



# Release Notes for Cisco SN 5428 Storage Router Release 3.2.2

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March 24, 2003



**Note**

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You can find the most current documentation on Cisco.com. This set of electronic documents may contain updates and modifications made after the hard-copy documents were printed.

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These release notes support Cisco SN 5428 Storage Router software release 3.2.2.

For a list of software caveats that apply to Release 3.2.2, see the “[Caveats](#)” section. The caveats are updated for every maintenance release and are located on Cisco.com and the Documentation CD-ROM.

## Contents

These release notes describe the following topics:

- [Introduction, page 2](#)
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**Corporate Headquarters:**  
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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# Introduction

The Cisco SN 5428 Storage Router provides universal access to storage over IP networks. The storage router software controls the operation of the Cisco SN 5428 Storage Router. You can configure the software to provide one of two types of access to storage over IP networks; either SCSI routing or Transparent SCSI routing.

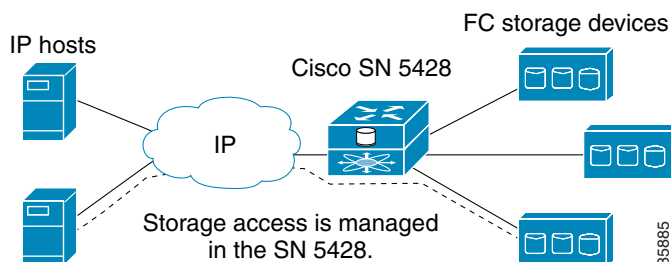
SCSI routing provides IP hosts with access to Fibre Channel (FC) storage devices, using iSCSI protocol. The iSCSI protocol is an IETF-defined protocol for IP storage (ips).


**Note**

For more information about the iSCSI protocol, refer to the IETF standards for IP storage at <http://www.ietf.org>.

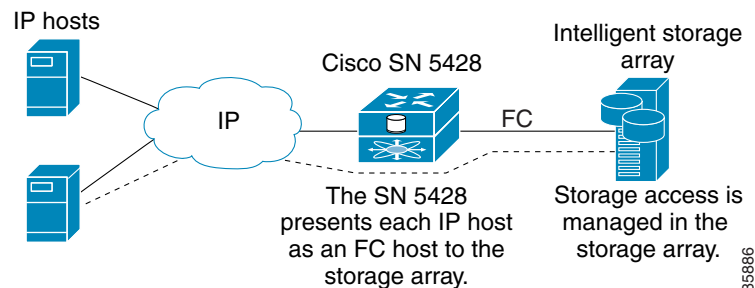
With SCSI routing, storage device access is managed primarily in the SN 5428. (See [Figure 1](#).)

**Figure 1** *SCSI Routing*



Transparent SCSI routing provides IP hosts with transparent access to intelligent storage arrays using iSCSI protocol; that is, each IP host is presented as an FC host to an intelligent storage array. With transparent SCSI routing, availability of storage devices is managed primarily in the intelligent storage array. (See [Figure 2](#).)

**Figure 2** *Transparent SCSI Routing*



In addition to providing services for accessing storage over IP networks, the SN 5428 Storage Router software provides the following services:

- VLAN Access Control—provides IP access control to storage based on a VLAN identifier (VID) number (in addition to access control through access lists)
- Authentication—provides iSCSI, Enable and Login authentication using AAA authentication methods
- High Availability (HA)—provides the ability to group storage routers in a cluster for intelligent failover and other cluster-related functions (for SCSI routing only)
- E\_Port with FC Fabric Zoning—provides the ability to connect FC ports to FC switches and participate in fabric zoning, manage zoning, and support zone mergers
- SNMP/MIB support—provides network management of the SN 5428 through SNMP using selected MIBs
- Gigabit Ethernet Interface features—provides the ability to assign a management IP address per Gigabit Ethernet interface, multiple IP addresses per SCSI routing instance, and an optional secondary Gigabit Ethernet interface per IP address used for SCSI routing or SN 5428 management
- Buffer credit extension—enables the SN 5428 to donate buffer credits from a donor port to selected FC ports
- Secure Sockets Layer support—provides HTTPS connection for secure access through the web-based GUI
- Secure Shell (SSH) protocol version 2 support—provides high encryption and authentication for interactive management sessions, and is a common replacement for Telnet
- Routing Information Protocol (RIP) listening support—allows the SN 5428 to learn dynamic routing using RIP (version 1 or version 2) listening
- Service Location Protocol (SLP) Support—provides the ability to advertise targets of specified SCSI routing instances
- TCP Window Tuning—provides the ability to maximize bandwidth across the network by automatically setting the local TCP receive window size to the remote TCP receive window size without user intervention
- A command-line interface (CLI) and a web-based GUI—provides user interfaces for configuration and maintenance of an SN 5428



