



# Release Notes for the Cisco 1700 Series Routers for Cisco IOS Releases 12.4(2)XA

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**April 24, 2006**  
**Cisco IOS Release 12.4(2)XA**  
**OL-9446-01 Rev A3**

These release notes describe new features and significant software components for the Cisco 1700 series routers that support the Cisco IOS Release 12.4(2)XA releases. These release notes are updated as needed to describe new memory requirements, new features, new hardware support, software platform deferrals, microcode or modem code changes, related document changes, and any other important changes. Use these release notes with the [Cross-Platform Release Notes for Cisco IOS Release 12.4T](#) located on [Cisco.com](#) and the Documentation CD.

For a list of the software caveats that apply to Cisco IOS Release 12.4(2)XA, see the “[Caveats](#)” section on [page 7](#) and [Caveats for Cisco IOS Release 12.4\(2\)T](#). The online caveats document is updated for every maintenance release and is located on [Cisco.com](#) and the Documentation CD.

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## System Requirements

This section describes the system requirements for the Cisco IOS Cisco IOS Release 12.4(2)XA releases and includes the following sections:



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## Memory Requirements

Table 1 describes the memory requirements for the Cisco IOS feature sets supported by the Cisco IOS Cisco IOS Release 12.4(2)XA releases on the Cisco 1700 series routers.

**Table 1** Recommended Memory for the Cisco 1700 Series Routers with Cisco IOS Release 12.4(2)XA

Platform	Image Name	Feature Set	Image	Flash Memory	DRAM
Cisco 1760	Cisco 1700 ADVANCED ENTERPRISE SERVICES	ADVANCED ENTERPRISE SERVICES	c1700-adventerprisek9-mz	32	160
	Cisco 1700 IOS ADVANCED IP SERVICES	ADVANCED IP SERVICES	c1700-advipservicesk9-mz	32	160
1701 1711 1712 1721 1751 1751-V 1760	Cisco 1700 IOS ADVANCED SECURITY	ADVANCED SECURITY	c1700-advsecurityk9-mz	32	96
1701 1721 1751 1751-V	Cisco 1700 IOS ENTERPRISE BASE W/O CRYPTO	ENTERPRISE BASE W/O CRYPTO	c1700-entbase-mz	32	96
	Cisco 1700 IOS ENTERPRISE BASE	ENTERPRISE BASE	c1700-entbasek9-mz	32	256
	Cisco 1700 IOS ENTERPRISE SERVICES W/O CRYPTO	ENTERPRISE SERVICES W/O CRYPTO	c1700-entservices-mz	32	128
	Cisco 1700 IOS ENTERPRISE SERVICES	ENTERPRISE SERVICES	c1700-entservicesk9-mz	32	128
	Cisco 1700 IOS IP BASE W/O CRYPTO	IP BASE W/O CRYPTO	c1700-ipbase-mz	32	64
	Cisco 1700 IOS IP BASE	IP BASE	c1700-ipbasek9-mz	64	96

**Table 1** Recommended Memory for the Cisco 1700 Series Routers with Cisco IOS Release 12.4(2)XA

Platform	Image Name	Feature Set	Image	Flash Memory	DRAM
1751 1760	Cisco 1700 IOS IP VOICE W/O CRYPTO	IP VOICE W/O CRYPTO	c1700-ipvoice-mz	32	128
	Cisco 1700 IOS IP VOICE	IP VOICE	c1700-ipvoicek9-mz	32	128
1701 1721 1751 1751-V	Cisco 1700 IOS SP SERVICES	SP SERVICES	c1700-spservicesk9-mz	32	128

## Hardware Supported

Cisco IOS Release 12.4(2)XA supports the following Cisco 1700 series routers:

- Cisco 1701
- Cisco 1710
- Cisco 1711
- Cisco 1712
- Cisco 1720
- Cisco 1721
- Cisco 1751 and 1751-V
- Cisco 1760

