

Installing the Cisco ONS 15216 OADMs

Overview

This document contains descriptions and instructions for installing Cisco ONS 15216 Optical Add/Drop Multiplexers (OADMs). The ONS 15216 has two separate rack-mounted assemblies, a one-channel and a two-channel OADM. The OADMs mount in a 19- or 23-inch rack and occupy 1 RU. The ONS 15216 OADMs are intended for use with the ONS 15454 DWDM ITU optics cards. The OADMs can be used with other optical equipment if the equipment has laser outputs that follow the ITU 200 GHz optics specification.

OADM Description

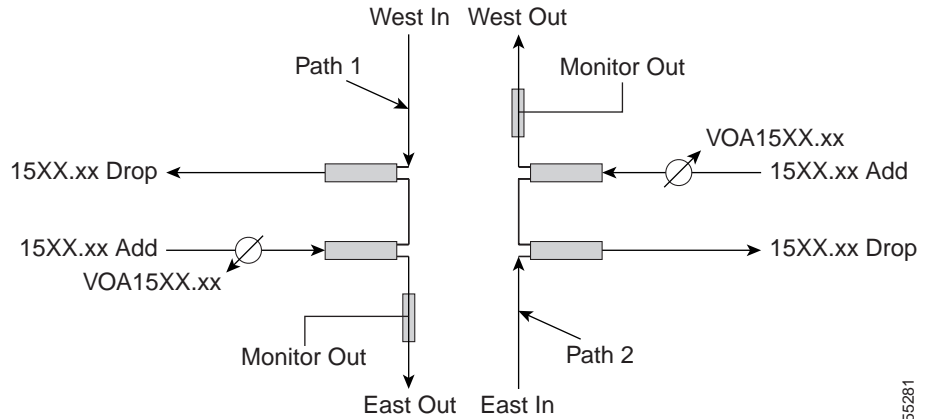
This section provides functional and physical descriptions of the ONS 15216 OADMs.

Functional Description

The ONS 15216 OADMs are passive units consisting of two 200 GHz unidirectional optical add/drop multiplexer modules. The modules transmit in opposite directions (designated as east and west) in the 1530.33 to 1560.01 wavelength range for the one-channel OADM and the 1531.90 to 1558.98 wavelength range for the two-channel OADM.

Figure 1 is a block diagram of the one-channel OADM.

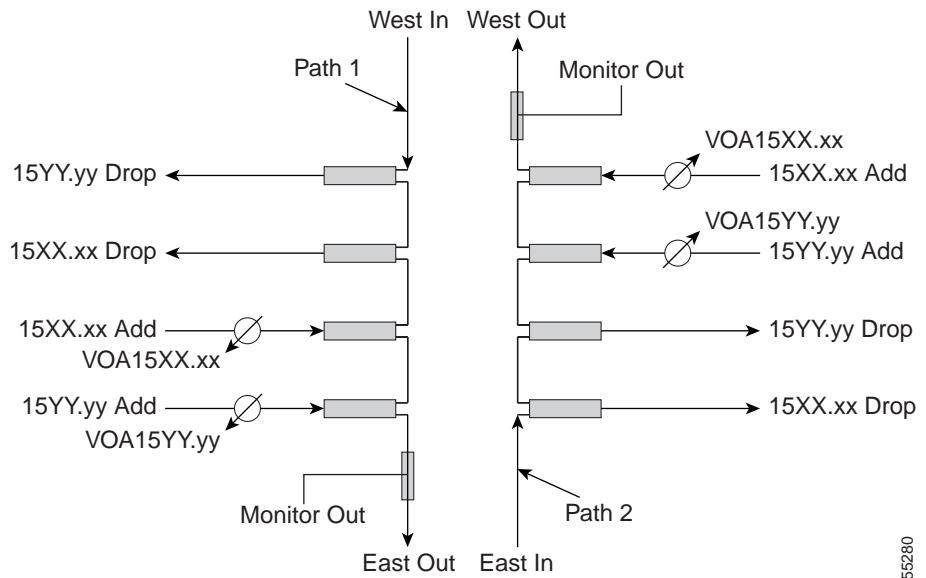
Figure 1 *Block Diagram of the One-Channel OADM*



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Figure 2 is a block diagram of the two-channel OADM.