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**Note** The web-based GUI is not available in SN 5428s deployed for transparent SCSI routing.

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# System Requirements

This section describes the system requirements for Release 3.2.2 and includes the following information:

- [Network Equipment, page 4](#)
- [IP Hosts, page 4](#)
- [Graphical User Interface, page 4](#)
- [iSCSI Driver Version Support, page 5](#)
- [Interoperability Information, page 5](#)

## Network Equipment

- The Gigabit Ethernet interfaces on the SN 5428 Storage Router use a flow control mechanism for stopping and starting traffic that prevents the loss of data. Flow control should also be turned on at the router's Gigabit Ethernet interfaces where the SN 5428 Storage Router is connected.
- If the SN 5428 Storage Router is participating in a cluster, and the HA or management interfaces are plugged into a switch that has Spanning Tree Protocol (STP) enabled, the storage router should be considered as an end station and the affected ports on the switch should be configured appropriately. For example, set "portfast" on Cisco switches to cause the ports to immediately switch from blocking mode to forwarding mode. This helps prevent time-outs, which can cause unexpected behavior when storage routers join a cluster.

## IP Hosts

To ensure the best performance for the SN 5428 Storage Router and the iSCSI drivers, the extended windowing feature of TCP and the receive and transmit flow control feature of the Gigabit Ethernet driver should be enabled on all IP hosts connecting to the SN 5428. On the SN 5428 Storage Router, you can use the CLI **show scsirouter all connection tcp** command to display the current and maximum TCP window size for each connected host.

## Graphical User Interface

The SN 5428 Storage Router web-based GUI officially supports the following browsers:

Browser	Platform
Microsoft Internet Explorer version 5.5 with service pack 2, or later	Microsoft Windows NT 4.0, Microsoft Windows 2000
Netscape Navigator version 4.76	Linux
Netscape Navigator version 4.7	Sun Solaris

The browser must be enabled to support JavaScript and style sheets.

## iSCSI Driver Version Support

A Cisco SN 5428 Storage Router running software release 3.2.2 or later is compatible with an IP host running any Cisco iSCSI Driver version 2.1.1 or later; it is not compatible with an IP host running any Cisco iSCSI Driver version 1.8.x.

A Cisco SN 5428 Storage Router running software release 3.2.2 or later is also compatible with a Cisco SN 5420 Storage Router deployed for iSCSI SAN Interconnect.

## Interoperability Information

SN 5428 interoperability information is available on Cisco.com. You can access the interoperability matrix by following these instructions:

- 
- Step 1** At <http://www.cisco.com>, Click **Products & Services**, and select **Storage Networking Products** from the menu.
  - Step 2** At the Cisco Storage Networking Products web page, click the **Cisco SN 5400 Series Storage Routers** link.
  - Step 3** At the Cisco SN 5400 Series Storage Routers web page, click **Instructions and Guides** from the navigation menu on the left side of the page.
  - Step 4** Click the **Technical References** link, and then click the **Cisco SN 5428 Storage Router Interoperability Test Matrix** link.
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## Installation Notes

This section describes how to obtain updated SN 5428 software and upgrade an existing SN 5428 software installation, and includes the following information:

- [Obtaining Updated Software and iSCSI Drivers, page 5](#)
- [Determining the SN 5428 Software Version, page 6](#)
- [Upgrading to a New Software Release, page 7](#)
- [Uninstalling an Upgrade, page 7](#)

## Obtaining Updated Software and iSCSI Drivers

Registered Cisco.com users can download the most current SN 5400 Series system software, Cisco iSCSI drivers, readme files, release notes and example configuration files from Cisco.com. In addition, information about driver compatibility and other relevant driver information is available on Cisco.com. You can access software and related information by following these instructions:

- 
- Step 1** At <http://www.cisco.com>, log in to Cisco.com. Click **Technical Support** and **Software Center**.
  - Step 2** At the Software Center web page, under Software Products & Downloads, click **Storage Networking Software**.
  - Step 3** At the Storage Networking Software web page, click the appropriate link for your software.

