Installing the Interleaver and Deinterleaver Module and Coupler and Splitter Module

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Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

This chapter explains how to install and operate the Cisco ONS 15216-MD-48-CM interleaver and deinterleaver pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 coupler and splitter pluggable.

Overview of the Cisco ONS 15216-MD-48-CM, ONS 15216-MD-48-CME, and 15216-MD48-CME2 Pluggables

Cisco ONS 15216-MD-48-CM is 50 GHz/100 GHz C-band interleaver and deinterleaver pluggable that provides signal interleaving and deinterleaving in 50-GHz channel spacing DWDM systems. It operates inside the ONS 15216-MD-40, ONS 15216-EF-40, or ONS 15216-MD-48 odd and even patch panels.

Cisco ONS 15216-MD-48-CME and 15216-MD48-CME2 are bidirectional units that have the MUX and the DEMUX functions implemented as two different sections. The DEMUX section includes an optical splitter

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

■ **Features**

to split the optical signal evenly into two different output ports: EVEN-TX port and ODD-TX port. The optical coupler provides the MUX section and combines even and odd channels signals at 100 GHz spacing (EVEN-RX and ODD-RX ports respectively) into a signal of 50 GHz channel spacing. In the Cisco ONS 15216-MD48-CME2 2x2 dual coupler and splitter pluggable, the DEMUX section also provides the input signal to dual monitor ports. The MUX section also duplicates the combined spectrum on two output ports.

For installing the 15216-MD-40 patch panel, refer to the *"Installing the Cisco ONS 15216-MD-40-ODD and 15216-MD-40-EVEN Mux/Demux Patch Panels"* guide. For installing the 15216-EF-40 patch panel, refer to the *"Installing the Cisco ONS 15216-EF-40-ODD and 15216-EF-40-EVEN Mux/Demux Patch Panels"* guide. For installing the 15216-MD-48 patch panel, refer to the *"Installing the Cisco ONS 15216-MD-48-ODD and 15216-MD-48-EVEN Mux/Demux Patch Panels"*

The ONS 15216-MD-48-CM, 15216-MD-48-CME, and 15216-MD48-CME2 interfaces between the following:

- 15216-MD-40 odd/even patch panels and 80 channels of wavelengths

- 15216-EF-40 odd/even patch panels and 80 channels of wavelengths

- 15216-MD-48 odd/even patch panels and 96 channels of wavelengths

The advantages of installing the ONS15216-MD-48-CM, 15216-MD-48-CME, and 15216-MD48-CME2 are:

- Extends existing network capacity.

- Provides low-cost future proofing of network capacity.

- Allows for non-traffic affecting capacity upgrade when the patch panel is equipped with the ONS15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable at first installation.

Features

The ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 is optically and electrically passive and requires no temperature control. It uses fused fiber coupler and birefringent crystal technologies.

The operating features of ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 include:

- Low dispersion

- Low insertion loss

- High channel isolation

- Wide clear bandwidth

- Full C-band coverage

- Interleave and Deinterleave (ONS 15216-MD-48-CM)/Couple and Split (ONS 15216-MD-48-CME/ONS 15216-MD48-CME2) 80 or 96 channels

- Athermal design

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Functional Description

Functional Description

ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable

The ONS 15216-MD-48-CM pluggable increases the network capacity by combining two optical data streams into a single, more densely spaced stream. This pluggable can be used in mux mode to combine two 100 GHz optical signal streams into one 50 GHz stream, or in demux mode to separate the 50 GHz stream into two 100 GHz streams.

The ONS 15216-MD-48-CM is a bidirectional pluggable in which the mux and demux functions are implemented in two different sections to enable signals flowing in opposite directions to be managed separately. This functionality is illustrated in the following figure.

Figure 1: Functional Description of the ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable
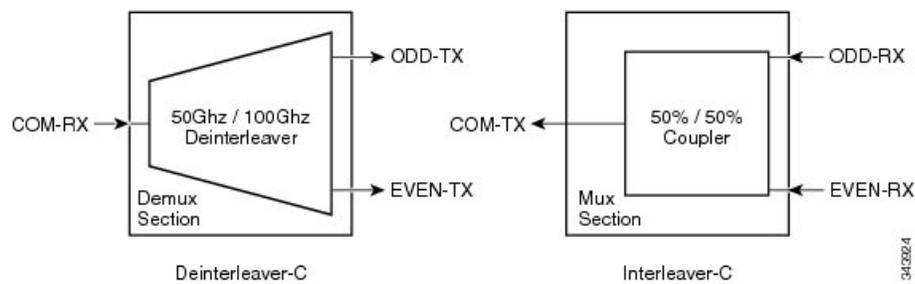
The interleaver (3dB optical coupler) in the mux section combines the even and odd channel signals at 100 GHz spacing (EVEN-RX and ODD-RX ports, respectively) into the 50 GHz channel spacing signal.

The deinterleaver in the demux section separates the 50 GHz channel spacing signal into even and odd channel signals of 100 GHz spacing (EVEN-TX and ODD-TX ports, respectively).

The interleaver and deinterleaver module is plugged inside the patch panel and is interconnected with another patch panel of a different grid (odd or even).

ONS 15216-MD-48-CME and ONS 15216-MD48-CME2 Coupler and Splitter Pluggables

The ONS 15216-MD-48-CME and ONS 15216-MD48-CME2 pluggables increase the network capacity by combining two optical data streams into a single, more densely spaced stream. This pluggable can be used in mux mode to combine two 100 GHz optical signal streams into one 50 GHz stream, or in demux mode to split the optical signal evenly into two different streams.

The ONS 15216-MD-48-CME and 15216-MD48-CME2 are bidirectional pluggables in which the mux and demux functions are implemented in two different sections to enable signals flowing in opposite directions to be managed separately. This functionality is illustrated in the following figure.

Figure 2: Functional Description of the Coupler and Splitter Pluggable

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Interconnections
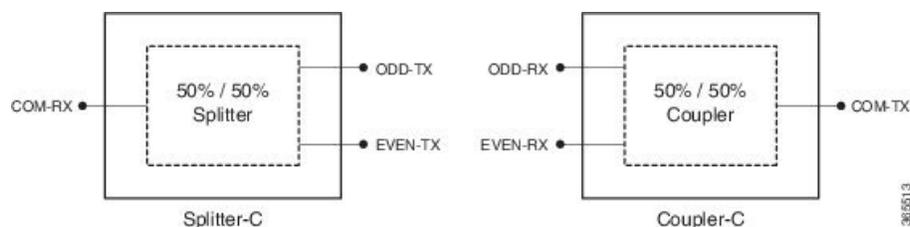
The DEMUX section includes an optical splitter to split the optical signal evenly into two different output ports: EVEN-TX port and ODD-TX port.

The MUX section includes an optical coupler that combines even and odd channels signals at 100 GHz spacing (EVEN-RX and ODD-RX ports respectively) into a signal of 50 GHz channel spacing.

Figure 3: Functional Description of the 15216-MD48-CME2 Pluggable
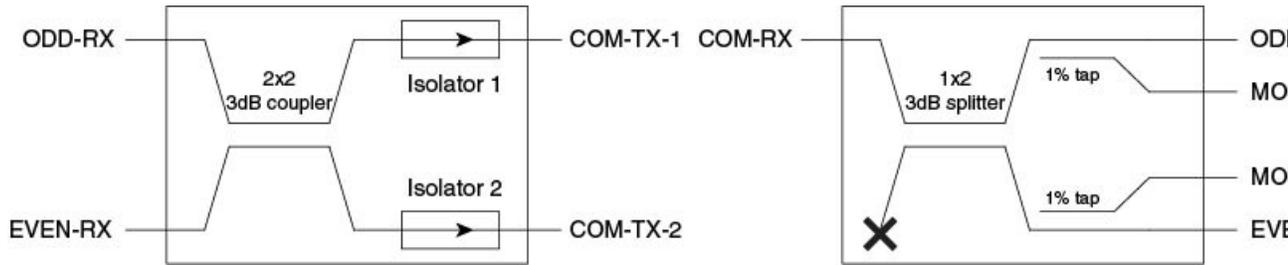
Optical Interconnections

Optical Interconnections for ONS 15216-MD-48-CM

The optical interconnections between the odd patch panel, ONS 15216-MD-48-CM interleaver and deinterleaver pluggable and the even patch panel is shown in the following figure.

Figure 4: ONS 15216-MD-40 and ONS 15216-EF-40 Patch Panel Interconnection with ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Interconnections ■
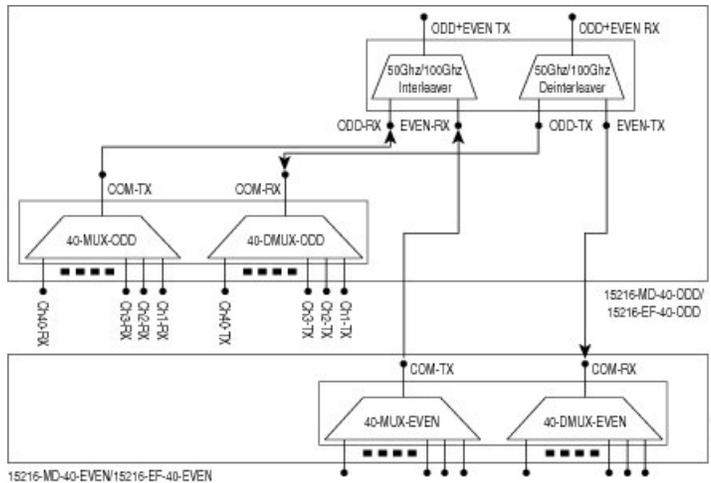
Figure 5: ONS 15216-MD-48 Patch Panel Interconnection with ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable
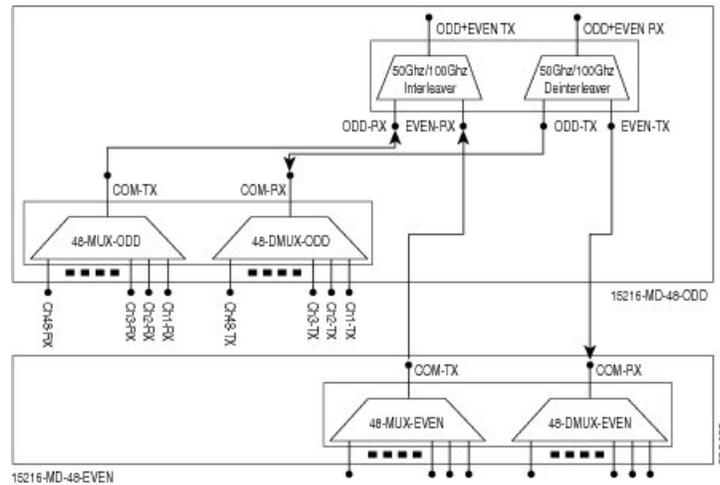
The port connections between the odd patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48), ONS 15216-MD-48-CM interleaver and deinterleaver pluggable, and the even patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48) are established as follows:

- COM-TX port of the odd patch panel and ODD-RX port of the interleaver and deinterleaver pluggable.

