, as applicable, to the configuration you ordered

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Installing hinges for the shelf front cover (optional)

> **ATTENTION**
> It is easier to install the shelf front cover hinges before you install the 6500 4-slot optical shelf rather than afterwards.

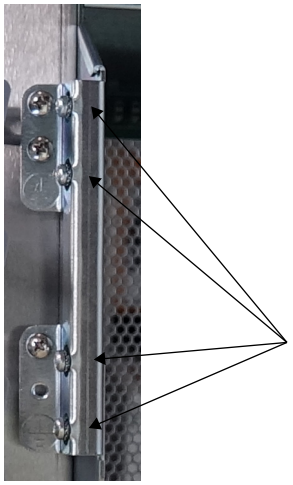
7 Locate the hinges that are supplied with NTK509CJ (6500 4-Slot Shelf Front Cover Kit w/Extended Depth).

This shelf front cover is optional. It is extended depth and protrudes at the front of the 6500 4-slot optical shelf.

This shelf front cover accommodates the use of fibers with boot lengths greater than 42.5 mm and/or in-line optical attenuators (fixed pads).

8 Remove the screws that are pre-installed on the left side wall of the shelf.

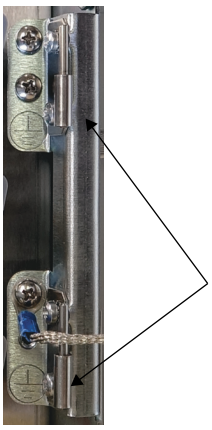
Figure 1-42
Remove pre-installed screws



Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action
9	With the pin pointing upwards, attach the male portion of one hinge to the shelf using two of the screws that you removed (from the left side of the shelf). Repeat the same action for the second hinge.

Figure 1-43
Shelf front cover hinges installed on 4-slot optical shelf



Hinges
(from NTK509CJ, 6500 4-Slot Shelf Front Cover Kit w/Extended Depth)

Ground wire shown.
(Install when you install NTK509CJ.)

Do not install the shelf front cover now.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

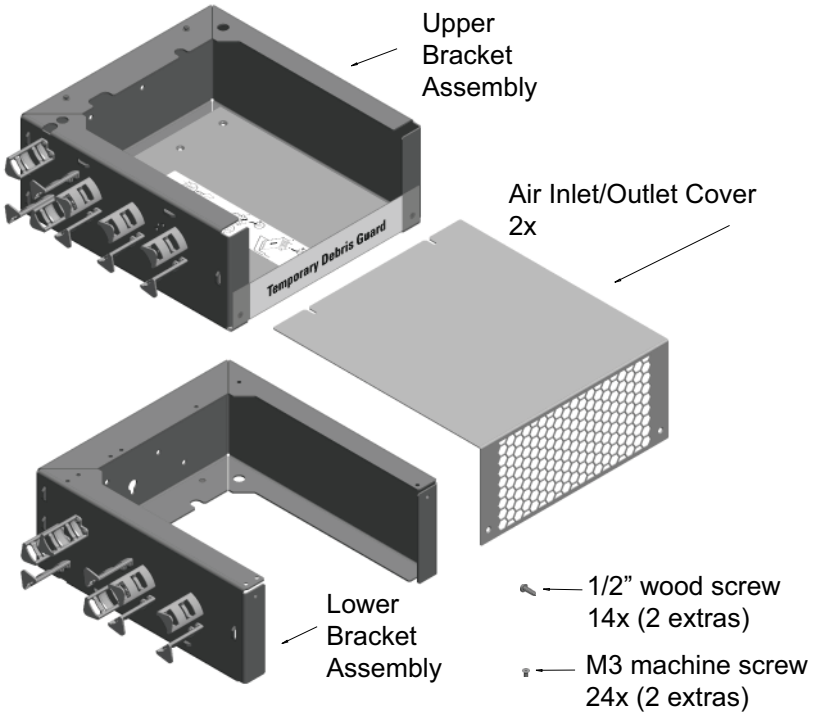
Step	Action

Fasten Upper Bracket Assembly and Lower Bracket Assembly to 4-slot optical shelf

10 Remove the Air Inlet/Outlet Cover from the Upper Bracket Assembly and from the Lower Bracket Assembly.

You will re-install the two covers later in this procedure.

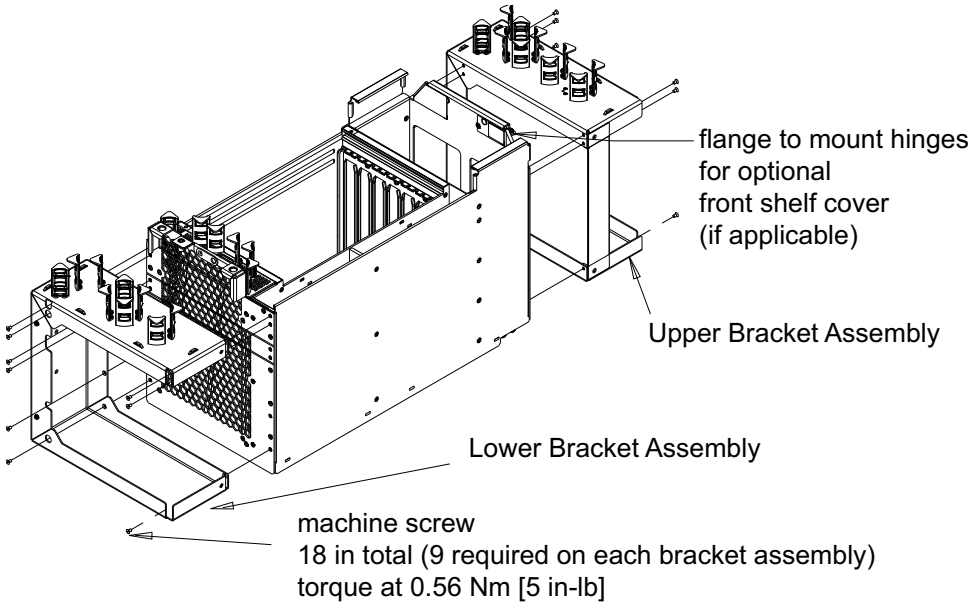
Figure 1-44
NTK509NL Wall Mount Kit for 6500 4-Slot Shelf



Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action
11	Place the 4-slot optical shelf on a clean flat surface, with the empty cage facing up.
12	Partially fasten the Lower Bracket Assembly to the shelf using 9 machine screws. Once they are aligned correctly, tighten the machine screws.
13	Partially fasten the Upper Bracket Assembly to the shelf using 9 machine screws. Once they are aligned correctly, tighten the machine screws.
14	Make sure that you use a torque wrench to verify that torque has been applied correctly: 0.56 N-m (5 lb-in) for installation and 0.45 N-m (4 lb-in) for inspection

Figure 1-45
Installing bracket assemblies to the 4-slot optical shelf



Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Preparing the wall

15 If required review the envelope dimensions for the location on the wall.

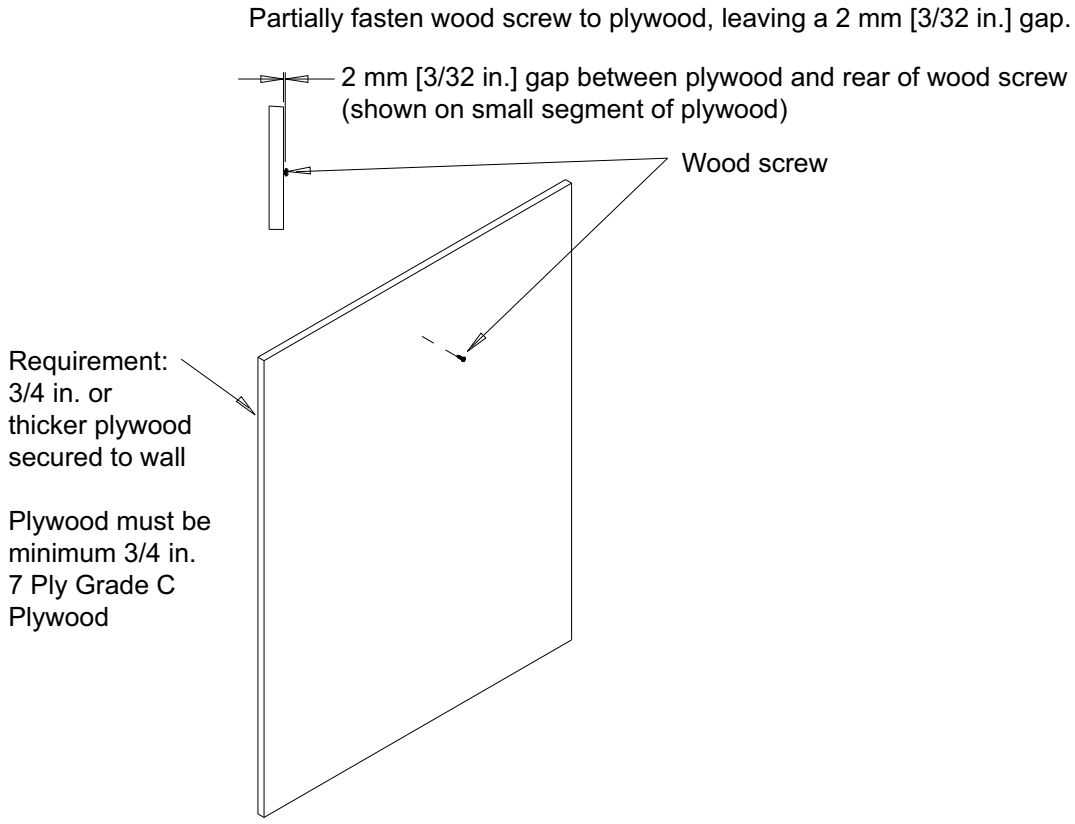
See the two illustrations in the introduction of this procedure:

- "Envelope required for wall mount—dimensions—height and width (view facing the wall)" on page 1-61
- "Envelope required for wall mount—dimensions—protrusion from wall" on page 1-62

16 Partially fasten the wood screw to the plywood, leaving a gap between the wall and the rear of the wood screw.

To mount the shelf to other wall types, use the appropriate mounting fasteners. Leave the same gap as shown in the illustration.

Figure 1-46
Partially fastening wood screw to plywood



Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Mounting on a wall

17 Hang the 4-slot optical shelf by lining up the keyhole feature on the rear of the Upper Bracket Assembly over the wood screw (which you fastened to the wall in step 16).

Figure 1-47
Hanging onto wall

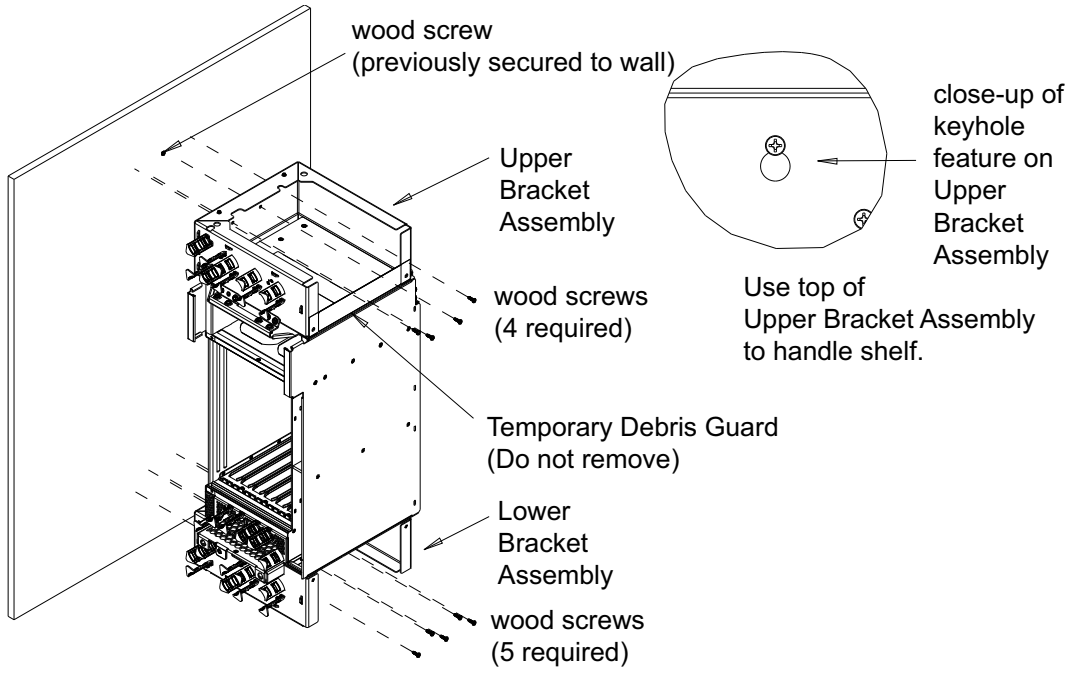
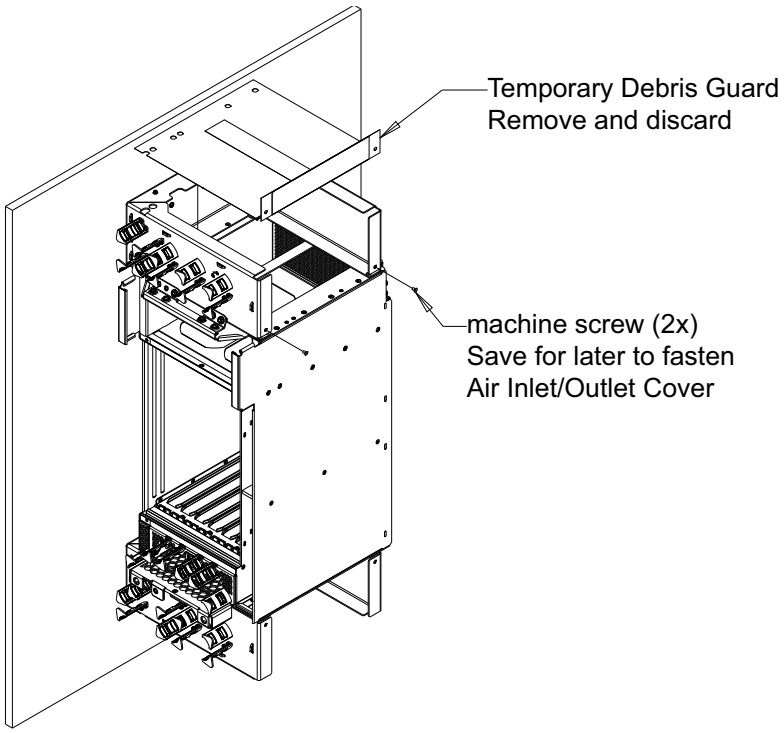


Figure 1-48
Keyhole feature on Upper Bracket Assembly

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action
18	Level the shelf.
19	Fasten to secure the bracket assemblies to the wall using • four wood screws for the Upper Bracket Assembly • five wood screws for the Lower Bracket Assembly
20	Tighten the wood screw that you partially fastened the Upper Bracket Assembly to the wall initially (in step 16).
21	Make sure that you use a torque wrench to verify that torque has been applied correctly to all wood screws: 1 N-m (8.85 lb-in) for installation
22	Vacuum any dirt or dust off the Temporary Debris Guard to make sure that no contaminants enter the system.
23	Remove the machine screws that secure the Temporary Debris Guard. Save the machine screws to use later to fasten the Air Inlet/Outlet Cover.

Figure 1-49
Removing and discarding Temporary Debris Guard

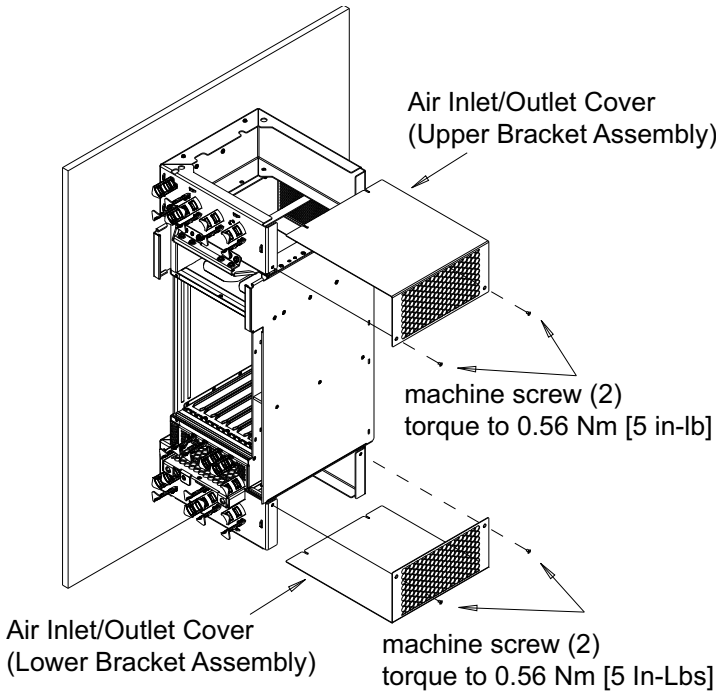


24	Remove and discard the Temporary Debris Guard.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action
25	Install the Air Inlet/Outlet Cover on the Upper Bracket Assembly and fasten using two machine screws from step 23.
26	Install the Air Inlet/Outlet Cover on the Lower Bracket Assembly and fasten using two machine screws.
27	Make sure that you use a torque wrench to verify that torque has been applied correctly to all machine screws: 0.56 N-m (5 lb-in)

Figure 1-50
Installing Air Inlet/Outlet Covers



The following shows the wall-mounted 4-slot optical shelf.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Figure 1-51
Wall-mounted 4-slot optical shelf on plywood

Routing power cables and fiber to the wall

28 Route power cables and fiber (based on industry standards) to the wall.

Do not connect power cables or fiber as part of this procedure.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Grounding the 6500 4-slot optical shelf

29 Make sure that you prepare ground lugs as follows.

ATTENTION
Use non-oxidizing compound before any crimp connections are made on bare conductors. For details, see the grounding guidelines in *Installation - General Information*, 323-1851-201.0, the section on preparing for installation.

CAUTION
Risk of improper grounding due to poor contact with a painted surface
If the surface is painted, follow company procedures to remove the paint from the area where you will fasten the bolt. Make sure that the bolt washer makes direct contact with the surface.

30 Fasten one lug end of the prepared ground cable (No. 6 AWG [16 mm^2]) to the equipment grounding bar as required.

31 Select your next step.

If the rear ground location	**Then** go to
is accessible	step 32
is not accessible, you can use the front ground located near the cooling fan module	step 34

ATTENTION
The rear ground location is recommended for the 6500 4-slot optical shelf.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Rear ground

32 Fasten the other lug end of the prepared ground cable to the ground screws located on the rear of the 6500 4-slot optical shelf.

The location of the ground studs on the shelf is embossed with the ground symbol. See the following illustration.

33 Secure the ground cable to the tie points on the rear of the Upper Bracket Assembly as shown in the following illustration.

Figure 1-52
Rear grounding location on a wall-mounted 6500 4-slot optical shelf—recommended

Then go to step 35.

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Front ground

34 Remove the two screws from the front right grounding tab. Attach the other lug end of the prepared ground wire assembly, and fasten the screws.

The 4-slot optical shelf includes two front ground locations:

— The right location can be used to ground the shelf.

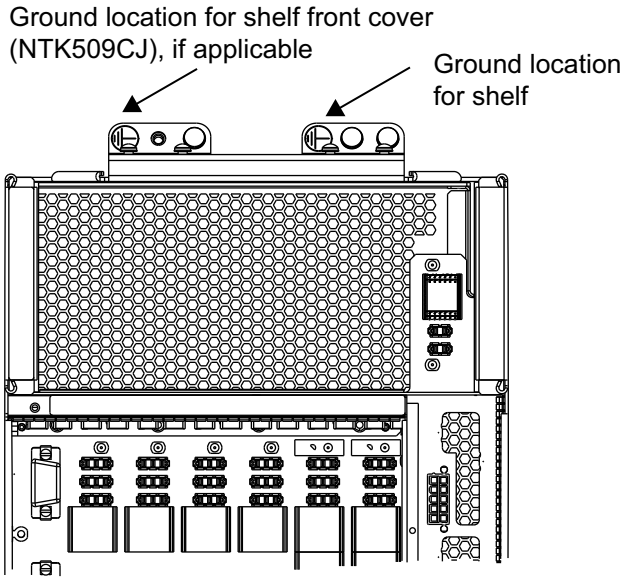
— The left location is used to ground the optional shelf front cover.

The ground studs on the shelf are embossed with the ground symbol.

If applicable you will later fasten a ground wire to the right ground location if you plan to install the 6500 4-slot Shelf Front Cover Kit w/Extended Depth (NTK509CJ).

See the following illustration for the front grounding locations.

Figure 1-53
Front grounding location of the 6500 4-slot optical shelf NTK503HA (vertical view)



Installing the cooling fan module

35 Slide cooling fan module NTK507HA all the way into the slot until it is fully seated into the backplane.

36 Fasten the cooling fan module to the top wall (viewed vertically) using a Phillips screwdriver to a torque value between 0.45 N-m and 0.68 N-m (between 4 lb-in. and 6 lb-in.).

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Installing the access panel

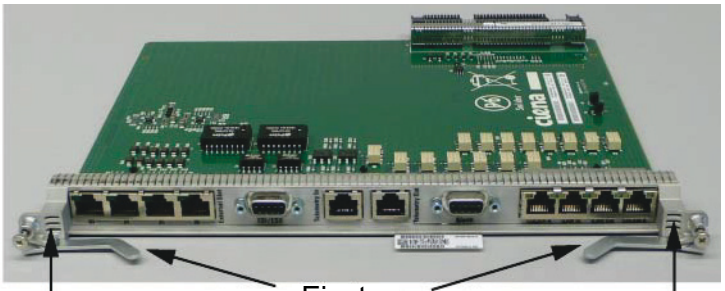
37 Insert the access panel into slot 19 (the left-most slot of the shelf, viewed vertically).

38 Ensure that the ejectors are closed and parallel to the faceplate. See the following illustration.

Figure 1-54
Access Panel for 6500-7 packet-optical and 4-slot optical shelves NTK505JA

Use ejectors only to remove the access panel from the shelf.

Do not use ejectors to install the access panel.



Note: A wall-mounted shelf is installed vertically. All components are installed vertically.

39 Press firmly on the left and right surfaces, located inside the latches, until the two flanges mate with the vertical members.

40

CAUTION
Risk of access panel not functioning
Make sure to fasten both sides of the access panel to the 6500 4-slot optical shelf using a Phillips driver. Otherwise, the access panel may not function correctly.

Fasten the captive fasteners on the both sides of the faceplate of the access panel to a torque value between 0.45 N-m and 0.68 N-m (between 4 lb-in. and 6 lb-in.).

Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Installing a wire wrap adapter, if applicable

41 Select your next step.

If	**Then** go to
a wire wrap adapter is required	step 42
otherwise	step 44

42 Review "Wire wrap adapter NTK505JZ for Access Panel NTK505JA and NTK505JB" for details on the wire wrap adapter.

Table 1-4
Wire wrap adapter NTK505JZ for Access Panel NTK505JA and NTK505JB

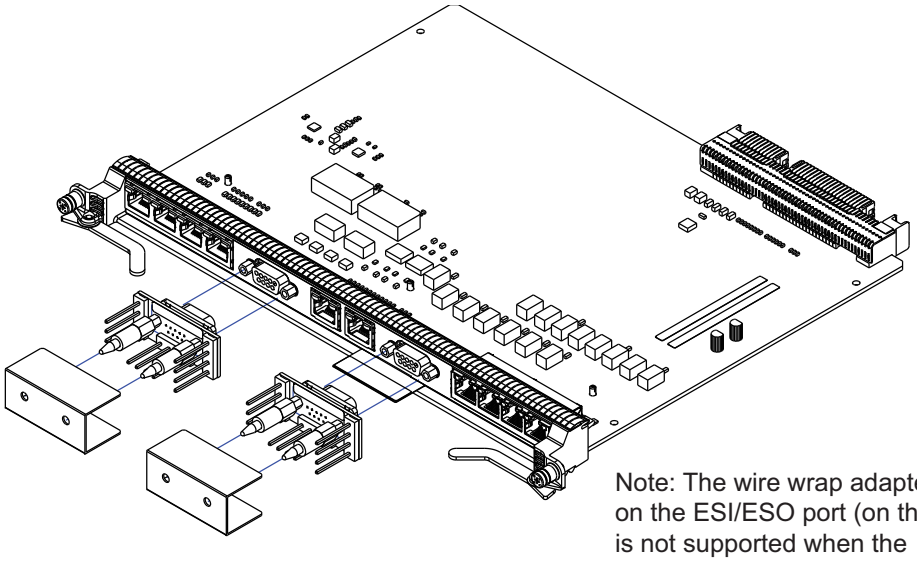
PEC	Description	Function	Quantity
NTK505JZ	Female DB9 to wire wrap adapter	Alarms	1

43 Attach the wire wrap adapter to the female DB9 alarms port, as applicable.

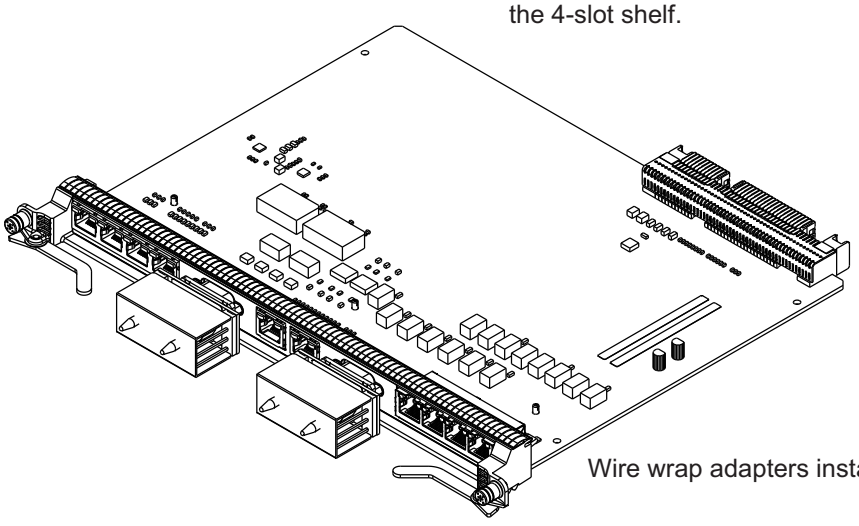
Procedure 1-2 (continued)
Wall mounting a 6500 4-slot optical shelf (NTK503HA) using Wall Mount Kit NTK509NL

Step	Action

Figure 1-55
Installing wire wrap adapters NTK505JZ and covers on Access Panel NTK505JA or NTK505JB (example shows NTK505JA)



Note: The wire wrap adapter on the ESI/ESO port (on the left) is not supported when the Access Panel is used in the 4-slot shelf.



Wire wrap adapters installed

44 You have completed this procedure. Next, perform "Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)" on page 1-84.

—end—

Procedure 1-3
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Use this procedure to install the following power input cards and connect power cables into a 6500 4-slot optical shelf as applicable:

- two Power Input Cards, Max 30A (NTK505UD) or
- two AC Power Input Cards (100 - 240 Vac) (NTK505UN)

AC and DC power input cards cannot be mixed in the 6500 4-slot optical shelf.

The cooling fan module provides right-to-left cooling to the NTK505UD Power Input Cards.

Integrated fans in the NTK505UN AC Power Input Card provide front-to-rear cooling. At least 50 mm (2 inches) of unrestricted exhaust space is required behind the 6500 4-slot optical shelf, even if the 6500 4-slot optical shelf is configured for front-only exhaust. AC power is not supported in front-only exhaust applications such as 300 mm cabinets with a solid rear panel.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically. As a guide for DC or AC cable routing and related tie features, see the photos for a wall-mounted shelf: Figure 1-59 on page 1-91, Figure 1-62 on page 1-94, and Figure 1-66 on page 1-98.

Prerequisites

Make sure that

- for power disconnection after installation, the male end of each AC power cable must remain accessible at the socket-outlet connection to the power source.
- you have the following tools and material:
  - the required DC or AC power input cards and DC or AC power cables

    For details, see *Planning*, NTRN10GP.
  - a Phillips or small flathead screwdriver
  - hex driver 8.0 mm (0.315 in)
  - torque driver
  - a multimeter

  - — non-abrasive, non-metallic pad
  - — heat-shrink tubing
  - — non-oxidizing compound
  - — hook and loop tape (such as Velcro), cable ties or lacing twine and tools according to your company's practice to secure power cables

    You must protect all cables from cuts and abrasions according to your company's practice and industry standards.
- you have the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans
- you observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0
- you have the appropriate personal grounding device to dissipate electrostatic charges

ATTENTION
All AC inputs to an AC-powered 6500 shelf or to any rectifier supplying DC power to a 6500 shelf must be equipped with an external surge protection device (SPD not supplied) to meet the criteria for equipment interfacing with AC power port(s) in Telcordia lightning criteria.

Guidelines and precautions

DANGER
Risk of electrocution
Working with live circuits is dangerous. Before you continue, make sure that the shelf power is turned off at the power distribution panel and cannot be turned on by accident. Use a multimeter to verify that no potential exists.

Understand the following information for ETSI or front-only exhaust applications when the 4-slot optical shelf is to be equipped with AC Power Input Cards (NTK505UN).

ATTENTION
AC Power Input Cards (NTK505UN) have integrated air intake fans at the front and exhaust ports at the rear of the shelf that cannot be restricted. If the shelf is equipped with AC power input cards and configured for front exhaust, at least 50 mm (2 inches) of unrestricted exhaust space is required at the rear of the shelf.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet or wall-mounted shelf to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet or wall-mounted shelf is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure.

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Verify that the equipment rack/cabinet or wall-mounted shelf is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 1-86.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/ cabinet or clip to a suitable ground point.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action
3	Select your next step.

If you are installing	**Then** go to
DC Power Input Cards NTK505UD	step 4
AC Power Input Cards NTK505UN	step 28

Installing DC Power Input Cards NTK505UD

4 Familiarize yourself with the DC Power Input Cards NTK505UD (Figure 1-56).

- Two DC Power Input Cards are required in slots 17 and 18 for A/B redundancy in the 6500 4-slot optical shelf.
- AC and DC power input cards cannot be mixed in the same 6500 4-slot optical shelf.
- The L- and L+ lug connection points consist of two #10-32 stud terminal (0.190 in/4.83 mm diameter) on 5/8 in (0.625 in / 15.9 mm) centers.
- The stud terminals support 2-hole straight lugs up to 2 AWG/35 mm^2 or 1-hole straight lugs for 10 AWG/6 mm^2 wire (with a maximum tongue width of 0.48 in [12.2 mm]).
- The stud terminals come with M5 KEPS hex nuts with an external tooth washer that you tighten with an 8.0 mm (0.315 in) hex driver.
- The DC Power Input Cards are shipped with the terminal cover oriented correctly to use in power card slot 17. To use the DC Power Input Card in slot 18, you must rotate the terminal cover. Instructions follow.
- Input feeds require external source current protection breaker/fuse of 30A or less (software support for 10A, 15A, 20A, 25A and 30A power budgets).
- As you push a power input card into its slot, the spring-loaded latch moves down and the tab (under the power input card) engages with a hole in the shelf. The power input card is successfully engaged into the backplane when the latch is down and you hear an audible click. (See Figure 1-64.)

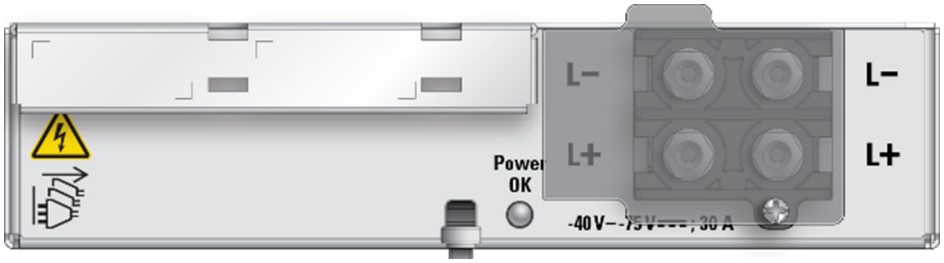
Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

- The green circle Power OK LED indicates that a minimum voltage in the correct polarity is being supplied to the backplane. (This LED does not support a lamp test.)

CAUTION
Risk of power brownout
Make sure power input cards are fully seated and secured before applying power. When applying power, the Power OK LED will be activated even if the power input card is not fully seated.

Figure 1-56
DC Power Input Card NTK505UD (with terminal cover ready for slot 17)



Slot 17

5 Insert the DC Power Input Card into slot 17 until it engages with the backplane and you hear a click. As you push the DC Power Input Card into the slot, the latch moves down.

6 Remove the terminal cover to prepare to connect the DC power cables.

Note: After you connect the DC power cables, you will re-install the terminal cover in the same orientation. Instructions follow later in this procedure.

Slot 18

7 Insert the DC Power Input Card into slot 18 until it engages with the backplane and you hear a click. As you push the DC Power Input Card into the slot, the latch moves down.

8 Unfasten the captive screw from the terminal cover.

9 Remove the terminal cover to prepare to connect the DC power cables.

Note: After you connect the DC power cables, you will rotate the terminal cover and install the terminal cover. Instructions follow later in this procedure.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Installing DC power cables

Slot 17

10 Prepare the appropriate DC power cables with the appropriate lugs based on industry standards. Insulate the lug barrels and the end of the input feeds with heat-shrink tubing.

11 Clean the power terminals and 2-hole lugs with a non-abrasive, non-metallic pad. If required, lightly coat non-oxidizing compound on the power terminals and 2-hole lugs. For details, see the grounding guidelines in *Installation - General Information*, 323-1851-201.0, the section on preparing for installation.

12 Connect the prepared DC power cables as applicable to the appropriate terminals on the Power Input Card in slot 17.

13 Reinstall the nut/washer assemblies on each of the DC power cables. Using an 8.0 mm (0.315 in) hex driver, tighten the nuts. Then verify that the torque is 2.26 N-m (20 lb-in.) using a torque driver.

14 Reinstall the terminal cover to the terminal block, over the DC power cables.

15 Tighten the captive screw to secure the terminal cover to the terminal block.

16 Route the DC power cables to the left away from the shelf (and around the edge of the shelf if required).

17 Tuck the DC power cables under the flange (above the fan slot).

Securing power cables to tie features

18 Secure power cables in the following steps by

- making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and
- protecting all cables from cuts and abrasions according to your company's practice and industry standards.

19 Secure the DC power cable to the left side features and to the top of the left side air baffle/duct, as required. See Figure 1-57 and Figure 1-58.

For a wall-mounted shelf,

- secure to the tie features as shown in Figure 1-59, and
- secure to the tie features on the top of the Upper Bracket Assembly (similar to AC power cables as shown in Figure 1-67 on page 1-99)

Securing the DC power cables as shown allows the fan module to be inserted or removed if required, without interfering with the DC power cables.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Figure 1-57
Left DC power cable (slot 17)—routing and securing

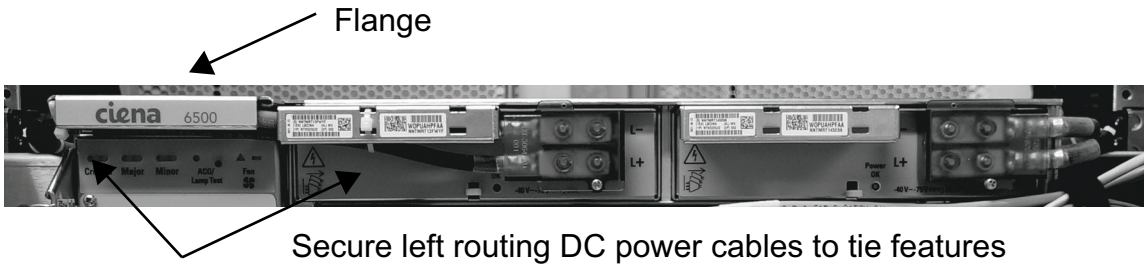
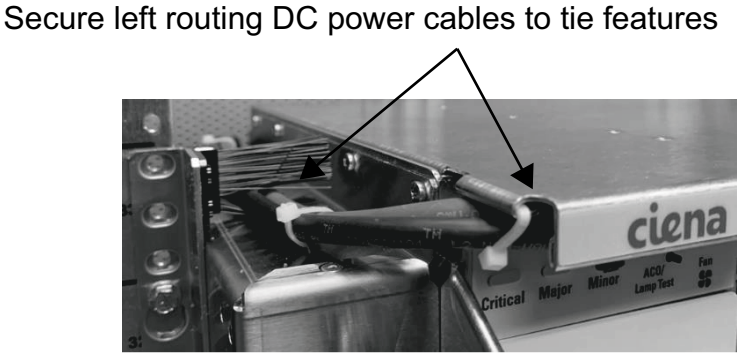


Figure 1-58
Left DC power cables (slot 17)—routing to rear and securing

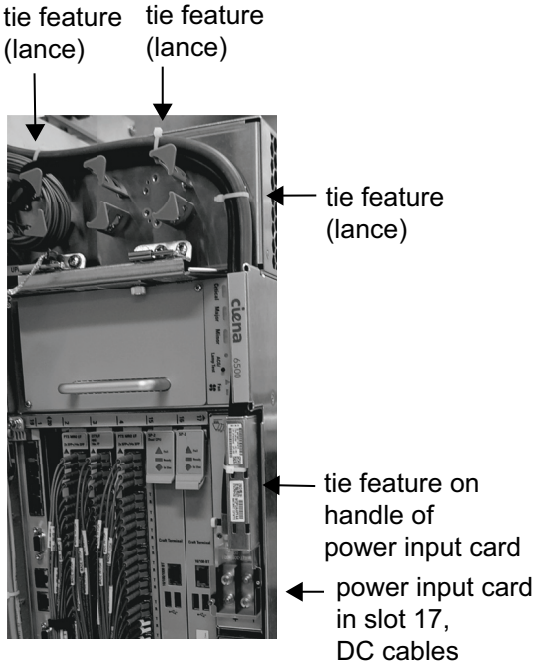


Note: For a wall-mounted 4-slot optical shelfs, see Figure 1-59.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Figure 1-59
Wall-mounted shelf showing DC cabling of power input card in slot 17—example



Note 1: Figure 1-59 is an example that includes components and fiber. However, when you install power input cards in a wall-mounted application, the shelf is not yet fibered and components are not yet installed in the shelf.

Note 2: Also secure to the tie features on the top of the Upper Bracket Assembly (similar to AC power cables as shown in Figure 1-67 on page 1-99).

Slot 18

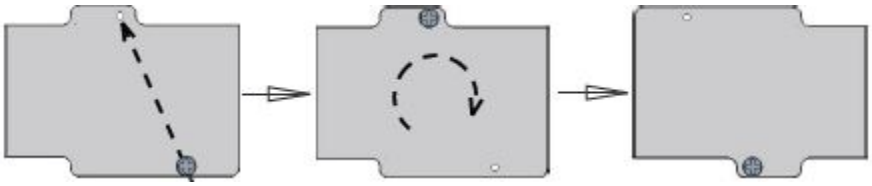
20 Prepare the appropriate DC power cables with the appropriate lugs based on industry standards. Insulate the lug barrels and the end of the input feeds with heat-shrink tubing.

21 Clean the power terminals and 2-hole lugs with a non-abrasive, non-metallic pad. If required, lightly coat non-oxidizing compound on the power terminals and 2-hole lugs. For details, see the grounding guidelines in *Installation - General Information*, 323-1851-201.0, the section on preparing for installation.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action
22	Connect the prepared DC power cables as applicable to the appropriate terminals on the Power Input Card in slot 18.
23	Reinstall the nut/washer assemblies on each of the DC power cables. Using an 8.0 mm (0.315 in) hex driver, tighten the nuts. Then verify that the torque is 2.26 N-m (20 lb-in.) using a torque driver.
24	Prepare the terminal cover as follows (see Figure 1-60): **a.** Holding the terminal cover in the same orientation as the terminal cover installed on the Power Input Card in slot 17, move the captive screw into the other threaded hole of the terminal cover. **b.** Rotate the terminal cover. **c.** Install the terminal cover to the terminal block. **d.** Tighten the captive screw to secure the terminal cover to the terminal block.

Figure 1-60
Preparing the DC terminal cover for slot 18—move captive screw, rotate, install



25	Route the DC power cables to the right and away from the shelf (and around the edge of the shelf to the rear if required). • ETSI and 23-inch mounting kits include pass-through brushes. • You can route DC power cables that are 8 AWG/10 mm^2 or less to the rear of the shelf on top of the ETSI/23-inch side air baffles/ducts as required. • You can route DC power cables that are 6 AWG/16 mm^2 to the rear on top of the 23-inch side air baffles/ducts, if the pass-through brushes are not used.

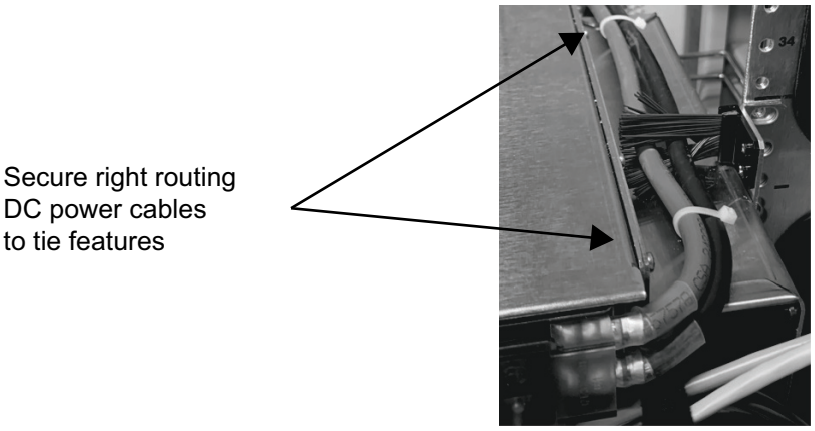
Securing power cables to tie features

26	Secure power cables in the following steps by • making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and • protecting all cables from cuts and abrasions according to your company's practice and industry standards.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action
27	Secure the DC power cables using the right side features (see Figure 1-61). For a wall-mounted shelf, secure to the tie features as shown in Figure 1-62. You have completed this procedure.

Figure 1-61
Right DC power cable routing—secure to top of right air baffle/duct as required



Note: Figure 1-61 does not apply to a wall-mounted 4-slot optical shelf.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Figure 1-62
Wall-mounted shelf showing DC cabling of power input card in slot 17—example

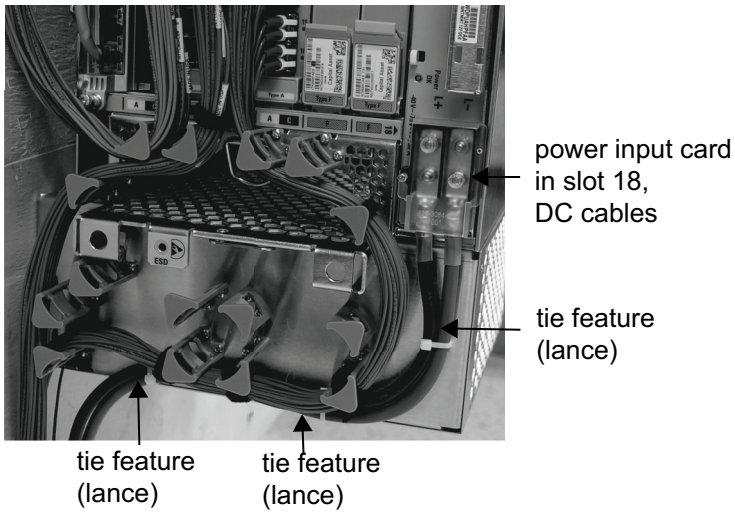


Figure 1-62 is an example that includes components and fiber. However, when you install power input cards in a wall-mounted application, the shelf is not yet fibered and components are not yet installed in the shelf.

Installing AC Power Input Cards (100 - 240 Vac, 50/60 Hz) (NTK505UN)

28 Familiarize yourself with the AC Power Input Cards NTK505UN.

- Two AC Power Input Cards are required in slots 17 and 18 for A/B redundancy in the 6500 4-slot optical shelf.
- AC and DC power cards cannot be mixed in the same 6500 4-slot optical shelf.
- AC Power Input Card NTK505UN is not supported in front-to-front airflow applications such as 300 mm cabinets with a solid rear panel.
- As you push the AC Power Input Card into its slot, the spring-loaded latch moves down and the tab (under the power input card) engages with a hole the shelf. The AC Power Input Card is successfully engaged into the backplane when the latch is down and you hear an audible click. (See Figure 1-64.)
- The green circle Power OK LED indicates that AC voltage is within the operating range and is being converted to -48 Vdc for supplying to the backplane. (This LED does not support a lamp test.)

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

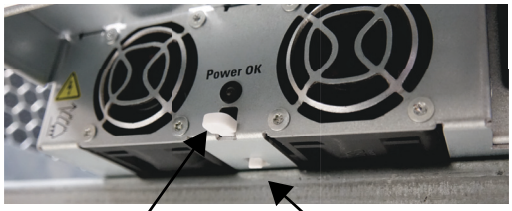
CAUTION
Risk of power brownout
Make sure power input cards are fully seated and secured before applying power. When applying power, the Power OK LED will be activated even if the power input card is not fully seated.

Figure 1-63
AC Power Input Card (100-240 Vac, 50/60 Hz) - NTK505UN

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action
29	Insert the AC Power Input Card into slot 17 until it engages with the backplane and you hear a click. As you push the AC Power Input Card into the slot, the latch moves down.
30	Insert the AC Power Input Card into slot 18 until it engages with the backplane and you hear a click. As you push the AC Power Input Card into the slot, the latch moves down.

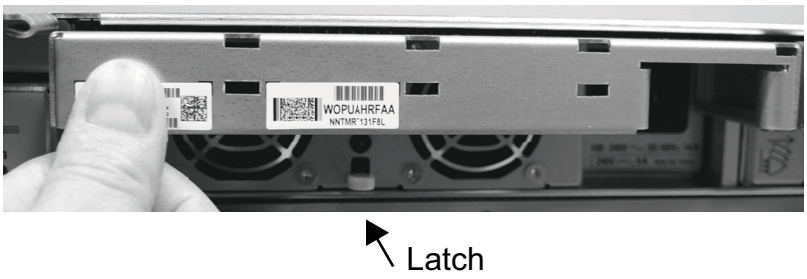
Figure 1-64
Latch and tab on power input card—example of AC Power Input Card



To install push the power input card (AC or DC) into its slot. As you do so, the spring-loaded latch moves down. The power input card is inserted correctly when the latch is down and the tab engages with the hole in the shelf. You will hear a click.

(This example shows an AC Power Input Card being installed. When a power input card is fully inserted, the tab will no longer be visible: it will be engaged with the hole in the shelf.)

Figure 1-65
AC Power Input Card installed in 6500 4-slot optical shelf



Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Installing AC power cables

31 Locate the AC power cables.

32 Insert one of the AC power cables into the AC power input card receptacle in slot 17. Insert the other AC power cables into the AC power input card receptacle in slot 18.

33 Route the AC power cable to the left. Route the other AC power cable to the right. Route both cables to the rear above the ETSI/21-inch or 23-inch air ducts.

Securing power cables to tie features

34 Secure power cables in the following steps by

- making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and
- protecting all cables from cuts and abrasions according to your company's practice and industry standards.

35 Secure the right AC power cables using the right side features. Secure the left AC power cable to the left side features. Secure the AC power cables to the lances above the ETSI/21-inch or 23-inch air ducts.

36 Route the AC power cable from slot 17 to the left. Route the power cable from slot 18 to the right. Secure the cable to the power card's faceplate, and also secure the cable to the shelf cable exit point.

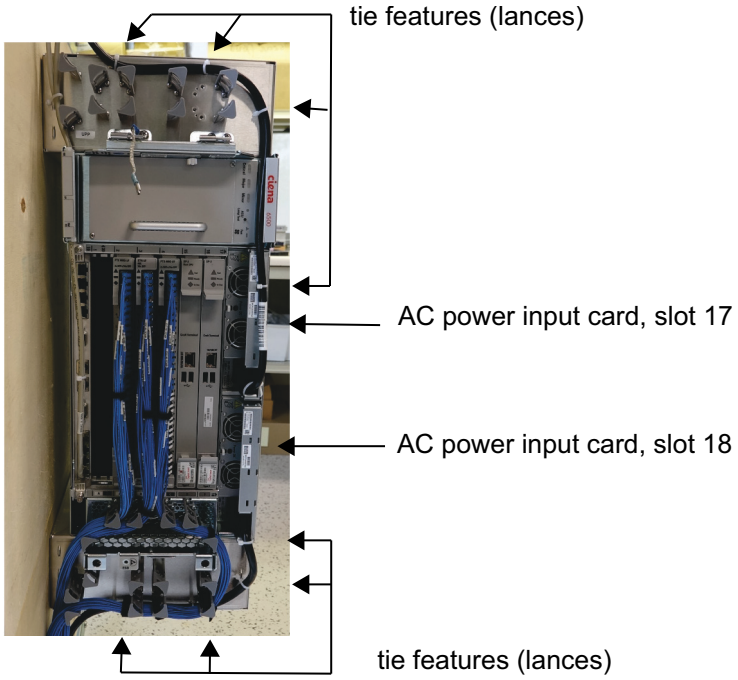
For a wall-mounted shelf, secure to the tie features as shown in Figure 1-66 and Figure 1-67.

Securing the AC power cable to the power card's faceplate allows the fan module to be inserted or removed if required, without interfering with the AC power cable.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Figure 1-66
Wall-mounted shelf showing AC cabling of power input cards in slot 17 and slot 18—example



Note: Figure 1-66 is an example that includes components and fiber. However, when you install power input cards in a wall-mounted application, the shelf is not yet fibered and components are not yet installed in the shelf.

Procedure 1-3 (continued)
Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)

Step	Action

Figure 1-67
Wall-mounted shelf showing AC cable secured to tie features—example (view from rear)

Note: Routing and securing to tie features shown is similar for DC power cables.

37 Next perform "Testing power to the 6500 shelf" on page 1-100.

—end—

Procedure 1-4
Testing power to the 6500 shelf

Use this procedure to test power to the 6500 shelf.

ATTENTION
This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

Prerequisites

Make sure that you

- have a digital voltmeter (DVM).

DANGER
Risk of electrocution
Working with live circuits is dangerous. Before you continue, make sure that the shelf power is turned off at the power distribution panel and cannot be turned on by accident. Use a multimeter to verify that no potential exists.

- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0.
- have hook and loop tape (such as Velcro), cable ties or lacing twine and tools according to your company's practice to re-secure power cables

  You must protect all cables from cuts and abrasions according to your company's practice and industry standards.
- have the appropriate personal grounding device to dissipate electrostatic charges.

Procedure 1-4 (continued)
Testing power to the 6500 shelf

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet or wall-mounted shelf to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet or wall-mounted shelf is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Verify that the equipment rack/cabinet or wall-mounted shelf is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/ cabinet or clip to a suitable ground point.

Procedure 1-4 (continued)
Testing power to the 6500 shelf

Step	Action

3 Select your next step.

If you are testing	**Then** go to
DC power input cards	step 4
AC power input cards	step 19

Testing power to the shelf equipped with breakerless DC power input cards

4 Follow the instructions in the precautionary message.

CAUTION
Risk of power brownout
Make sure the power input cards are fully seated and secured, and that the terminal covers on the DC power input cards are securely in place before applying power. When applying power, the Power OK LED will be activated even if the power input card is not fully seated.

5 Select your next step.

If the power to the power input card is coming from	**Then** go to
a BIP	step 6
a power distribution panel	step 9

6 Turn on the circuit breakers at the secondary power distribution panel to the BIP.

7 Identify on the BIP the circuit breakers that connect the power cables to the A and B feeds on the 6500 shelf you are installing.

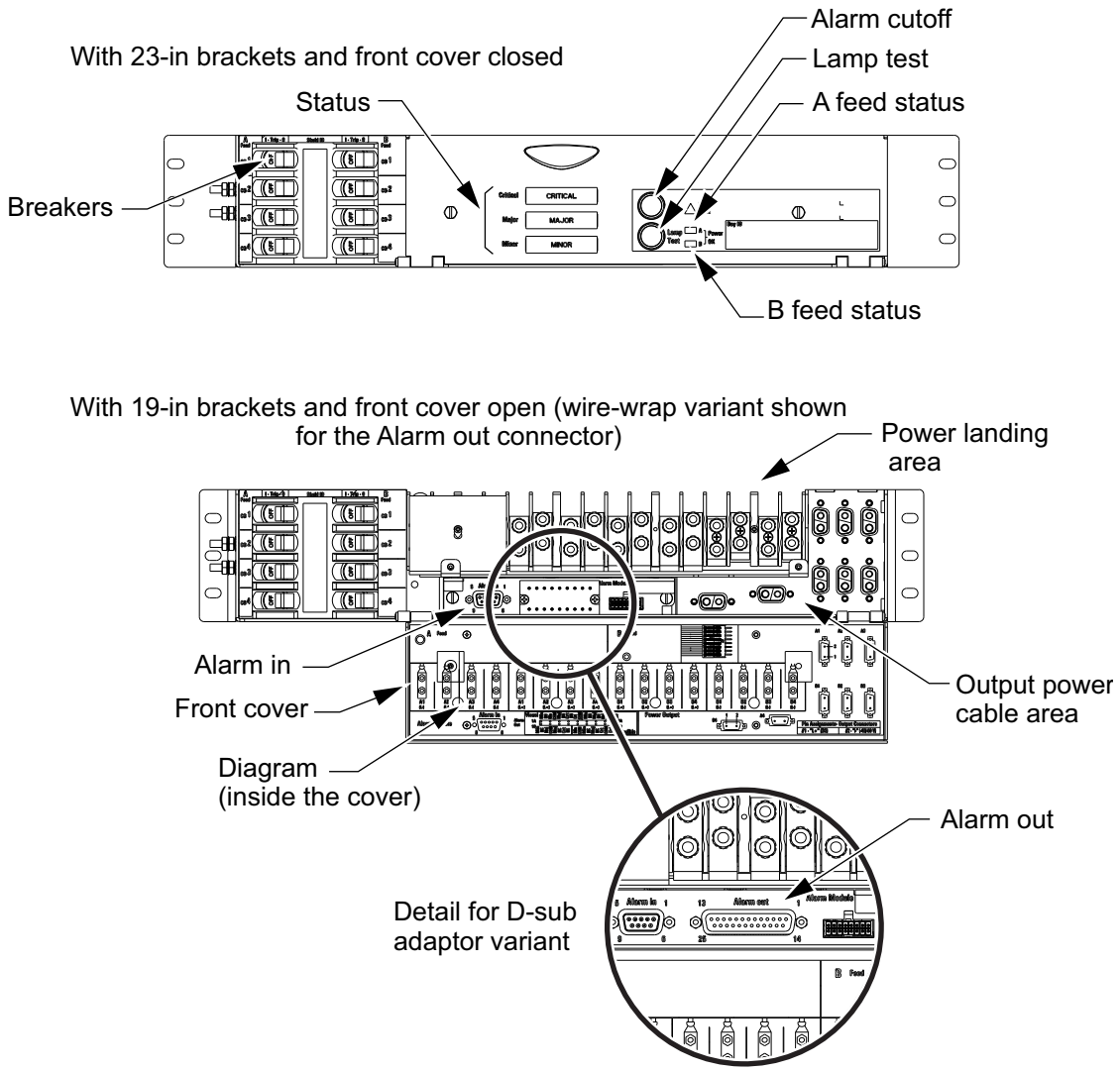
See the following illustration for the location of the circuit breakers:

- “Front view of the 2U BIP example” on page 1-103

Procedure 1-4 (continued)
Testing power to the 6500 shelf

Step	Action

Figure 1-68
Front view of the 2U BIP example



Procedure 1-4 (continued)
Testing power to the 6500 shelf

Step	Action

8 Turn on the BIP circuit breakers you identified for the A feed.

Go to step 10.

9 Turn on the power at the power distribution site for the A feed.

10 Using a DVM, measure the voltage at the input terminals on the power input card A in reference to ground. DVM readings must be as indicated in the following table.

Power cable	Nominal system value (V dc)	DVM reading (V dc) (Note)
Feed (A or B) (L-)	-48	-52 to -54.6
Battery return (L+)	0	approximately 0
Note: The values measured by the DVM must correspond to the float voltage of the connected power plant. The values in this column are typical.		

If the values indicated by the DVM are not correct, the cables are incorrectly wired. Verify that the power cables are terminated correctly at the BIP. If the power cables are correctly terminated, you must replace the power cable assembly.

11 Check that the LEDs on the fan module turn green and that the units are functioning.

12 Select your next step.

If the power to the power input card is coming from	**Then** go to
a BIP	step 13
a power distribution panel	step 16

13 Turn off the BIP circuit breakers you identified for the A feed.

14 Repeat step 8 to step 13 for the B feed and the B power input card.

15 Turn off the circuit breakers at the secondary power distribution panel to the BIP.

Go to step 18.

16 Turn off the power at the power distribution site for the A feed.

17 Repeat step 8 to step 16 for the B feed and the B power input card.

18 Next install the shelf processor. Perform “Installing the shelf processor” on page 1-106.

Procedure 1-4 (continued)
Testing power to the 6500 shelf

Step	Action

Testing AC power input cards

19 Follow the instructions in the precautionary message.

CAUTION
Risk of power brownout
Make sure the power input cards are fully seated and secured before applying power. When applying power, the Power OK LED will be activated even if the power input card is not fully seated.

20 Test the AC circuit and cables following your company's procedure.

21 Make sure that both the A and B AC power sources are turned off or that both AC cables are disconnected from either the power source or from the power input connector.

22 Turn on the power for the AC source that you identified for the A feed and make sure that the AC power cable is connected to the power source and to the power card input in Slot 17.

23 Check that Power OK LED on the power input card is green and that the LED on the fan module turns green and that the unit is functioning.

24 Turn off the AC source that you identified for the A feed or unplug the AC power cable from the power source or from the power input card connector.

25 Repeat step 20 to step 24 for the B feed and the B power input card in Slot 18.

26 Turn off the A and B AC sources or unplug the AC power cables from the power source or from the power input card connectors.

After completing the power testing, re-secure the AC power cables. (For details, see Procedure 1-3, "Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)".)

27 Next install the shelf processor. Perform "Installing the shelf processor" on page 1-106.

—end—

Procedure 1-5
Installing the shelf processor

Use this procedure to install the shelf processor into the shelf.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

CAUTION

Risk of damage to equipment

Before installing the shelf processor(s) into a 6500 shelf, make sure that you have installed and tested the cooling fan module and applicable power input cards.

Then—before installing any other circuit packs into the 6500 shelf—install the shelf processor (this procedure).

ATTENTION

When using the zero touch provisioning (ZTP) commissioning mode, the RJ45 Ethernet loopback plug (ELP) (NTT09FA) must be installed in the Craft port of the SP before the SP is powered up. If two SPs are installed, the RJ45 ELP must be installed in both SPs.

ATTENTION

If no NTZF07xx label is present on the SP-3 circuit pack, then you need to be prepared to download the correct software release after you install the first SP-3 circuit pack in slot 15. For details on optionally running a software upgrade (higher release) or a software install (forced) (lower release), see *Administration and Security*, 323-1851-301. Next you can install the second SP-3 circuit pack and the remaining circuit packs. You can then perform the procedure on commissioning a network element using Advanced SLAT in *Commissioning and Testing*, 323-1851-221.

