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Release Notes for Cisco 2600 Series for Cisco IOS Release 12.0(5)XK2

February 10, 2002

These release notes for Cisco 2600 series support Cisco IOS Release 12.0(5)XK2 and are updated as needed to describe new features, memory requirements, hardware support, software platform deferrals, microcode or modem code changes, and related document changes.

For a list of the software caveats that apply to Cisco IOS Release 12.0(5)XK2, see “Caveats” section on page 19.

Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 12.0* on Cisco Connection Online (CCO) and the Documentation CD-ROM.

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Introduction

Cisco Systems extends enterprise-class versatility, integration, and power to branch offices with the Cisco 2600 series modular access router family. The Cisco 2600 series routers are modular access routers designed to enable customers to easily adopt future technologies and scale to accommodate network expansion. The Cisco 2600 series shares modular interfaces with the Cisco 1600, Cisco 1700, and Cisco 3600 series, providing a solution to meet today's branch office needs for applications such as:

- Secure Internet/intranet access
- Multiservice voice/data integration
- Analog and digital dial access services
- Virtual Private Network (VPN) access
- Inter-VLAN routing

The Cisco 2600 series modular architecture provides the versatility needed to adapt to changes in network technology as new services and applications become available. Driven by a powerful RISC processor, the Cisco 2600 series supports the advanced Quality of Service (QoS), security, and network integration features required in today's evolving enterprise networks.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.0(5)XK2:

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- Determining Your Software Release, page 5
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Memory Requirements

Table 1 Memory Requirements for the Cisco 2600 Series

Feature Set by Platform	Image Name	Required Flash Memory	Required DRAM Memory	Runs From
IP	c2600-i-mz	4 MB	20 MB	RAM
IP/FW/IDS Plus/IP Sec 3DES	c2600-ik2o3s-mz	8 MB	32 MB	RAM
IP Plus/IP Sec 3DES	c2600-ik2s-mz	8 MB	32 MB	RAM
IP/FW/IDS	c2600-io3-mz	8 MB	32 MB	RAM
IP/FW/IDS Plus/IPSec 56	c2600-io3s56i-mz	8 MB	32 MB	RAM
IP Plus	c2600-is-mz	8 MB	32 MB	RAM
IP Plus IPsec 56	c2600-is56i-mz	8 MB	32 MB	RAM
IP/H323	c2600-ix-mz	8 MB	32 MB	RAM

Table 1 Memory Requirements for the Cisco 2600 Series (continued)

Feature Set by Platform	Image Name	Required Flash Memory	Required DRAM Memory	Runs From
IP/IPX/AT/DEC	c2600-d-mz	8 MB	24 MB	RAM
IP/IPX/AT/DEC Plus	c2600-ds-mz	8 MB	32 MB	RAM
IP/IPX/AT/DEC/FW/IDS Plus	c2600-do3s-mz	8 MB	32 MB	RAM
Enterprise Plus	c2600-js-mz	16 MB	32 MB	RAM
Enterprise Plus/IPSec 3DES	c2600-jk2s-mz	8 MB	40 MB	RAM
Enterprise/FW/IDS Plus/IPSec 3DES	c2600-jk2o3s-mz	16 MB	40 MB	RAM
Enterprise/FW/IDS Plus/IPSec 56	c2600-jo3s56i-mz	16 MB	40 MB	RAM
Enterprise Plus/IPSec 56	c2600-js56i-mz	16 MB	40 MB	RAM
Remote Access Server	c2600-c-mz	4 MB	20 MB	RAM

Hardware Supported

Cisco IOS Release 12.0(5)XK2 supports the Cisco 2600 series routers:

- Cisco 2610
- Cisco 2611
- Cisco 2612
- Cisco 2613
- Cisco 2620
- Cisco 2621

Table 2 Supported Interfaces on the Cisco 2600 Series

Interface, Network Module, or Data Rate ¹	Platforms Supported	
LAN Interfaces²	1- or 2-port Ethernet (10BaseT)	Cisco 2610, Cisco 2611, Cisco 2612
	1-port Token Ring (RJ-45)	Cisco 2612, Cisco 2613
LAN Network Modules	1-port Ethernet	All Cisco 2600 series platforms
	4-port Ethernet	All Cisco 2600 series platforms
	1-port ATM-25 RJ-45 interface	All Cisco 2600 series platforms
Serial Network Modules	16- or 32-port Asynchronous	All Cisco 2600 series platforms
	4- or 8-port Asynchronous/ Synchronous Serial low speed (128 kbps max)	All Cisco 2600 series platforms
Multiport T1/E1 ATM Network Modules with Inverse Multiplexing over ATM (IMA)³	4-port T1 ATM network module with IMA (NM-4T1-IMA (=))	All Cisco 2600 series platforms
	4-port E1 ATM network module with IMA (NM-4E1-IMA (=))	All Cisco 2600 series platforms
	8-port T1 ATM network module with IMA (NM-8T1-IMA (=))	All Cisco 2600 series platforms
	8-port E1 ATM network module with IMA (NM-8E1-IMA (=))	All Cisco 2600 series platforms

System Requirements

Table 2 Supported Interfaces on the Cisco 2600 Series

Interface, Network Module, or Data Rate ¹	Platforms Supported
Digital T1/E1 Packet Voice Trunk Network Modules and Spare Components	All Cisco 2600 series platforms
1-port, 24-channel T1 voice/fax module, supports 24 channels of medium-complexity codecs: G.729a/b, G.726, G.711 and fax or 12 channels of G.726, G.729, G.723.1, G.728, G.729a/b, G.711, and fax. Consists of one NM-HDV, two PVDM-12s, and one VWIC-1MFT-T1 ⁴ . Part number: NM-HDV-1T1-24(=)	All Cisco 2600 series platforms
1-port, enhanced 24-channel T1 voice/fax module, supports 24 channels of high- and medium-complexity codecs: G.729a/b, G.726, G.729, G.728, G.723.1, G.711, and fax. Consists of one NM-HDV, four PVDM-12s, and one VWIC-1MFT-T1 ⁴ . Part number: NM-HDV-1T1-24E(=)	All Cisco 2600 series platforms
2-port, 48-channel T1 voice/fax module, supports add/drop multiplexing (drop and insert); 48 channels of medium-complexity codecs: G.729a/b, G.726, G.711, and fax; or 24 channels of G.726, G.729, G.723.1, G.728, G.729a/b, G.711, and fax. Consists of one NM-HDV, four PVDM-12, and one VWIC-2MFT-T1-DI ⁴ . Part number: NM-HDV-2T1-48(=)	All Cisco 2600 series platforms
High-density voice/fax network module spare (NM-HDV=)	Digital T1/E1 Packet Voice Trunk Network Modules spare component
12-channel packet voice DSP module upgrade spare (PVDM-12=)	Digital T1/E1 Packet Voice Trunk Network Modules spare component
1-port RJ-48 MultiFlex Trunk - T1 (VWIC-1MFT-T1(=)) ⁴	Digital T1/E1 Packet Voice Trunk Network Modules spare component
2-port RJ-48 MultiFlex Trunk - T1 (VWIC-2MFT-T1(=)) ⁴	Digital T1/E1 Packet Voice Trunk Network Modules spare component
2-port RJ-48 MultiFlex Trunk with drop and insert - T1 (VWIC-2MFT-T1-DI(=)) ⁴	Digital T1/E1 Packet Voice Trunk Network Modules spare component
Dial, ISDN and Channelized Serial Network Modules	All Cisco 2600 series platforms
1- or 2-port Channelized T1/ISDN PRI	All Cisco 2600 series platforms
1- or 2-port Channelized T1/ISDN PRI with CSU	All Cisco 2600 series platforms
1- or 2-port Channelized E1/ISDN PRI balanced	All Cisco 2600 series platforms
1- or 2-port Channelized E1/ISDN PRI unbalanced	All Cisco 2600 series platforms
4-or 8-port ISDN BRI S/T interface	All Cisco 2600 series platforms
4- or 8-port ISDN BRI U (NT1) interface	All Cisco 2600 series platforms
8- or 16-port Analog modems	All Cisco 2600 series platforms
E1/T1 Multiflex Voice/WAN Interface Cards³	All Cisco 2600 series platforms
1-Port T1 multiflex trunk interface (VWIC-1MFT-T1)	All Cisco 2600 series platforms
1-Port E1 multiflex trunk interface (VWIC-1MFT-E1)	All Cisco 2600 series platforms
2-Port T1 multiflex trunk interface (VWIC-2MFT-T1)	All Cisco 2600 series platforms
2-Port E1 multiflex trunk interface (VWIC-2MFT-E1)	All Cisco 2600 series platforms
2-Port T1 multiflex trunk interface with Drop and Insert (VWIC-2MFT-T1-DI)	All Cisco 2600 series platforms
2-Port E1 multiflex trunk interface with Drop and Insert (VWIC-2MFT-E1-DI)	All Cisco 2600 series platforms

