Upgrading to Cisco IOS Release 12.2(28)SB on a Cisco 10000 Series Router

This document describes how to upgrade a Cisco 10000 series router to Cisco IOS Release 12.2(28)SB on an ESR-PRE2 processor. Four different procedures are available; the choice of which to use depends on the specific system configuration you start from.

Upgrading a system that currently uses an ESR-PRE1 requires a hardware upgrade to an ESR-PRE2. For hardware installation instructions, see the *Cisco 10000 Router Performance Routing Engine Installation* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/aggr/10000/hdwr/3971pr.htm

Technical Support

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. Support is available 24 hours a day, 365 days a year, at this URL:

http://www.cisco.com/techsupport

This web page has a link for email or phone technical support.

Note All the procedures in this document are service-affecting. These procedures can require a hardware replacement, forced switchover of the active PRE, or software reload. At some point during each process, the router will not be available for user traffic.

Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Upgrade Paths and Compatibility

Table 1 shows the upgrade procedure options matched to the starting ESR-PRE version and Cisco IOS release. Use the information in Table 1 to determine which upgrade procedure to use.

Table 1 Upgrade Procedures Matched to ESR-PRE Version and IOS Release

Current Processor	Cisco IOS Release	Use Procedure...
ESR-PRE1	12.0(22)S 12.0(23)S 12.0(24)S 12.0(25)S 12.0(26)S 12.0(27)S3 or earlier 12.0(28)S1 or earlier 12.0(30)S2 or earlier 12.0(25)SX8 or earlier	Upgrade Option 1: ESR-PRE1 Upgrade with Cold Start, page 2
ESR-PRE2	12.2(16)BX or earlier 12.3(7)XI1 or earlier	Upgrade Option 2: ESR-PRE2 Upgrade with Cold Start, page 4
ESR-PRE1	12.0(30)S3 or later 12.0(27)S4 or later 12.0(28)S2 or later 12.0(25)SX9 or later	Upgrade Option 3: ESR-PRE1 Upgrade with RPR Switchover, page 5
ESR-PRE2	12.3(7)XI2 or later	Upgrade Option 4: ESR-PRE2 Upgrade with RPR Switchover, page 8

Caution In general, configurations for earlier releases are compatible with release 12.2(28)SB. However, some configuration commands from release 12.2(28)SB may not be understood by earlier releases. It is always advisable to test the old configuration with the new image before installing the new image on the production network.

Upgrade Option 1: ESR-PRE1 Upgrade with Cold Start

This procedure assumes the following configuration:

- Cisco 10000 series chassis with two installed ESR-PRE1 processors.
- A non-upgrade-enabled image such as 12.0(25)SX6 or 12.0(27)S2 on the ESR-PRE1s; see Table 1 for a list of affected images.

You need two ESR-PRE2s to replace the ESR-PRE1s.

Note This upgrade procedure requires a dual ESR-PRE hardware replacement. The hardware replacement requires a cold reboot and therefore is a service-affecting hardware upgrade. The router will not be available for user traffic starting with Step 3 of the upgrade, and traffic cannot resume until the upgrade is complete.

To perform the upgrade, follow these steps:

Step 1 On the active ESR-PRE1, issue the **write memory** command to make sure the startup configuration is up to date.

Step 2 Copy the saved startup configuration to a TFTP server and edit the configuration to reflect the new capabilities of the 12.2(28)SB software. At a minimum, you must edit the boot system variable to point to the new image, using the **boot system bootflash:***image_name* command and specifying your chosen image name.

Step 3 Remove both ESR-PRE1s, and install one ESR-PRE2 in one open slot. Make sure you have direct console access to the ESR-PRE2.

Step 4 The boot image should load itself from bootflash (the expected behavior). If the ESR-PRE2 comes up in ROM monitor, type **boot** to load the boot image.

Step 5 Configure the network management interface (typically FastEthernet 0/0/0) and the gateway IP address the same as they were on the removed ESR-PRE1s to enable communications with the TFTP server.

Step 6 Copy the edited startup configuration from the TFTP server to your startup configuration using the **copy tftp startup** command.