Figure 2 Block Diagram of the Two-Channel OADM



The ONS 15216 OADMs have the following ports:

- The WEST IN port connects to the incoming (west) fiber.
- The WEST OUT port connects to the outgoing (west) fiber.
- The EAST IN port connects to the incoming (east) fiber.
- The EAST OUT port connects to the outgoing (east) fiber.
- The WEST MONITOR OUT port connects to monitoring equipment using a 2% tap coupler and monitors the output signal in the west direction.
- The EAST MONITOR OUT port connects to monitoring equipment using a 2% tap coupler and monitors the output signal in the east direction.
- The WEST 15xx.xx DROP ports connect to the wavelengths being dropped in the west direction.
- The EAST 15xx.xx DROP ports connect to the wavelengths being dropped in the east direction.
- The WEST 15xx.xx ADD ports connect to the wavelengths being added in the west direction.

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- The EAST 15xx.xx ADD ports connect to the wavelengths being added in the east direction.

The ONS 15216 OADMs also have a variable optical attenuator (VOA) for every wavelength being added. The VOAs adjust the power level of the added wavelength to match the remaining wavelengths that comprise the optical signal.

Figure 3 shows the faceplate of the Cisco ONS 15216 One-Channel OADM.

Figure 3 Cisco ONS 15216 One-Channel OADM Front Panel

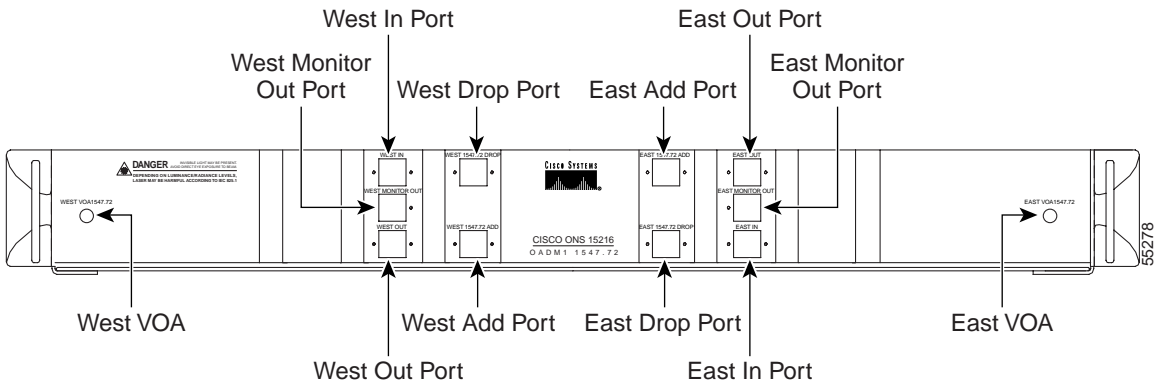
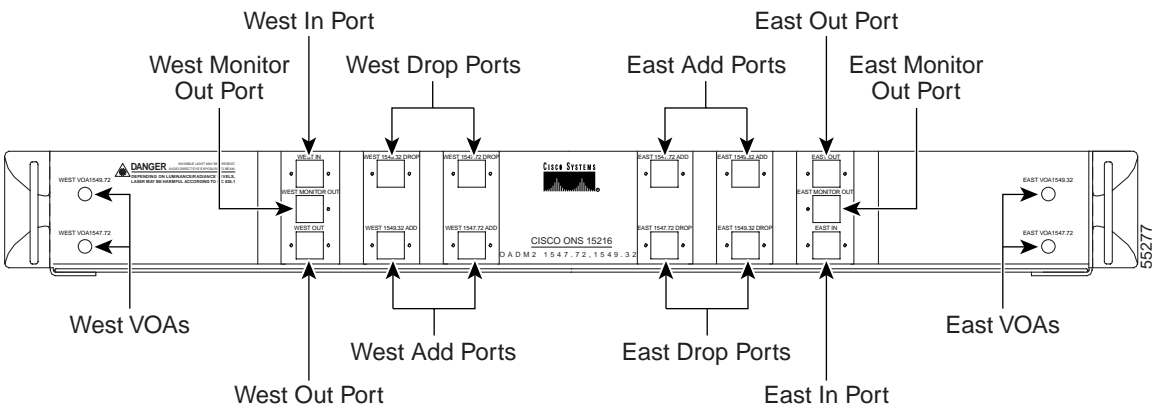


Figure 4 shows the faceplate of the Cisco ONS 15216 Two-Channel OADM.