Table 2 Supported Interfaces on the Cisco 2600 Series

Interface, Network Module, or Data Rate ¹	Platforms Supported	
Voice/Fax Interface Cards	1- or 2- Voice interface card slots	All Cisco 2600 series platforms
	2-port FXS Voice/Fax interface card ⁵	All Cisco 2600 series platforms with Voice/Fax network modules
	2-port E&M Voice/Fax interface card ³	All Cisco 2600 series platforms with Voice/Fax network modules
	2-port FXO Voice/Fax interface card ³	All Cisco 2600 series platforms with Voice/Fax network modules
WAN Interface Cards	1-port ISDN BRI S/T interface (requires external NT1)	All Cisco 2600 series platforms
	1-port ISDN BRI (NT1) U	All Cisco 2600 series platforms
	1-port 56/64-kbps DSU/CSU	All Cisco 2600 series platforms
	1-port T1/Fractional T1 with DSU/CSU	All Cisco 2600 series platforms
	1-port High-Speed Serial (up to 2.048 Mbps)	All Cisco 2600 series platforms
	2-port Dual High-speed Serial (up to 2.048 Mbps; Asynchronous/Synchronous support)	All Cisco 2600 series platforms
	2-port Asynchronous/ Synchronous (up to 128 kbps)	All Cisco 2600 series platforms
Advanced Integration Modules	Data Compression AIM (up to 8.192 Mbps)	All Cisco 2600 series platforms

1 The Voice/Fax and ATM-25 network modules require Cisco IOS Plus feature sets.

2 The 1- or 2-port 10/100 Ethernet LAN interface for the Cisco 2621 and Cisco 2621 series routers is only available in Cisco IOS Release 12.0 XC and later.

3 Requires the Cisco IOS Plus feature sets.

4 See E1/T1 Multiflex Voice/WAN Interface Cards in this table.

5 Requires the NM-1V or NM-2V network module.

Determining Your Software Release

To determine the version of Cisco IOS software running on a Cisco 2600 series router, log in to the router and enter the **show version EXEC** command:

```
router>show version
Cisco Internetwork Operating System Software
IOS (tm) 2600 Software (c2600-i-mz), Version 12.0(5)XK2, RELEASE SOFTWARE
```

Other Firmware Code

The latest version of analog modem firmware for the Cisco 2600 series allows support of the internal analog modems in a wide range of countries. Firmware version 1.0.1 extends support internationally starting with Cisco IOS Release 11.3(5)T and later.

On CCO:

Service & Support: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers: Analog Modem Firmware

On the Documentation CD-ROM:

Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers: Analog Modem Firmware

Feature Set Tables

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.

Table 3 Feature Sets Supported by the Cisco 2600 Series

Feature Sets		Feature Set Matrix Term	Software Image	Platforms
IP Standard Feature Sets	IP	• Basic	c2600-i-mz	All Cisco 2600 series platforms
	IP Plus	• Basic • Plus	c2600-is-mz	All Cisco 2600 series platforms
	IP Plus IPsec 3DES	• Plus • IPsec 3DES	c2600-ik2s-mz	All Cisco 2600 series platforms
	IP Plus IPsec 56	• Plus • IPsec 56	c2600-is56i-mz	All Cisco 2600 series platforms
	IP/FW/IDS	• Basic • FW/IDS	c2600-io3-mz	All Cisco 2600 series platforms
	IP/FW/IDS Plus IPsec 3DES	• Basic • FW/IDS Plus • IPsec 3DES	c2600-ik2o3s-mz	All Cisco 2600 series platforms
	IP/FW/IDS Plus IPsec 56	• Basic • FW/IDS Plus • IPsec 56	c2600-io3s56i-mz	All Cisco 2600 series platforms
IP/IPX/AppleTalk/DEC Standard Feature Sets	IP/IPX/AppleTalk/DEC	• Basic	c2600-d-mz	All Cisco 2600 series platforms
	IP/IPX/AppleTalk/DEC Plus	• Basic • Plus	c2600-ds-mz	All Cisco 2600 series platforms
	IP/IPX/AT/DEC/FW/IDS Plus	• Basic • FW/IDS Plus	c2600-do3s-mz	All Cisco 2600 series platforms
Enterprise Standard Feature Sets	Enterprise Plus	• Plus	c2600-js-mz	All Cisco 2600 series platforms
	Enterprise Plus IPsec 3DES	• Plus • IPsec 3DES	c2600-jk2s-mz	All Cisco 2600 series platforms
	Enterprise Plus IPsec 56	• Plus • IPsec 56	c2600-js56i-mz	All Cisco 2600 series platforms
	Enterprise/FW/IDS Plus IPsec 56	• FW/IDS Plus • IPsec 56	c2600-jo3s56i-mz	All Cisco 2600 series platforms
	Enterprise/FW/IDS Plus IPsec 3DES	• FW/IDS Plus • IPsec 3DES	c2600-jk2o3s-mz	All Cisco 2600 series platforms
Remote Access Server Feature Set	Remote Access Server	• Basic	c2600-c-mz	All Cisco 2600 series platforms



Caution 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 are likely to require an export license. Customer orders may be denied or subject to delay due to United States government regulations. When applicable, the purchaser or user must obtain local import and use authorizations for all encryption strengths. Contact your sales representative or distributor for more information, or send an e-mail to export@cisco.com.

Table 4 and Table 5 list the features and feature sets supported by the Cisco IOS Release 12.0(5)XK2 for the Cisco 2600 series.

- Table 4—IP and IP/IPX/AppleTalk/DEC Feature Sets and Features for the Cisco 2600 Series
- Table 5—Enterprise and Enterprise Plus Feature Sets and Features for the Cisco 2600 Series

The following tables use the following conventions to identify features:

- Yes—The feature is supported in the feature set.
- No—The feature is not supported in the feature set.
- In—The Cisco IOS release that first introduces a feature. For example, (1) means a feature is introduced in 12.0(1)T. If a cell is empty in this column, the feature was included in the initial base release.

Note These feature set tables contain only selected lists of features. These tables are not cumulative or complete lists of all the features in each image.