Variants

The following shelf processor variants are available for the 6500 4-slot optical shelf:

- NTK555CAE5/NTK555EAE5—SP-2 circuit packs
- NTK555FAE5—SP-2 Dual CPU circuit pack
- NTK555JA—SP-3 circuit pack

The shelf processor is installed horizontally.

Procedure 1-5 (continued)
Installing the shelf processor

Hardware product engineering codes (PEC) are used in this procedure for general identification only. Except for SP-3 circuit pack (NTK555JA), each shelf processor is ordered/shipped with pre-loaded software as a shelf processor kit (combined hardware and software), by the related kit PEC. SP-3 circuit pack (NTK555JA) can be ordered separately and contains the minimum software release.

You can order the SP-3 circuit pack separately using the circuit pack ordering code (NTK555JA) or as part of the SP-3 shelf processor kit (NTZF07QE). When ordered separately:

- the SP-3 contains the minimum software release
- after you install the first SP-3, you must apply the correct software release to the SP-3 by
  - — downloading the correct software release, which involves full delivery of that software release
  - — if the new software release is higher than the running release, you must upgrade the shelf processor
  - — if the new software release is lower than the running release, you must software install the shelf processor
  - — if the new software release is equal to the running release, you must commit the shelf to the running release
- you can then install the optional second SP-3 for redundancy

  Note: The system raises a "Software Release Unknown" alarm when the shelf processor release is unknown, which occurs when a shelf processor with minimal software load is installed. For information on alarm clearing, refer to *Fault Management - Alarm Clearing*, 323-1851-543.

For details on the applicable shelf processor based on the shelf and software load, see *Ordering Information*, 323-1851-151.

Procedure 1-5 (continued)
Installing the shelf processor

Figure 1-69
SP-2 circuit packs NTK555CAE5/NTK555EAE5

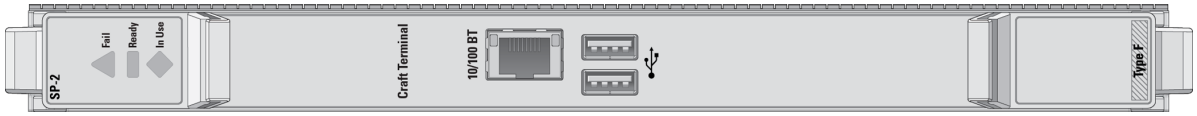


Figure 1-70
SP-2 Dual CPU circuit pack NTK555FAE5

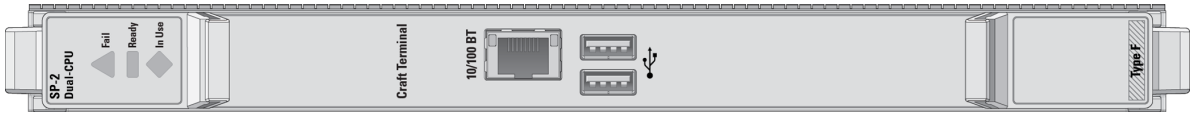
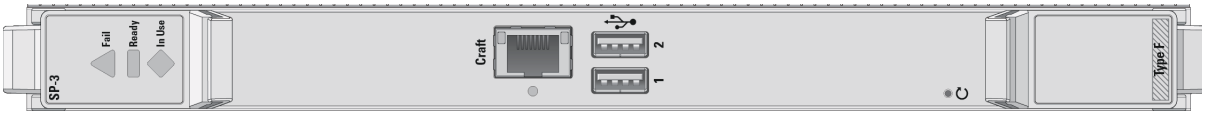


Figure 1-71
SP-3 circuit pack NTK555JA



Shipping options

Depending on your requirements, the shelf processor is shipped in different packaging options.

If the 6500 shelf is shipped in a packs-in-place kit

Components—including the shelf processor—are pre-installed but not seated into the backplane. Use this procedure to seat the shelf processor into the backplane.

If the 6500 shelf is not shipped in a packs-in-place kit

Components—including the shelf processor—are not pre-installed in the shelf. Use this procedure to install and seat the shelf processor into the backplane.

Procedure 1-5 (continued)
Installing the shelf processor

Prerequisites

Make sure that you

- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0
- have the appropriate personal grounding device to dissipate electrostatic charges
- refer to *Ordering Information*, 323-1851-151, for valid slot assignments
- have fully seated the power input cards (Procedure 1-3, “Installing power input cards and connecting power cables into a 6500 4-slot optical shelf (NTK503HA)”, as applicable to your configuration, have tested the voltage to the shelf, and have confirmed that the voltage is above the start-up threshold (Procedure 1-4, “Testing power to the 6500 shelf”)

Guidelines and precautions

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Risk of equipment damage
Before you insert any shelf processor, make sure that you power up the 6500 shelf and test the power input cards and cooling fan module.

CAUTION
Risk of autoprovisioning failure
Before you install any circuit packs, you must install the shelf processor (this procedure). To prevent damage to equipment and to ensure autoprovisioning of circuit packs, insert circuit packs in the correct order, as instructed.

Procedure 1-5 (continued)
Installing the shelf processor

CAUTION
Risk of circuit pack damage
Handle circuit packs with care at all times. Make sure that you do not drop any circuit pack. Otherwise, you will damage it. Also, do not remove the connector protectors until you are ready to install the circuit pack.

CAUTION
Risk of circuit pack damage
Do not force a circuit pack all the way to the back of its slot if it resists insertion. Before installing a circuit pack, make sure that you understand the detailed procedure for inserting circuit packs (see “Inserting or removing circuit packs in the 6500 shelf” on page 1-140).

CAUTION
Risk of incorrect installation
Make sure that the SP circuit pack lock latches are locked into position. If the lock covers are not locked, the latch sensors on the SP circuit pack do not allow the 6500 shelf to identify the SP circuit pack and allow it to autoprovision.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
2	Enable the A and B power and make sure that the shelf cooling system is operating.
3	Select your next step.

If the 6500 shelf	**Then** go to
was shipped in a packs-in-place kit	step 4
was not shipped in a packs-in-place kit	step 6

4	Open the latches of the SP circuit pack.

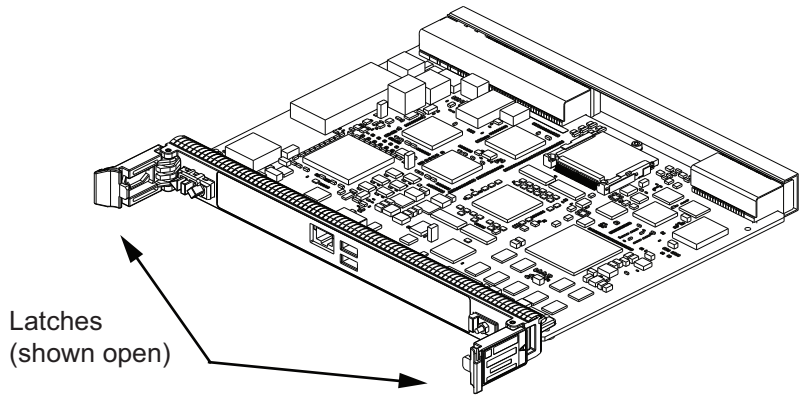
Procedure 1-5 (continued)
Installing the shelf processor

Step	Action
5	Slide the SP circuit pack into the 6500 shelf until the backplane alignments pins are engaged and then push on the faceplate to partially seat the SP circuit pack. Then go to step 11.
6	Remove the protective cover/covers from the shelf backplane.
7	If applicable, remove the shelf processor from its packaging.
8	Make sure to un-clip and remove the connector protector from the rear of the circuit pack ("Examples of circuit pack connector protectors" on page 1-135).

Installing the SP circuit pack

9	Open the latches of the SP circuit pack.
10	Position the SP circuit pack into the tracks of slot 15, slide in until the backplane alignments pins are engaged, and then push on the faceplate to partially seat the SP circuit pack. The 6500 4-slot optical shelf supports single or redundant SP circuit packs. If two SP circuit packs are used, one SP circuit pack is always active SP circuit pack and controls the 6500 shelf, while the other SP circuit pack is the standby SP circuit pack.
11	Use the latches (see Figure 1-72) to fully seat the SP circuit pack. This action requires some force to fully engage the connector field.

Figure 1-72
Shelf processor circuit pack view with latches shown open



Procedure 1-5 (continued)
Installing the shelf processor

Step	Action

12

CAUTION
Risk of incorrect installation
Make sure that the SP circuit pack lock latches are locked into position. If the lock covers are not locked, the latch sensors on the SP circuit pack do not allow the 6500 shelf to identify the SP circuit pack and allow it to autoprovision.

The SP circuit pack must be fully seated, and both latches must be locked to the faceplate.

Waiting for the software to initialize

13 The red Fail, the green Ready and the blue In Use status LEDs on the front of the shelf processor (circuit pack) go through the following sequence:

- The red LED turns on when the circuit pack is first inserted.
- After a few seconds, the red, green and blue LEDs turn on.
- After a few seconds, the red and blue LEDs turn off and the green LED flashes to indicate the software is initializing.
- When software initialization is complete, the green status LED turns on (does not flash).
- The circuit pack is in service and the blue LED turns on after all software and firmware upgrades are completed.

Wait until this sequence is complete before proceeding to the next step.

Software initialization can take up to five minutes and is complete when the green status LED stops flashing and the green Ready LED turns on. If the red Fail LED turns on, the circuit pack has faults and must be returned to Ciena.

ATTENTION
The red LED may turn on if the incorrect shelf processor is inserted. Make sure that the shelf processor has the correct product engineering code (PEC) for the given shelf type. For the 6500 shelf processor types, see *Planning*, NTRN10GP.

ATTENTION
Do not remove the shelf processor if the green LED is flashing or the blue LED is on.

Procedure 1-5 (continued)
Installing the shelf processor

Step	Action

ATTENTION
If no NTZF07xx label is present on the SP-3 circuit pack, after you install the first SP-3 in slot 15, you must download the correct software release to the SP-3 circuit pack. For details on optionally running a software upgrade (higher release) or a software install (forced) (lower release), see *Administration and Security*, 323-1851-301. Next you can install the second SP-3 circuit pack and the remaining circuit packs. You can then perform the procedure on commissioning a network element using Advanced SLAT in *Commissioning and Testing*, 323-1851-221.

If SP redundancy is required

14 Repeat from step 9 (or if shipped packs-in-place, repeat from step 4) to install the second SP circuit pack in slot 16, as applicable.

ATTENTION
Installing a shelf processor in slot 16 of the 6500 4-slot optical shelf does not automatically create redundant SP groups. To provision a redundant SP group, see the procedures *Configuration - Provisioning & Operating*, 323-1851-310.

ATTENTION
When both SP circuit packs are in the 6500 shelf and no protection is provisioned, if you place the active SP circuit pack in slot 15 to out of service (OOS), the SP circuit pack in slot 16 will be in service (IS). However, the SP circuit pack in slot 15 is still active and the blue LED is off. Removing the SP circuit pack from slot 15 will result in loss of communication to the user interface. Before removing the SP circuit pack from slot 15, ensure that equipment protection is provisioned. See the procedures *Configuration - Provisioning & Operating*, 323-1851-310.

15 You have completed this procedure. Next, perform "Connecting control and communication cables" on page 1-114.

—end—

Procedure 1-6
Connecting control and communication cables

- Use this procedure to connect cables to the following ports of the access panel of the 6500 4-slot optical shelf, as applicable:
  - telemetry input/output (I/O)
  - shelf alarms
  - DTE
  - ILAN and COLAN
  - console port on NTK505JB

  Note: External synchronization (BITS) I/O (ESI/ESO DB9, wire wrap) is not used when the Access Panel is equipped on the 6500 4-slot optical shelf.

- Also use this procedure to connect to the following external equipment through the external slots on the access panel:
  - photonic layer passive modules (for example, BMD2, CMD44, CMD64, DSCM, MBMD2, UBMD2, GMD10, FIM), Transponder Protection Tray (TPT), or OMX
  - PPC6 (174-0040-900)

  The following access panels can be used:
  - access panels with connections for four external slots (NTK505JA or NTK505JB) in a 6500 4-slot optical shelf
- Also use this procedure to connect alarm cables to the 2U BIP (NTK599BGE5, NTK599BH).
- Also use this procedure to connect the alarm cable and Ethernet cables to the 6500 4-slot optical shelf.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

Procedure 1-6 (continued)
Connecting control and communication cables

See the following illustrations and "Reference list of access panel illustrations" on page 1-116.

Figure 1-73
NTK505JA Access Panel (with Telemetry/Environmental control outputs)

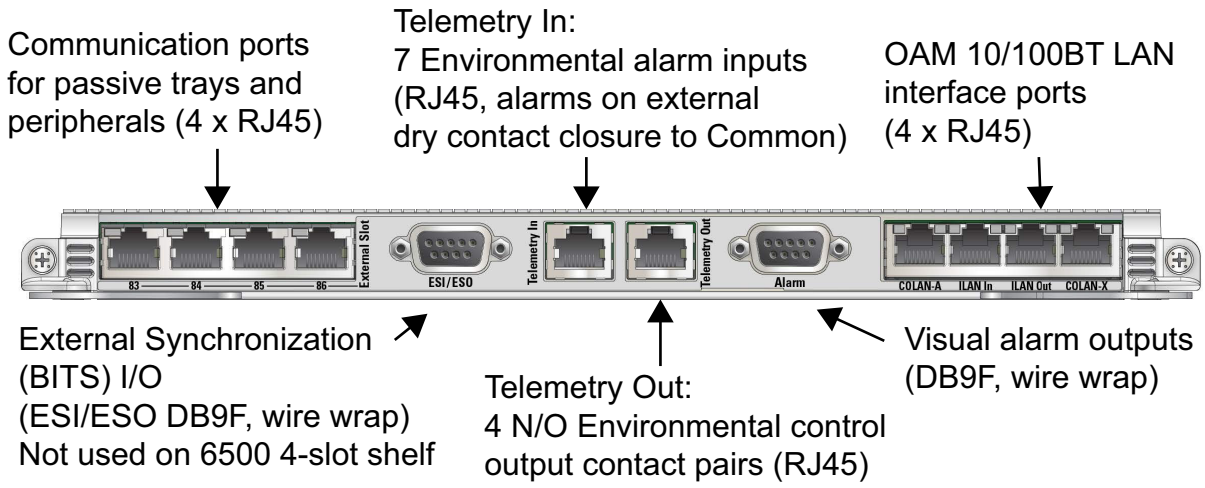
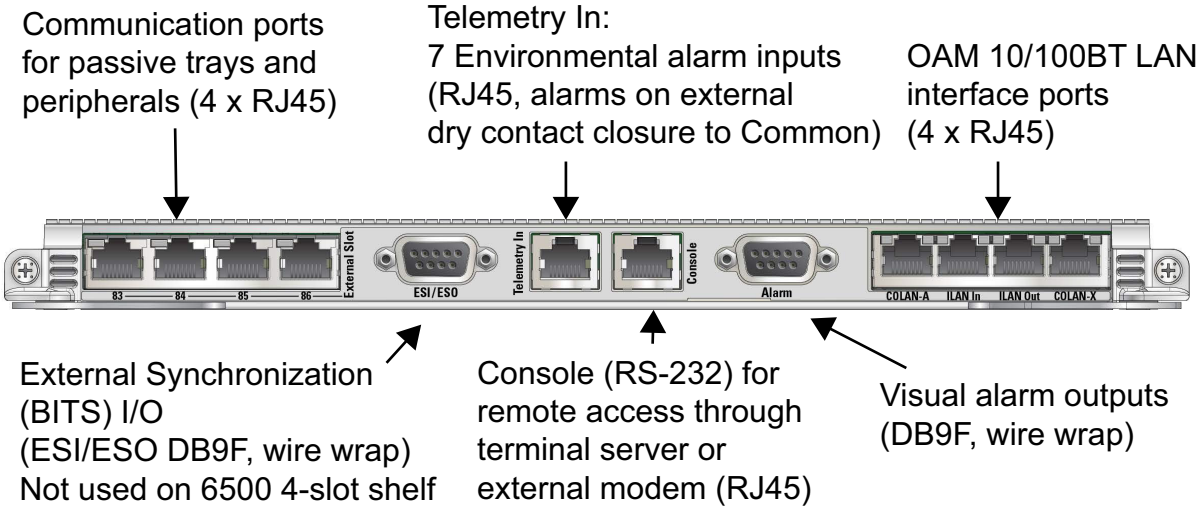


Figure 1-74
NTK505JB Access Panel (with RS-232 Console port)



Procedure 1-6 (continued)
Connecting control and communication cables

Table 1-5
Reference list of access panel illustrations

Description	See ...
Access Panel for 6500-7 packet-optical and 4-slot optical shelves (NTK505JA)	• "NTK505JA Access Panel (with Telemetry/ Environmental control outputs)" on page 1-115 • "Access Panel for 6500-7 packet optical and 4-slot optical shelves NTK505JA" on page 1-126
Access Panel (Type 2) for 6500-7 packet-optical and 4-slot optical shelves (NTK505JB)	• "NTK505JB Access Panel (with RS-232 Console port)" on page 1-115 • "Access Panel (Type 2) for 6500-7 packet optical and 4-slot optical shelves NTK505JB" on page 1-127

In addition to the illustrations listed in Table 1-5, see Figure 1-77 on page 1-124 and Table 1-10 on page 1-125 for the wire-wrap adapter (NTK505JZ) connector pinout.

For cable and connector specifications, see the section on cable and connector details in *Installation - General Information*, 323-1851-201.0.

There is no physical RS-232 DTE port on the NTK505JA Access Panel for 6500-7 packet-optical and 4-slot optical shelves. Use Access Panel (Type 2) for 6500-7 packet-optical and 4-slot optical shelves (NTK505JB variant) if the application requires RS-232 Console access.

The interfaces described in this procedure are intended for intra-building use only. The Ethernet intra-building port(s) described in this procedure must use a shielded intra-building cable/wire that is (are) grounded at both ends to meet the metallic lightning criteria of Telcordia GR-1089-CORE.

Shielded RJ45 cables must be used in customer premise locations where compliance to Telcordia GR-1089-CORE Issue 6 intrabuilding lightning is required for any connections to an RJ45 Ethernet port (including 100/ 1000BASE-T connections to COLAN, ILAN, Craft, WSC as connections to 10/ 100/1000BASE-T capable SFPs).

Procedure 1-6 (continued)
Connecting control and communication cables

Prerequisites

Make sure that you

- have the following tools and materials:
  - — the appropriate control and communication cables. For details, see *Ordering Information*, 323-1851-151.
  - — a torque driver
  - — hook and loop tape (such as Velcro), cable ties, or lacing twine and tools according to your company's practice

  You must protect all cables from cuts and abrasions according to your company's practice and industry standards.
- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0
- have the appropriate personal grounding device to dissipate electrostatic charges

Precautions

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

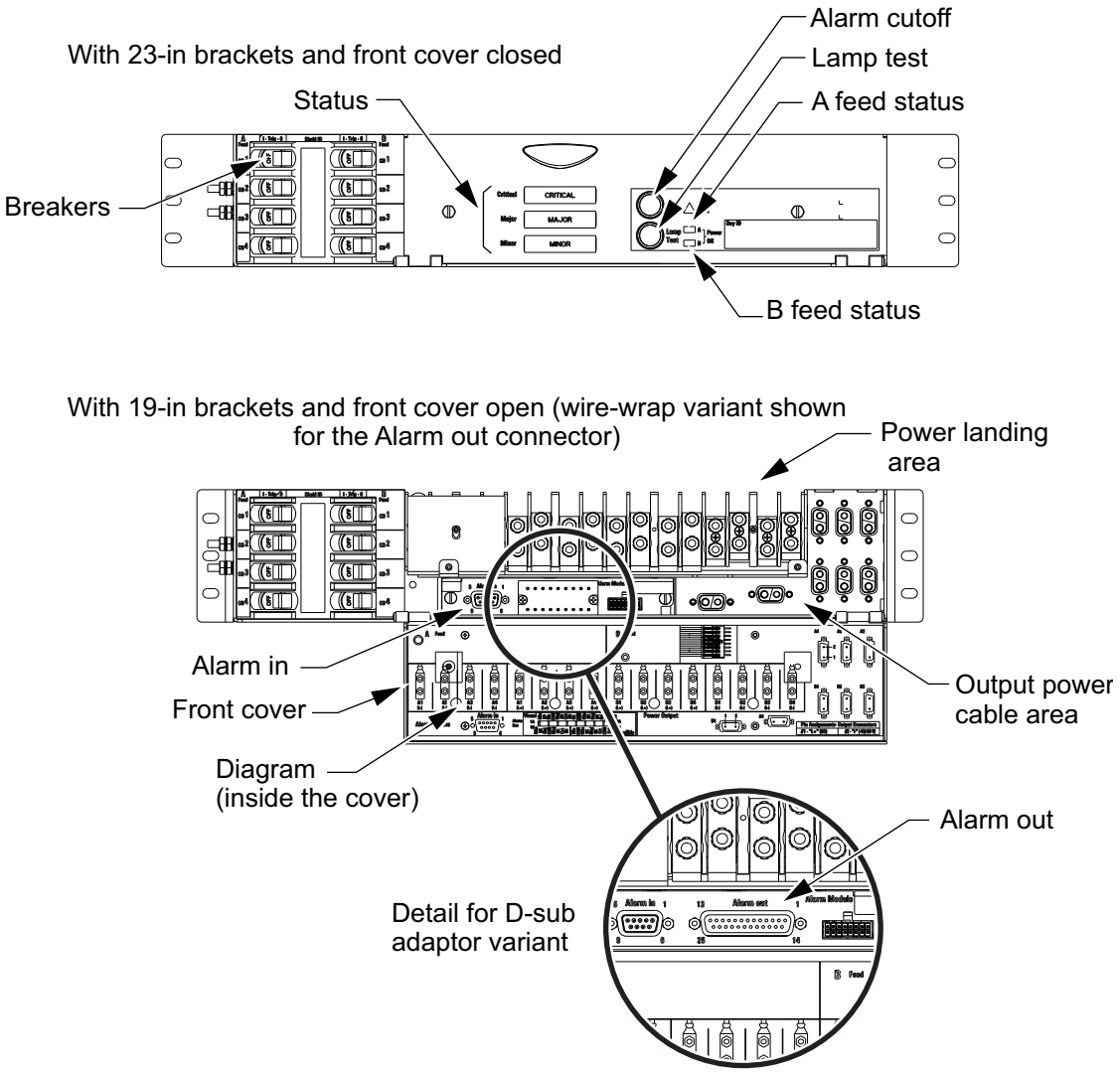
Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
2	Verify the compatibility of your shelf alarm and telemetry I/O interfaces. See the related illustrations. • "NTK505JA Access Panel (with Telemetry/Environmental control outputs)" on page 1-115 • "NTK505JB Access Panel (with RS-232 Console port)" on page 1-115

Procedure 1-6 (continued)
Connecting control and communication cables

Step	Action
3	Select your next step. **If** you are using — **Then** go to the 2U BIP (NTK599BGE5, NTK599BH) — step 4 no BIP — step 10
4	Make sure that all circuit breakers located on the BIP are in the OFF (0 position) on both the A and B feeds.
5	Unfasten the two thumbscrews that secure the BIP cover and open the cover.
6	Connect the alarm out connector to the BIP. Torque to 0.56 N-m (5 lb-in.) (maximum). If the alarm outputs require a wire wrap connection, insert the D-sub-to-wire wrap add-on adapter (see Figure 1-75 on page 1-119).
7	If you do not plan to use the BIP alarm functionality, plug the BIP alarm terminator into the BIP alarm input connector (see Figure 1-75 on page 1-119) to eliminate the BIP visual alarms. Fasten the two screws on the terminator shell.
8	Connect the alarm cable to the BIP. If you are planning to eventually install multiple 6500 shelves and are pre-dressing the rack with multiple-shelf alarm cables, but are initially installing only one shelf, plug the BIP alarm terminator(s) into the unused ports on the alarm cable to eliminate the BIP visual alarms. Fasten the two screws on the terminator shell.
9	Close the BIP cover and fasten the thumbscrews to secure the cover in place.
10	On the access panel, connect cables and torque the fixing pins to 0.56 N-m (5 lb-in.), or wire wrap, as applicable, and route the cables to the left as follows: • alarms • telemetry in • telemetry out on NTK505JA • console on NTK505JB For additional details for the console port, see Procedure 1-18, “Connecting a terminal to the 6500 4-slot optical shelf”. For locations of the ports on the access panel, see the related illustration. • Access Panel for 6500-7 packet optical and 4-slot optical shelves NTK505JA on page 1-126 • Access Panel (Type 2) for 6500-7 packet optical and 4-slot optical shelves NTK505JB on page 1-127

Procedure 1-6 (continued)
Connecting control and communication cables

Figure 1-75
Front view of the 2U BIP example



Procedure 1-6 (continued)
Connecting control and communication cables

Step	Action
11	On the access panel, connect the following cables as applicable to your application: • COLAN-X • COLAN-A • ILAN In • ILAN Out • Telemetry In • Telemetry Out on NTK505JA • External Slot I/F See • “Access Panel for 6500-7 packet optical and 4-slot optical shelves NTK505JA” on page 1-126 • “Access Panel (Type 2) for 6500-7 packet optical and 4-slot optical shelves NTK505JB” on page 1-127 • If access is required to the individual wires of the NTTC09DM cable when used for Telemetry In or Telemetry Out, cut off the RJ-45 connector before connecting it to the shelf. Route these cables as appropriate: • the intershelf cables to connectors ILAN IN and ILAN OUT • the COLAN cable to the COLAN-A or the COLAN-X connectors, as applicable • the cables connecting to photonic layer trays ***Note 1:*** If you disconnect a cable from an external slot and want to insert the same cable or another cable in the same external port, wait a few seconds before reconnecting (wait for the green LED to turn off) to allow the shelf inventory to update. ***Note 2:*** If you disconnect a cable from an RJ45 port, protect the empty port with the appropriate dust cap.

Procedure 1-6 (continued)
Connecting control and communication cables

Step	Action
	If you set the 6500 LAN port configuration to Automatic, auto-negotiation is enabled. Auto-negotiation automatically senses the speed/mode settings of the link. The COLAN and ILAN ports on the access panel are medium-dependent interfaces (MDI). The LAN-15 port on the shelf processor is medium-dependent interface crossover (MDI-X) and requires an Ethernet crossover cable. Use a straight Ethernet cable to connect opposite interface types (MDI to MDI-X) and a crossover Ethernet cable to connect like interface types (MDI to MDI or MDI-X to MDI-X).

Securing cables to tie features

12 Secure cables in the following step by

- making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and
- protecting all cables from cuts and abrasions according to your company's practice and industry standards

13 Secure to the appropriate tie points on the shelf.

14 You have completed this procedure. Next, perform "Installing circuit packs in the 6500 shelf" on page 1-128 in conjunction with "Inserting or removing circuit packs in the 6500 shelf" on page 1-140.

—end—

Table 1-6
Environmental/External Alarm Inputs (Telemetry In)

Telemetry In (RJ45 female port)	Pin	Signal	EIA/TIA 568B cable color code	Wire pairing
	1	IN_1	White/Orange	
	2	IN_2	Orange	
	3	IN_3	White/Green	
	4	IN_4	Blue	
	5	IN_5	White/Blue	
	6	IN_6	Green	
	7	IN_7	White/Brown	
	8	COMMON	Brown	

Table 1-7
External Control Contacts (Telemetry Out)—NTK505JA only

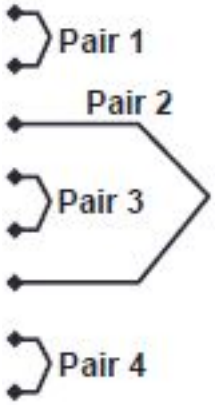
Telemetry Out (RJ45 female port)	Pin	Signal	EIA/TIA 568B cable color code	Wire pairing
	1	OUT_1_COM	White/Orange	
	2	OUT_1_NO	Orange	
	3	OUT_2_COM	White/Green	
	4	OUT_3_COM	Blue	
	5	OUT_3_NO	White/Blue	
	6	OUT_2_NO	Green	
	7	OUT_4_COM	White/Brown	
	8	OUT_4_NO	Brown	

Table 1-8
RJ45 Console (EIA/TIA-561 RS-232) Pinout—NTK505JB only

Console (RJ45 female port)	Pin	EIA/TIA 568B cable color code	EIA/TIA-561 Signal	Direction	Description
	1	White/Orange	RI	In: DCE-to-DTE	Ring Indicator
	2	Orange	CD	In: DCE-to-DTE	Carrier Detect
	3	White/Green	DTR	Out: DTE-to_DCE	Data Terminal Ready
	4	Blue	GND	N/A (Ground)	Ground
	5	White/Blue	RX	IN: DCE-to-DTE	Receive Data
	6	Green	TX	Out: DTE-to-DCE	Transmit Data
	7	White/Brown	CTS	In: DCE-to-DTE	Clear to Send
	8	Brown	RTS	Out: DTE-to-DCE	Request to Send

Figure 1-76
Alarm cable from access panel to an external alarm monitoring unit

Table 1-9
Visual alarm outputs (using DB9 open-ended cable)

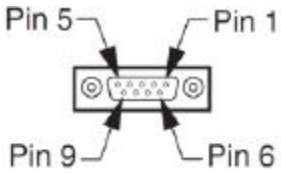
Alarms (DB9F connector)	Pin	Signal	Cable color code (NTTC08ATE6 cable)
	1	VIS_CRIT_NC	Black
	2	VIS_CRIT_NO	White
	3	VIS_MAJ_NO	Red
	4	VIS_MIN_NO	Green
	5	VIS_MIN_COM	Brown
	6	VIS_CRIT_COM	Blue
	7	VIS_MAJ_NC	Orange
	8	VIS_MAJ_COM	Yellow
	9	VIS_MIN_NC	Violet
	N/A	No Connect	Gray

Figure 1-77
DB9 to Wire Wrap Adapter (NTK505JZ) for alarms interface

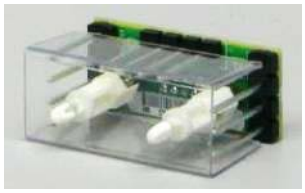


Table 1-10
Wire-wrap adapter (NTK505JZ) connector pinout when used on the Alarms DB9 port of an Access Panel (NTK505JA or NTK505JAB)

	1	2	3	4	5	6
A	VIS_MAJ_NO					VIS_CRIT_NC
B	VIS_MAJ_COM					VIS_CRIT_COM
C	VIS_MIN_NO					VIS_CRIT_NO
D	VIS_MIN_NC	VIS_MIN_COM	GND	GND	GND	VIS_MAJ_NC

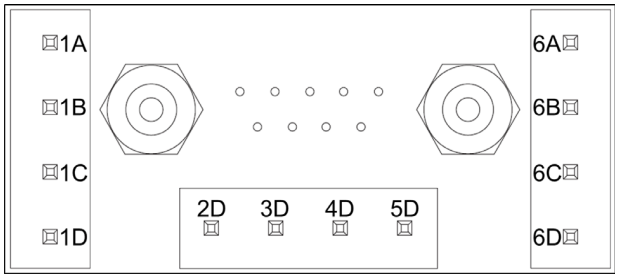
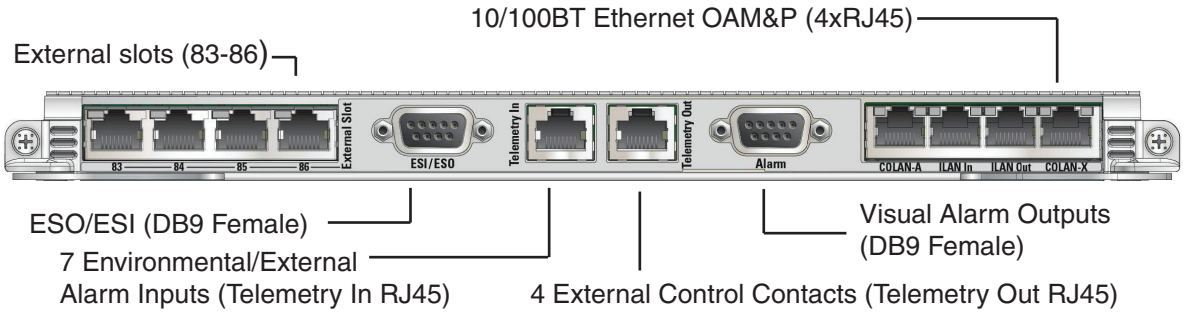
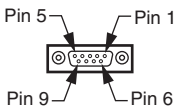
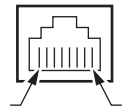


Figure 1-78
Access Panel for 6500-7 packet optical and 4-slot optical shelves NTK505JA



ESI/ESO DB9F Connector	Pin	Signal	Cable Color Code	Pin	Signal	Cable Color Code
	1	ESI A-N (ring)	White/Blue	6	ESI A-P (tip)	Blue/White
	2	ESO A-N (ring)	White/Orange	7	ESO A-P (tip)	Orange/White
	3	ESI B -N (ring)	White/Green	8	ESI B-P (tip)	Green/White
	4	ESO B-N (ring)	White/Brown	9	ESO B-P (tip)	Brown/White
	5	GND	White/Gray	N/A	No Connects	Gray/White, Red/Blue, Blue/Red

Telemetry In	Pin	Signal	Cable color code with NTTC09DM cable (see Note 2 and Note 3)	Wire Pairs
	1	IN_1	White/Orange	Pair 1
	2	IN_2	Orange	
	3	IN_3	White/Green	Pair 2
	4	IN_4	Blue	Pair 3
	5	IN_5	White/Blue	
	6	IN_6	Green	
	7	IN_7	White/Brown	Pair 4
	8	COMMON	Brown	
Telemetry Out	**Pin**	**Signal**	**Cable color code with NTTC09DM cable (see Note 2 and Note 3)**	**Wire Pairs**
	1	OUT_1_COM	White/Orange	Out 1 Pair
	2	OUT_1_NO	Orange	Out 2 Pair
	3	OUT_2_COM	White/Green	
	4	OUT_3_COM	Blue	Out 3 Pair
	5	OUT_3_NO	White/Blue	
	6	OUT_2_NO	Green	
	7	OUT_4_COM	White/Brown	Out 4 Pair
	8	OUT_4_NO	Brown	

Note 1: The RJ-45 plug orientation varies by circuit pack/shelf/port.
Note 2: Cable Assembly, STP Cat 5E, RJ45, TIA568B, Straight, Single, 3 m (NTTC09DM) is used with this interface.
To access the individual wires within the cable, the RJ-45 connector must be cut off.
Note 3: Up to 6500 Release 11.1, a NT6Q71ABE6 cable from the NT6Q59ABE6 kit was listed for this application. Since the wire color scheme is not consistent, the RJ-45 pin to wire color should be visually and electrically checked when using a NT6Q71ABE6 cable.

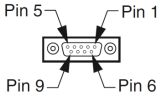
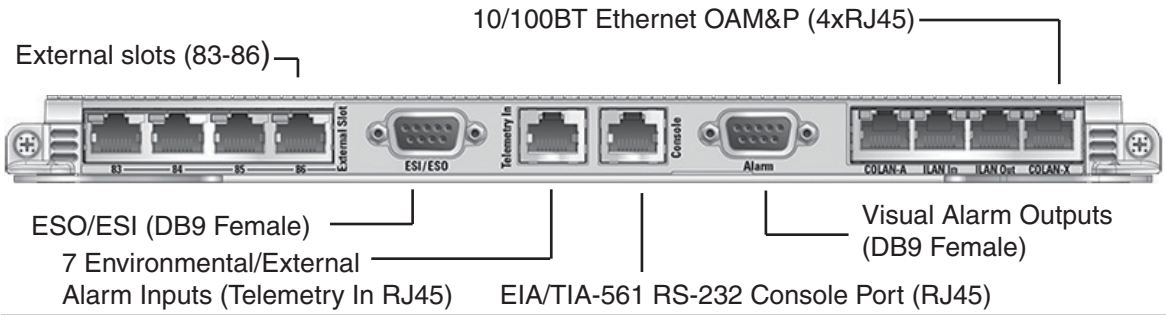
Alarms DB9F Connector	Pin	Signal	Cable Color Code (NTTC08ATE6 cable)	Pin	Signal	Cable Color Code (NTTC08ATE6 cable)
	1	VIS_CRIT_NC	Black	6	VIS_CRIT_COM	Blue
	2	VIS_CRIT_NO	White	7	VIS_MAJ_NC	Orange
	3	VIS_MAJ_NO	Red	8	VIS_MAJ_COM	Yellow
	4	VIS_MIN_NO	Green	9	VIS_MIN_NC	Violet
	5	VIS_MIN_COM	Brown	N/A	No Connect	Gray

Figure 1-79
Access Panel (Type 2) for 6500-7 packet optical and 4-slot optical shelves NTK505JB



ESI/ESO DB9F Connector	Pin	Signal	Cable Color Code	Pin	Signal	Cable Color Code
Pin 5 Pin 1 Pin 9 Pin 6	1	ESI A-N (ring)	White/Blue	6	ESI A-P (tip)	Blue/White
	2	ESO A-N (ring)	White/Orange	7	ESO A-P (tip)	Orange/White
	3	ESI B -N (ring)	White/Green	8	ESI B-P (tip)	Green/White
	4	ESO B-N (ring)	White/Brown	9	ESO B-P (tip)	Brown/White
	5	GND	White/Gray	N/A	No Connects	Gray/White, Red/Blue, Blue/Red

Telemetry In	Pin	Signal	Cable color code with NTTC09DM cable (see Note 2 and Note 3)	Wire Pairs
Pin 8 Pin 1 RJ45 Female Plug	1	IN_1	White/Orange	Pair 1
	2	IN_2	Orange	
	3	IN_3	White/Green	Pair 2
	4	IN_4	Blue	Pair 3
	5	IN_5	White/Blue	
	6	IN_6	Green	
	7	IN_7	White/Brown	Pair 4
	8	COMMON	Brown	

Console	RJ45 Pin	EIA/TIA-561 Color Code	EIA/TIA-561 Signal	Direction	Description
Pin 8 Pin 1 RJ45 Female Plug	1	White/Orange	RI	In: DCE-to-DTE	Ring Indicator
	2	Orange	CD	In: DCE-to-DTE	Carrier Detect
	3	White/Green	DTR	Out: DTE-to-DCE	Data Terminal Ready
	4	Blue	GND	N/A (Ground)	Ground
	5	White/Blue	RX	In: DCE-to-DTE	Receive Data
	6	Green	TX	Out: DTE-to-DCE	Transmit Data
	7	White/Brown	CTS	In: DCE-to-DTE	Clear To Send
	8	Brown	RTS	Out: DTE-to-DCE	Request To Send

Note 1: The RJ-45 plug orientation varies by circuit pack/shelf/port.
Note 2: Cable Assembly, STP Cat 5E, RJ45, TIA568B, Straight, Single, 3 m (NTTC09EA) is used with this interface.
To access the individual wires within the cable, the RJ-45 connector must be cut off.
Note 3: Up to 6500 Release 11.1, a NT6Q71ABE6 cable from the NT6Q59ABE6 kit was listed for this application. Since the wire color scheme is not consistent, the RJ-45 pin to wire color should be visually and electrically checked when using a NT6Q71ABE6 cable.

Alarms DB9F Connector	Pin	Signal	Cable Color Code (NTTC08ATE6 cable)	Pin	Signal	Cable Color Code (NTTC08ATE6 cable)
Pin 5 Pin 1 Pin 9 Pin 6	1	VIS_CRIT_NC	Black	6	VIS_CRIT_COM	Blue
	2	VIS_CRIT_NO	White	7	VIS_MAJ_NC	Orange
	3	VIS_MAJ_NO	Red	8	VIS_MAJ_COM	Yellow
	4	VIS_MIN_NO	Green	9	VIS_MIN_NC	Violet
	5	VIS_MIN_COM	Brown	N/A	No Connect	Gray

Procedure 1-7
Installing circuit packs in the 6500 shelf

Use this procedure to install circuit packs and filler cards into a 6500 shelf.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

For details on inserting or removing circuit packs, see "Inserting or removing circuit packs in the 6500 shelf" on page 1-140.

This procedure includes instructions on the following:

- installing optical or data services circuit packs
- installing filler cards
- installing optical transponder circuit packs
- testing power feed A and power feed B

CAUTION

Risk of equipment damage

You must install the shelf processor(s) and the "Ready" LED must be solid green before performing this procedure. To install the shelf processor, see "Installing the shelf processor" on page 1-106.

Do not insert any circuit packs—except the Access Panel—into an unpowered 6500 shelf. Otherwise, you risk damaging equipment.

You must power up a 6500 shelf, test the power input cards and cooling fan module, and install the shelf processors before seating any circuit packs into the backplane.

CAUTION

Risk of equipment damage

Never operate equipment without a circuit pack or filler card in every slot (either fully seated or in the parking position). Empty slots compromise the efficiency of the shelf's cooling system and can cause circuit packs to overheat.

CAUTION
Risk of module damage—High
Handle modules with care at all times. Make sure that you do not drop any module. Otherwise you will damage it. Also, do not remove connector protectors until you are ready to install the module.

Depending on your requirements, circuit packs are shipped in separate packaging that contains the four circuit packs.

Depending on your requirements, the shelf is shipped as follows:

- without circuit packs pre-installed
- with circuit packs pre-installed (in a packs-in-place kit)
- with the slots 17 and 18 of the following shelves equipped (in a packs-in-place kit) as follows:
  - — two DC power input cards (NTK505UD), or
  - — two AC power input cards (NTK505UN)

  For the procedure on installing power input cards, see Table 1-1 on page 1-5.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Prerequisites

Make sure that you

- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0

ATTENTION

As of Release 10.2, a MuxAmp configuration is supported using the following amplifiers. The MuxAmp is used in some networks where lower power interfaces (like the WL3n source) are used. This configuration requires that Automatic Power Reduction (APR) be disabled, otherwise it may be triggered during normal operation and hence the amplifiers had to be reclassified as Class 1M from IEC 60825-1.

- NTK552AAE5, Single Line Amplifier (SLA C-Band), Release 19 and lower

- NTK552BAE5, Midstage Line Amplifier (MLA C-Band), Release 19 and lower

- NTK552FAE5, Midstage Line Amplifier 2 (MLA2 C-Band), Release 17 and lower

- NTK552FB, Midstage Line Amplifier 2 (MLA2 C-Band) with variable optical attenuator (VOA), Release 05 and lower

- NTK552GAE5, Midstage Line Amplifier 3 (MLA3 C-Band), Release 06 and lower

Such configuration requires that Automatic Power Reduction (APR) be disabled. The amplifiers used in this application are required to have a Hazard Level 1M warning label. Consequently, the latest circuit pack release will be labeled for use in Class 1M applications.

These circuit packs and hardware releases were originally manufactured with a Hazard Level 1 warning label and can be re-labeled with the Level 1M label kit.

For more information and the procedure to apply the Level 1M label on these circuit packs, see the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0.

- have the appropriate personal grounding device to dissipate electrostatic charges
- refer to *Ordering Information*, 323-1851-151, for valid slot assignments

  Note: If you are installing pluggables that use MPO cables, the MPO cables can be formed to create a 90-degree exit but may interfere with the standard depth door/cover, if equipped. Some specific pluggables have an extended flexible pull tab/handle that will interfere with the standard depth door/cover, if equipped. The extended depth cover solution provides additional space in front of the circuit pack. For specific door compatibility considerations with pluggables that use MPO cables, refer to the pluggable's description in *Ordering Information*, 323-1851-151.

Guidelines and precautions

ATTENTION

The release number printed on the latch label and on the shipping box of some circuit packs appears as a three-digit number, with a leading zero (for example, 002). Be aware that the Shelf Inventory application may report the release number as a two-digit number, without the leading zero (for example, 02).

CAUTION

Risk of equipment damage

Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION

Risk of circuit pack damage—High

Handle circuit packs with care at all times. Make sure that you do not drop any circuit pack. Otherwise, you will damage it. Also, do not remove the connector protectors until you are ready to install the circuit pack.

CAUTION

Risk of autoprovisioning failure

Make sure that you install the shelf processor ("Installing the shelf processor" on page 1-106) before you install the cross-connect circuit packs. Insert circuit packs in the correct order to ensure that circuit packs autoprovision.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

CAUTION
Risk of circuit pack damage
Do not force a circuit pack all the way to the back of its slot if it resists insertion. Before installing a circuit pack, make sure you understand the detailed procedure for inserting the circuit packs ("Inserting or removing circuit packs in the 6500 shelf" on page 1-140).

CAUTION
Risk of incorrect installation
Make sure that the circuit pack lock/eject latches are locked in position. If the lock covers are not locked, the latch sensors on the circuit pack do not allow the shelf to identify the circuit pack, and do not allow the circuit pack to autoprovision.

CAUTION
Risk of traffic loss
Shelves that are configured to exclusively exhaust air out the front may affect the inlet air temperature of nearby shelves. If front exhaust is required and a 6500 shelf is equipped in the same rack as one or more other shelves configured for front exhaust, refer to front exhaust considerations in the Bay/rack configurations section in *Planning*, NTRN10GP.

DANGER
Risk of personal injury
When inserted in a shelf slot, optical interface circuit packs emit laser light that can blind. Keep all optical connectors on the optical interface circuit packs capped when they are not connected to optical fiber cables. Never look directly into the end of an optical fiber or components.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
2	If applicable, remove the protective cover/covers on the shelf backplane.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action
3	Make sure that • the A and B power is working, and • the system cooling system is operating, and • the shelf processor circuit pack or circuit packs are installed and functioning as described in the previous installation procedures
4	Make sure that the shelf processor(s) are installed in the shelf and the "Ready" LED on the shelf processor(s) is solid green. If not, then perform "Installing the shelf processor" on page 1-106.
5	Select your next step.

If the circuit packs are	**Then** go to
shipped pre-installed (packs-in-place)	step 6
not shipped packs-in-place	step 7

6	Follow these instructions for each circuit pack as you perform this procedure. **a.** Slide the circuit pack out 2 inches and undo the latches until they are perpendicular to the faceplate. **b.** Insert the circuit pack with the latches open until the connectors start to engage and the latch pawls reach into the left and right side latching troughs. **c.** Close the circuit pack latches at the same time with equal force.

CAUTION
Risk of equipment damage
Do not close one latch at a time. Otherwise you risk damaging the connectors. Close the latches with equal force on the left and right side.

7	Select your next step.

If you are installing	**Then** go to
filler cards	step 8
otherwise	step 9

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action

Installing filler cards

ATTENTION
You must use filler cards in slots that do not have active circuit packs. Filler cards protect the connectors on the backplane from dust and debris, and improve the efficiency of shelf cooling.

8 Remove the filler card from its packaging, un-clip and remove the connector protector ("Examples of circuit pack connector protectors" on page 1-135), and install the filler card in an empty slot. Refer to "Inserting or removing circuit packs in the 6500 shelf" on page 1-140. Repeat this step until all empty slots are filled.

9 Select your next step.

If you are installing	**Then** go to
optical or data services circuit packs	step 10
optical transponder circuit packs	step 16

Installing optical or data services circuit packs

DANGER
Risk of personal injury
When inserted in a shelf slot, optical interface circuit packs emit laser light that can blind. Keep all optical connectors on the optical interface circuit packs capped when they are not connected to optical fiber cables. Never look directly into the end of an optical fiber or components.

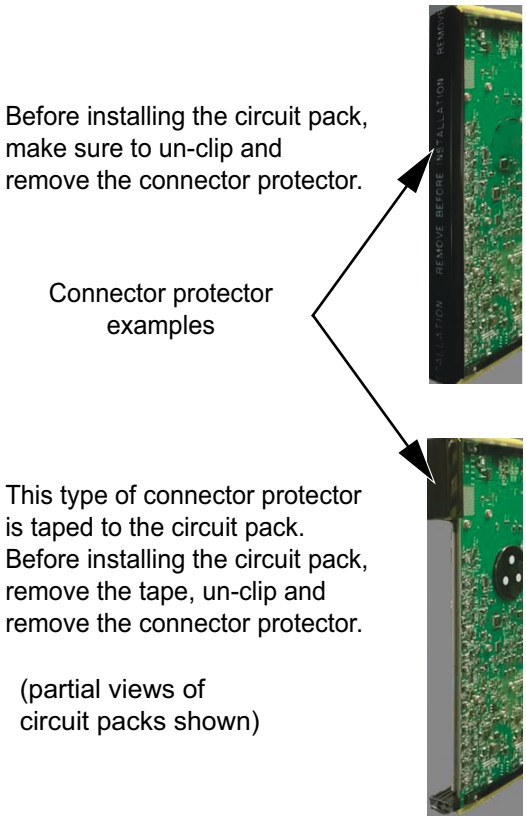
10 Remove the circuit pack from its packaging.

11 Make sure to un-clip and remove the connector protector from the rear of the circuit pack (see the following illustration).

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action

Figure 1-80
Examples of circuit pack connector protectors



12 After you have removed the connector protector, install the circuit pack in its assigned slot.

Refer to *Ordering Information*, 323-1851-151, for valid slot assignments. For more information on circuit pack support, refer to the “Shelf and equipment descriptions” section in *Planning*, NTRN10GP.

Refer to Procedure 1-8, “Inserting or removing circuit packs in the 6500 shelf” for circuit pack insertion.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action

The red Fail, the green Ready and the blue In Use status LEDs on the front of the circuit pack go through the following sequence:

- The red LED turns on when the circuit pack is first inserted.
- After a few seconds, the red, green and blue LEDs turn on.
- After a few seconds, the red and blue LEDs turn off and the green LED flashes to indicate the software is initializing.
- When software initialization is complete, the green status LED turns on (does not flash).
- If the auto-equipping feature is turned on or if the equipment is already provisioned for the respective slot, the circuit pack is in-service and the blue LED turns on after the green LED.

Software download and initialization can take up to five minutes and is complete when the green status LED stops flashing and the green Ready LED turns on. If the red Fail LED turns on, the circuit pack has faults and must be returned to Ciena.

When the green LED is steadily lit (after the software initialization), an auto-upgrade of the circuit pack may occur. During an auto-upgrade, the green LED remains steadily lit and the blue LED remains off (a Software Auto-Upgrade in progress alarm is raised and clears after the auto-upgrade is complete).

Do not remove the circuit pack if the green LED is flashing, if the blue LED is on, or if the circuit pack is auto-upgrading (check for the Software Auto-Upgrade in progress alarm).

13 Select your next step.

If you are installing a circuit pack that requires	**Then** go to
pluggable modules and the modules are not installed	step 14
no pluggable modules or the modules are installed and there are more circuit packs to install	step 15
you have finished installing all the required circuit packs	step 20

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action
14	If you are installing a circuit pack that requires pluggable modules, and the modules are not installed, install the modules on the circuit pack. Refer to "Installing and removing pluggable modules" on page 1-143. "Installing and removing pluggable modules" also instructs you to • install dust covers for any empty pluggable cages to prevent damage to empty pluggable module cages. • use optical terminators on unused input faceplate connectors of installed WSS circuit packs. If dust caps are used instead of optical terminators, PMs can be reported against the port and the port may appear in-service. After you install the pluggable modules, go to step 15.
15	Repeat step 10 to step 14 as applicable for the remaining circuit packs.
16	Select your next step.

If you are installing	**Then** go to
optical transponder circuit packs	step 17
otherwise	step 20

Installing optical transponder circuit packs

CAUTION
Risk of circuit pack damage
Make sure that you installed all the fillers cards required by your configuration before you install the optical transponder circuit packs. Failure to comply will result in damage to the circuit packs due to overheating.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action
17	Remove the optical transponder circuit pack from its packaging, un-clip and remove the connector protector, if applicable to your shipping option, and check for obvious physical damage (for example, bent pins, damaged shrouds or housings). Then install the optical transponder circuit pack in its assigned slot. Refer to *Ordering Information*, 323-1851-151, for valid slot assignments. Refer to "Inserting or removing circuit packs in the 6500 shelf" on page 1-140 for circuit pack insertion. The red Fail, the green Ready and the blue In Use status LEDs on the front of the circuit pack go through the following sequence: • The red LED turns on when the circuit pack is first inserted. • After a few seconds, the red, green and blue LEDs turn on. • After a few seconds, the red and blue LEDs turn off and the green LED flashes to indicate the software is initializing. • When software initialization is complete, the green status LED turns on (does not flash). • If the auto-equipping feature is turned on and the network element mode is provisioned, or if the equipment is already provisioned for the respective slot, the circuit pack is in-service and the blue LED turns on shortly after the green LED. If the network element is not commissioned (network element mode not provisioned), the blue LED will not illuminate. Software download and initialization can take up to five minutes and is complete when the green status LED stops flashing and the green Ready LED turns on. If the red Fail LED turns on, the circuit pack has faults and must be returned to Ciena. When the green LED is steadily lit (after the software initialization), an auto-upgrade of the circuit pack may occur (only if the NE mode is provisioned). During an auto-upgrade, the green LED remains steadily lit and the blue LED remains off (a Software Auto-Upgrade in progress alarm is raised and clears after the auto-upgrade is complete). Do not remove the circuit pack if the green LED is flashing, if the blue LED is on, or if the circuit pack is auto-upgrading (check for the Software Auto-Upgrade in progress alarm).
18	Install the required pluggable modules on the circuit pack. Refer to "Installing and removing pluggable modules" on page 1-143.
19	Repeat step 17 and step 18 as applicable for the remaining circuit packs. Then go to step 20.

Procedure 1-7 (continued)
Installing circuit packs in the 6500 shelf

Step	Action

Testing power feed A and power feed B

20 After the circuit pack installation is complete, verify power feed A and power feed B as follows:

- Remove power from power feed A and check that all circuit packs are functional (no intercard suspected alarms or card failures) and that the proper power feed failure alarm is raised.
- Restore power feed A and ensure that the power feed A failure alarms clear.
- Remove power from power feed B (flip breaker or remove fuse depending on power input card) and check that all circuit packs are functional (no intercard suspected alarms or card failures) and that the proper power feed failure alarm is raised.
- Restore B feed and ensure that the power feed B failure alarms clear.

21 You have completed this procedure. Make sure to power down the network element when you have completed the installation procedures that require power.

22 Next, perform "Installing and removing pluggable modules" on page 1-143.

—end—

Procedure 1-8
Inserting or removing circuit packs in the 6500 shelf

Use this procedure to insert circuit packs in their slot or to remove circuit packs from their slot.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

For details on shelf processors, see "Installing the shelf processor" on page 1-106.

Prerequisites

Make sure that you

- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0
- have the appropriate personal grounding device to dissipate electrostatic charges

Precautions

CAUTION
Hot surface
The circuit pack may be hot—do not touch hot surfaces when reseating or removing a circuit pack.

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Risk of circuit pack damage—High
Handle circuit packs with care at all times. Make sure that you do not drop any circuit pack. Otherwise you will damage it. Also, do not remove connector protectors until you are ready to install the circuit pack.

Procedure 1-8 (continued)
Inserting or removing circuit packs in the 6500 shelf

CAUTION
Risk of circuit pack damage
Do not force a circuit pack all the way to the back of its slot if it resists insertion.

CAUTION
Risk of traffic loss
Shelves that are configured to exclusively exhaust air out the front may affect the inlet air temperature of nearby shelves. If front exhaust is required and a 6500 shelf is equipped in the same rack as one or more other shelves configured for front exhaust, refer to front exhaust considerations in the Bay/rack configurations section in *Planning*, NTRN10GP.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.

Inserting a circuit pack in a slot

2	Refer to *Ordering Information*, 323-1851-151, to make sure that you can install the circuit pack in the selected slot.
3	Lift the circuit pack by the edges of the faceplate.
4	Carefully guide the back end of the circuit pack into the required slot, while making sure that the edges of the circuit pack enter the slot guide rails. For the 6500 4-slot optical shelf, the circuit pack is oriented horizontally when the printed labels on the front faceplate are right side up and the LEDs are at the left of the front faceplate.
5	Push the circuit pack into the shelf until 75% of the length of the circuit pack is in the shelf.
6	Pull the lock/eject latches of the circuit pack faceplate to their completely extended positions.

Procedure 1-8 (continued)
Inserting or removing circuit packs in the 6500 shelf

Step	Action
7	**CAUTION** **Risk of incorrect installation** Make sure that the circuit pack lock/eject latches are locked into position. The circuit pack cannot autoprovision if the lock/eject latches are not locked. Push the circuit pack towards the back of the shelf until it engages with the backplane and then push on the faceplate to partially seat it. At this time, the lock/eject latches will slip into the grooves at the top and bottom edges of the slot rack. Push the lock/eject latches towards the circuit pack faceplate. The latch snaps into the locked position as the circuit pack mates with the shelf backplane. The latches are now locked in position against the circuit pack faceplate and hold the circuit pack securely in the shelf. Do not use excessive force when pushing the lock/eject latches towards the face plates. If the latches do not lock into place, remove the circuit pack and examine the connector at the back of the circuit pack. Look for bent pins or damage.
8	You have completed inserting the circuit pack. If you were referred to this procedure from another procedure, return to the referring procedure.

Removing a circuit pack from a slot

9	Make sure that the blue LED on the circuit pack faceplate is off. If the blue LED is on, do not pull out the circuit pack.
10	Disconnect any cables or fibers from the circuit pack faceplate as applicable. See “Connecting or disconnecting fiber-optic cables to or from circuit packs” on page 1-222.
11	Pull the lock/eject latches of the circuit pack faceplate to their completely extended positions. The circuit pack connector disengages from the backplane.
12	Pull the circuit pack out of the slot. You have completed removing the circuit pack. If you were referred to this procedure from another procedure, return to the referring procedure.

—end—

Procedure 1-9
Installing and removing pluggable modules

Use this procedure to install or remove XFP, SFP, SFP+, SFP28, QSFP+, QSFP28, QSFP-DD, CFP, CFP2, or CFP2-DCO modules to or from a circuit pack.

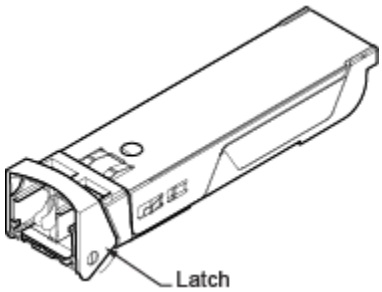
ATTENTION
This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

See the following illustrations:

- "Example of an optical SFP/SFP+/SFP28 module" on page 1-143
- "Example of an XFP module" on page 1-144
- "Example of an optical CFP module and CFP module mated in host system" on page 1-144
- "Example of a CFP2 module—bail latch type (metal)" on page 1-145
- "Examples of CFP2-DCO modules—direct-pull tab type (plastic))" on page 1-145
- "Example of CFP2-DCO module—tilt-and-pull tab type (plastic)" on page 1-145
- "Examples of optical QSFP+ modules" on page 1-146
- "Example of an optical QSFP28 module" on page 1-146
- "Example of an optical QSFP-DD module" on page 1-146

Figure 1-81
Example of an optical SFP/SFP+/SFP28 module

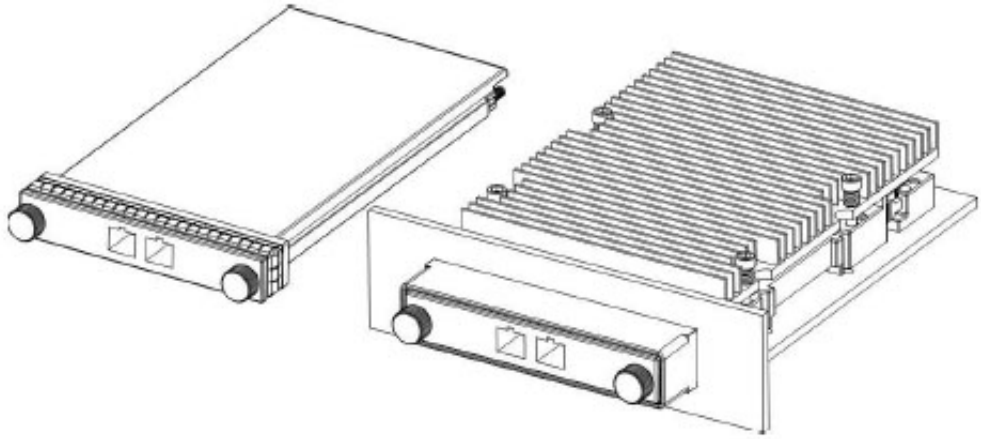


Note: SFP, SFP+, and SFP28 modules have a similar form factor.