The Cisco 1701, Cisco 1710, Cisco 1711, Cisco 1712, Cisco 1720, and Cisco 1721 routers run data images only. The Cisco 1751, Cisco 1751-V, and Cisco 1760 routers run data or data-and-voice images, providing digital and analog voice support. The Cisco 1711 and Cisco 1712 routers run select IPsec Triple Data Encryption Standard (3DES) images only (the Cisco 1700 IOS IP/ADSL/IPX/AT/IBM/FW/IDS PLUS IPSEC 3DES, the Cisco 1700 IOS IP/ADSL/FW/IDS PLUS IPSEC 3DES, the Cisco 1700 Advanced Security, and the Cisco 1700 IOS ADVANCED ENTERPRISE SERVICES images).

For descriptions of existing hardware features and supported modules, see the hardware installation guides, configuration and command reference guides, and additional documents specific to the Cisco 1700 series routers, which are available on [Cisco.com](http://www.cisco.com) and the Documentation CD at the following location:

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_mod/1700/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/1700/index.htm)

This URL is subject to change without notice. If it changes, point your web browser to [Cisco.com](http://www.cisco.com), and click the following path:

**Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 1700 Series Routers: <platform\_name>**

## Determining the Software Version

To determine which version of Cisco IOS software is currently running on your Cisco 1700 series router, log in to the router and enter the **show version** EXEC command. The following sample output from the **show version** command indicates the version number.