Table 4 Feature List by Feature Set for the Cisco 2600 Series—Part 1 of 2

Features	In	Feature Sets										
		IP	IP Plus	IP Plus 56	IP Plus 3DES	IP/FW/IDS	IP/FW/IDS Plus 56	IP/FW/IDS Plus 3DES	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IPX/AT/DEC/FW/IDS Plus	
New Features in 12.0(5)XK1												
Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 Series Routers	(5)XK	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multipoint T1/E1 ATM Network Modules with Inverse Multiplexing	(5)XK	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New Features in 12.0(4)T												
Annex G (X.25) over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Async over UDP	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CLI String Search	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CNS Client for Cisco IOS Software	(4)	No	No	No	No	No	No	No	No	No	No	No

System Requirements

Table 4 Feature List by Feature Set for the Cisco 2600 Series—Part 1 of 2 (continued)

Features	Feature Sets											
	In	IP	IP Plus	IP Plus IPsec 56	IP Plus IPsec 3DES	IP/FW/IDS	IP/FW/IDS Plus IPsec 56	IP/FW/IDS Plus IPsec 3DES	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IPX/AT/DEC/FW/IDS Plus	
DLSw RSVP	(4)	No	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	
Easy IP Phase 2-DHCP Server	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Cisco 2620 and Cisco 2621	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Flow Random Early Detection	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
8Mbps Compression AIM	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
IOX Firewall Feature Set	(4)	No	No	No	No	Yes	Yes	Yes	No	No	Yes	
IOS IEEE 802.1Q Support	(4)	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	
IOS STP Enhancements	(4)	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	
ISDN MIB RFC2127	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
L2TP	(4)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	
1FE2P NM	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Mobile IP	(4)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	
Modem over ISDN BRI	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
VIC-2BRI-ST-TE	(4)	No	No	No	No	No	No	No	No	No	No	
OSPF Packet Pacing	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
OS_IFSS	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Parse Bookmarks	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Policy Routing Infrastructure	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
RIP Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Response time Reporter (RTR) Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
SNMP Version 3	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Dynamic Multiple Encapsulation for Dial-in over ISDN	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Time-based Access List	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Voice over Frame Relay Enhancements	(4)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	

Table 4 Feature List by Feature Set for the Cisco 2600 Series—Part 1 of 2 (continued)

Features	Feature Sets											
	In	IP	IP Plus	IP Plus IPsec 56	IP Plus IPsec 3DES	IP/FW/IDS	IP/FW/IDS Plus IPsec 56	IP/FW/IDS Plus IPsec 3DES	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IPX/AT/DEC/FW/IDS Plus	
Web Cache Communications Protocol V2 (WCCPv2)	(4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
X.25 Load Balancing	(4)	No	No	No	No	No	No	No	No	No	No	
New Features in 12.0(3)T												
802.1Q and ISL VLAN	(3)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	
Cisco Process MIB	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
DLSw+ Load Balancing Enhancements	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
DLSw+ Peer Group Cluster	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
DLSw+ RSVP	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Fast Ethernet (10baseT/100baseT Mbps) Network Ports	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Flow WRED	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
NetFlow Policy Routing	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Response Time Reporter Enhancements	(3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
IBM Support												
Bridging Code Rework		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
RIF Passthru in DLSw+		No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	

System Requirements

Table 4 Feature List by Feature Set for the Cisco 2600 Series—Part 1 of 2 (continued)

Features	Feature Sets										
	In	IP	IP Plus	IP Plus IPsec 56	IP Plus IPsec 3DES	IP/FW/IDS	IP/FW/IDS Plus IPsec 56	IP/FW/IDS Plus IPsec 3DES	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IPX/AT/DEC/FW/IDS Plus
IP Routing											
Data Compression Advanced Interface Module (AIM)	(1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IP Precedence for GRE Tunnels (GRE VPN)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Protocol-Independent Multicast (PIM) Version 2		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Management											
SNMP Inform Request		No	No	No	No	No	No	No	No	No	No
VPDN MIB and Syslog Facility		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service											
CLI String Search	(1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scalability											
Airline Product Set (ALPS)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cisco IOS File System		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Expression MIB		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OSPF Point to Multipoint		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Per Port Debugging (Conditionally Triggered Debugging)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SNMP Manager		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Security											
Additional Vendor-Proprietary RADIUS Attributes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Authenticating ACLs		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Automated Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Certificate Authority Interoperability		No	No	Yes	Yes	Yes	Yes	Yes	No	No	No
Internet Key Exchange Security Protocol		No	No	Yes	Yes	No	Yes	Yes	No	No	No

Table 4 Feature List by Feature Set for the Cisco 2600 Series—Part 1 of 2 (continued)

Features	Feature Sets										
	In	IP	IP Plus	IP Plus IPsec 56	IP Plus IPsec 3DES	IP/FW/IDS	IP/FW/IDS Plus IPsec 56	IP/FW/IDS Plus IPsec 3DES	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IPX/AT/DEC/FW/IDS Plus
IOS Firewall Feature Set	(1)	No	No	No	No	Yes	Yes	Yes	No	No	Yes
3DES Network Security	(2)	No	No	Yes	Yes	No	No	Yes	No	No	No
IPsec Network Security		No	No	Yes	Yes	No	No	Yes	No	No	No
MS-CHAP Support		No	No	No	No	No	No	No	No	No	No
Named Method Lists for AAA Authentication & Accounting		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subblock Phase 1		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Switching											
Enhanced ATM VC Configuration and Management		No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Multiple ISDN Switch Types		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Voice/Multimedia											
Voice over IP		No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
WAN Optimization											
ATM PVC Management		No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WAN Services											
Always On/ Dynamic ISDN (AO/DI)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Interface Name Modularity		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Microsoft Point-to-Point Compression (MPPC)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mobile IP	(1)	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
MS Callback		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New and Changed Show Commands for the Cisco 2600 series Routers		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stackable Home Gateway		No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Time-based Access List	(1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

System Requirements

Table 5 Feature List by Feature Set for the Cisco 2600 Series—Part 2 of 2

Features	Feature Sets						
	In	Enterprise Plus	Enterprise/ FW/IDS Plus IPSec 56	Enterprise Plus IPSec 3DES	Enterprise Plus IPSec 56	Enterprise/ FW/IDS Plus IPSec 3DES	Remote Access Server
New Features in 12.0(5)XK1							
Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 Series Routers	(5)XK	Yes	Yes	Yes	Yes	Yes	Yes
Multiport T1/E1 ATM Network Modules with Inverse Multiplexing	(5)XK	Yes	Yes	Yes	Yes	Yes	Yes
New Features in 12.0(4)T							
Annex G (X.25) over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Async over UDP	(4)	Yes	Yes	Yes	Yes	Yes	Yes
CLI String Search	(4)	Yes	Yes	Yes	Yes	Yes	Yes
CNS Client for Cisco IOS Software	(4)	Yes	Yes	Yes	Yes	Yes	No
DLSw RSVP	(4)	Yes	Yes	Yes	Yes	Yes	No
Easy IP Phase 2-DHCP Server	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Cisco 2620 and Cisco 2621	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Flow Random Early Detection	(4)	Yes	Yes	Yes	Yes	Yes	Yes
8Mbps Compression AIM	(4)	Yes	Yes	Yes	Yes	Yes	Yes
IOX Firewall Feature Set	(4)	No	No	No	No	No	No
IOS IEEE 802.1Q Support	(4)	Yes	Yes	Yes	Yes	Yes	No
IOS STP Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	No
ISDN MIB RFC2127	(4)	Yes	Yes	Yes	Yes	Yes	Yes
L2TP	(4)	Yes	Yes	Yes	Yes	Yes	Yes
IFE2P NM	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Mobile IP	(4)	Yes	Yes	Yes	Yes	Yes	No
Modem over ISDN BRI	(4)	Yes	Yes	Yes	Yes	Yes	Yes
VIC-2BRI-ST-TE	(4)	No	No	No	No	No	No
OSPF Packet Pacing	(4)	Yes	Yes	Yes	Yes	Yes	No
OS_IFSS	(4)	Yes	Yes	Yes	Yes	Yes	Yes
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Parse Bookmarks	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Policy Routing Infrastructure	(4)	Yes	Yes	Yes	Yes	Yes	No

Table 5 Feature List by Feature Set for the Cisco 2600 Series—Part 2 of 2 (continued)