Step 7 Copy the 12.2(28)SB image from the TFTP server to bootflash, being sure to use the same name for the image that you specified in Step 2 for the **boot system** variable in the startup configuration.

Step 8 Enter the **reload** command and type **no** when asked if you want to save your running configuration.

If the ESR-PRE2 config-register is set to 0x2, this command will autoboot the new image.

If the ESR-PRE2 config-register is set to 0x0, it will come up in ROM monitor. Boot the new image from ROM monitor using the **boot bootflash:***image_name* command.

Step 9 After the ESR-PRE2 is up and running the new image, verify that the Cisco IOS version, configuration, boot variable, and traffic are as expected.

Step 10 Shut down the FastEthernet 0/0/0 interface on the first ESR-PRE2 using the **shut** command. Then insert the second ESR-PRE2 and repeat Step 4 through Step 8 for the second ESR-PRE2. After the second ESR-PRE2 has booted, use the **no shut** command on the active ESR-PRE2 to activate the FastEthernet 0/0/0 interface again.

Now the system should be operating as a dual-PRE redundant 12.2(28)SB system in the configured mode (either SSO or RPR+), running the properly modified startup configuration. You can verify the redundancy status using the **show redundancy** or **show redundancy state** command.

Step 11 Enter the **write memory** command from the active console to bring the startup configuration up to date on the active and standby ESR-PRE2s.

Rollback Procedure for Option 1

To roll back to the ESR-PRE1 configuration:

Step 1 Remove both ESR-PRE2s and reinstall the ESR-PRE1s.

The ESR- PRE1s should operate as they did in the original setup.

Upgrade Option 2: ESR-PRE2 Upgrade with Cold Start

This procedure assumes the following configuration:

- Cisco 10000 series chassis with two installed ESR-PRE2 processors
- A non-upgrade-enabled image such as 12.2(16)BX or earlier 12.3(7)XI1 or earlier on the PRE2s

Note The router will not be available for user traffic during Step 7 of the software upgrade, and traffic cannot resume until the upgrade is complete.

To perform the upgrade, follow these steps:

Step 1 Load the appropriate 12.2(28)SB image from the TFTP server into bootflash on both ESR-PRE2s.

Step 2 If the startup configuration is not up to date, save the running configuration using the **write-memory** command.

Step 3 Copy the startup configuration from the active ESR-PRE2 to a disk or TFTP server to save it for possible rollback.

Step 4 At the console, use the **boot system bootflash:***image_name* command to edit your boot system variable to point to the 12.2(28)SB image in bootflash. Save the running configuration using the **write memory** command.

Use the **show bootvar** command to verify that the boot system variable has been altered appropriately on both the active and standby ESR-PRE2s.

If you do not want to make further changes to the startup configuration for the new command set offered by release 12.2(28)SB, skip to Step 7.

Note In some older releases, the configuration does not explicitly specify the redundancy mode. If your current configuration is one of these, and you want RPR+ operation with release 12.2(28)SB, you must add the line **mode rpr-plus** after the line that specifies redundancy in the configuration on the TFTP server. Release 12.2(28)SB defaults to SSO mode unless it is explicitly configured for RPR+.

Step 5 Your startup configuration now reflects the altered boot system image. Copy it to the TFTP server and make any other needed edits. Then copy the altered configuration from the server to the startup configuration on the active and standby ESR-PRE2s using the **copy tftp startup** and **copy tftp stby-nvram:startup-config** commands. Verify that the startup configuration has been copied to both the active and the standby NVRAM using the **dir** command and comparing file size.

Step 6 Verify again that the boot image and config-register are set appropriately using the **show bootvar** command.

Step 7 On the active ESR-PRE2, enter the **reload** command and type **no** if you are asked to save the running configuration.

- If the system is configured for autoboot, it will autoboot the new 12.2(28)SB image on both ESR-PRE2s.
- If the system is not configured for autoboot, both ESR-PRE2s will come up in ROM monitor after reloading. Boot the 12.2(28)SB image in bootflash from the ROM monitor prompt on each ESR-PRE2.

At this point, the system should be operating as a dual-PRE redundant 12.2(28)SB system in the configured mode (either SSO or RPR+), running the properly modified startup configuration. You can verify the redundancy status using the **show redundancy** or **show redundancy state** command.