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) C1700 Software (C1700-Y7-MZ), Version 12.4(2)XA, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
Synched to technology version 12.4(2)T
```

## Upgrading to a New Software Release

For general information about upgrading to a new software release, refer to the *Software Installation and Upgrade Procedures* located at [http://www.cisco.com/warp/public/130/upgrade\\_index.shtml](http://www.cisco.com/warp/public/130/upgrade_index.shtml).

## Feature Set Tables

The Cisco IOS software is packaged in feature sets consisting of software images, depending on the platform. Each feature set contains a specific set of Cisco IOS features. Cisco IOS Release 12.4(2)XA supports the same feature sets as Releases 12.4 and 12.4(2)T, but Cisco IOS Release 12.4(2)XA includes new features supported by the Cisco 1700 series routers.



### Caution

The Cisco IOS images with strong encryption (including, but not limited to, 168-bit [3DES] data encryption feature sets) are subject to United States government export controls and have limited distribution. Strong encryption images to be installed outside the United States will likely require an export license. Customer orders can be denied or subject to delay as a result of United States government regulations. When applicable, the purchaser/user must obtain local import and use authorizations for all encryption strengths. Please contact your sales representative or distributor for more information, or send an e-mail to [export@cisco.com](mailto:export@cisco.com).

Table 2 lists the feature and feature sets supported in the Cisco IOS Release 12.4(2)XA releases.

The tables use the following conventions:

- In—The number in the ‘In’ column indicates the Cisco IOS release in which the feature was introduced. For example, “12.4(2)XA” indicates that the feature was introduced in 12.4(2)XA. If a cell in this column is empty, the feature was included in a previous release or in the initial base release.
- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.



### Note

These feature set tables contain only a selected list of features, which are cumulative for Release 12.4(2)*nn* early deployment releases only (*nn* identifies each early deployment release). The tables do not list all features in each image—additional features are listed in *Cross-Platform Release Notes for Cisco IOS Release 12.4(2)T* and Release 12.4(2)T Cisco IOS documentation.

**Table 2** Feature List by Cisco 1700 Legacy Feature Set for Cisco 1751, 1751-V, and 1760 Routers

Feature	In	Feature Set
		IP/ADSL/VOX PLUS
<a href="#">ATM Oversubscription for DSL</a>	Yes	All. See <a href="#">Table 1</a> for image names.
<a href="#">Single Port G.SHDSL WAN Interface Card (WIC-1SHDSL-V3)</a>	Yes	All. See <a href="#">Table 1</a> for image names.

## New and Changed Information

This section contains the following information:

- [New Hardware Features in Release 12.4\(2\)XA and 12.4\(2\)XA1, page 5](#)
- [New Software Features in Cisco IOS Release 12.4\(2\)XA and 12.4\(2\)XA1, page 5](#)
- [Changed Software Features in Cisco IOS Release 12.4\(2\)XA, page 6](#)

### New Hardware Features in Release 12.4(2)XA and 12.4(2)XA1

#### Single Port G.SHDSL WAN Interface Card (WIC-1SHDSL-V3)

A single port multi line G.SHDSL WAN interface card (WIC), or WIC-1SHDSL-V3, provides Multirate Symmetrical High-Speed Digital Subscriber Line (G.SHDSL) feature support for Two-Wire Mode and Four-Wire Mode for SHDSL on the Cisco 1700 series, Cisco 1800 series, Cisco 26xxXM, Cisco 2691, Cisco 2800, Cisco 3700 series, and Cisco 3800 series modular access routers. The WIC-1SHDSL-V3 incorporates the latest firmware and the latest circuitry. For more information about this feature, see the following document:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123newft/123t/123t\\_7/gt4wire.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123newft/123t/123t_7/gt4wire.htm)

### New Software Features in Cisco IOS Release 12.4(2)XA and 12.4(2)XA1

The following sections describe the new software features supported by the Cisco 1700 series routers for the Cisco IOS Release 12.4(2)XA releases.

#### ATM Oversubscription for DSL

The ATM Oversubscription for DSL feature lets you configure bandwidth oversubscription on Cisco xDSL interfaces up to a defined bandwidth. You can configure variable bit rate (VBR) and unspecified bit rate plus (UBR+) service classes for permanent virtual circuit (PVC) connections with a sum of sustainable cell rates (SCRs) greater than the line rate, which means you can configure an infinite oversubscription amount of bandwidth. Each PVC receives up to its configured SCR value of traffic, and PVCs with higher SCR values receive more bandwidth.

To enable ATM oversubscription for DSL, use the ATM oversubscribe factor command in ATM configuration mode. To disable ATM oversubscription for DSL, use the no form of this command.

**atm oversubscribe factor** *factor*  
**no atm oversubscribe factor** *factor*

To configure unspecified bit rate (UBR) quality of service (QoS) and specify the output peak cell rate and output minimum guaranteed cell rate for an ATM PVC, PVC range, switched virtual circuit (SVC), virtual circuit (VC) class, or VC bundle member, use the **ubr+** command in the appropriate command mode. To remove the UBR+ parameters, use the **no** form of this command.

**ubr+** *output-pcr output-mcr [input-pcr] [input-mcr]*  
**no ubr+** *output-pcr output-mcr [input-pcr] [input-mcr]*

## Multiqueue Command

The **multiqueue** command enables a priority and a regular (nonpriority) queue for traffic streams. When the command is enabled and there are multiple classes of packet streams over the same PVC, packets coming from the streams that have priority values configured in a policy map are sent to the high priority queue. Packets from all other streams will be sent over the low priority queue. Multiqueue is intended for configuring DSL lines and permits configuring one data flow in a priority queue. If you have configured more than one flow in a priority queue, the latency for delay-sensitive traffic flow may not be guaranteed.

