



# Cisco ONS 15530 Cleaning Procedures for Fiber Optic Connections

---

This document describes the processes and procedures for cleaning the fiber optic connectors and component interfaces of the Cisco ONS 15530. It is intended for use by service personnel, field service technicians, and hardware installers. It is assumed that the user has knowledge of basic inspection techniques and cleaning processes for fiber optic connectors and component interfaces.

  
Warning

---

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

---

  
Warning

---

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.**

---

This document includes the following sections:

- [Introduction, page 2](#)
- [Inspection Equipment, page 2](#)
- [Cisco ONS 15530 Cleaning Kit, page 4](#)
- [Inspecting the Cisco ONS 15530 Fiber Optic Connections, page 6](#)
- [Cleaning Fiber Optic Connectors of the Cisco ONS 15530, page 7](#)
- [Related Documentation, page 11](#)
- [Obtaining Documentation, page 11](#)
- [Obtaining Technical Assistance, page 13](#)
- [Obtaining Additional Publications and Information, page 15](#)

# Introduction

Cleaning the fiber optic components of the Cisco ONS 15530 is important for maintaining the system. Any contamination in the fiber connection can cause failure of the component or failure of the entire system.

Microscopic dust particles can cause a variety of problems for optical connectors. A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. Dust particles trapped between two fiber faces can scratch the glass surfaces. Even if a particle is only situated on the cladding or the ferrule, it can cause an air gap or misalignment between the fiber cores that can significantly degrade the optical signal.

- A 1-micrometer dust particle on a single-mode core can block up to 1% of the light (a 0.05 dB loss).
- A 9-micrometer speck is too small to see without a microscope, but it could completely block the fiber core.

By comparison, a typical human hair is 50 to 75 micrometers in diameter, as much as 8 times larger. So, even though dust may not be visible, it is still present in the air and can deposit onto the connector.

In addition to dust, other types of contamination must also be cleaned off the fiber. Such materials include:

- Oils (frequently from human hands)
- Film residues (condensed from vapors in the air)
- Powdery coatings (left after water or other solvents evaporate away)

These contaminants can be more difficult to remove than dust particles.

**Caution**

---

With 1- to 200-mW lasers (0 to 23 dBm) now in use for communications systems, any contaminant can be burned into the fiber end face if it blocks the core while the laser is turned on. This burning may damage the optical surface such that it cannot be cleaned.

---

When cleaning fiber components, procedures must be followed precisely and carefully with the goal of eliminating any dust or contamination. A clean component connects properly; a dirty component may transfer contamination to the connector, or it may even damage the optical contacts.

Inspecting, cleaning, and re-inspecting are critical steps that must be done before making any fiber connection.

## Inspection Equipment

It is important that every fiber connector be inspected with a microscope before a connection is made as many of the contaminants are too small to see with the naked eye. The fiber inspection scopes (not included in the Cisco ONS 15530 cleaning kit) described in this section are designed to magnify and display the critical portion of the ferrule where the connection is made.

## Video and Optical Fiberscopes

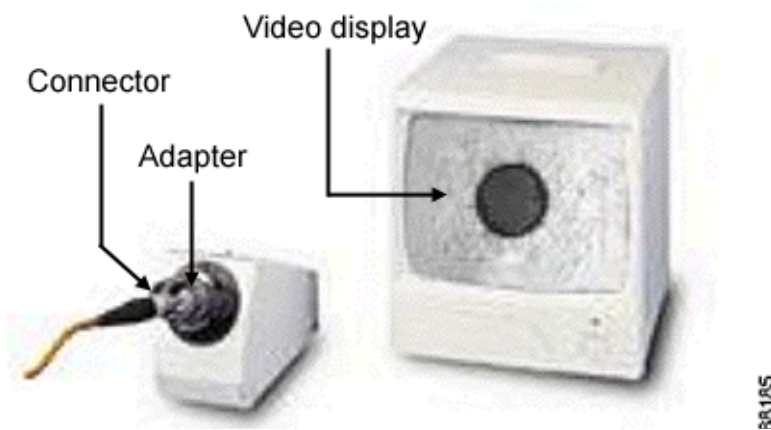
Fiberscopes are customized microscopes used to inspect optical fiber components. The scope should provide at least 200x magnification. Specific adapters are needed to properly inspect the ferrule faces of some connector types (such as the MPO, E2000, or MU connectors). In instances where multiple connector types need inspection, it may be more efficient to have a dedicated scope for each type of adapter.



**Note**

To ensure personal eye safety, we strongly recommend that a video fiberscope be used for inspections. (See [Figure 1](#) and [Figure 2](#).) Be certain that optical fiberscopes have the appropriate wavelength band filters to protect the user.