Procedure 1-9 (continued)
Installing and removing pluggable modules

Figure 1-82
Example of an XFP module

Figure 1-83
Example of an optical CFP module and CFP module mated in host system



Procedure 1-9 (continued)
Installing and removing pluggable modules

Figure 1-84
Example of a CFP2 module—bail latch type (metal)

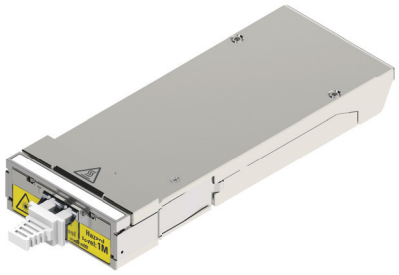
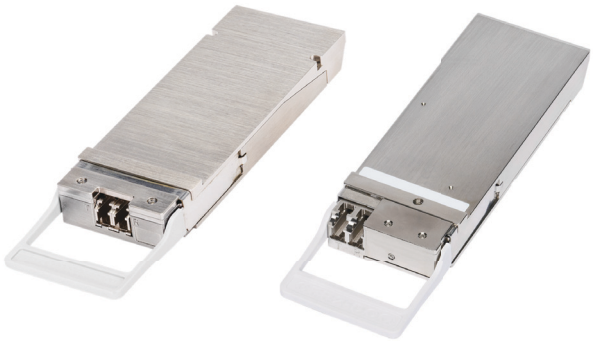
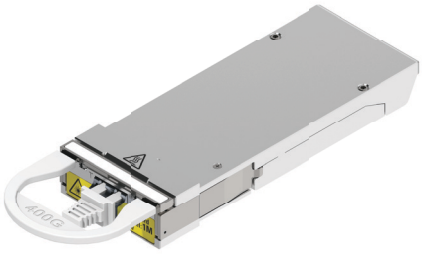


Figure 1-85
Examples of CFP2-DCO modules—direct-pull tab type (plastic))



Note: Figure 1-85 shows two variants of CFP2-DCO direct-pull tab type. The CFP2 and CFP2-DCO modules have the same form factor.

Figure 1-86
Example of CFP2-DCO module—tilt-and-pull tab type (plastic)



Note: To remove this type of CFP2-DCO module form a circuit pack you must first tilt and then pull the tab (see Figure 1-93 on page 1-155).

Procedure 1-9 (continued)
Installing and removing pluggable modules

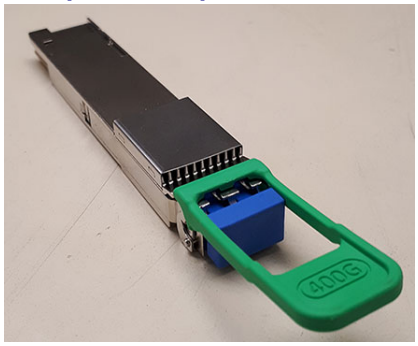
Figure 1-87
Examples of optical QSFP+ modules

QSFP+ example (MPO connector)

QSFP+ example (LC connector)

Figure 1-88
Example of an optical QSFP28 module

Figure 1-89
Example of an optical QSFP-DD module



Procedure 1-9 (continued)
Installing and removing pluggable modules

Prerequisites

Make sure that

- You obtain dust covers for any empty pluggable cages. Dust covers are required to prevent damage to empty cages.
- You obtain optical terminators for WSS circuit packs.

  Use optical terminators on unused input faceplate connectors of installed WSS circuit packs. If dust caps are used instead of optical terminators, PMs can be reported against the port and the port may appear in-service.
- You have the correct type of pluggable module and the required number of modules. You require one module for each port.
- For the pluggable modules supported by each optical interface circuit pack, refer to the section “Supported pluggable modules in each circuit pack” in *Planning*, NTRN10GP.
- If you are using fixed attenuators for the optical interfaces and the shelf is equipped with a front cover, do not add the attenuators on the optical interface. Instead, add the required attenuators to the patch panel or inside a fiber storage tray.
- If you are installing the following RJ45 SFPs (NTTP61AAE6, NTTP61BAE6, or NTTP61CA) or extended body optical SFPs (NTTP12BCE6 or manufacture discontinued NTTP12CAE6) on circuit packs with horizontal SFP cages as opposed to angled SFP cages, then the shelf front cover cannot be installed on the shelf. Doing so can damage the patchcords that connect to the SFP.
- For 6500 circuit packs where the fiber connection exits the faceplate at 90 degrees, use fibers with standard short 42.5 mm flexible boots, NTTC50++V6 Ciena supplied patchcords or the equivalent Telcordia GR-326 compliant, short flexible LC boot.

  Do not install in-line plug attenuators at the 6500 circuit pack faceplate on ports that are perpendicular to the faceplate (also not recommended on angled ports).
- For the following circuit packs: NTK553LA/NTK553LB: The faceplate LC connectors on the NTK553LA and NTK553LB circuit packs protrude by an extra 10 mm compared to faceplate LC connectors on the NTK553FAE5 circuit pack. As a result, in order to avoid unacceptable interference with the shelf front cover, NTTC50++ patchcords (which employ short boot LC with a maximum boot length of 42.5mm from ferrule tip to back of the boot) or approved equivalent must be used. Also, attenuator pads cannot be mounted on the faceplate of the NTK553LA and NTK553LB circuit pack when the shelf front cover is installed.

- If you are installing pluggables that use MPO cables, the MPO cables can be formed to create a 90-degree exit but may interfere with the standard depth door/cover, if equipped. Some specific pluggables have an extended flexible pull tab/handle that will interfere with the standard depth door/cover, if equipped. The extended depth cover solution provides additional space in front of the circuit pack. For specific door compatibility considerations with pluggables that use MPO cables, refer to the pluggable's description in *Ordering Information*, 323-1851-151.
- Make sure that you observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0.
- Make sure that you have the appropriate personal grounding device to dissipate electrostatic charges.
- Make sure that you have the LC fiber tool (174-0099-900).

  Although optional, this tool assists in installing and removing LC fibers or removing pluggables (SFP/SFP+/SFP28/QSFP+/XFP) when space is restricted. When not in use, this tool can be stored in its container.

Precautions

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs and pluggable modules.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
2	Select your next step.

If you are	**Then** go to
installing a pluggable module	step 3
removing pluggable module	step 10

Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action

Installing a pluggable module

3 Remove the dust cover from the cage on the host circuit pack,

4 Remove the pluggable module from its packaging.

5 Select your next step.

If you are installing	**Then** go to
an XFP, QSFP+ or SFP/SFP+/SFP28 module	step 6
QSFP28/QSFP-DD module	step 7
a CFP/CFP2/CFP2-DCO module	step 8

6 Make sure that the latch on the XFP, QSFP+ or SFP/SFP+/SFP28 module is closed (folded back in the pluggable module). See Figure 1-81 on page 1-143.

CAUTION
Risk of equipment damage
If the latch is not closed when you insert the pluggable module, the module can jam inside the receptacle in the circuit pack faceplate.

7 Slide the pluggable module into one of the receptacles in the circuit pack faceplate.

ATTENTION
Mounting rails inside the host circuit pack guide and support the module. The module must slide easily into its receptacle until it locks into place. If it does not slide easily, verify the orientation of the module.

You have completed installing the XFP, QSFP+/QSFP28/QSFP-DD, or SFP/SFP+/SFP28 module.

8 If you are installing a CFP2 module with metal bail latch, make sure that the metal bail latch is closed (folded back into the module) to ensure that the module is properly engaged. See Figure 1-84 on page 1-145.

This action does not apply to the CFP or CFP2-DCO with pull tab modules.

Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action
9	Slide the CFP/CFP2/CFP2-DCO module into the receptacles in the circuit pack faceplate.

ATTENTION
Mounting rails inside the host circuit pack guide and support the module. The module must slide easily into its receptacle until it locks into place. If it does not slide easily, verify the orientation of the module.

Ensure that the module is fully inserted, then—if applicable—fasten the thumbscrews on the module. See the following illustrations:

- "Example of an optical CFP module and CFP module mated in host system" on page 1-144
- "Example of a CFP2 module—bail latch type (metal)" on page 1-145

You have completed installing the module. If you were referred to this procedure from another procedure, return to the referring procedure or go to step 23.

Removing a pluggable module

10 Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.

11 Select your next step.

If	Then
you are using the LC fiber tool (174-0099-900) (see Figure 1-90 on page 1-151) ***Note:*** The LC fiber tool is not used with the QSFP-28 and QSFP-DD pluggable modules, which have a rubber handle to use to remove them from the card.	go to step 12
otherwise	disconnect the fiber-optic cables from the pluggable module. Then go to step 14. ***Note:*** Also follow these actions if you are using QSFP-28 or QSFP-DD pluggable modules.

Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action

Figure 1-90
LC fiber tool (174-0099-900)—two views

12 Disconnect the fiber-optic cables from the SFP/SFP+/SFP28/QSFP+/XFP pluggable module using the LC fiber tool as follows.

(Figure 1-91 on page 1-152 provides an illustration of the following steps.)

Note: The LC fiber tool can be used in any orientation to remove pluggables with different types of latches. You can also use the tool to open the latch from the top, side, or the inside surfaces of the pluggable.

- Hold the LC fiber tool with the hook end pointing up and press down on the LC connector trigger.

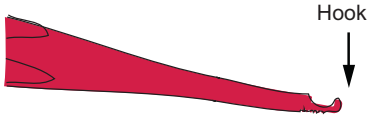
  An audible click indicates that the LC connector is ready to be disengaged.
- With the hook end of the LC fiber tool pointing down, carefully disengage the LC connector from the latch of the pluggable module.
- Grip the boot (of the LC fiber) between your thumb and index finger or use the cradle end of the LC fiber tool to grip the boot.

  Then remove the LC fiber from the pluggable module.

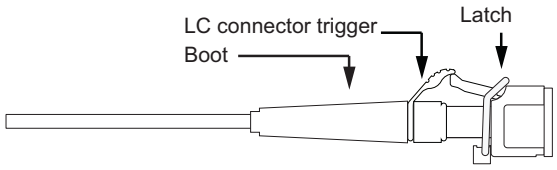
Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action

Figure 1-91
Disconnecting fiber-optic cables using the LC fiber tool (174-009-900)



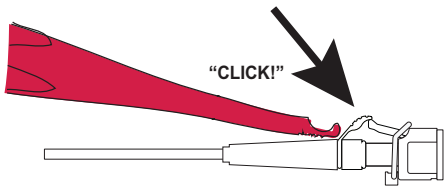
Close-up of LC fiber tool
(partial view)



Side view - close-up of LC fiber, clicked into position in the pluggable module

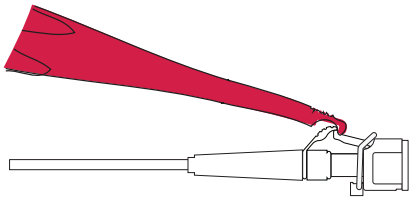
With the hook end of the LC fiber toolpointing up, press down on the LC connector trigger. You will hear a click.

A



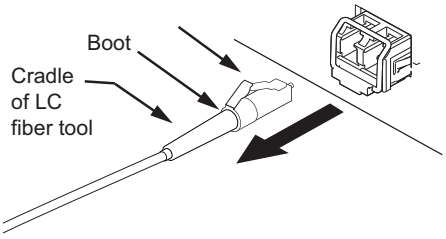
With the hook end of the LC fiber tool pointing down, carefully disengage the LC connector trigger from the latch of the pluggable module.

B



Then grip the boot of the LC fiber between your thumb and index finger or use the cradle end of the LC fiber tool to grip and remove the LC fiber from the pluggable module.

C



Procedure 1-9 (continued)
Installing and removing pluggable modules

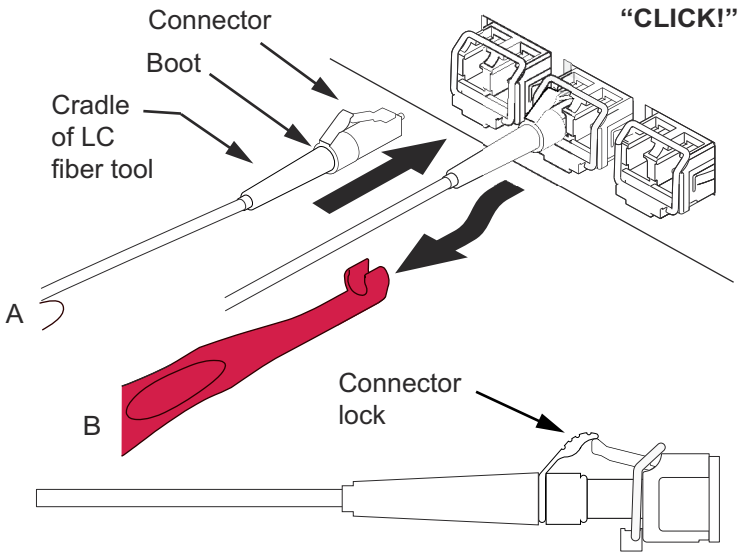
Step	Action
13	Remove an SFP/SFP+/SFP28/QSFP+/XFP pluggable module using the LC fiber tool as follows. (Figure 1-92 provides an illustration of the following steps.) • Open the latch of the pluggable module using the hook end of the LC fiber tool pointing down. • Use the cradle end (pointing down) and carefully pull the latch to remove the pluggable module from the circuit pack. Then go to step 21.

Figure 1-92
Removing an SFP/SFP+/SFP28/QSFP+/XFP pluggable module using the LC fiber tool (174-0099-900)

A. Attach the cradle of the LC fiber tool to the boot of the LC fiber as shown.

Then holding the LC fiber tool, slide the LC connector into the pluggable module until the LC connector clicks into position.

B. Carefully remove the LC fiber tool from the boot (of the LC fiber).



Side view - close-up of LC connector, clicked into position in the pluggable module

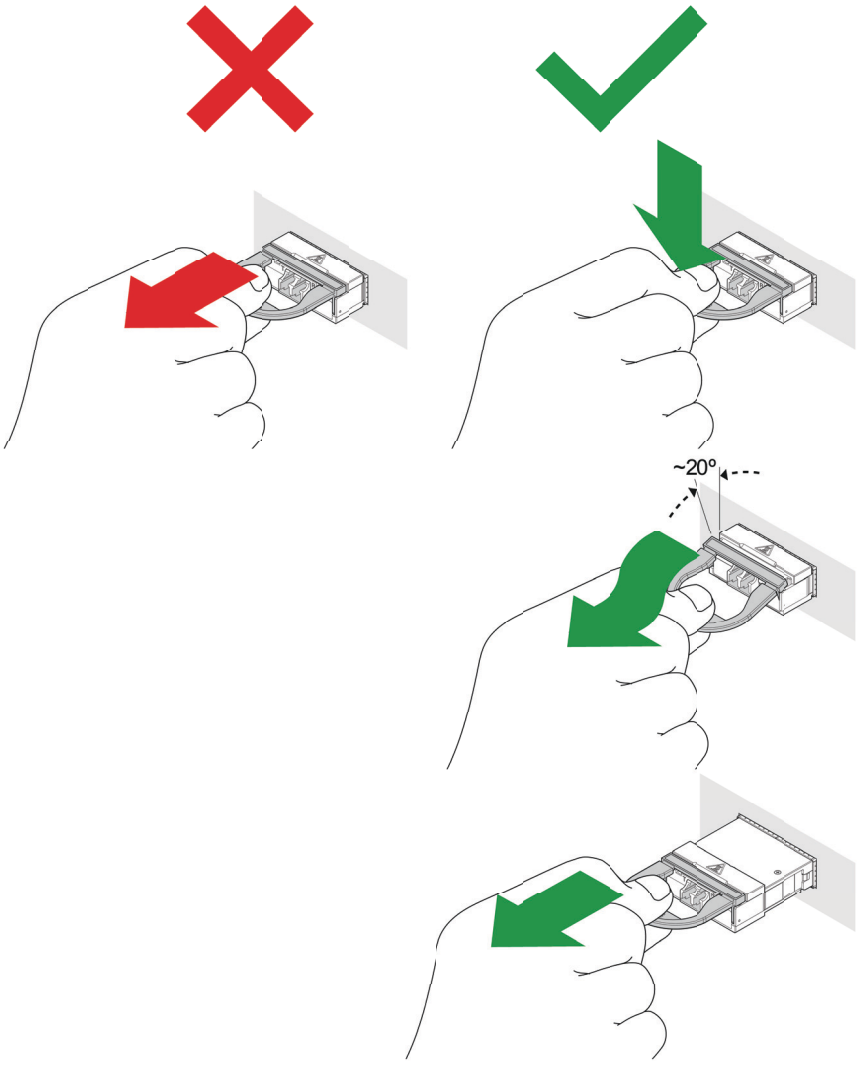
Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action
14	Select your next step. **If** you are removing — **Then** go to an XFP, QSFP+, or SFP/SFP+/SFP28 module — step 15 a CFP/CFP2/CFP2-DCO module with direct-pull tab — step 17 a CFP2-DCO module with tilt-and-pull tab — step 19 QSFP28/QSFP-DD module — step 20
15	Swing open the latch on the XFP, QSFP+, or SFP/SFP+/SFP28 module to disengage the module from the optical interface circuit pack. Open the bail latch until it is perpendicular to the face of the module.
16	Use the bail latch to carefully pull the XFP, QSFP+, or SFP/SFP+/SFP28 module out of its cage on the circuit pack. Make sure that you apply the extraction force in a direction parallel to the long dimension of the module. Then go to step 21.
17	As applicable unfasten the captive fasteners/thumbscrews that secure in place the CFP module. Captive fasteners/thumbscrews do not apply to the CFP2 or CFP2-DCO.
18	Carefully pull the CFP/CFP2 module, or CFP2-DCO with direct-pull tab module out of its cage on the circuit pack. Make sure that you apply the extraction force in a direction parallel to the long dimension of the module. Then go to step 21.
19	**CAUTION** **Risk of equipment damage** To remove the CFP2-DCO module—tilt-and-pull tab type—do the following in a continuous motion. First unlock the module by tilting the tab toward the optical interface ports and then carefully pull the module out of its cage on the circuit pack. Make sure that you apply the extraction force in a direction parallel to the long dimension of the module. Do not pull out this type of module without first tilting the tab as described. Otherwise you risk damaging the module. See “Removing the CFP2-DCO pluggable module—tilt-and-pull tab type” on page 1-155.

Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action

Figure 1-93
Removing the CFP2-DCO pluggable module—tilt-and-pull tab type



Note: This illustration shows how to remove the CFP2-DCO tilt-and-pull tab type pluggable module that is in the horizontal orientation. Follow the same approach if this type of pluggable module is in any other orientation.

Then go to step 21.

Procedure 1-9 (continued)
Installing and removing pluggable modules

Step	Action
20	Pull the rubber handle of the QSFP28 or QSFP-DD pluggable module to unlatch and remove it from the card. Then go to step 21.
21	If this cage will remain empty, then insert a dust cover into the cage. The dust cover prevents contamination of the electrical connector. Use optical terminators on unused input faceplate connectors of installed WSS circuit packs. If dust caps are used instead of optical terminators, PMs can be reported against the port and the port may appear in-service.
22	Place the pluggable module back into its ESD-protective packaging. You have completed removing the pluggable module. If you were referred to this procedure from another procedure, return to the referring procedure or go to step 23.
23	You have completed this procedure. Select your next procedure, as required: • "Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module" on page 1-157 and/or • "Installing a DSCM tray in a DSCM drawer (NT0H57LA)" on page 2-36 and/or • "Installing a Fiber Interconnect Module (FIM)" on page 1-192 **—end—**

Procedure 1-10
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Use this procedure to install the following modules into a rack:

- 16 Channel Mux/Demux (CMD16) 100 GHz C-Band module
- 24 Channel Mux/Demux (CMD24) 100 GHz C-Band module
- 42 Channel Mux/Demux (CMD42) 112.5 GHz C-Band module
- 48 Channel Mux/Demux (CMD48) 100GHz C-Band module
- 64 Channel Mux/Demux (CMD64) 75 GHz C-Band module
- 64 Channel Mux/Demux (CMD64) 75 GHz C-Band Type 2 module
- 96 Channel Mux/Demux (CMD96) 50 GHz C-Band
- 100GHz 44 Channel Mux/Demux (100 GHz CMD44)
- Enhanced 100GHz CMD44 (100GHz eCMD44)
- 50GHz CMD44 Blue
- 50GHz CMD44 Red
- Enhanced 50GHz CMD44 Blue (50 GHz eCMD44)
- Enhanced 50GHz CMD44 Red (50 GHz eCMD44)
- Broadband Mux/Demux 1x2 (BMD2)
- Upgrade Broadband Mux/Demux 1x2 (UBMD2)
- Monitor Broadband Mux/Demux 1x2 (MBMD2)
- 10 Group Mux/Demux (GMD10) C-Band
- OSC Filter

Prerequisites

- Make sure that you
  - — are familiar with the manufacturer’s torque specifications for the rack, as required
  - — have a 3/8-in. wrench
  - — have the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans

— have the required mounting brackets if you are not using the 19-inch EIA brackets pre-installed on the module. Brackets for mounting at 19-inch EIA (pre-installed), 23-inch EIA and ETSI are included with the module.

— have a ground cable and a ground lug appropriate to the frame. Have screws appropriate to the frame to attach the frame ground.

— have a crimp tool for 6 AWG (16-mm^2) ground cable

— have a flathead screwdriver

— use hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice.

You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

— observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0

— have the appropriate personal grounding device to dissipate electrostatic charges

- For UBMD2 and MBMD2 modules, use Ciena-supplied (or equivalent Telcordia GR-326 compliant) SC optical fiber patchcords specified to have the Telcordia GR-326 standard boot that measures 58 mm (maximum) from ferrule tip to the back of the boot. Any other fiber boot length that exceeds 58 mm is not recommended and has not been qualified to use with these modules.

  To achieve the correct fiber bend radius with the 58 mm fiber boot, the UBMD2 and MBMD2 ship with metallic 90-degree fiber boot clips. The boot clips are packaged in a small ESD bag (open the module door to find the ESD bag attached to the module).

- For CMD44 modules, use Ciena-supplied (or equivalent Telcordia GR-326 compliant) LC optical fiber patchcords specified to have the Telcordia GR-326 standard boot that measures 42.5 mm (maximum) from ferrule tip to the back of the boot. Any other fiber boot length that exceeds 42.5 mm is not recommended and has not been qualified to use with these modules.

  Note: The CMD44 modules are shipped with 20 plastic bend radius clips. These clips are optional and are included in case attenuators or incorrect LC fiber boot length were installed. They are not required if the correct 42.5 mm fibers are installed and dressed correctly.

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

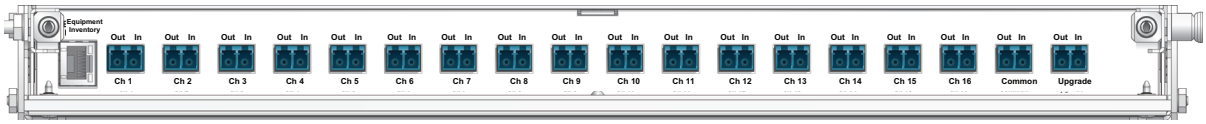
CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging equipment.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/ cabinet or clip to a suitable ground point.
3	Unpack and inspect the module. See the applicable illustration. • "16 Channel Mux/Demux (CMD16) 100 GHz C-Band module (door open)" • "24 Channel Mux/Demux (CMD24) 100 GHz C-Band module (door open)" • "42 Channel Mux/Demux (CMD42) 112.5 GHz C-Band module (door removed)" on page 1-161 • "48 Channel Mux/Demux (CMD48) 100GHz C-Band module (door open and ground cable connected)" on page 1-161 • "64 Channel Mux/Demux (CMD64) 75 GHz C-Band module (door open)" on page 1-161 • "64 Channel Mux/Demux (CMD64) 75 GHz C-Band Type 2 module (door open)" on page 1-162 • "96 Channel Mux/Demux (CMD96) 50 GHz C-Band module (door open)" on page 1-162 • "44 Channel Mux/Demux (CMD44) module (door open)" on page 1-162 • "10 Group Mux/Demux (GMD10) C-Band module" on page 1-163 • "Broadband Mux/Demux 1x2 (BMD2) module" on page 1-163 • "Upgrade Broadband Mux/Demux 1x2 (UBMD2)" on page 1-163 • "Monitor Broadband Mux/Demux 1x2 (MBMD2)" on page 1-164 • "OSC Filter module" on page 1-164

Figure 1-94
16 Channel Mux/Demux (CMD16) 100 GHz C-Band module (door open)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-95
24 Channel Mux/Demux (CMD24) 100 GHz C-Band module (door open)

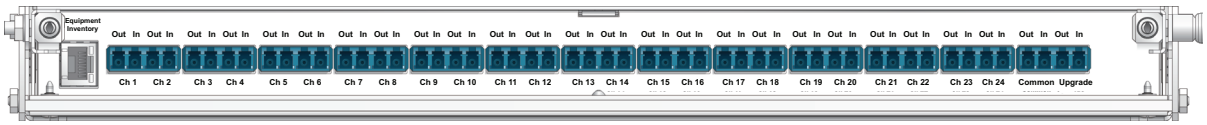


Figure 1-96
42 Channel Mux/Demux (CMD42) 112.5 GHz C-Band module (door removed)

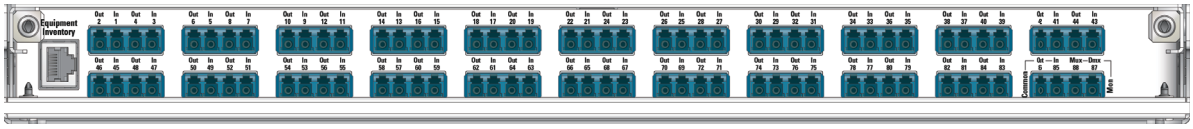


Figure 1-97
48 Channel Mux/Demux (CMD48) 100GHz C-Band module (door open and ground cable connected)

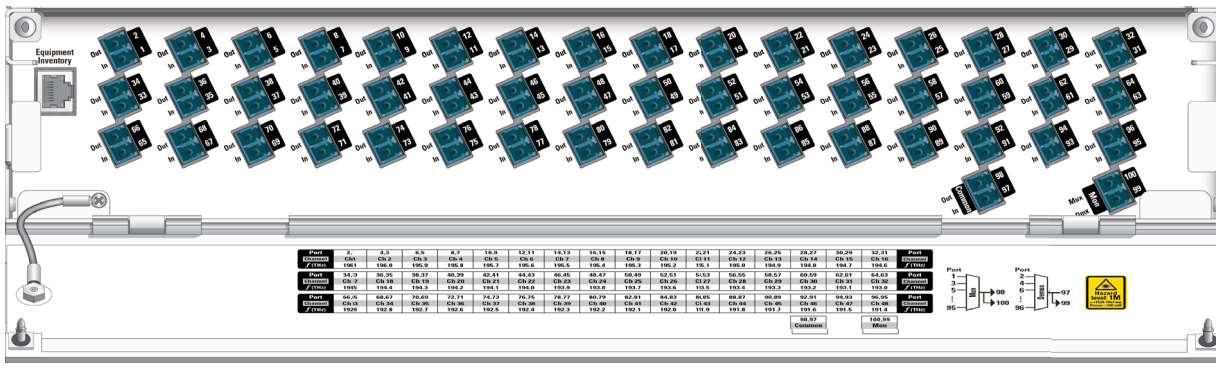
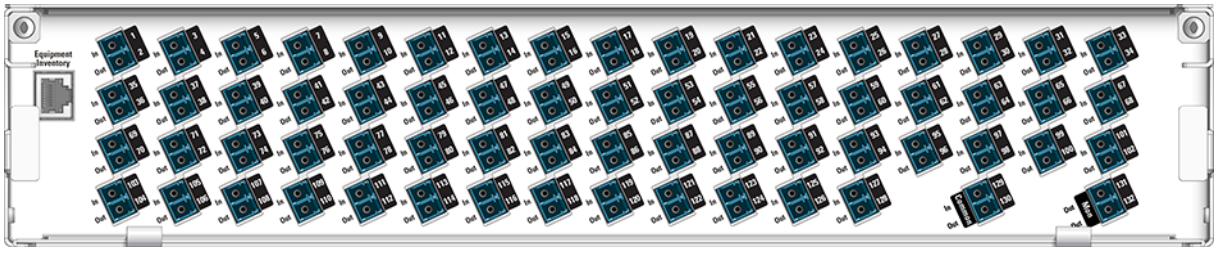


Figure 1-98
64 Channel Mux/Demux (CMD64) 75 GHz C-Band module (door open)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-99
64 Channel Mux/Demux (CMD64) 75 GHz C-Band Type 2 module (door open)

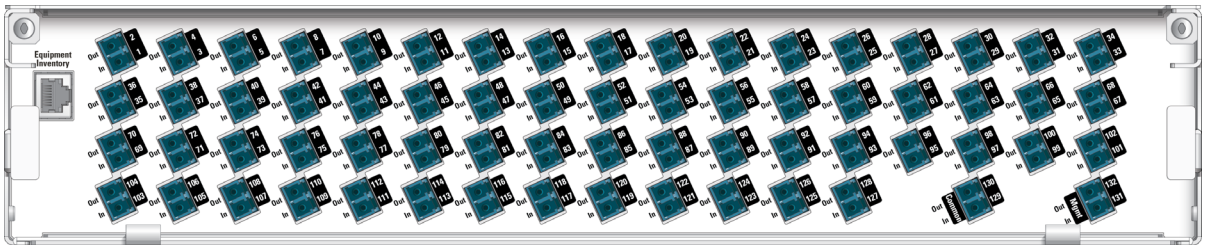


Figure 1-100
96 Channel Mux/Demux (CMD96) 50 GHz C-Band module (door open)

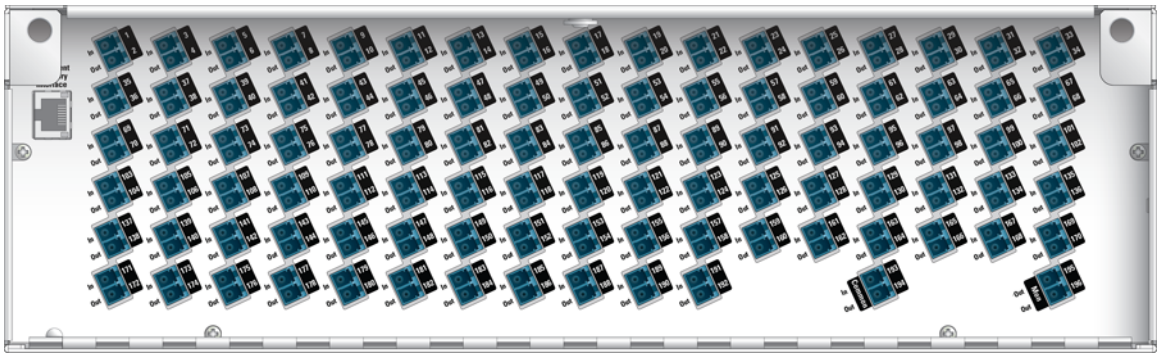
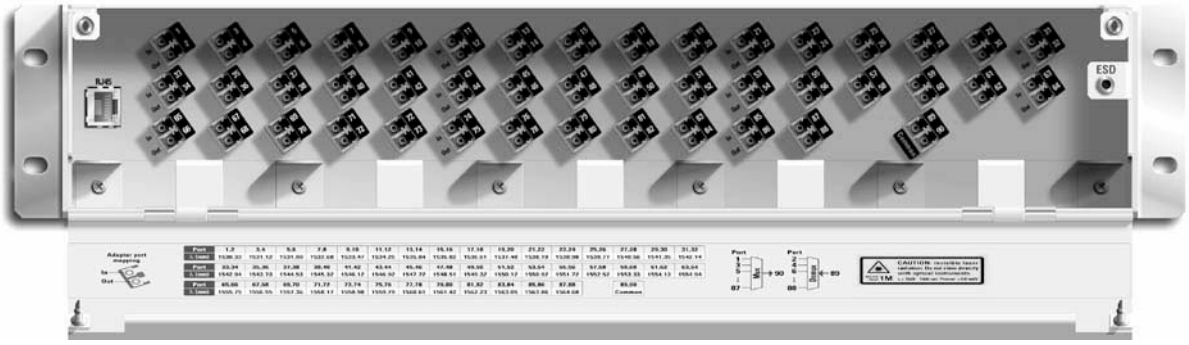


Figure 1-101
44 Channel Mux/Demux (CMD44) module (door open)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-102
10 Group Mux/Demux (GMD10) C-Band module

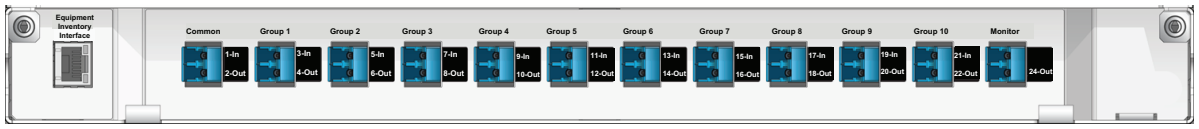


Figure 1-103
Broadband Mux/Demux 1x2 (BMD2) module

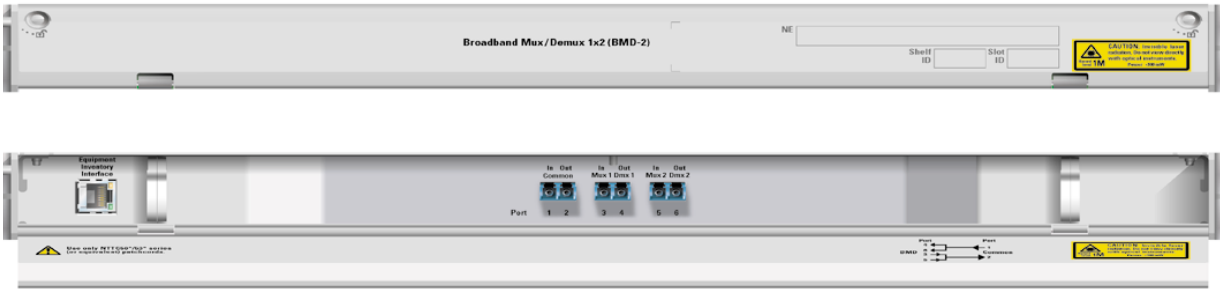
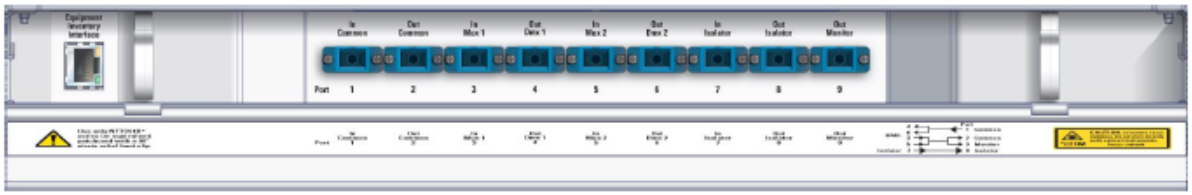


Figure 1-104
Upgrade Broadband Mux/Demux 1x2 (UBMD2)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-105
Monitor Broadband Mux/Demux 1x2 (MBMD2)

Figure 1-106
OSC Filter module

4 Select your next step.

If you are using	**Then**
the pre-installed mounting brackets	use the information in step 5 to determine the appropriate mounting position on the frame
other mounting brackets	unfasten the pre-installed brackets. Then install the required brackets using the information in step 5 to determine the appropriate mounting positions on the module. Also, use the information in step 5 to determine the appropriate mounting position on the frame.

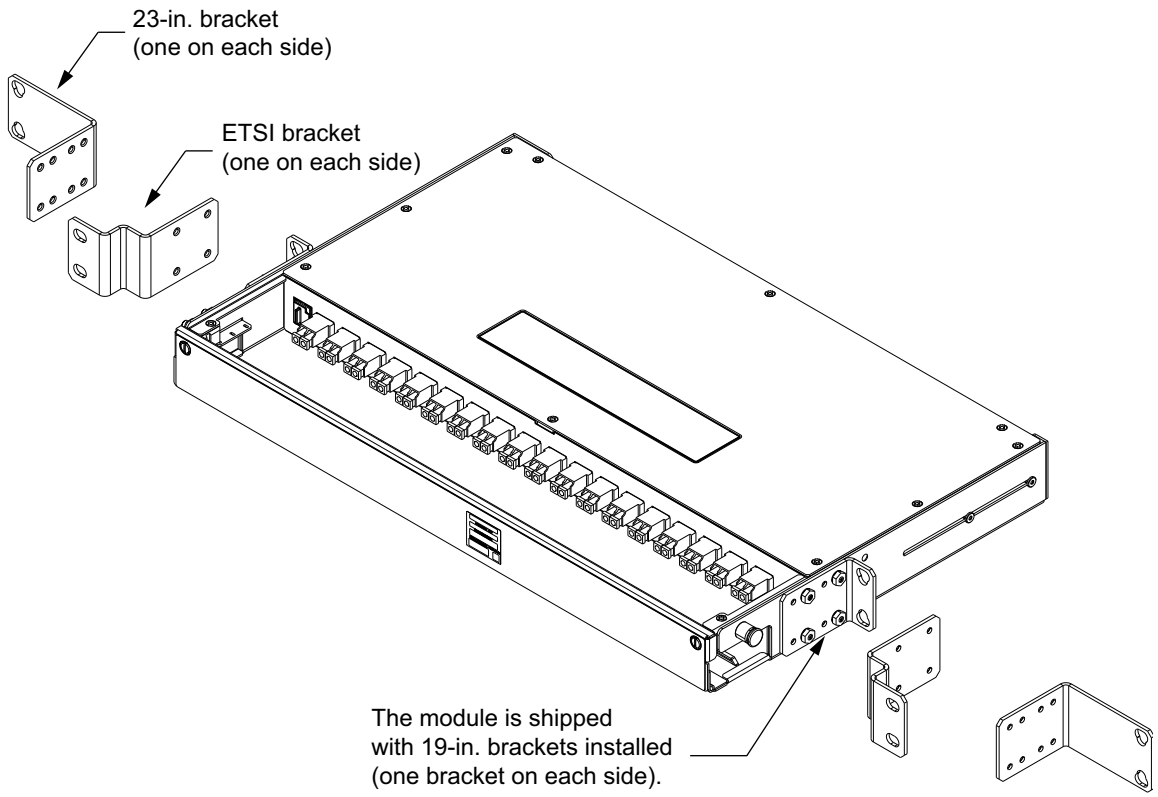
Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action
5	Determine the appropriate mounting hole position on the frame and mounting bracket setback position. For details, see the EDP, IDP, or equivalent site/network engineering plans. Also see the following illustrations for examples. • "Mounting brackets for the CMD16 module" on page 1-166 • "Mounting brackets for the CMD24 module" on page 1-167 • "Mounting brackets for the CMD42 module" on page 1-168 • "Mounting brackets for the CMD48 module" on page 1-169 • "Mounting brackets for the CMD64 and CMD64 Type 2 module" on page 1-170 • "Mounting brackets for the CMD96 module" on page 1-171 • "Mounting brackets for the OSC Filter module" on page 1-172 • "Mounting bracket setback position for all CMD modules" on page 1-173 • "Mounting bracket setback positions for the OMD4, BMD2, GMD10, UBMD2, MBMD2, and OSC Filter module" on page 1-174 • "Mounting brackets for 1U modules" on page 1-175 • "Mounting bracket for 19-inch frame in 5-inch setback position (default)" on page 1-175 The position of the mounting brackets for the 23-inch frame with 5-inch setback is the same as shown for the 19-inch frame. • "Mounting bracket for ETSI rack" on page 1-176 ***Note:*** The setback positions for the mounting brackets accommodate for 0.394 in. (10 mm) for the module door.

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

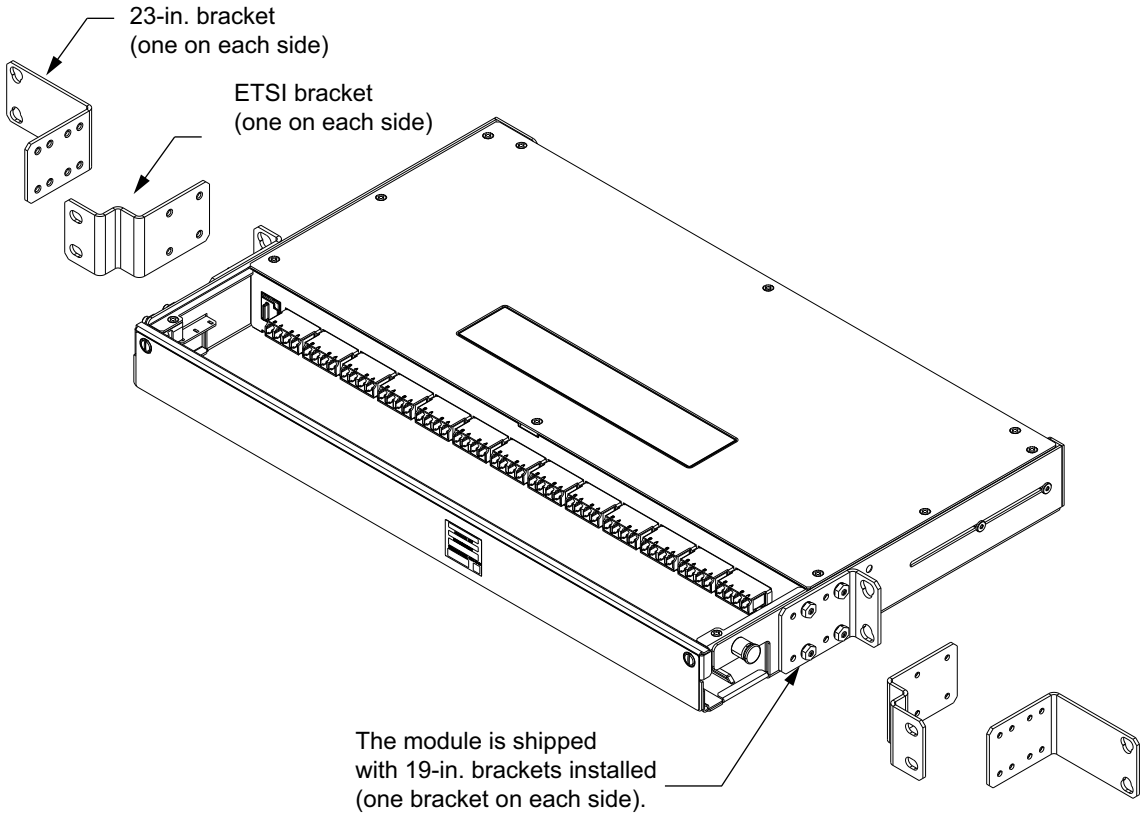
Figure 1-107
Mounting brackets for the CMD16 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

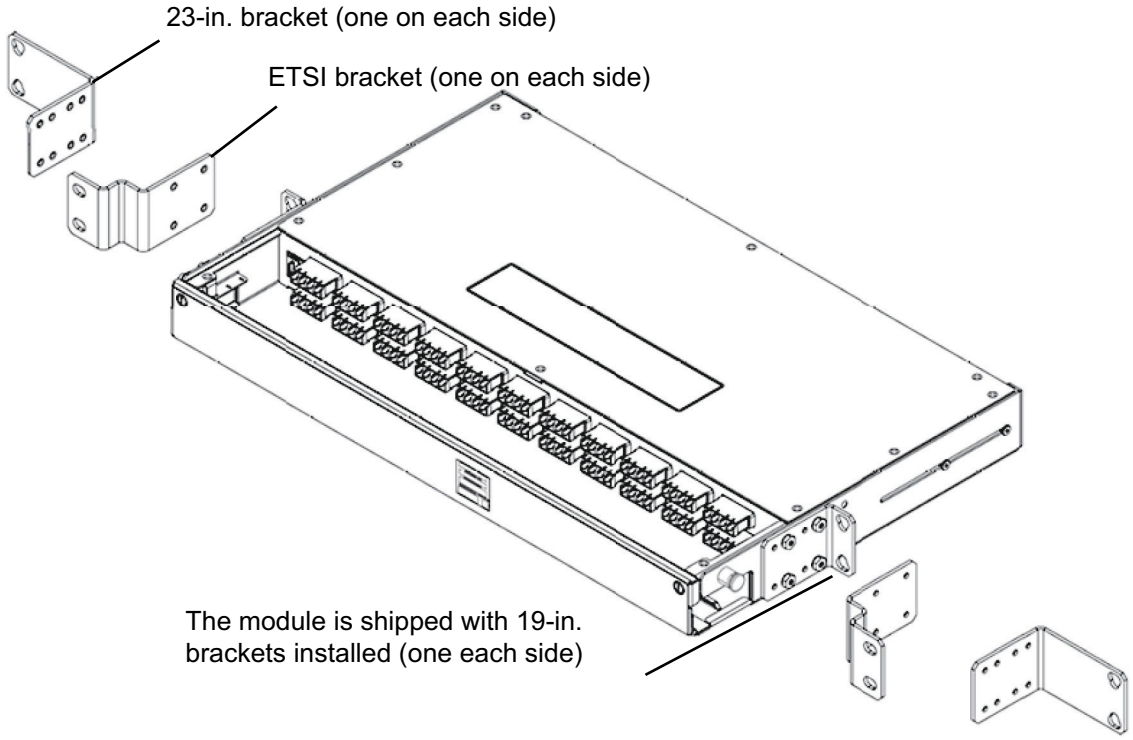
Figure 1-108
Mounting brackets for the CMD24 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

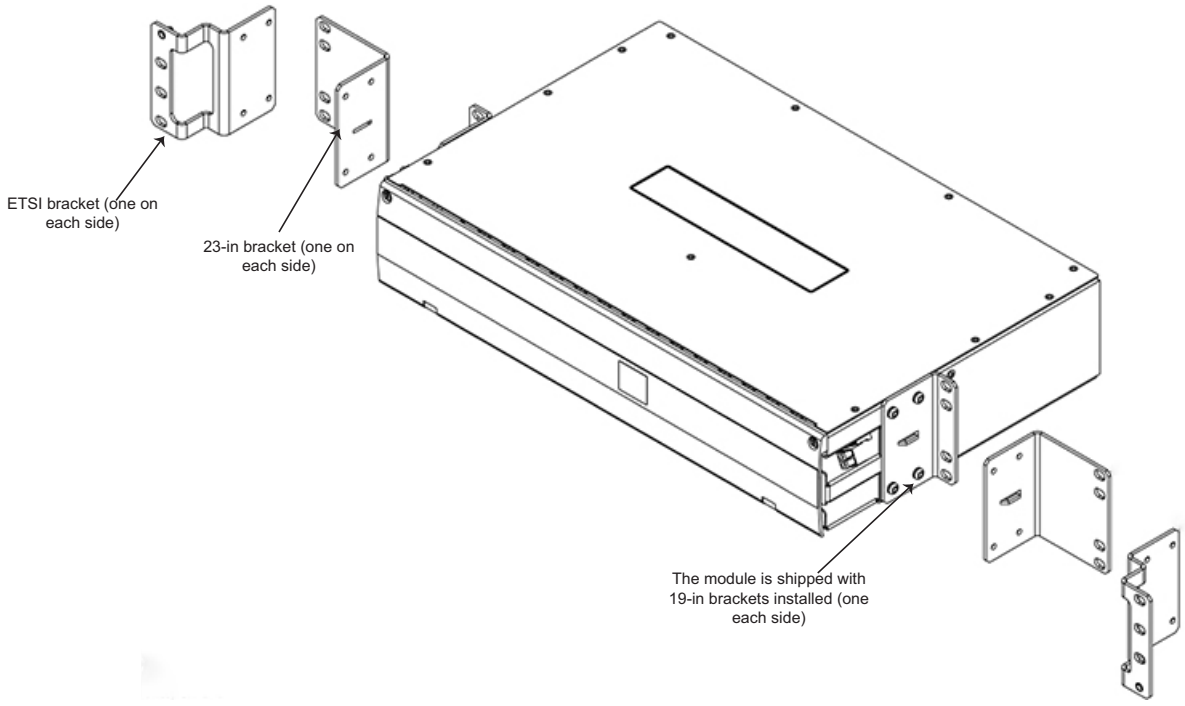
Figure 1-109
Mounting brackets for the CMD42 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

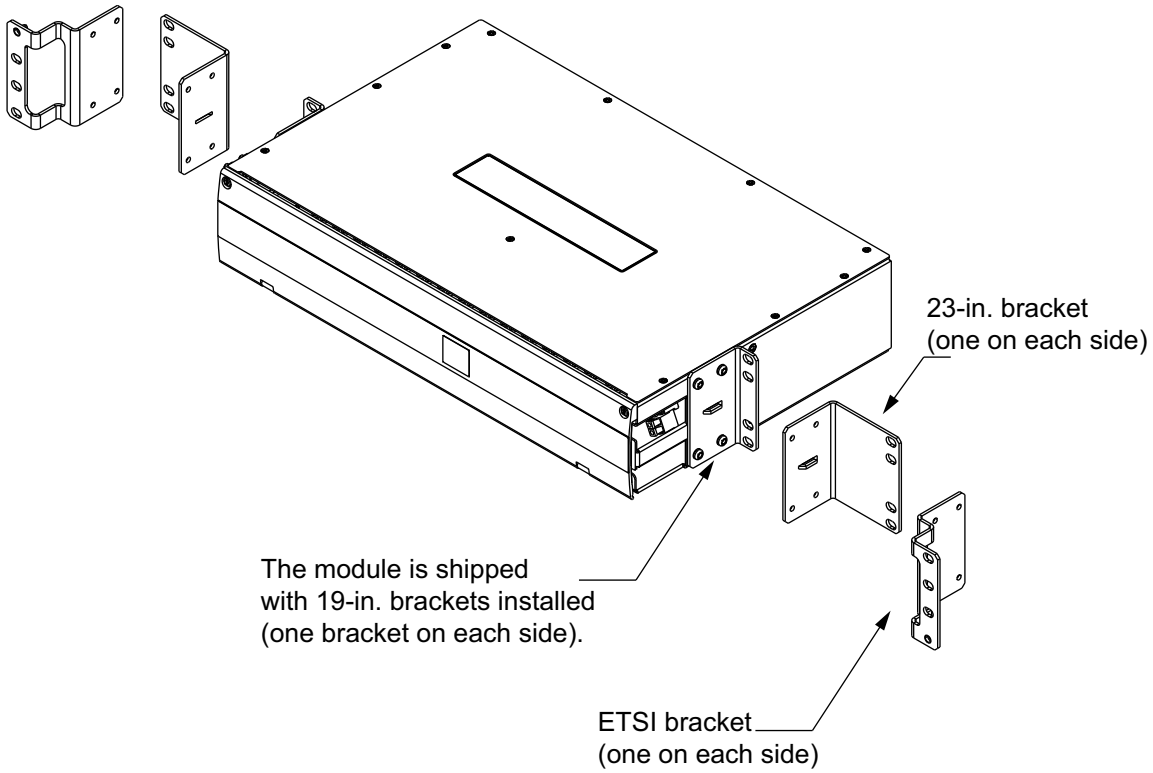
Figure 1-110
Mounting brackets for the CMD48 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

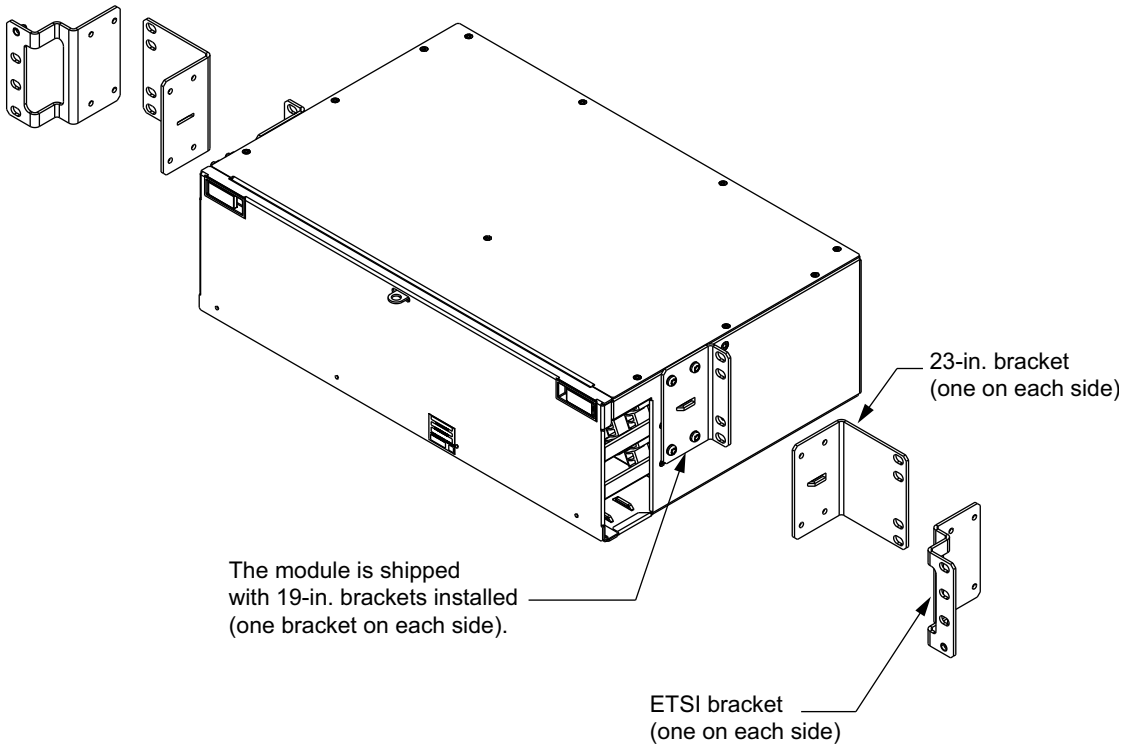
Figure 1-111
Mounting brackets for the CMD64 and CMD64 Type 2 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

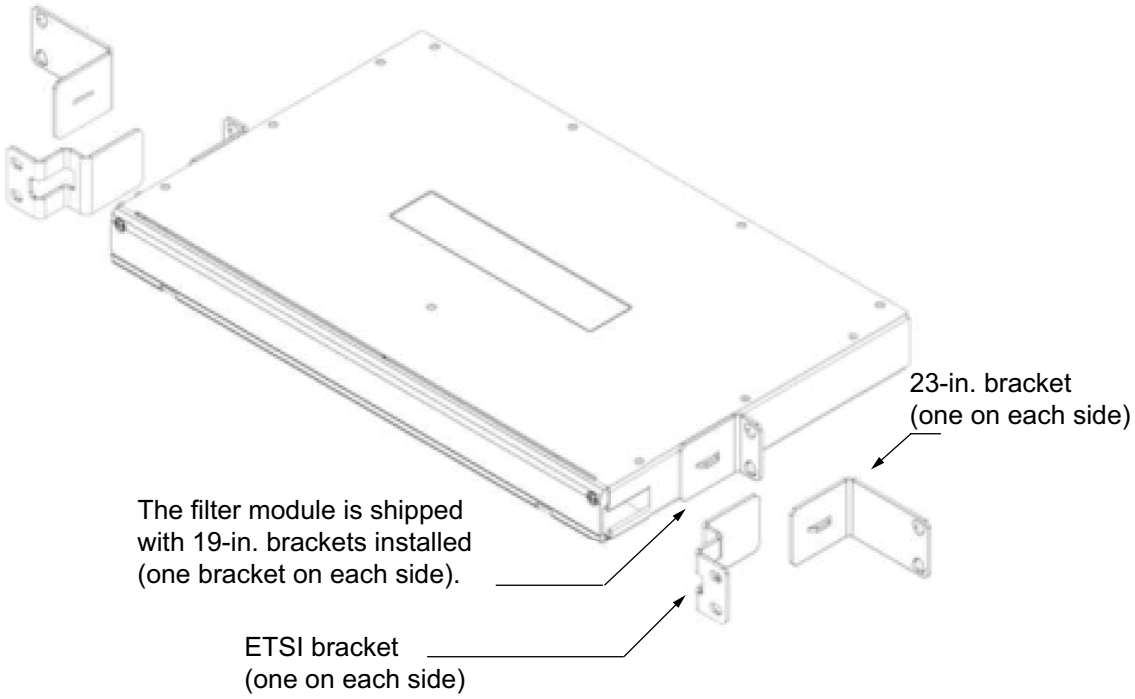
Figure 1-112
Mounting brackets for the CMD96 module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

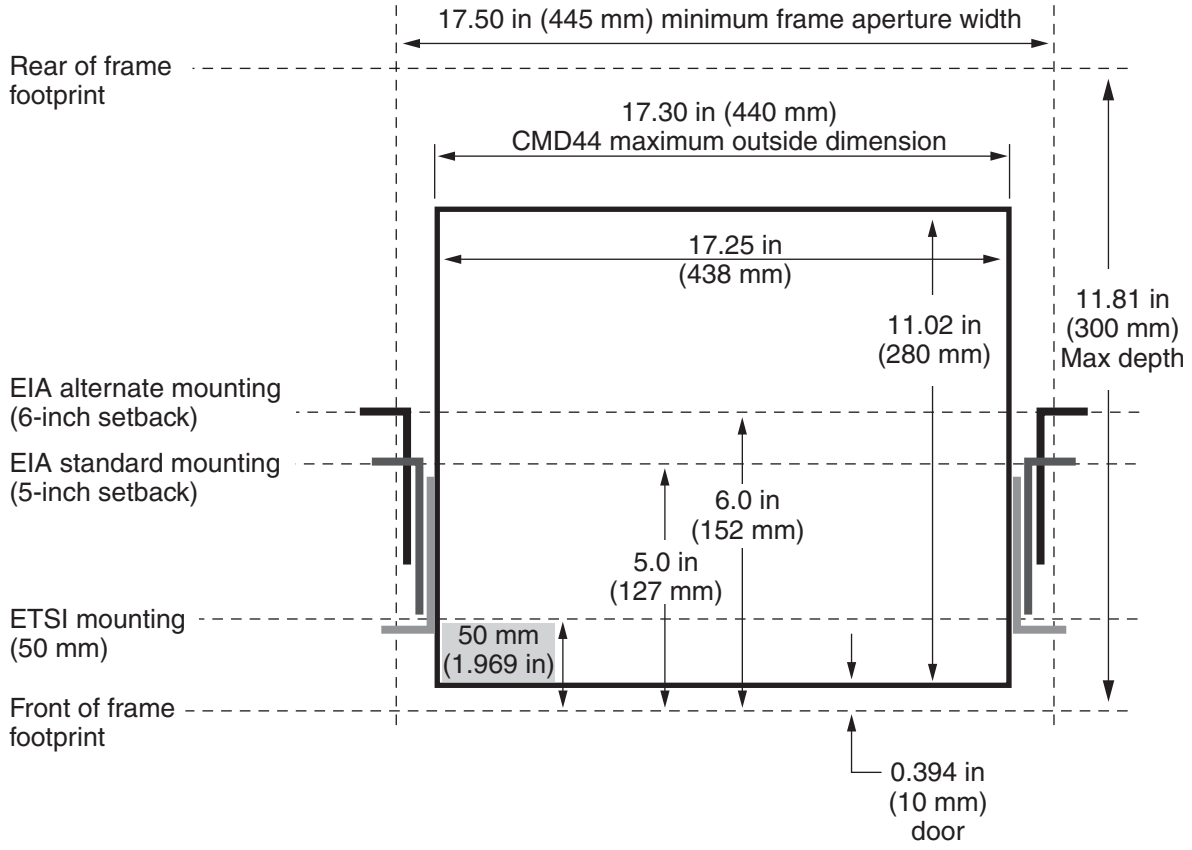
Figure 1-113
Mounting brackets for the OSC Filter module



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-114
Mounting bracket setback position for all CMD modules

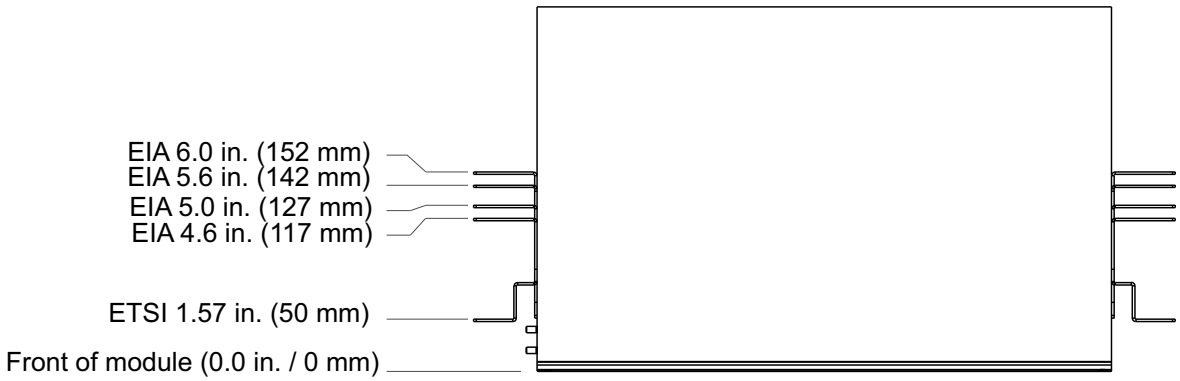


Note: The illustration is an example. The dimensions relate to the CMD44 module.