The multiqueue approach does not work well with applications such as MLPPP with interleave and Crypto. This is because MLPPP uses the same sequence numbering scheme for interleaved packets as the multiqueue approach. For example, if there are a voice and two data packets interleaved, the MLPPP sequence numbers for these packets could be 1 for the first data packet, 2 for the voice packet, and 3 for a second data packet. In the multiqueue approach, the voice packet with MLPPP sequence number 2 would go out before the data packet with MLPPP sequence number 1. This would result in out-of-order sequencing of packets as far as MLPPP is concerned, and result in unexpected behavior. The same problems apply to the Crypto application. The multiqueue approach is disabled by default so that when MLPPP and the Crypto applications are used with DSL the network will not be disrupted by upgrading to an image with multiqueue support.

To enable two queues to prioritize multiple classes of packet streams over the same PVC, use the **multiqueue** command in either the PVC- or VC-class configuration modes. To return to a single queue, use the **no** form of this command.

**multiqueue**  
**no multiqueue**

## Changed Software Features in Cisco IOS Release 12.4(2)XA

Table 3 lists the feature history for ATM Mode for Two-Wire or Four-Wire SHDSL

**Table 3** Feature History for ATM Mode for Two-Wire or Four-Wire SHDSL

Release	Modification
12.3(4)XD	This feature (WIC-1SHDSL-V2) was introduced on the Cisco 2600 series and Cisco 3700 series routers to add 4-wire support. 2-wire support was previously available in Cisco IOS Release 12.2(8)T. For more information, see the document 1-Port G.SHDSL WAN Interface Card for Cisco 2600 Series and Cisco 3600 Series Routers.
12.3(4)XG	This feature (WIC-1SHDSL-V2) was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.

**Table 3 Feature History for ATM Mode for Two-Wire or Four-Wire SHDSL (continued)**

Release	Modification
12.3(7)T	This feature (WIC-1SHDSL-V2) was integrated into the Cisco IOS Release 12.3(7)T on the Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers. Cisco 1700 series routers do not support the WIC-1SHDSL-V2 in this release.
12.3(4)XG1	Support for the auto line-mode feature was added.
12.3(11)T	Support for the following was added: additional annex parameters for Cisco 1700, Cisco 2600, Cisco 2800, Cisco 3631, Cisco 3700, and Cisco 3800 series routers; the HDSL2-SHDSL-LINE-MIB (RFC3276); and support for the ATM Mode for SHDSL feature was added for Cisco 2800 series and Cisco 3800 series routers.
12.3(14)T	Support was added for Cisco 1800 series routers and the Cisco 2801 integrated services router.
12.4(2)XA and 12.4(2)XA1	Support was added for the WIC-1SHDSL-V3 interface card.

## Limitations and Restrictions

There are no limitations or restrictions.

## Caveats

Caveats describe unexpected behavior or defects in the Cisco IOS software releases. Severity 1 caveats are the most serious caveats, severity 2 caveats are less serious, and severity 3 caveats are the least serious of these three severity levels.

Caveats in Cisco IOS Release 12.4(2)T are also in Cisco IOS Release 12.4(2)XA. For information on caveats in Cisco IOS Release 12.4(2)T, refer to the *Caveats for Cisco IOS Release 12.4(2)T* document. This document lists severity 1 and 2 caveats; the documents are located on [Cisco.com](http://www.cisco.com) and the Documentation CD.



### Note

If you have an account with [Cisco.com](http://www.cisco.com), you can also use the Bug Toolkit to find select caveats of any severity. To reach the Bug Toolkit, log in to [Cisco.com](http://www.cisco.com) and click **Service & Support: Technical Assistance Center: Tool Index: Bug Toolkit**. Another option is to go to [http://www.cisco.com/cgi-bin/Support/Bugtool/launch\\_bugtool.pl](http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl).

This section documents possible unexpected behavior by Cisco IOS Release 12.4(2)XA and describes only severity 1 and 2 caveats and selected severity 3 caveats.

This section contains the following caveat information:

- [Resolved Caveats - Release 12.4\(2\)XA2, page 8](#)
- [Open Caveats - Release 12.4\(2\)XA2, page 8](#)
- [Resolved Caveats - Release 12.4\(2\)XA1, page 8](#)
- [Open Caveats - Release 12.4\(2\)XA1, page 9](#)
- [Resolved Caveats - Release 12.4\(2\)XA, page 9](#)

- [Open Caveats - Release 12.4\(2\)XA, page 10](#)

## Resolved Caveats - Release 12.4(2)XA2

- CSCsc36118: The default route is removed if the one of multiple PPPoE session down  
Symptoms: The default route is removed if the one of multiple PPPoE session down.  
Conditions: This problem occurs when you configure multiple PPPoE which connect to the same BRAS or same LNS if using L2TP and **ppp ipcp route default** is configured using Cisco IOS Software Release 12.4(2)T1.  
Workaround: There is no workaround. However, you can still turn routing on. For example, configure the multiple default routes pointing to the dialer interface(s) as the next hop.

## Open Caveats - Release 12.4(2)XA2

There are no known open caveats in this release.

## Resolved Caveats - Release 12.4(2)XA1

- CSCsb76796: Seconds granularity support for X.25 encapsulation VC idle timeout  
Symptoms: This caveat fix enhances the **x25 idle** and **x25 map** interface configuration mode commands to support seconds granularity for X.25 idle VC timeout for X.25 encapsulation VCs.  
Workaround: Use the enhanced **x25 idle** command with seconds option:

```
Router(config-if)#x25 idle ?
<0-255> Minutes; 0 to never clear

tinaturner(config-if)#x25 idle 0 ?
<1-59> Seconds; valid for encapsulation VCs only
<cr>

tinaturner(config-if)#x25 idle 0 10 ?
<cr>
```

Use the enhanced **x25 map** command with seconds option:

```
Router(config-if)#x25 map ip 2.132.0.9 200910 idle ?
<0-255> Idle time (minutes)

tinaturner(config-if)#x25 map ip 2.132.0.9 200910 idle 0 ?
<1-59> Idle time (seconds)
accept-reverse Accepting incoming reverse-charged calls
broadcast Send broadcasts to this host
compress Use payload Compression
cug Specify a Closed User Group number
method Specify encapsulation method
no-incoming Do not use map for incoming Calls
no-outgoing Do not use map for outgoing Calls
nudata Specify user formatted network user ID
nuid Specify Cisco formatted network user ID
nvc Set number of virtual circuits for this map
packetize Request data packet sizes for originated calls
reverse Use reverse charging on originated calls
roa Specify ROA
```



```

throughput      Request bandwidth in X.25 network
transit-delay   Specify transit delay (msec)
window size     Request window sizes for originated calls
<cr>

```

```

Router(config-if)#x25 map ip 2.132.0.9 200910 idle 0 10 ?
accept-reverse  Accepting incoming reverse-charged calls
broadcast       Send broadcasts to this host
compress        Use payload Compression
cug             Specify a Closed User Group number
method          Specify encapsulation method
no-incoming     Do not use map for incoming Calls
no-outgoing     Do not use map for outgoing Calls
nudata          Specify user formatted network user ID
nuid            Specify Cisco formatted network user ID
nvc             Set number of virtual circuits for this map
packet size     Request data packet sizes for originated calls
reverse         Use reverse charging on originated calls
roa             Specify ROA
throughput      Request bandwidth in X.25 network
transit-delay   Specify transit delay (msec)
window size     Request window sizes for originated calls
<cr>

```

- CSCsb90481: Bad enqueue and traceback when ping with packets > 1445 bytes

Symptoms: The following error and traceback messages are shown on the console:

```

*Sep 19 15:04:17.027: %SYS-2-LINKED: Bad enqueue of 46ECBC6C in queue 4678EF4C
-Process= "<interrupt level>", ip1= 4
-Traceback= 0x414C292C 0x400AF600 0x4277FB60 0x4036E0EC 0x41A8CE98 0x400E0BD0
0x40067050 0x42C555B0 0x42C559CC 0x42B06718 0x430B4AA8 0x4312FEB4 0x4313882C
0x4313AF2C 0x43124AFC 0x43124FA4

```

Conditions: This occurs when you ping with packets > 1445 bytes

Workaround: There is no workaround.

- CSCsc25964: PPPoE dialer CEF VAI adjacency does not honor dialer **ip mtu**

Symptoms: A PPPoE client router does not honor the **ip mtu** command settings when they are configured on the PPPoE dialer interface when the IP MTU is different from the interface MTU.

Fragmentation of IP packets larger than the configured IP MTU will not happen, which can create problems in a PPPoE environment.

Conditions: This symptom occurs whenever a v-access is cloned from the dialer interface and could be PPPoE, multilink or PPPoA.

Workaround: Configure the **interface mtu** command to the required value.

## Open Caveats - Release 12.4(2)XA1

There are no open caveats in this release.

## Resolved Caveats - Release 12.4(2)XA

- CSCec26533: Hold timer not invoked with multiple hold requests.

Symptoms: Sometimes when a call is resumed, the hold timer is not stopped, and the call is terminated when the timer expires.

Workaround: There is no workaround.

- CSCed27956: TCP checks should verify ack sequence number.

Symptoms: A vulnerability in the Transmission Control Protocol (TCP) specification (RFC793) has been discovered by an external researcher. The successful exploitation enables an adversary to reset any established TCP connection in a much shorter time than was previously discussed publicly. Depending on the application, the connection may get automatically re-established. In other cases, a user will have to repeat the action (for example, open a new Telnet or SSH session). Depending upon the attacked protocol, a successful attack may have additional consequences beyond terminated connection which must be considered. This attack vector is only applicable to the sessions which are terminating on a device (such as a router, switch, or computer) and not to the sessions that are only passing through the device (for example, transit traffic that is being routed by a router). In addition, this attack vector does not directly compromise data integrity or confidentiality.

All Cisco products which contain TCP stack are susceptible to this vulnerability.

This advisory is available at

<http://www.cisco.com/warp/public/707/cisco-sa-20040420-tcp-ios.shtml>, and it describes this vulnerability as it applies to Cisco products that run Cisco IOS® software.

A companion advisory that describes this vulnerability for products that do not run Cisco IOS software is available at

<http://www.cisco.com/warp/public/707/cisco-sa-20040420-tcp-nonios.shtml>.

## Open Caveats - Release 12.4(2)XA

- CSCeh97137: newRoot & topologyChange Traps are not generated for Bridge Mib

Symptoms: The topology change trap is not generated while state from listening to learning & learning to forwarding is getting change on an interface. The new root trap is not generated while bridging is enabled & disabled on interfaces and while changing the mac address to make a new root.

Workaround: There is no workaround.

## Related Documentation

The following sections describe the documentation available for the Cisco 1700 series routers. Typically, these documents consist of hardware and software installation guides, Cisco IOS configuration and command references, system error messages, feature modules, and other documents. Documentation is available as printed manuals or electronic documents, except for feature modules, which are available online on [Cisco.com](http://www.cisco.com) and the Documentation CD.

Use these release notes with the documents listed in the following sections:

- [Release-Specific Documents](#)
- [Platform-Specific Documents](#)

## Release-Specific Documents

The following documents are specific to Release 12.4 and apply to Cisco IOS Release 12.4(2)XA. They are located on [Cisco.com](http://www.cisco.com) and the Documentation CD (under the heading Service & Support):

- To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.4(2)T*, click this path:  
**Technical Documents: Cisco IOS Software: Release 12.4: Release Notes: Cisco IOS Release 12.4(2)T**
- To reach product bulletins, field notices, and other release-specific documents, click this path:  
**Technical Documents: Product Bulletins**
- To reach the *Caveats for Cisco IOS Release 12.4* and *Caveats for Cisco IOS Release 12.4(2)T* documents, which contain caveats applicable to all platforms for all maintenance releases of Release 12.4, click this path:  