- COM-RX port of the odd patch panel and ODD-TX port of the interleaver and deinterleaver pluggable.

- COM-TX port of the even patch panel and EVEN-RX port of the interleaver and deinterleaver pluggable.

- COM-RX port of the even patch panel and EVEN-TX port of the interleaver and deinterleaver pluggable.

Optical Interconnections for ONS 15216-MD-48-CME

The optical interconnections between the odd patch panel, ONS 15216-MD-48-CME coupler and splitter pluggable and the even patch panel is shown in the following figure.

Figure 6: ONS 15216-MD-40 and ONS 15216-EF-40 Patch Panel Interconnection with ONS 15216-MD-48-CME Coupler and Splitter Pluggable

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Channel Wavelength Allocation
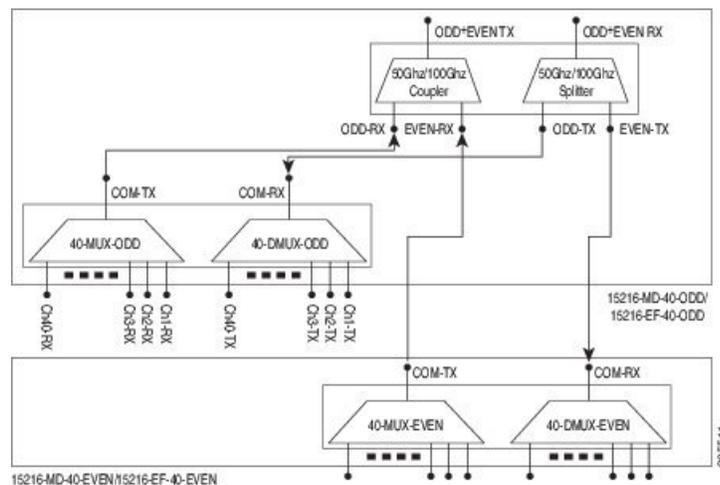
Figure 7: ONS 15216-MD-48 Patch Panel Interconnection with ONS 15216-MD-48-CME Coupler and Splitter Pluggable
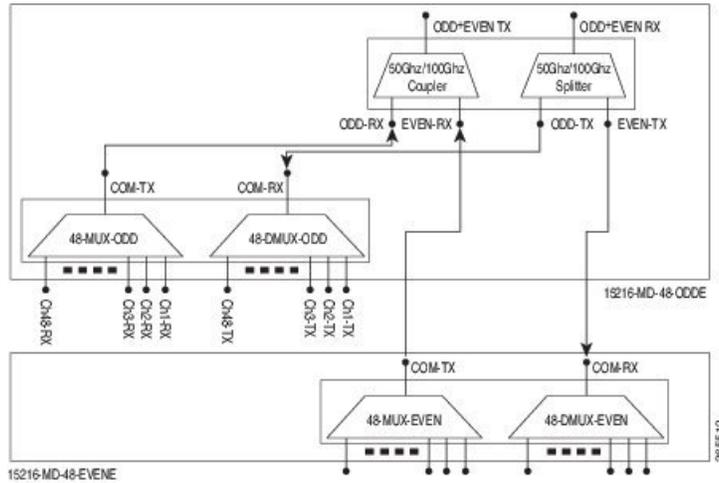
The port connections between the odd patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48), ONS 15216-MD-48-CME coupler and splitter pluggable, and the even patch panel (15216-MD-40, 15216-EF-40, or 15216-MD-48) are established as follows:

- COM-TX port of the odd patch panel and ODD-RX port of the pluggable.

- COM-RX port of the odd patch panel and ODD-TX port of the pluggable.

- COM-TX port of the even patch panel and EVEN-RX port of the pluggable.

- COM-RX port of the even patch panel and EVEN-TX port of the pluggable.

Channel Wavelength Allocation

The following table describes the C-band channel wavelength allocation plan for the odd and even patch panels.

Table 1: 15216-MD-40 and 15216-EF-40 Odd and Even Patch Panels C-Band Channel Wavelength Allocation Plan

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			15216-MD-40-ODD/15216-EF-40-EVEN		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
1	195.9	1530.33	1	195.85	1530.72
2	195.8	1531.12	2	195.75	1531.51
3	195.7	1531.90	3	195.65	1532.29
4	195.6	1532.68	4	195.55	1533.07
5	195.5	1533.47	5	195.45	1533.86
6	195.4	1534.25	6	195.35	1534.64
7	195.3	1535.04	7	195.25	1535.43

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Channel Wavelength Allocation ■

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			15216-MD-40-ODD/15216-EF-40-EVEN		
Channel Label	Frequency (THz)	Wavelength (nm)	Channel Label	Frequency (THz)	Wavelength (nm)
8	195.2	1535.82	8	195.15	1536.22
9	195.1	1536.61	9	195.05	1537.00
10	195	1537.40	10	194.95	1537.79
11	194.9	1538.19	11	194.85	1538.58
12	194.8	1538.98	12	194.75	1539.37
13	194.7	1539.77	13	194.65	1540.16
14	194.6	1540.56	14	194.55	1540.95
15	194.5	1541.35	15	194.45	1541.75
16	194.4	1542.14	16	194.35	1542.54
17	194.3	1542.94	17	194.25	1543.33
18	194.2	1543.73	18	194.15	1544.13
19	194.1	1544.53	19	194.05	1544.92
20	194	1545.32	20	193.95	1545.72
21	193.9	1546.12	21	193.85	1546.52
22	193.8	1546.92	22	193.75	1547.32
23	193.7	1547.72	23	193.65	1548.11
24	193.6	1548.51	24	193.55	1548.91
25	193.5	1549.32	25	193.45	1549.72
26	193.4	1550.12	26	193.35	1550.52
27	193.3	1550.92	27	193.25	1551.32
28	193.2	1551.72	28	193.15	1552.12
29	193.1	1552.52	29	193.05	1552.93
30	193	1553.33	30	192.95	1553.73
31	192.9	1554.13	31	192.85	1554.54
32	192.8	1554.94	32	192.75	1555.34
33	192.7	1555.75	33	192.65	1556.15
34	192.6	1556.55	34	192.55	1556.96
35	192.5	1557.36	35	192.45	1557.77
36	192.4	1558.17	36	192.35	1558.58
37	192.3	1558.98	37	192.25	1559.39

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Channel Wavelength Allocation

Channel Wavelength			Channel Wavelength		
15216-MD-40-ODD/15216-EF-40-ODD			**15216-MD-40-ODD/15216-EF-40-EVEN**		
Channel Label	**Frequency (THz)**	**Wavelength (nm)**	**Channel Label**	**Frequency (THz)**	**Wavelength (nm)**
38	192.2	1559.79	38	192.15	1560.20
39	192.1	1560.61	39	192.05	1561.01
40	192	1561.42	40	191.95	1561.83

Table 2: 15216-MD-48 Odd and Even Patch Panels C-Band Channel Wavelength Allocation Plan

Channel Wavelength			Channel Wavelength		
15216-MD-48-ODD/15216-MD-48-ODDE			**15216-MD-48-EVEN/15216-MD-48-EVENE**		
Channel Label	**Frequency (THz)**	**Wavelength (nm)**	**Channel Label**	**Frequency (THz)**	**Wavelength (nm)**
1	196.1	1528.77	1	196.05	1529.16
2	196.0	1529.55	2	195.95	1529.94
3	195.9	1530.33	3	195.85	1530.72
4	195.8	1531.12	4	195.75	1531.51
5	195.7	1531.90	5	195.65	1532.29
6	195.6	1532.68	6	195.55	1533.07
7	195.5	1533.47	7	195.45	1533.86
8	195.4	1534.25	8	195.35	1534.64
9	195.3	1535.04	9	195.25	1535.43
10	195.2	1535.82	10	195.15	1536.22
11	195.1	1536.61	11	195.05	1537.00
12	195	1537.40	12	194.95	1537.79
13	194.9	1538.19	13	194.85	1538.58
14	194.8	1538.98	14	194.75	1539.37
15	194.7	1539.77	15	194.65	1540.16
16	194.6	1540.56	16	194.55	1540.95
17	194.5	1541.35	17	194.45	1541.75
18	194.4	1542.14	18	194.35	1542.54
19	194.3	1542.94	19	194.25	1543.33
20	194.2	1543.73	20	194.15	1544.13
21	194.1	1544.53	21	194.05	1544.92
22	194	1545.32	22	193.95	1545.72
23	193.9	1546.12	23	193.85	1546.52

