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Release Notes for Cisco 7000 Family for Cisco IOS Release 11.3 T

August 2, 1999

These release notes for the Cisco 7000 family of routers support Cisco IOS Release 11.3 T, up to and including Release 11.3(11)T. These release notes are updated as needed to describe new features, memory requirements, hardware support, software platform deferrals, and changes to the microcode or modem code and related documents.

For a list of software caveats that apply to Release 11.3 T, refer to the *Caveats for Cisco IOS Release 11.3 T* document and the “Important Notes and Caveats” section of the *Cross-Platform Release Notes for Cisco IOS Release 11.3*. The caveats document is updated for every maintenance release and is located on Cisco Connection Online (CCO) and the Documentation CD-ROM. For more information, see the “Caveats” section on page 51 of this document.

Use these release notes with the cross-platform *Release Notes for Cisco IOS Release 11.3* located on Cisco Connection Online (CCO) and the Documentation CD-ROM.

Contents

These release notes discuss the following topics:

- System Requirements, page 2
- New and Changed Information, page 35
- Limitations and Restrictions, page 47
- Important Notes, page 50
- Caveats, page 51
- Related Documentation, page 52
- Service and Support, page 56
- Cisco Connection Online, page 57
- Documentation CD-ROM, page 58

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System Requirements

This section describes the system requirements for Release 11.3 T and includes the following sections:

- Memory Requirements, page 2
- Hardware Supported, page 3
- Determining the Version of Your Software Release, page 5
- Updating to a New Software Release, page 5
- Microcode Software, page 6
- Feature Set Tables, page 6

Memory Requirements

Table 1 describes the memory requirements for the feature sets for the Cisco 7000 family of routers supported by Cisco IOS Release 11.3 T.

All feature sets for Cisco 7500 series and Cisco 7000 series routers with the RSP7000 and RSP7000CI include VIP support.

Table 1 Memory Requirements for Cisco 7000 Family Routers

Platforms	Feature Sets	Image Name	Software Image	Required Flash Memory	Required DRAM Memory	Release 11.3 T Runs From
Cisco 7200 series	IP Standard Feature Set	IP	c7200-is-mz	16 MB	32 MB	RAM
		IP 40	c7200-is40-mz	16 MB	32 MB	RAM
		IP IPsec 56	c7200-is56i-mz	16 MB	32 MB	RAM
	Desktop/IBM Standard Feature Set	Desktop/IBM	c7200-ds-mz	16 MB	32 MB	RAM
		Desktop/IBM/40	c7200-ds40-mz	16 MB	32 MB	RAM
		Desktop/IBM/IPsec 56	c7200-ds56i-mz	16 MB	32 MB	RAM
	Enterprise Standard Feature Set	Enterprise	c7200-js-mz	16 MB	32 MB	RAM
		Enterprise 40	c7200-js40-mz	16 MB	32 MB	RAM
		Enterprise/IPsec 56	c7200-js56i-mz	16 MB	32 MB	RAM
	Enterprise/APPN Standard Feature Set	Enterprise/APPN	c7200-ajs-mz	16 MB	32 MB	RAM
		Enterprise/APPN/40	c7200-ajs40-mz	16 MB	32 MB	RAM
		Enterprise/APPN/IPsec 56	c7200-ajs56i-mz	16 MB	32 MB	RAM
	Enterprise/APPN DBConn Standard Feature Set	Enterprise/APPN/DBConn	c7200-aejs-mz	16 MB	32 MB	RAM
		Enterprise/APPN/DBConn 40	c7200-aejs40-mz	16 MB	32 MB	RAM
		Enterprise/APPN/DBConn IPsec 56	c7200-aejs56i-mz	16 MB	32 MB	RAM
Network Layer 3 Switching	Network Layer 3 Switching	c7200-inu-mz	16 MB	32 MB	RAM	

Table 1 Memory Requirements for Cisco 7000 Family Routers

Platforms	Feature Sets	Image Name	Software Image	Required Flash Memory	Required DRAM Memory	Release 11.3 T Runs From
Cisco 7500 Series and Cisco 7000 Series with RSP7000 and RSP7000CI	IP Standard Feature Set	IP	rsp-isv-mz	16 MB	32 MB	RAM
		IP 40	rsp-isv40-mz	16 MB	32 MB	RAM
		IP IPSec 56	rsp-isv56i-mz	16 MB	32 MB	RAM
	Desktop/IBM Standard Feature Set	Desktop/IBM	rsp-dsv-mz	16 MB	32 MB	RAM
		Desktop/IBM/40	rsp-dsv40-mz	16 MB	32 MB	RAM
		Desktop/IBM/IPSec 56	rsp-dsv56i-mz	16 MB	32 MB	RAM
	Enterprise Standard Feature Set	Enterprise	rsp-jsv-mz	16 MB	32 MB	RAM
		Enterprise 40	rsp-jsv40-mz	16 MB	32 MB	RAM
		Enterprise IPSec 56	rsp-jsv56i-mz	16 MB	32 MB	RAM
	Enterprise/APPN Standard Feature Set	Enterprise/APPN	rsp-ajsv-mz	16 MB	32 MB	RAM
		Enterprise/APPN 40	rsp-ajsv40-mz	16 MB	32 MB	RAM
		Enterprise/APPN/IPSec 56	rsp-ajsv56i-mz	16 MB	32 MB	RAM
	Enterprise/APPN/DBConn Standard Feature Set	Enterprise/APPN/DBConn	rsp-aejsv-mz	16 MB	32 MB	RAM
		Enterprise/APPN/DBConn 40	rsp-aejsv40-mz	16 MB	32 MB	RAM
		Enterprise/APPN/DBConn IPSec 56	rsp-aejsv56i-mz	16 MB	32 MB	RAM