Features	Feature Sets						
	In	Enterprise Plus	Enterprise/ FW/IDS Plus IPSec 56	Enterprise Plus IPSec 3DES	Enterprise Plus IPSec 56	Enterprise/ FW/IDS Plus IPSec 3DES	Remote Access Server
RIP Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Response time Reporter (RTR) Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	Yes
SNMP Version 3	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Multiple Encapsulation for Dial-in over ISDN	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Time-based Access List	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Voice over Frame Relay Enhancements	(4)	Yes	Yes	Yes	Yes	Yes	No
Web Cache Communications Protocol V2 (WCCPv2)	(4)	Yes	Yes	Yes	Yes	Yes	No
X.25 Load Balancing	(4)	Yes	Yes	Yes	Yes	Yes	No
New Features in 12.0(3)T							
802.1Q and ISL VLAN	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Cisco Process MIB	(3)	Yes	Yes	Yes	Yes	Yes	Yes
DLSw+ Load Balancing Enhancements	(3)	Yes	Yes	Yes	Yes	Yes	Yes
DLSw+ Peer Group Cluster	(3)	Yes	Yes	Yes	Yes	Yes	Yes
DLSw+ RSVP	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Fast Ethernet (10/100 Mbps) Network Ports	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Flow WRED	(3)	Yes	Yes	Yes	Yes	Yes	Yes
NetFlow Policy Routing	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Response Time Reporter Enhancements	(3)	Yes	Yes	Yes	Yes	Yes	Yes
IBM Support							
Bridging Code Rework		Yes	Yes	Yes	Yes	Yes	Yes
RIF Passthru in DLSw+		Yes	Yes	Yes	Yes	Yes	No
IP Routing							
Data Compression Advanced Interface Module (AIM)	(1)	Yes	Yes	Yes	Yes	Yes	Yes
IP Precedence for GRE Tunnels (GRE VPN)		Yes	Yes	Yes	Yes	Yes	Yes
Protocol-Independent Multicast (PIM) Version 2		Yes	Yes	Yes	Yes	Yes	Yes

System Requirements

Table 5 Feature List by Feature Set for the Cisco 2600 Series—Part 2 of 2 (continued)

Features	Feature Sets						
	In	Enterprise Plus	Enterprise/ FW/IDS Plus IPSec 56	Enterprise Plus IPSec 3DES	Enterprise Plus IPSec 56	Enterprise/ FW/IDS Plus IPSec 3DES	Remote Access Server
Management							
SNMP Inform Request		Yes	Yes	Yes	Yes	Yes	No
VPDN MIB and Syslog Facility		Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service							
CLI String Search	(1)	Yes	Yes	Yes	Yes	Yes	Yes
Scalability							
Airline Product Set (ALPS)		Yes	Yes	Yes	Yes	Yes	No
Cisco IOS File System		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB		Yes	Yes	Yes	Yes	Yes	Yes
Expression MIB		Yes	Yes	Yes	Yes	Yes	Yes
OSPF Point to Multipoint		Yes	Yes	Yes	Yes	Yes	Yes
Per Port Debugging (Conditionally Triggered Debugging)		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Manager		Yes	Yes	Yes	Yes	Yes	Yes
Security							
Additional Vendor-Proprietary RADIUS Attributes		Yes	Yes	Yes	Yes	Yes	Yes
Authenticating ACLs		Yes	Yes	Yes	Yes	Yes	No
Automated Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
Certificate Authority Interoperability		No	Yes	Yes	Yes	Yes	No
Internet Key Exchange Security Protocol		No	Yes	Yes	Yes	Yes	No
IOS Firewall Feature Set	(1)	No	Yes	Yes	No	Yes	No
3DES Network Security	(2)	No	No	Yes	No	Yes	No
IPSec Network Security		No	No	No	Yes	Yes	No
MS-CHAP Support		Yes	Yes	Yes	Yes	Yes	No
Named Method Lists for AAA Authentication & Accounting		Yes	Yes	Yes	Yes	Yes	Yes
Subblock Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
Switching							
Enhanced ATM VC Configuration and Management		Yes	Yes	Yes	Yes	Yes	No

Table 5 Feature List by Feature Set for the Cisco 2600 Series—Part 2 of 2 (continued)

Features	Feature Sets						
	In	Enterprise Plus	Enterprise/ FW/IDS Plus IPSec 56	Enterprise Plus IPSec 3DES	Enterprise Plus IPSec 56	Enterprise/ FW/IDS Plus IPSec 3DES	Remote Access Server
Multiple ISDN Switch Types		Yes	Yes	Yes	Yes	No	Yes
Voice/Multimedia							
Voice over IP		Yes	Yes	Yes	Yes	Yes	No
WAN Optimization							
ATM PVC Management		Yes	Yes	Yes	Yes	Yes	No
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	No
WAN Services							
Always On/ Dynamic ISDN (AO/DI)		Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch		Yes	Yes	Yes	Yes	Yes	Yes
Interface Name Modularity		Yes	Yes	Yes	Yes	Yes	Yes
Microsoft Point-to-Point Compression (MPPC)		Yes	Yes	Yes	Yes	Yes	Yes
Mobile IP	(1)	Yes	Yes	Yes	Yes	Yes	No
MS Callback		Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types		Yes	Yes	Yes	Yes	Yes	Yes
New and Changed Show Commands for the Cisco 2600 series Routers		Yes	Yes	Yes	Yes	Yes	Yes
Stackable Home Gateway		Yes	Yes	Yes	Yes	Yes	Yes
Time-based Access List	(1)	Yes	Yes	Yes	Yes	Yes	No

New and Changed Information

The following sections list the new features supported by the Cisco 2600 series for Cisco IOS Release 12.0(5)XK2.

New Features in Cisco IOS Release 12.0(5)XK2

No new features are supported for the Cisco 2600 series in Cisco IOS Release 12.0(5)XK2.

New Features in Cisco IOS Release 12.0(5)XK1

No new features are supported for the Cisco 2600 series in Cisco IOS Release 12.0(5)XK1.

New Features in Cisco IOS Release 12.0(5)XK

The following features are available for the Cisco 2600 series in Cisco IOS Release 12.0(5)XK.

Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 Series Routers

Digital T1 packet voice trunk network modules for Cisco 2600 series routers allow enterprises or service providers, using the equipped routers as customer premises equipment, to deploy digital voice and fax relay. These modules receive constant bit-rate telephony information over T1 interfaces and can convert that information to a compressed format, so that it can be transmitted as voice over IP.

The following high-density T1 network modules are available:

- 1-port 24-Channel T1 High-Density Voice Network Module (NM-HDV-1T1-24)
- 1-port Enhanced 24-Channel T1 High-Density Voice Network Module (NM-HDV-1T1-24E)
- 2-Port 48-Channel High-Density Voice Network Module (NM-HDV-2T1-48)

T1 digital voice over IP includes the following functionality:

- T1 Channel Associated Signaling (CAS) for the following line-signaling types:
 - rEceive and transMit or Ear and Mouth (E&M) immediate start
 - E&M wink start
 - E&M delay start (also called “dial repeating”)
 - Foreign Exchange Station (FXS) and Foreign Exchange Office (FXO) loop start
 - FXS and FXO ground start
- Dynamic bandwidth allocation using voice activity detection (VAD)
- Drop-and-Insert capability, allowing the interchange of time-division multiplexing (TDM) slots between the ports on a two-port T1 multiflex trunk voice/WAN interface card installed in a digital T1 packet voice trunk network module
- Support for a wide range of International Telecommunication Union (ITU-T) G-series compression specifications, including:
 - G.711 A Law at 64,000 bps
 - G.711 u Law at 64,000 bps
 - G.723.1 Annex A at 5,300 bps
 - G.723.1 Annex A at 6,300 bps
 - G.723.1 at 5,300 bps
 - G.723.1 at 6,300 bps
 - G.726 at 16,000 bps
 - G.726 at 24,000 bps
 - G.726 at 32,000 bps
 - G.728 at 16,000 bps
 - G.729 at 8,000 bps
 - G.729 Annex A at 8,000 bps