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-115
Mounting bracket setback positions for the OMD4, BMD2, GMD10, UBMD2, MBMD2, and OSC Filter module



- The supported 19-inch and 23-inch EIA mounting setback positions are shown as four straight lines.
- The ETSI mounting setback position is 40 mm (1.575 inches), which is used for 50 mm setback applications. The front cover of the module is recessed by 10 mm (0.394 in) to provide clearance for any ETSI cabinet front door.

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-116
Mounting brackets for 1U modules

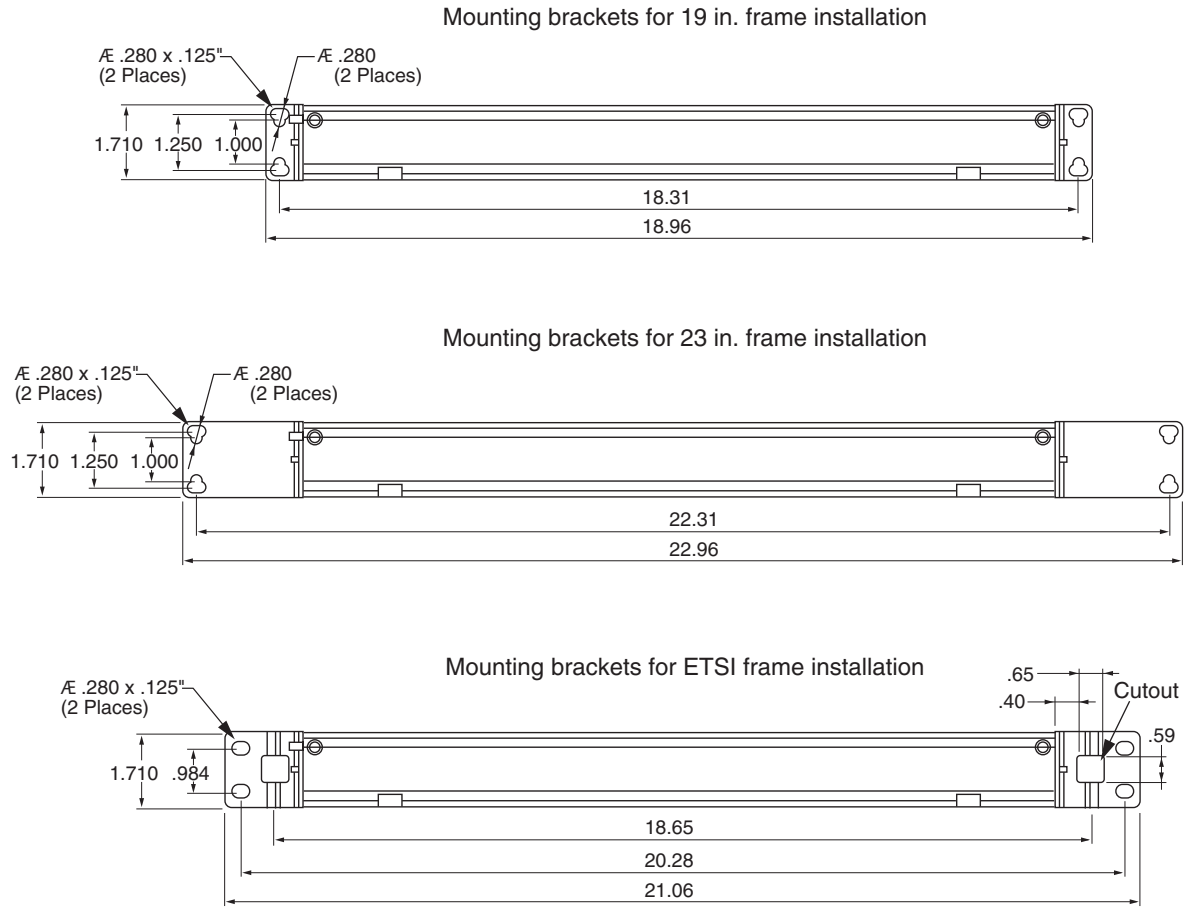
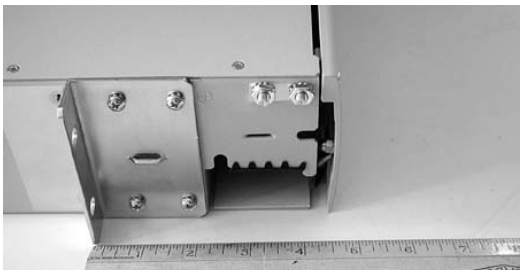


Figure 1-117
Mounting bracket for 19-inch frame in 5-inch setback position (default)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Figure 1-118
Mounting bracket for ETSI rack

6 Secure the module to the rack using the appropriate mounting screws (two on each side for 1U modules, four on each side for 2U modules and for 3U modules).

7 Insert and tighten the appropriate mounting hardware in the top hole of each bracket. Use a torque wrench to verify that torque has been applied correctly according to rack manufacturer torque specifications. In the case of the PTE2000 rack, for the M6 and 12-24 mounting options, that specification is 5.65 N-m (50 lb-in.) for installation and 4.52 N-m (40 lb-in.) for inspection.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the module to the frame with the appropriate mounting screws. Otherwise, you risk damaging the equipment.

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

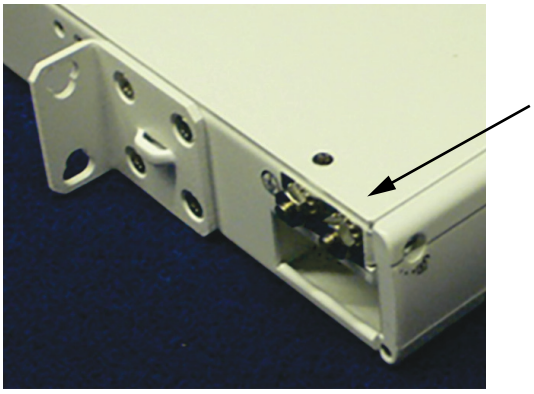
Installing a ground bracket or a two-hole lug with a ground cable on the module

8 If the module you are installing has two grounding locations (on the side of the module and at the rear), select the grounding location you will be using.

Grounding is mandatory. You must ground every module.

One example of a module with one grounding location is the OSC Filter module as shown in the following illustration.

Figure 1-119
Front left grounding location of the OSC module



Remove the pre-installed #10-32 KEPS nuts from the front left grounding location.

After you attach the two-hole lug with a ground cable over the two #10 studs, you must re-install the two #10-32 KEPS nuts.

9 Attach the two-hole lug with a ground cable to the module.

10 Fasten the other end of the ground cable to an appropriate location on the rack.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the ground cable with mounting screws onto the frame. Otherwise, you risk damaging the equipment. Torque the #10-32 KEPS nuts to 2.26 N-m (20 lb-in.).

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

Routing fiber-optic cables to the module

11 Route the fiber-optic cables to the applicable module.

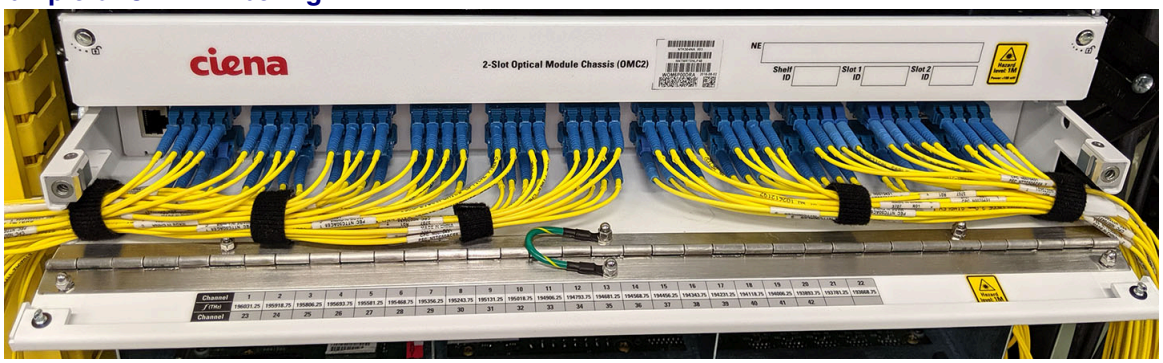
- Route GMD10 fiber-optic cables out the left side only.
- You can route fiber-optic cables for all other modules covered in this procedure out the left side or the right side.
- For CMD44, see Figure 1-120 on page 1-178 for a fibering example (qualified 42.5 mm flexible boot fiber). The example shows the left side of the CMD44 faceplate.
- For CMD42, see Figure 1-121 on page 1-179 for a fibering example.
- For CMD96, see Figure 1-122 on page 1-179 for a fibering example (qualified 42.5 mm flexible boot fiber).

Figure 1-120
Example of CMD44 fibering (shows left side)

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

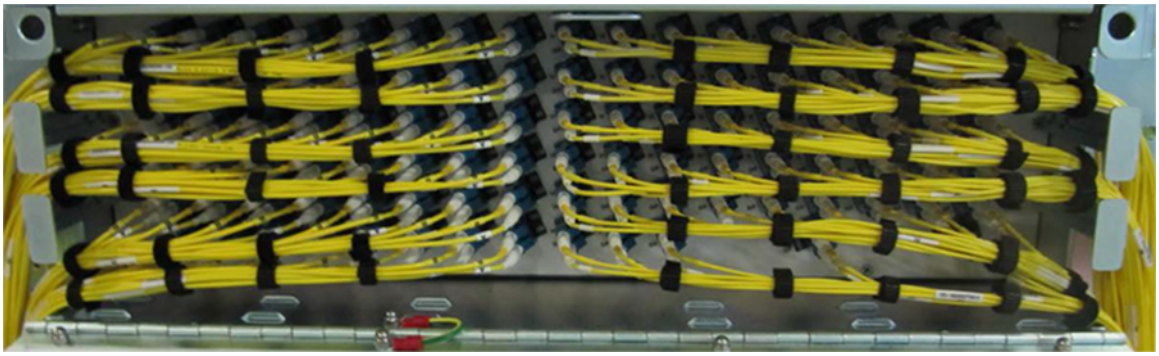
Step	Action

Figure 1-121
Example of CMD42 fibering



- For CMD42, Ciena recommends bundling the top row of LC adapters separately from the bottom row. This allows you to lift the top bundle to access the connectors on the bottom row.
- Use hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice.
- You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

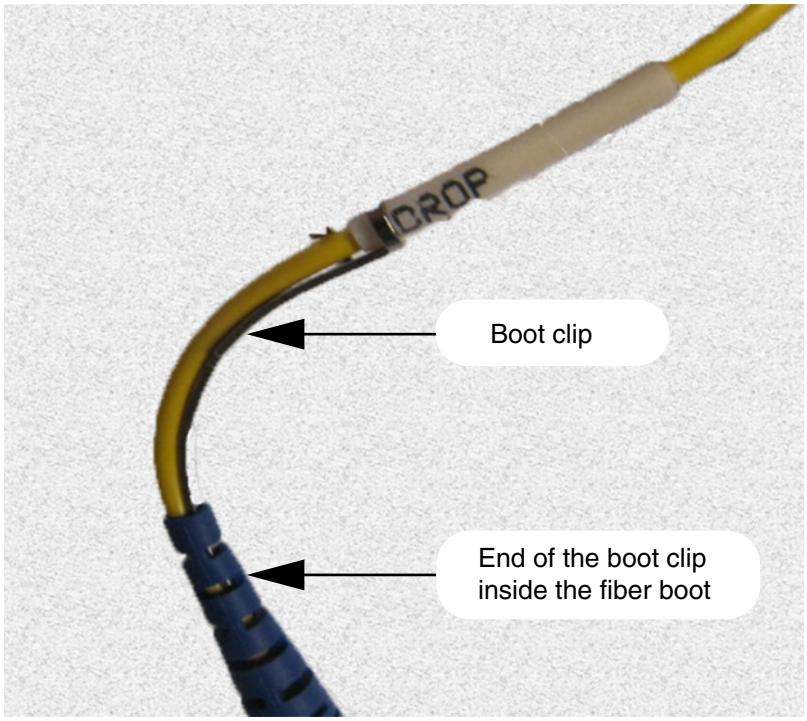
Figure 1-122
Example of CMD96 fibering



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action
	• To install the 90-degree boot clips provided with the UBMD2 and the MBMD2, insert (wiggle) the end of the clip carefully into the end of the fiber boot, while making sure that the clip does not work through one of the slots in the boot. If this occurs, remove the clip and start over.

Figure 1-123
90-degree boot clip (shipped with the UBMD2 and the MBMD2)



Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

For UBMD2, see a fibering example (qualified 42.5 mm flexible boot fiber) in the following illustration.

Hook and loop tape (such as Velcro), fiber cable ties, or lacing twine (according to your company's practice) must be used to dress fiber in three different areas. It is important that the fastener be used at the exit point of the module, see the instructions included in the illustration.

The same guidance applies to MBMD2.

You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

Figure 1-124
Example of routing fiber out the left side of the UBMD2

After connecting the fiber-optic cables to the ports, use hook and loop fasteners (such as VELCRO) to secure the fiber-optic cables. Make sure to do so at the exit point of the UBMD-2 to protect the fiber-optic cables from damage when the door is closed.

The UBMD2 requires a fiber be run between two UBMD2 ports. The UBMD2 does not provide within the module the capability of port-to-port fiber connecting. Consequently, this fiber:

a. must exit the UBMD2 and must be secured as shown in the previous illustration

b. then must be routed to an external fiber manager to store fiber slack (The UBMD2 does not provide fiber slack storage)

c. then must re-enter the UBMD2 and must be secured as shown in the previous illustration

Procedure 1-10 (continued)
Installing a CMD16, CMD24, CMD42, CMD64, CMD64 Type 2, CMD96, CMD44, CMD48, eCMD44, BMD2, GMD10, UBMD2, or MBMD2 module or OSC Filter module

Step	Action

- For BMD2, see a fibering example (qualified 42.5 mm flexible boot fiber) in the following illustration.

Figure 1-125
Example of BMD2 fibering

12 Next, perform as applicable:

- Procedure 1-11, “Installing an OMC2 chassis and associated modules”
- Procedure 1-12, “Installing a Fiber Interconnect Module (FIM)”
- Procedure 2-1, “Installing and grounding equipment drawers” to install the DSCM drawer (NT0H57LA), then Procedure 2-4, “Installing a DSCM tray in a DSCM drawer (NT0H57LA)”

—end—

Procedure 1-11
Installing an OMC2 chassis and associated modules

Use this procedure:

- to install a 2-slot optical module chassis (OMC2) (NTK504NA) in the equipment rack
- to install the following equipment in the OMC2 chassis:
  - C/L-Band Mux/Demux (CLMD) module (NTK504PA)
  - Upgrade Coupler/Splitter (UCS) module (NTK504PL)
  - Monitor Coupler/Splitter (MonCS) module (NTK504PN)
  - OMC2 filler panel (NTK504PY)

Prerequisites

- If you are using the UCS and/or the CLMD in applications that require using the isolator port of the respective module for wet plant deployments of Submarine Line Terminal Equipment (SLTE), Hazard Level 3B laser safety labels (supplied as a kit with each UCS and CLMD) must be applied on the front and back of the OMC2 door. Ensure that you have completed the procedure on applying Hazard Level 3B and/or 1M laser safety labels on OMC2 in *Installation - General Information*, 323-1851-201.0.
- For the UCS, CLMD, and MonCS modules, you must also apply a Hazard Level 1M label to the back of the OMC2 door, if the Hazard Level 3B safety labels are not applied. Ensure that you have completed the procedure for applying Hazard Level 3B and/or 1M laser safety labels on OMC2 in *Installation - General Information*, 323-1851-201.0.
- Make sure that you:
  - observe all of the safety requirements described in *Installation - General Information*, 323-1851-201.0.
  - are familiar with the manufacturer's torque specifications for the rack, as required
  - have the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans
  - have the appropriate personal grounding device to dissipate electrostatic charges
  - have the following tools and materials:
    - a ground cable and a ground lug appropriate to the frame. Have screws appropriate to the frame to attach the frame ground.
    - crimp tool for 6 AWG (16-mm^2) ground cable

- 3/8-in. wrench
- flathead screwdriver and Phillips screwdriver
- hook and loop tape (such as Velcro), cable ties, or lacing twine and tools according to your company's practice. You must protect all cables from cuts and abrasions according to your company's practice and industry standards.

Precautions

DANGER

Risk of electrical shock and equipment damage

Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the subsection on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

CAUTION
Risk of laser radiation exposure
If you are using the UCS and/or the CLMD in applications that require using the isolator port of the respective module for wet plant deployments of Submarine Line Terminal Equipment (SLTE), Hazard Level 3B laser safety labels (supplied as a kit with each UCS and CLMD) must be applied on the front and back of the OMC2 door. Users and service personnel must have appropriate laser safety training.

For more information and the procedure to apply the Hazard Level 3B labels, see the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0.

If you are installing a UCS, CLMD, or MonCS module, you must also apply Hazard Level 1M laser safety labels to the back of the OMC2 door. The labels are supplied as a kit with each module. For the procedure to apply the Hazard Level 1 M labels, see *Installation - General Information*, 323-1851-201.0.

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging equipment.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
3	Unpack and inspect the equipment.

Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

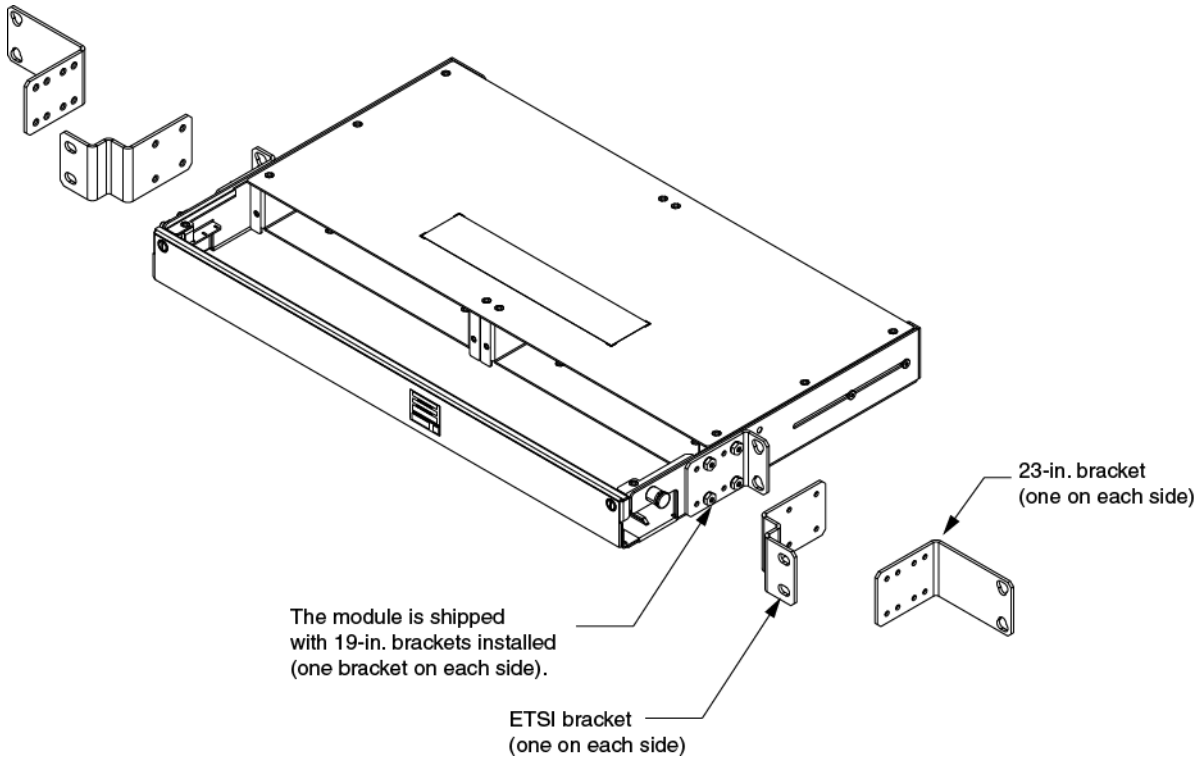
Step	Action
4	If you are using the UCS and/or the CLMD in applications that require using the isolator port of the respective module for wet plant deployments of Submarine Line Terminal Equipment (SLTE), ensure that the Hazard Level 3B laser safety labels (supplied as a kit with each UCS and CLMD) are applied on the OMC2, see the procedure in *Installation - General Information*, 323-1851-201.0. If you are installing a UCS, CLMD, or MonCS module, apply Hazard Level 1M laser safety labels (supplied as a kit with each module) to the back of the OMC2 door, if Hazard Level 3B laser safety labels are not already applied. See the procedure in *Installation - General Information*, 323-1851-201.0. ***Note:*** If you have already applied a Hazard Level 3B laser safety label to the back of the OMC2 door, you do not need to also apply the 1M label. Otherwise, go to step 5.
5	The OMC2 is shipped with 19-in. mounting brackets pre-installed. Select your next step.

If you are using	**Then**
the pre-installed mounting brackets	go to step 6
other mounting brackets	unfasten the pre-installed brackets. Then attach the required brackets to the OMC2 using the applicable mounting hardware (shipped with the OMC2). See "Mounting brackets for the OMC2".

Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

Step	Action

Figure 1-126
Mounting brackets for the OMC2



6 Determine the appropriate mounting hole position on the rack and mounting bracket setback position.

For details, see the EDP, IDP, or equivalent site/network engineering plans.

7 Insert and tighten the appropriate mounting hardware to secure the OMC2 to the rack. Use a torque wrench to verify that torque has been applied correctly according to rack manufacturer specifications. In the case of the PTE2000 rack, for the M6 and 12-24 mounting options that specification is 5.64 N-m (50 lb-in.) for installation and 4.52 N-m (40 lb-in.) for inspection.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the OMC2 to the rack with the appropriate mounting screws. Otherwise, you risk damaging the equipment.

Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

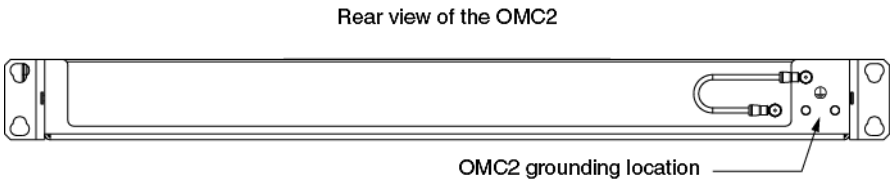
Step	Action

Grounding the OMC2

8 Select the grounding location you will be using. Fasten one end of the ground cable to the selected grounding location on the OMC2.

- The location at the rear of the OMC2 is shown in the following illustration.
- The grounding location on the left-hand side is illustrated in "Installing an OMC2 filler panel" on page 1-190.

Figure 1-127
OMC2 grounding location on the rear of the chassis



9 Fasten the other end of the ground cable to an appropriate grounding location on the rack.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the ground cable with mounting screws onto the rack. Otherwise, you risk damaging the equipment. Torque the #10-32 KEPS nuts to 2.26 N-m (20 lb-in.).

10 Slide the OMC2 toward the front of the rack and secure it in a position that provides easier access for installing modules or a filler panel. To achieve this, pull out the plunger on the right-hand side of the OMC2 chassis ("Installing a module into the OMC2 chassis" on page 1-189), pull the chassis toward the front of the rack, and release the plunger to secure the chassis in the front-most position.

11 Select your next step.

If you want to install	**Then** go to
a MonCS module, a UCS module or a CLMD module	step 12
an OMC2 filler panel	step 16

Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

Step	Action

Installing a MonCS module, a UCS module or a CLMD module (see the following illustration)

12 If a filler panel is installed in the OMC2 slot where you must install the module, unfasten the captive screws on the filler panel, remove the panel and store it in a safe place.

13 Remove the module faceplate:

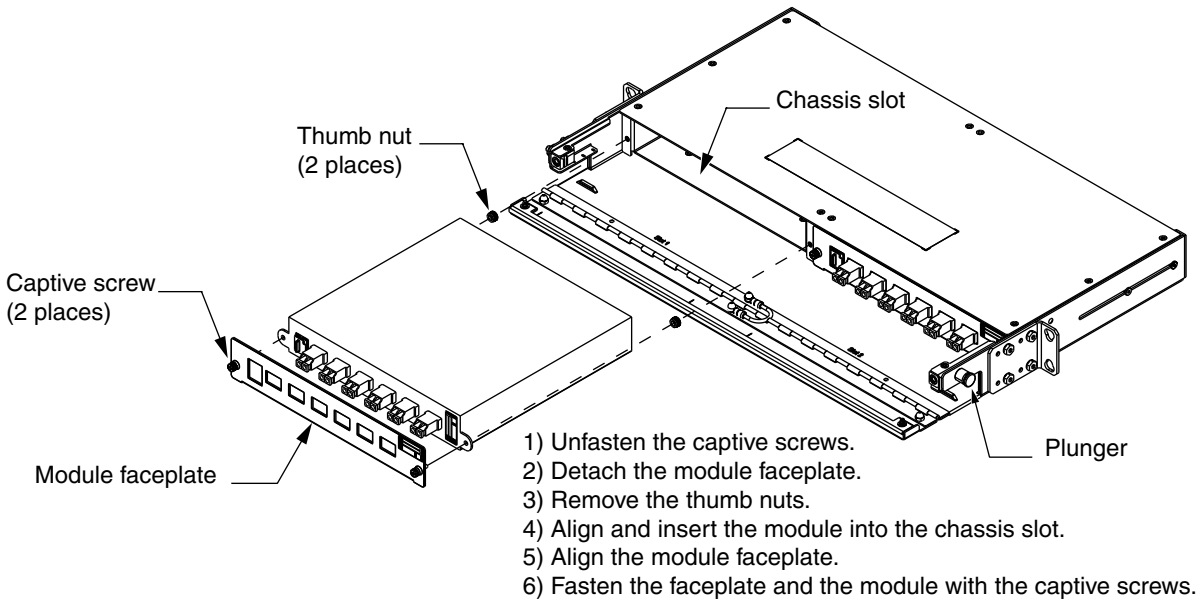
a. The module faceplate is secured with two captive screws (front of the module faceplate) and two thumb nuts (back of the module faceplate). Unfasten the captive screws and remove the thumb nuts.

Note: The thumb nuts can be discarded if the module installation is permanent.

b. Detach the faceplate and store it within reach. You will install back the module faceplate after you install the module in the chassis.

14 Align and insert the module into the OMC2 slot. Ensure that the tabs are on the bottom.

Figure 1-128
Installing a module into the OMC2 chassis

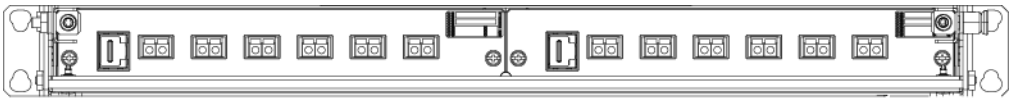


15 Place and align the module faceplate against the module and secure the module to the chassis with the captive screws.

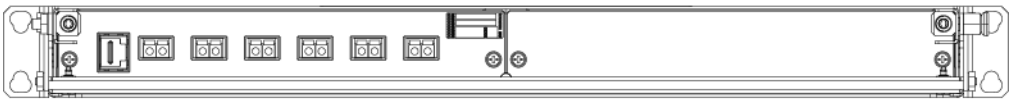
Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

Step	Action

Figure 1-129
OMC2 configurations—2-module and 1-module



Front view of 2-module OMC2 configuration



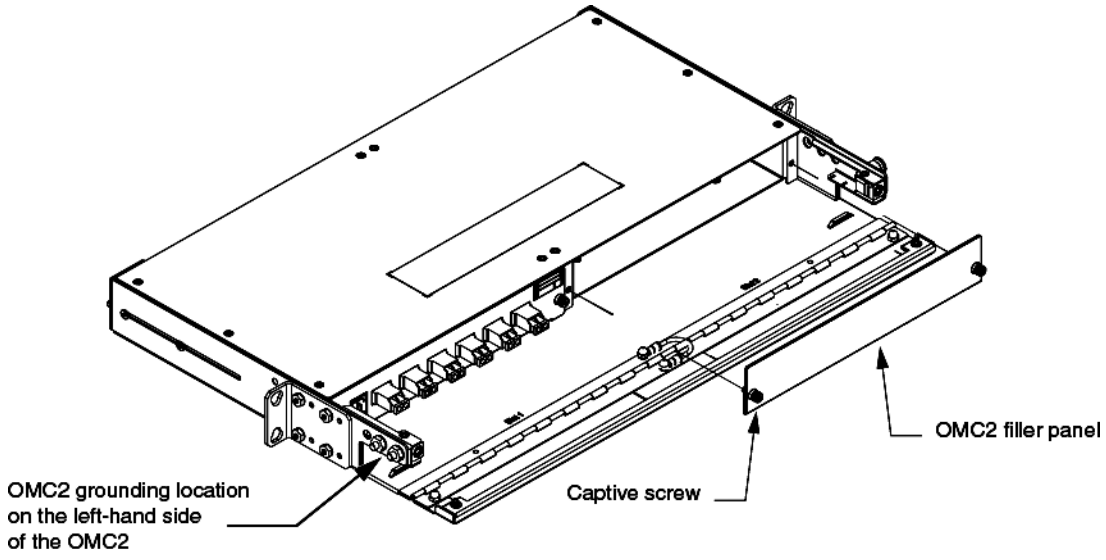
Front view of 1-module OMC2 configuration (with filler panel installed on the right-hand side)

Installing an OMC2 filler panel

16 Align and install the filler panel (see an example in "Installing an OMC2 filler panel"),

17 Secure the panel to the chassis with the captive screws on the panel.

Figure 1-130
Installing an OMC2 filler panel



Procedure 1-11 (continued)
Installing an OMC2 chassis and associated modules

Step	Action

Routing the fiber-optic cables and the communication cable(s) to the module(s) equipped in the OMC2

18 Make sure that the OMC2 is in the most forward position—see step 10.

19 Route the fiber-optic cables to the applicable module.

20 Route the communication cable to the Equipment Inventory port on the module faceplate.

Note: The OMC2 is equipped with features that allow you to bundle and secure cables.

21 Bundle and secure cables to the OMC2 features by

- making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and
- protecting all cables from cuts and abrasions according to your company's practice and industry standards.

22 Close the OMC2 door. Make sure to avoid pinching the cable bundle routed through the OMC2 side opening.

23 Pull out the plunger on the right-hand side of the OMC2 chassis (see "Installing a module into the OMC2 chassis" on page 1-189), push the chassis inside the rack, and use the plunger to secure the chassis in position.

—end—

Procedure 1-12
Installing a Fiber Interconnect Module (FIM)

Use this procedure to install the following modules:

- FIM Type 1 (NTK504CA)
- FIM Type 2 (NTK504CB)
- FIM Type 3 (NTK504CC)
- FIM Type 4 (NTK504CD)
- FIM Type 5 (NTK504CE)
- FIM Type 6 (NTK504CF)

FIMs are shipped with the following equipment pre-installed. FIM ports are pre-equipped with dust caps or loopback modules as listed below. In addition to providing the optical loopback operation required by applications that use the FIM, the loopback modules act as dust caps for the optical ports. Do not remove the dust caps or loopback modules except as part of a fiber connecting procedure. FIM assemblies that include pre-installed loopback modules also include a bag of dust caps that must be put on any loopback module that is being removed and saved for future use. For more information, see the Photonic passive modules table in *Planning - Ordering Information*, 323-1851-151.

- FIM Type 1:
  - dust caps on MPO ports 1 to 4 (WSS1)
  - MPO Loopback (APC, SM, 12 Fiber) modules in all the other MPO ports
  - Duplex LC Loopback (SM) modules in each of the duplex LC ports
- FIM Type 2:
  - dust caps on MPO ports 1 to 4 (WSS1)
  - MPO Loopback (APC, SM, 12 Fiber) modules in all the other MPO ports

- FIM Type 3:
  - dust caps pre-installed on Fiber Group 1 ports (4 items)
  - MPO loopback modules pre-installed on Fiber Group 2-20 ports (76 items)
  - dust caps for MPO loopback modules (not installed, 76 items)
  - LC duplex loopback modules pre-installed on UPG ports 1-20 (20 items)
  - dust caps for LC loopback modules (not installed, 20 items)
- FIM Type 4:
  - Duplex LC Loopback (SM) modules in each of the duplex LC ports
- FIM Type 5:
  - four MPO Loopback (APC, SM, 12 Fiber) modules pre-installed in four of the FIM's five MPO ports
  - Duplex LC Loopback (SM) modules in each of the duplex LC ports
  - dust caps on the rest of the FIM optical ports
- FIM Type 6:
  - MPO Loopback (APC, SM, 12 Fiber) modules in each of the MPO ports
  - dust caps on the rest of the FIM optical ports

If you discarded 299-1575-001 LC duplex loopback connectors that were included in the FIM1, FIM3, FIM4, or FIM5, you can order the following kit (see *Planning - Ordering Information*, 323-1851-151):

500-0201-020 - Duplex LC Loopback (SM, max 1.2 dB insertion loss) Module Kit (Qty 20 of 299-1575-001)

Prerequisites

Make sure that you

- are familiar with the manufacturer's torque specifications for the rack, as required
- have a 3/8-in. wrench
- have the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans

- have a ground cable and a ground lug appropriate to the frame. Have screws appropriate to the frame to attach the frame ground.
- have a crimp tool for 6 AWG (16-mm^2) ground cable
- have a flathead screwdriver
- observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0
- have the appropriate personal grounding device to dissipate electrostatic charges

Precautions

DANGER

Risk of electrical shock and equipment damage

Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the topic on consequences of incorrect grounding. For additional details, see the section on working with power.

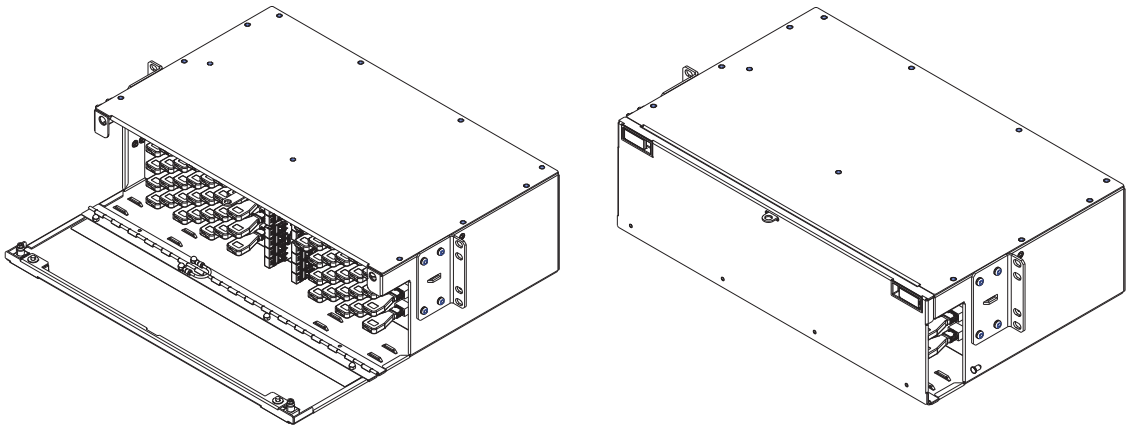
Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging equipment.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf installed and grounded in a grounded rack/cabinet or clip to a suitable ground point.
3	Unpack and inspect the module. See the following illustrations: • "FIM Type 1" on page 1-195 • "FIM Type 2" on page 1-196 • "FIM Type 3" on page 1-196 • "FIM Type 4, FIM Type 5, and FIM Type 6 - front view" on page 1-197

Figure 1-131
FIM Type 1



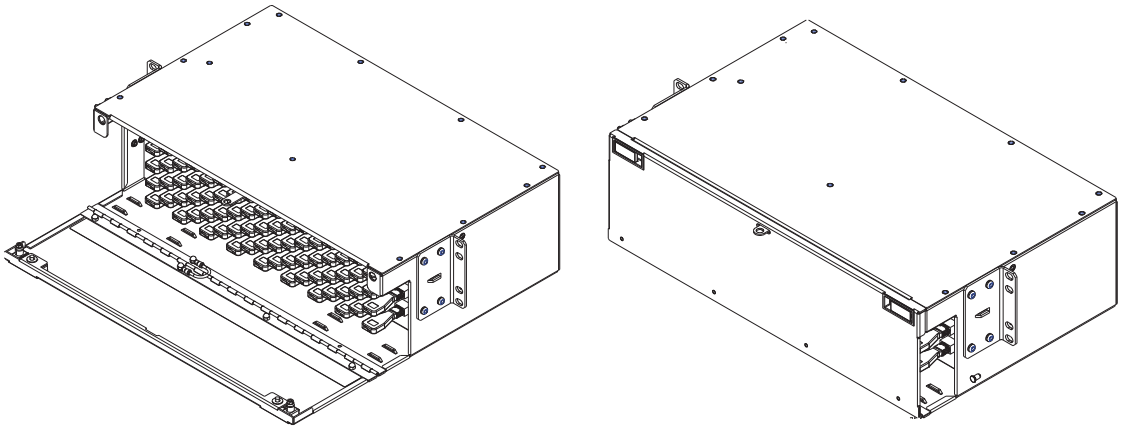
Front view - door open

Front view - door closed

Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

Step	Action

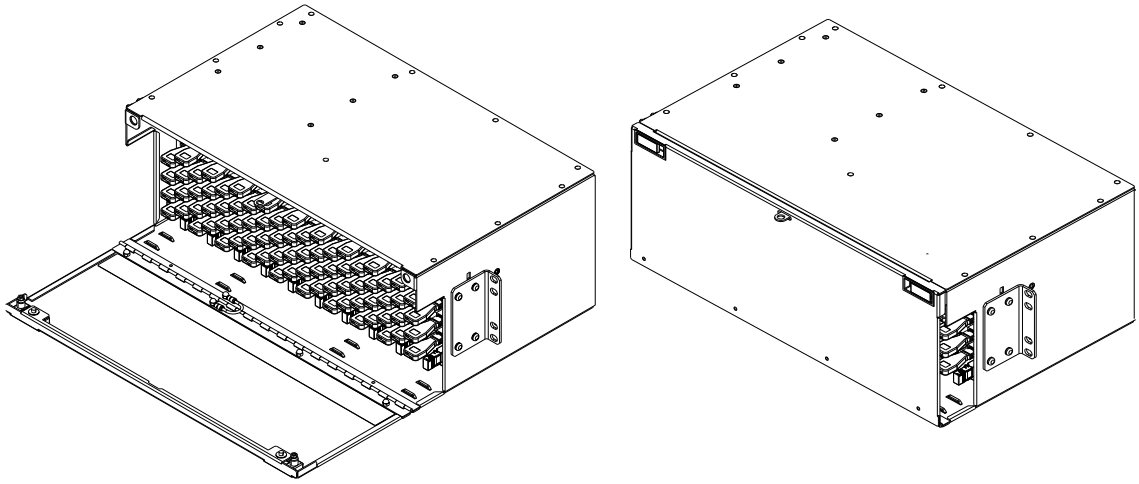
Figure 1-132
FIM Type 2



Front view - door open

Front view - door closed

Figure 1-133
FIM Type 3



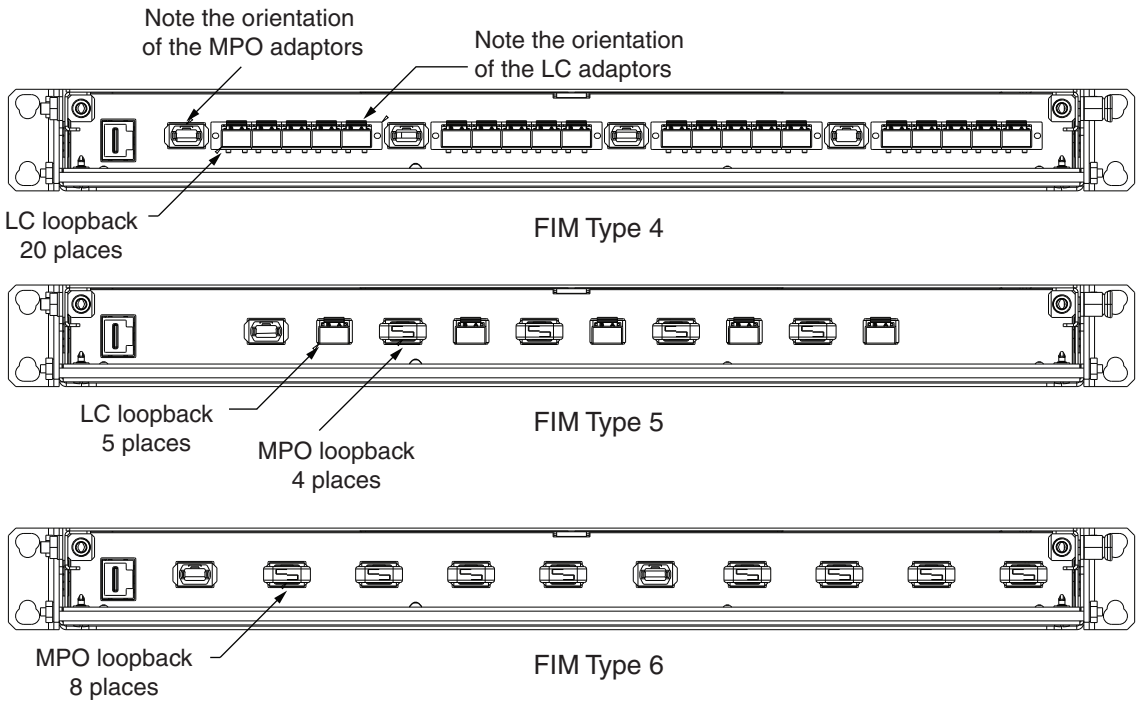
Front view - door open

Front view - door closed

Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

Step	Action

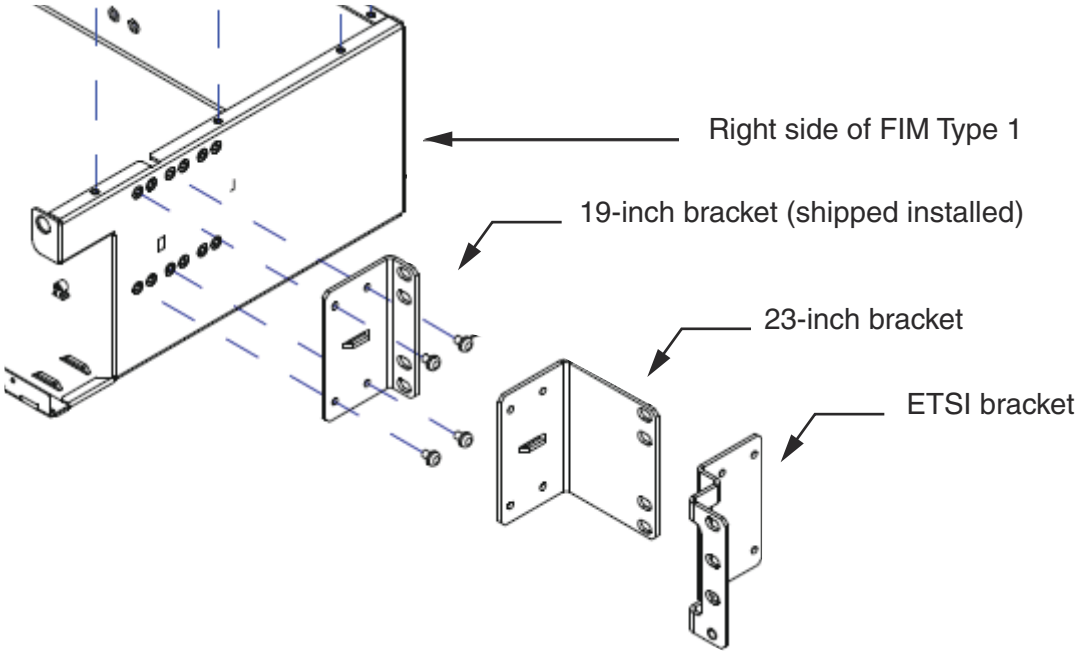
Figure 1-134
FIM Type 4, FIM Type 5, and FIM Type 6 - front view



Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

Step	Action
4	Select the applicable mounting brackets. For details, see the EDP, IDP, or equivalent site/network engineering plans.
5	Attach the applicable mounting brackets to the module (see the following illustrations). The 19-in. brackets are shipped installed.

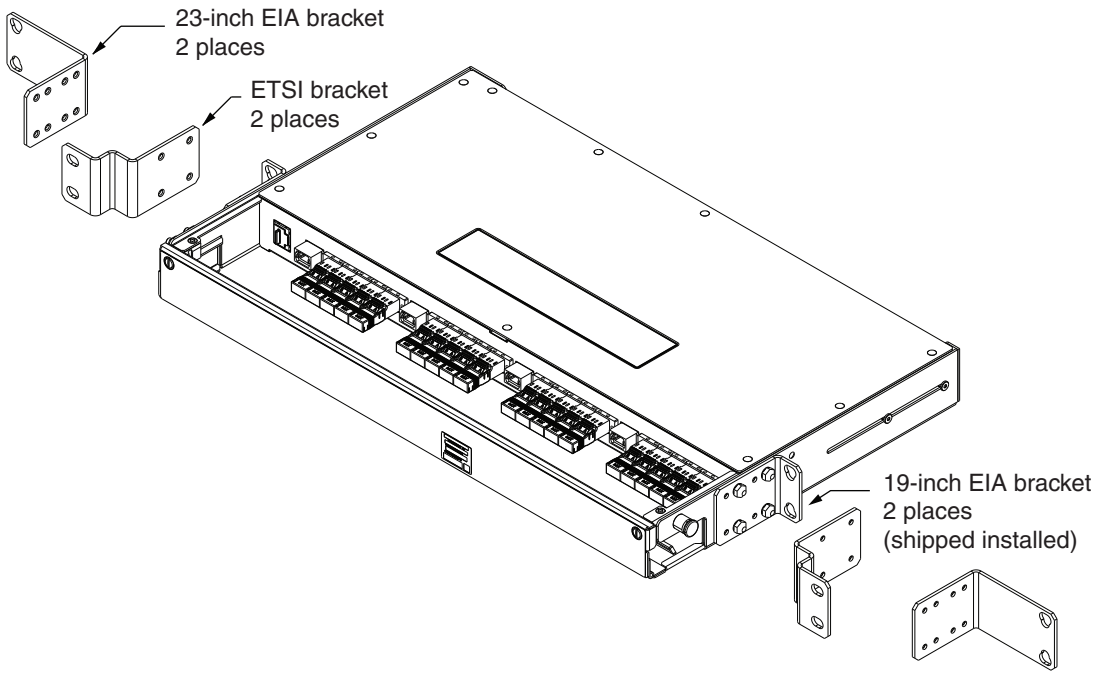
Figure 1-135
Mounting brackets for FIM Type 1, FIM Type 2, and FIM Type 3 (example shows the right side of FIM Type 1)



Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

Step	Action

Figure 1-136
Mounting brackets for FIM Type 4, FIM Type 5, and FIM Type 6



6 Determine the appropriate mounting hole positions and setback positions on the frame. For details, see the EDP, IDP, or equivalent site/network engineering plans.

7 Secure the module to the rack using the appropriate mounting screws.

Tighten the mounting hardware to the rack manufacturer's torque specifications. Use a torque wrench to verify that torque has been applied correctly. In the case of the PTE2000 rack, for the M6 and 12-24 mounting options, that specification is 5.65 N-m (50 lb-in.) for installation and 4.52 N-m (40 lb-in.) for inspection.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the module to the rack with the appropriate mounting screws. Otherwise, you risk damaging the equipment.

Procedure 1-12 (continued)
Installing a Fiber Interconnect Module (FIM)

Step	Action

Grounding the module

8 Locate the main protective ground terminal points. Two options are provided: on the left-hand side of the module and at the rear.

9 Attach the two-hole lug with a ground cable to the module.

10 Fasten the other end of the ground cable to an appropriate location on the rack.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the ground cable with mounting screws onto the frame. Otherwise, you risk damaging the equipment. Torque the #10-32 KEPS nuts to 2.26 N-m (20 lb-in.).

CAUTION
Risk of damage to MPO cables
Before you close the FIM door, make sure you bend the flexible boots of the MPO cables to allow the cables to route to the side of the FIM. Otherwise, you can pinch the optical fiber. (See “Bending the flexible boot of the MPO cable before closing the FIM door” on page 1-232.)

You have completed this procedure.

To install the DSCM drawer (NT0H57LA), see Procedure 2-1, “Installing and grounding equipment drawers”, then Procedure 2-4, “Installing a DSCM tray in a DSCM drawer (NT0H57LA)”.

To install cables, see as applicable to your equipment:

- Procedure 1-13, “Routing fiber-optic cables to circuit packs in the 6500 shelf”
- Procedure 2-10, “Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900”.
- Procedure 1-14, “Guidelines for cable routing to electrical SFP and optical ports on the same shelf”
- Procedure 1-15, “Installation guidelines for QSFP28-QSFP28 DAC cable”

To connect MPO cables, see “Connecting or disconnecting fiber-optic cables to or from circuit packs” on page 1-222.

—end—

Procedure 1-13
Routing fiber-optic cables to circuit packs in the 6500 shelf

For DAC cables, see "Installation guidelines for QSFP28-QSFP28 DAC cable" on page 1-217.

Use this procedure to route

- MPO cables for colorless-directionless-contentionless (CDC) applications
- fiber-optic cables onto the 4-slot optical shelf, and between paired circuit packs on the shelf.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically. The Upper Bracket Assembly and the Lower Bracket Assembly include features for routing fiber (and cables). As a guide for routing fiber, see the photos for a wall-mounted shelf: Figure 1-138 on page 1-205. Figure 1-139 on page 1-206, and Figure 1-140 on page 1-206.

- In order to prevent congestion in the shelf fiber manager and minimize interference between fiber patchcords and a shelf front cover, you must consider the recommendations detailed in the operational considerations section in *Ordering Information,* 323-1851-151, if any of the following apply:
  - — using fiber patchcords with a boot length greater than 42.5 mm (not recommended, but using an extended depth cover solution will provide additional space in front of the circuit packs)
  - — using in-line optical attenuators (fixed pads) (not recommended, but using an extended depth cover solution will provide additional space in front of the circuit packs)
  - — using a circuit pack (such as eMOTR 4xXFP/8xSFP+/32xSFP) that has more than 32 optical connections/slot (16 duplex ports/slot) (using bend insensitive optical patchcords with 1.6 mm diameter is recommended)
- If you are installing pluggables that use MPO cables, the MPO cables can be formed to create a 90 degree exit but may interfere with the standard depth door/cover, if equipped. Some specific pluggables have an extended flexible pull tab/handle that will interfere with the standard depth door/cover, if equipped. The extended depth cover solution provides

additional space in front of the circuit pack. For specific door compatibility considerations with pluggables that use MPO cables, refer to the pluggable's description in *Ordering Information*, 323-1851-151.

- The Optical Time Domain Reflectometer requires at least 20 km of optical fiber to verify the fiber for reflection or loss. An OTDR trace run on short fiber may fail due to loss or reflection. The Optical Time Domain Reflectometer applies to the following circuit packs:
  - — Single line Raman Amplifier (SRA C-Band) w/Optical Service Channel (OSC) 1xSFP 10/100 BT WSC circuit pack (NTK552JA)
  - — Enhanced Service Access Module (ESAM C-Band) w/Optical Service Channel (OSC) 1xSFP 10/100 BT WSC circuit pack (NTK552JT)

CAUTION
Risk of equipment damage
Connect only a fiber spool (with at least 20 km of fiber) to Port 8 of the SRA circuit pack. Never directly connect any other equipment to Port 8, for example, any type of eVOA or fixed attenuation pads.

- RJ-45 cables to the following circuit packs if there is an intention to use Wayside traffic on the circuit pack now or in the future:
  - — 2xOSC circuit pack (NTK554BAE5)
  - — Single line Raman Amplifier (SRA C-Band) w/Optical Service Channel (OSC) 1xSFP 10/100 BT WSC circuit pack (NTK552JA)
  - — Service Access module (SAM C-Band) w/Optical Service Channel (OSC) 1xSFP 10/100 BT WSC circuit pack (NTK552JN)
  - — Enhanced Service Access Module (ESAM C-Band) w/Optical Service Channel (OSC) 1xSFP 10/100 BT WSC circuit pack (NTK552JT)

  that are equipped in the following shelves:
  - — 4-slot optical shelf (NTK503HA)

  Although 2xOSC, SRA, SAM, or ESAM circuit packs can be equipped in slots 1 to 4 of a 4-slot optical shelf, it is recommended to use slots 1 and/or 4 of the 4-slot optical shelf if there is an intention to use Wayside traffic on the circuit pack now or in the future.

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

For a circuit pack equipped in slot 1 of a 4-slot optical shelf (NTK503HA), RJ45 cables can be routed down and to the left in front of the access panel in order to be kept separate from the fiber routing area when connecting the two Wayside Ethernet ports found on the 2xOSC circuit pack or one Wayside Ethernet port found on the SRA, SAM, or ESAM circuit pack. The Wayside Ethernet ports are intended for intrabuilding use only.

See the following illustration:

- “Example of fiber routing for a 4-slot optical shelf (NTK503HA)” on page 1-204

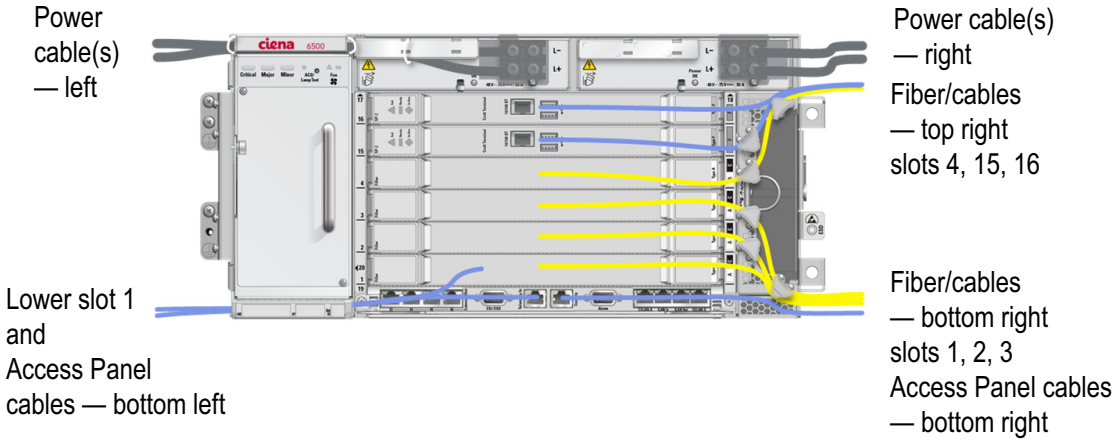
Some figures show power cables and communication cables as well as fiber-optic cables. Before routing fiber-optic cables, connect power cables to the power input cards and communication cables to the access panel. For certain shelves, the fiber-optic cables overlap with power cables and/or communication cables. For such shelves, a right side view of the shelf is also provided to show the placement of each type of cable.