Hardware Supported

Cisco IOS Release 11.3 T supports the following Cisco 7000 family platforms:

- Cisco 7200 series (including the Cisco 7204 and Cisco 7206)
- Cisco 7500 series (including the Cisco 7505, Cisco 7507, and Cisco 7513)
- Cisco 7000 series routers (including the Cisco 7000 and Cisco 7010) upgraded with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI)

Note In this document, the Cisco 7500/RSP series includes both the Cisco 7500 series and the Cisco 7000 series equipped with the RSP7000 and RSP7000CI.

Table 2 summarizes the LAN interfaces supported on the Cisco 7000 family of routers.

Table 3 summarizes the WAN data rates and interfaces supported on the Cisco 7000 family of routers.

“Yes” means that a particular data rate or interface is supported. “No” means that it is not.

Table 2 LAN Interfaces Supported on the Cisco 7000 Family of Routers

Interface	Cisco 7200 Series	Cisco 7500/RSP Series
100VG-Any LAN	Yes	Yes
ATM Interface	Yes	Yes
Channel Interface	No	Yes
ESCON Channel Adapter (ECA)	No	Yes
Ethernet (10BaseFL)	Yes	Yes
Ethernet (10BaseT)	Yes	Yes
Ethernet (AUI)	Yes	Yes
Fast Ethernet (100BaseFX)	Yes	Yes
Fast Ethernet (100BaseTX)	Yes	Yes
FDDI DAS	Yes	Yes
FDDI full-duplex	Yes	Yes
FDDI multimode	Yes	Yes
FDDI SAS	No	Yes
FDDI single-mode	Yes	Yes
Parallel Channel Adapter (Bus and Tag)	No	Yes
Second-Generation Channel Interface	No	Yes
Second-Generation Versatile Interface	No	Yes
Token Ring 16-Mbps	Yes	Yes
Token Ring 4-Mbps	Yes	Yes
Token Ring full-duplex	Yes	Yes
Versatile Interface	No	Yes

Table 3 WAN Data Rates or Interfaces Supported on the Cisco 7000 Family of Routers

Data Rates or Interface	Cisco 7200 Series	Cisco 7500/RSP Series
Data Rate		
48/56/64 kbps	Yes	Yes
1.544/2.048 Mbps	Yes	Yes
34/45/52 Mbps	Yes	Yes
Interface		
Channelized E1	Yes	Yes
Channelized T1	Yes	Yes
Channelized T3	Yes	Yes
E1-G.703/G.704	Yes	Yes
EIA-530	Yes	Yes
EIA/TIA-232	Yes	Yes

Table 3 WAN Data Rates or Interfaces Supported on the Cisco 7000 Family of Routers (continued)

Data Rates or Interface	Cisco 7200 Series	Cisco 7500/RSP Series
EIA/TIA-449	Yes	Yes
EIA/TIA-613 (HSSI)	Yes	Yes
ISDN BRI	Yes	No
ISDN PRI	Yes	Yes
MultiChannel Interface (Channelized E1/T1)	Yes	Yes
Packet-over-SONET OC-3	No	Yes
Serial	Yes	Yes
V.35	Yes	Yes
X.21	Yes	Yes

Determining the Version of Your Software Release

To determine the version of Cisco IOS software running on your Cisco 7000 family router, log in to the router and enter the **show version EXEC** command:

```
router>show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-JS-M), Version 11.3(11)T, RELEASE SOFTWARE
```

Updating to a New Software Release

For information about upgrading to a new software release, see the *Cisco IOS Software Release 11.3 Upgrade Paths and Packaging Simplification* product bulletin located on CCO at:

Service & Support: Technical Documents: Product Bulletins: Software

Under **Cisco IOS 11.3**, click on **Cisco IOS Software Release 11.3 Upgrade Paths (#703: 12/97)**.

This product bulletin does not contain information specific to Cisco IOS Release 11.3 but provides generic upgrade information that may apply to Cisco IOS Release 11.3.