**Technical Documents: Cisco IOS Software: Release 12.4: Caveats**

**Note**

If you have an account with [Cisco.com](http://www.cisco.com), you can also use the Bug Toolkit to find selected caveats of any severity. To reach the Bug Toolkit, log in to [Cisco.com](http://www.cisco.com), and click **Service & Support: Technical Assistance Center: Tool Index: Bug Toolkit**. Another option is to go to [http://www.cisco.com/cgi-bin/Support/Bugtool/launch\\_bugtool.pl](http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl).

## Platform-Specific Documents

Hardware installation guides, configuration and command reference guides, and additional documents specific to the Cisco 1700 series routers are available on [Cisco.com](http://www.cisco.com) and the Documentation CD at the following location:

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_mod/1700/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/1700/index.htm)

This URL is subject to change without notice. If it changes, point your web browser to [Cisco.com](http://www.cisco.com), and click the following path:

**Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 1700 Series Routers: <platform\_name>**

## Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a particular set of features and which features are supported in a particular Cisco IOS image. Feature Navigator is available 24 hours a day, 7 days a week.

To access Feature Navigator, you must have an account on [Cisco.com](http://www.cisco.com). If you have forgotten or lost your account information, e-mail the Contact Database Administration group at [cdbadmin@cisco.com](mailto:cdbadmin@cisco.com). If you do not have an account on [Cisco.com](http://www.cisco.com), go to <http://www.cisco.com/register> and follow the directions to set up an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. You can access Feature Navigator at the following URL:

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

## Cisco IOS Software Documentation Set

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents that are shipped with your order in electronic form on the Documentation CD-ROM—unless you specifically ordered printed versions.

### Documentation Modules

Each module in the Cisco IOS documentation set consists of one or more configuration guides and one or more corresponding command references. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality, and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference. The Cisco IOS software documentation set is available on Cisco.com and on the Documentation CD-ROM.

On Cisco.com:

**Products & Services: IOS Software: Cisco IOS Software Releases 12.4 Mainline: Technical Documentation: Master Indices**

On the Documentation CD-ROM at:

**Product Documentation: Cisco IOS Software: Cisco IOS Release 12.4: Configuration Guides and Command References**

### Release 12.4 Documentation Set

[Table 4](#) describes the contents of the Cisco IOS Release 12.4 software documentation set, which is available in both electronic and printed form.

**Note**

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You can find the most current Cisco IOS documentation on Cisco.com and the Documentation CD-ROM. These electronic documents may contain updates and modifications made after the hard-copy documents were printed.

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**Note**

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Some aspects of the complete Cisco IOS Release 12.4 software documentation set might not apply to the Cisco 1700 series router.

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**Table 4 Cisco IOS Release 12.4 Documentation Set**

<b>Books</b>	<b>Major Topics</b>
<ul style="list-style-type: none"> <li>• Cisco IOS Configuration Fundamentals Configuration Guide</li> <li>• Cisco IOS Configuration Fundamentals Command Reference</li> </ul>	Cisco IOS User Interfaces File Management System Management
<ul style="list-style-type: none"> <li>• Cisco IOS Bridging and IBM Networking Configuration Guide</li> <li>• Cisco IOS Bridging and IBM Networking Command Reference, Volume 1 of 2</li> <li>• Cisco IOS Bridging and IBM Networking Command Reference, Volume 2 of 2</li> </ul>	Transparent Bridging SRB Token Ring Inter-Switch Link Token Ring Route Switch Module RSRB DLSW+ Serial Tunnel and Block Serial Tunnel LLC2 and SDLC IBM Network Media Translation SNA Frame Relay Access NCIA Client/Server Airline Product Set DSPU and SNA Service Point SNA Switching Services Cisco Transaction Connection Cisco Mainframe Channel Connection CLAW and TCP/IP Offload CSNA, CMPC, and CMPC+ TN3270 Server