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Port Label Description ■

Channel Wavelength			Channel Wavelength		
15216-MD-48-ODD/15216-MD-48-ODDE			**15216-MD-48-EVEN/15216-MD-48-EVENE**		
Channel Label	**Frequency (THz)**	**Wavelength (nm)**	**Channel Label**	**Frequency (THz)**	**Wavelength (nm)**
24	193.8	1546.92	24	193.75	1547.32
25	193.7	1547.72	25	193.65	1548.11
26	193.6	1548.51	26	193.55	1548.91
27	193.5	1549.32	27	193.45	1549.72
28	193.4	1550.12	28	193.35	1550.52
29	193.3	1550.92	29	193.25	1551.32
30	193.2	1551.72	30	193.15	1552.12
31	193.1	1552.52	31	193.05	1552.93
32	193	1553.33	32	192.95	1553.73
33	192.9	1554.13	33	192.85	1554.54
34	192.8	1554.94	34	192.75	1555.34
35	192.7	1555.75	35	192.65	1556.15
36	192.6	1556.55	36	192.55	1556.96
37	192.5	1557.36	37	192.45	1557.77
38	192.4	1558.17	38	192.35	1558.58
39	192.3	1558.98	39	192.25	1559.39
40	192.2	1559.79	40	192.15	1560.20
41	192.1	1560.61	41	192.05	1561.01
42	192	1561.42	42	191.95	1561.83
43	191.9	1562.23	43	191.85	1562.64
44	191.8	1563.05	44	191.75	1563.45
45	191.7	1563.86	45	191.65	1564.27
46	191.6	1564.68	46	191.55	1565.09
47	191.5	1565.50	47	191.45	1565.90
48	191.4	1566.31	48	191.35	1566.72

Port Label Description

The following table lists the connection ports, description, and the type of connectors used for each port. All ports are on the front faceplate of ONS 15216-MD-48-CM/15216-MD-48-CME, which is equipped with optical LC adapters and one USB Type A receptacle connector.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Channel Identification Label

Table 3: Port Label Descriptions

Port Label	Description	Type of Connector
ODD+EVEN-RX	Common input	LC-UPC II
ODD-TX	Odd channels output	LC-UPC II
EVEN-TX	Even channels output	LC-UPC II
ODD+EVEN-TX	Common output	LC-UPC II
ODD-RX	Odd channels input	LC-UPC II
EVEN-RX	Even channels input	LC-UPC II
INV	USB inventory port	USB Type A receptacle connector

The following table lists the connection ports, description, and the type of connectors used for each port. All ports are on the front faceplate of 15216-MD48-CME2.

Table 4: Port Label Descriptions

Port Label	Description	Type of Connector
ODD+EVEN-RX	Common input	LC-UPC II
ODD-TX	Odd channels output	LC-UPC II
EVEN-TX	Even channels output	LC-UPC II
ODD+EVEN-TX	Common output	LC-UPC II
ODD-RX	Odd channels input	LC-UPC II
EVEN-RX	Even channels input	LC-UPC II
COM1-TX		
COM1-RX		
COM2-TX		
MON-TX1		
MON-TX2		

Channel Identification Label

ONS 15216-MD-48-CM

The channel identification label is placed on the ONS 15216-MD-48-CM interleaver and deinterleaver pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD-48-CM interleaver and deinterleaver pluggable.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Channel Identification Label ■

Figure 8: ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable-Product and Channel ID Label
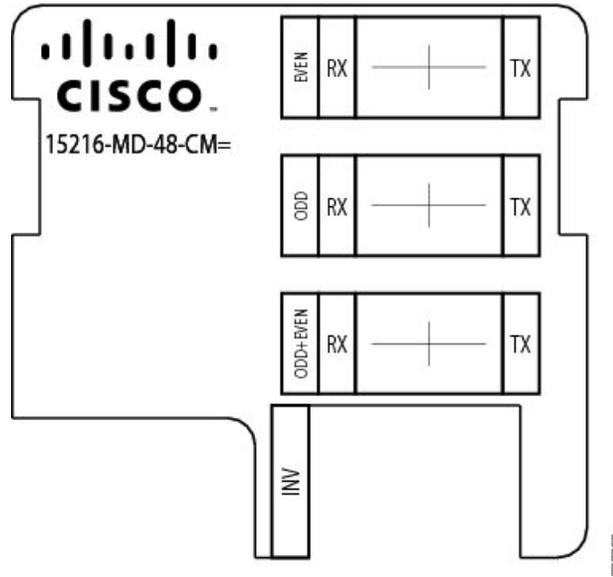
ONS 15216-MD-48-CME

The channel identification label is placed on the ONS 15216-MD-48-CME coupler and splitter pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD-48-CME coupler and splitter pluggable.

Figure 9: ONS 15216-MD-48-CME Coupler and Splitter Pluggable-Product and Channel ID Label

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Safety Information

ONS 15216-MD48-CME2

The channel identification label is placed on the ONS 15216-MD48-CME2 coupler and splitter pluggable faceplate. The following figure shows the product identification and channel identification label of the ONS 15216-MD48-CME2 coupler and splitter pluggable.
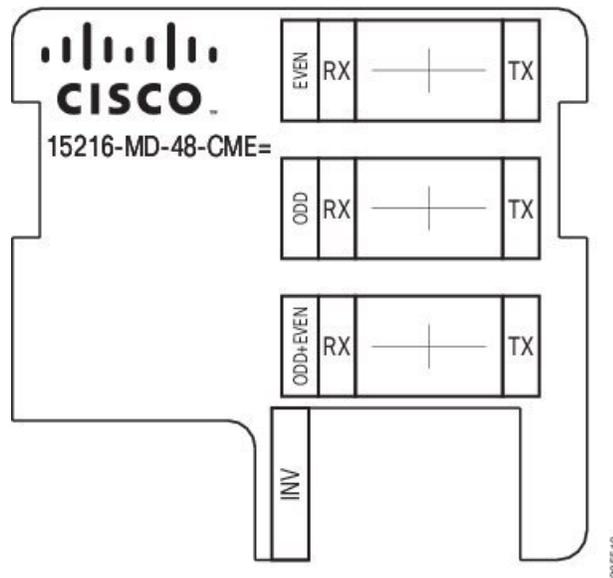
Figure 10: ONS 15216-MD48-CME2 Coupler and Splitter Pluggable-Product and Channel ID Label
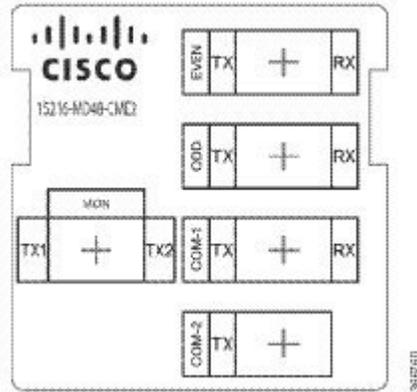
Safety Information

Before you install, operate, or service this product, you must read the Regulatory Compliance and Safety Information for Cisco Optical Transport Products document for important safety information and warning translations.

This product is compliant with the GR 1089, UL60950 /CSA 22.2 No. 60950-00, and IEC 60950 standards.

Laser Radiation Emission Restrictions

The Class 1M Laser safety and warning label is affixed to this product and indicates that the product should never be used or installed in an optical network with emissions higher than Class 1M.

⚠

Warning   Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 281

⚠

Warning   Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Electrical Safety

This product is optically and electrically passive and requires no electrical connections. No electrostatic discharge (ESD) or other electrical safety considerations apply.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Unpacking and Verifying the ONS 15216-MD-48-CM/15216-MD-48-CME Pluggable ■

Unpacking and Verifying the ONS 15216-MD-48-CM/15216-MD-48-CME Pluggable

Procedure

Step 1   Unpack and inspect the pluggable. The package should include these components:

- ONS 15216-MD-48-CM or 15216-MD-48-CME or 15216-MD48-CME2 pluggable
- Packing slip

Step 2   Compare the equipment received with the packing slip and the equipment list that the customer service representative provided. If there are any discrepancies, notify the Customer Service Center.

Step 3   Check for external damage. Visually check all components and immediately report any shipping damage to your customer service representative. Have this information ready:

- Invoice number of shipper (see packing slip)
- Model and serial number of the damaged unit
- Description of damage
- Effect of damage on the installation
- Packing slip

Installing the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

The following procedure explains how to install the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable inside the 15216-EF-40 or 15216-MD-48 odd and even patch panels. To install the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 inside the 15216-MD-40 odd or even patch panel, see the *Installing Cisco ONS 15216-MD-ID-50 Optical Interleaver and Deinterleaver Pluggable* guide.

⚠

Caution   Use only the fastening hardware provided with the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Installing the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

Procedure

Step 1   Unscrew the captive screws to remove the Interleaver/Deinterleaver (I/D) or the Coupler/Splitter blank cover from the patch panel as shown in the following figure:

Figure 11: Removing the Interleaver/Deinterleaver or Coupler/Splitter Blank Cover
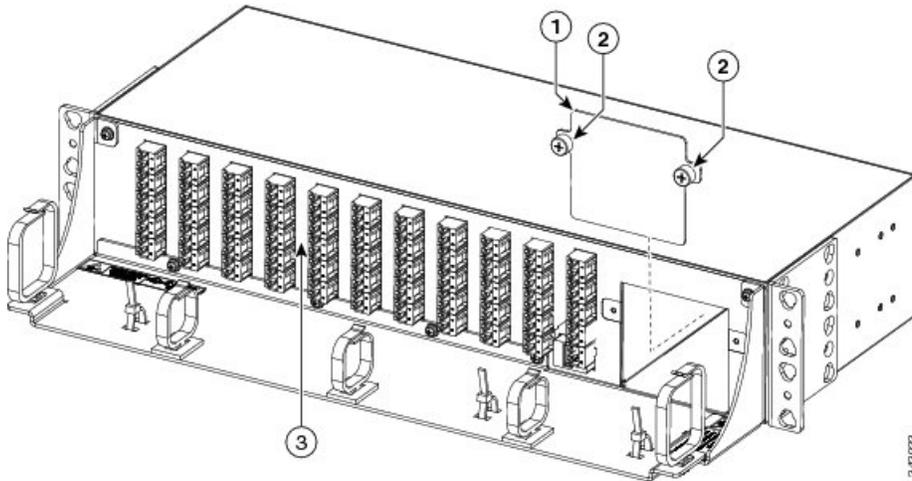
1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	2	Captive screw
3	Front plate		

Note   During an in-field upgrade, all the fibers installed previously must be routed toward the left fiber bend radius controller. To plug in the pluggable, the space in front of the I/D blank cover must be free of fibers and cables.