Figure 4 Cisco ONS 15216 Two-Channel OADM Front Panel



Physical Description

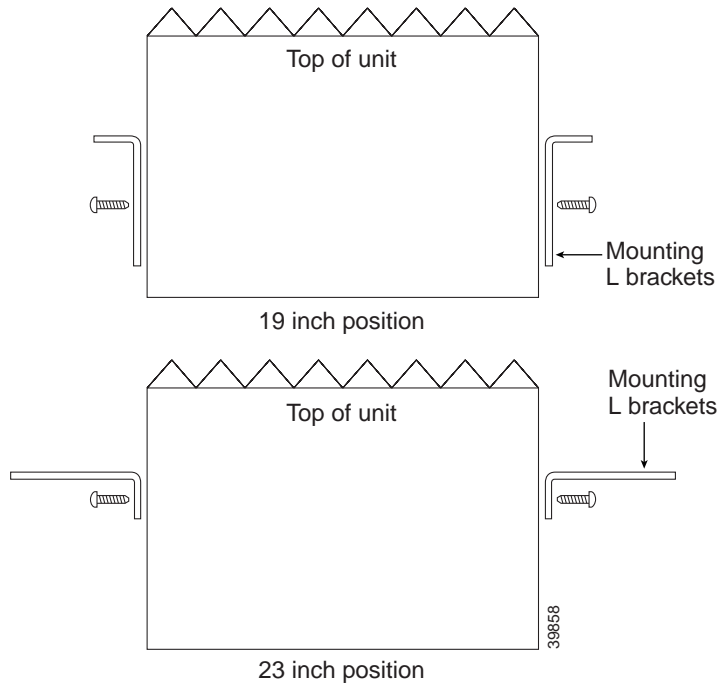
Both the one-channel and two-channel OADM are housed in 1 RU, 19 inch rack mounted assemblies and measure 1.75-in. high by 17-in. wide by 12-in. deep.

The connectors on both OADMs are SC bulkhead adapters. As you face the unit, the group of connectors on the left-hand side are the west connectors and the group of connectors on the right-hand side are the east connectors. The connectors are labeled with the corresponding wavelength or function. A retractable tray located under the front panel contains a port map to help you identify port locations.

Installation

You can install the ONS 15216 OADMs in a standard 19- or 23-inch equipment rack. Each shelf assembly includes reversible mounting brackets that you can rotate to fit either rack size. The units ship with the mounting brackets in the 23-inch position. Figure 5 shows the top view of a unit with the mounting brackets in both positions.

Figure 5 *Reversible Mounting Brackets*



Four rack-mounting screws are included with each ONS 15216 OADM. Because the units are passive devices, no power cabling or connections are necessary. You can install units anywhere in the rack (in other words, above or below the DWDM-generating equipment) according to local site practice.

Procedure: Install the ONS 15216 OADM

- Step 1** Set the mounting brackets to either the 19- or 23-inch position, depending on the rack you are using.
The units are shipped with the mounting brackets in the 23-inch position. See Figure 5 for mounting bracket position information.
- Step 2** Secure the unit to the rack using the four mounting screws provided.
- Step 3** Connect the WEST and EAST IN/OUT fibers to to/from the outside plant optical patch panel.
- Step 4** Connect fibers to the ADD and DROP ports.