- Step 4** At the Software Download web page, click the file that you want to download. Another software download web page will be displayed with detailed information about the download file and Cisco's Software License Agreement. Follow the instructions on that and any subsequent web pages to download the software.
- Step 5** To install and configure storage router software, see the appropriate storage router software configuration guide and release notes. To install and configure an iSCSI driver, see the readme file that accompanies the iSCSI driver (in the downloaded driver archive file) and the appropriate release notes.

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Configuration guides and release notes are available online. You can access online documentation by following these instructions:

- Step 1** At <http://www.cisco.com>, click **Products & Services** and **Storage Networking Products**.
- Step 2** At the Cisco Storage Networking Products web page, click **Cisco SN 5400 Series Storage Routers**.
- Step 3** At the Cisco SN 5400 Series Storage Routers web page, click **Technical Documentation**. On the Technical Documentation web page, choose the appropriate link for documentation, release notes, or other related information.
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## Determining the SN 5428 Software Version

To determine the version of SN 5428 software running on the Cisco SN 5428 Storage Router, establish a Telnet or console port session with the storage router, and enter the CLI **show version** command. (See [Example 1](#).)

The Application field displays the version of software currently running on the storage router. The System Bootstrap field displays the software version that will run the next time the storage router is restarted.

You can also check the version of the SN 5428 software by using the SN 5428 web-based GUI. Log in as **monitor** to display the Processor and Software Information table, or click **Processor and SW** (under System) in the Monitor dynamic menu list in the left frame. The Software Version field contains the current software version information.

### Example 1 Determining the Software Version

```
[SN5428-A01]$ show version
Cisco SN 5428 Storage Router

      CLI Version: 2.1
      iSCSI Version: 2/2 (Min/Max)
      System Bootstrap: 3.2.2-K9
      Operating System: 3.2.2-K9
      Application: 3.2.2-K9
      Web Server: R6_1_0
      OpenSSH: 3.4p1
      OpenSSL: 0.9.6e
      Zlib: 1.1.4
```

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## Upgrading to a New Software Release



**Note** To upgrade to SN 5428 software release 3.2.2, your storage router must currently be running software version 3.2.1 or 2.5.1.

For information about upgrading to new SN 5428 software using the CLI, see the section “Installing Updated Software” in Chapter 10, “Maintaining and Managing the SN 5428 Storage Router,” of the *Cisco SN 5428 Storage Router Software Configuration Guide, Release 3.2*.


To upgrade to new SN 5428 software using the web-based GUI, follow these instructions.

- 
- Step 1** In the web-based GUI, log in as “admin”. To access the GUI, enter the URL for the SN 5428 by pointing your browser to the SN 5428 management interface IP address using the HTTP protocol (for example, type **http://10.1.10.244**).
- Step 2** Click **Maintenance** to view information about the software versions currently available to the storage router. If multiple versions of software are available, delete all versions except the currently running version.
- Step 3** (Optional) Based on your storage router configuration, click the appropriate link in the Upgrade section of the **Maintenance** dynamic menu list in the left frame to download a list of currently available software versions. Use this list to determine the software version you want to download.
- Step 4** Click the appropriate link in the Upgrade section of the **Maintenance** dynamic menu list to download the desired version of software.
- Step 5** After you have downloaded the new version of software, click **Reset** in the System section of the **Maintenance** dynamic menu list.
- Step 6** At **Select next boot version**, select the new software version. If you have made configuration changes to the storage router that have not been saved, click the **Save unsaved changes?** checkbox to save any configuration changes that have been made but not saved to the storage router’s bootable configuration.
- Step 7** Click **Reset System**.
- Step 8** After the storage router has rebooted, verify that it is running the new software. (See the “[Determining the SN 5428 Software Version](#)” section on page 6.)
- 