- G.729 Annex B at 8,000 bps
- G.729 Annex B with Annex A at 8,000 bps
- Depending on codec complexity, either 30 or 60 channels of compressed voice
- High-quality voice endpoint-standard features, such as high-quality echo cancellation, silence suppression, comfort noise generation, and DTMF relay
- Group 3 fax relay

This feature is supported on the following platforms:

- Cisco 2610
- Cisco 2611
- Cisco 2612
- Cisco 2613
- Cisco 2620
- Cisco 2621

Multiport T1/E1ATM Network Modules with Inverse Multiplexing over ATM on Cisco 2600 Series Routers

Digital T1 packet voice trunk network modules allow Cisco 2600 series routers to provide T1 connectivity to PBXs or to a central office (CO). With digital T1 connectivity, Cisco 2600 series routers can provide greater voice density for enterprise and service provider VoIP networks than they could before. A digital T1 packet voice trunk network module is a complete solution, made up of a network module with installed packet voice data modules (PVDMs), and one T1 multiflex trunk voice/WAN interface card with either one or two T1 ports. The T1/E1 multiflex trunk interface cards are dual-mode T1 or E1 interfaces in a VWIC (Voice/WAN Interface Card) form for voice, data, and integrated voice/data applications. The following T1/E1 multiflex trunk interface cards are available:

- 1-port T1 multiflex trunk interface (VWIC-1MFT-T1)
- 1-port E1 multiflex trunk interface (VWIC-1MFT-E1)
- 2-port T1 multiflex trunk interface (VWIC-2MFT-T1)
- 2-port E1 multiflex trunk interface (VWIC-2MFT-E1)
- 2-port T1 multiflex trunk interface with Drop and Insert (VWIC-2MFT-T1-DI)
- 2-port E1 multiflex trunk interface with Drop and Insert (VWIC-2MFT-E1-DI)

The T1/E1 VWICs support the following T1/E1 functionality:

- Single- or dual-port T1/E1 functionality
- Structured or unstructured T1/E1 functionality
- Drop and Insert (also called TDM Cross-Connect) between the T1/E1 ports on dual-port cards, used to hairpin bearer channels to a media gateway device and allowing the interchange of time-division multiplexing (TDM) slots between the ports on a two-port card

This feature is supported on the following platforms:

- Cisco 2610
- Cisco 2611
- Cisco 2612

- Cisco 2613
- Cisco 2620
- Cisco 2621

Important Notes

This section contains important information about use of your Cisco IOS Release 12.0(5)XK2 software.

Cisco IOS release 12.0(5)XK2 is supported on all Cisco 2600 series routers and incorporates a number of bug fixes and enhancements. These include improvements to the echo canceller located within the DSP firmware. These improvements result in better performance during off-net calls and within noisy environments.

Refer to the Caveats section for details on individual bug fixes found within this release.

Deprecated MIBs

Older Cisco Management Information Bases (MIBs) will be replaced in a future release. OLD-CISCO-* MIBs are currently migrated into more scalable MIBs, without affecting existing Cisco IOS products or NMS applications. Application developers should update from deprecated MIBs to the replacement MIBs as shown in the following table.

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1243-MIB
OLD-CISCO-CHASSIS-MIB	ENTITY-MIB
OLD-CISCO-CPUK-MIB	In Development
OLD-CISCO-DECNET-MIB	
OLD-CISCO-ENV-MIB	CISCO-ENVMON-MIB
OLD-CISCO-FLASH-MIB	CISCO-FLASH-MIB
OLD-CISCO-INTERFACES-MIB	IF-MIB CISCO-QUEUE-MIB
OLD-CISCO-IP-MIB	
OLD-CISCO-MEMORY-MIB	CISCO-MEMORY-POOL-MIB
OLD-CISCO-NOVELL-MIB	NOVELL-IPX-MIB
OLD-CISCO-SYS-MIB	(Compilation of other OLD* MIBS)
OLD-CISCO-SYSTEM-MIB	CISCO-CONFIG-COPY-MIB
OLD-CISCO-TCP-MIB	CISCO-TCP-MIB
OLD-CISCO-TS-MIB	
OLD-CISCO-VINES-MIB	CISCO-VINES-MIB
OLD-CISCO-XNS-MIB	

Caveats

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

This section only contains open and resolved caveats for the current Cisco IOS maintenance release.

All caveats in Release 12.0 and Release 12.0 T are also in Release 12.0(5)XK2.

For information on caveats in Cisco IOS Release 12.0, see *Caveats for Cisco IOS Release 12.0* that describes caveats affecting all maintenance releases.

For information on other caveats that also apply to this release, see *Caveats for Cisco IOS Release 12.0 T* which lists severity 1 and 2 caveats, and is located on CCO and the Documentation CD-ROM

Note If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. You can reach Bug Navigator II on CCO at **Service & Support: Online Technical Support: Software Bug Toolkit** or at <http://www.cisco.com/support/bugtools>.

Open Caveats for Release 12.0(5)XK2

There are no open caveats specific to Cisco IOS Release 12.0(5) XK2 that require documentation in the release notes.

Resolved Caveats for Release 12.0(5)XK2

All the caveats listed in this section are resolved in Cisco IOS Release 12.0(5) XK2. This section describes only severity 1 and 2 caveats and select severity 3 caveats.

SNMP

- CSCdw65903

An error can occur with management protocol processing. Please use the following URL for further information:

<http://www.cisco.com/cgi-bin/bugtool/onebug.pl?bugid=CSCdw65903>

Open Caveats for Release 12.0(5)XK1

This section describes possibly unexpected behavior by Release 12.0(5)XK1. Unless otherwise noted, these caveats apply to all 12.0 releases up to and including 12.0(5)XK1.

Basic System Services

- CSCdj54850

Brings IOS up to RFC 2217 spec. Adds in extra flow control for faxing through IOS. Corrects [now ignores] software flow control issue.

- CSCdk75315

Error messages are generated by RSP routers with VIP cards in some cases. The error messages are generally benign, indicating temporarily out of memory situations, which are then recovered from.

- CSCdm11467
SegV Exception in peer_list_sum, NTP related
When utilizing ntp private mode and control type messages for remote query, it is possible to see a router crash or traceback messages.
- CSCdm44772
If **sh run** or **wr t** are issued at exactly the same time from two different VTY, one session may finish before the other and trash a variable that still need to be used by the 1st session which causes a router crash.
Workaround: Don't do **sh run** at the same time from 2 VTY's.
- CSCdm78286
If you have a Vip2-50 with a ESA module for hardware encryption, you might be seeing this problem. Execute **show version** and look for 12.0.5, if rsp-dsv56i-mz.120-5 show interface stat and look for...

```
Router # sh int stat FastEthernet4/0/0 Switching path Pkts In Chars In Pkts Out Chars  
Out Processor 169 17028 5866912 2018892867 Route cache 5866778 2019797528 0 0 ^^notice  
no route cache^^ Distributed cache 0 0 0 0 Total 5866948 2019815576 5866912 2018892867  
Serial5/0/0 Switching path Pkts In Chars In Pkts Out Chars Out Processor 5964672  
1993916338 530 37168 Route cache 0 0 5958298 1967889708 ^^notice no route cache^^  
Distributed cache 0 0 0 0 Total 5964672 1993916338 5958828 1967926876
```
- CSCdm80864
The use of the command **backup interface bri 0** breaks the tdm-group command under the T1/E1 controllers in Cisco IOS 12.0(5)XK. Removing the command, saving the config to nvram, and reloading doesn't resolve the problem. The user must either:
write erase and reload
-or-
boot the router ignoring nvram
Reconfigure the router without the faulty command. The work-around is to disable ISDN backup.