Step 8 Enter the **write memory** command from the active console to bring the startup configuration up to date on the active and standby ESR-PRE2s.

Rollback Procedure for Option 2

To roll back to the original release:

Step 1 Copy the original startup configuration from the TFTP server to the startup configuration on the active and standby ESR-PRE2s using the **copy tftp startup** and **copy tftp stby-nvram:startup-config** commands. (This is the configuration file you copied in Step 3 of the upgrade procedure.)

Step 2 Use the **show bootvar** command to verify that the boot system variable now points to the old image and the config-register is set appropriately.

Step 3 Reload the active ESR-PRE2 using the **reload** command.

- If autoboot is set, the system should come up in the configured redundant mode (for older releases that support redundancy).
- If autoboot is not set, the system will come up to ROM monitor. From the ROM monitor prompt, boot the proper image from the bootflash on each ESR-PRE2.

You have now reverted to the original system configuration.

Upgrade Option 3: ESR-PRE1 Upgrade with RPR Switchover

This procedure assumes the following configuration:

- Cisco 10000 chassis with two installed ESR-PRE1 processors
- An upgrade-enabled image such as 12.0(25)SX9 (or later) or 12.0(27)S4 (or later) on the ESR-PRE1s; see Table 1 for a list of affected images.

You need two ESR-PRE2s with boot image installed in the bootflash to replace the ESR-PRE1s.

Note This upgrade procedure is service affecting. It requires a sequential PRE hardware replacement and a switchover from the active to standby PRE. During the switchover in Step 10, the router will not be available for user traffic.

Note At several steps during this procedure, two PREs will alternately be using their FastEthernet0/0/0 NME ports to copy files to and retrieve files from your TFTP server. Be certain that the FastEthernet0/0/0 port that is not in current use is shut down (using the **shut** command) and that the one in use is active (using the **no shut** command). Otherwise, collisions are likely if both ports are using the same IP address.

To perform the upgrade, follow these steps:

Step 1 On the active ESR-PRE1, issue the **write memory** command to make sure the startup configuration is up to date. Save the startup configuration to a TFTP server in case you need to roll back to the previous version.

Step 2 Remove the *standby* ESR-PRE1 and insert an ESR-PRE2 into the empty slot.

If the config register on the new ESR-PRE2 is set to 0x2, it will autoboot the eboot image bootflash. Type **no** at the **---System Configuration Dialog---** prompt.

If the config register on the new ESR-PRE2 is set to 0x0, it will come up in ROM monitor. Boot the eboot image from ROM monitor using the **boot** command. Type **no** at the **---System Configuration Dialog---** prompt.

Step 3 Access the ESR-PRE2 through the console port and configure the FastEthernet 0/0/0 interface and gateway IP address the same as they were on the ESR-PRE1 to enable communication with the TFTP server. Make sure the ESR-PRE2 can ping the TFTP server.

Step 4 From the ESR-PRE2 console, copy the 12.2(28)SB image from the TFTP server to the bootflash using the **copy tftp bootflash**:*image_name* command.

Step 5 From the newly installed ESR-PRE2 console, use the **dir bootflash** command to verify that the 12.2(28)SB image is in the bootflash. Configure the ESR-PRE2 to autoboot using the **boot system bootflash**:*image_name* and **config-register 0x2** commands. Save the configuration using the **write memory** command.

Step 6 Copy the ESR-PRE1 startup configuration to the TFTP server and edit the configuration to reflect the new capabilities of the 12.2(28)SB software. At a minimum, you must configure the ESR-PRE2 to autoboot using the **boot system bootflash**:*image_name* (as in Step 5).

Step 7 Copy the edited startup configuration to the ESR-PRE2 using the **copy tftp startup** command. Your startup configuration and boot variable should now be correct. Verify the boot variable using the **show bootvar** command.

Step 8 From the ESR-PRE2 console, use the **reload** command to boot the new ESR-PRE2 image. Wait until the ESR-PRE2 comes up as standby. At this point the ESR-PRE2 is in cold standby RPR state, and the console is disabled. The console displays the message `Standby operating in RPR mode, console disabled`.