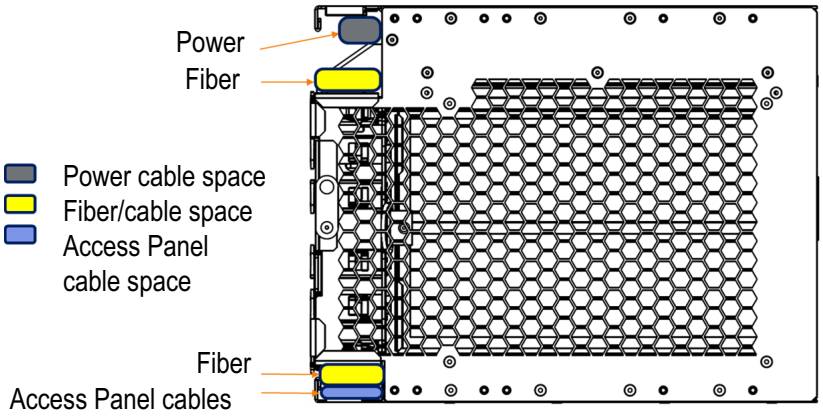
If applicable to your configuration, see “Guidelines for cable routing to electrical SFP and optical ports on the same shelf” on page 1-213. For more information, see the respective sections on special considerations when using:

- 10/100BASE-T RJ45 SFP (NTTP61BAE5), 10/100/1000BASE-T RJ45 SFP (NTTP61CA) and 1000BASE-T RJ45 SFP (NTTP61AAE6) in *eMOTR Circuit Packs*, 323-1851-102.7
- 10/100/1000BASE-T RJ45 SFP (NTTP61CA) and 1000BASE-T RJ45 SFP (NTTP61AAE6) in *OTN Flex MOTR Circuit Packs*, 323-1851-102.5

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

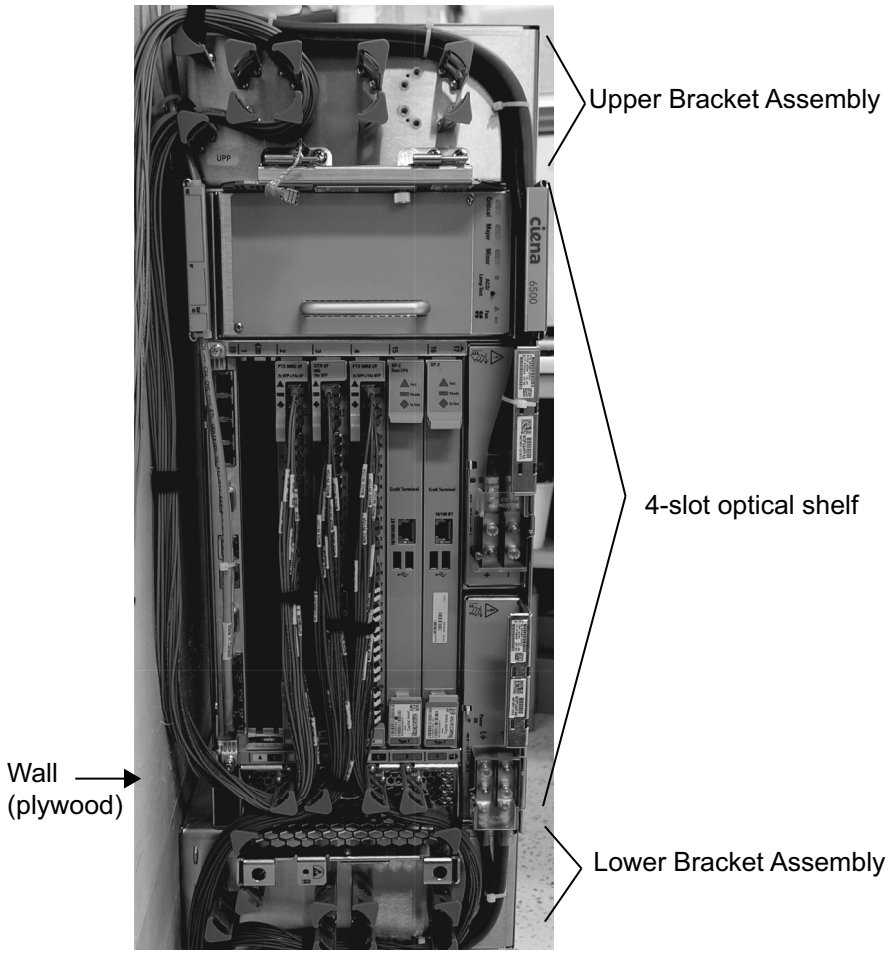
Figure 1-137
Example of fiber routing for a 4-slot optical shelf (NTK503HA)





Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Figure 1-138
Wall-mounted shelf—fiber routing for a 4-slot optical shelf (NTK503HA)—example (DC power)



Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Figure 1-139
Wall-mounted shelf—fiber routing close-up of Upper Bracket Assembly—example (DC power

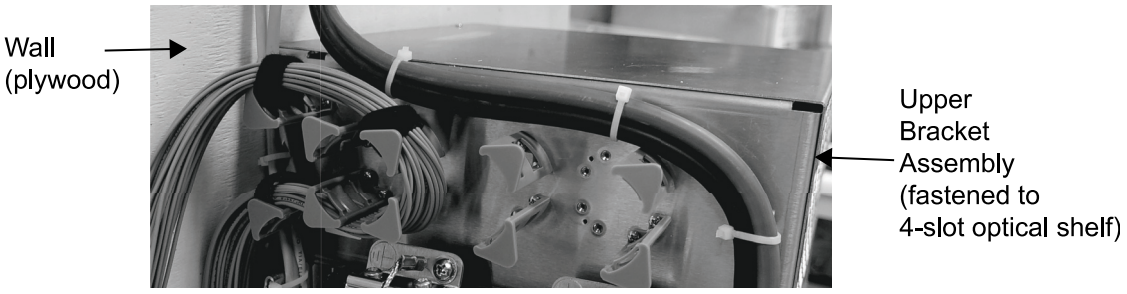
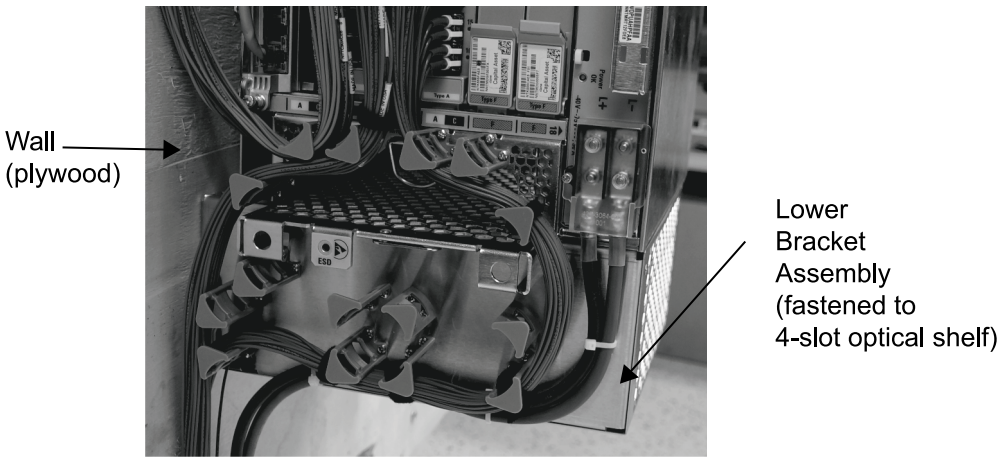


Figure 1-140
Wall-mounted shelf—fiber routing close-up of Lower Bracket Assembly—example (DC power)



Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Prerequisites

- Make sure that you have
  - — hook and loop tape (such as Velcro), fiber cable ties or lacing twine and tools (according to your company's practice) to bundle the fibers

    You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.
  - — hook and loop tape (such as Velcro), cable ties or lacing twine and tools according to your company's practice to secure RJ-45 cables

    You must protect all cables from cuts and abrasions according to your company's practice and industry standards.
  - — the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans
  - — the appropriate personal grounding device to dissipate electrostatic charges

Precautions

CAUTION
Risk of fiber-optic cable damage
The minimum bend radius for fiber-optic cable is 1.5 in. (3.8 cm). Observe this limit at all times to avoid low fiber-optic cable performance or damage.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Locate the required shelf. For details, see the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on a shelf installed in a grounded rack/cabinet or clip to a suitable ground point.

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Step	Action	
3	Select your next step.	
	If the shelf front cover is	**Then**
	installed on the shelf	remove the shelf front cover from the shelf
	not installed on the shelf	go to step 4
4	Select your next step.	
	If you are	**Then**
	routing fibers at a regenerator site	go to step 5
	routing fibers for a WL5e MOTR, WLAi, and OTN FLEX MOTR application	go to step 6
	routing fibers at a terminal site	go to step 7
	routing RJ-45 cable to a 2xOSC, SRA, SAM, or ESAM circuit pack	prepare to route the RJ-45 cable by first reading the general instructions in step 7. Then continue to step 8 and step 9 and follow the routing instructions based on the recommended slot and shelf. ***Note:*** For an overview of the recommended slots for these specific circuit packs, see the introductory section of this procedure.
	routing MPO cables for CDC applications	go to step 11
5	For regenerator applications, deploy back-to-back connections on paired 100G WL3e OTR, 100G WL3n OTR, WLAi MOTR, or WL5e MOTR circuit packs as follows: • Route the fiber-optic cables as described in step 7. • Route and store the excess fiber cable between the paired 100G WL3e OTR, 100G WL3n OTR, WLAi MOTR, or WL5e MOTR circuit packs in an external fiber manager (or other fiber slack management system).	

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Step	Action
	For details related to routing in a fiber manager, see the following procedures: — "Installing a 1U Bulk Fiber Management Tray 174-0094-900" on page 2-27 — "Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager" on page 2-62 — "Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900" on page 2-67
6	For WL5e MOTR, WL3, WLAi, OTN Flex MOTR and other broadband applications: • Route the fiber-optic cables as described in step 7. • Route and store the excess fiber cable between the pair of circuit packs in an external fiber manager (or other fiber slack management system). For details related to routing in a fiber manager, see the following procedures: — "Installing a 1U Bulk Fiber Management Tray 174-0094-900" on page 2-27 — "Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager" on page 2-62 — "Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900" on page 2-67
7	Route the optical fibers or cables to the right towards the fiber guides on the right side of the shelf. • For the 4-slot shelf, route optical fibers that terminate on slot 1 to 3 toward the bottom right of the shelf through the appropriate channel of the fiber routing guide, and on slot 4 toward the top right of the shelf through the appropriate channel of the fiber routing guide. • Use hook and loop tape (such as Velcro), fiber cable ties or lacing twine and tools according to your company's practice to attach the fibers and cables to the lancing point integrated into the fiber routing guides as required. • Secure the fiber/cable to the support points above and below the cover closure points to prevent interference with the optional shelf cover. Do not route cable or fibers across the shelf air inlet or they will interfere with access to the air filter. • See the following illustrations.

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Step	Action

Figure 1-141
Routing fiber

Use external fiber management drawers to store excess fiber cable. Fiber slack storage is not provided for fibers leaving the 6500 shelf.

8 Select your next step.

If	**Then** go to
you are routing an RJ-45 cable to a 2xOSC, SRA, SAM, or ESAM circuit pack	step 9
otherwise	step 13

9 If the RJ-45 cable cannot be routed towards the bottom of the circuit pack and through the fiber channel, then routing the RJ-45 cable towards the top of the circuit pack is possible with the following considerations:

- obstruction of circuit-pack level faceplate LEDs
- interference with other access panel cables, and
- due to the required cable bend radius, interference with a shelf front cover.

Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Step	Action
10	Manage the RJ-45 cable exiting the shelf by • making sure that you use hook and loop tape (such as Velcro), cables ties or lacing twine and tools according to your company's practice, and • protecting all cables from cuts and abrasions according to your company's practice and industry standards. Then go to step 13.

Routing MPO cables for CDC applications

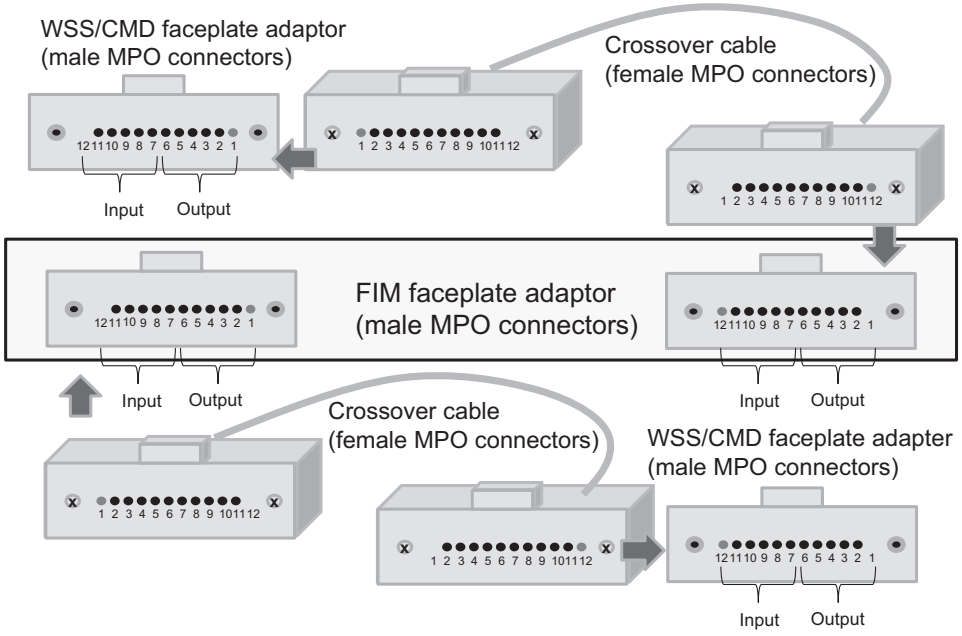
11 When routing MPO cables, note the following:

- Use Female – Female crossover cable + Male – Female straight cable (see Figure 1-142 on page 1-211).

12 Route four MPO cables for each WSS:

- one cable from WSS circuit pack Switch A to FIM WSS port A
- one cable from WSS circuit pack Switch B to FIM WSS port B
- one cable from WSS circuit pack Switch C to FIM WSS port C
- one cable from WSS circuit pack Switch D to FIM WSS port D

Figure 1-142
CDC—MPO cables and connector types



Procedure 1-13 (continued)
Routing fiber-optic cables to circuit packs in the 6500 shelf

Step	Action
13	Close the fiber manager door (if applicable).
14	If you have removed the shelf front cover to route optical fibers and cables, re-install the shelf front cover.

—end—

Procedure 1-14
Guidelines for cable routing to electrical SFP and optical ports on the same shelf

Use the examples in the following illustrations as a guide when routing cables to RJ45 SFP ports and fiber patch cords to optical ports on the same shelf:

- "Cable routing example for eMOTR Edge 4xXFP/2xSFP+/8xSFP (NTK536BE)" on page 1-215
- "Cable routing example — CAT5 cable secured and routed" on page 1-216
- "Cable routing example — CAT5 cable exiting" on page 1-216

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

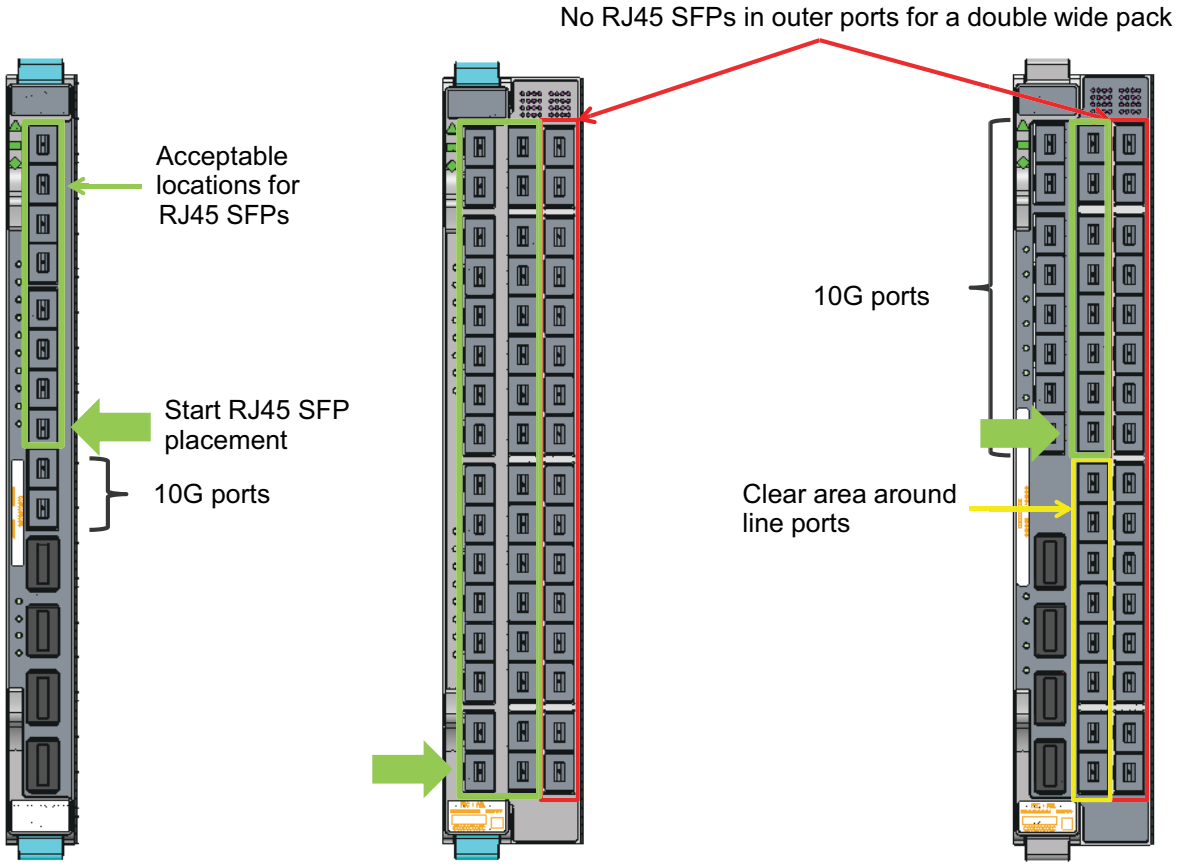
For a wall-mount application, the 4-slot optical shelf is mounted vertically.

For more information, refer to the following sections in the respective technical publication:

- "Special considerations when using 10/100/1000BASE-T RJ45 SFP (NTTP61CA)", in *eMOTR Circuit Packs*, 323-1851-102.7.

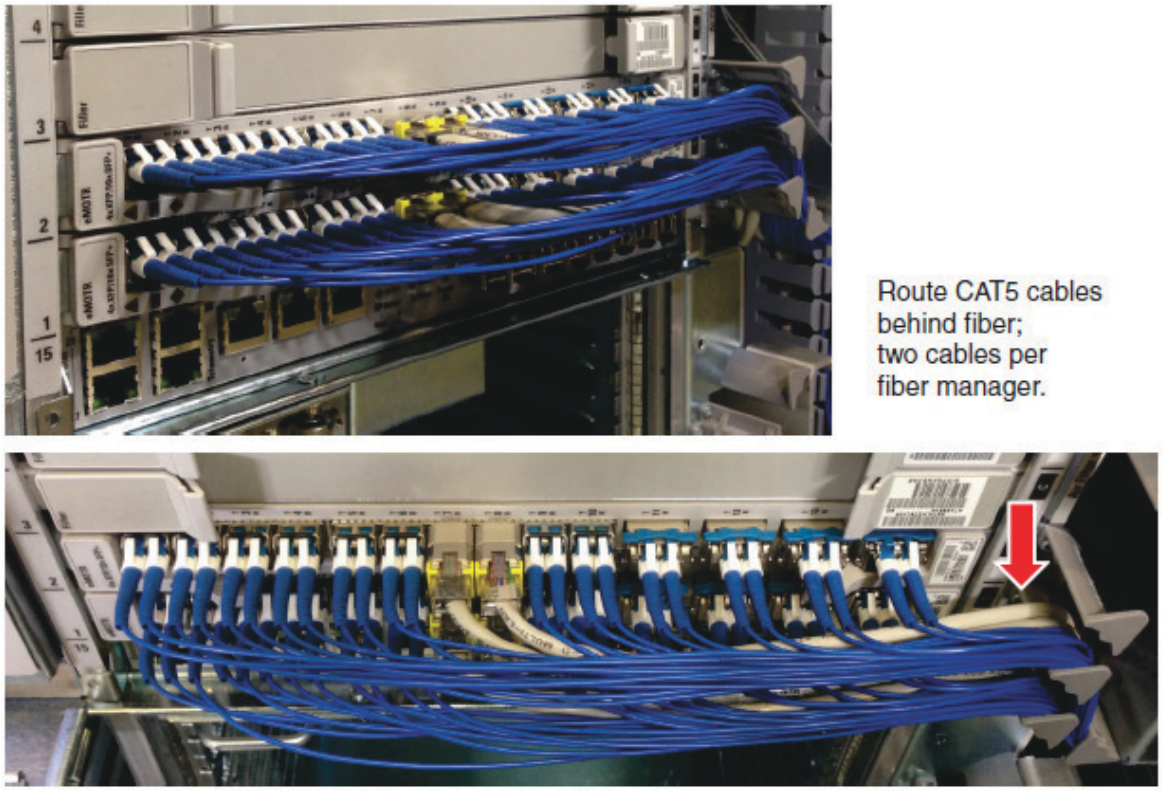
Procedure 1-14 (continued)
Guidelines for cable routing to electrical SFP and optical ports on the same shelf

Figure 1-143
Port locations on circuit packs



Procedure 1-14 (continued)
Guidelines for cable routing to electrical SFP and optical ports on the same shelf

Figure 1-144
Cable routing example for eMOTR Edge 4xXFP/2xSFP+/8xSFP (NTK536BE)



Procedure 1-14 (continued)
Guidelines for cable routing to electrical SFP and optical ports on the same shelf

Step	Action

Figure 1-145
Cable routing example — CAT5 cable secured and routed

CAT5 cables can be secured to the bottom of the lower fiber manager and routed towards the back through the shelf side air intake.

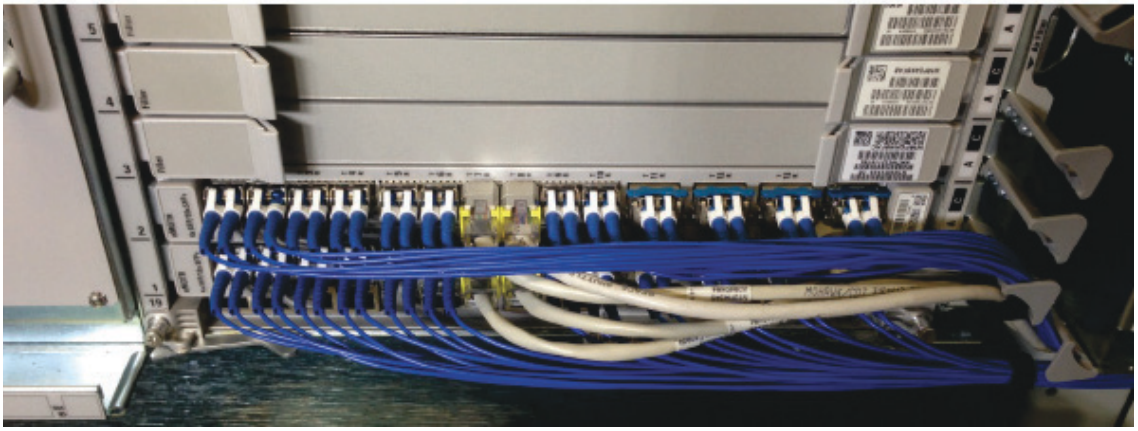
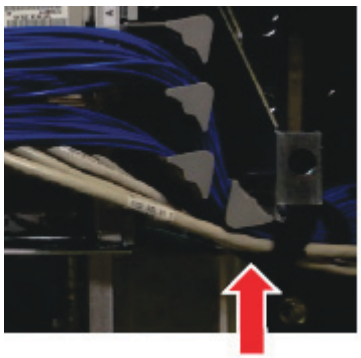


Figure 1-146
Cable routing example — CAT5 cable exiting



—end—

Procedure 1-15
Installation guidelines for QSFP28-QSFP28 DAC cable

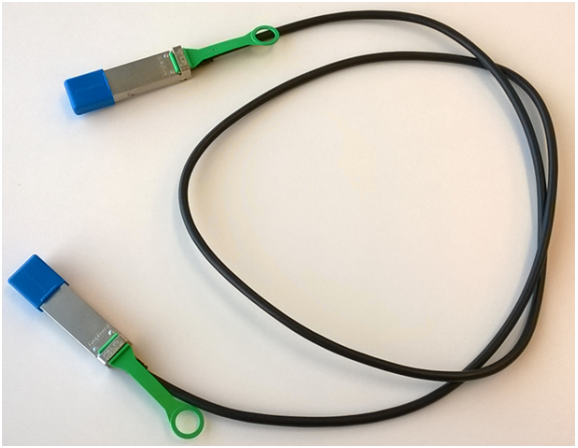
For Active Optical Cable (AOC) routing, see the "Routing fiber-optic cables to circuit packs in the 6500 shelf" on page 1-201 procedure.

The 6500 only supports the DAC cables (160-9450-900, 160-9451-900, and 160-9452-900) described in this document. Third-party DAC cables and other Ciena branded DAC cables are not supported. Refer to *Pluggable Datasheets and Reference,* 323-1851-180, for the circuit packs that support DAC cables.

For technical specifications, see the section on QSFP+ and QSFP28 specifications in *Pluggable Datasheets and Reference*, 323-1851-180. For additional AOC planning considerations, see the Enhanced quad (4-channel) small form-factor pluggable 28 modules (QSFP28) section in *Planning - Ordering Information*, 323-1851-151.

For more information on WLAi MOTR NTK538DZ/NTK538CT/NTK538DR/ NTK538DT/NTK538DS: two-circuit pack Regen, three-circuit pack Regen, or four-circuit pack Regen configurations, see the section on WL5e MOTR, WL3 (MOTR, OTR) and WLAi (MOTR, FOTR) circuit packs in *WaveLogic, OCLD, OCI, MUX, and Submarine Circuit Packs,* 323-1851-102.4.

Figure 1-147
QSFP28-QSFP28 Passive Direct Attach Copper (DAC) cable



ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

Procedure 1-15 (continued)
Installation guidelines for QSFP28-QSFP28 DAC cable

Applications

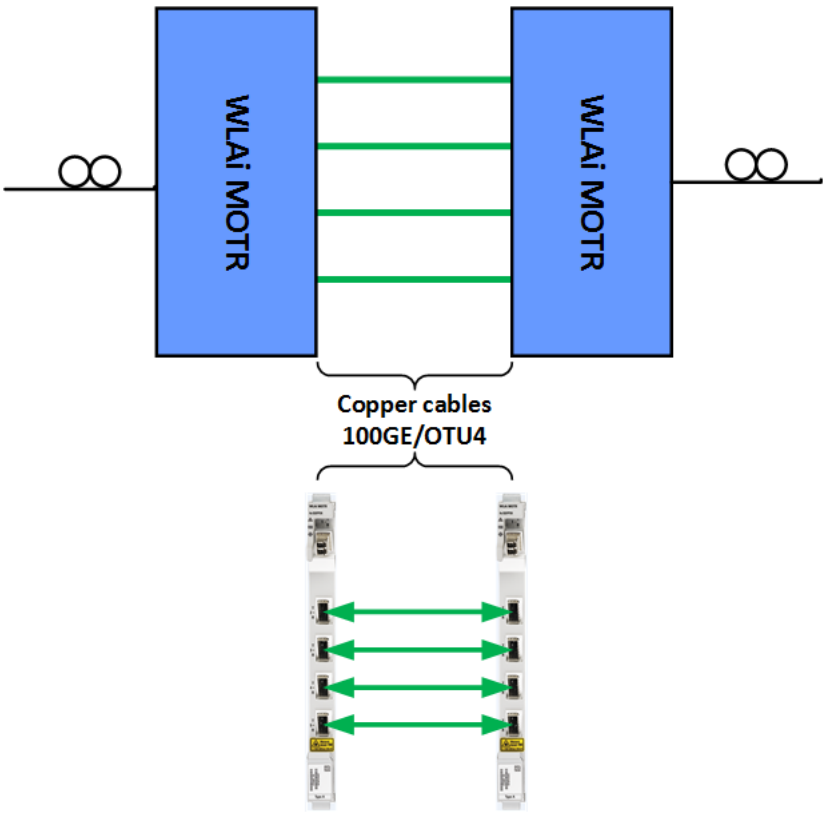
QSFP28-QSFP28 Passive Direct Attach Copper (DAC) cable is supported for the following applications:

- "Application 1—WLAi MOTR Client Regen (OTUCn client FEC ON, 100GE FEC ON)" on page 1-218

  Note: Active Optical Cables (AOC) can be used instead of DAC cables for the Regen applications described in this procedure (but are not limited to these applications).

- "Application 2—200G (2x100G/5x40G) MUX OTU4 (FEC ON) to WLAi MOTR OTU4 (FEC ON)" on page 1-219

Figure 1-148
Application 1—WLAi MOTR Client Regen (OTUCn client FEC ON, 100GE FEC ON)



Procedure 1-15 (continued)
Installation guidelines for QSFP28-QSFP28 DAC cable

Figure 1-149
Application 2—200G (2x100G/5x40G) MUX OTU4 (FEC ON) to WLAi MOTR OTU4 (FEC ON)

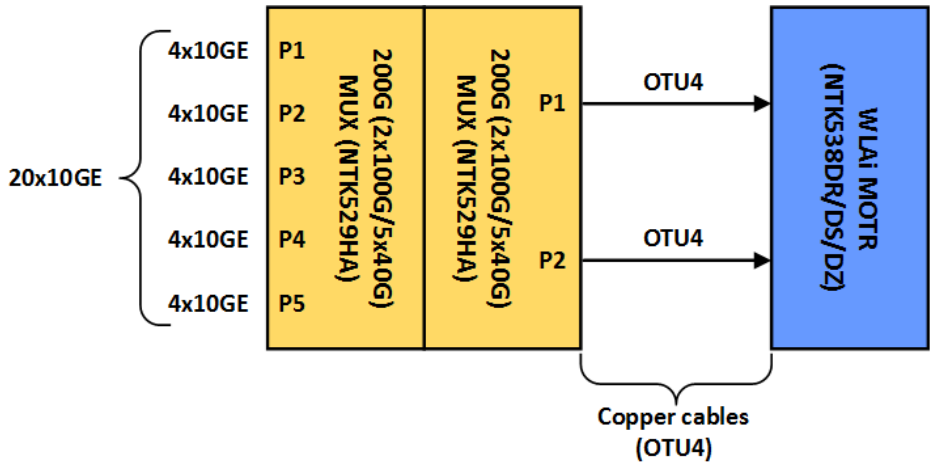


Figure 1-150
Cable routing example using 1.5 m DAC cables

Figure 1-151
Cable routing example using 1.5 m and 0.35 m DAC cables

Procedure 1-15 (continued)
Installation guidelines for QSFP28-QSFP28 DAC cable

Engineering rules

The following engineering rules apply:

- FEC must be ON on the ports interconnected with DAC cables in these applications. (For more information, see the section on QSFP+ and QSFP28 specifications in *Pluggable Datasheets and Reference*, 323-1851-180.)
- When using the 1.2 m or 1.5 m DAC cable, the circuit packs interconnected with this cable can be, but do not have to be, located in consecutive slots.When using a 0.35 m DAC cable, the circuit packs interconnected with this cable must be in adjacent slots.
- Refer to equipping rules in *WaveLogic, OCLD, OCI, MUX, and Submarine Circuit Packs*, 323-1851-102.4, for rules relating to mating WLAi MOTRs.
- For MOTR card regen three card groups, the 0.35 m cable can only be used for the adjacent card interconnect.
- For MOTR card regen four card groups, the 0.35 m cable cannot be used. The 1.2 m or 1.5 m cable must be used as all connections are across cards.
- When both fiber patchcords and DAC cables are installed in the same section of the shelf fiber manager, ensure that the DAC cables are installed prior to the fibers.
- When appropriately routed, DAC cables will not interfere with the use of a standard depth shelf cover/door. However, use of an extended depth cover provides additional space in front of the circuit packs. For details on extended depth covers, see *Ordering Information*, 323-1851-151.
- Whenever rack space permits, a cable slack management accessory such as crossover channel can be used to dress the excess DAC cables.
- Ensure that the DAC cable is aligned correctly prior to inserting the QSFP28 plug end into the circuit pack.
- When inserting a circuit pack adjacent to a circuit pack with DAC cables, ensure the DAC cable tabs do not get caught.
- The DAC cable minimum static bend radius is 16 mm (internal).
- Existing and future fiber bend limiter space should be evaluated before filling fiber bend limiters with copper cables, with more than the maximum number of cables specified for the respective application.

Procedure 1-15 (continued)
Installation guidelines for QSFP28-QSFP28 DAC cable

- Cable space in fiber bend limiters and available space on the side of the shelf (to manage the copper cables) should be assessed because this is dependent on circuit pack configuration, rack choice, and shelf setback.
- Depending on setback, if the cables cannot be dressed on the sides of the shelf, they may have to loop above or below the vertical footprint of the shelf.

—end—

Procedure 1-16
Connecting or disconnecting fiber-optic cables to or from circuit packs

Use this procedure to connect or disconnect fiber-optic cables to or from circuit packs or FIMs, (including MPO cables, and FIM loopback modules).

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically.

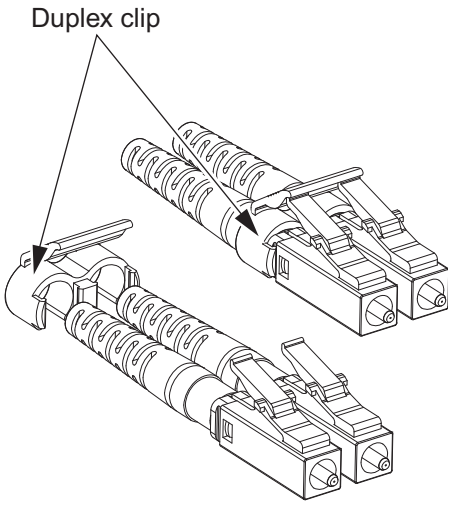
Prerequisites

- Review the operational considerations section in the section on circuit packs, modules, pluggable modules, and interface hardware, in *Ordering information*, 323-1851-151.
- Have the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans.
- Make sure you have the appropriate patchcords before connecting fiber-optic cables.
- If you are connecting FIM loopback modules, make sure you have the applicable loopback modules (shipped with the FIM).
- For circuit packs that use optical XFP, SFP, SFP+, SFP28, QSFP+, QSFP28, QSFP-DD, CFP, CFP2, or CFP2-DCO modules, make sure that the modules are installed before you connect the fiber-optic cables.

  See Procedure 1-9, “Installing and removing pluggable modules”.
- If you are installing pluggables that use MPO cables, the MPO cables can be formed to create a 90-degree exit but may interfere with the standard depth door/cover, if equipped. Some specific pluggables have an extended flexible pull tab/handle that will interfere with the standard depth door/cover, if equipped. The extended depth cover solution provides additional space in front of the circuit pack. For specific door compatibility considerations with pluggables that use MPO cables, refer to the pluggable’s description in *Ordering Information*, 323-1851-151.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Figure 1-152
Duplex clip on optical fiber patchcords



Connecting fiber-optic cables (non-MPO)

- Make sure you have the LC fiber tool kit (174-0099-900) to disconnect the connector.

  Although optional, this tool assists in installing and removing LC fibers or removing pluggables when space is restricted. When not in use, this tool can be stored in its container.
- Make sure that you have the appropriate dust covers to protect unused pluggable modules.
- If you are using fixed attenuators for the optical interfaces and the shelf is equipped with a shelf front cover, do not add the attenuators on the optical interface. Instead, add the required attenuators to the patch panel or inside a fiber storage tray.
- For 6500 circuit packs that have the fiber connection exiting the faceplate at 90 degrees, use fibers with standard short 42.5 mm flexible boots, NTTC50++V6 Ciena supplied patchcords or equivalent with Telcordia GR-326 compliant, short flexible LC boot. See Figure 1-153 on page 1-224.

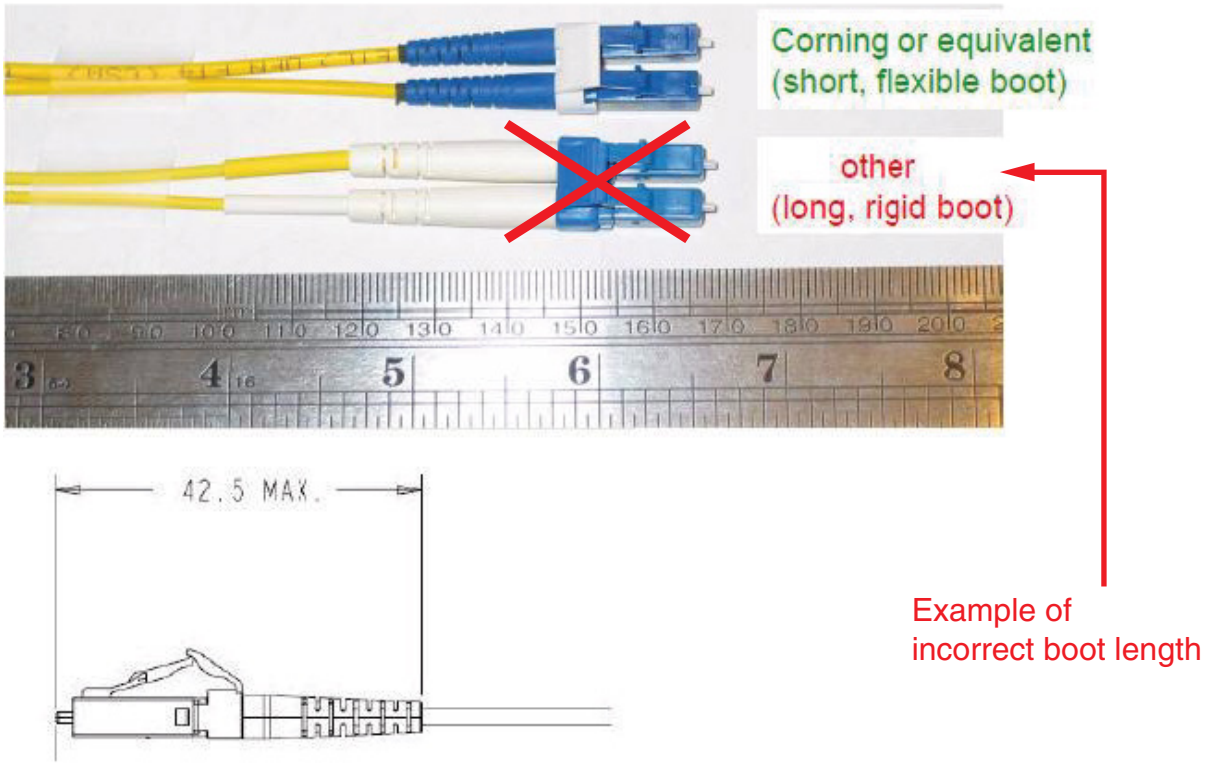
  Do not install in-line plug attenuators at the 6500 circuit pack faceplate on ports that are perpendicular to the faceplate (also not recommended on angled ports).

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

- Make sure that you have the appropriate personal grounding device to dissipate electrostatic charges.
- Make sure that you have hook and loop tape (such as Velcro), fiber cable ties or lacing twine and tools according to your company's practice.

  You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

Figure 1-153
6500 optical fiber boot length



Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Precautions

CAUTION
Risk of personal injury
When inserted in a shelf slot, the optical interface circuit pack emits laser light that can blind. Keep all optical connectors on the optical interface circuit packs capped when they are not connected to optical fiber cables. Never look directly into the end of an optical fiber.

CAUTION
Risk of laser radiation exposure
Using the upgrade coupler/splitter module (UCS) and/or the C/L-band mux/demux module (CLMD) in applications that require using the isolator port of the respective module for wet plant deployments of Submarine Line Terminal Equipment (SLTE) will necessarily defeat the laser safety features of the line-facing amplifiers for operational reasons. Users of the equipment and service personnel must have appropriate laser safety training for Hazard Level 3B.

For more information, see the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

ATTENTION
Make sure that you follow the recommendations described in “Circuit packs with 90-degree SFPs” on page 1-3 if you use the shelf front cover circuit packs that have 90-degree SFPs.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on another shelf installed in a grounded rack/cabinet or clip to a suitable ground point.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action
2	Determine the required task.

If you are	**Then** go to
connecting fiber-optic cables (non-MPO)	step 3
disconnecting fiber-optic cables (non-MPO)	step 8
connecting/disconnecting MPO cables	step 10

See the following illustration for an example of the LC fiber tool.

Figure 1-154
LC fiber tool ((174-009-900)—two views

Connecting fiber-optic cables (non-MPO)

3 Inspect and clean the circuit pack internal connectors and the fiber. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

4 Inspect and clean connectors and adaptors on patchcords. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

Make sure that the two connectors to be mated are clean.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

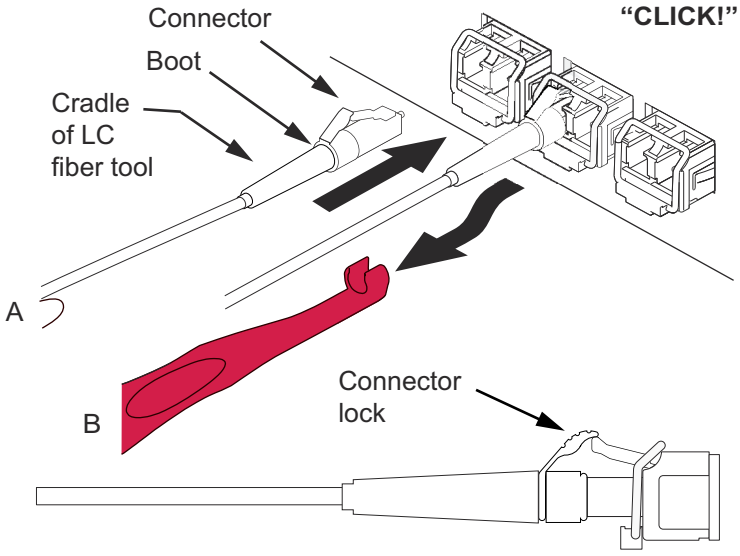
Step	Action
5	Connect the fiber-optic patchcord to the module according to the EDP, IDP, or equivalent site/network engineering plans. (Figure 1-155 on page 1-228 provides an illustration of the following steps.) • Attach the cradle of the LC fiber tool to the boot of the LC fiber. • Holding the LC fiber tool, slide the LC connector into the module. An audible click indicates that the LC connector is fully inserted. • Carefully remove the LC fiber tool from the boot of the LC fiber. For FIMs, see as applicable to your equipment: • "FIM Type 4 connectors" on page 1-240 • "FIM Type 5 connectors" on page 1-241 • "Recommended port usage for 1x20 Colorless Directionless (CD) with FIM4 configurations" on page 1-234
6	Repeat step 3 through step 5 for all modules, as required.
7	Make sure not to violate the fiber-optic cable minimum bend radius. Place any slack fiber-optic cable in external fiber management drawers. If you are connecting/disconnecting more fiber-optic cables, go to step 2 to select the required task.

Figure 1-155
Connecting fiber-optic cables using the LC fiber tool (174-0099-900)

A. Attach the cradle of the LC fiber tool to the boot of the LC fiber as shown.

Then holding the LC fiber tool, slide the LC connector into the pluggable module until the LC connector clicks into position.

B. Carefully remove the LC fiber tool from the boot (of the LC fiber).



Side view - close-up of LC connector, clicked into position in the pluggable module

Disconnecting fiber-optic cables (non-MPO)

8 Disconnect the patchcord from the module using the LC fiber tool as follows.

(Figure 1-156 on page 1-229 provides an illustration of the following steps.)

- Hold the LC fiber tool with the hook end pointing up and press down on the LC connector trigger.

  An audible click indicates that the LC connector is ready to be disengaged.
- With the hook end of the LC fiber tool pointing down, carefully disengage the LC connector from the latch of the module.
- Grip the boot (of the LC fiber) between your thumb and index finger or use the cradle end of the LC fiber tool to grip the boot.

  Then remove the LC fiber from the module.

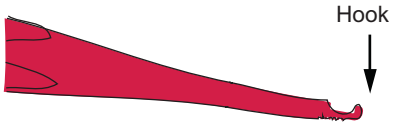
9 Protect unused modules and module ports with the appropriate dust cover.

If you are connecting/disconnecting more fiber-optic cables, go to step 2.

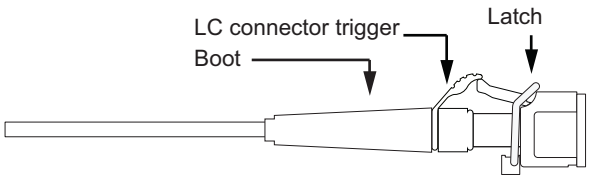
Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Figure 1-156
Disconnecting fiber-optic cables using the LC fiber tool (174-0099-900)



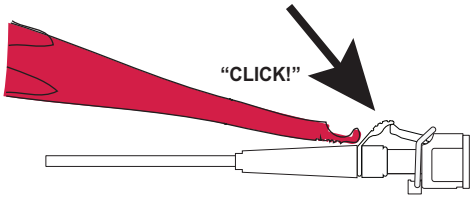
Close-up of LC fiber tool
(partial view)



Side view - close-up of LC fiber, clicked into position in the pluggable module

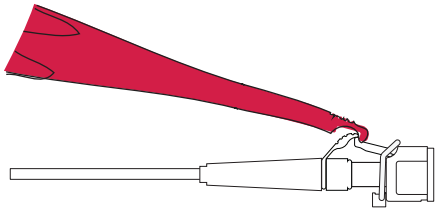
With the hook end of the LC fiber toolpointing up, press down on the LC connector trigger. You will hear a click.

A



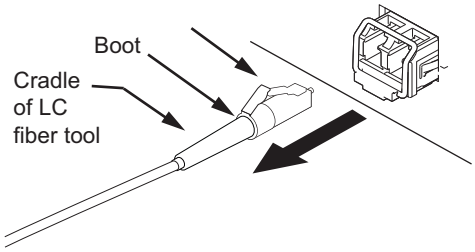
With the hook end of the LC fiber tool pointing down, carefully disengage the LC connector trigger from the latch of the pluggable module.

B



Then grip the boot of the LC fiber between your thumb and index finger or use the cradle end of the LC fiber tool to grip and remove the LC fiber from the pluggable module.

C



Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Preparing to connect MPO cables

10 To prepare to connect the MPO cables, use:

- the information in the EDP, IDP, or equivalent site/network engineering plans
- the information in "Recommended port usage for 1x20 Colorless Directionless (CD) with FIM4 configurations" on page 1-234, if applicable to your equipment
- the following illustrations, as applicable to your equipment:
  - "CDC—MPO cables and connector types" on page 1-211
  - "CDC—MPO fiber numbering on WSS and CCMD connectors" on page 1-236
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS1 ports" on page 1-236
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS2 ports" on page 1-237
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS3 ports" on page 1-237
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS4 ports" on page 1-238
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS5 ports" on page 1-238
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS6 ports" on page 1-239
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS7 ports" on page 1-239
  - "CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS8 ports" on page 1-240
  - "FIM Type 4 connectors" on page 1-240
  - "FIM Type 5 connectors" on page 1-241
  - "FIM Type 6 connectors" on page 1-241

11 Remove the dust caps or the loopback modules, as applicable, from the equipment ports you are connecting.

Note: On FIM Type 1, dust caps are equipped on WSS1 ports only.

12 Put dust caps on all the loopback modules that you are removing. (The FIM tray assembly includes a bag of dust caps that you can use for this purpose.) Store the modules for future use, as applicable.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Connecting MPO cables

CAUTION
Risk of affecting performance
Before connecting an MPO cable, you must inspect and clean the MPO cable connectors after removing the MPO cable from its original packaging or if the MPO cable was removed from the faceplate for any reason.

Before connecting any equipment that uses MPO connectors, always inspect and clean all the MPO connectors involved in the connection.

13 Before connecting, clean the MPO cable connector and the MPO faceplate connector. See the procedure on inspecting and cleaning MPO connectors in *Optical Connector Inspection and Cleaning*, 323-1859-500.

14 Connect the MPO cables to the ports as specified in the EDP/IDP.

- The connectors have a key that indicates the correct aligning and mating position. Make sure you are placing the key in the correct position.
- When connecting an MPO cable to the FIM, bend the flexible boot of the MPO cable to allow the cable to route to the side of the FIM.
- Use the following to bundle the MPO cable fibers:

  hook and loop tape (such as Velcro), fiber cable ties or lacing twine and tools according to your company's practice.

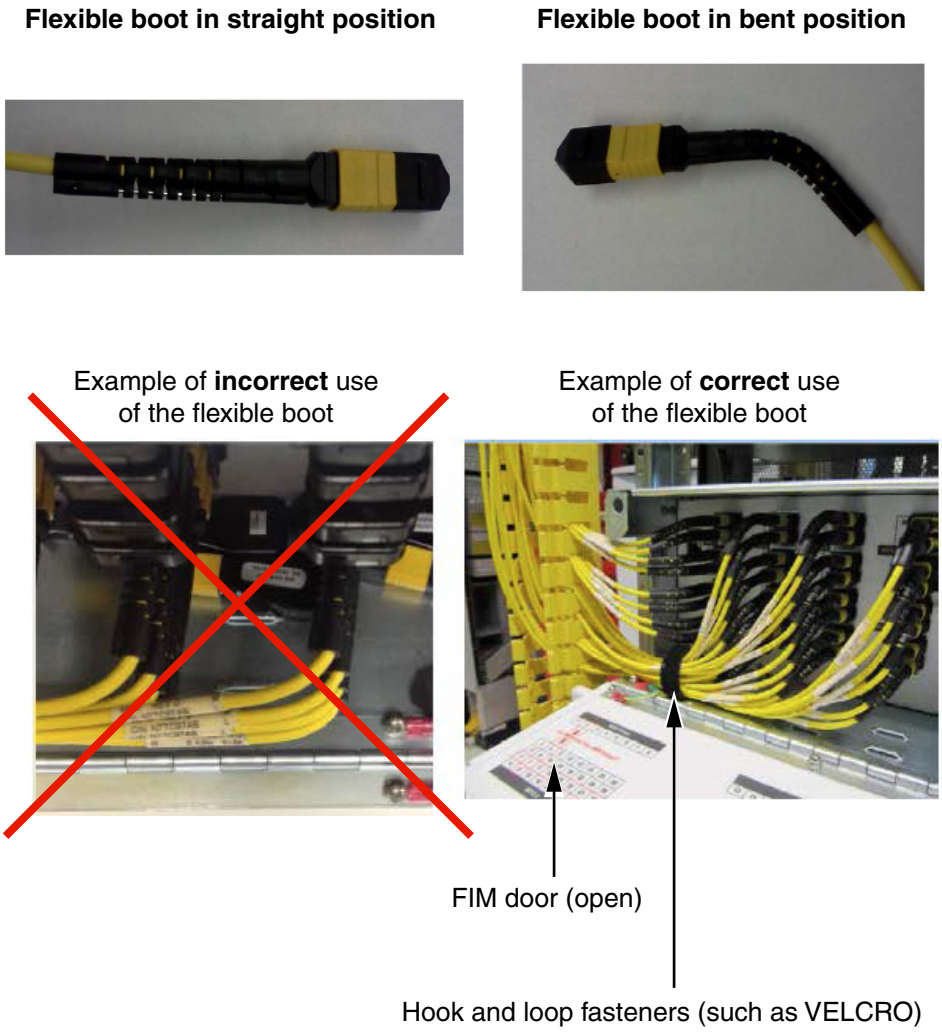
  You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.
- See the following precautionary message and illustration.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

CAUTION
Risk of damage to MPO cables
Before you close the FIM door, make sure you have bent the flexible boots of the MPO cables. Otherwise, you can pinch the optical fiber.

Figure 1-157
Bending the flexible boot of the MPO cable before closing the FIM door



Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Note: A single connector (MPO) is used for both Tx and Rx QSFP+ pluggable modules: 160-9503-900, 160-9504-900, and 160-9506-900. When connecting MPO breakout cables to the 10G sub-ports on these modules, make sure the arrangements are followed as specified in the datasheets for these modules in *Pluggable Datasheets and Reference*, 323-1851-180.

CAUTION
Risk of affecting performance
Before connecting any equipment that uses MPO connectors, always inspect and clean all the MPO connectors involved in the connection. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

For FIM Type 3 port usage information, see the procedure on Connecting intra-site fibers for 1x20 Colorless Directionless (CD) ROADM with FIM Type 3 sites, in *Commissioning and Testing*, 323-1851-221.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Table 1-11
Recommended port usage for 1x20 Colorless Directionless (CD) with FIM4 configurations

	With add/drops	Without add/drops
FIM Type 4 LC ports	For FIM connected to 1x20 WSS: — FIM ports 38/39 (LC) are used for future channel expansion. For FIM connected to SMD 14x8: • The following FIM ports (LC) are not used (they are not connected physically to any SMD port): — 18 and 19 — 28 and 29 — 38 and 39 — 44 to 49 • Each FIM can connect up to 14 degrees as add/drops.	• FIM ports 48 and 49 (LC) are used for future channel expansion. • All the other 19 pairs of FIM fibers (LC) are used for full 20 degree interconnection with FIMs.
FIM Type 4 MPO ports	For FIM connected to 1x20 WSS: — FIM ports (MPO) that connect to WSS ports 5, 6, and 7 are used for interconnections between degrees. — FIM ports (MPO) that connect to WSS port 8 are used for add/drops and can connect to selective 5 add/drop banks (any 5 out of the 15 add/drop banks).	• FIM passthrough fibers (MPO) are populated starting from the ones that correspond to 1x20 WSS port 5, and then to higher numbered ports (6, 7, 8).
1x20 WSS MPO ports	• 1x20 WSS ports 5, 6, and 7 (MPO) are used for degree interconnections. • Passthrough interconnections are populated starting from 1x20 WSS port 5 (MPO), then to 1x20 WSS ports 6 and 7. • 1x20 WSS port 8 (MPO) is used for add/drops and can support up to 5 selective add/drop banks (any 5 out of the 15 add/drop banks).	No additional recommendations.
Note: The port usage detailed is recommended, however, other port usages are allowed. The flexibility of fiber connections is everywhere that includes the locations between WSS and FIM, and FIM and FIM, under the condition that provisioning is correct.		

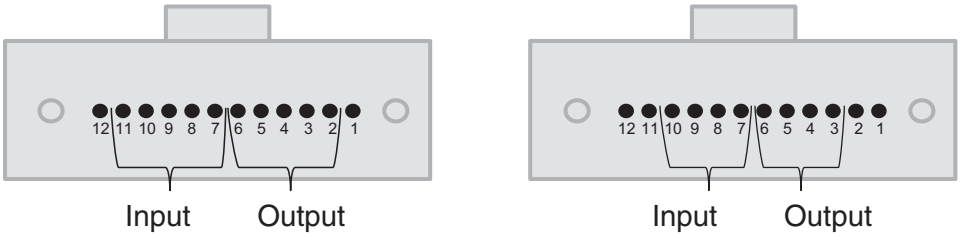
Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action
15	Make sure all the MPO faceplate ports that are not connected are equipped with dust caps as follows: • FIM Type 1 WSS1 ports • WSSOPM MPO ports (CDC applications and CDA applications) • FIM Type 4, FIM Type 5, and FIM Type 6 ports connecting to WSS • FIM Type 3 ports connecting to WSS
16	 **CAUTION** **Risk of affecting performance** Before connecting any equipment that uses MPO connectors, always inspect and clean all the MPO connectors involved in the connection. See *Optical Connector Inspection and Cleaning*, 323-1859-500. Make sure all the other FIM Type 1 MPO ports (WSS2 to WSS8 and CMD ports) and all the FIM Type 2 ports are equipped with MPO loopback modules. Inspect and clean the MPO loopback modules before connecting.
17	Make sure all the FIM Type 1 UPG ports are equipped with LC loopback modules. Inspect and clean the LC loopback modules before connecting.