Microcode Software

Microcode software images are bundled with the system software image—with the exception of the Channel Interface Processor (CIP) microcode (all system software images). Bundling eliminates the need to store separate microcode images. When the router starts, the system software unpacks the microcode software bundle and loads the proper software on all the interface processor boards.

Table 4 lists the current microcode versions for the Cisco 7000 family of routers.

Table 4 Current Microcode Versions for the Cisco 7000 Family of Routers

Processor or Module	Current Bundled Microcode Version	Minimum Version Required
AIP (ATM Interface Processor)	20.13	20.5
EIP (Ethernet Interface Processor)	20.6	20.1
FEIP (Fast Ethernet Interface Processor)	20.8	20.1
FIP (FDDI Interface Processor)	20.4	20.1
FSIP (Fast Serial Interface Processor)	20.9	20.1
HIP (HSSI Interface Processor)	20.2	20.0
MIP (MultiChannel Interface Processor)	22.3	20.3
POSIP (Packet over SONET OC-3 Interface Processor)	20.0	20.0
TRIP (Token Ring Interface Processor)	20.2	20.0
VIP (Versatile Interface Processor)	22.20	21.9
VIP2/VIP2C (second-generation Versatile Interface Processor)	22.20	21.40

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 11.3 T supports the same feature sets as Cisco IOS Release 11.3, but Release 11.3 T can include new features supported by the Cisco 7000 family of routers. Table 5 lists the Cisco IOS software feature sets available for the Cisco 7000 family of routers in Cisco IOS Release 11.3 T.

Table 5 Feature Sets Supported by the Cisco 7000 Family

Feature Sets	Image Name	Software Image	Platform
IP Standard Feature Set	IP	c7200-is-mz	Cisco 7200 series
		rsp-isv-mz	Cisco 7500/RSP series
	IP 40	c7200-is40-mz rsp-isv40-mz	Cisco 7200 series Cisco 7500/RSP series
IP IPSec 56		c7200-is56i-mz	Cisco 7200 series
		rsp-isv56i-mz	Cisco 7500/RSP series

Table 5 Feature Sets Supported by the Cisco 7000 Family (continued)

Feature Sets	Image Name	Software Image	Platform
Desktop/IBM Standard Feature Set	Desktop IBM	c7200-ds-mz rsp-dsv-mz	Cisco 7200 series Cisco 7500/RSP series
	Desktop IBM 40	c7200-ds40-mz rsp-dsv40-mz	Cisco 7200 series Cisco 7500/RSP series
	Desktop IBM IPSec 56	c7200-ds56i-mz rsp-dsv56i-mz	Cisco 7200 series Cisco 7500/RSP series
Enterprise Standard Feature Set	Enterprise	c7200-js-mz rsp-jsv-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise 40	c7200-js40-mz rsp-jsv40-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise IPSec 56	c7200-js56i-mz rsp-jsv56i-mz	Cisco 7200 series Cisco 7500/RSP series
Enterprise/APPN Standard Feature Set	Enterprise/APPN	c7200-ajs-mz rsp-ajsv-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise/APPN 40	c7200-ajs40-mz rsp-ajs40-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise/APPN IPSec 56	c7200-ajs56i-mz rsp-ajs56i-mz	Cisco 7200 series Cisco 7500/RSP series
Enterprise/APPN/DBConn Standard Feature Set	Enterprise/APPN DBConn	c7200-aejs-mz rsp-aejsv-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise/APPN DBConn 40	c7200-aejs40-mz rsp-aejs40-mz	Cisco 7200 series Cisco 7500/RSP series
	Enterprise/APPN DBConn IPSec 56	c7200-aejs56i-mz rsp-aejs56i-mz	Cisco 7200 series Cisco 7500/RSP series
Network Layer 3 Switching	Network Layer 3 Switching	c7200-inu-mz	Cisco 7200 series



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 a limited distribution. Strong encryption images to be installed outside the United States, may require an export license. Customer orders may be denied or subject to delay due to United States government regulations. When applicable, 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.

System Requirements

Table 6, Table 7, and Table 8 list the features supported by the Cisco 7200 series routers. Table 9 and Table 10 list the features supported by the Cisco 7500 series routers and Cisco 7000 series with the RSP7000 and RSP7000CI. The tables use the following conventions to identify feature sets:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.
- In—The number in the “In” column indicates the Cisco IOS release in which the feature was introduced. For example, (2) means a feature was introduced in Release 11.3(2)T. If a cell in this column is empty, the feature was included in the initial base release.

Note This feature set table contains only a selected list of features. This table is not cumulative—nor does it list all the features in each image.