## Uninstalling an Upgrade

To return to a previous SN 5428 software release (2.5.1) and remove the updated SN 5428 software using the CLI, follow these instructions:

	Command	Description
Step 1	<b>enable</b>	Enter Administrator mode
Step 2	<b>show software version all</b>	Verify that the previous version of SN 5428 software is still available. If it is not, see the section “Installing Updated Software” in Chapter 10, “Maintaining and Managing the SN 5428 Storage Router,” of the <i>Cisco SN 5428 Storage Router Software Configuration Guide, Release 3.2</i> .

	Command	Description
Step 3	<b>software version</b> 2.5.1	Select the software to be booted when the system next starts; for example, boot version 2.5.1 when the system restarts. This may take several minutes.
Step 4	<b>reboot</b>	Reboot the SN 5428 Storage Router.   <b>Caution</b> Do not use the <b>reboot fast</b> command. Downgrading software requires a reboot with diagnostics.
Step 5	<b>enable</b>	Enter Administrator mode after the SN 5428 reboots.
Step 6	<b>show version</b>	Verify that the SN 5428 Storage Router is now running the correct software.
Step 7	<b>delete software version</b> 3.2.2	(Optional) Remove the updated software from the SN 5428 Storage Router.

To return to a previous SN 5428 software release and remove the updated SN 5428 software using the SN 5428 web-based GUI, follow these instructions:

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- Step 1** In the web-based GUI, log in as “admin”. To access the GUI, enter the URL for the SN 5428 by pointing your browser to the SN 5428 management interface IP address using the HTTP protocol (for example, type **http://10.1.10.244**).
  - Step 2** Click **Maintenance** to display the dynamic Maintenance menu list in the left frame.
  - Step 3** Click **Reset** from the dynamic Maintenance menu list.
  - Step 4** Click the **Select next boot version** drop-down arrow to view the list of available software versions. Choose the version of software to run when the system is booted.
  - Step 5** (Optional) To save configuration changes before rebooting, check the **Save unsaved changes** checkbox. If the checkbox is not checked, any unsaved configuration changes will be lost.
  - Step 6** Click **Reset System**.
  - Step 7** After the SN 5428 reboots, verify that it is running the selected software. (See “[Determining the SN 5428 Software Version](#)” section on page 6.)
  - Step 8** (Optional) Click **Maintenance** and then click the **Delete** link to the right of the updated software in the Show Storage Router Software table to remove it from the SN 5428 Storage Router.
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## Limitations and Restrictions on SN 5428 Storage Router Clusters

This release includes the following restrictions on SN 5428 Storage Router clusters:

- A cluster can be composed of up to two SN 5428 Storage Routers, or one SN 5428 and one SN 5428-2 Storage Router.
- A cluster can support up to 12 SCSI routing instances.
- A cluster can support up to 100 iSCSI targets.

## Important Notes

The SN 5428 Gigabit Ethernet ports, GE 1 and GE 2, can use either MT-RJ small form-factor pluggable (SFP) modules or LC SFP modules. The Cisco product numbers for those SFP modules are listed as follows:

- MT-RJ SFP module – Cisco Product Number SN-SFP-GEMM-MTRJ
- LC SFP module – Cisco Product Number SN-SFP-FCGEMM-LC

The availability of the MT-RJ SFP modules may be limited; if they are unavailable, you can use LC SFP modules in place of the MT-RJ modules. If you are using LC SFP modules in place of MT-RJ SFP modules, make sure that you use the appropriate cable. For example, if you are connecting an LC SFP module in an SN 5428 to an MT-RJ connector in an external end system, switch, or router, you would need a cable with an LC connector at one end and an MT-RJ connector at the other end.

## Caveats

Caveats describe unexpected behavior or defects in SN 5428 software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious.

This document describes open and resolved severity 1 and 2 caveats and selected caveats of other severities.

- The “[Open Caveats](#)” section lists caveats that are open in the current release and may be open in previous releases.
- The “[Resolved Caveats](#)” section lists caveats that are resolved in this release, but open in previous releases.