IBM Connectivity

- CSCdm55118
A Cisco router using Advanced Peer-to-Peer Networking (APPN) may consume excessive CPU while issuing messages during a Locate storm. In particular, message: XXXTPD02_LOGMSG_01 can be issued repetitively.
- CSCdm71190
APPN Network Node router fails to allocate the conwinner session of its dual CP-CP session with an adjacent End Node. The conloser session will be setup correctly, but the conwinner sessions fails with sense 80140003 as indicated in the **debug appn ss**. The problem results after changing an adjacent Network Node to an End Node. The workaround is to cycle the link for this End Node.
- CSCdp00456
Router may crash when creating a circuit history for a DLSw lite circuit.
Workaround is to disable circuit history logging by configuring **no dlsw history-log**.

Interfaces and Bridging

- CSCdj54192

If an interface on a HSSI 1 port (PA-H or HIT+) card goes down/down and you see the following error message, you may be experiencing this problem:

```
%MUSELIX-1-STOPFAIL: XXXX: Stop Failed at disable port (XXXX = the interface affected)
%MUSELIX-1-STARTFAIL: XXXX: Start Failed at enable port MUESLIX-1-FAILURE_CAUSE:
SerialX/X:
```

This problem is caused by several factors.

Once it falls into this state, execute the following (undocumented) test commands -- (<CR> is a carriage return):

```
term len 0<CR> sh cont h 1/0<CR> test tpu b<CR> 1/0<CR> g<CR> x<CR> y<CR>
r<CR> s<CR> 3<CR> q<CR> test tpu b<CR> 1/1<CR> g<CR> x<CR> y<CR> r<CR>
s<CR> 3<CR> q<CR> test len 24<CR>
```

An example of this process can be obtained by using Bug Navigator II.

Note If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. You can reach Bug Navigator II on CCO at **Service & Support: Online Technical Support: Software Bug Toolkit** or at <http://www.cisco.com/support/bugtools>.

Resolved Caveats for Release 12.0(5)XK1

All caveats listed in this section are resolved in Release 12.0(5)XK1. This section only describes severity 1 and severity 2 caveats.

- CSCdm66420

Crashed happened on routing_svc, switching_svc, and bridging_svc HAWK testing after the configuration is done. It is in version 12.0(5.1)PI6.

The same problem is also seen on 12.0(19990715:065145) [BLD-v120_5_xk_throttle.990714 109] where is stack trace is the same.

- CSCdm67215

Regression of BVM (qsig) failed to pass the SETUP to the PBX (i.e., making an outgoing call). Apparently, some code changes for other boxes introduced the problem. A new field called bchan_reassigned is added to the isdn_bri structure. This structure is used to make calls to routines such as process_bri_call. For the MC3810, we have an api (ccsapi.c) to translate ccs api messages to isdn host messages, the person(s) who add this field forgot to initialize the field for this api, and thus contains garbage.

This is causing the "UNKNOWN BCHANNEL" problem shown by the regression.

- CSCdm70244

Clocking configuration information may be over written if the hw work-around software is running while a clocking config change is made.

- CSCdm70913

Cannot configure more than one channel-group on E1.

- CSCdm72687

In FRF8, the IWF is setting the DE bit of the FR frame only if the last cell of a AAL5 pack has the CLP bit set. According to the FRF.8 spec, the DE bit should be set if any of the cells of a fragmented AAL5 packet has the CLP bit set.

- CSCdm72696

FRF.8 ATM PVCs cannot be removed if the corresponding FR VCs are not configured on the IWF.

Caveats for Release 12.0(5)XK

This section describes possibly unexpected behavior by Release 12.0(5)XK. Unless otherwise noted, these caveats apply to all 12.0 releases up to and including 12.0(5)XK.

Basic System Services

- CSCdk33632

Under noisy line conditions, a giant packet followed by a runt packet on a serial line causes a Cisco 2600 router to crash or report spurious accesses.

- CSCdk72065

The correct buffer size should be determined before zeroing out the buffer.

- CSCdm07937

When a customer repeatedly executed the command **write term**, a GSR shut down due to environmental alarms. The env table, which is used to compare with measured readings, was corrupted.

- CSCdm11467

An NTP-related SegV Exception occurs in peer_list_sum.

When NTP private mode is used with control type messages for remote queries, a router can crash or issue traceback messages.

- CSCdm45305

On the Cisco MC3810, comfort-noise generation cannot be disabled.

Workaround: Disable VAD, as comfort noise is only applicable when VAD is engaged.

IBM Connectivity

- CSCdm11922

Environment: DLSW direct encapsulation serial link WAN with Ethernet LAN on one side and Token Ring LAN on the other.

Observed Problem: Connections are only established from the Token Ring side.

Workaround: Raise the MTU of the serial WAN to 1800 bytes or so.

Fix: The code will be altered to allow connections from Ethernet end stations even with the WAN MTU at 1500. Network administrators must make sure that no packets of 1500 bytes (pre-encapsulation) come in off the LAN. This sets up the possibility of hung sessions with oversized packets, but it allows well-configured networks to run without modification.

- CSCdm34552

A router crashed from a bus error at PC_inm_add_entry, probably because it received a frame on its Token Ring interface that pertains to LNM and also has its RIF length greater than 7 hops.

Workaround: Try deactivating LNM REM with the **no lnm rem** command.

Interfaces and Bridging

- CSCdj54192

If an interface on a HSSI 1 port (PA-H or H1T+) card goes down/down and you see the following error message, that you may be experiencing this problem:

```
%MUSELIX-1-STOPFAIL: XXXX: Stop Failed at disable port (XXXX = the interface
affected) %MUSELIX-1-STARTFAIL: XXXX: Start Failed at enable port
MUESLIX-1-FAILURE_CAUSE: SerialX/X:
```

This problem is caused by several factors.

Once it falls into this state, execute the following (undocumented) test commands (<CR> is a carriage return):

```
term len 0<CR> sh cont h 1/0<CR> test tpu b<CR> 1/0<CR> g<CR> x<CR> y<CR> r<CR>
s<CR> 3<CR> q<CR> test tpu b<CR> 1/1<CR> g<CR> x<CR> y<CR> r<CR> s<CR>
3<CR> q<CR> test len 24<CR>
```

An example of this process can be obtained by using Bug Navigator II.

Note You can reach Bug Navigator II on CCO at **Service & Support: Online Technical Support: Software Bug Toolkit** or at <http://www.cisco.com/support/bugtools>.

- CSCdm46735

A PA-4R-DTR port may reset under the following circumstances:

- A high rate of traffic (200 pps or better) traversing the port
- The PA-4R-DTR port as the Active monitor of the physical ring
- An event on the ring forces the active monitor to purge the ring.

When this problem occurs, the PA-4R-DTR port resets, and the ring experiences a beacon.

Workaround: Make sure the DTR port is not the active monitor on the ring. Ensure that the MAC address of the DTR card is not the highest MAC address on the physical ring.

- CSCdm60960

With the following input-type-list, the router doesn't respond to an ARP request. Without the list or with the addition of a line for ARP packets, it works. You can still ping the interface IP address but not the HSRP address.

interface Ethernet0/0 ip address 13.13.13.1 255.255.255.0 standby 143 priority 110 preempt standby 143 ip 13.13.13.254 bridge-group 1 bridge-group 1 input-type-list 201 !

Workaround: Delete the input access lists on the bridge interface or permit the type 0x0806 in the access list.

IP Routing Protocols

- CSCdk08868

Symptom: Lock and Key idle timer is taking too long to time out. The idle timeout, as configured by the **autocommand access-enable** command, is taking too long to time out. While the logging is on for access list hits, the time that it takes to idle out (with no access list hits) is up to two times the length configured.

Conditions: If the dynamic entry is created by the Lock and Key feature that requires the user Telneting into the router, then the idle timeout takes up to two times the length configured by using the **autocommand access-enable host timeout minutes** command.

Workaround: Suggest customers that are running 11.1 series of images with this problem to upgrade to 11.2.

Further problem description:

There are two fixes for this problem.

The first problem was that the router refreshes the last-hit timer against all the traffic coming into the interface instead of refreshing the timer only when the traffic matched the created dynamic access list.