Step 2   Insert the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable as shown in the following figure:

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Installing the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable ■

Figure 12: Inserting the ONS 15216-MD-48-CM/15216-MD-48-CME Pluggable
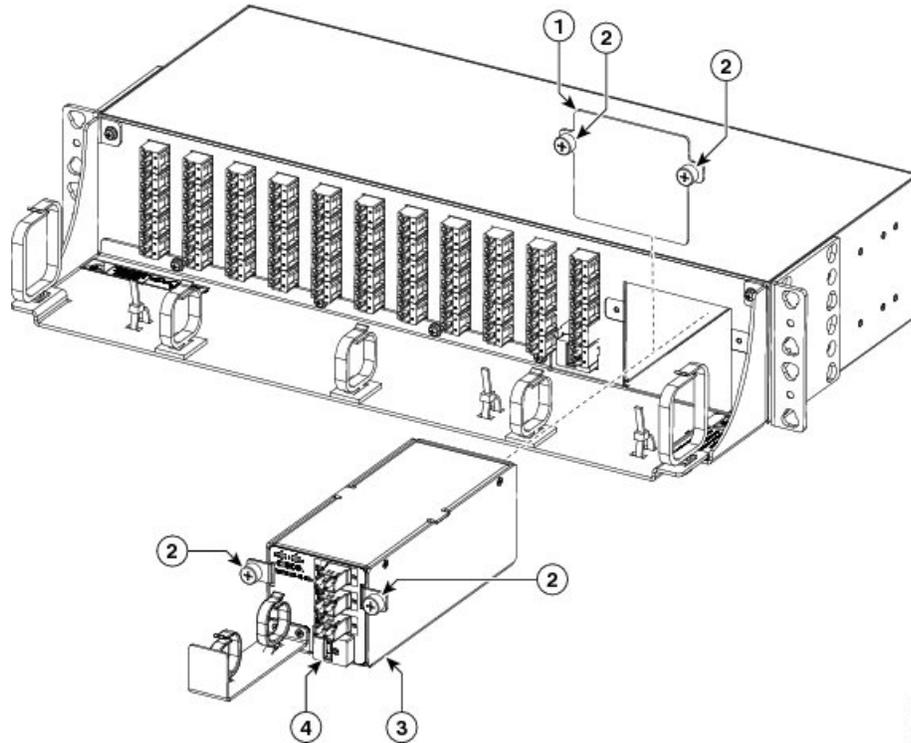
1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	**2**	Captive screw
3	Interleaver/Deinterleaver or Coupler/Splitter pluggable	**4**	Inventory USB Type A receptacle connector

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Install and Route Fiber-Optic and USB Cables

Figure 13: Inserting the ONS 15216-MD48-CME2 Pluggable

1	Interleaver/Deinterleaver or Coupler/Splitter blank cover	2	Captive screw
3	ONS 15216-MD48-CME2 pluggable		

Step 3 Tighten the screws of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

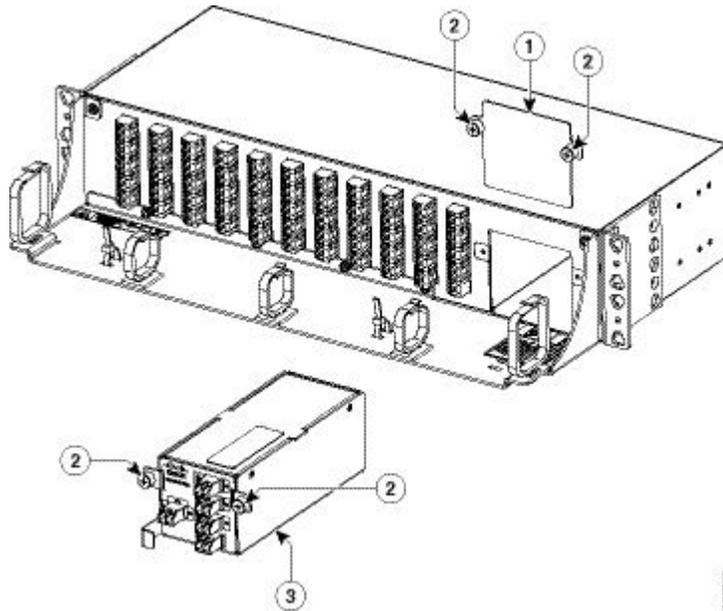For installing and routing fiber-optic and USB cables, see " Install and Route Fiber-Optic and USB Cables, on page 16". For cleaning the fiber-optic connectors, see "Cleaning and Maintaining Fiber-Optic Connectors, on page 20".

Install and Route Fiber-Optic and USB Cables

All connectors are on the front of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable and are equipped with LC/UPC bulkhead adapters and with a USB Type A receptacle connector for inventory purpose. For port label description, see "Table 3: Port Label Descriptions, on page 10". The LC-LC patch cords are used to connect the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable to the patch panels.

Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Install and Route Fiber-Optic and USB Cables ■

⚠

Caution   When connecting an optical fiber patch cord between the patch panel and the optical card ports in a Cisco ONS 15454, use the electrostatic discharge wristband supplied with the ONS 15454. Plug the wristband into the ESD jack on the lower right front side of the ONS 15454.

✎

Note   Always clean all fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the patch panel, which makes regular cleaning imperative. For cleaning instructions see "Clean Fiber-Optic Cable Connectors, on page 21".

⚠

Caution   The ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggables have LC/UPC bulkhead adapters for optical connections. Always use fiber-optic cables equipped with the corresponding (LC/UPC) connector type. Using any other type of connector results in damage to the connector or adapter, or both.
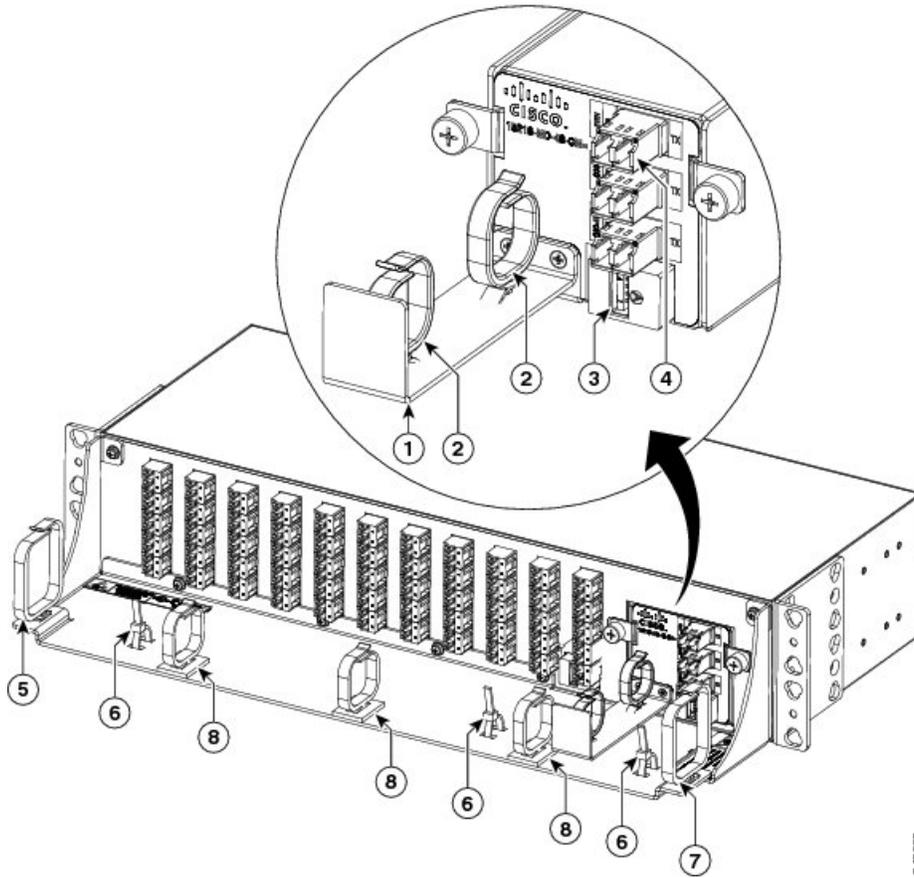
Procedure

Step 1   To connect the fibers as appropriate (see the following figure):

a) Remove the LC adapter cap from the LC-LC adapter of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable .

b) Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

c) Align the keyed ridge of the cable connector with the slot in the receiving adapter.

d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.

e) Route the cables through the left or right fiber holder clip.

f) (Optional) Secure the fibers further by placing them into one or more adhesive clips. The adhesive clips can be placed on the fiber management plate as per the actual installation conditions.

g) Place the extra fiber length of the two LC-LC patch cords used to connect the patch panel with its plugged ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 module on the interleaver/deinterleaver or coupler/splitter fiber management bracket.

   Note   The interleaver/deinterleaver or coupler/splitter fiber management bracket can be removed from the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable and the extra fiber length of the two LC-LC patch cords can be routed outside the patch panel.

For interconnections between the ONS 15216-MD-48-CM/15216-MD-48-CME pluggables, odd or even patch panel with a patch panel of a different grid, see "Optical Interconnections , on page 4".