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Figure 1-158
CDC—MPO fiber numbering on WSS and CCMD connectors



WSS fiber mapping

CCMD fiber mapping

Figure 1-159
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS1 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 5
		4		3	WSS 4
		5		2	WSS 3
		6		1	WSS 2
		7	IN	1	WSS 2
		8		2	WSS 3
		9		3	WSS 4
		10		4	WSS 5
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 6
		7	IN	5	WSS 6
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step **Action**

Figure 1-160
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS2 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 5
		4		3	WSS 4
		5		2	WSS 3
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 3
		9		3	WSS 4
		10		4	WSS 5
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 6
		7	IN	5	WSS 6
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Figure 1-161
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS3 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 5
		4		3	WSS 4
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 4
		10		4	WSS 5
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 6
		7	IN	5	WSS 6
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step **Action**

Figure 1-162
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS4 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 5
		4		3	WSS 3
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 3
		10		4	WSS 5
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 6
		7	IN	5	WSS 6
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Figure 1-163
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS5 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 4
		4		3	WSS 3
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 3
		10		4	WSS 4
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 6
		7	IN	5	WSS 6
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step **Action**

Figure 1-164
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS6 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 4
		4		3	WSS 3
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 3
		10		4	WSS 4
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 7
		6		5	WSS 5
		7	IN	5	WSS 5
		8		6	WSS 7
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Figure 1-165
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS7 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 4
		4		3	WSS 3
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 3
		10		4	WSS 4
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 8
		5		6	WSS 6
		6		5	WSS 5
		7	IN	5	WSS 5
		8		6	WSS 6
		9		7	WSS 8
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

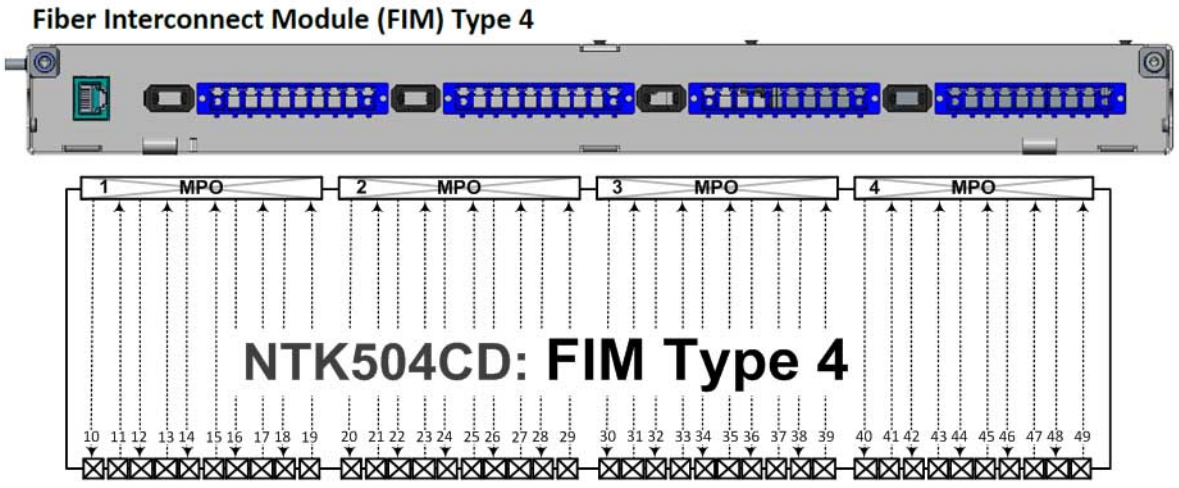
Step **Action**

Figure 1-166
CDC—Logical port mappings for WSS MPO ports connected to FIM Type 1 WSS8 ports

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
5	1	1	OUT	NC	NC
		2		8	CMD 1
		3		4	WSS 4
		4		3	WSS 3
		5		2	WSS 2
		6		1	WSS 1
		7	IN	1	WSS 1
		8		2	WSS 2
		9		3	WSS 3
		10		4	WSS 4
		11		8	CMD 1
		12		NC	NC
6	2	1	OUT	NC	NC
		2		10	CMD 3
		3		9	CMD 2
		4		7	WSS 7
		5		6	WSS 6
		6		5	WSS 5
		7	IN	5	WSS 5
		8		6	WSS 6
		9		7	WSS 7
		10		9	CMD 2
		11		10	CMD 3
		12		NC	NC

WSS physical port #	MPO logical port #	Fiber position	Direction	WSS switch port connected	Connected to
7	3	1	OUT	NC	NC
		2		15	CMD 8
		3		14	CMD 7
		4		13	CMD 6
		5		12	CMD 5
		6		11	CMD 4
		7	IN	11	CMD 4
		8		12	CMD 5
		9		13	CMD 6
		10		14	CMD 7
		11		15	CMD 8
		12		NC	NC
8	4	1	OUT	NC	NC
		2		20	UPG 2
		3		19	UPG 1
		4		18	CMD 11
		5		17	CMD 10
		6		16	CMD 9
		7	IN	16	CMD 9
		8		17	CMD 10
		9		18	CMD 11
		10		19	UPG 1
		11		20	UPG 2
		12		NC	NC

Figure 1-167
FIM Type 4 connectors



Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Figure 1-168
FIM Type 5 connectors

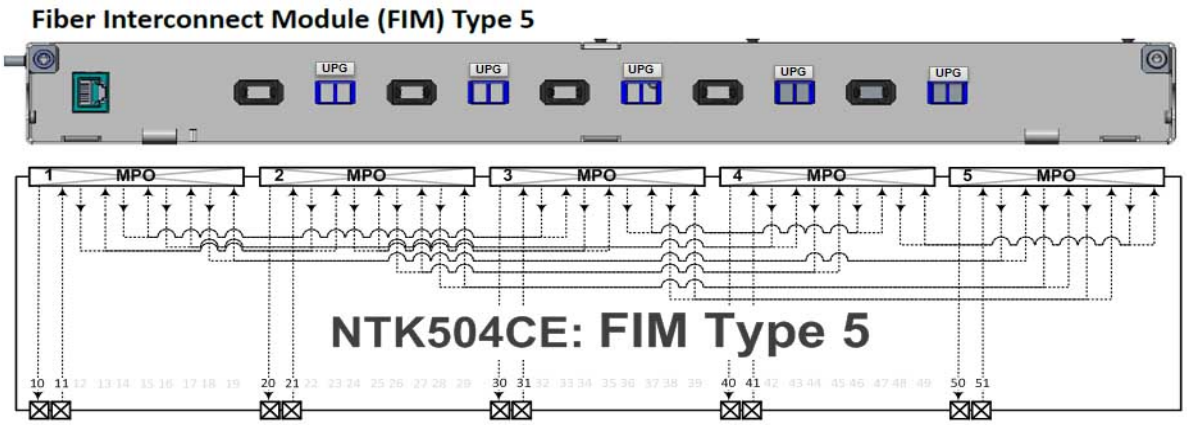
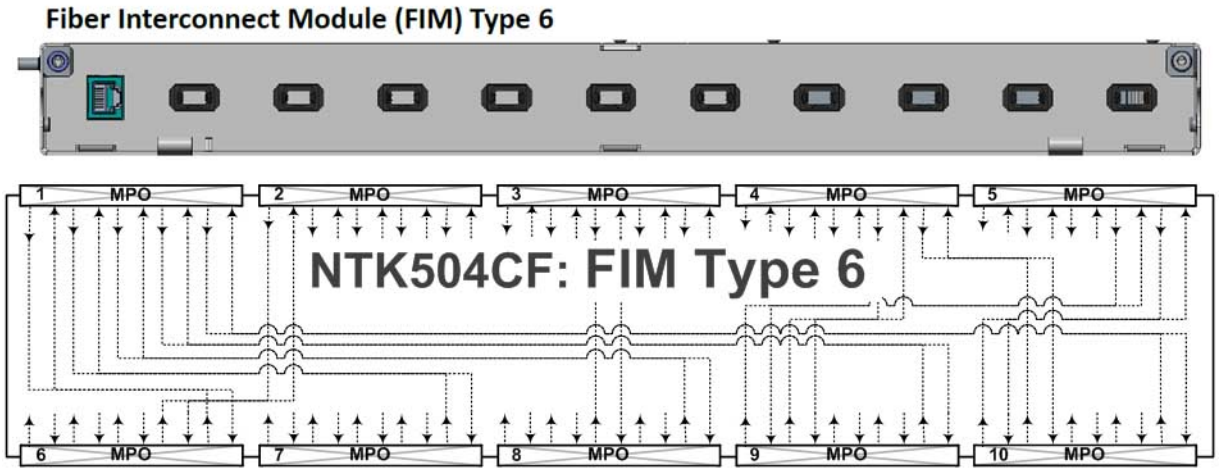


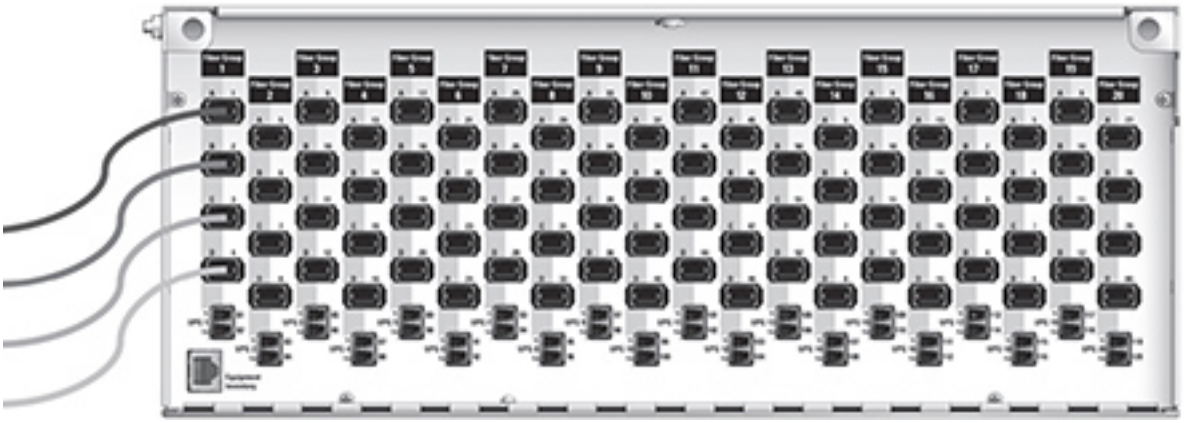
Figure 1-169
FIM Type 6 connectors



Procedure 1-16 (continued)
Connecting or disconnecting fiber-optic cables to or from circuit packs

Step	Action

Figure 1-170
FIM Type 3 connectors



Disconnecting MPO cables

18 Slide back the colored sleeve on the MPO cable connector and pull out the cable.

If you are connecting/disconnecting more fiber-optic cables, go to step 2 to select the required task.

—end—

Procedure 1-17
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Use this procedure to install and lock the 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth (NTK509CJ) on the 6500 4-Slot Optical Shelf (NTK503HA).

NTK509CJ is used when additional space is required to accommodate long fiber boots or fixed pad attenuators.

ATTENTION

This procedure presents information and instructions for a horizontally oriented 4-slot optical shelf.

For a wall-mount application, the 4-slot optical shelf is mounted vertically. As a guide, see the photos for a wall-mounted shelf: Figure 1-175 on page 1-247, Figure 1-177 on page 1-249, and Figure 1-178 on page 1-249.

The shelf front cover mounts on two hinges that you attached to the left side of the shelf. For instructions on installing the hinges, see "Installing a 6500 4-slot optical shelf NTK503HA and cooling fan module, and access panel"

Prerequisites

Make sure that you have the following:

- the 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ
- a screwdriver
- a lock
- the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans
- the appropriate personal grounding device to dissipate electrostatic charges

Precautions

CAUTION

Risk of equipment damage

Make sure that all cables are installed correctly before you replace a shelf front cover. Failure to do so can cause damage to the cables or result in a service outage.

Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging equipment.

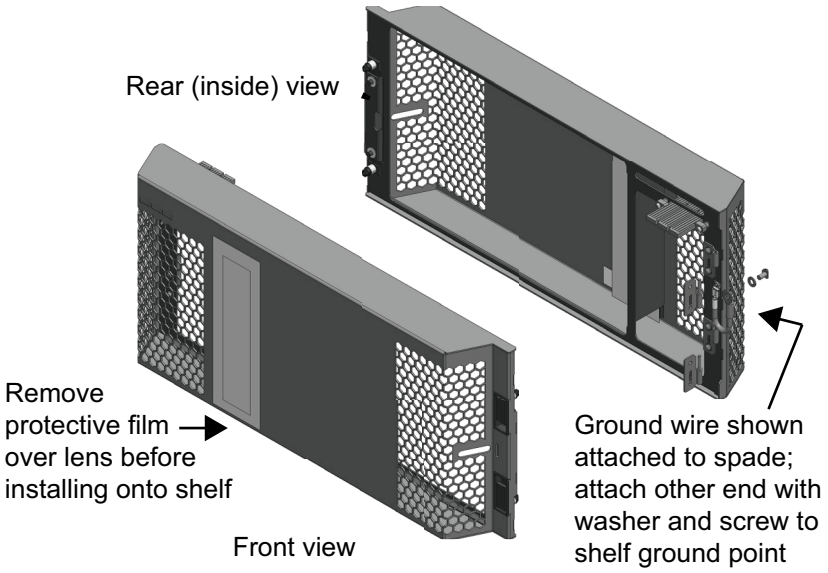
Step	Action
1	Locate the required shelf. For details, see the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on another shelf installed in a grounded rack/cabinet or clip to a suitable ground point.
3	Determine the required task.

If you want to	**Then** go to
install the shelf front cover	step 4
close the shelf front cover and lock the shelf	step 10
unlock the shelf	step 12
remove the shelf front cover	step 13

For a view of the 6500 4-Slot Shelf Front Cover W/ Extended Depth NTK509CJ, see the following illustration.

Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Figure 1-171
6500 4-slot Shelf Front Cover W/ Extended Depth (NTK509CJ)



Installing the shelf front cover

4 Select your next step.

If	**Then** go to
you already installed hinges (part of NTK509CJ) when you installed the shelf in the rack	step 7
otherwise	step 4

5 Remove the four screws from the left side of the shelf.

6 With the pin pointing upwards, attach the male portion of one hinge to the shelf using two of the screws (removed in step 4). Repeat the same action for the second hinge.

7 Align and engage the hinge pins on the side of the shelf with the hinges on the shelf front cover and carefully place the shelf front cover on the hinges.

Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Step	Action

Attaching the ground cable

8 Attach the ground cable to the spade inside the shelf front cover. See the two following figures.

Figure 1-172
Spade on inside shelf front cover

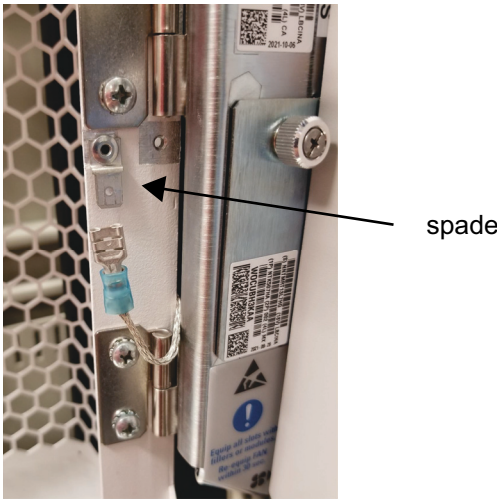
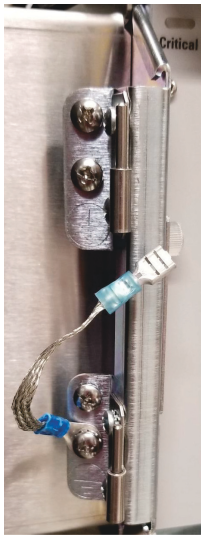


Figure 1-173
Ground cable attached to spade

Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

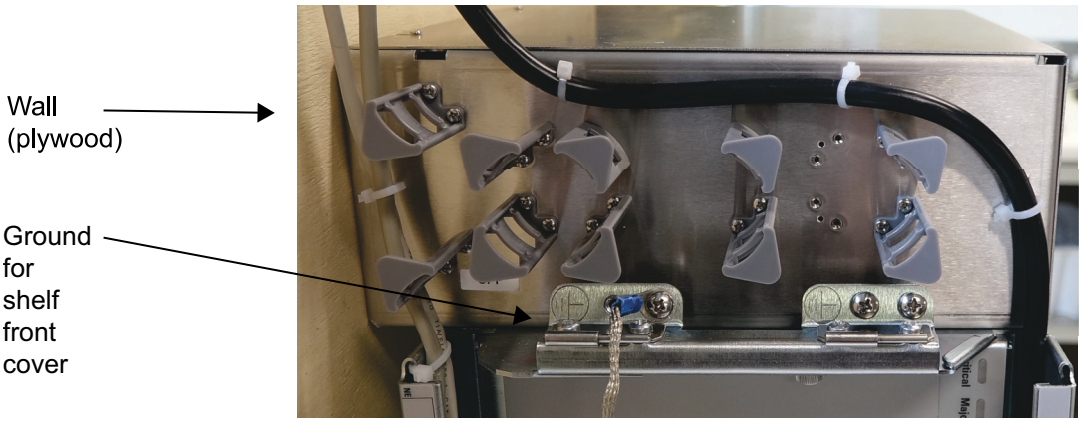
Step	Action
9	Attach the other end of the ground cable: place the ground ring over the shelf ground point and secure with the washer and screw. The following view shows the shelf ground points without the shelf front cover.

Figure 1-174
Attach ground cable to shelf ground point



The following view shows the shelf ground points without the shelf front cover on a wall-mounted shelf.

Figure 1-175
Wall-mount shelf—attach ground cable to shelf ground point



Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Step	Action

Closing the shelf front cover and locking the shelf

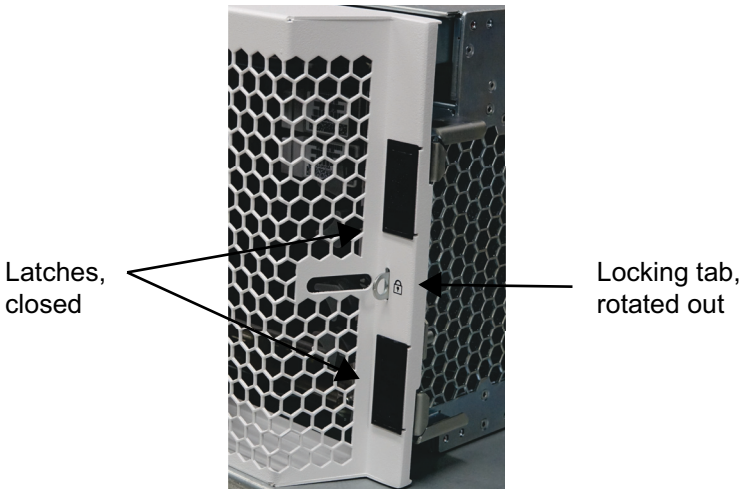
10 Ensure the fibers are not trapped or pinched between the shelf front cover and the shelf while you perform step 11.

11 If you are locking a shelf front cover, with the shelf front cover open, rotate out the locking tab. Open the latches. Rotate the shelf front cover into the closed position while you align the latching plungers on the shelf front cover with the two holes on the shelf.

To lock the shelf, make sure that the locking tab protrudes through the locking tab slot near the latches. Then insert the lock.

You have completed locking the shelf.

Figure 1-176
Shelf front cover closed with locking tab rotated out



Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Step	Action

Figure 1-177
Wall-mount shelf with shelf front cover

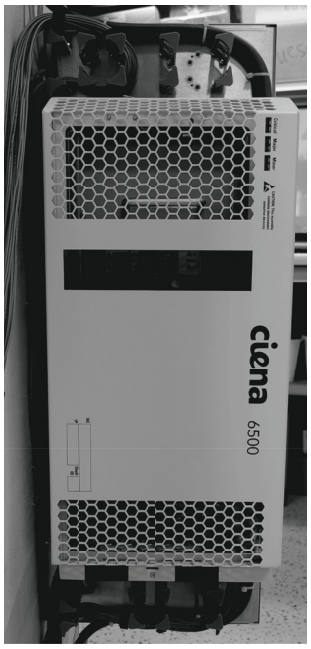


Figure 1-178
Wall-mount shelf—close-up of latches on shelf front cover (and Lower Bracket Assembly)

Procedure 1-17 (continued)
Installing and locking a 6500 4-Slot Shelf Front Cover Kit W/ Extended Depth NTK509CJ

Step	Action
	Unlocking the shelf
12	Remove the securing lock and store it in a safe place. You have completed unlocking the shelf.
	Removing the shelf front cover
13	If applicable disconnect the ground cable that runs from the shelf front cover to the ground point on the left shelf bracket.
14	Open the shelf front cover. Hold the shelf front cover at the top and bottom, and lift it off to disengage it from the shelf.
15	Store the shelf front cover in a safe place.

—end—

Procedure 1-18
Connecting a terminal to the 6500 4-slot optical shelf

Use this procedure to connect a VT100 (or VT100 emulating) terminal to the shelf. For cable and connector specifications, see the section on cable and connector details in *Installation - General Information*, 323-1851-201.0. Torque all fixing pins to 0.56 N-m (5 lb-in.).

If you plan to use Site Manager for the maintenance activity and have a terminal that has never been connected to a shelf processor (SP) circuit pack running the correct 6500 network element software load, make sure that the correct version of Site Manager is installed on the terminal. Also make sure that you have first connected the terminal to the SP (running the correct network element software load) with an Ethernet cable.

This LAN connection is required briefly for the automatic transfer of necessary nodal information files from the SP circuit pack to the terminal. See *User Interface Overview and Site Manager Fundamentals*, 323-1851-195, for information on Site Manager installation requirements and procedures.

ATTENTION
The Access Panel for 6500-7 packet-optical and 4-slot optical shelves (NTK505JA) does not include a physical RS-232 DTE port. There is no modem connection supported for remote access on the 6500 4-slot optical shelf.

ATTENTION
The SP-2 NTK555CAE5, NTK555EAE5, NTK555FAE5, and SP-3 NTK555JA circuit packs do not have a DCE port.

The interfaces described in this procedure are intended for intrabuilding use only.

Prerequisites

Make sure that you have the following:

- the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans
- the appropriate personal grounding device to dissipate electrostatic charges

Procedure 1-18 (continued)
Connecting a terminal to the 6500 4-slot optical shelf

Precaution

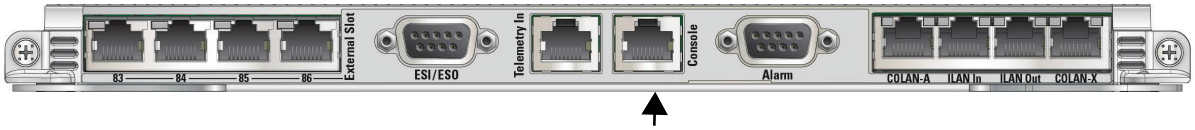
CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Locate the required shelf. For details, see the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on another shelf installed in a grounded rack/cabinet or clip to a suitable ground point.

Connecting a terminal for temporary maintenance activity

3 Connect RS-232 console RJ45 port on the NTK505JB Access Panel (see Figure 1-179).

Figure 1-179
Connecting a terminal cable to NTK505JB Access Panel



RS-232 Console RJ-45 port for remote access through terminal server or external modem

4 Connect the data terminating equipment (DTE) end of the null terminal cable to the VT100 terminal (or VT100 terminal emulator).

5 At the VT100 terminal (or VT100 terminal emulator), set the terminal communications parameters to the following values:

Speed (baud) = 9600

Data bits = 8

Stop bits = 1

Parity = None

6 After you complete the temporary maintenance activity, disconnect the terminal cable from the RJ45 port on the access panel.

—end—

Installing OMX, fiber manager, and routing/connecting related cables

This section describes how to install the following hardware:

- OMX 4CH enhanced + fiber manager equipment drawer
- OMX 16CH DWDM equipment drawer
- fiber manager drawer

Note 1: This section refers to the information in the engineering documentation package (EDP), installation documentation package (IDP), or equivalent site/network engineering plans. Ciena provides a custom service that can provide this documentation (contact your Ciena representative for details of this service). If not provided by Ciena, it is the responsibility of the user to obtain the necessary information (for example, from a OnePlanner design file).

Note 2: The layout of the product identification labels may not look exactly as illustrated.

This section contains the following topics:

See the feature overview section in *Planning*, NTRN10GP, for information regarding the possible bay configurations and the engineering rules.

For installation procedures for the following passive equipment

- 2150 Passive Optical Multiplexer (6-slot)
- 2150 Passive Optical Multiplexer (3-slot)
- Passive Photonics Chassis (PPC6)

refer to *Installation - Passive Chassis (2150 & Photonics), Filters, and Modules*, 323-1851-201.5.

Before you begin the procedures in this section, make sure that you have:

- determined your site prerequisites
- determined your equipment prerequisites
- available all required tools and materials

  Refer to the section on preparing for installation in *Installation - General Information*, 323-1851-201.0 for information on the above.
- you have read the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0

Precautions

CAUTION
Risk of shelf malfunction
Ciena recommends that you do not use cellular phones at any 6500 site. The use of cellular phones in proximity to 6500 equipment can cause shelf malfunction.

CAUTION
Risk of equipment damage
Make sure you know how to handle electronic components correctly before you begin installation procedures. Incorrect handling can cause damage to static sensitive components.

Abbreviations used in procedures

1U	one rack unit (1.75 in.)
BIP	breaker interface panel
DVM	digital voltmeter
EDP	engineering documentation package
EIA	Electronics Industries Alliance
ESD	electrostatic discharge

ETSI	European Telecommunications Standards Institute
IDP	installation documentation package
OMX	optical multiplexer

Procedure list

The following table lists the procedures in this section.

Note: After you installed all shelves, the system is ready for system line-up and testing (SLAT). Make sure the network element is powered down before you proceed to SLAT. See *Commissioning and Testing*, 323-1851-221.

Table 2-1
Installation procedures

Procedure	Comment
“Installing and grounding equipment drawers” on page 2-5	Required if you are using OMX equipment drawers or DSCM drawers (NT0H57LA)
“Installing a 1U Bulk Fiber Management Tray 174-0094-900” on page 2-27	Required if you are using 174-0094-900 equipment drawers
“Installing an NT0H57BB equipment drawer” on page 2-31	Required if you are using NT0H57BB equipment drawers
“Installing a DSCM tray in a DSCM drawer (NT0H57LA)” on page 2-36	Required if you are using DSCM trays.
“Connecting OMX 4CH equipment drawers to the 6500 shelves” on page 2-40	Required if you are using OMX 4CH equipment drawers
“Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves” on page 2-46	Required if you are using OMX 16CH DWDM equipment drawers
“Routing fiber-optic cables for the OMX 4CH equipment drawer” on page 2-53	Required if you are using OMX 4CH equipment drawers
“Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer” on page 2-57	Required if you are using OMX 16CH DWDM equipment drawers

Table 2-1
Installation procedures (continued)

Procedure	Comment
“Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager” on page 2-62	Required if you are using fiber manager (NT0H57BB) equipment drawers
“Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900” on page 2-67	Required if you are using 1U Bulk Fiber Management Tray (174-0094-900) equipment drawers
“Installing a 2110 shelf” on page 2-85	Perform as required or when referred to from another procedure
“Installing 2110-Tx-xxxx DCMs into the 2110 shelf” on page 2-89	Perform as required or when referred to from another procedure

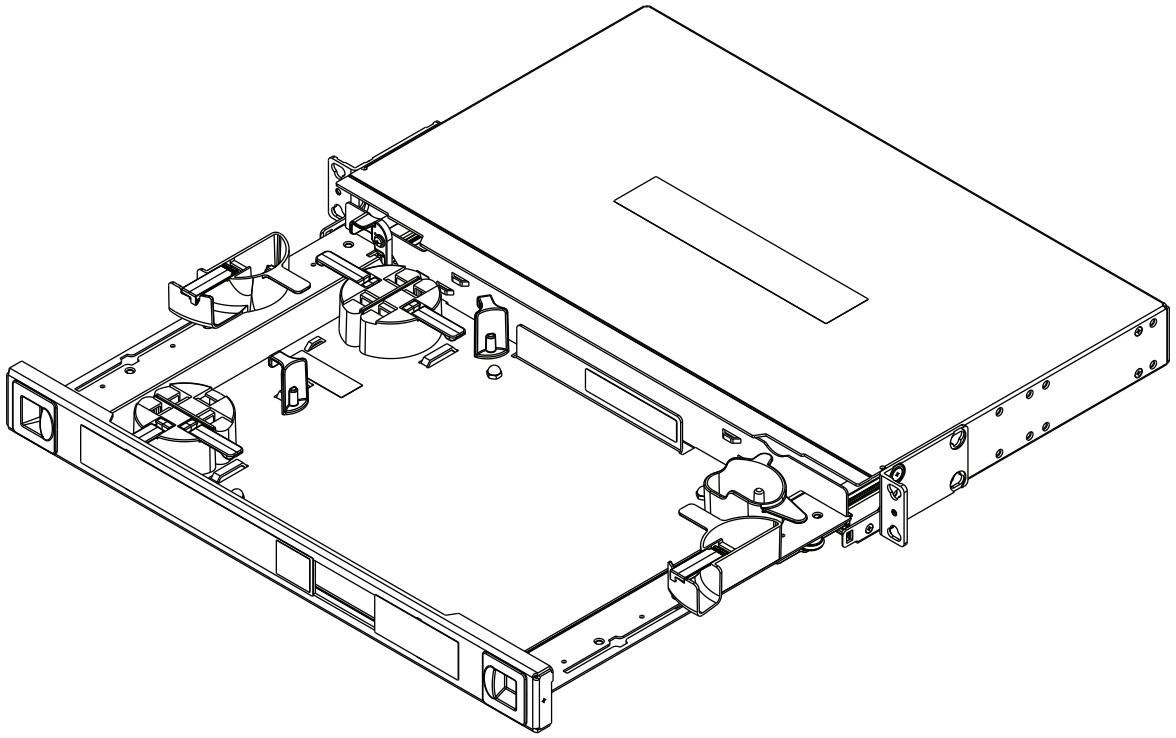
Procedure 2-1
Installing and grounding equipment drawers

Use this procedure to install the following equipment drawers in the equipment rack:

- OMX 4CH enhanced + fiber manager
- OMX 16CH DWDM
- two-channel TPT (TPT-2)
- four-channel TPT (TPT-4)
- 10-channel TPT (TPT-10)

Also use this procedure to install the DSCM drawer (NT0H57LA) (see “DSCM drawer (NT0H57LA)”), in which case follow the instructions that apply to 1U drawers. The DSCM drawer (NT0H57LA) is shipped with brackets already installed for mounting in a 19-inch equipment rack. The brackets can be also used for 23-inch installations by removing them from the supplied installation, rotating them 90 degrees and then reattaching them to the drawer’s sides.

Figure 2-1
DSCM drawer (NT0H57LA)



Procedure 2-1 (continued)
Installing and grounding equipment drawers

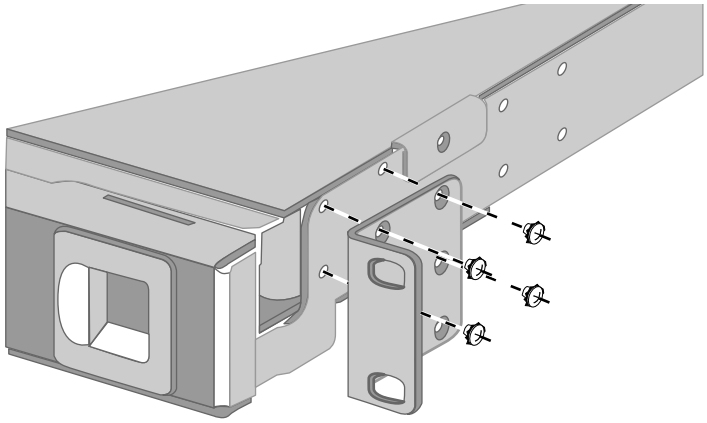
The OMX is a 1U (OMX 4CH) or 2U (OMX 16CH DWDM) external drawer that contains optical filters, a small patch panel with bulkhead connectors, and fiber management components. The drawers can be installed anywhere in the rack. It is recommended that you install the drawers directly beneath a shelf.

The OMX drawers are shipped with one set of mounting brackets already installed. The installed brackets are for front-mounting the drawer in a 19-inch equipment rack. ETSI mounting brackets and 23-inch mounting brackets are also shipped with these drawers.

The OMX equipment drawer can be front-mounted or mid-mounted.

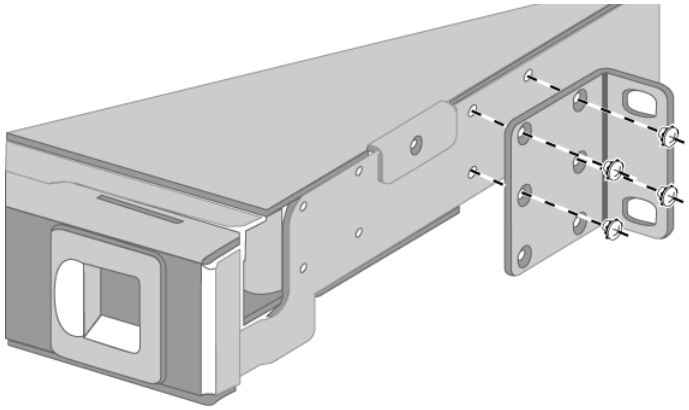
- For front-mounting, attach the bracket at the front of the shelf, see "Attaching brackets for front-mounting installation (example shows a 1U drawer)".
- For mid-mounting, attach the bracket using the second set of holes, see "Attaching brackets for mid-mounting installation (example shows a 1U drawer)" on page 2-7.

Figure 2-2
Attaching brackets for front-mounting installation (example shows a 1U drawer)



Procedure 2-1 (continued)
Installing and grounding equipment drawers

Figure 2-3
Attaching brackets for mid-mounting installation (example shows a 1U drawer)



For OMX 16CH DWDM and mounting brackets examples, see

- “Attaching PTE2000-EEA mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)” on page 2-8
- “Attaching PTE2000-EEA mounting brackets with 4 in. setback (example shows 16CH OMX DWDM)” on page 2-8
- “Attaching ETSI mounting brackets (example shows 16CH OMX DWDM)” on page 2-9
- “Attaching 23-in. mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)” on page 2-9

For an OMX 4CH, to front mount a drawer in the 5-inch setback position, attach the mounting brackets as shown in “1U front mount 23-in. mounting bracket, 5-in. setback (4CH OMX)” on page 2-10.

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Figure 2-4
Attaching PTE2000-EEA mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)

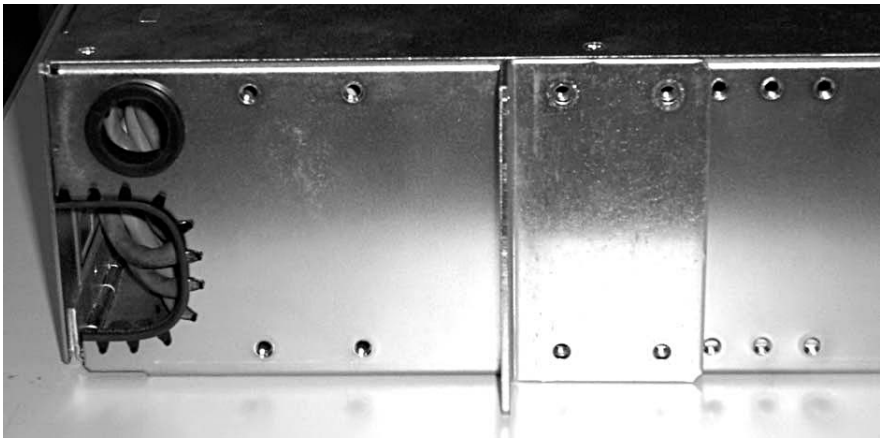
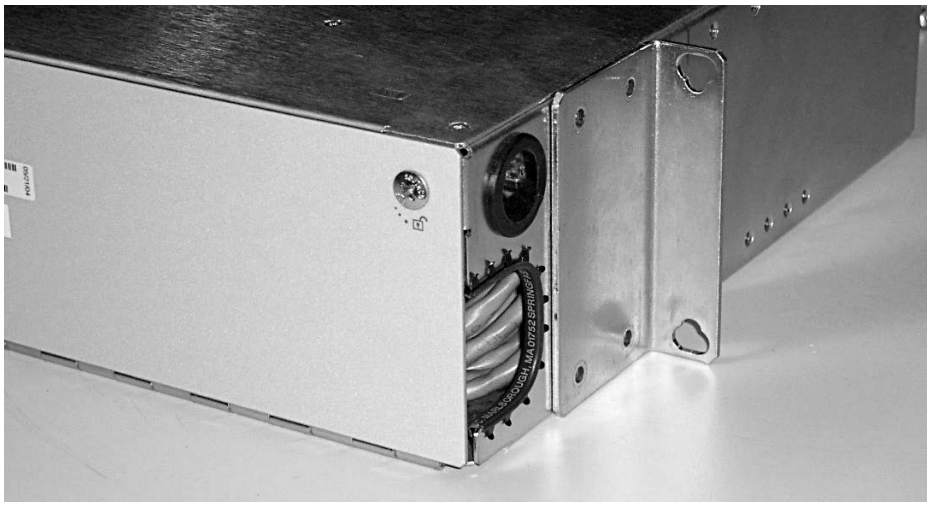


Figure 2-5
Attaching PTE2000-EEA mounting brackets with 4 in. setback (example shows 16CH OMX DWDM)



Procedure 2-1 (continued)
Installing and grounding equipment drawers

Figure 2-6
Attaching ETSI mounting brackets (example shows 16CH OMX DWDM)

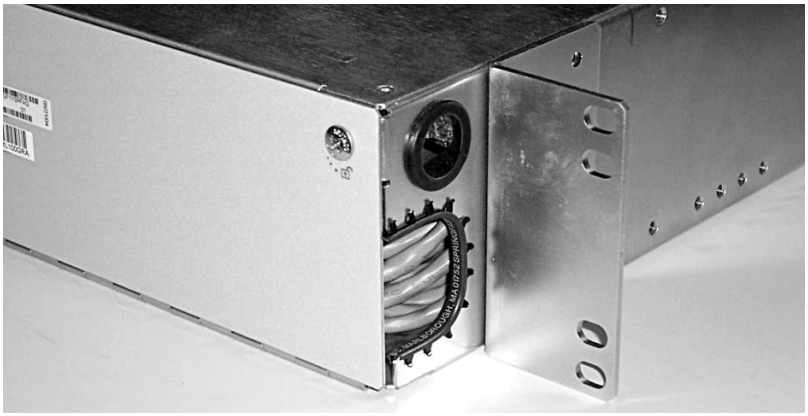
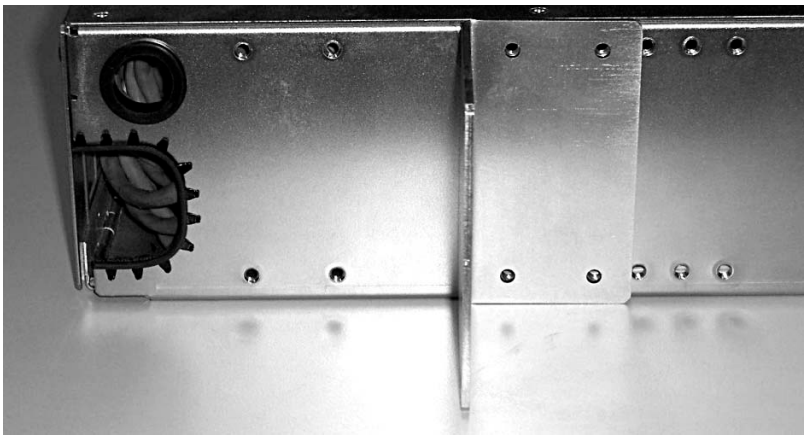
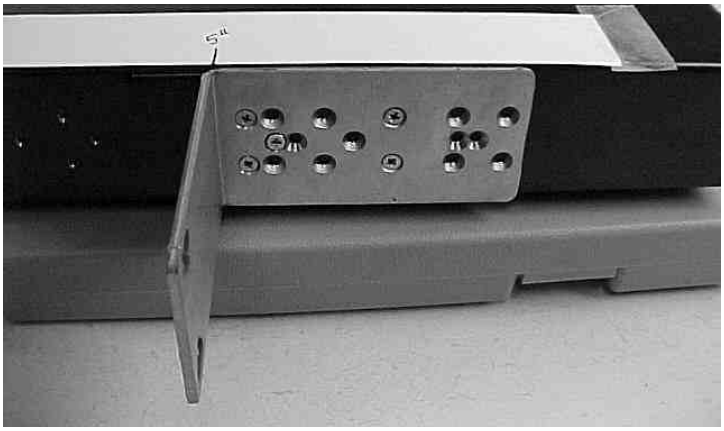


Figure 2-7
Attaching 23-in. mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)



Procedure 2-1 (continued)
Installing and grounding equipment drawers

Figure 2-8
1U front mount 23-in. mounting bracket, 5-in. setback (4CH OMX)



The two-channel transponder protection tray (TPT-2) is a 1U high single-mode or multi-mode passive tray containing two splitters and two couplers that split and couple an optical signal.

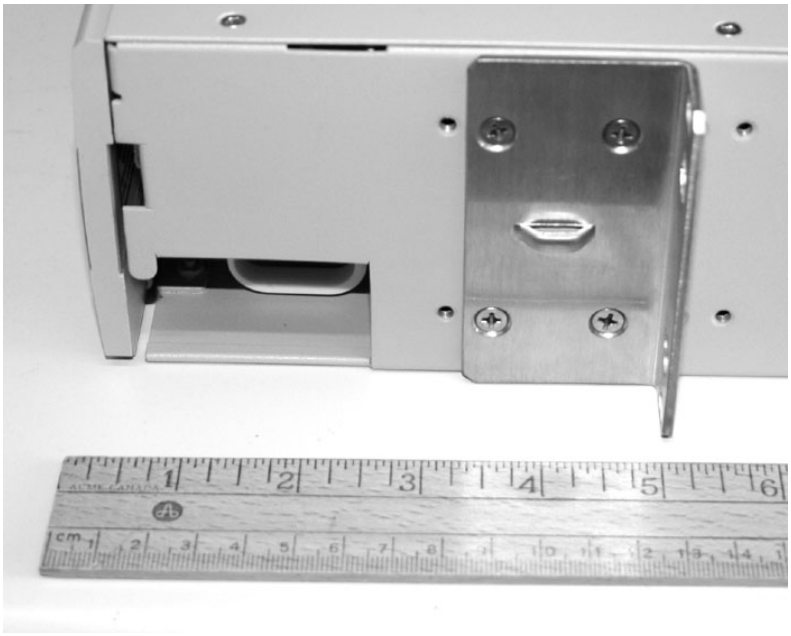
The four-channel transponder protection tray (TPT-4) is a 1U high single-mode or multi-mode passive tray containing four splitters and four couplers that split and couple an optical signal.

The 10-channel transponder protection tray (TPT-10) is a 2U high single-mode passive tray containing ten splitters and ten couplers that split and couple an optical signal.

The following illustration shows a 2U TPT-10 with the mounting brackets pre-installed in the 5-inch mounting position measured from the front of the component.

Procedure 2-1 (continued)
Installing and grounding equipment drawers

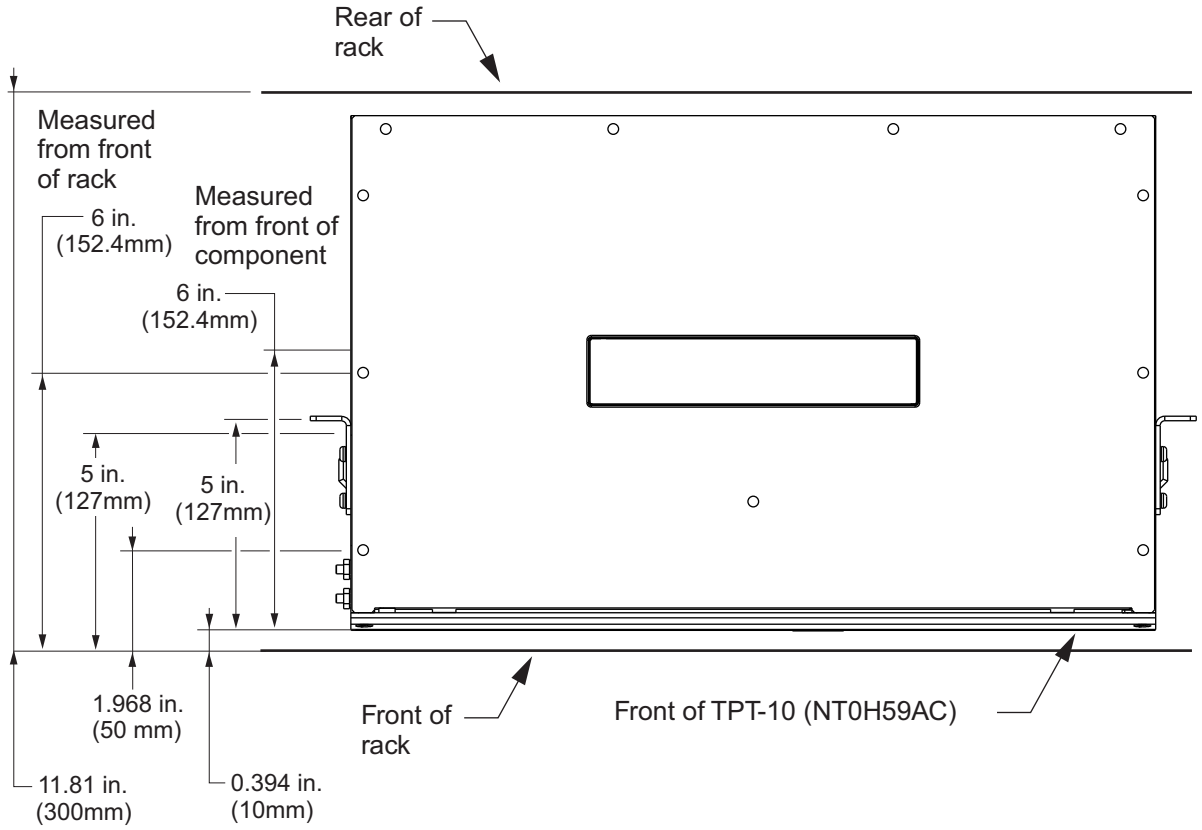
Figure 2-9
Example of TPT-10 (5-inch setback from front of TPT-10—pre-installed mounting bracket



Procedure 2-1 (continued)
Installing and grounding equipment drawers

To mount a 2U single-mode Transponder Protection Tray in the 5-inch setback position from the front of a rack footprint, attach the mounting brackets as shown in "Setback positions for mounting brackets for 2U TPT-10".

Figure 2-10
Setback positions for mounting brackets for 2U TPT-10

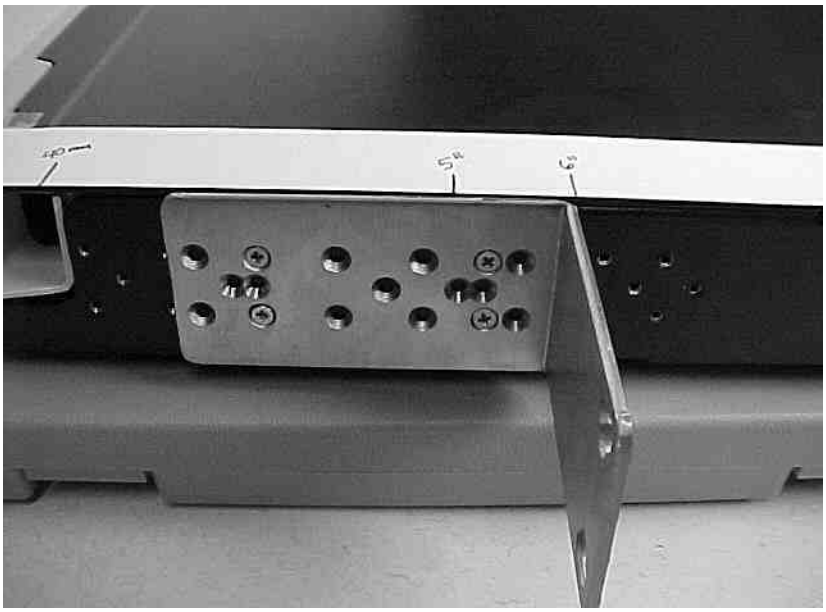


Procedure 2-1 (continued)
Installing and grounding equipment drawers

To front mount a drawer in the 6-inch setback position, attach the mounting brackets as shown in "Front mount (6-inch setback)" for a regular 1U drawer.

For the regular 1U drawer, the mounting brackets are mounted in a reverse position (from the 40 mm and 5-inch setback positions).

Figure 2-11
Front mount (6-inch setback)



Procedure 2-1 (continued)
Installing and grounding equipment drawers

Prerequisites

The tools and materials required to install and ground OMX drawers are listed in the following table.

Table 2-2
Tools and materials for installing and grounding equipment drawers

Item	Quantity	Supplied
Mounting brackets	2 sets (2 brackets per set)	yes
Phillips flat countersunk screws 4-40 X 3/16-in. (for attaching mounting brackets to the drawer)	12	yes
1U drawers: single-hole grounding lug OMX 16CH DWDM: two-hole grounding lug	2 2	no yes
1U drawers: two-hole lug for 6 AWG (for system grounding point) This two-hole lug (which is not supplied) is a choice in addition to the single-hole lug (which is supplied).	2	not supplied with the 1U drawer
6 AWG wire (for grounding), as desired, for 1U equipment drawer See details regarding the related two-hole lug.	1	no
Two-hole lug (#10 bolt, 5/8" spacing) for 6 AWG wire for grounding 1U drawer	2	supplied with 1U drawer
#12-24 x 1/2-inch Hex Head thread forming screws	4	yes
#12 external-tooth lock washers	4	yes
#10-32 x 3/4-inch Phillips Head machine screws	4	yes
#10-32 flange-mount nuts	4	yes
#10 external-tooth lock washers	4	yes
M5 x 20 mm machine screws	4	yes
M5 external-tooth lock washers	4	yes
M6 x 20 mm machine screws	4	yes
M6 flange-mount nuts	4	yes
M6 external-tooth lock washers	4	yes

Table 2-2
Tools and materials for installing and grounding equipment drawers (continued)

Item	Quantity	Supplied
#1 Phillips screwdriver	1	no
#2 Phillips screwdriver	1	no
#3 Phillips screwdriver	1	no
5/16-inch socket (for hex-head screws)	1	no
Torque wrench	1	no

The torque values required for attaching the screws from "Tools and materials for installing and grounding equipment drawers" on page 2-14 are listed in the following table.

Table 2-3
Torque values

Item	Torque
Phillips flat countersunk screws 4-40 X 3/16-in. (for attaching mounting brackets to the drawer)	1.01 N-m (9 lb-in.)
#12-24 x 1/2-inch hex head thread forming screws	3.61 N-m (32 lb-in.)
#10-32 x 3/4-inch Phillips head machine screws	2.71 N-m (24 lb-in.)
M5 x 20mm machine screws	3.39 N-m (30 lb-in.)
M6 x 20mm machine screws	5.08 N-m (45 lb-in.)
#10-32 KEPS nut for grounding	2.26 N-m (20 lb-in.)
Mounting in a rack	Tighten the mounting hardware to the rack manufacturer's torque specifications.

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Make sure that you have the following:

- the tools and materials listed for your OMX type in "Tools and materials for installing and grounding equipment drawers" on page 2-14.
- the correct mounting bracket for installation. "1U OMX mounting brackets used with the 6500" on page 2-16 specifies the mounting bracket (types A, C, or E) that fit the specific rack types and hole spacing.
- the information on where you must install the OMX or TPT in the equipment rack. See *Planning*, NTRN10GP, and the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans
- the appropriate personal grounding device to dissipate electrostatic charges

Table 2-4
1U OMX mounting brackets used with the 6500

Bracket label	Rack type and hole spacing
A	EIA 19-in. with 1.25-in. (31.75-mm) hole spacing
C	EIA 23-in. wide with 1.25-in. (31.75-mm) hole spacing
E	ETSI widths with 0.98-in. (25-mm) hole spacing

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION
Risk of equipment damage
Make sure you know how to handle electronic components correctly before you begin installation procedures. Incorrect handling can cause damage to static sensitive components.

Procedure 2-1 (continued)
Installing and grounding equipment drawers

ATTENTION
Drawers are shipped with mounting brackets installed for front-mounting into a 19-in. equipment rack with 1.25-in. (31.75 mm) EIA hole spacing. If you are front-mounting the drawer with the brackets already installed into a 19-in. rack, begin with step 10.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.

Installing the brackets on the equipment drawer

3 Place the drawer on a hard, level surface with the front facing toward you and select your next step.

If you are installing	**Then** go to
drawers with the already installed 19-in. mounting brackets	step 10
otherwise	step 4

4 Remove the mounting brackets installed in the front-mounting holes of the shelf.

5 For 23-inch installations of the DSCM drawer (NT0H57LA), use the same brackets you have removed from the supplied installation, rotate them 90 degrees, then reattach them to the sides of the drawer. Then go to step 10 to Install the DSCM drawer in the rack.

For ETSI installations of the DSCM drawer (NT0H57LA), go to step 6 and follow the instructions for 1U drawers.

For installations of other drawers, select the appropriate mounting brackets according to Table 2-4 on page 2-16. Then go to step 6.

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
6	Select the appropriate mounting holes to use. See the following illustrations: • "Attaching brackets for front-mounting installation (example shows a 1U drawer)" on page 2-6 • "Attaching brackets for mid-mounting installation (example shows a 1U drawer)" on page 2-7 • "Attaching PTE2000-EEA mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)" on page 2-8 • "Attaching PTE2000-EEA mounting brackets with 4 in. setback (example shows 16CH OMX DWDM)" on page 2-8 • "" on page 2-9 • "Attaching 23-in. mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)" on page 2-9
7	Position the mounting bracket for your application as follows: • For mid-mounting on a 19-in. rack, line up the wider face of the 19/23 bracket in the mid-mounting holes on one side of the drawer. • For front-mounting in a 19-in., 23-in. or ETSI rack, line up the narrower face of a 19/23/535 bracket in the front-mounting holes on one side of the drawer. • For mid-mounting on a 19-in. or 23-in. or ETSI rack, line up the narrower face of a 19/23/535 bracket in the mid-mounting holes on one side of the drawer. • For front-mounting in an ETSI rack, line up the narrower face of a 19/23 bracket in the front-mounting holes on one side of the drawer. See examples in the following illustrations: • "Attaching PTE2000-EEA mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)" on page 2-8 • "Attaching PTE2000-EEA mounting brackets with 4 in. setback (example shows 16CH OMX DWDM)" on page 2-8 • "" on page 2-9 • "Attaching 23-in. mounting brackets with 5 in. setback (example shows 16CH OMX DWDM)" on page 2-9 • "1U front mount 23-in. mounting bracket, 5-in. setback (4CH OMX)" on page 2-10

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
8	Hold the bracket in position against the side of the drawer. Insert the screws in the top and bottom holes and tighten. See "Torque values" on page 2-15.
9	Attach the second mounting bracket on the other side of the drawer (repeat step 7 and step 8).

Installing the equipment drawer in the rack

10

CAUTION
Risk of equipment damage
Make sure that the drawer is adequately supported during the rack-mounting procedure.

Lift and position the drawer in the rack.

11 Based on your rack type, select the mounting hardware from the installation kit provided.

If the rack type is	**Then** select
19-in. or 23-in.	the thread forming screws
ETSI	the machine screws with cage nuts

12 On one side of the drawer, insert a screw with lock washer through the top hole in the mounting bracket and into the rack rail and secure the screw.

13 On the other side of the drawer, insert one screw with lock washer through the top hole in the mounting bracket and into the rack rail and secure the screw.

14 Insert one screw with lock washer into each of the remaining holes on both sides of the drawer.

15 Tighten all the screws to secure the drawer to the rack rails. Tighten the mounting hardware to the rack manufacturer's torque specifications. Use a torque wrench to verify that torque has been applied correctly. In the case of the PTE2000 rack, for the M6 and 12-24 mounting options, that specification is 5.65 N-m (50 lb-in.) for installation and 4.52 N-m (40 lb-in.) for inspection.

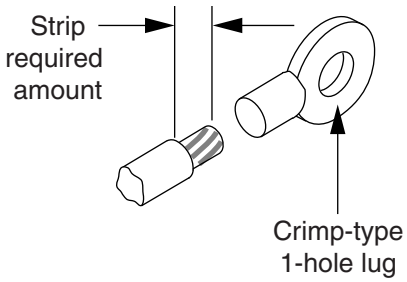
Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action

Grounding the equipment drawer

16 Measure and cut a length of insulated ground wire to reach from the ground point on the drawer to the system ground point. See “Attaching ring lugs to ground wire”.

Figure 2-12
Attaching ring lugs to ground wire



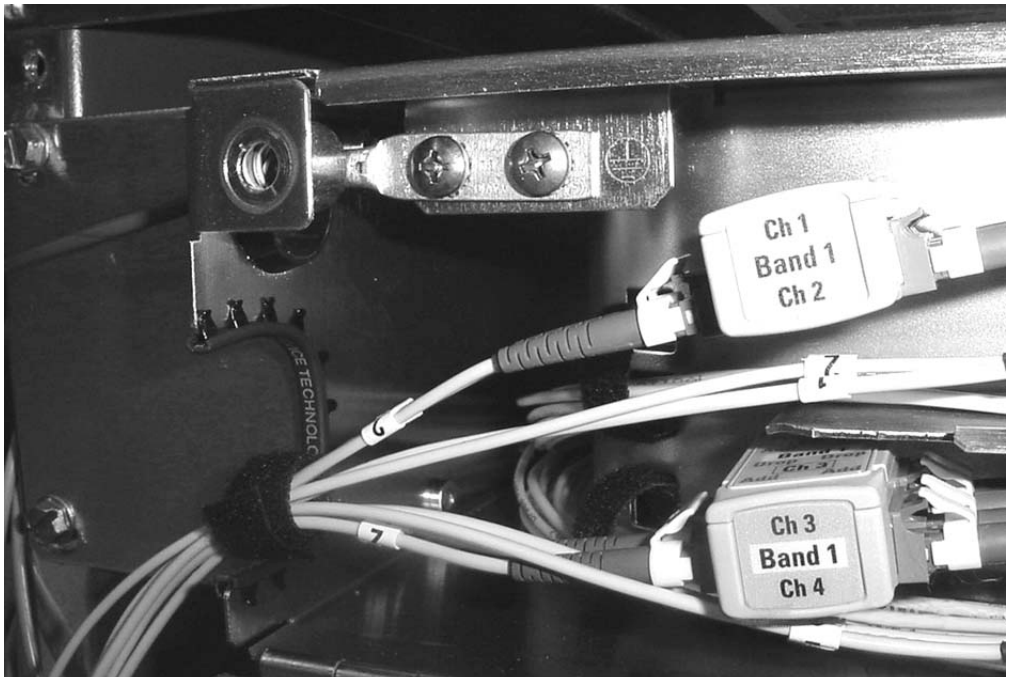
For 1U drawers, the mounting bracket on the left side of the drawer is the ground point for the drawer. A second ground point for the drawer is located on the left side of the drawer. See “Second ground point on left side of 1U OMX drawer”.

Figure 2-13
Second ground point on left side of 1U OMX drawer

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
	For OMX 16CH DWDM drawers, the ground point is located inside the module on the top left of the Channel 1 add/drop connectors. See “Dual-hole ground point inside OMX 16CH DWDM”.

Figure 2-14
Dual-hole ground point inside OMX 16CH DWDM

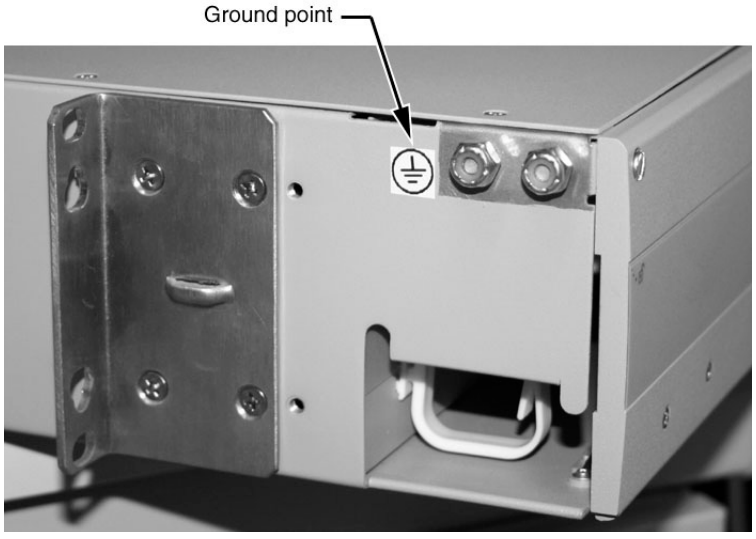


Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
	For the 1U drawers and the OMX 16CH DWDM drawers, the metallic grounding strip on the rack rail is the connection point for the system ground. See "Dual-hole ground point and metallic ground strip on rack rail". If the mounting brackets rest on the metallic grounding strip, you do not require the ground cable. For the 2U 10-channel Transponder Protection Tray ("Ground point for a 2U 10-channel TPT-10" on page 2-23), the ground point is located on the left side.

Figure 2-15
Dual-hole ground point and metallic ground strip on rack rail

Figure 2-16
Ground point for a 2U 10-channel TPT-10



Procedure 2-1 (continued)
Installing and grounding equipment drawers

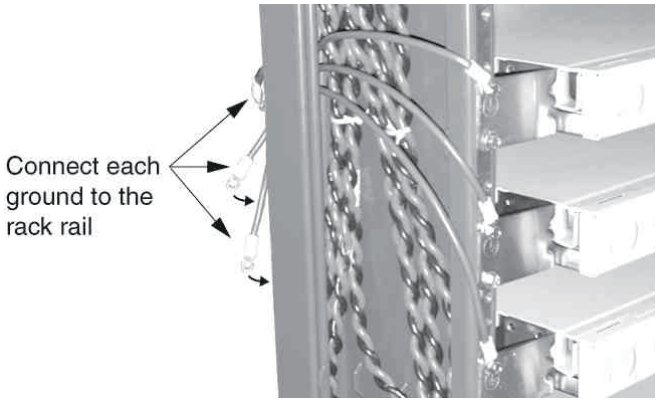
Step	Action
17	Prepare the ground cable by stripping 14 mm (0.5 in.) of insulation from both ends of the 6 AWG ground cable, based on the manufacturer's recommendations or standard practice.
18	Select the appropriate ground lug to insert and crimp at each end of the stripped wire.

If you are grounding	**Then**
a 1U drawer using the ground point on the left side of the drawer	insert each stripped end into a two-hole ground lug and crimp. Then go to step 19.
an OMX 16CH DWDM	insert each stripped end into a two-hole ground lug, and crimp. Then go to step 25.
a 2U TPT-10	insert each stripped end into a two-hole ground lug, and crimp. Then go to step 33.

Grounding a 1U drawer using the ground point on the left side of the drawer

19	Route the ground cable behind the back rack upright to the ground point on the left side of the drawer. See "Second ground point on left side of 1U OMX drawer" on page 2-21.
20	Position the lug over the holes and insert the screws (with the lockwasher attached) through the lug. The screws are provided with the drawer.
21	Tighten the screws. See "Torque values" on page 2-15.
22	Secure the lug on the other end of the ground wire to the system ground point (see "Example of grounding each OMX drawer individually to rack").

Figure 2-17
Example of grounding each OMX drawer individually to rack



Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
23	Tighten the screws. See “Torque values” on page 2-15.
24	If required, put the appropriate East and/or West label sticker(s) on the faceplate of the drawer. Go to step 32.

Grounding an OMX 16CH DWDM

25 Open the OMX 16CH DWDM drawer by unscrewing the two lock-screws on the top side (left and right) of the front panel. Then, pull down the OMX 16CH DWDM front panel. See the following illustration for a view of the top right lock screw (front panel closed).

Figure 2-18
Lock screw on OMX 16CH DWDM front panel (front panel closed)

26 Locate the dual hole grounding point inside the OMX 16CH DWDM. The dual hole grounding point is located in the top left portion of the module, near the Band 1 fiber connectors (see to “Dual-hole ground point inside OMX 16CH DWDM” on page 2-22).

27 Insert the ground wire in the OMX 16CH DWDM by routing the wire and the dual hole lug through the round aperture on the side of the OMX 16CH DWDM. The round aperture is where the ground wire must exit the OMX 16CHM DWDM when the front panel is closed (see “Dual-hole ground point inside OMX 16CH DWDM” on page 2-22).