*Figure 1 Video Fiberscope—Desktop*



*Figure 2 Optical Fiberscopes—Handheld*



## Bulkhead Fiberscope

The bulkhead fiberscope is a handheld fiberscope used to inspect connectors in bulkhead ports. The scope should provide at least 200x magnification displayed on a video monitor. Specific adapters are needed to properly inspect the ferrule faces of some connector types (such as the MPO, E2000, or MU connectors). See [Figure 3](#).

*Figure 3 Bulkhead Fiberscope—Handheld*



## Laser Safety Glasses

Laser safety glasses can protect a person's eyes from laser light while handling fiber. They are intended to provide a level of protection across specific wavelengths. Be sure that the glasses are matched to the laser's wavelength. Laser safety glasses must meet federal and state regulations.

## Cisco ONS 15530 Cleaning Kit

[Table 1](#) lists the contents of the Cisco ONS 15530 cleaning kit.

*Table 1 Cisco ONS 15530 Cleaning Kit Contents*

Quantity	Part Number	Item Description
1	51-3613-01	Cartridge cleaner (OPTIPOP) one slot
1	51-3513-01	Package of 50 optical cleaning lint-free swabs (1.25 mm)
1	51-3359-01	Package of 250 optical cleaning lint-free swabs (2.5 mm)

## Cartridge Cleaners

Cartridge cleaners contain a roll of woven material packaged in a cassette (see [Figure 4](#)). When a lever is pressed, a shutter opens to provide access to a fresh span of cleaning material. The cartridge cleaner included in the Cisco ONS 15530 cleaning kit is an OPTIPOP one slot cartridge cleaner. It is used to

perform dry cleaning of 2.5-mm (SC, FC, and so on) and 1.25-mm (MU, LC, and so on) ferrule connectors and female multi-fiber connectors such as MT-RJ. When the lever is pressed, a shutter opens to provide a new section of the cleaning material.



**Note**

The ferrule is the part of the connector that keeps the fiber accurately aligned within the connector.

*Figure 4 Cartridge Cleaner*



## Lint-Free Swabs

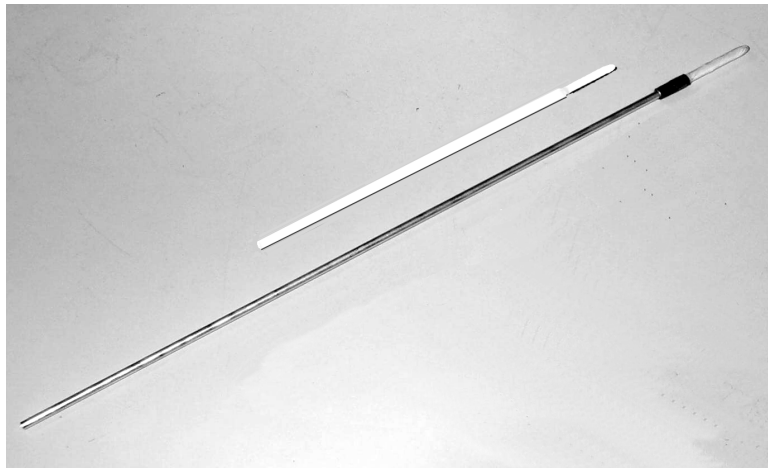
Swabs have a fabric tip at the end of a long stick. Lint-free swabs should be stored in a clean container to avoid contamination of the tip. Be sure to use a swab sized properly for the ferrule type (1.25 mm or 2.5 mm). See [Figure 5](#).



**Caution**

Never reuse a swab; it could transfer dirt or oils from one connector to another.

Figure 5 1.25-mm and 2.5-mm Lint-Free Swabs



## Inspecting the Cisco ONS 15530 Fiber Optic Connections

Inspecting the fiber optic connectors for dust particles or other contaminants before bringing the card or module online can help to prevent system failures. Always work carefully around lasers and fiber optic connections. Keep the following information in mind.

- Always turn off any laser sources before you inspect fiber connectors or optical components.
- Always inspect the connectors or adapters before you clean.
- Always inspect and clean the connectors before you make a connection.
- Always use the connector housing to plug or unplug a fiber.
- Always keep the protective cap on unplugged fiber connectors.
- Always store unused protective caps in a resealable box and locate them near the connectors for easy access.
- Always discard used lint-free swabs properly.
- Always wear appropriate safety glasses when required in your production area.
- Never look into a fiber while the system lasers are on.
- Never use unfiltered handheld magnifiers or focusing optics to inspect fiber connectors.
- Never connect a fiber to a fiberscope while the system lasers are on.
- Never touch the end face of the fiber connectors.
- Never twist or pull forcefully on the fiber cable.
- Never reuse any lint-free swab or OPTIPOP cartridge cleaner reel.
- Never touch the clean area of a lint-free swab or OPTIPOP cartridge cleaner.