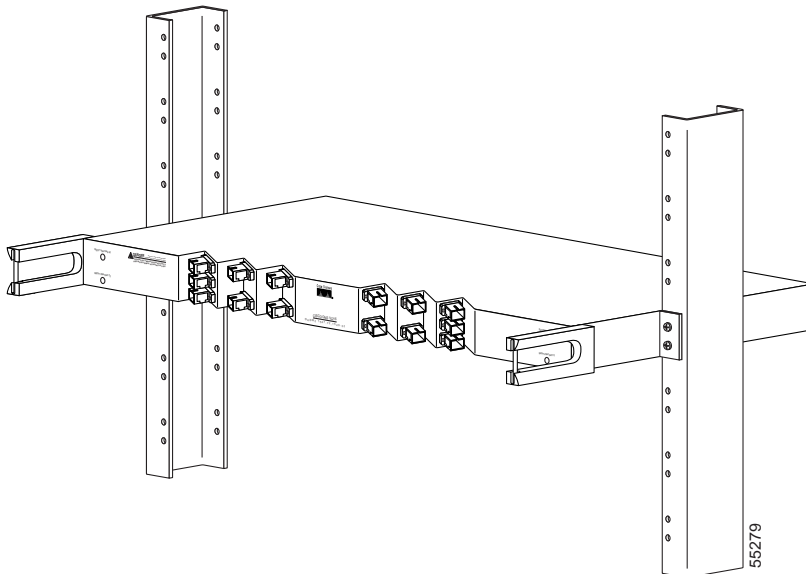
When connecting the add/drop ports to the ONS 15454 ITU cards, make sure to connect the east side ports on the OADM to the appropriate ITU card on the east side of the Cisco ONS 15454 shelf assembly and the west side ports to the west side of the ONS 15454. Connecting in this manner ensures proper routing to working and protect ITU cards. In unprotected configurations, each side of the OADM can be used to add/drop wavelengths coming from different working ITU cards.

Step 5 Connect monitoring equipment to the MONITOR ports.

Monitoring equipment is not required but is highly recommended. A spectrum analyzer such as the Cisco ONS 15216 Optical Performance Manager (OPM) measures signal strength on added wavelengths. Using a spectrum analyzer in combination with the VOAs ensures that spectrum uniformity (flatness) is maintained on the added wavelengths. The Cisco ONS 15216 OPM measures power, frequency, and optical signal to noise ratio (OSNR).

Step 6 Route the cables out through the fiber lockers on each side of the ONS 15216. Figure 6 shows an ONS 15216 installed in a rack.

Figure 6 ONS 15216 Installed in a Rack



Adding wavelengths

When using the Cisco ONS 15216 OADMs, ensure that added wavelengths (channels) have the same optical power as the composite signal. Adjust the optical power using the VOAs on each ADD port. The VOA's attenuation range is from 0 dB to 35 dB. Although a spectrum analyzer (monitor) is not required to operate the ONS 15216 OADMs, a spectrum analyzer is helpful for obtaining accurate information about optical signal strength.

Procedure: Adjust the Optical Power Using the VOAs

- Step 1** Use a spectrum analyzer to determine the optical signal strength of the wavelength you are adding.
- Step 2** Insert a small flat head screwdriver into the opening over the appropriate VOA.
- Step 3** Using the screwdriver, turn the VOA to adjust the signal strength. Turn the VOAs clockwise to increase the attenuation (decrease signal strength) or counterclockwise to decrease the attenuation (increase signal strength).

The VOAs have stoppers at each end that indicate if you reach the attenuation limit when increasing or decreasing the signal strength. The VOA dial will continue to turn after you reach the limit but the stoppers prevent any further changes to the amount of attenuation after the limit is reached.

Fiber-Optic Connector Cleaning and Maintenance

Disciplined connector cleaning care is required to maintain the performance of fiber-optic circuits. Both the connector at the end of the fiber-optic cable and the mating bulkhead adapter on the front panel of the ONS 15216 must be clean before you make the connection.



Warning

To prevent serious eye damage, never look directly into a fiber optic cable connector or mating adapter. Never assume laser power is turned off or the fiber is disconnected at the other end.

**Warning**

Always handle, use, and dispose of chemicals and other cleaning materials in accordance with manufacturer's instructions.

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 mating bulkhead adapter on the ONS 15216 front panel.

The SC bulkhead adapters on the ONS 15216 front panel are less likely to become dirty if you cap them when not in use. Because the procedure for a thorough cleaning of these adapters is complicated and involves opening the ONS 15216 unit, Cisco recommends that you use a commercially available cleaning kit and closely follow the instructions included with the kit. Only a simple, routine cleaning procedure for these adapters that can be easily performed by the customer is described here.