Procedure 2-1 (continued)
Installing and grounding equipment drawers

Step	Action
28	Select the two required screws in the OMX 16CH DWDM installation kit, and secure the ground wire to the dual hole ground point inside the OMX 16CH DWDM (see "Dual-hole ground point inside OMX 16CH DWDM" on page 2-22).
29	Tighten the screw. See "Torque values" on page 2-15.
30	Secure the lug (see "Torque values" on page 2-15) on the other end of the ground wire to the system ground point (see "Dual-hole ground point and metallic ground strip on rack rail" on page 2-23).
31	Close the OMX 16CH DWDM front panel by pulling up the panel and securing the two external lock-screws.
32	If required, put the appropriate East and/or West label sticker(s) on the faceplate of the OMX equipment drawer. You have completed this procedure. If you have performed this procedure to install a DSCM drawer (NT0H57LA), next perform "Installing a DSCM tray in a DSCM drawer (NT0H57LA)" on page 2-36.

Grounding a 2U TPT-10

33	Locate the dual-hole grounding point on the left side of the drawer. See "Ground point for a 2U 10-channel TPT-10" on page 2-23.
34	Route the ground cable behind the back rack upright to the ground point on the left side of the drawer.
35	Position the dual-hole lug over the hole and insert the screws (with the lockwasher attached) through the dual hole lug. See "Torque values" on page 2-15. ***Note:*** The screws are provided with the drawer.
36	Use screws to secure the dual-hole lug on the other end of the ground wire to the system ground point (see "Dual-hole ground point and metallic ground strip on rack rail" on page 2-23). See "Torque values" on page 2-15.

—end—

Procedure 2-2
Installing a 1U Bulk Fiber Management Tray 174-0094-900

Use this procedure to install a 1U Bulk Fiber Management Tray 174-0094-900 in the rack.

Prerequisites

Make sure that you have

- a torque wrench
- the appropriate personal grounding device to dissipate electrostatic charges
- the EDP, IDP, or equivalent site/network engineering plans

Precautions

DANGER

Risk of electrical shock and equipment damage

Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the subsection on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

Procedure 2-2 (continued)
Installing a 1U Bulk Fiber Management Tray 174-0094-900

CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

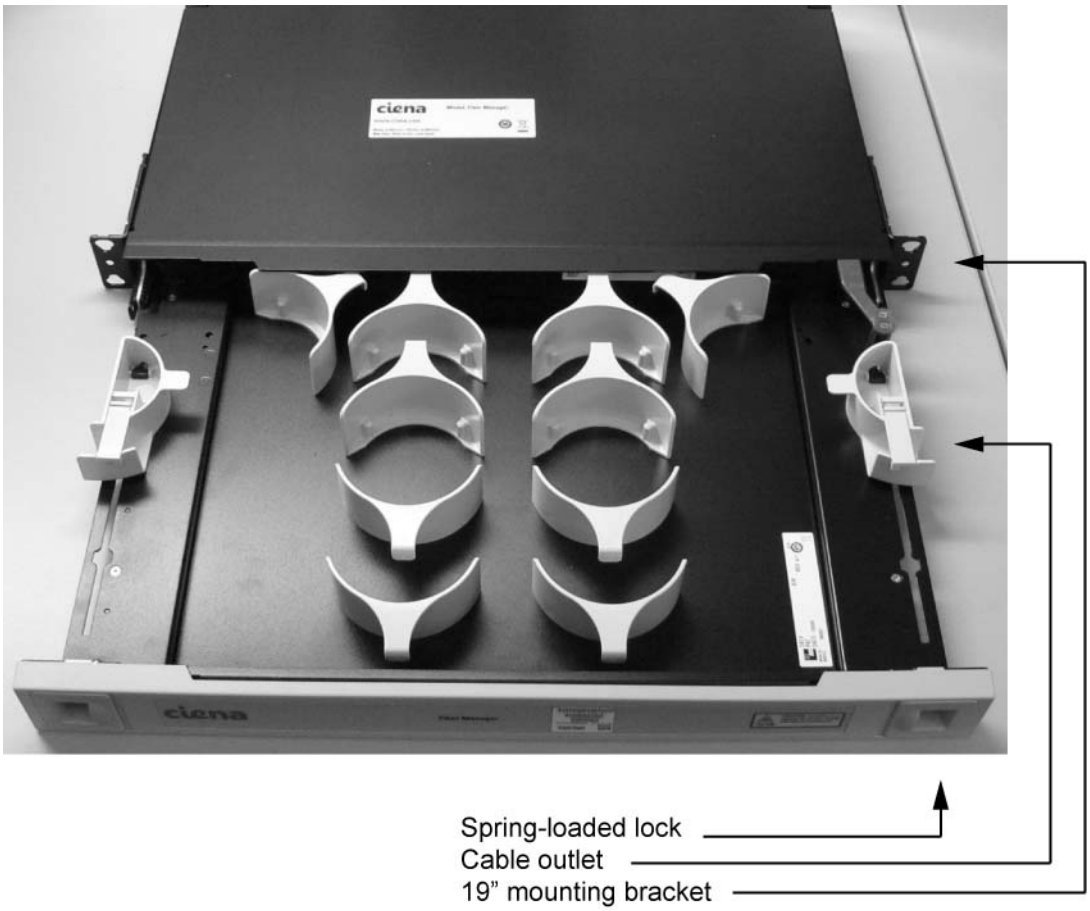
Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 2-27.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
3	Determine the correct height for the fiber manager equipment drawer below the shelf, on the equipment rack, according to your EDP, IDP, or equivalent site/network engineering plans.
4	Determine the type of rack in which you will install the fiber manager equipment drawer, according to your EDP, IDP, or equivalent site/network engineering plans. The fiber manager equipment drawer is shipped with the mounting brackets pre-configured for a 19-in. rack. See the following illustration.

If you are installing the fiber manager in a	**Then** go to
19-in. rack	step 7 to install the fiber manager on the rack
23-in. rack	step 5 to detach the mounting brackets from the fiber manager and re-configure for 23-in. rack installation
ETSI rack	step 6 to detach the mounting brackets from the fiber manager and attach the ETSI brackets

Procedure 2-2 (continued)
Installing a 1U Bulk Fiber Management Tray 174-0094-900

Step	Action

Figure 2-19
Fiber manager 174-0094-900



5 Detach the pre-installed mounting brackets from the fiber manager. Attach the short side of each bracket to the side of the fiber manager. Use the same mounting screws that were pre-installed on the mounting bracket.

Use a torque wrench to verify that torque has been applied correctly: 3.05 N-m (27 lb-in.) for installation and 2.26 N-m (20 lb-in.) for inspection.

Then go to step 7 to install the fiber manager on the rack.

Procedure 2-2 (continued)
Installing a 1U Bulk Fiber Management Tray 174-0094-900

Step	Action
6	Detach the pre-installed mounting brackets from the fiber manager. Attach the short side of each of the ETSI brackets to the side of the fiber manager. Use the same mounting screws that were pre-installed on the mounting bracket. Use a torque wrench to verify that torque has been applied correctly: 3.05 N-m (27 lb-in.) for installation and 2.26 N-m (20 lb-in.) for inspection. Then go to step 7 to install the fiber manager on the rack.

Installing the fiber manager on the rack

7 Based on your rack type, select the mounting hardware from the installation kit provided.

If the rack type is	**Then** select
19-in. or 23-in.	the thread forming screws
ETSI	the machine screws with cage nuts

8 Install the fiber manager equipment drawer on the rack using the hardware you selected.

9 Insert and tighten the four mounting screws in the bottom hole of each bracket. See “Torque values” on page 2-15.

Grounding the fiber manager equipment drawer

10 Fasten one end of the ground cable to the ground point on the left-hand side of the fiber manager equipment drawer. Fasten the other end of the ground cable to an appropriate location on the rack.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the ground cable with mounting screws onto the frame, otherwise, you risk damaging the equipment. Torque the #10-32 KEPS nuts to 2.26 N-m (20 lb-in.).

—end—

Procedure 2-3
Installing an NT0H57BB equipment drawer

Use this procedure to install an NT0H57BB (fiber manager with flip-up fiber spools) equipment drawer in the rack.

Prerequisites

Make sure that you have

- a torque wrench
- the appropriate personal grounding device to dissipate electrostatic charges
- the EDP, IDP, or equivalent site/network engineering plans

Precautions

DANGER

Risk of electrical shock and equipment damage

Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the subsection on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION

Risk of equipment damage

Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

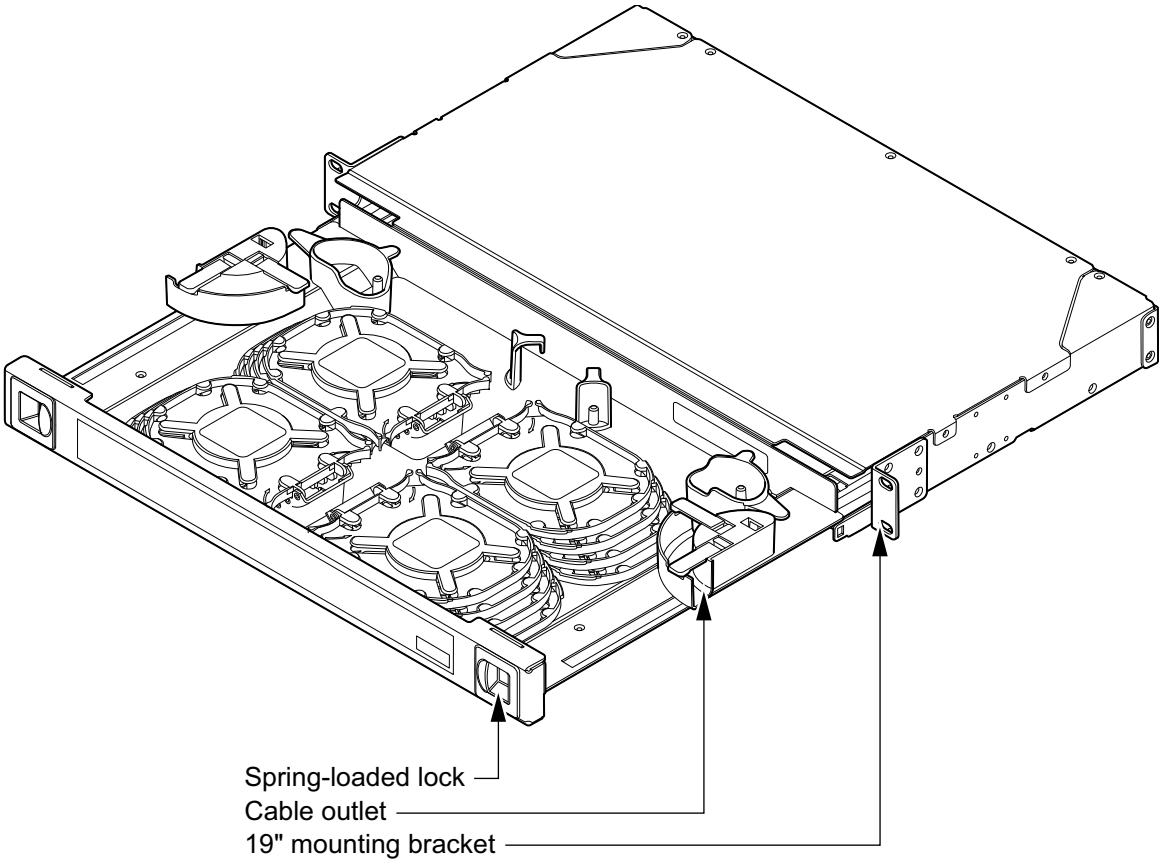
Procedure 2-3 (continued)
Installing an NT0H57BB equipment drawer

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 2-27.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
3	Determine the correct height for the fiber manager equipment drawer below the shelf, on the equipment rack, according to your EDP, IDP, or equivalent site/network engineering plans.
4	Determine the type of rack in which you will install the fiber manager equipment drawer (19-in, 23-in., or ETSI rack) according to your EDP, IDP, or equivalent site/network engineering plans.
5	Check as follows whether the bracket type corresponding to the rack type is attached to the side of the equipment drawer, and whether it is attached in the required position: • bracket for 19-in. installation—For a 19-in. rack installation, the respective bracket must be mounted with the long side attached to the equipment drawer, as shown in the following illustration. • bracket for 23-in. installation—For a 23-in. rack installation, the bracket shown in the illustration below must be mounted with the short side attached to the equipment drawer. The respective instructions will follow later in this procedure. • ETSI bracket. The respective instructions will follow later in this procedure.

Procedure 2-3 (continued)
Installing an NT0H57BB equipment drawer

Step	Action

Figure 2-20
Fiber manager NT0H57BB (with bracket attached for 19-in. rack installation)



Note: The OMX fiber manager capacity is 16 fibers x 6.56 ft each.

Procedure 2-3 (continued)
Installing an NT0H57BB equipment drawer

Step	Action
6	Select your next step. **If** the brackets of the required bracket type are / **Then** go to attached in the required position — step 9 to install the equipment drawer on the rack not attached in the required position — step 7 to detach the mounting brackets from the existing position and attach them in the required position not attached to the fiber manager — step 8 to attach the required mounting brackets
7	Detach the mounting brackets from the fiber manager. Using the same mounting screws, attach to the side of the fiber manager the required side of each bracket: long side of mounting bracket for 19-in. rack installations, short side of mounting bracket for 23-in. rack installations. Use a torque wrench to verify that torque has been applied correctly: 3.05 N-m (27 lb-in.) for installation and 2.26 N-m (20 lb-in.) for inspection. Then go to step 9 to install the fiber manager in the rack.
8	Attach the mounting brackets to the sides of the fiber manager. Use a torque wrench to verify that torque has been applied correctly: 3.05 N-m (27 lb-in.) for installation and 2.26 N-m (20 lb-in.) for inspection. Then go to step 9 to install the fiber manager in the rack.

Installing the fiber manager on the rack

9	Based on your rack type, select the mounting hardware from the installation kit provided. **If** the rack type is / **Then** select 19-in. or 23-in. — the thread forming screws ETSI — the machine screws with cage nuts
10	Install the fiber manager equipment drawer on the rack using the hardware you selected.
11	Insert and tighten the four mounting screws in the bottom hole of each bracket. See “Torque values” on page 2-15.

Procedure 2-3 (continued)
Installing an NT0H57BB equipment drawer

Step	Action

Grounding the fiber manager equipment drawer

12 Fasten one end of the ground cable to the ground point on the left-hand side of the fiber manager equipment drawer. Fasten the other end of the ground cable to an appropriate location on the rack.

CAUTION
Risk of damage to equipment
Use a torque wrench to attach the ground cable with mounting screws onto the frame, otherwise, you risk damaging the equipment. Torque the #10-32 KEPS nuts to 2.26 N-m (20 lb-in.).

Installing the storage tray cover

13 Position the storage tray cover, press the two spring-loaded locks, push the storage tray cover in, and release the spring-loaded locks. See “Fiber manager NT0H57BB (with bracket attached for 19-in. rack installation)” on page 2-33.

—end—

Procedure 2-4
Installing a DSCM tray in a DSCM drawer (NT0H57LA)

Follow this procedure to install a dispersion slope compensation module (DSCM) tray in a DSCM drawer (NT0H57LA).

Normally, the DSCM trays are not shipped installed in the DSCM drawer. You must perform this procedure to install every DSCM tray received.

The DSCM drop-in plate assembly provides slack storage.

ATTENTION
If you use a DSCM that is not part of the Ciena portfolio or that has no I2C external Ethernet connector, the DSCM must be provisioned in virtual slots 91-99 for the 32-slot shelf. Otherwise, a “Circuit Pack Missing” alarm will be raised.

Prerequisites

Make sure that you

- Have installed the DSCM drawer (NT0H57LA) (see “Installing and grounding equipment drawers” on page 2-5).
- Have a 5/16-in. wrench.
- Have the hex cap nuts (4) supplied with the DSCM drawer (NT0H57LA)
- Have the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans.
- Observe all the safety requirements described in *Installation - General Information*, 323-1851-201.0.
- Have the appropriate personal grounding device to dissipate electrostatic charges.

Procedure 2-4 (continued)
Installing a DSCM tray in a DSCM drawer (NT0H57LA)

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

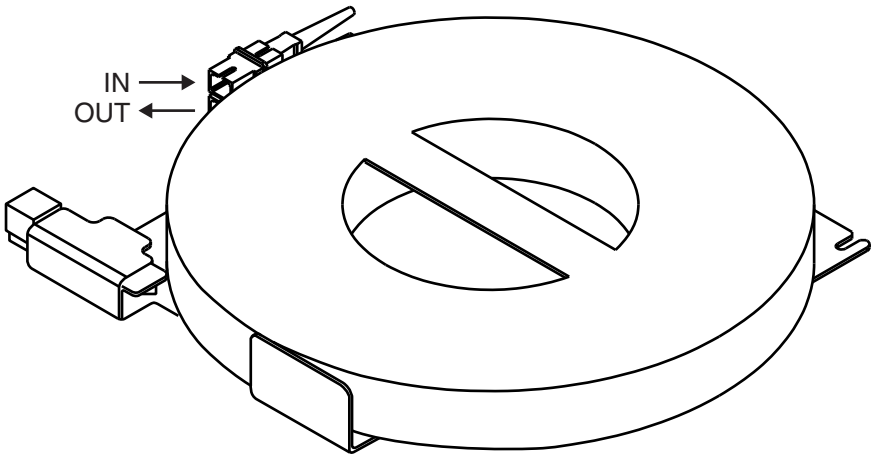
CAUTION
Risk of equipment damage
Electrostatic discharge (ESD) can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging equipment.

Step	Action
1	Open the DSCM tray drawer by pressing and holding the two locking latches located on the sides of the drawer, and pulling it toward you until the drawer is fully extended.
2	Locate the locking clip at the back left corner of the drawer. Lock the drawer open by rotating the locking clip counter-clockwise until it rests on the edge of the drawer.

Procedure 2-4 (continued)
Installing a DSCM tray in a DSCM drawer (NT0H57LA)

Step	Action
3	Insert the DSCM tray (see "DSCM tray") into the DSCM tray drawer as follows: **a.** Place the DSCM tray at an angle so that the slots at the rear of the tray align with the rear studs on the drawer. **b.** Align the front slots on the tray with the front studs on the drawer and lower the front of the tray to the base of the drawer

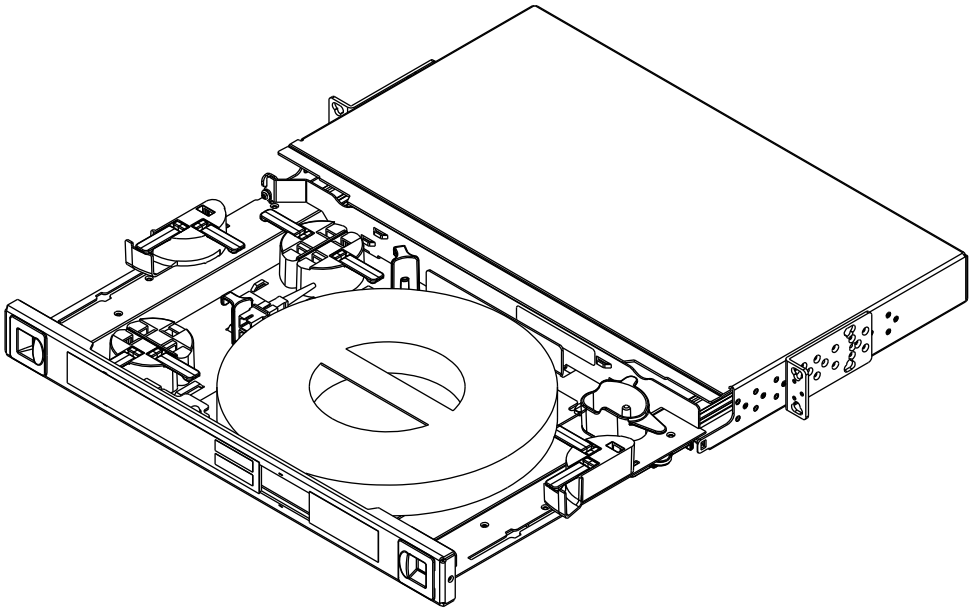
Figure 2-21
DSCM tray



Procedure 2-4 (continued)
Installing a DSCM tray in a DSCM drawer (NT0H57LA)

Step	Action
4	Fasten the DSCM tray to the drawer using the four nuts as follows: **a.** Insert a nut to each of the screws at the front of the tray and tighten. **b.** Insert a nut to each of the screws at the back of the tray and tighten. See "DSCM tray in a DSCM drawer".

Figure 2-22
DSCM tray in a DSCM drawer



5	Locate the locking clip at the back left corner of the drawer. Unlock the drawer by rotating the locking clip clockwise.
6	Close the drawer by pressing and holding the locking tabs on the sides of the tray while you slide the tray into the rack.

—end—

Procedure 2-5
Connecting OMX 4CH equipment drawers to the 6500 shelves

Use the procedure to access connectors in OMX 4CH Enhanced + fiber manager equipment drawers and to establish connections to the DWDM optical interface circuit packs in the 6500 shelves.

Prerequisites

Make sure that you have the tools and materials listed in the following table.

Table 2-5
Required tools and materials

Item	Quantity	Supplied
Antistatic wrist and heel straps	1	no
Fiber-optic cleaning kit See *Optical Connector Inspection and Cleaning*, 323-1859-500.	1	no
Fiber inspection scope	1	no
Hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.	as required	no

Procedure 2-5 (continued)
Connecting OMX 4CH equipment drawers to the 6500 shelves

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION
Risk of personal injury
When inserted in a shelf slot, the optical interface circuit pack emits laser light that can blind. Keep all optical connectors on the optical interface circuit packs capped when they are not connected to optical fiber cables. Never look directly into the end of an optical fiber.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Risk of affecting network reliability
Always clean fiber connectors before making connections to ensure network reliability. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

Procedure 2-5 (continued)
Connecting OMX 4CH equipment drawers to the 6500 shelves

CAUTION
Possible risk of damage to equipment and fiber
Make sure that the bulkhead connectors are lowered and snapped into place before closing the drawer. Failure to do so could cause damage to the connector unit, the fibers attached to the connector unit, or both.

Observe the minimum bend radius of 30 mm (1.18 inches) for the patch cords. Always use the fiber management components in the drawer to route the fiber.

Allow for sufficient slack in the fibers entering and exiting the drawer. If you do not allow sufficient slack, the fibers can become stretched and damaged when you open the drawer.

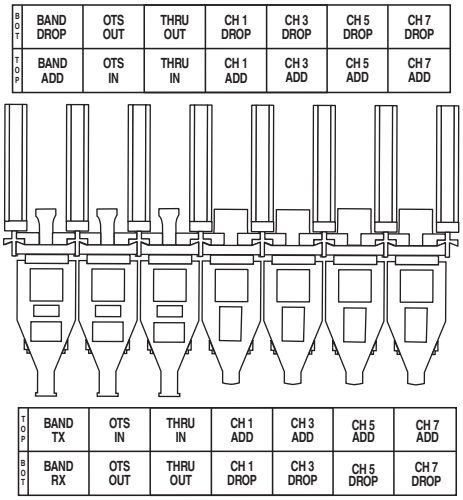
Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 2-41.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
3	Open the OMX 4CH equipment drawer by pressing and holding the two locking latches on the drawer and pulling the drawer toward you until it is fully open.
4	Verify if the drawer has a locking clip and if the locking clip is spring-loaded. The locking clip is located in the back left corner of the drawer.

If the drawer	**Then**
has a non-spring-loaded locking clip	lock the drawer open by rotating the locking clip counter-clockwise until it rests on the edge of the drawer. Then go to step 5.
does not have a locking clip or the locking clip is spring-loaded	go to step 5

Procedure 2-5 (continued)
Connecting OMX 4CH equipment drawers to the 6500 shelves

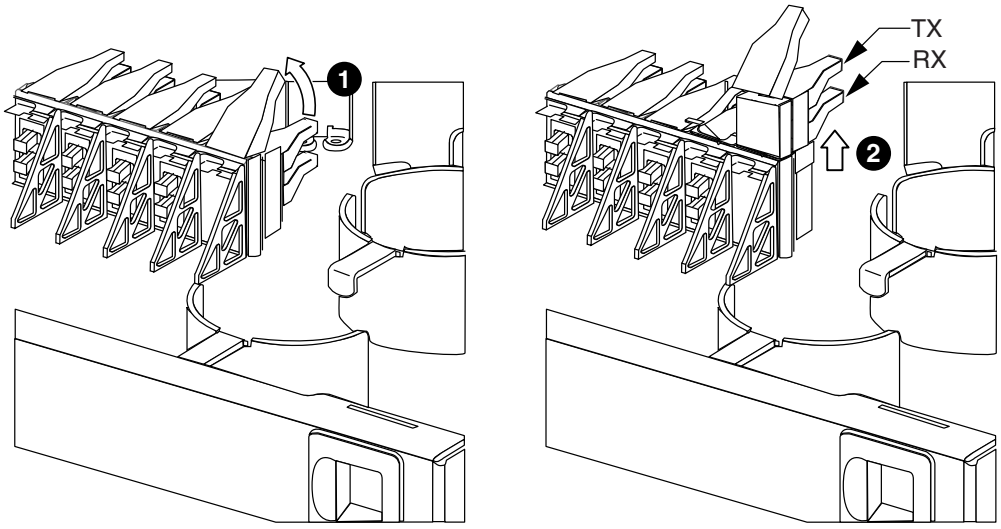
Step	Action
5	Locate the connector on the OMX 4CH required to make the necessary connection. See "OMX 4CH connectors".

Figure 2-23
OMX 4CH connectors



6	Lift the pull-up tab on the top of the bulkhead to access the connector. See "OMX 4CH connector bulkheads" (an example of channel 1 or [CH1] add port).

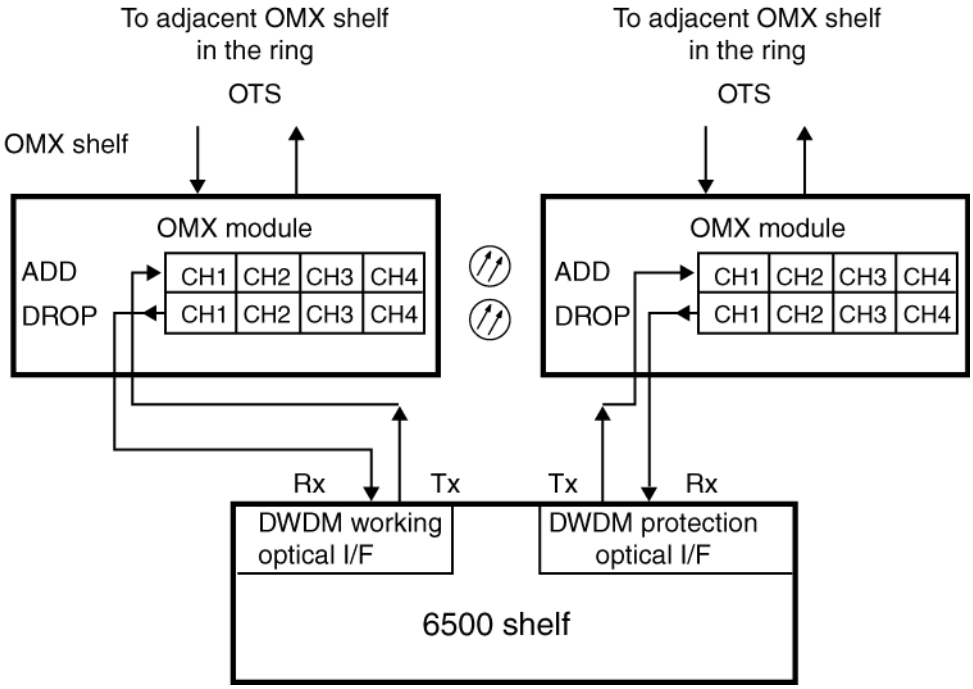
Figure 2-24
OMX 4CH connector bulkheads



Procedure 2-5 (continued)
Connecting OMX 4CH equipment drawers to the 6500 shelves

Step	Action
7	Scope the channel 1 (CH1) connector on the OMX 4CH add port. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
8	Scope the fiber-optic patch cord connector. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
9	Scope the Tx port on the DWDM circuit pack. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
10	Connect channel 1 (CH1) on the OMX 4CH add port to the Tx port on the DWDM circuit pack. See "Connecting an OMX 4CH equipment drawer to the 6500 shelf" on page 2-44 (an example of channel 1 or [CH1] add port).

Figure 2-25
Connecting an OMX 4CH equipment drawer to the 6500 shelf



11	Lower the connector by pushing down on the tab at the top of the unit, until the bulkhead snaps into place.

Procedure 2-5 (continued)
Connecting OMX 4CH equipment drawers to the 6500 shelves

Step	Action
12	Locate the connector on the OMX 4CH required to make the necessary connection. In this case (CH1) drop port. See "OMX 4CH connectors" on page 2-43.
13	Lift the pull-up tab on the top of the bulkhead to access the connector. See "OMX 4CH connector bulkheads" on page 2-43.
14	Scope the channel 1 (CH1) connector on the OMX 4CH drop port. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
15	Scope the fiber-optic patch cord connector. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
16	Scope the Rx port on the DWDM circuit pack. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
17	Connect channel 1 (CH1) on the OMX 4CH drop port to the Rx port on the optical interface circuit pack. See "Connecting an OMX 4CH equipment drawer to the 6500 shelf" on page 2-44.
18	Route the slack fiber around the fiber management components in the drawer.
19	Use curly ties, hook and loop tape (such as VELCRO), fiber cable ties or lacing twine and tools according to your company's practice to bundle the fibers where they enter the drawer. You must protect all fiber from cuts and abrasions according your company's practice and industry standards.
20	Make sure that you have lowered all the bulkheads and that the fibers are routed correctly around the fiber management components.
21	Select your next step.

If the drawer has a	**Then**
non-spring-loaded locking clip	return the locking clip to the original upright position
spring-loaded locking clip	push the clip down

22	Perform step 5 through step 21 for the OMX 4CH protection module.
23	To close the drawer, press and hold the locking tabs on the drawer while you slide the drawer into the shelf. The locking tabs click into position when the drawer is in place.

—end—

Procedure 2-6
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Use this procedure to access connectors in OMX 16CH DWDM equipment drawers and to establish connections to the DWDM optical interface circuit packs in the 6500 shelves.

Prerequisites

Make sure that you have the tools and materials listed in the following table.

Table 2-6
Required tools and materials

Item	Quantity	Supplied
Antistatic wrist and heel straps	1	no
Fiber-optic cleaning kit See *Optical Connector Inspection and Cleaning*, 323-1859-500.	1	no
Fiber inspection scope	1	no
Hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.	as required	no

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION
Risk of affecting network reliability
To ensure network reliability, clean the fiber connectors before you make connections. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

CAUTION
Risk of equipment damage
When the gray slider adapter is extended to the furthest outward position and an SC or LC connector is inserted into the SC or LC coupling, the slider adapter can separate at the seams due to the pressure being applied.

Firmly support the slider adapter when inserting an SC or LC connector to avoid equipment damage.

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

CAUTION
Risk of damage to equipment and fiber
Make sure that the sliders are pushed fully to the rear before closing the front cover. Failure to do so could cause damage to the connector unit, the fibers attached to the connector unit, or both.

Observe the minimum bend radius of 30 mm (1.18 inches) for the patch cords. Always use the fiber management components to route the fiber.

Allow for sufficient slack in the fibers entering and exiting the drawer. If sufficient slack is not left, the fibers can become stretched and damaged when the drawer is opened.

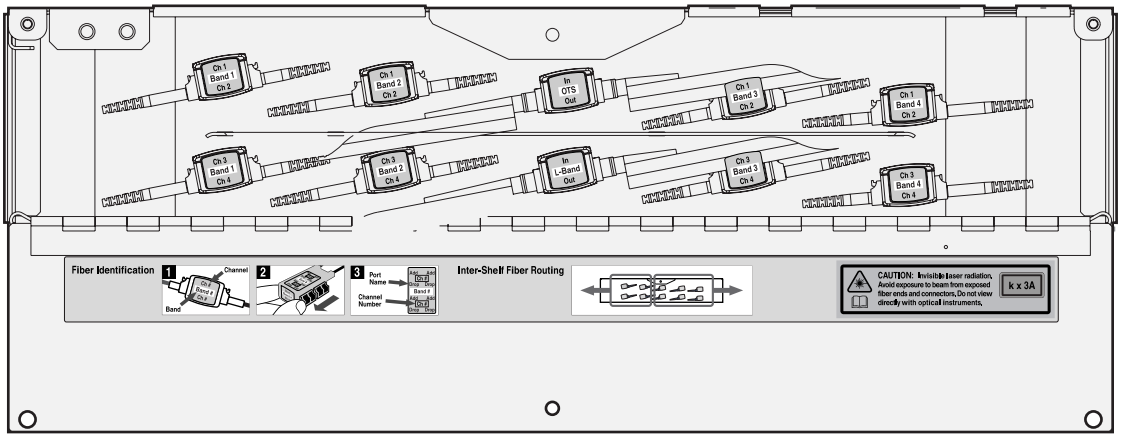
CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage" on page 2-47.
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
3	Using a Phillips #2 screwdriver, open the front cover of the OMX 16CH DWDM by turning the screws counterclockwise, see "OMX 16CH DWDM" on page 2-49.

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Step	Action

Figure 2-26
OMX 16CH DWDM



4 Locate the required slider adapter. For the connector labels, see the following illustrations:

- “Labels for OMX 16CH DWDM C-band” on page 2-50
- “Labels for OMX 16CH DWDM L-band” on page 2-50

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Step	Action

Figure 2-27
Labels for OMX 16CH DWDM C-band

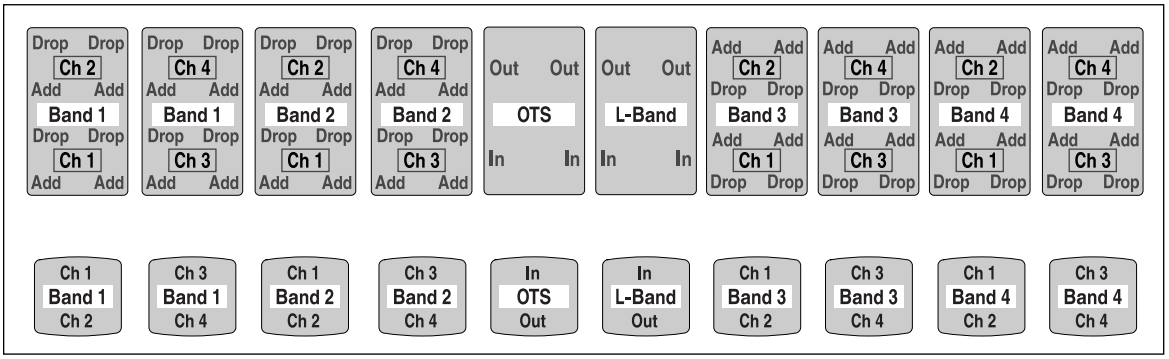
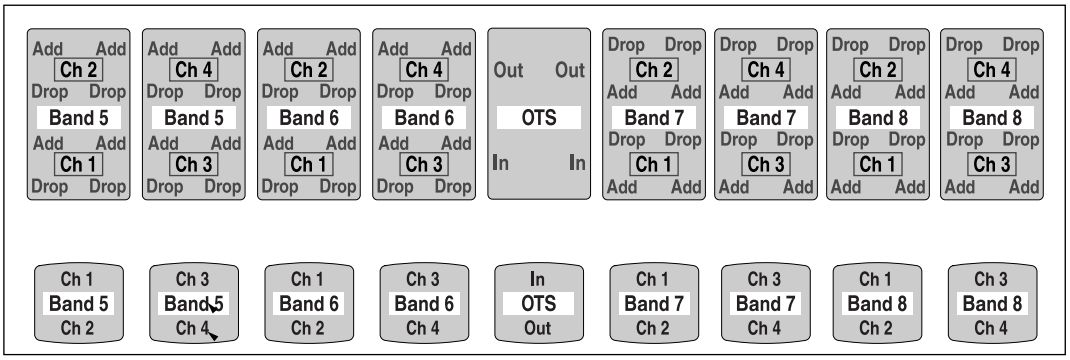


Figure 2-28
Labels for OMX 16CH DWDM L-band



5 Pull the slider adapter out. See “Using the slider adapter” on page 2-51.

6 Remove the connector dust cover.

7 Scope the channel 1 (CH1) connector on the OMX 16CH DWDM add port. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

8 Scope the fiber-optic patch cord connector. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

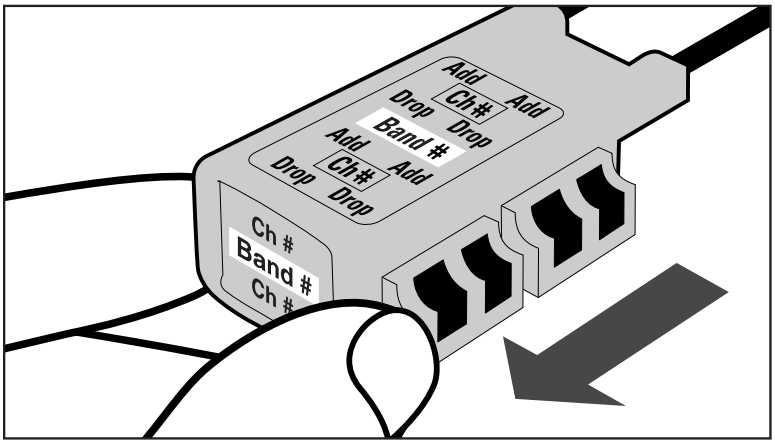
9 Carefully insert the optical fiber connector into the slider adapter.

A click indicates that you have inserted the optical fiber connector correctly.

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Step	Action

Figure 2-29
Using the slider adapter



10 Scope the Tx port on the DWDM circuit pack. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

11 Connect channel 1 (CH1) on the OMX 16CH DWDM add port to the Tx port on the DWDM circuit pack.

12 Locate the connector on the OMX 16CH required to make the next connection. In this case (CH1) drop port.

13 Pull the slider adapter out. See "Using the slider adapter".

14 Remove the connector dust cover.

15 Scope the channel 1 (CH1) connector on the OMX 16CH DWDM drop port. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

16 Scope the fiber-optic patch cord connector. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.

17 Carefully insert the optical fiber connector into the slider adapter.

A click indicates that you have inserted the optical fiber connector correctly.

Procedure 2-6 (continued)
Connecting OMX 16CH DWDM equipment drawers to the 6500 shelves

Step	Action
18	Push the slider adapter in.
19	Scope the Rx port on the DWDM circuit pack. Clean if necessary, and scope again. See *Optical Connector Inspection and Cleaning*, 323-1859-500.
20	Connect channel 1 (CH1) on the OMX 16CH DWDM drop port to the Rx port on the optical interface circuit pack.
21	Route the slack fiber around the fiber management components in the OMX16CH drawer.
22	Use hook and loop tape (such as VELCRO), fiber cable ties or lacing twine and tools according to your company's practice to bundle the fibers where they enter the drawer. You must protect all fiber from cuts and abrasions according your company's practice and industry standards.
23	Perform step 4 through step 22 for the OMX 16CH DWDM protection module.
24	Move any slack fiber so that you can close the OMX 16CH DWDM door.
25	Use hook and loop tape (such as VELCRO), fiber cable ties or lacing twine and tools according to your company's practice to bundle the fibers close to the entry point of the fiber manager. You must protect all fiber from cuts and abrasions according your company's practice and industry standards. See "Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager" on page 2-62.
26	Close the front cover of the OMX 16CH DWDM by turning the screws (clockwise).
27	Perform fiber management. See "Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager" on page 2-62.

—end—

Procedure 2-7
Routing fiber-optic cables for the OMX 4CH equipment drawer

Use this procedure to route the optical fibers from the OMX 4CH + fiber manager tray through the fiber management trough below the card cage of the 6500 shelf. Consult your system diagram for site-specific details.

Prerequisites

Make sure that:

- The OMX cable (Ethernet cable) has been installed.
- All fibers and connectors are clean (see *Optical Connector Inspection and Cleaning*, 323-1859-500).
- All fibers are labeled.
- you have hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice.

  You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.
- You have the appropriate personal grounding device to dissipate electrostatic charges.

When you complete this procedure, the optical fibers are routed from the OMX 4CH + fiber manager tray to the circuit pack area of the 6500 shelf.

Guidelines and precautions

When installing the 6500 shelves and equipment within a new or existing rack, provide fiber management according to your company's practice. When the fiber management requirements are not specified, Ciena recommends that split flex tubing be used to route and secure fibers.

If you are using split flex tubing to route and secure fiber-optic cables, secure the split flex tubing approximately every 12-in. (30.5 cm) to the transverse arms of the equipment rack using lacing cord or wax string according to your company's practice.

CAUTION
Invisible laser radiation
The 6500 Packet-Optical Platform operates up to a hazard level of 1M. Use only viewing instruments with proper optical attenuation.

Procedure 2-7 (continued)
Routing fiber-optic cables for the OMX 4CH equipment drawer

CAUTION
Possible risk of damage to equipment and fiber
Make sure that the bulkhead connectors are lowered and snapped into place before closing any drawers. Failure to do so could cause damage to the connector unit, the fibers attached to the connector unit, or both.

Observe the minimum bend radius of 30 mm (1.18 in.) for the patch cords. Always use the fiber management components in the drawer to route the fiber.

Allow for sufficient slack in the fibers entering and exiting the any drawers. If sufficient slack is not left, the fibers can become stretched and damaged when the drawer is opened.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

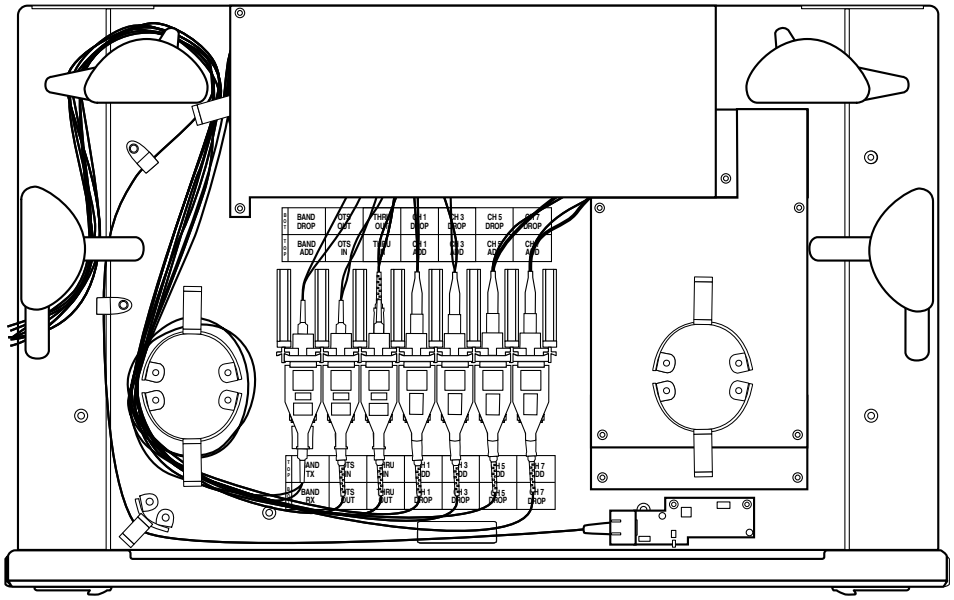
Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
2	Open the OMX 4CH + fiber manager tray by pressing and holding the two locking latches on the drawer and pull the drawer toward you until it is fully open.

CAUTION
Risk of equipment damage
Incorrect handling can result in damage to the optical fibers.

Procedure 2-7 (continued)
Routing fiber-optic cables for the OMX 4CH equipment drawer

Step	Action
3	If this OMX connects to circuit packs in slots on the left hand side, route the fibers entering or exiting the tray through the opening on the left side (see "OMX 4CH + fiber manager tray optical fiber routing (left side)"). If this OMX connects to circuit packs in slots on the right hand side, route the fibers entering or exiting the tray through the opening on the right side (see "OMX 4CH + fiber manager tray optical fiber routing (right side)" on page 2-56). Consult your system diagram for site-specific details. Follow the bend radius rule when you route fiber. Do not exceed a 30-mm (1.18-in.) bend radius when you route fiber. Do not exceed a 3-in. (76.2-mm) bend radius when you coil or bend fibers. Store excess fiber slack within the tray. You can bundle together the fibers that enter the tray. Use curly locks, hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards. **CAUTION** **Risk of equipment damage** To avoid damaging the optical fibers, make sure that the optical fibers inside the OMX are clear of the cover when you replace the cover.

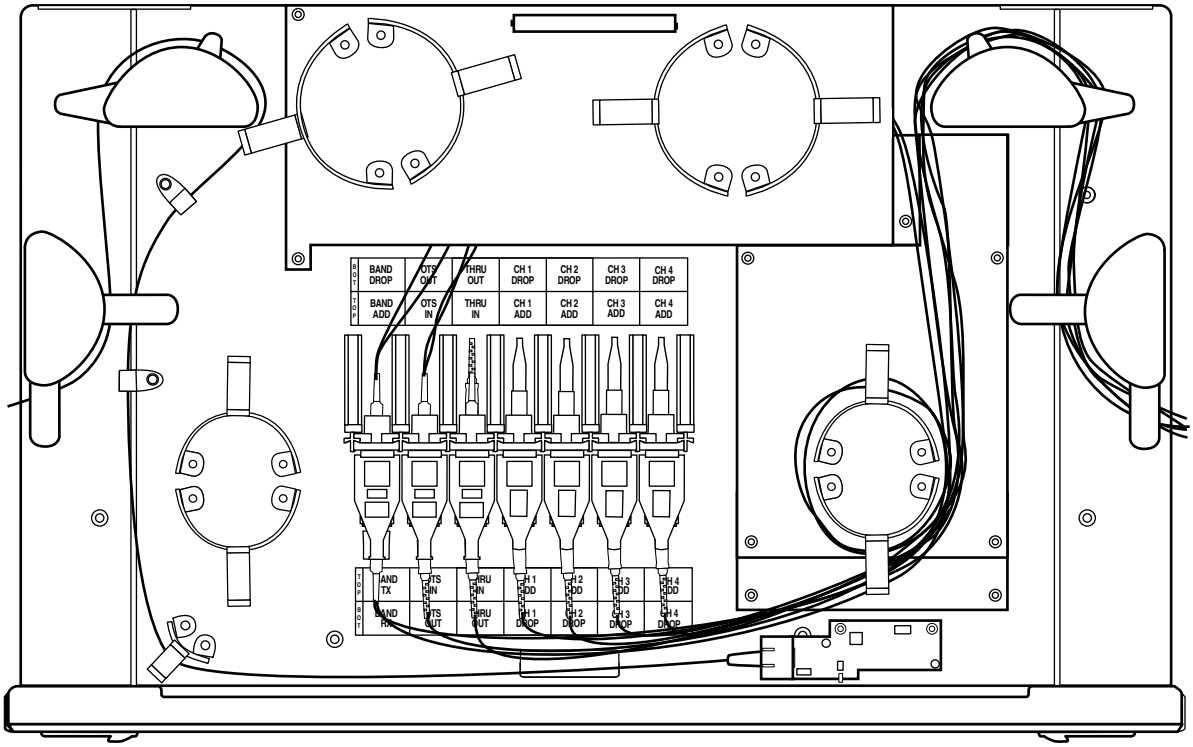
Figure 2-30
OMX 4CH + fiber manager tray optical fiber routing (left side)



Procedure 2-7 (continued)
Routing fiber-optic cables for the OMX 4CH equipment drawer

Step	Action

Figure 2-31
OMX 4CH + fiber manager tray optical fiber routing (right side)



4 Repeat step 1 and step 3 for the other OMX (if applicable).

5 Use hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice to bundle fiber-optic cables entering and exiting the shelf. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

6 Slide the OMX drawer into the rack while pressing the locking tabs in the middle of the sides of the drawer. The front locking tabs click when the tray is in the correct position.

—end—

Procedure 2-8
Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer

Use this procedure to route the optical fibers within the OMX 16CH DWDM equipment drawer. Consult your system diagram for site-specific details.

No fiber slack storage devices are provided inside the OMX 16CH DWDM. You must manage fiber slack outside the OMX 16CH DWDM. The steps in this procedure provide guidelines on fiber management. Make sure that you confirm the preferred method of fiber slack management for the system with the person responsible for installation.

Prerequisites

Make sure you that:

- The OMX 16CH DWDM equipment drawer is installed. For installation information, see Procedure 2-1, “Installing and grounding equipment drawers”.
- All fibers and connectors are clean (see *Optical Connector Inspection and Cleaning*, 323-1859-500).
- All fibers are labeled.
- You find out the strategy for fiber slack management for the system from your next level of support (for installation).
- You have the following tools and materials:
  - — a #2 Phillips screwdriver
  - — hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company’s practice.

    You must protect all fiber from cuts and abrasions according to your company’s practice and industry standards.
- You have the appropriate personal grounding device to dissipate electrostatic charges.

Guidelines and precautions

When installing the 6500 shelves and equipment in a new or existing rack, provide fiber management according to your company’s practice. When the fiber management requirements are not specified, Ciena recommends that split flex tubing be used to route and secure fibers.

Procedure 2-8 (continued)
Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer

If you are using split flex tubing to route and secure fiber-optic cables, secure the split flex tubing approximately every 12 inches (30.5 cm) to the transverse arms of the equipment rack using lacing cord or wax string according to your company's practice.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

CAUTION
Invisible laser radiation
The 6500 operates up to a hazard level of 1M. Use only viewing instruments with proper optical attenuation.

CAUTION
Possible risk of damage to equipment and fiber
Make sure that the slider adapters (which hold the fiber connectors) are completely inserted back into place before you close the OMX 16CH DWDM front panel. Failure to do so can cause damage to the connector unit, the fibers attached to the connector unit, or both.

Observe the minimum bend radius of 30 mm (1.18 in.) for the patch cords. Always follow the fiber routing guidelines within this procedure.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on a shelf installed in a grounded rack/cabinet or clip to a suitable ground point.
2	Use a Phillips screwdriver to unfasten the two lock-screws on the top side (left and right) of the front panel of the OMX 16CH DWDM drawer. Then pull down the OMX 16CH DWDM front panel. See "Lock screw on the OMX 16CH DWDM front panel (front panel closed)" on page 2-59.

Procedure 2-8 (continued)
Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer

Step	Action

Figure 2-32
Lock screw on the OMX 16CH DWDM front panel (front panel closed)

The internal fibers are already routed inside the OMX 16CH DWDM drawer.

3 For the routing of external fibers, follow the inter-shelf routing fiber diagram inside the OMX 16CH DWDM front panel. See "Inter-shelf fiber routing label inside the OMX 16CH DWDM front cover" on page 2-60. For external and internal fiber routing in the OMX 16CH DWDM, see "Routing fibers inside the OMX 16CH DWDM" on page 2-60. For external fibers, follow the guidelines shown on the inter-shelf routing fiber label, which are as follows:

- Slider adapters on the left side: Route to the left side of the drawer the duplex LC fibers going to the slider adapters for
  - — Band 1 and Band 2 on the C-band OMX 16CH DWDM (NT0H32JA), and
  - — Band 5 and Band 6 on the L-band OMX 16CH DWDM (NT0H32KA)
- Slider adapters in the center: Route to the right side of the drawer
  - — the SC fibers going to the OTS slider adapters for both the C-band and the L-band OMX 16CH DWDM, and
  - — the L-band slider adapters on the C-band OMX 16CH DWDM. (These ports are the L-band upgrade ports only available on the NT0H32JA.)

Procedure 2-8 (continued)
Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer

Step	Action

Figure 2-33
Inter-shelf fiber routing label inside the OMX 16CH DWDM front cover

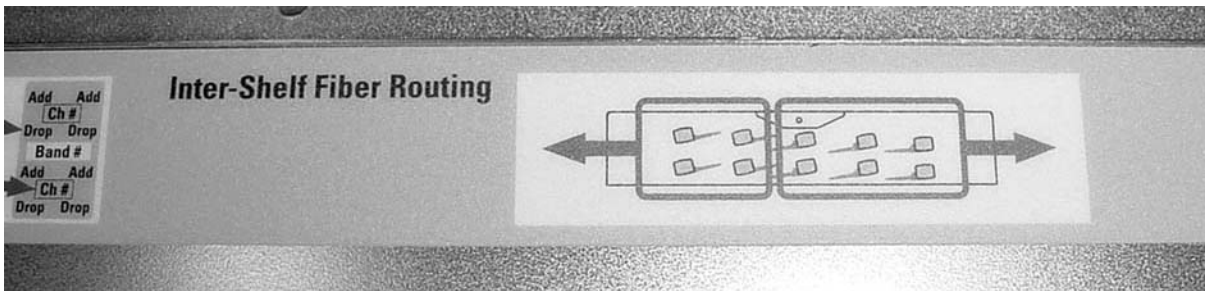
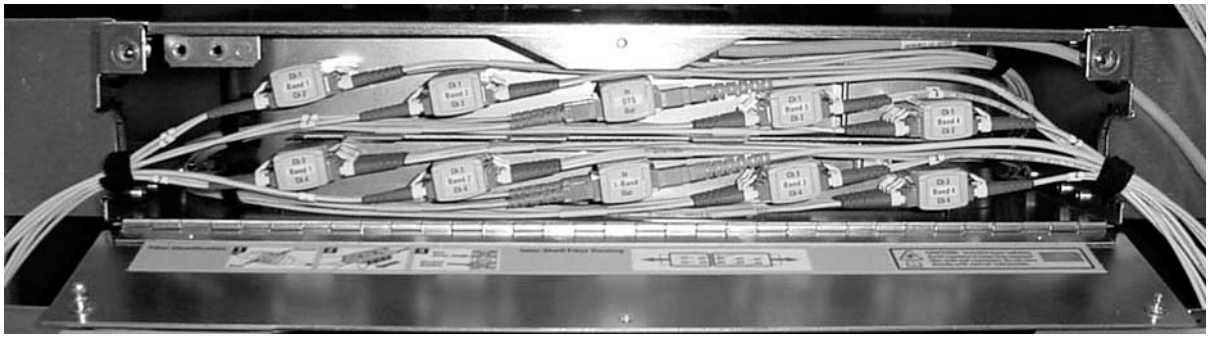


Figure 2-34
Routing fibers inside the OMX 16CH DWDM



- Slider adapters on the right side: Route to the left side of the drawer the duplex LC fibers going to the slider adapters for
  - — Band 3 and Band 4 on the C-band OMX 16CH DWDM (NT0H32JA), and
  - — Band 7 and Band 8 on the L-band OMX 16CH DWDM (NT0H32KA)

"Routing fibers inside the OMX 16CH DWDM" shows the external fibers connected in the OMX 16CH DWDM.

4 Make sure that the fibers enter and exit the OMX 16CH DWDM through the apertures on the side of the drawer. See "Lock screw on the OMX 16CH DWDM front panel (front panel closed)" on page 2-59 for a view of the fibers entering and exiting the OMX 16CH DWDM (front panel closed).

Procedure 2-8 (continued)
Routing fiber-optic cables for the OMX 16CH DWDM equipment drawer

Step	Action
	Store fiber slack outside the OMX 16CH DWDM, using alternative methods. For example, tie fiber bundles on the side of the rack using hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards. Make sure that you confirm the preferred method of fiber slack management with the person responsible for installation.
5	Follow the bend radius rule when you store the excess fiber slack outside the drawer. Do not exceed a 30 mm (1.18-inch) bend radius when you route fiber. Do not exceed a 3-inch (76.2-mm) bend radius when you coil or bend fibers.
6	Use hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice to bundle fiber-optic cables entering and exiting the OMX 16CH DWDM. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards. See "Lock screw on the OMX 16CH DWDM front panel (front panel closed)" on page 2-59 and "Routing fibers inside the OMX 16CH DWDM" on page 2-60.
7	Pull up the front panel and secure the two external lock-screws to close the OMX 16CH DWDM.

—end—

Procedure 2-9
Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager

Follow these guidelines when you are routing slack fiber through the NT0H57BB fiber manager.

Do not use the NT0H57BB fiber manager with devices that have MPO-type connectors. For more information, including a list of devices that have MPO-type connectors, see the table of additional hardware components in *Ordering Information*, 323-1851-151.

For guidelines related to fiber manager 174-0094-900, see "Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900" on page 2-67.

Precautions

CAUTION
Risk of insufficient fiber slack
Be sure the fiber manager, and the drawer from which the fiber is being routed, are fully open before you begin to route the fiber around the fiber manager spools. You must leave sufficient slack in the fiber so that you can open the drawers without stretching the fiber.

CAUTION
Risk of fiber damage
Each fiber manager can manage a maximum of 16 fibers. Each fiber spool in the drawer can manage 1.6 meters of fiber (maximum 3-mm diameter). Do not stretch the fiber, or wrap the fiber on the spools too tightly, or you risk damaging the fiber.

CAUTION
Risk of affecting network reliability
You must always clean fiber connectors before you make connections to ensure network reliability. For details, see *Optical Connector Inspection and Cleaning*, 323-1859-500.

Procedure 2-9 (continued)
Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager

ATTENTION

The fiber manager has two sliding fiber management components located on the left and right sides of the drawer. Each of these components has two tabs that lock into position across the top of the dish, to hold the routed fibers in position.

To open the tab to route fiber through the dish, press the tab toward the back of the latch while you lift the tab. Press down on the tab to close it.

CAUTION

Possible risk of damage to equipment and fiber

Observe the minimum bend radius of 30 mm (1.18 in.) for the patch cords. Always use the fiber management features in the drawer to route the fiber.

Allow for sufficient slack in the fibers that enter and exit the drawers. If sufficient slack is not left, the fibers can become stretched and damaged when the drawer is opened.