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Install and Route Fiber-Optic and USB Cables

Figure 14: 15216-MD-48-CM/15216-MD-48-CME - Connecting and Routing Cables

1	Interleaver/Deinterleaver or Coupler/Splitter fiber management bracket	2	Interleaver/Deinterleaver or Coupler/Splitter fiber clip
3	Inventory USB Type A receptacle connector	4	LC-LC adapter
5	Left fiber holder clip	6	Tie-wrap
7	Right fiber holder clip	8	Adhesive fiber holder clip

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Install and Route Fiber-Optic and USB Cables ▮

Figure 15: 15216-MD48-CME2 - Connecting and Routing Cables
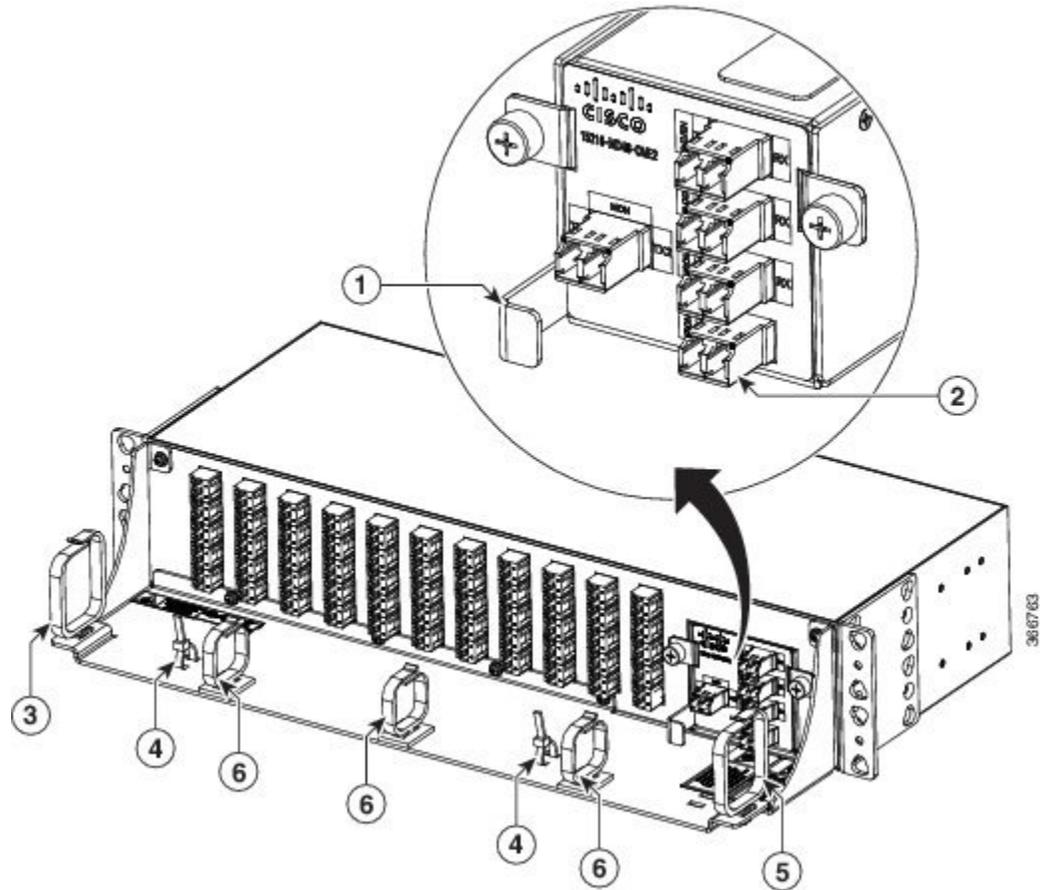
1	Unit withdrawal hook	2	LC-LC adapter
3	Left fiber holder clip	4	Tie-wrap
5	Right fiber holder clip	6	Adhesive fiber holder clip

Step 2   To secure the fibers, bundle the fibers using one of the four velcro strips that is provided.

Step 3   To connect and secure the inventory USB Type A plug connector to the inventory USB Type A receptacle connector (see Figure 14: 15216-MD-48-CM/15216-MD-48-CME - Connecting and Routing Cables, on page 18):

a)   Route the inventory USB cable through the left or right fiber holder clip.

b)   Connect the USB Type A plug connector to the USB Type A receptacle connector.

c)   Secure the USB cable with a tie-wrap at one of the three available locations on the patch panel.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Uninstalling the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

Uninstalling the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable

Procedure

Step 1   Gently disconnect the fiber-optic connectors from the LC-LC adapters of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

Step 2   Disconnect the inventory USB cable releasing it from the tie wrap and from the USB receptacle connector of the pluggable. Clear the front of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable from any cable or fiber.

Step 3   Unscrew the captive screws of the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

Step 4   Remove the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable from the patch panel.

Step 5   Close the empty space on the patch panel with the I/D blank cover.

Cleaning and Maintaining Fiber-Optic Connectors

Connector cleaning is required to maintain the performance of fiber-optic circuits. It is important that both the LC/UPC connector at the end of the fiber-optic cable and the optical mating adapter on the front panel of the device are clean before the connection is made.

Warning   Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

The following warning applies to disposal of chemicals and other materials used to clean connectors and adapters:

Warning   Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Note   Before installing the fiber-optic cable, always perform the cleaning procedure for cable connectors described in the following section. Whenever possible, inspect each connector before connecting it to the optical mating adapter on the front panel.

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Customer-supplied Cleaning Materials ■

Note The LC optical mating adapter on the faceplate of the device is less likely to get dirty if it is capped when not in use. On some devices, the optical mating adapter has a shutter. The shutter automatically closes when the LC/UPC connector is disconnected. This prevents entry of dirt.

The procedure for a thorough cleaning of these adapters is complicated. Use a commercially available cleaning kit and closely follow the instructions included with the kit.

Customer-supplied Cleaning Materials

The Type A fiber optic connector cleaners (for example, CLETOP reel) are recommended to clean the cable connectors, but are not supplied with the device.

If properly maintained (only used with clean, defect-free fiber connectors and capped when not in use), the mating adapter would not require cleaning. However, if you suspect the adapter is dirty, clean it by using the CLETOP stick swab.

Note For multifiber cable assemblies, use specific cleaning tools or materials designed for the assembly type.

Cleaning the Optical Mating Adapter

Procedure

Step 1 Read the cartridge cleaning instructions (provided by the manufacturer) to insert the cartridge cleaning tip into the optical mating adapter.

Step 2 Slide the lever on the cartridge to swipe the mating surface.

Note Always keep unused adapter ports and fiber connectors capped with a clean dust cap. The optical mating adapters that have shutter need not be capped.

Clean Fiber-Optic Cable Connectors

The tools required to clean fiber connectors are:

- Inspection microscope
- Type A Fiber Optic Connector Cleaner (CLETOP reel)
- Optical swab
- Optical receiver cleaning stick

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Cisco ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable Specifications

Procedure

Step 1   Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2   Replace any damaged fiber connectors.

    Note   Replace all dust caps whenever the equipment is unused for 30 minutes or more.

    Caution   Do not reuse optical swabs. Keep unused swabs off of work surfaces.

Step 3   Clean the fiber connectors with CLETOP reel:

    a) If present, remove the dust cap from the fiber connector.

    b) Press the lever down to open the shutter door. When you press the lever each time, you expose a clean wiping surface.

    c) Insert the connector into the CLETOP cleaning cassette slot, rotate one-quarter turn, and gently swipe downwards.

    d) Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat the above sub-steps.

    e) Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

    Note   Before replacing a dust cap on a connector, verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry, lint-free wipe and the inside of the dust cap using a CLETOP stick swab (14100400).

Cisco ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 Pluggable Specifications

This section contains environmental, power, optical, connector and mechanical specifications for the ONS 15216-MD-48-CM/15216-MD-48-CME/15216-MD48-CME2 pluggable.

Environmental and Power Specifications

Table 5: Environmental and Power Specifications for ONS 15216-MD-48-CM

Environmental Condition	Minimum	Maximum	Units
Short Term (96 hours/year) Temperature Range (STR)	-5	65	Celsius
	23	149	Fahrenheit
Continuous Operative Temperature Range (OTR)	5	40	Celsius
	41	104	Fahrenheit

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Specifications ▪

Environmental Condition	Minimum	Maximum	Units
Power handling for the optical port	500	—	mW
Power handling for the USB Port	400	600	mW

Table 6: Environmental and Power Specifications for ONS 15216-MD-48-CME

Environmental Condition	Minimum	Maximum	Units
Storage Temperature Range	-40	85	Celsius
	-40	185	Fahrenheit
Continuous Operative Temperature Range (OTR)	-5	65	Celsius
	23	149	Fahrenheit
Power handling for each port	500	—	mW

Table 7: Environmental and Power Specifications for 15216-MD48-CME2

Environmental Condition	Minimum	Maximum	Units
Short Term (96 hours/year) Temperature Range (STR)	-40	85	Celsius
	-40	185	Fahrenheit
Continuous Operative Temperature Range (OTR)	-5	65	Celsius
	23	149	Fahrenheit
Operating Humidity	5	95	RH
Power handling for each port	500	—	mW

Optical Specifications

Table 8: Optical Specifications for ONS 15216-MD-48-CM

Parameter	Condition	Min	Typical	Max	Units
50 GHz /100 GHz Channel Grids					

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
ITU Channel Center Frequencies /Wavelength	• COM ports • Within short term temperature range	191.35	—	196.10	THz
ITU Channel Spacing		1528.77	—	1566.72	nm
		50		—	GHz
Number of Channels		96		—	
ITU Channel center frequencies/Wavelength (ODD Grid)	• ODD ports • Within short term temperature range	191.40	—	196.10	THz
		1528.77	—	1566.31	nm
ITU Channel spacing - ODD Grid		100		—	GHz
Number of Channels		48		—	
ITU Channel center frequencies/Wavelength (EVEN Grid)	• EVEN ports • Within short term temperature range	191.35	—	196.05	THz
		1529.16	—	1566.72	nm
ITU Channel spacing - EVEN Grid		100		—	GHz
Number of Channels		48		—	
Deinterleaver Module					
Operating Bandwidth		± 10	—	—	GHz
Bandwidth at -0.5 dB	• Any state of polarization (SOP) and within operative temperature range • Around ITU center wavelength	± 10	± 11	—	GHz
Bandwidth at -1.0 dB		± 12	± 13	—	GHz
Bandwidth at -3.0 dB		± 16	± 17	—	GHz