The fix is to perform the checking of the source address of packets against the source address in the dynamic access list. If there is a match, then the last hit time stamp is refreshed.

The second problem is that when the last packet comes in really close to the creation time of the dynamic entry, the new delta time for the next expiration could be less than zero, due to the real timer event being processed later than the exact scheduled timeout. The timer routine figures out the next expiration time by using the total idle timer value minus the time elapsed since the last reference timestamp. But the timer routine is scheduled later than the expected expiration time due to other activities in the router.

```
last reference calculated expiration time (3 minutes) | (2 seconds) | v v
|-----|-----|-----|----- ^ ^ | | +-+ dynamic ACL is created +-+ the
timeout event get processed (3 minutes and 5 seconds)
```

The elapsed time (now timestamp minus last reference timestamp) is 3 minutes and 3 seconds (3 minutes 5 seconds minus 2 seconds), which is greater than 3 minutes as shown above. We should only extend the expiration time for one minute (due to the timer unit is 1 minute), but the old implementation extended a whole idle time (3 minutes) instead of 1 minute.

The fix for the second problem is to set the next expiration time of the idle timeout to be 1 minute from now.

Miscellaneous

- CSCdk03906

When running NAT and encryption, FTP fails, but Telnet and ping work. The TCP checksum is not calculated correctly. Removing NAT or encryption resolves the problem.

For performance reasons, decryption is not done until the packets are switched to the output interface. This caused the problem with IOS NAT, because NAT may need to do the payload translation for certain protocols. The affected protocols include FTP and NetBios, for example.
- CSCdk29115

When you configure Bisync (**encapsulation bstun**) with the ASCII character set (**bsc char-set ascii**) on the first port of a serial WIC (1T, 2T, or 2A/S) in WIC slot 0 of a Cisco 2600 series router, only the first character of each frame is received, and the BSTUN tunnel is not established. This only affects Bisync mode when it is configured with the ASCII character set. Other encapsulations are not affected, and use of the EBCDIC character set with Bisync works correctly.

For the first serial port in WIC slot 0, the parity detection is not configured correctly for Bisync in ASCII mode. The first character of each frame generates a parity error that causes the receiver to discard the frame after the first character received.

Workaround: Use a different serial port, either the second serial port (port 1) on a 2T or 2A/S WIC in WIC slot 0, or any serial port in WIC slot 1. If you have only one serial WIC, moving it from WIC slot 0 to WIC slot 1 fixes this problem.
- CSCdk34543

Encryption does not work properly with following hardware combination: 7500, VIP2-40, PA-2CE1 (or PA-CE1) when the channelized E1 interface is configured for Frame Relay.

The problem is related to distributed services, and only the channelized E1 PAs on the VIP2-40 are affected.

Workaround: Use VIP2-15 instead of VIP2-40.
- CSCdk46853

In Release 11.2P and 11.3, when Fast Ethernet subinterfaces are configured for encryption and the crypto map is only applied to the main interface with the IP address configured in the subinterface, the packets can be switched in the clear. In Release 12.0, enabling CEF can cause the packets to be dropped.
- CSCdk55110

When tunneling IPX over an IP tunnel, and when using an extended inbound access list for IP on the tunnel interface, the IPX traffic is blocked by the access list.

Workaround: Add a **permit gre** statement in the extended access list.
- CSCdk66567

If Token Ring is the endpoint of an encrypted tunnel, extra packets are generated.

Symptoms are a high CPU load (mainly taken by the crypto engine) and bogus addresses when you enable the **debug tunnel** command.

Workaround: Use the interface command **tunnel sequence-datagrams** on both endpoints of the tunnel.

- CSCdk79294

A PA-A3 ATM Enhanced Port Adapter may cause a VIP crash. Console messages like the following one appear:

```
%ATMPA-3-BADPARTICLE: ATM0/0: bad rx particle 0x605C7C80 index 282 -Traceback=
6015D550 60170C50 60171B78 600A8FB4
```

The **show diag** command for that VIP displays an address error (load or instruction fetch) exception.

- CSCdm30103

The Cisco 1700 Fast Ethernet interface receives input errors when small packets (less than 200 bytes) are received while the interface is receiving 500 packets per second and running fast switching.

- CSCdm31275

A Cisco AS5300 may crash when running very high traffic (60 pps on all 96 channels) with calls are being setup and torn down continuously.

- CSCdm39879

If VAD is enabled on VoFR/VoATM calls on a Cisco MC3810, there may be significant voice quality degradation.

Workaround: Disable VAD by placing a **no vad** statement in all VoFR or VoATM dial peers.

- CSCdm45085

If the IDB is not defined, IPSec crashes. There is no known workaround. See CSCdm52531 for a description.

- CSCdm55716

An ATM subinterface drops packets when distributed CEF is disabled

The problem only occurs on subinterfaces created after DCEF was on and then turned off.

Workaround: Enable and then disable DCEF after creating a new subinterface.

- CSCdm57609

PA-A2 may cause memory corruption if you are using SVCs with ARP server when you shut down the interface.

- CSCdm60622

SS-EVAL GWs running 12.0(5)T ignore or discard RAS messages that contain cleartokens other than settlement cleartokens. This can prevent the establishment of calls when interacting with vendor systems that include cleartokens where the Object IDs in the nonStandarParameter fields are coded to be anything other than OSP cleartokens.

Novell IPX, XNS, and Apollo Domain

- CSCdm56600

Images without the IPX-EIGRP subsystem have high CPU load due to continually triggering an attempt to process EIGRP-specific service information when no information is present. There is no workaround.

Wide-Area Networking

- CSCdm12648
All platforms running MLP can encounter a transient error condition where no links are assigned to a multi-link bundle.
- CSCdm48047
A Cisco 4000 series router can crash when configuring LECS, LES/BUS, and LEC on the router. This crash occurs on 11.3(9)WA4(11.1). There is no workaround.
- CSCdm57650
In a multi-chassis MLP stack group where two stack group members cross project MLP link interfaces, one of the stack group member may crash. There is no workaround.
- CSCdm61038
It is not possible to change the status of channel 31 (the 32nd channel) in an ISDN E1.

Related Documentation

The following sections describe the documentation available for the Cisco 2600 series. 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 CCO and the Documentation CD-ROM.

Use these release notes with these documents:

- Release-Specific Documents, page 27
- Platform-Specific Documents, page 28
- Feature Modules, page 29
- Cisco IOS Software Documentation Set, page 29

Release-Specific Documents

The following documents are specific to Cisco IOS Releases 12.0 T and 12.0, on which Release 12.0(5)XK1 is based and located on CCO and the Documentation CD-ROM:

- *Cross-Platform Release Notes for Cisco IOS Release 12.0*

On CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Release Notes: Cross-Platform Release Notes

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Release Notes: Cross-Platform Release Notes

- Product bulletins, field notices, and other release-specific documents on CCO:
Service & Support: Technical Documents
- Caveat documents

As a supplement to the caveats listed in the “Caveats” section in these release notes, see *Caveats for Cisco IOS Release 12.0 T* which contains caveats applicable to all platforms for all maintenance releases of Release 12.0 T. Caveats for Release 12.0(5)T apply to Release 12.0(5)XK1.

On CCO:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Caveats: Caveats for Cisco IOS Release 12.0 T

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS 12.0: Caveats: Caveats for Cisco IOS Release 12.0 T

Note If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. You can reach Bug Navigator II on CCO at **Service & Support: Online Technical Support: Software Bug Toolkit** or at <http://www.cisco.com/support/bugtools>.

Platform-Specific Documents

These documents are available for the Cisco 2600 on CCO and on the Documentation CD-ROM.