Within the sections, the caveats are sorted alphanumerically by caveat number.



### Note

If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. You can reach Bug Navigator II on Cisco.com at Service & Support: [http://www.cisco.com/cgi-bin/Support/Bugtool/launch\\_bugtool.pl](http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl).

## Open Caveats

The caveats listed in this section are open in SN 5428 software release 3.2.2.

### CLI

- CSCdy05687

Event messages may appear during the initial configuration script for setting up a new SN 5428 storage router, or following a **clear conf all** command. This may make it difficult to complete the script, since event messages may overwrite the last question on the screen. Automated scripts may fail unexpectedly, since no prompt is returned after an event message.

Workaround: If the unit is being configured manually, you can usually get the last question to repeat by simply hitting the **Enter** key. If you have lost your place in the script and want to start over, **Ctrl-C** will restart the script. There is no workaround for an automated script except to be careful that nothing is going on in the network that would cause messages to appear on the console (for example, other units rebooting).

## FC-Switch

- CSCdx80621

SNMP Walks of the FCMGMT MIB may result in the following error: %SNMP-3-FSSPRQF: fcSwSnmPktReqeust() failed. The Network Management tool(s) may report "Generic error" and the fail the MIB walk. This can occur when there are many devices.

Workaround: Use the GUI Monitor Fibre Channel screen or the CLI **show interface** command to display fibre channel interface information.

## GUI

- CSCdy06532

SN 5428 software download fails when using the HTTP Put File function from Microsoft Internet Explorer version 5.5 with service pack 2. The user may receive a "page cannot be displayed error" or the download may appear to hang. This is bug in Microsoft Internet Explorer.

Workaround: Use Microsoft Internet Explorer 6.0 to download SN 5428 software using the HTTP Put File function.

## SNMP

- CSCdw74606

If an SNMP set request is issued with multiple variable bindings, and there is an error with one of the bindings (for example, trying to set a read-only object), the set request to the other bindings are allowed to complete. The SNMP V1 and V2 specs specify that if any of the set operations to the bindings in a SNMP set request fail, none of them should be done.

Workaround: Only issue an SNMP set request with a single variable binding.

## Software-Mgmt

- CSCdy66379

The SN 5428 Storage Router may fail to boot successfully because the integrated Fibre Channel switch component does not retain the default IP address. This problem can only occur in two situations. The user will only encounter one of these situations.

The first situation occurs during diagnostics, when test 18 fails with the following message:

```
Starting -> 18 - FC switch startup Test...Waiting for switch to reboot
Failed!
curTest = 00018, error code = 06000000
Test Number = HL 18
Execution Count = 1
Voltage Margin = Nominal
Date/Time of failure: TUE SEP 17 19:12:09 2002
Error code = 0600-0000
Severity = Fatal
```

```
Failed FC Switch logic ping command
FRU Replacement List = FC Switch Logic, CISCO SN5428, END.
Failure address = 00000000
Expected -> 00 00 <- Received
```

The second situation occurs during initialization, when the Fibre Channel switch application attempts to ping the integrated switch components and diagnostics are disabled. In this situation, the following message displays:

```
"Switch ping check failed"
```

In either of these situations, the user will be brought to the vxWorks console prompt.

Workaround: Contact Cisco TAC for more information on this defect.

## Resolved Caveats

The caveats listed in this section are resolved in SN 5428 software release 3.2.2.

### FC-Switch-Manager

- CSCea46485

Unable to Telnet to the SN 5428 to use the CLI. Also unable to use the GUI interface. Clearing the local zones using either the GUI or the **clear fcswitch zones local** CLI command will cause this problem.

Workaround: Do not clear the local zones from either the CLI or the GUI.

### Software-Mgmt

- CSCea42081

During a software upgrade from sn5428-sw-2.5.1-K9.tar to sn5428-sw-3.2.1-K9.tar, the SN 5428 may crash during the HTTP PUT operation.

Workaround: If this occurs, attempt the upgrade again, as subsequent attempts worked without any problem.

## Documentation Updates

This section describes corrections to the Cisco SN 5428 Storage Router Release 3.2 documentation set since initial publication.