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Specifications ▪

Parameter	Condition	Min	Typical	Max	Units
Bandwidth at -0.5 dB	• Any state of polarization (SOP) and within short term temperature range • Around ITU center wavelength	± 8	± 9	—	GHz
Bandwidth at -1.0 dB		± 10	± 12	—	GHz
Bandwidth at -3.0 dB		± 14	± 16	—	GHz
DMX Adjacent Channel Isolation[1]	• Any state of polarization (SOP) and within operating bandwidth	25	28	—	dB
Insertion Loss EOL— COM-RX to ODD-TX path and COM-RX to EVEN-TX path	• Any state of polarization (SOP) and within operating bandwidth including connectors	0.5	± 1.8	2.5	dB

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
Insertion Loss Uniformity[2]	• Any state of polarization (SOP) and within operating bandwidth including connectors	—	0.35	0.5	dB
Channels Band Ripple		—	—	0.5	dB
Group Delay Ripple (GDR)[3]		—	1.8	± 2.5	ps
Chromatic Dispersion[4]		—	± 15	± 45	ps/nm
Optical Return Loss		40.0	45.0	—	dB
Polarization Dispersion Loss (PDL)[5]		—	0.3	0.4	dB
Polarization Mode Dispersion (PMD)[6]		—	0. 25	0.3	ps
Directivity ODD-TX<– –> EVEN-TX ports		40.0	—	—	dB
Interleaver Module (50%/50% Coupler)					
Wavelength range	• Any state of polarization (SOP) and within short term temperature range	1525 to 1570	—	—	nm

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Optical Specifications

Parameter	Condition	Min	Typical	Max	Units
Insertion Loss EOL— COM-RX to ODD-TX path and COM-RX to EVEN-TX path	• Any state of polarization (SOP) and within wavelength range including connectors	2.5	—	3.6	dB
Insertion Loss Uniformity[7]		—	—	0.5	
Insertion Loss Ripple[8]		—	—	0.2	dB
Chromatic Dispersion		—	—	± 5	ps/nm
Optical Return Loss		40.0	—	—	dB
Polarization Dispersion Loss		—	—	0.1	dB
Polarization Mode Dispersion		—	—	0.1	
Directivity ODD-RX<– –> EVEN-RX ports		50.0	—	—	dB

[1] Adjacent Channel Isolation is defined as the difference between the maximum IL in the 50 GHz transmitted channel Bandwidth (ITU ± 80 pm) and the minimum IL measured over the Operating Wavelength Bandwidth (± 80 pm, centered on each ITU wavelength of the channel) of both adjacent 100 GHz channels.

[2] Defined as the difference between the maximum insertion losses over any two wavelengths in the wavelength range.

[3] The difference between the maximum and minimum group delay in the Operating Wavelength Bandwidth of each channel evaluated at all SOP.

[4] Chromatic Dispersion is defined as the maximum of derivative of the Group Delay versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth)

[5] PDL (Polarization Dependent Loss) is defined as the difference between the maximum and minimum IL in the 100 GHz transmitted channel Bandwidth (Operating Wavelength Bandwidth) evaluated at all SOP, measured at a given wavelength.

[6] PMD (Polarization Mode Dispersion) is defined as the maximum of the DGD versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth).

[7] Defined as the difference between the insertion loss values of the ODD-RX —>COM-TX and the EVEN-RX —>COM-TX paths.

[8] Difference between the maximum and minimum Insertion Loss values measured within the overall Operating Wavelength Bandwidth.

Table 9: Optical Specifications for ONS 15216-MD-48-CME

Parameter	Condition	Min	Typical	Max	Units
50 GHz /100 GHz Channel Grids					

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

■ **Optical Specifications**

Parameter	Condition	Min	Typical	Max	Units
ITU Channel Center Frequencies /Wavelength	• COM ports	191.35	—	196.1	THz
	• Within short term temperature range	1566.72	—	1528.77	nm
Insertion Loss EOL— ODD-RX to COM-TX path EVEN-RX to COM-TX path	• Any state of polarization (SOP) and within operating bandwidth including connectors	2.5	—	3.5	dB
Insertion Loss Uniformity[9]	• Any state of polarization (SOP) and within operating bandwidth including connectors	—	—	0.6	dB
Insertion Loss Ripple[10]		—	—	0.25	dB
Chromatic Dispersion[11]		—	—	± 5	ps/nm
Optical Return Loss		40.0	—	—	dB
Polarization Dispersion Loss (PDL)[12]		—	—	0.15	dB
Polarization Mode Dispersion (PMD)[13]		—	—	0.1	ps
Directivity ODD-RX<– –> EVEN-RX ports		50	—	—	dB

[9] Defined as the difference between the maximum insertion losses over any two wavelengths in the wavelength range.

[10] Difference between the maximum and minimum Insertion Loss values measured within the overall Operating Wavelength Bandwidth.

[11] Chromatic Dispersion is defined as the maximum of derivative of the Group Delay versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth)

[12] PDL (Polarization Dependent Loss) is defined as the difference between the maximum and minimum IL in the 100 GHz transmitted channel Bandwidth (Operating Wavelength Bandwidth) evaluated at all SOP, measured at a given wavelength.

[13] PMD (Polarization Mode Dispersion) is defined as the maximum of the DGD versus the wavelength curve in the 50 GHz transmitted channel bandwidth (Operating Wavelength Bandwidth).

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Connector and Mechanical Specifications

Table 10: Optical Specifications for ONS 15216-MD48-CME2

Parameter	Min	Max	Units
Frequency range	191.35	196.10	Thz
Wavelength range	1528.77	1566.72	nm
DEMUX insertion loss	2.5	3.8	dB
MUX insertion loss	3.2	4.2	dB
Insertion loss uniformity	—	0.6	dB
Insertion loss ripple	—	0.3	dB
Chromatic dispersion	—	± 5	ps/nm
Optical return loss	40	—	dB
Polarization dispersion loss	—	0.25	dB
Polarization mode dispersion	—	0.1	ps
Directivity ODD-RX <– –> EVEN-RX ports	40	—	dB
Directivity COM TX-1/2 <– –> ODD/EVEN-RX ports	40	—	dB
MON ports relative attenuation	18	22	dB

Connector and Mechanical Specifications

Table 11: Connector and Mechanical Specifications

Parameter	Condition	Specification
Connector Type	All optical ports	LC/UPC II
	USB inventory port	USB Type A receptacle connector
Adapter Type	All optical ports	LC
Patch Panel Dimensions		9.911-inches (251.7 mm) long, 2.645-inches (67.2 mm) wide, and 2.452-inches (62.2 mm) high. Considering the captive screw brackets, the interleaver and deinterleaver module width is 3.54-inches (89.9 mm).

Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable and the Cisco ONS 15216-MD-48-CME, 15216-MD48-CME2 Coupler and Splitter Pluggable

Related Documentation

Related Documentation

Use this guide in conjunction with the following referenced publications:

- *Cisco ONS 15454 DWDM Configuration Guides*

- *Cisco ONS 15454 DWDM Troubleshooting Guide*

Short Description

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Installing the NCS1K-MD-64-C Module

This chapter explains how to install and operate the NCS1K-MD-64-C module.

Understanding NCS1K-MD-64-C

A new optical passive optical multiplexer and de-multiplexer module, NCS1K-MD-64-C, is introduced in Cisco NCS 2000 Series R12.1 and in Cisco NCS 1000 Series R7.3.1. The new optical module is based on Athermal Wave Guide (AWG) providing 64 channels at 75-GHz space covering the extended C-band of optical spectrum. The passive module allows you to transmit 400G ZR and 400G ZR+ wavelengths.

NCS1K-MD-64-C is a bidirectional unit that have the MUX and the DEMUX functions implemented as two different sections. This module fits into ETSI 300 mm and ANSI 450 mm racks.

Mutiplexer

- 64 Channels AWG combines the signal coming from Chi-RX ports into the aggregated COM-TX port.

- An integrated tap-coupler splits 1% of the aggregated signals toward MON-TX port for monitoring.
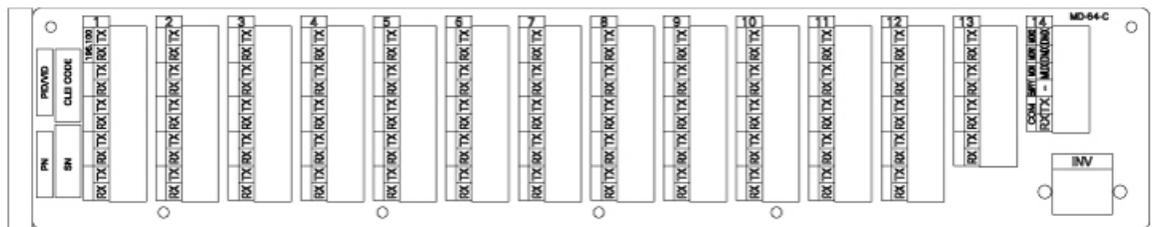
Demutiplexer

- An integrated tap-coupler splits 1% of the aggregated signals coming from COM-RX port toward MON-TX port for monitoring.

- 64 Channels AWG splits the aggregated signals into individual Chi-TX ports.