**Warning**

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

# Cleaning Fiber Optic Connectors of the Cisco ONS 15530

The Cisco ONS 15530 cleaning kit provides the necessary tools and accessories to clean the various fiber optic connectors used on the system. This section describes the use of the cleaning kit with the various optical connectors used in the Cisco ONS 15530, and it includes the following topics:

- [Cisco ONS 15530 Optical Components, page 7](#)
- [Cleaning MU and LC Optical Port Connectors, page 7](#)
- [Cleaning SC Optical Port Connectors, page 8](#)
- [Cleaning MT-RJ Optical Port Connectors, page 8](#)
- [Cleaning the Fiber Optic Cables, page 9](#)

We recommend inspecting the optical connectors both before and after cleaning.

## Cisco ONS 15530 Optical Components

The Cisco ONS 15530 supports various line cards and modules. [Table 2](#) lists these components, with the types of optical connectors used on each.

**Table 2** *Line Card and Module Optical Connector Types*

Card/Module	Connector Type(s)
OSC module	MU
Transponder line card	MU, SC
OADM module	MU
10-port ESCON aggregation card	MT-RJ
8-Port FC/GE aggregation card	LC
2.5-Gbps ITU trunk card	MU
10-Gbps ITU trunk card	MU
10-Gbps uplink (1310 nm)	SC
WB-VOA module	MU
PB-OE module	MU
Protection switch module	MU

## Cleaning MU and LC Optical Port Connectors

To clean the MU and LC optical port connectors, follow these steps:



**Caution**

Be certain that lasers are turned off before cleaning.

**Step 1** Remove the fiber optic cables (or the end cap) from the desired port.

**Step 2** Inspect the optical connector. If the connector is clean, proceed to [Step 5](#).



**Caution** Some pluggable transceivers do not have cleanable optical surfaces. Do not attempt to clean these transceivers.

**Step 3** Insert a 1.25-mm lint-free swab into the optical port until contact is made with the optical connector. Give the swab a few turns and remove it from the cleaning adapter. Discard the lint-free swab.



**Note** Never reuse a lint-free swab.

**Step 4** Re-inspect the optical connector. If the connector is still dirty, return to [Step 3](#).

**Step 5** Proceed to the [“Cleaning the Fiber Optic Cables” section on page 9](#).

## Cleaning SC Optical Port Connectors

To clean the SC optical port connectors, follow these steps:



**Caution** Be certain that lasers are turned off before cleaning.

**Step 1** Remove the fiber optic cables (or the end cap) from the desired port.

**Step 2** Inspect the optical connector. If the connector is clean, proceed to [Step 5](#).

**Step 3** Insert a 2.5-mm lint-free swab into optical port until contact is made with the optical connector. Give the swab a few turns and remove it from the cleaning adapter. Discard the lint-free swab.



**Note** Never reuse a lint-free swab.

**Step 4** Re-inspect the optical connector. If the connector is still dirty, return to [Step 3](#).

**Step 5** Proceed to the [“Cleaning the Fiber Optic Cables” section on page 9](#).

## Cleaning MT-RJ Optical Port Connectors

To clean the MT-RJ optical port connectors, follow these steps:



**Caution** Be certain that lasers are turned off before cleaning.

**Step 1** Remove the fiber optic cables (or the end cap) from the desired port.

**Step 2** Inspect the optical connector. If the connector is clean, proceed to [Step 5](#).





**Caution** Some pluggable transceivers do not have cleanable optical surfaces. Do not attempt to clean these transceivers.

**Step 3** Insert a 2.5-mm lint-free swab into optical port until contact is made with the optical connector. Swipe the swab across the fiber ends a few times and remove it from the cleaning adapter. Discard the lint-free swab.



**Note** Never reuse a lint-free swab.

**Step 4** Re-inspect the optical connector. If the connector is still dirty, return to [Step 3](#).

**Step 5** Proceed to the [“Cleaning the Fiber Optic Cables”](#) section on page 9.

## Cleaning the Fiber Optic Cables

To clean the fiber optic cables, follow these steps:



**Caution** Be certain that lasers are turned off before cleaning.

**Step 1** Disconnect the cables from the transponder and the cross connect panel or other equipment. The cables should be free at both ends.

**Step 2** Inspect the optical connector. If the connector is clean, proceed to [Step 10](#).


**Step 3** Remove the connector protective cap and store it in a resealable box, if necessary.

**Step 4** Press on the lever to open the OPTIPOP cartridge cleaner. The shutter slides back and exposes a new cleaning area. See [Figure 6](#). If you are cleaning an MU, SC, or LC connector, proceed to [Step 6](#). If you are cleaning an MT-RJ connector without pins, proceed to [Step 5](#).