Fiber routing methods

You can route and store fiber as follows:

- storage with entrance and exit on the same side of the NT0H57BB fiber manager
- storage with entrance and exit on opposite sides of the NT0H57BB fiber manager (also called passthrough)

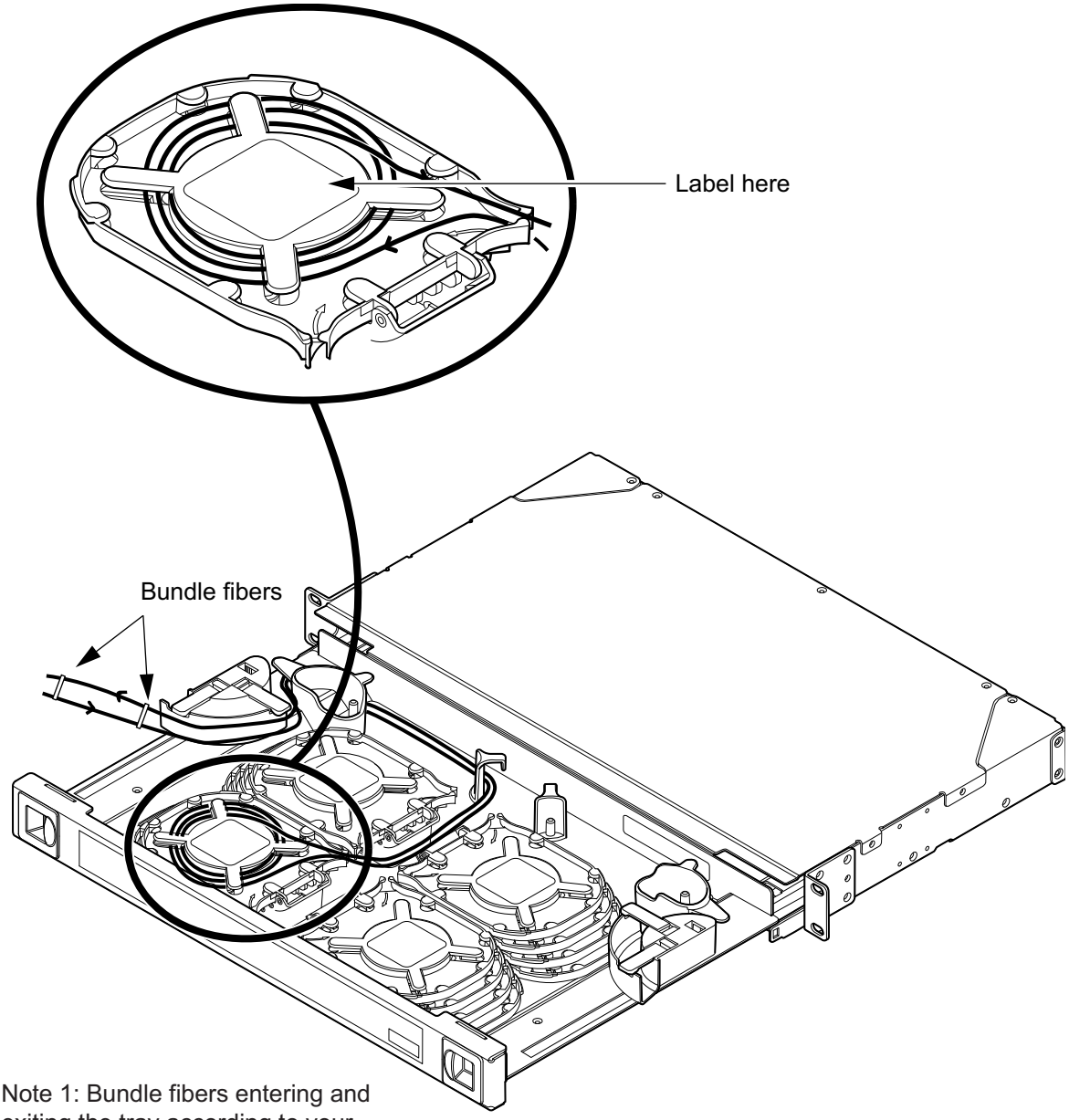
Guidelines for routing fiber

Guideline	Detail
1	Make sure every fiber is labeled.
2	Label each flip-up spool in the fiber manager.
3	Follow the bend radius rule when you route fiber. Do not exceed a 30 mm (1.18-in.) bend radius when you coil or bend fiber.
4	Route the fiber on the spools in the following order: front spools -> bottom to top rear spools -> bottom to top
5	Use curly locks, hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice. • entering and exiting the fiber manager drawer • in the rear middle of the fiber manager drawer You must protect all fiber from cuts and abrasions according to your company's practice and industry standards.

"Routing slack fiber on spools in the fiber manager (NT0H57BB), same side" on page 2-65 illustrates how to route slack fiber around the spools in the fiber manager. "Bundling fibers entering and exiting the fiber manager (NT0H57BB) (example shows same side routing)" on page 2-66 illustrates how to bundle the fibers. (Both examples show same side routing/fibers entering and exiting on the same side of the NT0H57BB fiber manager.)

—end—

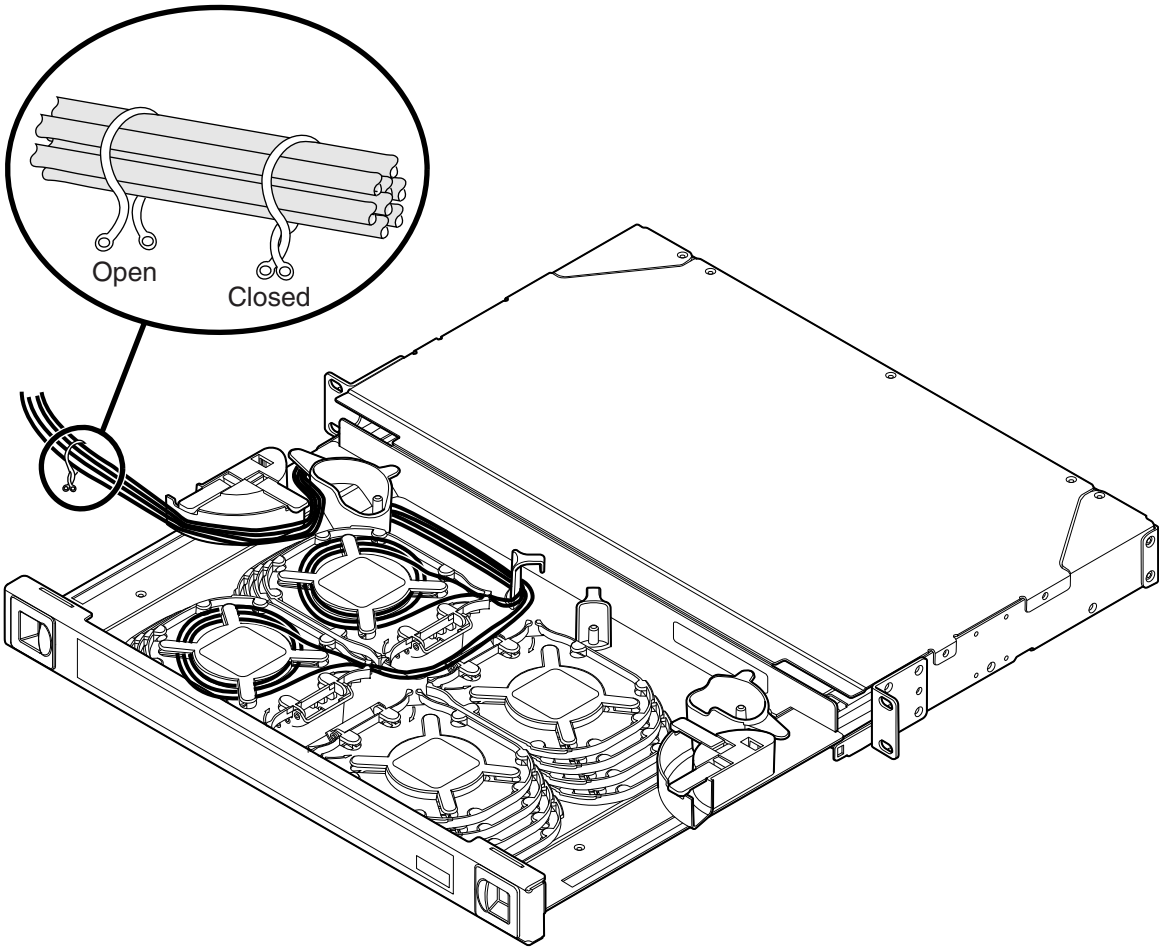
Figure 2-35
Routing slack fiber on spools in the fiber manager (NT0H57BB), same side



Note 1: Bundle fibers entering and exiting the tray according to your company's practice.
Note 2: Do not stretch fibers when wrapping them around the fiber spools.
Note 3: Route fiber onto the spools in this order:
- front spools first - bottom spool to top spool
- rear spools after the front spools are full - bottom spool to top spool

Note 4: Attach a label to each spool to identify the fiber on the spool.

Figure 2-36
Bundling fibers entering and exiting the fiber manager (NT0H57BB) (example shows same side routing)



Procedure 2-10
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

Follow these guidelines when you are routing slack fiber through the 1U Bulk Fiber Management Tray 174-0094-900.

For guidelines related to fiber manager NT0H57BB, see "Guidelines for routing fiber-optic cables in the NT0H57BB fiber manager" on page 2-62.

Precautions

CAUTION
Risk of insufficient fiber slack
Be sure the 1U Bulk Fiber Management Tray, and the drawer from which the fiber is being routed, are fully open before you begin to route the fiber around the fixed fiber semi-circular spools. You must leave sufficient slack in the fiber so that you can open the drawers without stretching the fiber.

CAUTION
Risk of fiber damage
Do not stretch the fiber, or wrap the fiber around the fiber semi-circular spool tightly, or you risk damaging the fiber.

CAUTION
Risk of affecting network reliability
You must always clean fiber connectors before you make connections to ensure network reliability. For details, see *Optical Connector Inspection and Cleaning*, 323-1859-500.

ATTENTION
The 1U Bulk Fiber Management Tray has two sliding fiber management components located on the left and right sides of the drawer. Each of these components has two tabs that lock into position across the top of the dish, to hold the routed fibers in position.

To open the tab to route fiber through the dish, press the tab toward the back of the latch while you lift the tab. Press down on the tab to close it.

Procedure 2-10 (continued)
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

CAUTION
Possible risk of damage to equipment and fiber
Observe the minimum bend radius of 30 mm (1.18 in.) for the patch cords. Always use the fiber management features in the drawer to route the fiber.

Allow for sufficient slack in the fibers that enter and exit the drawers. If sufficient slack is not left, the fibers can become stretched and damaged when the drawer is opened.

Guidelines for routing fiber

Follow the general pattern of slack storage take-up for all lengths with some slack outside the 1U Bulk Fiber Management Tray to facilitate opening and closing the 1U Bulk Fiber Management Tray.

Guideline	Detail
1	Make sure every fiber is labeled.
2	Follow the bend radius rule when you route fiber. Do not exceed a 30-mm (1.18-in.) bend radius when you coil or bend fiber.
3	Each 1U Bulk Fiber Management Tray can accommodate a maximum of fibers as specified in Table 2-7 on page 2-72. Information on other diameters that can be accommodated in the 1U Bulk Fiber Management Tray is also provided. See the examples of fiber routing listed in the following tables: • "Same side fiber routing—examples" on page 2-73 • "Opposite side (passthrough) fiber routing—examples" on page 2-79
4	Use curly locks, hook and loop tape (such as Velcro), fiber cable ties, or lacing twine and tools according to your company's practice to bundle the fibers entering and exiting the 1U Bulk Fiber Management Tray. You must protect all fiber from cuts and abrasions according to your company's practice and industry standards. • Use the lance features to secure fiber: Figure 2-37 on page 2-69, Figure 2-38 on page 2-69, Figure 2-39 on page 2-70, and Figure 2-40 on page 2-70. • Be sure to use a minimum slack of 20.3 to 21.6 cm (8 in. to 8.5 in.) exiting the 1U Bulk Fiber Management Tray. Note also how fiber is bundled and secured inside and outside the 1U Bulk Fiber Management Tray using hook and loop fasteners (such as VELCRO): Figure 2-41 on page 2-71. • To simplify some figures, the abbreviation 1U Bulk FMT is used.

Procedure 2-10 (continued)
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

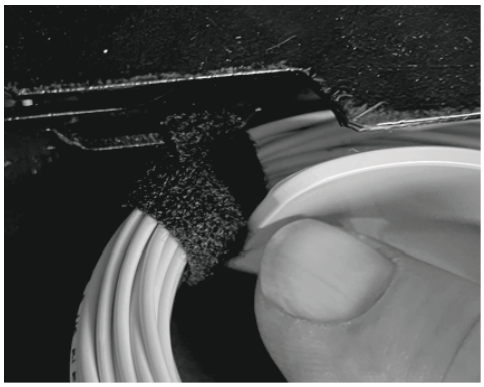
Figure 2-37
Lance features (rear left and right) for securing fiber in 1U Bulk FMT

Figure 2-38
Lance feature—rear left of 1U Bulk FMT

Procedure 2-10 (continued)
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

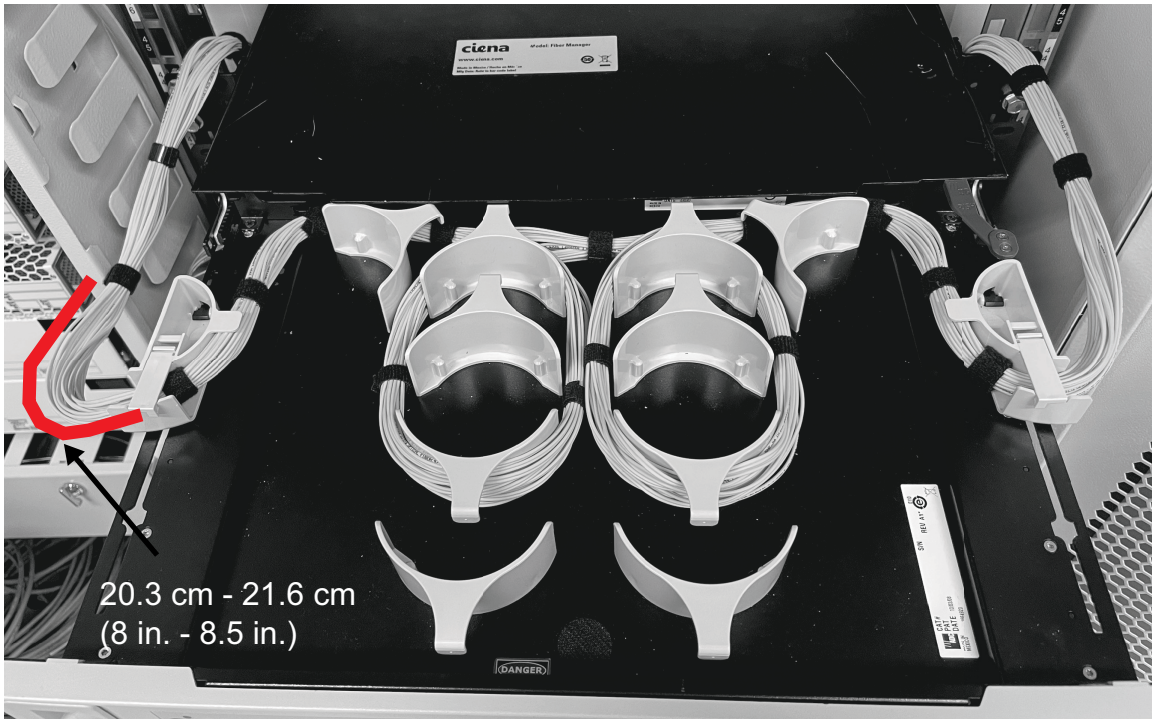
Figure 2-39
Inserting hook and loop cable tie (such as VELCRO) in lance feature of 1U Bulk FMT

Figure 2-40
Fiber secured to lance feature of 1U Bulk FMT



Procedure 2-10 (continued)
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

Figure 2-41
Example of 1U Bulk FMT fully fibered and secured—Minimum slack highlighted



ATTENTION

Be sure to use a minimum slack of 20.3 to 21.6 cm (8 in. to 8.5 in.) exiting the 1U Bulk FMT.

Note also how fiber is bundled and secured inside and outside the 1U Bulk FMT using hook and loop fasteners (such as VELCRO).

Table 2-7
1U Bulk Fiber Management Tray—capacity

Fiber diameter	Number of fiber patch cords passing through from one side to the other side	Number of fiber patch cords entering and exiting on the same side (left side or right side)	Average length per fiber patchcord
1.6 mm	60	30 (15 fibers on each side)	3.9 m (12.7 ft)
2.0 mm	48	24 (12 fibers on each side)	3.4 m (11.2 ft)
3.0 mm	24	12 (6 fibers on each side)	1.7 m (5.5 ft)

Fiber routing methods

You can route and store fiber as follows:

- storage with entrance and exit on the same side of the 1U Bulk Fiber Management Tray
- storage with entrance and exit on opposite sides of the 1U Bulk Fiber Management Tray (called passthrough in the following figures)

For examples of how to route fiber around the fixed fiber semi-circular spools in the 1U Bulk Fiber Management Tray based on the length of fiber slack and entrance and exit method, see the applicable illustration listed in the following tables:

- “Same side fiber routing—examples” on page 2-73
- “Opposite side (passthrough) fiber routing—examples” on page 2-79

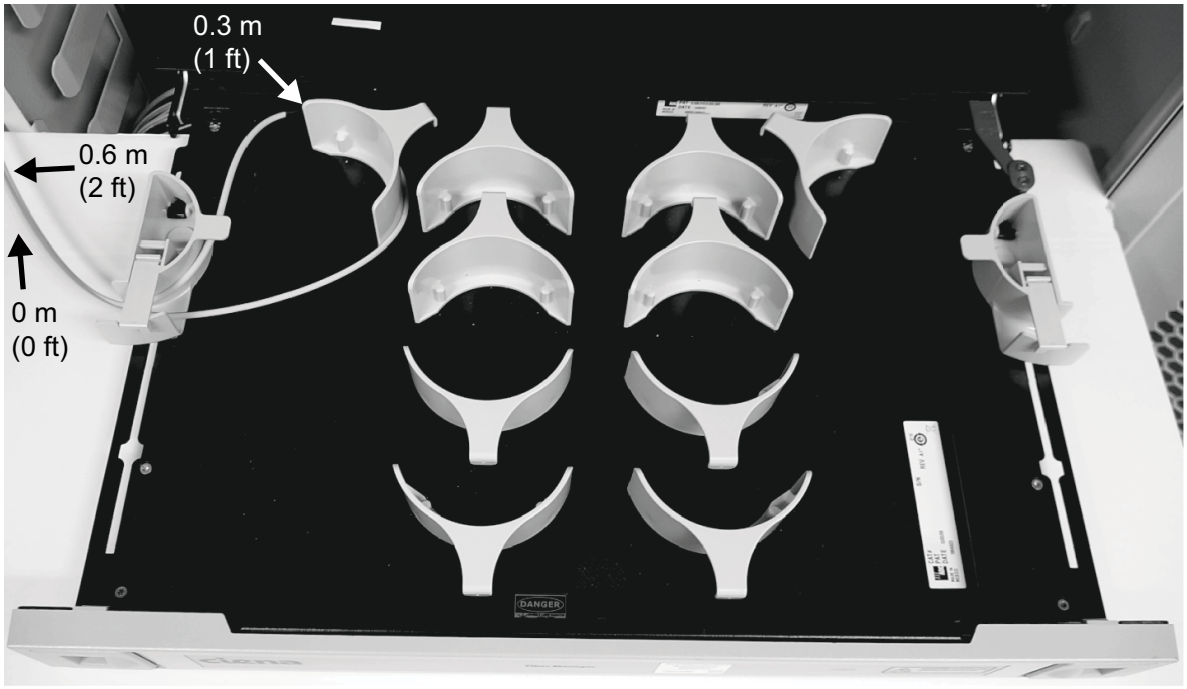
Procedure 2-10 (continued)
Guidelines for routing fiber-optic cables in the 1U Bulk Fiber Management Tray 174-0094-900

Table 2-8
Same side fiber routing—examples

Length in m	Length in ft	See
0.6 m	2 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.6 m (2 ft) same side” on page 2-74
0.9 m	3 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.9 m (3 ft) same side” on page 2-75
1.2 m	4 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.2 m (4 ft) same side” on page 2-76
1.5 m	5 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m (5 ft) same side” on page 2-77
1.7 to 1.8 m	5.5 to 6 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.7 to 1.8 m (5.5 to 6 ft) same side” on page 2-78
1.8 to 2.0 m	6 to 6.5 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.8 to 2.0 m (6 to 6.5 ft) same side” on page 2-79

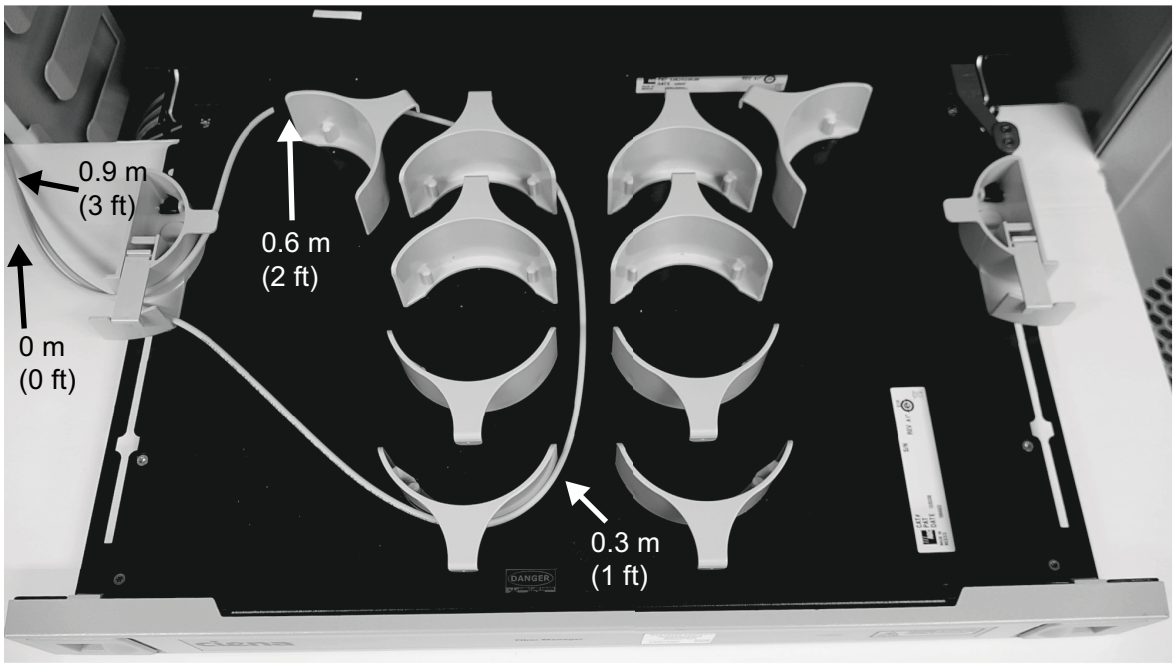
The same side figures show examples of routing fiber on the left side of the 1U Bulk Fiber Management Tray. Follow the same guidelines when routing on the right side of the 1U Bulk Fiber Management Tray.

Figure 2-42
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.6 m (2 ft) same side



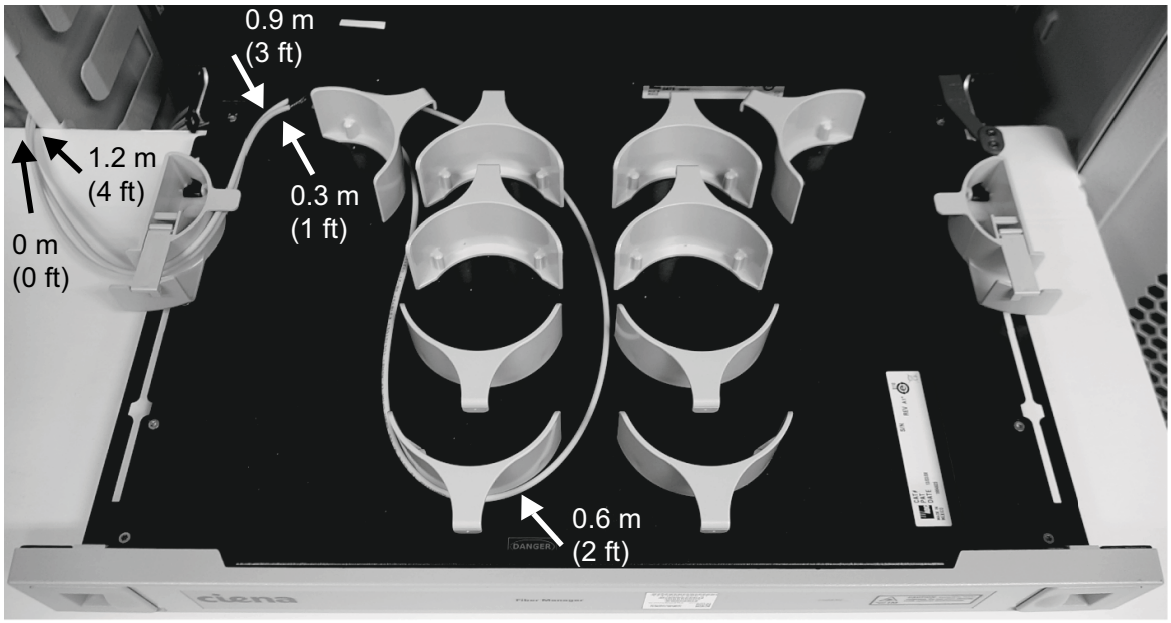
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-43
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.9 m (3 ft) same side



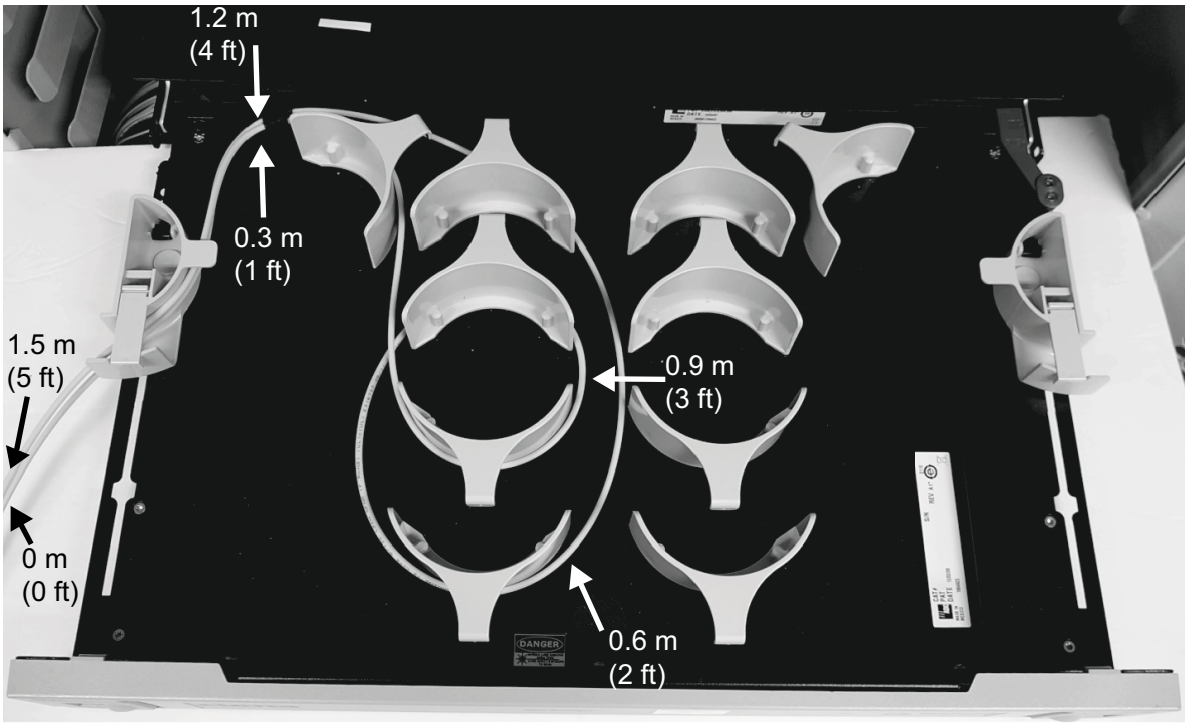
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-44
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.2 m (4 ft) same side



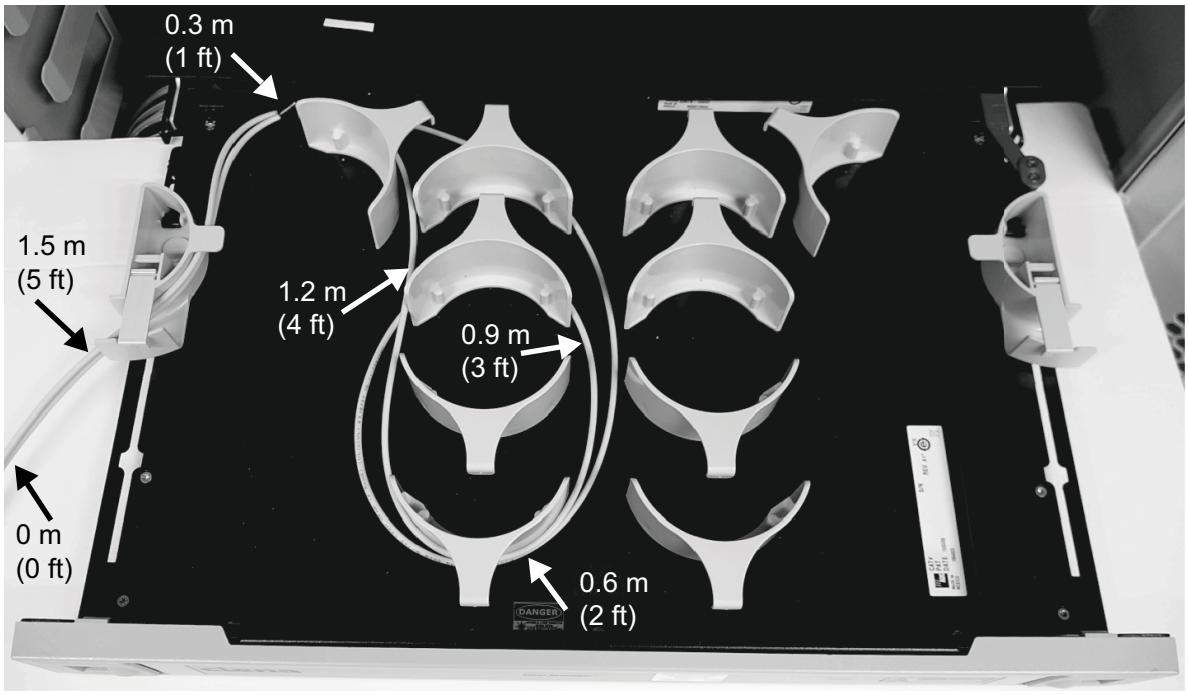
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-45
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m (5 ft) same side



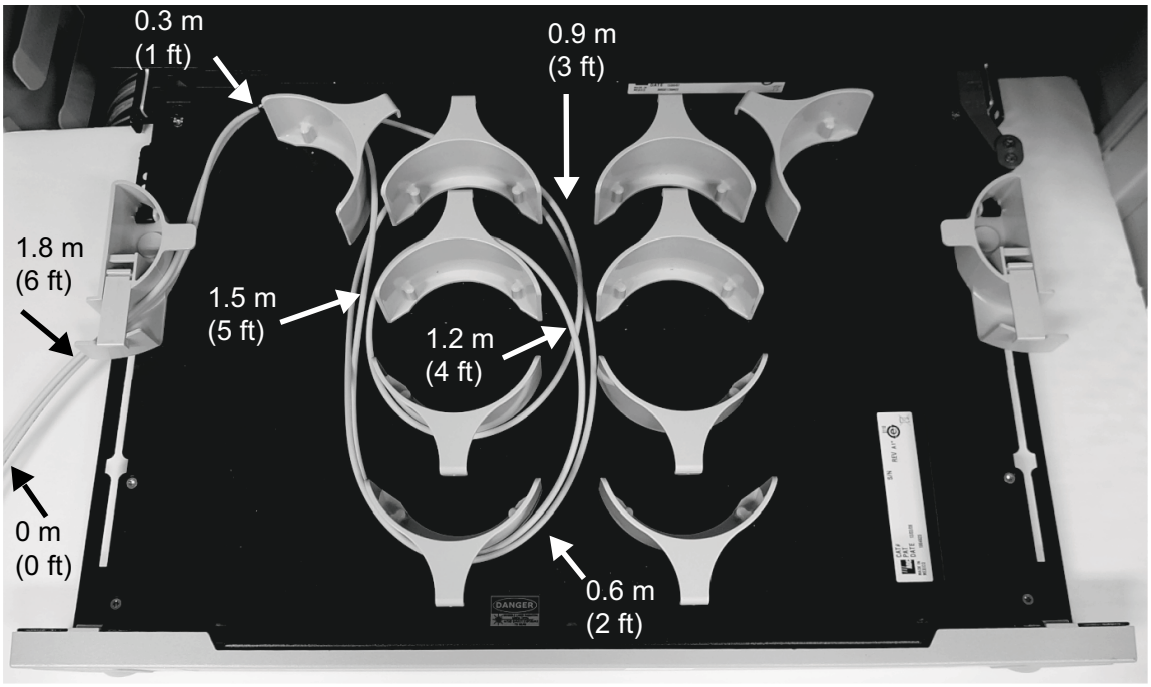
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-46
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.7 to 1.8 m (5.5 to 6 ft) same side



Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-47
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.8 to 2.0 m (6 to 6.5 ft) same side



Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

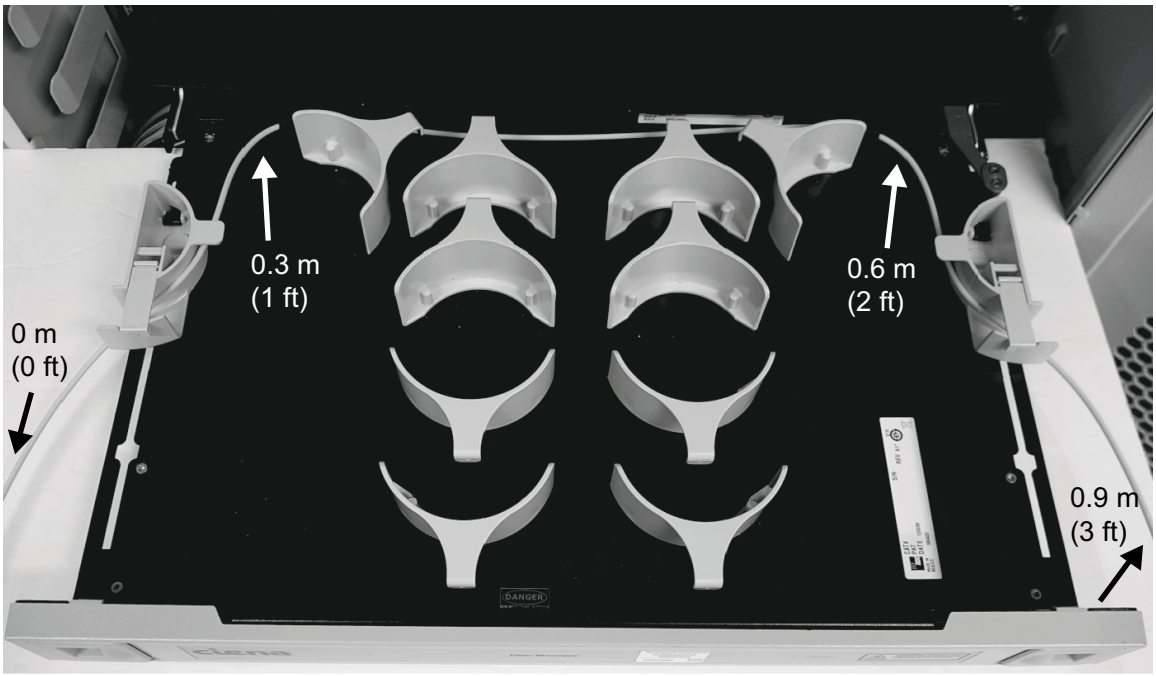
Table 2-9
Opposite side (passthrough) fiber routing—examples

Length in m	Length in ft	See
0.9 m	3 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.9 m (3 ft) passthrough” on page 2-80
1.2 m	4 ft	“Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.2 m (4 ft) passthrough” on page 2-81

Table 2-9
Opposite side (passthrough) fiber routing—examples (continued)

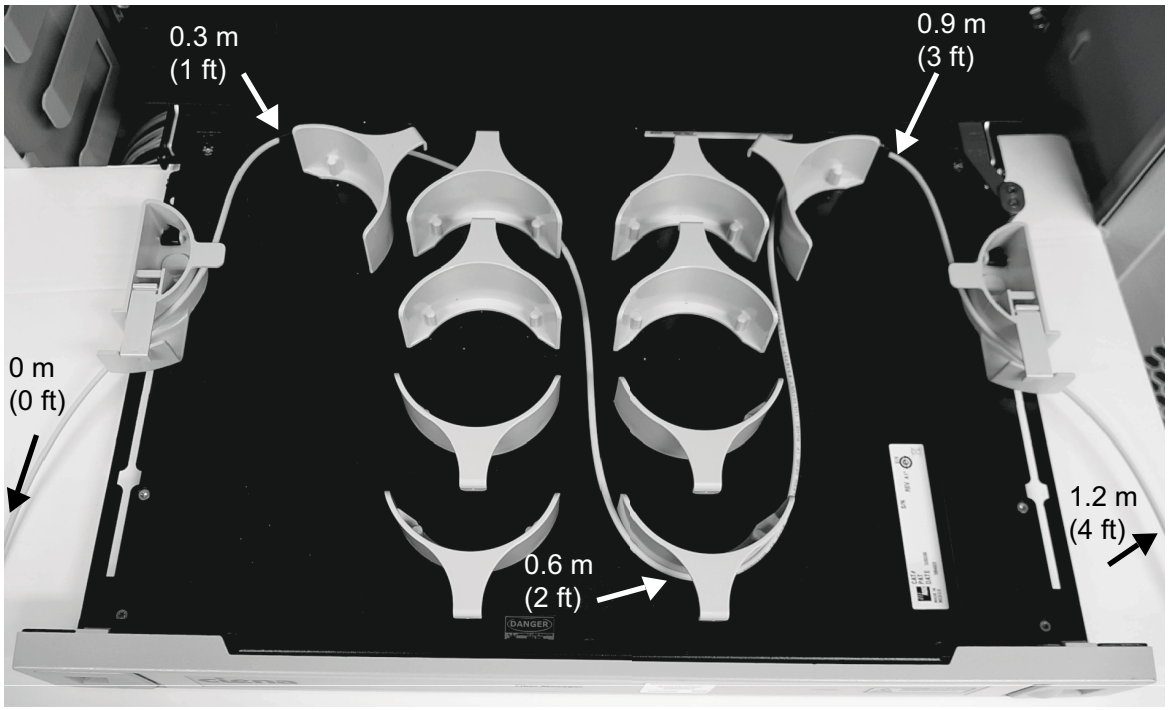
Length in m	Length in ft	See
1.5 m	5 ft	"Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m (5 ft) passthrough" on page 2-82
1.5 m+	5 ft+	"Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m+ (5 ft+) passthrough" on page 2-83
1.8 m	6 ft	"Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.8 m (6 ft) passthrough" on page 2-84

Figure 2-48
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—0.9 m (3 ft) passthrough



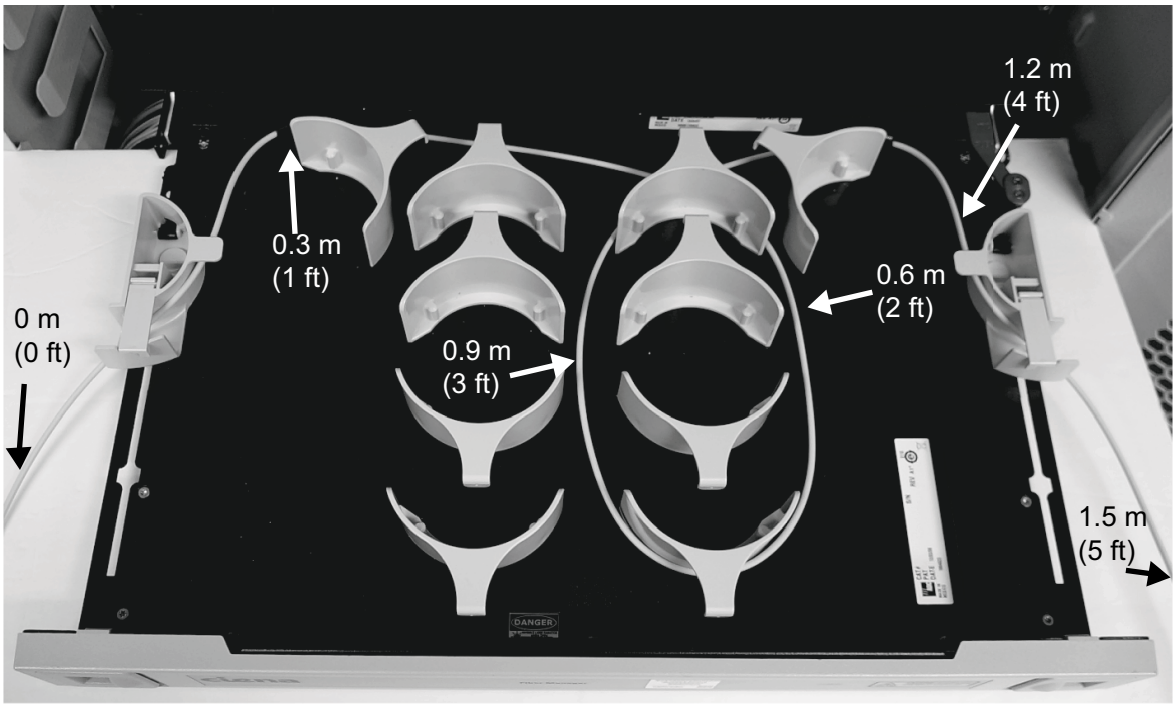
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-49
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.2 m (4 ft) passthrough



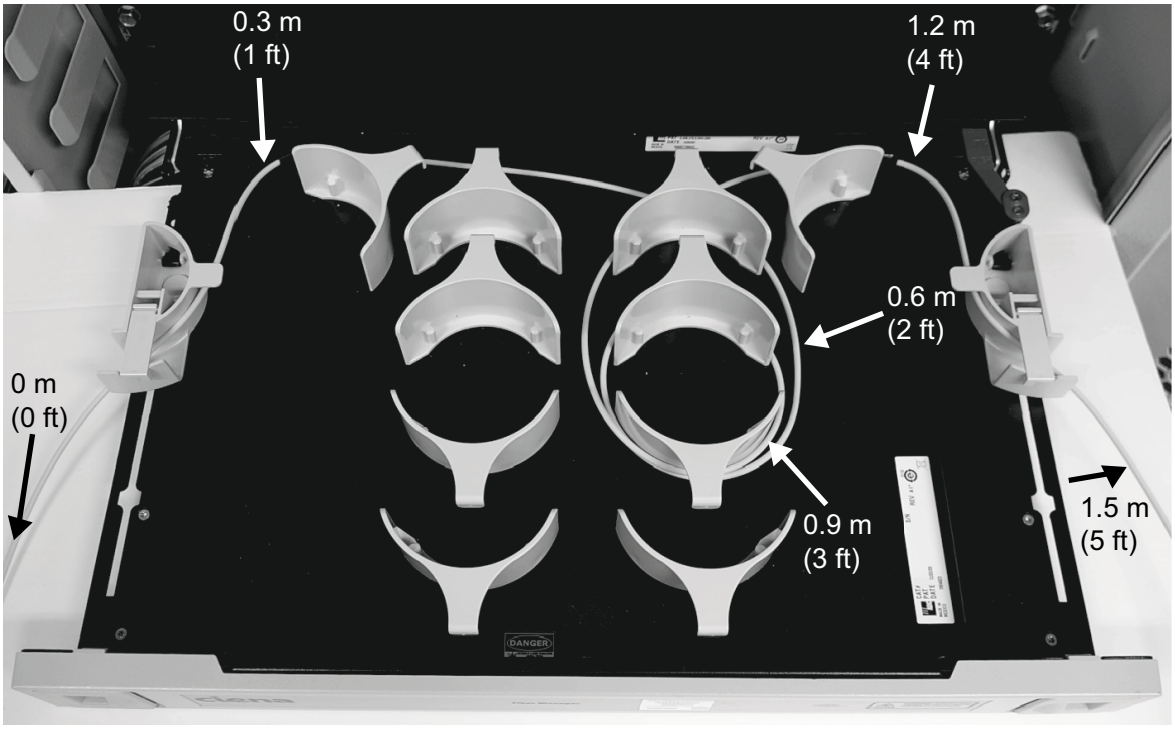
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-50
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m (5 ft) passthrough



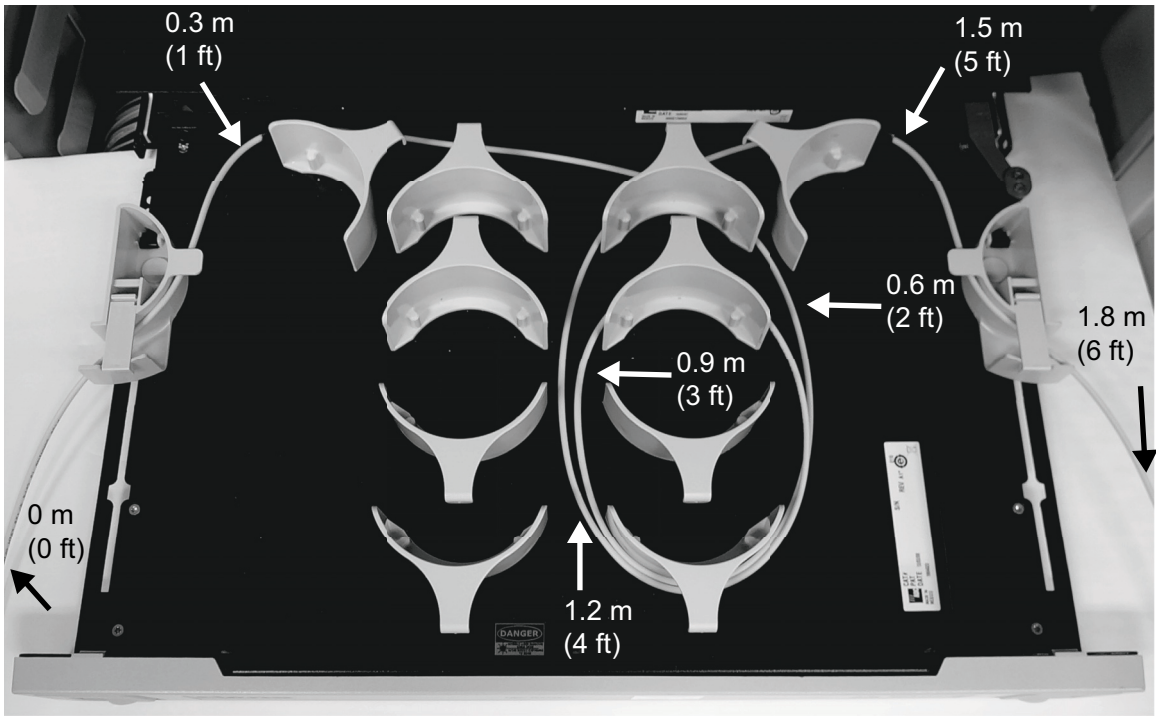
Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-51
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.5 m+ (5 ft+) passthrough



Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

Figure 2-52
Example—routing slack fiber on fiber spools in the 1U Bulk FMT—1.8 m (6 ft) passthrough



Must have slack outside FMT to close properly - see Figure 2-41 on page 2-71.

—end—

Procedure 2-11
Installing a 2110 shelf

Use this procedure to install a 2110 shelf into the 19-in., 23-in. or ETSI rack.

This procedure applies to the 2110 shelf for the DSCMs (B-955-0003-00x), which can be equipped with one full-width 2110-Tx-xxxx Dispersion Compensation Module (DCM, also referred to as DSCM) (166-0203-9xx and 166-0403-9xx) or up to two half-width 2110-Tx-xxxx DCMs (B-955-0003-00x, B-955-0003-3xx, 166-0203-9xx and 166-0403-9xx). If equipped with a half-width DCM, the remaining slot can be equipped with a 2110 blank (filler panel) (B-955-0004-001). For the installation procedure for DSCM modules (NTT870AAE5-AHE5/AJE5-ANE5/APE5-AQE5, NTT870CAE5-CHE5/CJE5, NTT870EAE5-EDE5, and NTT870GAE5-GGE5), refer to Procedure 2-4, “Installing a DSCM tray in a DSCM drawer (NT0H57LA)”.

Prerequisites

Make sure that you have the following:

- a #2 Phillips-head screwdriver
- a 5/16-in. wrench
- the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans
- the appropriate personal grounding device to dissipate electrostatic charges

Procedure 2-11 (continued)
Installing a 2110 shelf

Precautions

DANGER
Risk of electrical shock and equipment damage
Grounding is mandatory to satisfy local electrical codes/ regulations for the safe use of the equipment.

Ground the rack/cabinet to the common building network (CBN), isolated bonding network (IBN) or ETSI Mesh Bonding Network ground/protective earth. For details, see the procedure on connecting the rack ground to the office ground in *Installation - General Information*, 323-1851-201.0.

Correct grounding of the equipment rack/cabinet is mandatory in accordance to electrical safety standards and mitigates the electrostatic discharge (ESD) and operational concerns described in *Installation - General Information*, 323-1851-201.0, the section on observing product and personnel safety guidelines, the section on consequences of incorrect grounding. For additional details, see the section on working with power.

Also, ground every 6500 shelf and peripheral tray as described in the related procedure. Make sure that you perform the grounding steps in this procedure.

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Verify that the equipment rack/cabinet is grounded. Also, you must ground every 6500 shelf (and any peripheral trays as described in the applicable installation procedure). Grounding is mandatory. Follow the instructions in the precautionary message "Risk of electrical shock and equipment damage".
2	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
3	Unpack and inspect the 2110 shelf.

Procedure 2-11 (continued)
Installing a 2110 shelf

Step	Action
4	Position and attach a 19-inch, 23-inch, or ETSI mounting bracket to the side of the 2110 shelf, securing it with the supplied mounting screws as shown in "Example of installing a 19-inch brackets on 2110 shelf".
5	Secure the other bracket to the other side in the same way.
6	Position the 2110 shelf in the equipment frame and attach the brackets to the frame with four screws, two screws on each side, as shown in "Example of installing a 2110 shelf with 19-inch brackets" on page 2-88.

—end—

Figure 2-53
Example of installing a 19-inch brackets on 2110 shelf

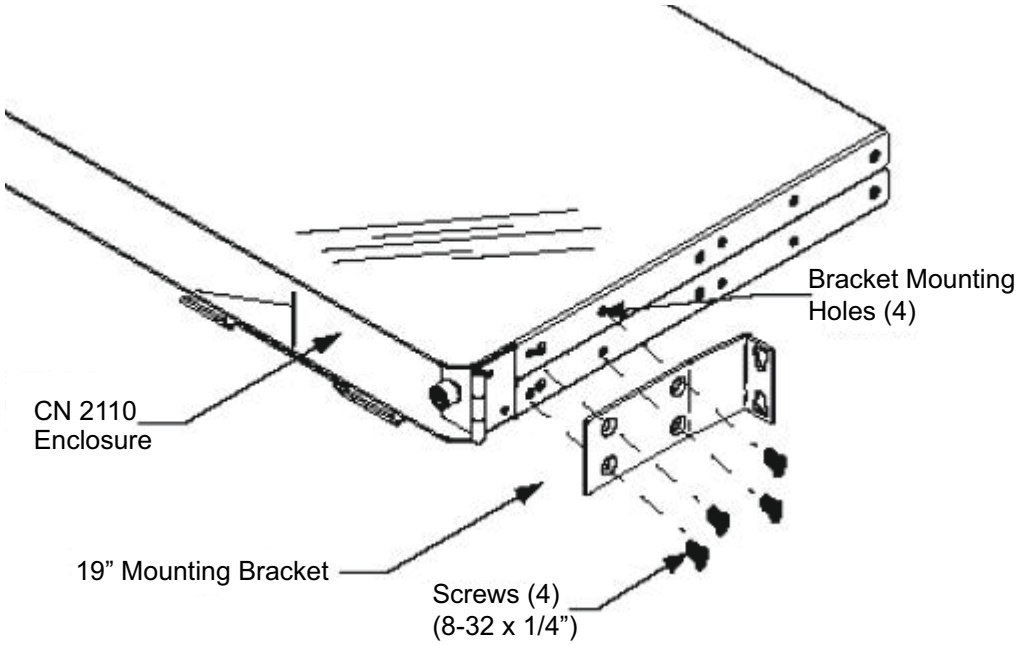
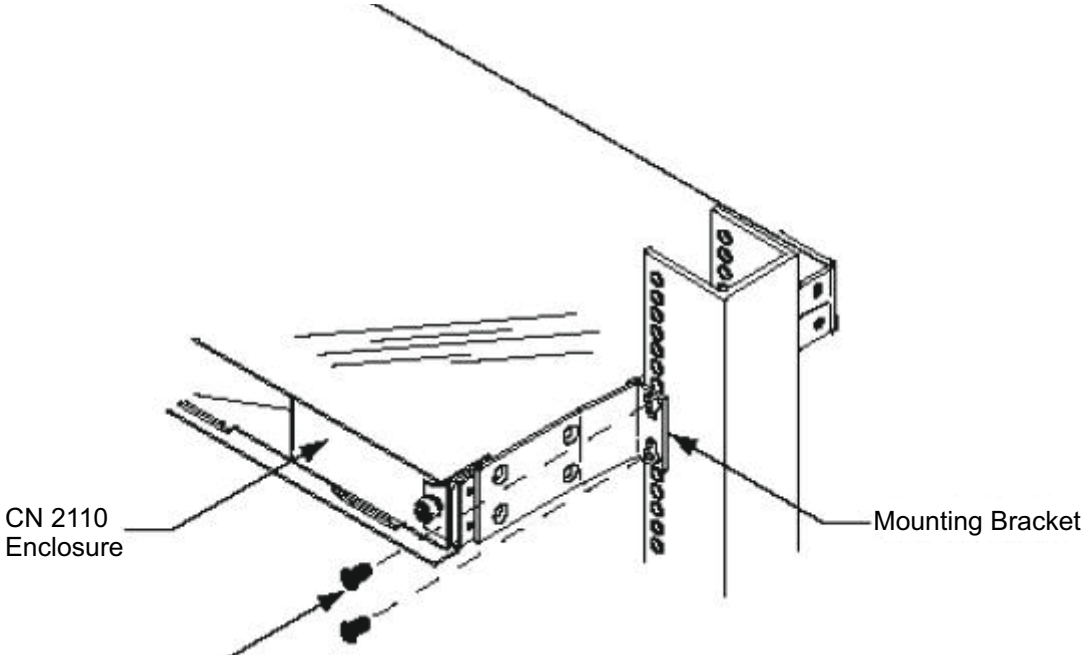


Figure 2-54
Example of installing a 2110 shelf with 19-inch brackets



Procedure 2-12
Installing 2110-Tx-xxxx DCMs into the 2110 shelf

Use this procedure to install one or two half-width DCM modules, or a full-width DCM module into a 2110 shelf.

Prerequisites

Make sure that you

- have the engineering documentation package (EDP) or installation documentation package (IDP) or equivalent site/network engineering plans
- read the section on observing product and personnel safety guidelines in *Installation - General Information*, 323-1851-201.0
- the appropriate personal grounding device to dissipate electrostatic charges

Precaution

CAUTION
Risk of equipment damage
Electrostatic discharge can damage electrostatic sensitive devices. Use antistatic protection to avoid damaging circuit packs.

Step	Action
1	Wear an appropriate ESD personal grounding device to dissipate electrostatic charges. If you are wearing an antistatic wrist strap, connect the cord to the ESD jack on the shelf.
2	If present, remove the blank module from the slot that will hold the new DSCM by turning its panel fasteners and removing it from the drawer. See “Installing a half-width module” on page 2-90.
3	From the front of the 2110 shelf, slide the rear of the DSCM into the required slot as shown in “Installing a half-width module” on page 2-90 and “Installing a full-width module” on page 2-91.

Procedure 2-12 (continued)
Installing 2110-Tx-xxxx DCMs into the 2110 shelf

Step	Action
4	Push the module until it is fully seated into the chassis and the back of the module faceplate is flush against the front of the chassis.
5	Turn the panel fastener on each side of the DSCM faceplate to secure the module to the chassis.

ATTENTION
On the half-width modules, the inner fastener does not engage the drawer. This does not compromise the mechanical stability of the unit. Equipping these modules with two fasteners enables them to be used in either slot.

6	Clean and connect all fiber jumpers to the appropriate ports on the module. For details, see *Optical Connector Inspection and Cleaning*, 323-1859-500.

—end—

Figure 2-55
Installing a half-width module

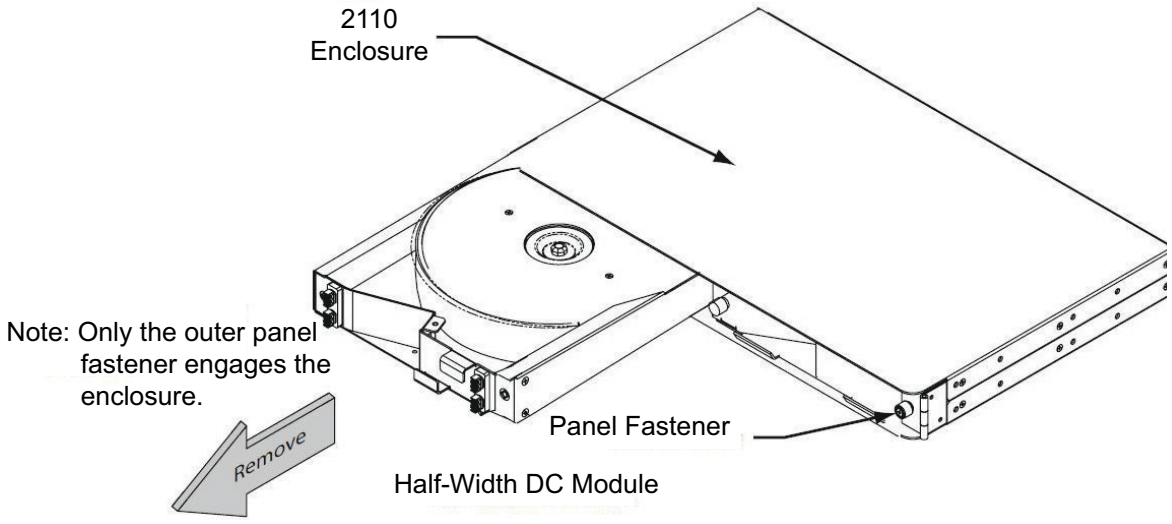
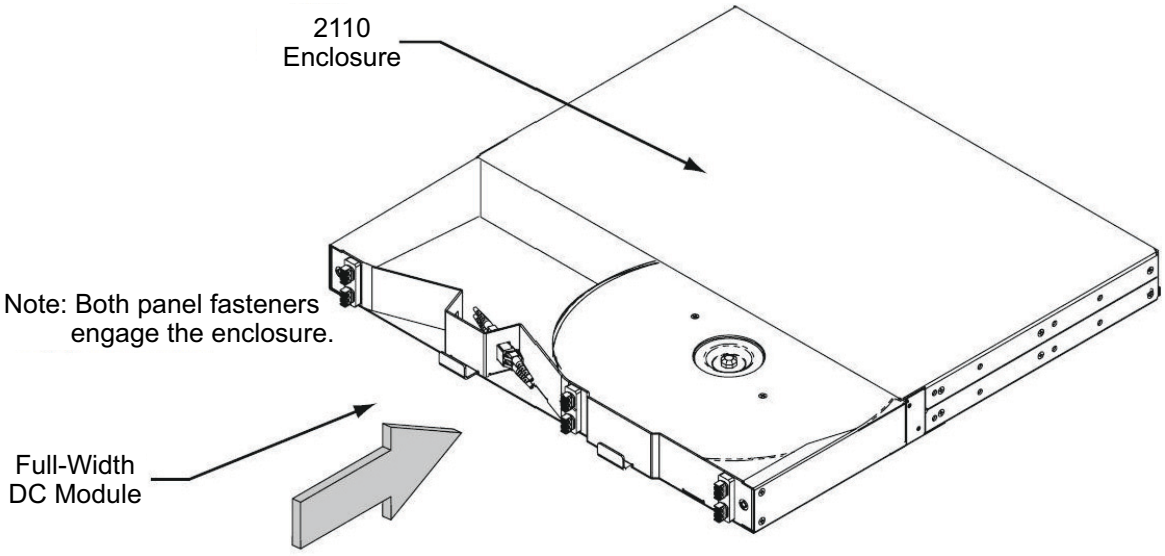


Figure 2-56
Installing a full-width module



6500 Packet-Optical Platform

Installation - 4-slot Shelf

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