- *Quick Start Guide Cisco 2600 Series Cabling and Setup*
- *Cisco 2600 Series Hardware Installation Guide*
- *Network Modules Hardware Installation Guide*
- *Update to Network Module Hardware and Software Guides*
- *Cisco WAN Interface Cards Hardware Installation Guide*
- *Update to WAN Interface Cards Hardware Installation Guide*
- *Software Configuration Guide For Cisco 3600 and Cisco 2600 Series Routers*
- *New and Changed Show Commands for the Cisco 2600 Series Routers*
- *Cisco 2600 Series Configuration Notes*
- *Analog Modem Firmware*
- *Analog modem firmware release notes and AT command set*
- *Cisco 2600 Series Cabling Specifications*
- *Cisco Modular Access Router Cable Specifications*

On CCO:

Service & Support: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers

On the Documentation CD-ROM:

Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers

Feature Modules

Feature modules describe new features supported by Cisco IOS Release 12.0 T and 12.0(5)XK1, and updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the feature, benefits, configuration tasks, and a command reference. As updates, the feature modules are available online only. Feature module information is incorporated in the next printing of the Cisco IOS documentation set.

On CCO:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: New Feature Documentation

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0: New Feature Documentation

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 which are shipped with your order in electronic form on the Documentation CD-ROM—unless you specifically ordered the printed versions.

Documentation Modules

Each module in the Cisco IOS documentation set consists of two books: a configuration guide and a corresponding command reference. Chapters in a configuration guide describe protocols, configuration tasks, Cisco IOS software functionality, and comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Each configuration guide can be used in conjunction with its corresponding command reference.

On CCO:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Configuration Guides and Command References

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Configuration Guides and Command References

Cisco IOS Release 12.0 Documentation Set

Table 6 describes the contents of the Cisco IOS Release 12.0 software documentation set. The document set is available in electronic form and also in printed form upon request.

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

On CCO:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Configuration Guides and Command References

Related Documentation

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Configuration Guides and Command References.

Table 6 Cisco IOS Software Release 12.0 Documentation Set

Books	Chapter Topics
<ul style="list-style-type: none"> • <i>Configuration Fundamentals Configuration Guide</i> • <i>Configuration Fundamentals Command Reference</i> 	Configuration Fundamentals Overview Cisco IOS User Interfaces File Management System Management
<ul style="list-style-type: none"> • <i>Bridging and IBM Networking Configuration Guide</i> • <i>Bridging and IBM Networking Command Reference</i> 	Transparent Bridging Source-Route Bridging Token Ring Inter-Switch Link Remote Source-Route Bridging DLSw+ STUN and BSTUN LLC2 and SDLC IBM Network Media Translation DSPU and SNA Service Point SNA Frame Relay Access Support APPN Cisco Database Connection NCIA Client/Server Topologies Cisco Mainframe Channel Connection Airline Product Set
<ul style="list-style-type: none"> • <i>Dial Solutions Configuration Guide</i> • <i>Dial Solutions Command Reference</i> 	X.25 over ISDN Appletalk Remote Access Asynchronous Callback, DDR, PPP, SLIP Bandwidth Allocation Control Protocol ISDN Basic Rate Service ISDN Caller ID Callback PPP Callback for DDR Channelized E1 & T1 Dial Backup for Dialer Profiles Dial Backup Using Dialer Watch Dial Backup for Serial Lines Peer-to-Peer DDR with Dialer Profiles DialOut Dial-In Terminal Services Dial-on-Demand Routing (DDR) Dial Backup Dial-Out Modem Pooling Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Dialup Networks Dial Business Solutions and Examples
<ul style="list-style-type: none"> • <i>Cisco IOS Interface Configuration Guide</i> • <i>Cisco IOS Interface Command Reference</i> 	Interface Configuration Overview LAN Interfaces Logical Interfaces Serial Interfaces

Table 6 Cisco IOS Software Release 12.0 Documentation Set (continued)

Books	Chapter Topics
<ul style="list-style-type: none"> • <i>Network Protocols Configuration Guide, Part 1</i> • <i>Network Protocols Command Reference, Part 1</i> 	IP Overview IP Addressing and Services IP Routing Protocols
<ul style="list-style-type: none"> • <i>Network Protocols Configuration Guide, Part 2</i> • <i>Network Protocols Command Reference, Part 2</i> 	AppleTalk Novell IPX
<ul style="list-style-type: none"> • <i>Network Protocols Configuration Guide, Part 3</i> • <i>Network Protocols Command Reference, Part 3</i> 	Network Protocols Overview Apollo Domain Banyan VINES DECnet ISO CLNS XNS
<ul style="list-style-type: none"> • <i>Security Configuration Guide</i> • <i>Security Command Reference</i> 	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options
<ul style="list-style-type: none"> • <i>Cisco IOS Switching Services Configuration Guide</i> • <i>Cisco IOS Switching Services Command Reference</i> 	Switching Services Switching Paths for IP Networks Virtual LAN (VLAN) Switching and Routing
<ul style="list-style-type: none"> • <i>Wide-Area Networking Configuration Guide</i> • <i>Wide-Area Networking Command Reference</i> 	Wide-Area Network Overview ATM Frame Relay SMDS X.25 and LAPB
<ul style="list-style-type: none"> • <i>Voice, Video, and Home Applications Configuration Guide</i> • <i>Voice, Video, and Home Applications Command Reference</i> 	Voice over IP Voice over Frame Relay Voice over ATM Voice over HDLC Frame Relay-ATM Internetworking Synchronized Clocks Video Support Universal Broadband Features
<ul style="list-style-type: none"> • <i>Quality of Service Solutions Configuration Guide</i> • <i>Quality of Service Solutions Command Reference</i> 	Policy-Based Routing QoS Policy Propagation via BGP Committed Access Rate Weighted Fair Queueing Custom Queueing Priority Queueing Weighted Random Early Detection Scheduling Signaling RSVP Packet Drop Frame Relay Traffic Shaping Link Fragmentation RTP Header Compression

Table 6 Cisco IOS Software Release 12.0 Documentation Set (continued)

Books	Chapter Topics
<ul style="list-style-type: none">• <i>Cisco IOS Software Command Summary</i>• <i>Dial Solutions Quick Configuration Guide</i>• <i>System Error Messages</i>• <i>Debug Command Reference</i>	

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* that shipped with your product.

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

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

Software Configuration Tips on Cisco’s Technical Assistance Center Home Page

If you have a CCO login account, you can access the following URL, which contains links and tips on configuring your Cisco products:

http://www.cisco.com/kobayashi/serv_tips.shtml

This URL is subject to change without notice. If it changes, point your Web browser to CCO and click on this path: **Products & Technologies: Products: Technical Tips.**

The following sections are provided from the Technical Tips page:

- **Access Dial Cookbook**—Contains common configurations or recipes for configuring various access routes and dial technologies.
- **Field Notices**—Notifies you of any critical issues regarding Cisco products and includes problem descriptions, safety or security issues, and hardware defects.
- **Frequently Asked Questions**—Describes the most frequently asked technical questions about Cisco hardware and software.
- **Hardware**—Provides technical tips related to specific hardware platforms.
- **Hot Tips**—Describes popular tips and hints gathered from the Cisco Technical Assistance Center (TAC). Most of these documents are available from the TAC Fax-on-demand service. To reach Fax-on-demand and receive documents at your fax machine from the United States, call 888-50-CISCO (888-502-4726). From other areas, call 650-596-4408.
- **Internetworking Features**—Lists tips on using Cisco IOS software features and services.
- **Sample Configurations**—Provides actual configuration examples that are complete with topology and annotations.

- Software Products—Contains Cisco IOS Software Bulletins, Cisco TCP/IP Suite 100, General Cisco IOS, Internet/Intranet Applications and Software, Network Management, Network Protection Software Tips, and WAN Switching Products and Software.
- Special Collections—Lists other helpful documents, including Case Studies, References & Request for Comments (RFCs), and Security Advisories.

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: <http://www.cisco.com>
- WWW: <http://www-europe.cisco.com>
- WWW: <http://www-china.cisco.com>
- Telnet: [cco.cisco.com](telnet://cco.cisco.com)
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section on page 27.

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