*Figure 6 Using a Cartridge Cleaner*




- Step 5** Hold the fiber tip lightly against the cleaning area, making sure the cleaning fabric is making contact with the flat area. Then pull the tip across the cleaning fabric.
- Step 6** Hold the fiber tip lightly against the cleaning area. Then give the tip a half turn and pull it across the cleaning fabric.

  
**Caution** Do not scrub the fiber against the fabric; doing so creates particles.

---

- Step 7** Release the lever to close the cleaning window.

  
**Caution** Never reuse the same area of cartridge cleaner fabric.

---

- Step 8** Repeat [Step 2](#) through [Step 7](#) for each optical connector.
  - Step 9** Re-inspect the optical connector. If the connector is still dirty, return to [Step 4](#).
  - Step 10** Reconnect the optical cables.
-

## Related Documentation

Refer to the following documents for more information about the Cisco ONS 15530:

- *[Regulatory Compliance and Safety Information for the Cisco ONS 15500 Series](#)*
- *[Cisco ONS 15530 Planning Guide](#)*
- *[Cisco ONS 15530 Hardware Installation Guide](#)*
- *[Cisco ONS 15530 Optical Transport Turn-Up and Test Guide](#)*
- *[Cisco ONS 15530 Cleaning Procedures for Fiber Optic Connections](#)*
- *[Cisco ONS 15530 Configuration Guide](#)*
- *[Cisco ONS 15530 Command Reference](#)*
- *[Cisco ONS 15530 System Alarms and Error Messages](#)*
- *[Cisco ONS 15530 Troubleshooting Guide](#)*
- *[Network Management for the Cisco ONS 15530](#)*
- *[Cisco ONS 15530 TLI Commands](#)*
- *[MIB Quick Reference for the Cisco ONS 15500 Series](#)*
- *[Cisco ONS 15530 Software Upgrade Guide](#)*

## Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

### Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

International Cisco websites can be accessed from this URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

### Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which may have shipped with your product. The Documentation CD-ROM is updated regularly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual or quarterly subscription.

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

[http://www.cisco.com/en/US/partner/ordering/ordering\\_place\\_order\\_ordering\\_tool\\_launch.html](http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html)

All users can order monthly or quarterly subscriptions through the online Subscription Store:

<http://www.cisco.com/go/subscription>

## Ordering Documentation

You can find instructions for ordering documentation at this URL:

[http://www.cisco.com/univercd/cc/td/doc/es\\_inpk/pdi.htm](http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm)

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

<http://www.cisco.com/en/US/partner/ordering/index.shtml>

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

## Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can e-mail your comments to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems  
Attn: Customer Document Ordering  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

# Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

## Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages

- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

<http://tools.cisco.com/RPF/register/register.do>

## Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The type of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration. There is little or no impact to your business operations.
- Priority level 3 (P3)—Operational performance of the network is impaired, but most business operations remain functional. You and Cisco are willing to commit resources during normal business hours to restore service to satisfactory levels.
- Priority level 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively impacted by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.
- Priority level 1 (P1)—An existing network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

## Cisco TAC Website

The Cisco TAC website provides online documents and tools to help troubleshoot and resolve technical issues with Cisco products and technologies. To access the Cisco TAC website, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://tools.cisco.com/RPF/register/register.do>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, we recommend that you open P3 and P4 cases online so that you can fully describe the situation and attach any necessary files.

## Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

## Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

[http://www.cisco.com/en/US/products/products\\_catalog\\_links\\_launch.html](http://www.cisco.com/en/US/products/products_catalog_links_launch.html)

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access *Packet* magazine at this URL:

<http://www.cisco.com/go/packet>

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

[http://www.cisco.com/en/US/about/ac123/ac147/about\\_cisco\\_the\\_internet\\_protocol\\_journal.html](http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html)

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

[http://www.cisco.com/en/US/learning/le31/learning\\_recommended\\_training\\_list.html](http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html)

---

This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section.

CCIP, CCSP, the Cisco Arrow logo, the Cisco *Powered* Network mark, Cisco Unity, Follow Me Browsing, FormShare, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherSwitch, Fast Step, GigaStack, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, MGX, MICA, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, RateMUX, Registrar, ScriptShare, SlideCast, SMARTnet, StrataView Plus, Stratm, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

All other trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0304R)

*Cisco ONS 15530 Cleaning Procedures for Fiber Optic Connections*

Copyright © 2003 Cisco Systems, Inc. All rights reserved.