Step 9 From the active ESR-PRE1 console, verify that the ESR-PRE1 can communicate with ESR-PRE2 using the following two commands:

dir stby-bootflash (to verify that the correct image name is present)

show redundancy

The **show redundancy** command output should include the following information:

- Operating Redundancy Mode: RPR
- State of standby ESR-PRE2: Standby Cold

The command output will also include the message `Communications = Down  Reason: Failure`. You can ignore this message; it indicates that some of the inter-PRE communications are disabled to prevent incompatibilities.

Step 10 From the ESR-PRE1 console in privileged EXEC mode, enter the **redundancy force-switchover main-cpu** command. Wait for the ESR-PRE2 to complete its boot sequence, including processing the startup configurations it has been set to use. The ESR-PRE2 will become the active PRE.

Step 11 As the ESR-PRE2 becomes active, all traffic should resume shortly. Verify that the state of the ESR-PRE1 is one of the following:

- If the ESR-PRE1 config-register is set to 0x0, it will boot to ROM monitor. Boot the ESR-PRE1 image from ROM monitor and wait for to come up as standby in RPR mode with the console disabled.
- If the ESR-PRE1 config-register is set to 0x2 and the autoboot string is set to boot the ESR-PRE1 image, it will come up as standby in RPR mode with the console disabled.

Note From the ESR-PRE1 console and the ESR-PRE2 console, you may see error messages such as `Failed to assert Cutover alarm RP A/or B` or `outgoing IPC bypass failed`. You can ignore these messages. because they do not affect operation of the system.

Note Now you should test the 12.2SBB image to determine whether or not a rollback to the previous image is needed. To roll back, see the "Rollback Procedure for Option 3" section on page 7.

Step 12 After you have verified correct operation of the ESR-PRE2, replace the standby ESR-PRE1 with a second ESR-PRE2. Bring it up and load the new image onto bootflash as follows:

a. From the newly installed ESR-PRE2 boot image console, copy the 12.2(28)SB image from the TFTP server to the bootflash using the **copy tftp bootflash**:*image_name* command.

b. From the newly installed ESR-PRE2 console, use the **dir bootflash** command to verify that the 12.2(28)SB image is in the bootflash. Configure the ESR-PRE2 to autoboot using the **boot system bootflash**:*mage-name* and **config-register 0x2** configuration commands. Save the configuration using the **write memory** command.

Step 13 Reload the second ESR-PRE2. It will autoboot the new image from the bootflash and come up as the standby. The console will display the following messages:

```
PRE2>
Standby console disabled
PRE2>
Standby console disabled
```

At this point, the system should be operating as a dual-PRE redundant 12.2(28)SB system in the configured mode (either SSO or RPR+), running the properly modified startup configuration. You can verify the redundancy status using the **show redundancy** or **show redundancy state** command.

Step 14 Enter the **write memory** command from the active console to bring the startup configuration up to date on the active and standby ESR-PRE2s.

Rollback Procedure for Option 3

If the active ESR-PRE2 does not operate satisfactorily after Step 11, you can initiate a second switchover to revert to the original ESR-PRE1 operating as the active processor. You must do so before you perform Step 12.

To change back to the ESR-PRE1:

Step 1 Make sure the ESR-PRE1 is up as the standby PRE (see Step 11).

Step 2 Remove the active ESR-PRE2 from the chassis. Service will be disrupted as the standby ESR-PRE1 becomes the active standalone.

Step 3 Insert the second ESR-PRE1 into the empty slot. If it is not configured for autoboot, boot the correct image from the ROM monitor prompt. The second ESR-PRE1 will come up as the standby in the configured mode.

You have now reverted to a dual-ESR-PRE1 redundant system.

Upgrade Option 4: ESR-PRE2 Upgrade with RPR Switchover

This procedure assumes the following configuration:

- Cisco 10000 series chassis with two installed ESR-PRE2 processors
- active and standby ESR-PRE2s set for autoboot
- Release 12.3(7)XI2 or later

Note This upgrade procedure is service affecting. It requires an RPR switchover from the active to the standby PRE. During the switchover in Step 8, the router will not be available for user traffic.