Customer Supplied Cleaning Materials

Cisco recommends the following cleaning materials but they are not supplied with the ONS 15216 module:

- Reagent grade isopropyl alcohol in an alcohol dispenser
- Lint-free laboratory wipes
- Clean, dry, oil-free compressed air

When cleaning a paired cable connector (bulkhead mating adapter), always clean the mating adapter first. If properly maintained—only used with clean, defect-free fiber connectors and capped when not in use—the mating adapter should not require cleaning. However, if you suspect the adapter is dirty, clean it by blowing with clean, dry, oil-free compressed air.

Procedure: Clean the Bulkhead Mating Adapters

- Step 1** Read the manufacturer's instructions to properly use the compressed air can. Improper use of the compressed air can contaminate the part being cleaned and defeat the purpose of cleaning the bulkhead mating adapters.

- Step 2** Before blowing the adapter clean, release a short blast of compressed air to remove any dust inside the nozzle of the compressed air can.
- Step 3** Blow three to four short blasts of air into the adapter housing to remove any dust.



Note Always keep unused adapter ports and fiber connectors capped with a clean dust cap.

Procedure: Clean Fiber-Optic Cable Connectors

- Step 1** Fold a clean wipe several times to make a pad of 6 to 8 layers of material.
- Step 2** Remove the protective cap on the SC/UPC optical-fiber cable connector.
- Step 3** Dampen (but do not soak) a corner of the pad with alcohol using the alcohol dispenser.
- Step 4** Firmly press the tip of the ferrule into the alcohol-moistened area of the wipe. Pinch the wipe firmly with your fingers against the ferrule and twist the ferrule. Repeat this step three times, using a clean alcohol-moistened area each time to wipe the ferrule.



Note The design of the SC connector makes it difficult to clean the entire perimeter of the ferrule, because only a small portion close to the ferrule tip is accessible. Clean the tip of the ferrule and the entire accessible perimeter. Keep the fiber connector capped at all times when not in use.

- Step 5** To dry the ferrule, press the ferrule tip into a clean, dry spot on the wipe and perform the pinch-and-twist procedure described in Step 4 once.
- Step 6** Discard the used wipe.
- Step 7** (Optional) A couple of short blasts of clean, dry, oil-free compressed air should remove any tissue fragments that may have deposited on the ferrule during cleaning.
- Step 8** Whenever possible, inspect the ferrule end face to ensure the cleaning procedure effectively removed the dust/dirt from the ferrule and that cleaning-induced damages are not present.
- Step 9** If the ferrule end face is still dirty, repeat Steps 1 – 8.

- Step 10** If the ferrule shows damages (for example, scratches or pits across the fiber core), replace the fiber patch cord with a new one equipped with a defect-free connector.
- Defects on the fiber-cable connector are likely to damage the mating connector inside the ONS 15216, which results in more costly repairs.
- Step 11** If the ferrule end face is clean and damage-free, place the connector into the corresponding clean mating adapter on the ONS 15216 front panel following the instructions in the next section.

Fiber Optic Cable Installation



Warning

Follow all directions and warning labels when working with optical fiber cables and adapters. To prevent serious eye damage, never look directly into an optical fiber cable connector or mating adapter.



Warning

When connecting an optical fiber patch cord between the ONS 15216 and the optical card ports in the ONS 15454, use the electrostatic discharge (ESD) wristband supplied with the ONS 15454. Plug the wristband into the ESD jack on the lower right front corner 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 ONS 15216 unit, which makes regular cleaning imperative. See the “Fiber-Optic Connector Cleaning and Maintenance” section on page 8 for cleaning instructions.



Note The ONS 15216 front panel features SC/UPC bulkhead adapters. Always use fiber-optic cables equipped with the corresponding (SC/UPC) connector type. Using any other type of connector results in damage to the connector and/or adapter.

Procedure: Install and Route Fiber-Optic Cables to the ONS 15216

- Step 1** Place the SC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the ONS 15216.
- Step 2** Align the keyed ridge of the cable connector with the slot in the receiving adapter.
- Step 3** Gently push the cable connector into the adapter until you hear a click, indicating the latching system is engaged.
- Step 4** Open the fiber guide by pulling the fiber guide locker on the appropriate side of the front panel.

A spring-ball screw allows you to easily open or close the fiber guide locker and it secures the top of the locker.
- Step 5** Route fiber cables through the fiber guide and lock them into place using the fiber guide locker.