Table 6 Feature List by Feature Set for the Cisco 7200 Series, Part 1

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPSec 56	Desktop/IBM	Desktop/IBM 40	Desktop/IBM IPSec 56
IBM Support							
APPN High-Performance Routing		No	No	No	No	No	No
APPN MIB Enhancements		No	No	No	No	No	No
APPN over Ethernet LAN Emulation		No	No	No	No	No	No
APPN Scalability Enhancements		No	No	No	No	No	No
Bisync Enhancements, includes: — Bisync 3780 Support — BSC Extended Addressing — Block Serial Tunneling (BSTUN) over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes
Cisco MultiPath Channel (CMPC)		No	No	No	No	No	No
Database Connection Feature	(2)	No	No	No	No	No	No
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Feature List by Feature Set for the Cisco 7200 Series, Part 1 (continued)

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPsec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPsec 56
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes	Yes	Yes	Yes
TN3270 LU Nailing		No	No	No	No	No	No
TN3270 Server Enhancements		No	No	No	No	No	No
Token Ring LANE		No	No	No	No	No	No
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes	Yes	Yes	Yes
Internet							
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes	Yes	Yes	Yes
IP Routing							
Easy IP (Phase 1)		Yes	Yes	Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes	Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes	Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes	Yes	Yes	Yes
LAN Support							
AppleTalk Access List Enhancements		No	No	No	Yes	Yes	Yes
DECnet Accounting		No	No	No	Yes	Yes	Yes
IPX Named Access Lists		No	No	No	Yes	Yes	Yes
IPX SAP-after-RIP		No	No	No	Yes	Yes	Yes
NLSP Enhancements		No	No	No	No	No	No
NLSP Multicast Support		No	No	No	Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Feature List by Feature Set for the Cisco 7200 Series, Part 1 (continued)

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPsec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPsec 56
Management							
Cisco Call History MIB Command Line Interface		No	No	No	No	No	No
Cisco IOS Internationalization		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		No	No	No	No	No	No
SNMPv2C		Yes	Yes	Yes	Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes	Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia							
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes	Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Stub IP Multicast Routing		Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service							
RTP Header Compression		Yes	Yes	Yes	Yes	Yes	Yes
Security							
AAA Support for MS-CHAP	(3)	No	No	No	No	No	No
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Automated Double Authentication	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Certification Authority Interoperability	(3)	No	No	Yes	No	No	Yes
Context-Based Access Control	(3)	No	No	No	No	No	No
Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	No	No	No	No
HTTP Security		Yes	Yes	Yes	Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes	No	No	Yes
IPsec Network Security	(3)	No	No	Yes	No	No	Yes
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes	Yes	Yes
Reflexive Access Lists		Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Feature List by Feature Set for the Cisco 7200 Series, Part 1 (continued)

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPsec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPsec 56
TCP Intercept		No	No	No	No	No	No
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Switching							
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		No	No	No	Yes	Yes	Yes
CLNS and DECnet Fast Switching over PPP		No	No	No	No	No	No
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		No	No	No	No	No	No
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes	Yes	Yes
IPX Routing over ISL Virtual LANs		No	No	No	Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		No	No	No	No	No	No
Terminal Services							
Virtual Templates for Protocol Translation		No	No	No	No	No	No
WAN Optimization							
ATM MIB Enhancements		No	No	No	No	No	No
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes	Yes	Yes	Yes
PAD Enhancements		No	No	No	No	No	No
PAD Subaddressing		Yes	Yes	Yes	Yes	Yes	Yes
WAN Services							
Always on/Direct ISDN (AO/DI)	(3)	No	No	No	No	No	No
Bandwidth Allocation Control Protocol		Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes	Yes	Yes

Table 6 Feature List by Feature Set for the Cisco 7200 Series, Part 1 (continued)

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPSec 56	Desktop/IBM	Desktop/IBM 40	Desktop/IBM IPSec 56
ISDN Advice of Charge		No	No	No	No	No	No
ISDN Caller ID Callback		No	No	No	No	No	No
ISDN NFAS	(3)	No	No	No	No	No	No
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No	No	No	No
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
PPP over ATM		No	No	No	No	No	No
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Stackable Home Gateway	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Telnet Extensions for Dialout		No	No	No	No	No	No
X.25 Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
X.25 on ISDN		No	No	No	No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes	Yes	Yes	Yes
X.28 Emulation		No	No	No	No	No	No

1 Indicates the maintenance release in which the feature was introduced.

Table 7 Feature List by Feature Set for the Cisco 7200 Series, Part 2

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPSec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPN IPSec 56
IBM Support							
APPN High-Performance Routing		No	No	No	Yes	Yes	Yes
APPN MIB Enhancements		No	No	No	Yes	Yes	Yes
APPN over Ethernet LAN Emulation		No	No	No	Yes	Yes	Yes
APPN Scalability Enhancements		No	No	No	Yes	Yes	Yes
Bisync Enhancements, includes: — Bisync 3780 Support — BSC Extended Addressing — Block Serial Tunneling (BSTUN) over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes

Table 7 Feature List by Feature Set for the Cisco 7200 Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPNIPsec 56
Cisco MultiPath Channel (CMPC)		No	No	No	No	No	No
Database Connection Feature	(2)	No	No	No	No	No	No
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes	Yes	Yes	Yes
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes	Yes	Yes	Yes
TN3270 LU Nailing		No	No	No	No	No	No
TN3270 Server Enhancements		No	No	No	No	No	No
Token Ring LANE		No	No	No	No	No	No
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes	Yes	Yes	Yes
Internet							
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes	Yes	Yes	Yes
IP Routing							
Easy IP (Phase 1)		Yes	Yes	Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes	Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes	Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 Feature List by Feature Set for the Cisco 7200 Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPNIPsec 56
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes	Yes	Yes	Yes
LAN Support							
AppleTalk Access List Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
DECnet Accounting		Yes	Yes	Yes	Yes	Yes	Yes
IPX Named Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
IPX SAP-after-RIP		Yes	Yes	Yes	Yes	Yes	Yes
NLSP Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
NLSP Multicast Support		Yes	Yes	Yes	Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Management							
Cisco Call History MIB Command Line Interface		No	No	No	No	No	No
Cisco IOS Internationalization		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		Yes	Yes	Yes	Yes	Yes	Yes
SNMPv2C		Yes	Yes	Yes	Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes	Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia							
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes	Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Stub IP Multicast Routing		Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service							
RTP Header Compression		Yes	Yes	Yes	Yes	Yes	Yes
Security							
AAA Support for MS-CHAP	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 Feature List by Feature Set for the Cisco 7200 Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPNIPsec 56
Automated Double Authentication	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Certification Authority Interoperability	(3)	No	No	Yes	No	No	Yes
Context-Based Access Control	(3)	No	No	No	No	No	No
Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	No	No	No	No
HTTP Security		Yes	Yes	Yes	Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes	No	No	Yes
IPsec Network Security	(3)	No	No	Yes	No	No	Yes
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes	Yes	Yes
Reflexive Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
TCP Intercept		Yes	Yes	Yes	Yes	Yes	Yes
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Switching							
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
CLNS and DECnet Fast Switching over PPP		Yes	Yes	Yes	Yes	Yes	Yes
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes	Yes	Yes
IPX Routing over ISL Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		No	No	No	No	No	No
Terminal Services							
Virtual Templates for Protocol Translation		Yes	Yes	Yes	Yes	Yes	Yes
WAN Optimization							
ATM MIB Enhancements		No	No	No	No	No	No

Table 7 Feature List by Feature Set for the Cisco 7200 Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPNIPsec 56
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes	Yes	Yes	Yes
PAD Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
PAD Subaddressing		Yes	Yes	Yes	Yes	Yes	Yes
WAN Services							
Always on/Direct ISDN (AO/DI)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Bandwidth Allocation Control Protocol		Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Advice of Charge		No	No	No	No	No	No
ISDN Caller ID Callback		No	No	No	No	No	No
ISDN NFAS	(3)	No	No	No	No	No	No
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No	No	No	No
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
PPP over ATM		No	No	No	No	No	No
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Stackable Home Gateway	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Telnet Extensions for Dialout		No	No	No	No	No	No
X.25 Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
X.25 on ISDN		No	No	No	No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes	Yes	Yes	Yes
X.28 Emulation		Yes	Yes	Yes	Yes	Yes	Yes

¹ Indicates the maintenance release in which the feature was introduced.

Table 8 Feature List by Feature Set for the Cisco 7200 Series, Part 3

Feature	Feature Set				
	In ¹	Enterprise/ APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/ DBConn IPSec 56	Network Layer 3 Switching
IBM Support					
APPN High-Performance Routing		Yes	Yes	Yes	No
APPN MIB Enhancements		Yes	Yes	Yes	No
APPN over Ethernet LAN Emulation		Yes	Yes	Yes	No
APPN Scalability Enhancements		Yes	Yes	Yes	No
Bisync Enhancements, includes: — Bisync 3780 Support — BSC Extended Addressing — Block Serial Tunneling (BSTUN) over Frame Relay		Yes	Yes	Yes	No
Cisco MultiPath Channel (CMPC)		No	No	No	No
Database Connection Feature	(2)	Yes	No	No	No
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes	No
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes	No
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes	Yes
TN3270 LU Nailing		No	No	No	No
TN3270 Server Enhancements		No	No	No	No
Token Ring LANE		No	No	No	No

Table 8 Feature List by Feature Set for the Cisco 7200 Series, Part 3 (continued)

Feature	Feature Set				
	In ¹	Enterprise/ APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/ DBConn IPSec 56	Network Layer 3 Switching
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes	No
Internet					
DRP Server Agent		Yes	Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes	Yes
IP Routing					
Easy IP (Phase 1)		Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes	Yes
LAN Support					
AppleTalk Access List Enhancements		Yes	Yes	Yes	No
DECnet Accounting		Yes	Yes	Yes	No
IPX Named Access Lists		Yes	Yes	Yes	Yes
IPX SAP-after-RIP		Yes	Yes	Yes	Yes
NLSP Enhancements		Yes	Yes	Yes	No
NLSP Multicast Support		Yes	Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes	Yes
Management					
Cisco Call History MIB Command Line Interface		No	No	No	No
Cisco IOS Internationalization		Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		Yes	Yes	Yes	No
SNMPv2C		Yes	Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes	No