Figure 16: NCS1K-MD-64-C Optical Block Diagram
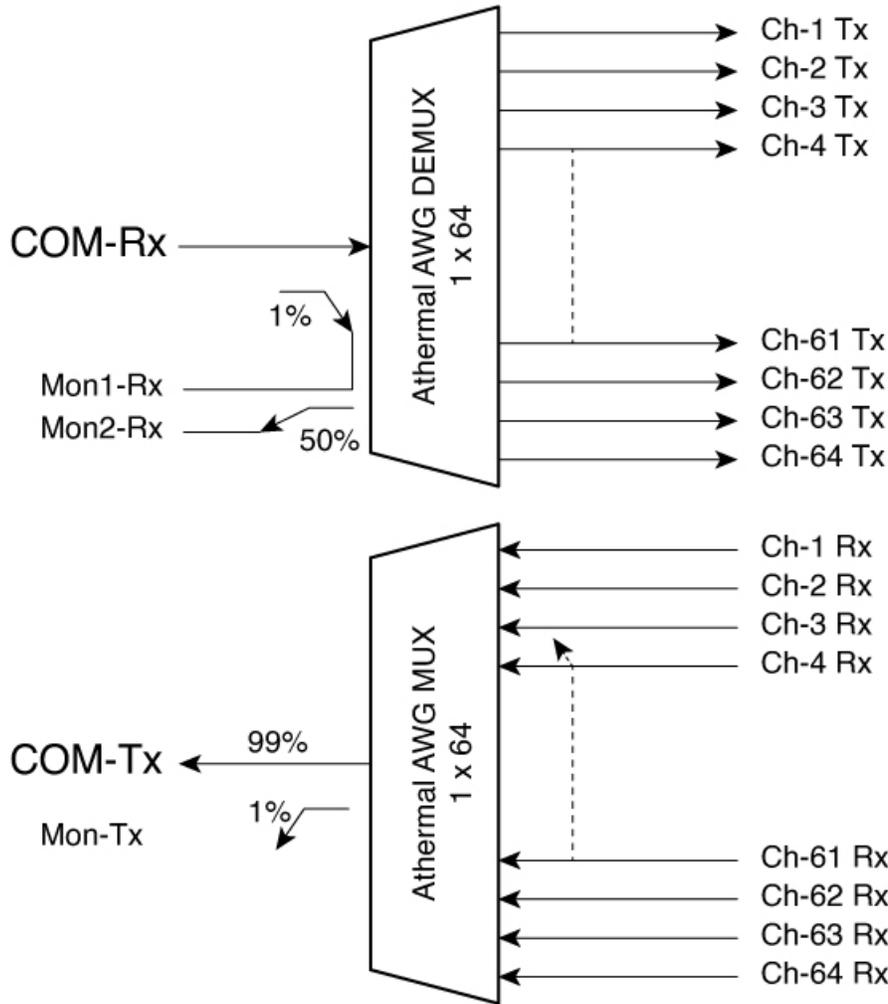
Figure 17: NCS1K-MD-64-C Faceplate

Port Label Descriptions

The following table lists the connection ports, description, and the type of connectors used for each port.

Table 12: Port Label Descriptions

Port Label	Description	Type of Connector
COM-TX	Common output	LC-UPC II
COM-RX	Common input	LC-UPC II
MON-TX	Monitor output	LC-UPC II
MON-RX1	Monitor input	LC-UPC II
MON-RX2	Monitor input	LC-UPC II

Optical Channel Grid

Table 13: Optical Channel Grid

Channel Number	Frequency
1	196,100
2	196,025
3	195,95
4	195,875
5	195,8
6	195,725
7	195,65
8	195,575
9	195,5
10	195,425
11	195,35
12	195,275
13	195,2
14	195,125
15	195,05
16	194,975
17	194,9
18	194,825

Channel Number	Frequency
19	194,75
20	194,675
21	194,6
22	194,525
23	194,45
24	194,375
25	194,3
26	194,225
27	194,15
28	194,075
29	194
30	193,925
31	193,85
32	193,775
33	193,7
34	193,625
35	193,55
36	193,475
37	193,4
38	193,325
39	193,25
40	193,175
41	193,1
42	193,025
43	192,95
44	192,875
45	192,8
46	192,725

Channel Number	Frequency
47	192,65
48	192,575
49	192,5
50	192,425
51	192,35
52	192,275
53	192,2
54	192,125
55	192,05
56	191,975
57	191,9
58	191,825
59	191,75
60	191,675
61	191,6
62	191,525
63	191,45
64	191,375

Install Patch Panel

Procedure

Step 1   Mount the brackets on the patch panel.

a) Place the mounting bracket flush against the patch panel.
b) Align the mounting bracket screw holes against the patch panel screw holes.
c) Insert the screws and tighten them.
d) Repeat steps 1a through 1c to mount another bracket on the opposite side.

*Figure 18: Mounting the brackets on the 8-degree mesh patch panel module*
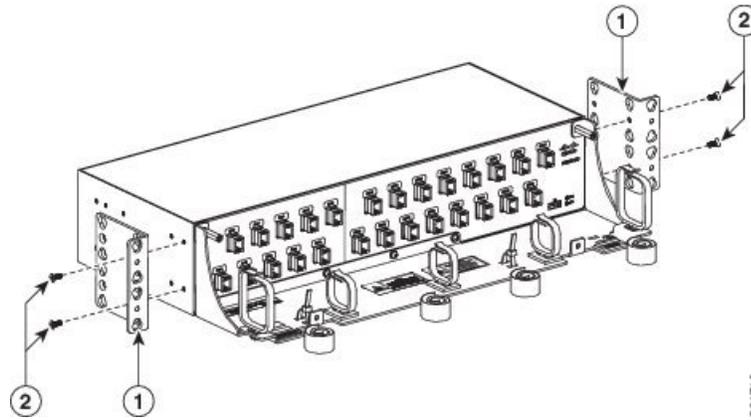
1	Mounting bracket	**2**	Screw

Step 2   Install the patch panel on the appropriate rack equipment.

    a)   Lift the patch panel to the desired position in the rack.

    b)   Align the screw holes on the mounting brackets with the mounting holes in the rack.

    c)   Insert the screws and tighten them.

Step 3   Establish grounding for the patch panel.

    a)   Crimp a #14 AWG ground cable to the ground lug.

    b)   Attach the ground lug to the patch panel.

      The ground points are present on the left and right rear side of the patch panel, as shown in the following figure.

Figure 19: Grounding the 8-degree mesh patch panel module
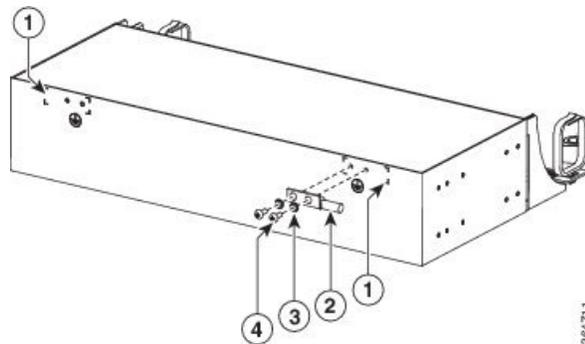
1	Ground point	**2**	Ground lug
3	Lock washer	**4**	Pan head screw

    c)   Tighten the lug using the screws.

    d)   Terminate the other end of the ground cable either at the office ground point or the rack ground point.

Install and Route Fiber-Optic and USB Cables

All connectors are on the front of the NCS1K-MD-64-C module and are equipped with LC/UPC bulkhead adapters and with a USB Type A receptacle connector for inventory purpose. For port label description, see Port Label Descriptions, on page 32. The LC-LC patch cords are used to connect the NCS1K-MD-64-C module to the patch panels.

Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Caution When connecting an optical fiber patch cord between the patch panel and the optical card ports in Cisco NCS 2000 Series, use the electrostatic discharge wristband supplied with NCS 2000 Series . Plug the wristband into the ESD jack on the lower right front side of NCS 2000.

Note Always clean all fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the patch panel, which makes regular cleaning imperative. For cleaning instructions see "Clean Fiber-Optic Cable Connectors, on page 21".

Caution The NCS1K-MD-64-C module has LC/UPC bulkhead adapters for optical connections. Always use fiber-optic cables equipped with the corresponding (LC/UPC) connector type. Using any other type of connector results in damage to the connector or adapter, or both.

Procedure

Step 1 To connect the fibers as appropriate, perform the following:

a) Remove the LC adapter cap from the LC-LC adapter of the NCS1K-MD-64-C module.

b) Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the NCS1K-MD-64-C module.

c) Align the keyed ridge of the cable connector with the slot in the receiving adapter.

d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.

e) Route the cables through the left or right fiber holder clip.

f) (Optional) Secure the fibers further by placing them into one or more adhesive clips. The adhesive clips can be placed on the fiber management plate as per the actual installation conditions.

g) Place the extra fiber length of the two LC-LC patch cords used to connect the patch panel with its plugged NCS1K-MD-64-C module.

Step 2 To secure the fibers, bundle the fibers using one of the four velcro strips that is provided.

Step 3   To connect and secure the inventory USB Type A plug connector to the inventory USB Type A receptacle connector, perform the following:

a)   Route the inventory USB cable through the left or right fiber holder clip.

b)   Connect the USB Type A plug connector to the USB Type A receptacle connector.

c)   Secure the USB cable with a tie-wrap at one of the three available locations on the patch panel.

Clean Fiber-Optic Cable Connectors

The tools required to clean fiber connectors are:

- Inspection microscope

- Type A Fiber Optic Connector Cleaner (CLETOP reel)

- Optical swab

- Optical receiver cleaning stick

Procedure

Step 1   Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2   Replace any damaged fiber connectors.

Note   Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Caution   Do not reuse optical swabs. Keep unused swabs off of work surfaces.

Step 3   Clean the fiber connectors with CLETOP reel:

a)   If present, remove the dust cap from the fiber connector.

b)   Press the lever down to open the shutter door. When you press the lever each time, you expose a clean wiping surface.

c)   Insert the connector into the CLETOP cleaning cassette slot, rotate one-quarter turn, and gently swipe downwards.

d)   Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat the above sub-steps.

e)   Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note   Before replacing a dust cap on a connector, verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry, lint-free wipe and the inside of the dust cap using a CLETOP stick swab (14100400).

Uninstall the NCS1K-MD-64-C Module

Procedure

Step 1   Gently disconnect the fiber-optic connectors from the LC-LC adapters of the NCS1K-MD-64-C module.

Step 2   Disconnect the inventory USB cable releasing it from the tie wrap and from the USB receptacle connector of the pluggable.

Step 3   Clear the front of the NCS1K-MD-64-C module from any cable or fiber.

Step 4   Unscrew the captive screws of the NCS1K-MD-64-C module.

Step 5   Remove the NCS1K-MD-64-C module.

Step 6   Close the empty space on the patch panel with the I/D blank cover.