To perform the upgrade, follow these steps:

Step 1 Load the appropriate 12.2(28)SB image from the TFTP server into bootflash on both ESR-PRE2s.

Step 2 If the startup configuration is not up to date, save the running configuration using the **write-memory** command.

Step 3 Copy the startup configuration from the active ESR-PRE2 to a disk or TFTP server to save it for possible rollback.

Step 4 At the console, use the **boot system bootflash:***image_name* command to edit your boot system variable to point to the 12.2(28)SB image in bootflash. Save the running configuration using the **write memory** command.

Use the **show bootvar** command to verify that the boot system variable has been altered appropriately on both the active and standby ESR-PRE2s.

If you do not want to make further changes to the startup configuration for the new command set offered by release 12.2(28)SB, skip to Step 7.

Note In some older releases, the configuration does not explicitly specify the redundancy mode. If your current configuration is one of these, and you want RPR+ operation with release 12.2(28)SB, you must add the line **mode rpr-plus** after the line that specifies redundancy in the configuration on the TFTP server. Release 12.2(28)SB defaults to SSO mode unless it is explicitly configured for RPR+.

Step 5 Your startup configuration now reflects the altered boot system image. Copy it to the TFTP server and make any other needed edits. Then copy the altered configuration from the server to the startup configuration on the active and standby ESR-PRE2s using the **copy tftp startup** and **copy tftp stby-nvram:startup-config** commands. Verify that the startup configuration has been copied to both the active and the standby NVRAM using the **dir** command and comparing file size.

Step 6 Verify again that the boot image and config-register are set appropriately using the **show bootvar** command.

Step 7 On the active ESR-PRE2 in privileged EXEC mode, enter the **hw-module sec-cpu reset** command to reboot the standby ESR-PRE2. This will load the 12.2(28)SB image from bootflash, and the standby PRE2 will come up in RPR mode.

Note The standby ESR-PRE2 is now in cold standby RPR state. It has not yet processed its configuration. You can verify its redundancy mode using the **show redundancy** command on the active ESR-PRE2.

Step 8 From the active ESR-PRE2, enter the **redundancy force-switchover main-cpu** command in privileged EXEC mode. The standby ESR-PRE2 will become the new active ESR-PRE2 (running 12.2S), and the former active ESR-PRE2 will become the standby ESR-PRE2. Check that the system is carrying traffic. Verify the autoboot string and IOS version using the **show bootvar** and **show version** commands.

Note Now you should test the 12.2(28)SB image to determine whether or not a rollback to the previous version is needed.

Step 9 When you know that rollback is not needed, enter the **write memory** command from the active console to bring the startup configuration up to date on the active and standby ESR-PRE2s.

If you need to roll back, follow the procedure in the next section.

Rollback Procedure for Option 4

If the newly active ESR-PRE2 does not operate satisfactorily after Step 8, you can initiate a rollback switchover to revert to the original 12.3 operating system.

To initiated a rollback switchover, follow these steps:

Step 1 Copy the original startup configuration from the TFTP server to the startup configuration on the active and standby ESR-PRE2s using the **copy tftp startup** and **copy tftp stby-nvram:startup-config** commands.

Step 2 Use the **show bootvar** command to verify that this action has modified the boot variable to point to the old release image.

Step 3 Enter the **hw-module standby-cpu reset** command from the active console. This command resets the standby ESR-PRE2, which will autoboot to the old release image and come up as the standby ESR-PRE2 in RPR mode.

Step 4 Enter the **redundancy force-switchover main-cpu** command from the active console. This is a service-affecting step. The standby ESR-PRE2 will come up as the active ESR-PRE2 running the old release. The standby ESR-PRE2 will autoboot to the old release, running in RPR+ mode.

You have now reverted to the original system configuration.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain 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 at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD=) from Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can send comments about Cisco documentation to 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.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.*x* through 8.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page

at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

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

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your 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.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

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

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

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

  or view the digital edition at this URL:

  http://ciscoiq.texterity.com/ciscoiq/sample/

- *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/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  http://www.cisco.com/discuss/networking

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html