Table 8 Feature List by Feature Set for the Cisco 7200 Series, Part 3 (continued)

Feature	Feature Set				
	In ¹	Enterprise/ APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/ DBConn IPSec 56	Network Layer 3 Switching
Multimedia					
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes	Yes
Stub IP Multicast Routing		Yes	Yes	Yes	Yes
Quality of Service					
RTP Header Compression		Yes	Yes	Yes	Yes
Security					
AAA Support for MS-CHAP	(3)	Yes	Yes	Yes	No
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes
Automated Double Authentication	(3)	Yes	Yes	Yes	No
Certification Authority Interoperability	(3)	No	No	Yes	No
Context-Based Access Control	(3)	No	No	No	No
Double Authentication		Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	No	No
HTTP Security		Yes	Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes	No
IPSec Network Security	(3)	No	No	Yes	No
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes
Reflexive Access Lists		Yes	Yes	Yes	No
TCP Intercept		Yes	Yes	Yes	No
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes
Switching					
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		Yes	Yes	Yes	No
CLNS and DECnet Fast Switching over PPP		Yes	Yes	Yes	No

Table 8 Feature List by Feature Set for the Cisco 7200 Series, Part 3 (continued)

Feature	Feature Set				
	In ¹	Enterprise/ APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/ DBConn IPSec 56	Network Layer 3 Switching
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		Yes	Yes	Yes	No
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes
IPX Routing over ISL Virtual LANs		Yes	Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		No	No	No	No
Terminal Services					
Virtual Templates for Protocol Translation		Yes	Yes	Yes	No
WAN Optimization					
ATM MIB Enhancements		No	No	No	No
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes	Yes
PAD Enhancements		Yes	Yes	Yes	No
PAD Subaddressing		Yes	Yes	Yes	Yes
WAN Services					
Always on/Direct ISDN (AO/DI)	(3)	Yes	Yes	Yes	No
Bandwidth Allocation Control Protocol		Yes	Yes	Yes	No
Dialer Watch	(2)	Yes	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes
ISDN Advice of Charge		No	No	No	No
ISDN Caller ID Callback		No	No	No	No
ISDN NFAS	(3)	No	No	No	No
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No	No

Table 8 Feature List by Feature Set for the Cisco 7200 Series, Part 3 (continued)

Feature	Feature Set				
	In ¹	Enterprise/ APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/ DBConn IPSec 56	Network Layer 3 Switching
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes	Yes
PPP over ATM		No	No	No	No
PPP over Frame Relay	(4)	Yes	Yes	Yes	No
Stackable Home Gateway	(3)	Yes	Yes	Yes	No
Telnet Extensions for Dialout		No	No	No	No
X.25 Enhancements		Yes	Yes	Yes	Yes
X.25 on ISDN		No	No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes	Yes
X.28 Emulation		Yes	Yes	Yes	No

¹ Indicates the maintenance release in which the feature was introduced.

Table 9 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 1

Feature	Feature Set						
	In ¹	IP	IP 40	IP IPSec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPSec 56
IBM Support							
APPN High-Performance Routing		No	No	No	No	No	No
APPN MIB Enhancements		No	No	No	No	No	No
APPN over Ethernet LAN Emulation		No	No	No	No	No	No
APPN Scalability Enhancements		No	No	No	No	No	No
Cisco MultiPath Channel (CMPC)		Yes	Yes	Yes	Yes	Yes	Yes
Database Connection Feature	(2)	No	No	No	No	No	No

Table 9 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 1 (continued)

Feature	Feature Set						
	In 1	IP	IP 40	IP IPSec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPSec 56
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes	Yes	Yes	Yes
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes	Yes	Yes	Yes
TN3270 LU Nailing		Yes	Yes	Yes	Yes	Yes	Yes
TN3270 Server Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Token Ring LANE		Yes	Yes	Yes	Yes	Yes	Yes
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes	Yes	Yes	Yes
Internet							
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes	Yes	Yes	Yes
IP Routing							
Easy IP (Phase 1)		Yes	Yes	Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes	Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes	Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes	Yes	Yes	Yes

Table 9 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 1 (continued)

Feature	Feature Set						
	In 1	IP	IP 40	IP IPSec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPSec 56
LAN Support							
AppleTalk Access List Enhancements		No	No	No	Yes	Yes	Yes
DECnet Accounting		No	No	No	Yes	Yes	Yes
IPX Named Access Lists		No	No	No	Yes	Yes	Yes
IPX SAP-after-RIP		No	No	No	Yes	Yes	Yes
NLSP Enhancements		No	No	No	No	No	No
NLSP Multicast Support		No	No	No	Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Management							
Cisco Call History MIB Command Line Interface		Yes	Yes	Yes	Yes	Yes	Yes
Cisco IOS Internationalization		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		No	No	No	No	No	No
SNMPv2C		Yes	Yes	Yes	Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes	Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia							
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes	Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Stub IP Multicast Routing		Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service							
RTP Header Compression		Yes	Yes	Yes	Yes	Yes	Yes
Security							
AAA Support for MS-CHAP	(3)	No	No	No	No	No	No
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Automated Double Authentication	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Certification Authority Interoperability	(3)	No	No	Yes	No	No	Yes
Context-Based Access Control	(3)	No	No	No	No	No	No