<ul style="list-style-type: none"> <li>• Cisco IOS Dial Technologies Configuration Guide: Dial Access</li> <li>• Cisco IOS Dial Technologies Configuration Guide: Large-Scale Dial Applications</li> <li>• Cisco IOS Dial Technologies Command Reference, Volume 1 of 2</li> <li>• Cisco IOS Dial Technologies Command Reference, Volume 2 of 2</li> </ul>	Dial Access Modem and Dial Shelf Configuration and Management ISDN Configuration Signaling Configuration Point-to-Point Protocols Dial-on-Demand Routing Dial Backup Dial Related Addressing Service Network Access Solutions Large-Scale Dial Solutions Cost-Control Solutions Internetworking Dial Access Scenarios
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Interface Configuration Guide</i></li> <li>• <i>Cisco IOS Interface Command Reference</i></li> </ul>	LAN Interfaces Serial Interfaces Logical Interfaces
<ul style="list-style-type: none"> <li>• Cisco IOS IP Configuration Guide</li> <li>• Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services</li> <li>• Cisco IOS IP Command Reference, Volume 2 of 3: Routing Protocols</li> <li>• Cisco IOS IP Command Reference, Volume 3 of 3: Multicast</li> </ul>	IP Addressing IP Services IP Routing Protocols IP Multicast
<ul style="list-style-type: none"> <li>• Cisco IOS AppleTalk and Novell IPX Configuration Guide</li> <li>• Cisco IOS AppleTalk and Novell IPX Command Reference</li> </ul>	AppleTalk Novell IPX

**Table 4 Cisco IOS Release 12.4 Documentation Set (continued)**

Books	Major Topics
<ul style="list-style-type: none"> <li>• Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide</li> <li>• Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference</li> </ul>	Apollo Domain Banyan VINES DECnet ISO CLNS XNS
<ul style="list-style-type: none"> <li>• Cisco IOS Voice, Video, and Fax Configuration Guide</li> <li>• <i>Cisco IOS Voice, Video, and Fax Command Reference</i></li> </ul>	Voice over IP Call Control Signaling Voice over Frame Relay Voice over ATM Telephony Applications Trunk Management Fax, Video, and Modem Support
<ul style="list-style-type: none"> <li>• Cisco IOS Quality of Service Solutions Configuration Guide</li> <li>• <i>Cisco IOS Quality of Service Solutions Command Reference</i></li> </ul>	Packet Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms
<ul style="list-style-type: none"> <li>• Cisco IOS Security Configuration Guide</li> <li>• <i>Cisco IOS Security Command Reference</i></li> </ul>	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options Supported AV Pairs
<ul style="list-style-type: none"> <li>• Cisco IOS Switching Services Configuration Guide</li> <li>• Cisco IOS Switching Services Command Reference</li> </ul>	Cisco IOS Switching Paths NetFlow Switching Multiprotocol Label Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
<ul style="list-style-type: none"> <li>• Cisco IOS Wide-Area Networking Configuration Guide</li> <li>• <i>Cisco IOS Wide-Area Networking Command Reference</i></li> </ul>	ATM Frame Relay SMDS X.25 and LAPB
<ul style="list-style-type: none"> <li>• Cisco IOS Mobile Wireless Configuration Guide</li> <li>• Cisco IOS Mobile Wireless Command Reference</li> </ul>	General Packet Radio Service

**Table 4** Cisco IOS Release 12.4 Documentation Set (continued)

Books	Major Topics
<ul style="list-style-type: none"> <li>• Cisco IOS Terminal Services Configuration Guide</li> <li>• Cisco IOS Terminal Services Command Reference</li> </ul>	ARA LAT NASI Telnet TN3270 XRemote X.28 PAD Protocol Translation
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Configuration Guide Master Index</i></li> <li>• <i>Cisco IOS Command Reference Master Index</i></li> <li>• Cisco IOS Debug Command Reference</li> <li>• Cisco IOS Software System Error Messages</li> <li>• New Features in 12.4-Based Limited Lifetime Releases</li> <li>• New Features in Release 12.4T</li> <li>• Release Notes (Release note and caveat documentation for 12.4-based releases and various platforms)</li> </ul>	

## Service and Support

Cisco provides [Cisco.com](http://www.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](http://www.cisco.com) registered users have complete access to the technical support resources on the Cisco TAC Web Site.

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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](http://www.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](http://www.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.

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<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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