- Enhanced input voltage specifications

In the *Cisco SN 5428 Storage Router Hardware Installation Guide*, the input voltage descriptions should be updated as follows:

The SN 5428 Storage Router has an internal power supply that monitors its temperature and output voltages. The power supply automatically senses the source and will adjust to an input voltage range between 90 VAC - 264 VAC 50/60 Hz.

- Changed maximum number of Telnet and SSH sessions

On page 11-442 of the *Cisco SN 5428 Storage Router Software Configuration Guide*, the “Usage Guidelines” section should be updated to read as follows:

There are a maximum of four concurrent CLI management sessions per storage router.

## Related Documentation

The following sections describe the related documentation available for Cisco SN 5428 Storage Router Release 3.2.2. These documents consist of hardware installation and software configuration guides, and platform-specific release notes, readme and example configuration files for the Cisco iSCSI drivers.

## Release-Specific Documents

This release notes document is the only document specific to SN 5428 Release 3.2.2. It is only available as an electronic document on Cisco.com and the Documentation CD-ROM.

## Platform-Specific Documents

Platform-specific documents consist of the release notes, readme and example configuration files for Cisco iSCSI drivers, version 2.1.x, 2.2.x, and 3.1.x. The files are currently available in electronic format only. See the [“Obtaining Updated Software and iSCSI Drivers” section on page 5](#) for details.

## Hardware Documents

Refer to the *Cisco SN 5428 Storage Router Hardware Installation Guide* for hardware installation procedures. This document is available as a printed manual. It is also available as an electronic document on Cisco.com and the Documentation CD-ROM.

## Software Documents

Refer to the *Cisco SN 5428 Storage Router Software Configuration Guide Release 3.2*, for configuration information and procedures. This document is available as a printed manual. It is also available as an electronic document on Cisco.com and the Documentation CD-ROM.

For documentation on the SN 5428 web-based GUI, refer to the SN 5428 Storage Router web-based GUI online Help system.

## Service and Support

For service and support for a product purchased from a reseller, contact the reseller, who offers a wide variety of Cisco service and support programs described in "Service and Support" of Cisco Information Packet shipped with your product.



### Note

If you purchased your product from a reseller, you can access Cisco.com as a guest. Cisco.com is Cisco Systems' primary real-time support channel. Your reseller offers programs that include direct access to Cisco.com services.

For service and support for a product purchased directly from Cisco, use Cisco.com.

## Software Configuration Tips on the Cisco TAC Home Page

A variety of Cisco SN 5428 Storage Router software installation, configuration and usage tips are available on the Cisco Technical Assistance Center (TAC) Web Site.

You can access “tech tips” by following these instructions:

- 
- Step 1** At <http://www.cisco.com>, log in to Cisco.com. Click **Technical Support**, and select **Hardware Support** from the menu.
  - Step 2** At the Hardware Support web page, click **Storage Networking Devices** from the Hardware Support menu on the left side of the page.
  - Step 3** At the Storage Networking Devices web page, click the appropriate link for your system. For example, click the **SN 5428 Storage Routers** link.
  - Step 4** Click the **Troubleshooting** link, and then click the appropriate links for information about installing, configuring, and troubleshooting SN 5400 Series system software and iSCSI drivers.
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## Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

### World Wide Web

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

<http://www.cisco.com>

Translated documentation is available at 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 is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

### Ordering Documentation

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/cgi-bin/order/order\\_root.pl](http://www.cisco.com/cgi-bin/order/order_root.pl)

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

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

- 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. In the Cisco Documentation home page, click the **Fax** or **Email** option in the “Leave Feedback” section at the bottom of the page.

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

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

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

We appreciate your comments.

## 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 monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:

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

- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. 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 the design, development, and operation of 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, with current offerings in network training 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)

## Obtaining Technical Assistance

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

### Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that 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

If you want to obtain customized information and service, you can self-register on Cisco.com. To access Cisco.com, go to this URL:

<http://www.cisco.com>

### Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

## Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, 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 Web Site. The Cisco TAC Web Site requires 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://www.cisco.com/register/>

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

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

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

## 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 level of 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.

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



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