Table 9 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 1 (continued)

Feature	Feature Set						
	In 1	IP	IP 40	IP IPSec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPSec 56
Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	No	No	No	No
HTTP Security		Yes	Yes	Yes	Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes	No	No	Yes
IPSec Network Security	(3)	No	No	Yes	No	No	Yes
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes	Yes	Yes
Reflexive Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
TCP Intercept		No	No	No	No	No	No
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Switching							
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		No	No	No	Yes	Yes	Yes
CLNS and DECnet Fast Switching over PPP		No	No	No	No	No	No
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		No	No	No	No	No	No
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes	Yes	Yes
IPX Routing over ISL Virtual LANs		No	No	No	Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		Yes	Yes	Yes	Yes	Yes	Yes
Terminal Services							
Virtual Templates for Protocol Translation		No	No	No	No	No	No
WAN Optimization							
ATM MIB Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes	Yes	Yes	Yes
PAD Enhancements		No	No	No	No	No	No
PAD Subaddressing		Yes	Yes	Yes	Yes	Yes	Yes

Table 9 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 1 (continued)

Feature	Feature Set						
	In 1	IP	IP 40	IP IPSec 56	Desktop/ IBM	Desktop/ IBM 40	Desktop/ IBM IPSec 56
WAN Services							
Always on/Direct ISDN (AO/DI)	(3)	No	No	No	No	No	No
Bandwidth Allocation Control Protocol		Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Advice of Charge		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Caller ID Callback		Yes	Yes	Yes	Yes	Yes	Yes
ISDN NFAS	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No	No	No	No
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
PPP over ATM		Yes	Yes	Yes	Yes	Yes	Yes
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Stackable Home Gateway	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Telnet Extensions for Dialout		No	No	No	No	No	No
X.25 Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
X.25 on ISDN		No	No	No	No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes	Yes	Yes	Yes
X.28 Emulation		No	No	No	No	No	No

1 Indicates the maintenance release in which the feature was added.

Table 10 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 2

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPN IPsec 56
IBM Support							
APPN High-Performance Routing		No	No	No	Yes	Yes	Yes
APPN MIB Enhancements		No	No	No	Yes	Yes	Yes
APPN over Ethernet LAN Emulation		No	No	No	Yes	Yes	Yes
APPN Scalability Enhancements		No	No	No	Yes	Yes	Yes
Cisco MultiPath Channel (CMPC)		Yes	Yes	Yes	Yes	Yes	Yes
Database Connection Feature	(2)	No	No	No	No	No	No
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes	Yes	Yes	Yes
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes	Yes	Yes	Yes
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes	Yes	Yes	Yes
TN3270 LU Nailing		Yes	Yes	Yes	Yes	Yes	Yes
TN3270 Server Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Token Ring LANE		Yes	Yes	Yes	Yes	Yes	Yes
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes	Yes	Yes	Yes
Internet							
DRP Server Agent		Yes	Yes	Yes	Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes	Yes	Yes	Yes

Table 10 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enter- prise	Enterprise 40	Enter- prise IPSec 56	Enter- prise/ APPN	Enterprise/ APPN 40	Enterprise/ APPN IPSec 56
IP Routing							
Easy IP (Phase 1)		Yes	Yes	Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes	Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes	Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes	Yes	Yes	Yes
LAN Support							
AppleTalk Access List Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
DECnet Accounting		Yes	Yes	Yes	Yes	Yes	Yes
IPX Named Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
IPX SAP-after-RIP		Yes	Yes	Yes	Yes	Yes	Yes
NLSP Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
NLSP Multicast Support		Yes	Yes	Yes	Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes	Yes	Yes	Yes
Management							
Cisco Call History MIB Command Line Interface		Yes	Yes	Yes	Yes	Yes	Yes
Cisco IOS Internationalization		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		Yes	Yes	Yes	Yes	Yes	Yes
SNMPv2C		Yes	Yes	Yes	Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes	Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia							
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes	Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes	Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes	Yes	Yes	Yes