Specifications

ITU Channel Plan

Table 1 shows model numbers and wavelengths for the one-channel OADM (Model 15216-AD1-2-xx).

Table 1 One-channel OADM Models and Wavelengths

Model Number	Wavelength
15216-AD1-2-60.6	1560.61 nm
15216-AD1-2-58.9	1558.98 nm
15216-AD1-2-57.3	1557.36 nm
15216-AD1-2-55.7	1555.75 nm
15216-AD1-2-54.1	1554.13 nm
15216-AD1-2-52.5	1552.52 nm
15216-AD1-2-50.9	1550.90 nm
15216-AD1-2-49.3	1549.32 nm
15216-AD1-2-47.7	1547.72 nm
15216-AD1-2-42.9	1542.94 nm
15216-AD1-2-41.3	1541.35 nm
15216-AD1-2-39.7	1539.77 nm
15216-AD1-2-38.1	1538.19 nm
15216-AD1-2-36.6	1536.61 nm
15216-AD1-2-35.0	1535.04 nm
15216-AD1-2-33.4	1533.47 nm
15216-AD1-2-31.9	1531.90 nm
15216-AD1-2-30.3	1530.33 nm

Table 2 shows model numbers and wavelengths for the two-channel OADM (Model 15216-AD2-2-xx)

Table 2 Two-Channel OADM Models and Wavelengths

Model Number	Wavelengths
15216-AD2-58.9	1558.98 nm/1557.36 nm
15216-AD2-55.7	1555.75 nm/1554.13 nm
15216-AD2-52.5	1552.52 nm/1550.92 nm
15216-AD2-49.3	1549.32 nm/1547.72 nm
15216-AD2-42.9	1542.94 nm/1541.35 nm
15216-AD2-39.7	1539.77 nm/1538.19 nm
15216-AD2-36.6	1536.61 nm/1535.04 nm
15216-AD2-33.4	1533.47 nm/1531.90 nm

Channel Spacing

200 GHz

Insertion Loss (Maximum)

One-Channel OADM

- 1.8 db pass through
- 2.1 db drop
- 3.2 db add

Two-Channel OADM

- 2.0 db pass through
- 2.6 db drop
- 4.0 db add

Directivity

55 dB minimum

Optical Return Loss

40 dB minimum

Polarization Mode Dispersion

0.1 ps maximum

Isolation of Dropped Wavelengths

Adjacent: 30 dB minimum

Non-adjacent: 40 dB minimum

In-out Isolation at Dropped Wavelengths

25 db

Wavelength Tolerance

ITU +/- .25 nm

Wavelength Passband at -1 db (minimum)

+/- .25 nm

Passband Flatness (maximum)

1 dB

Maximum Optical Power Input

250 mW

Temperature

Operating: 0° to 70° C

Storage: -45° to -85° C

Chassis Dimensions

Width: 17.44 in. (without mounting ears)

Height: 1.75 in.

Depth: 11 in.

Weight: 5 lbs 9 oz

Connector Type

SC/UPC

AccessPath, AtmDirector, Browse with Me, CCDA, CCDE, CCDP, CCIE, CCNA, CCNP, CCSI, CD-PAC, *CiscoLink*, the Cisco NetWorks logo, the Cisco *Powered* Network logo, Cisco Systems Networking Academy, the Cisco Systems Networking Academy logo, Fast Step, Follow Me Browsing, FormShare, FrameShare, GigaStack, IGX, Internet Quotient, IP/VC, iQ Breakthrough, iQ Expertise, iQ FastTrack, the iQ Logo, iQ Net Readiness Scorecard, MGX, the Networkers logo, *Packet*, RateMUX, ScriptBuilder, ScriptShare, SlideCast, SMARTnet, TransPath, Unity, Voice LAN, Wavelength Router, and WebViewer are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, Discover All That's Possible, and Empowering the Internet Generation, are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Enterprise/Solver, EtherChannel, EtherSwitch, FastHub, FastSwitch, IOS, IP/TV, LightStream, MICA, Network Registrar, PIX, Post-Routing, Pre-Routing, Registrar, StrataView Plus, Stratm, SwitchProbe, TeleRouter, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

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