Environmental and Power Specifications

Table 14: Environmental Specifications of NCS1K-MD-64-C Module

Environmental Condition	Min	Typical	Max	Unit
Operating Temperature Range	-5		55	ºC
Storage Temperature Range (non-condensing)	-40		85	ºC
Operating Humidity Range	5		95	%RH

Optical Specifications

Table 15: Optical Specifications of NCS1K-MD-64-C Module - Multiplexer Section

Parameter	Notes	Min	Typical	Max	Unit
Operating Bandwidth	Bandwidth over are defined CD, GDR, PMD, and PDL	± 31			GHz
Bandwidth @ -0.5 dB	Net bandwidth. Any SOP within OTR around ITU wavelength	± 25			GHz
Bandwidth @ -1.5 dB		± 30			GHz
Bandwidth @ -3 dB		± 33			GHz

Parameter	Notes	Min	Typical	Max	Unit
Bandwidth @ -0.5 dB	Gross bandwidth. Any SOP within OTR around ITU wavelength	53			GHz
Bandwidth @ -1.5 dB		63			GHz
Bandwidth @ -3 dB		70			GHz
Gaussian Filter Order App.	Gaussian Order		3		
Insertion Loss BOL MUX	Any SOP within OTR and within operating bandwidth including connectors	3		5,7	dB
Insertion Loss EOL MUX		3		6,2	dB
Insertion Loss BOL DMUX		3		5,4	dB
Insertion Loss EOL DMUX		3		5,9	dB
IL Uniformity				1,5	dB
Insertion Loss COM-TX to Mon-TX		22	20	18	dB
Adjacent Channel Isolation	Within +/-34GHz bandwidth of the adjacent channel	4.5			dB
Adjacent Channel Isolation @ central wavelength position	Probe signals located at central frequency	20			dB
Non-adjacent Channel Isolation	Within +/-34GHz bandwidth of the adjacent channel	19			dB
Non-adjacent Channel Isolation @ central wavelength position	Probe signals located at central frequency	28			dB
Total Crosstalk		1.8			dB

Parameter	Notes	Min	Typical	Max	Unit
Total Non-adjacent Crosstalk		19			dB
Group Delay Ripple (GDR)	Any SOP; within OTR			± 14	ps
Phase Ripple Standard Deviation	Within operating bandwidth			0,1	rad
Chromatic Dispersion	Including connectors			± 150	ps/nm
Return Loss		40			dB
Polarization Dispersion Loss (PDL)				0,8	dB
Polarization Mode Dispersion (PMD)				1	ps

Table 16: Optical Specifications of NCS1K-MD-64-C Module - Demultiplexer Section

Parameter	Notes	Min	Typical	Max	Unit
Operating Bandwidth	Bandwidth over are defined CD, GDR, PMD, and PDL	± 31			GHz
Bandwidth @ -0.5 dB	Net bandwidth. Any SOP within OTR around ITU wavelength	± 20			GHz
Bandwidth @ -1.5 dB		± 31			GHz
Bandwidth @ -3 dB		± 38			GHz
Bandwidth @ -0.5 dB	Gross bandwidth. Any SOP within OTR around ITU wavelength	44			GHz
Bandwidth @ -1.5 dB		67			GHz
Bandwidth @ -3 dB		82			GHz
Gaussian Filter Order App.	Gaussian Order		1,7		

Parameter	Notes	Min	Typical	Max	Unit
Insertion Loss BOL DMX	Any SOP within OTR and within operating bandwidth including connectors	3		5,4	dB
Insertion Loss BOL DMX		3		5,9	dB
IL Uniformity				1,5	dB
Insertion Loss COM-RX to Mon1-RX		25	23	21	dB
Insertion Loss COM-RX to Mon2-RX		25	23	21	dB
Adjacent Channel Isolation	Within +/-34GHz bandwidth of the adjacent channel	1			dB
Adjacent Channel Isolation @ central wavelength position	Probe signals located at central frequency	9			dB
Non-adjacent Channel Isolation	Within +/-34GHz bandwidth of the adjacent channel	25			dB
Non-adjacent Channel Isolation @ central wavelength position	Probe signals located at central frequency	33			dB
Total Crosstalk		-2			dB
Total Non-adjacent Crosstalk		15			dB
Group Delay Ripple (GDR)	Any SOP; within OTR			± 1.0	ps
Phase Ripple Standard Deviation	Within operating bandwidth			0,05	rad

Parameter	Notes	Min	Typical	Max	Unit
Chromatic Dispersion	Including connectors			± 20	ps/nm
Return Loss		40			dB
Polarization Dispersion Loss (PDL)				0,7	dB
Polarization Mode Dispersion (PMD)				0,7	ps

NCS1K-MD-64-C Directional Configuration in NCS 2000, Release 12.1

From NCS 2000 Release 12.1, the NCS1K-MD-64-C module supports directional connection towards the Router/DCI that is equipped with QSFP-DD-ZR or QSFP-DD-ZR+.

The following image explains a colored directional 64-channel 75 GHz add/drop ROADM configuration. MF-MPO-16LC passive device is connected to the A side of the 20-SMR-FS.
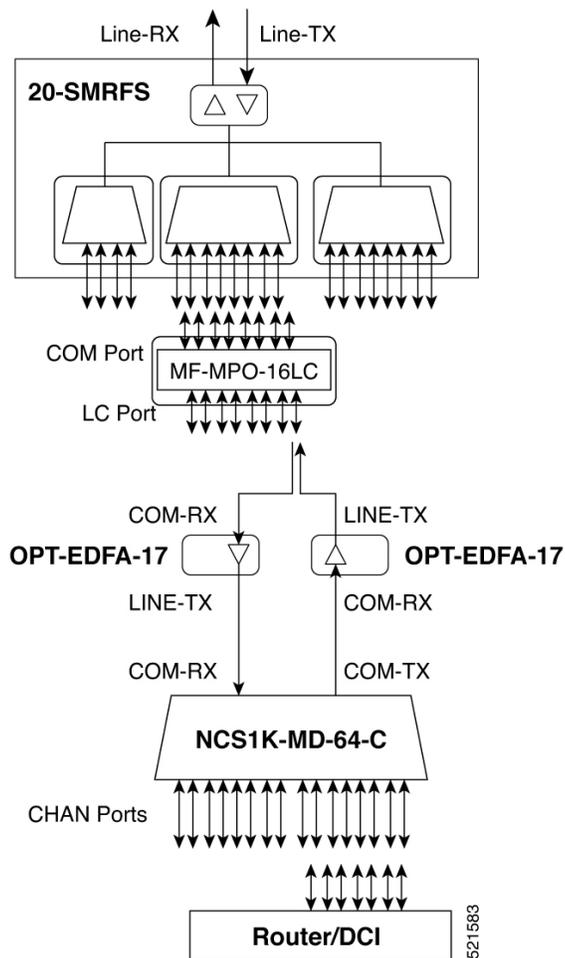
Two OPT-EDFA-17 cards are used as extra amplifiers between the MF-MPO-16LC passive device and the NCS1K-MD-64-C to compensate the low QSFP-DD-ZR/QSFP-DD-ZR+ TX power. The two OPT-EDFA-17 cards are configured as preamplifier with fixed gain as working mode.

Configure expected input power at the SVO Node level specifying the power received on RX of NCS1K-MD-64-C.

NCS1K-MD-64-C Omnidirectional Configuration in NCS 2000, Release 12.2

Table 17: Feature History

Feature	Release Information	Description
NCS1K-MD-64-C Omnidirectional Configuration	Cisco NCS 2000 Release 12.2	NCS1K-MD-64-C module is supported with omnidirectional connections. This configuration supports both connections towards Router/DCI that is equipped with QSFP-DD-ZR/QSFP-DD-ZR+ and to TXP (for example 1.2T-MXP, 400G-XP).

From NCS 2000 Release 12.2, the NCS1K-MD-64-C module is supported with omnidirectional connections. This configuration supports both connections, one to Router/DCI equipped with QSFP-DD-ZR/QSFP-DD-ZR+ and another to TXP (for example 1.2T-MXP, and 400G-XP).

The following image explains a colored directional 64-channel 75 GHz in a ROADM 4-degrees configuration with DEG-5/UPG-4.
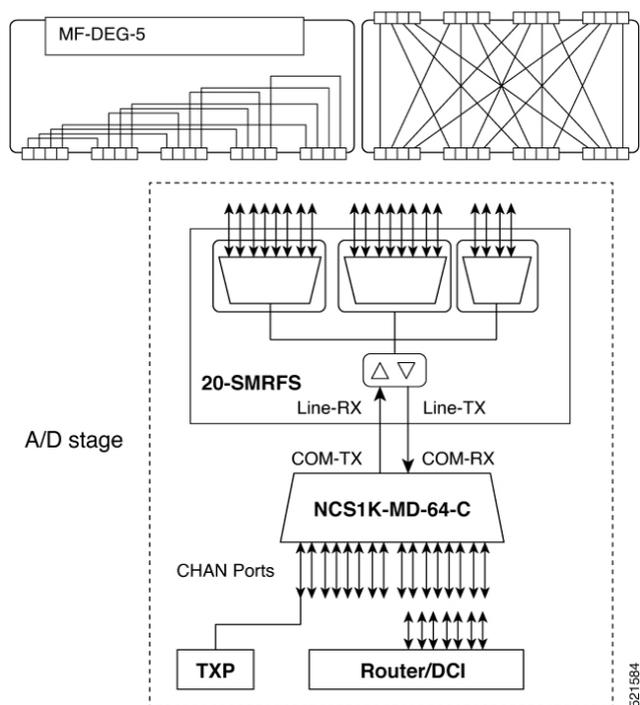
NCS1K-MD-64-C is connected to LINE-TX and LINE-RX of a 20-SMRFS used as add/drop stage in a 4-8-12-degrees ROADM. The 20-SMRFS amplifiers are configured in FIXED gain.

For the QSFP-DD-ZR or QSFP-DD-ZR+ pluggable, you can configure the expected input power that is received on the CHAN-RX port of the NCS1K-MD-64-C device at the SVO node level.

For TXP, the expected input power on the RX port is considered as 0 dB, by default, hence it is not necessary to configure the expected input power on the RX port.