Table 10 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPN IPsec 56
Stub IP Multicast Routing		Yes	Yes	Yes	Yes	Yes	Yes
Quality of Service							
RTP Header Compression		Yes	Yes	Yes	Yes	Yes	Yes
Security							
AAA Support for MS-CHAP	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Automated Double Authentication	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Certification Authority Interoperability	(3)	No	No	Yes	No	No	Yes
Context-Based Access Control	(3)	No	No	No	No	No	No
Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	Yes	No	No	Yes
HTTP Security		Yes	Yes	Yes	Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes	No	No	Yes
IPsec Network Security	(3)	No	No	Yes	No	No	Yes
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes	Yes	Yes
Reflexive Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
TCP Intercept		Yes	Yes	Yes	Yes	Yes	Yes
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Switching							
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
CLNS and DECnet Fast Switching over PPP		Yes	Yes	Yes	Yes	Yes	Yes
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes	Yes	Yes

Table 10 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPN IPsec 56
IPX Routing over ISL Virtual LANs		Yes	Yes	Yes	Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		Yes	Yes	Yes	Yes	Yes	Yes
Terminal Services							
Virtual Templates for Protocol Translation		Yes	Yes	Yes	Yes	Yes	Yes
WAN Optimization							
ATM MIB Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes	Yes	Yes	Yes
PAD Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
PAD Subaddressing		Yes	Yes	Yes	Yes	Yes	Yes
WAN Services							
Always on/Direct ISDN (AO/DI)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Bandwidth Allocation Control Protocol		Yes	Yes	Yes	Yes	Yes	Yes
Dialer Watch	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Advice of Charge		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Caller ID Callback		Yes	Yes	Yes	Yes	Yes	Yes
ISDN NFAS	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No	No	No	No
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes	Yes	Yes	Yes
PPP over ATM		Yes	Yes	Yes	Yes	Yes	Yes
PPP over Frame Relay	(4)	Yes	Yes	Yes	Yes	Yes	Yes

Table 10 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 2 (continued)

Feature	Feature Set						
	In ¹	Enterprise	Enterprise 40	Enterprise IPsec 56	Enterprise/APPN	Enterprise/APPN 40	Enterprise/APPN IPsec 56
Stackable Home Gateway	(3)	Yes	Yes	Yes	Yes	Yes	Yes
Telnet Extensions for Dialout		No	No	No	No	No	No
X.25 Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
X.25 on ISDN		No	No	No	No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes	Yes	Yes	Yes
X.28 Emulation		Yes	Yes	Yes	Yes	Yes	Yes

1 Indicates the maintenance release in which the feature was added.

Table 11 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 3

Feature	Feature Set			
	In ¹	Enterprise/APPN/DBConn	Enterprise/APPN/DBConn 40	Enterprise/APPN/DBConn IPsec 56
IBM Support				
APPN High-Performance Routing		Yes	Yes	Yes
APPN MIB Enhancements		Yes	Yes	Yes
APPN over Ethernet LAN Emulation		Yes	Yes	Yes
APPN Scalability Enhancements		Yes	Yes	Yes
Cisco MultiPath Channel (CMPC)		Yes	Yes	Yes
Database Connection Feature	(2)	Yes	No	No
DLSw+ Enhancements, includes: — Backup Peer Extensions for Encapsulation Types — DLSw+ Border Peer Caching — DLSw+ MIB Enhancements — DLSw+ SNA Type of Service — LLC2-to-SDLC Conversion between PU4 Devices — NetBIOS Dial-on-Demand Routing — UDP Unicast Enhancement		Yes	Yes	Yes

Table 11 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 3 (continued)

Feature	Feature Set			
	In ¹	Enterprise/APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/DBConn IPSec 56
FRAS Enhancements, includes: — FRAS Boundary Network Node Enhancement — FRAS Dial Backup over DLSw+ — FRAS DLCI Backup — FRAS Host — FRAS MIB — SRB over Frame Relay		Yes	Yes	Yes
RIF Passthru in DLSw+	(3)	Yes	Yes	Yes
TN3270 LU Nailing		Yes	Yes	Yes
TN3270 Server Enhancements		Yes	Yes	Yes
Token Ring LANE		Yes	Yes	Yes
Tunneling of Asynchronous Security Protocols		Yes	Yes	Yes
Internet				
DRP Server Agent		Yes	Yes	Yes
DRP Server Agent Enhancements	(2)	Yes	Yes	Yes
IP Routing				
Easy IP (Phase 1)		Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations		Yes	Yes	Yes
IP Enhanced IGRP Route Authentication		Yes	Yes	Yes
IP for GRE Tunnels	(4)	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Time Stamp		Yes	Yes	Yes
LAN Support				
AppleTalk Access List Enhancements		Yes	Yes	Yes
DECnet Accounting		Yes	Yes	Yes
IPX Named Access Lists		Yes	Yes	Yes
IPX SAP-after-RIP		Yes	Yes	Yes
NLSP Enhancements		Yes	Yes	Yes
NLSP Multicast Support		Yes	Yes	Yes
Token Ring Inter-Switch Link	(4)	Yes	Yes	Yes

Table 11 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 3 (continued)

Feature	Feature Set			
	In ¹	Enterprise/APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/DBConn IPSec 56
Management				
Cisco Call History MIB Command Line Interface		Yes	Yes	Yes
Cisco IOS Internationalization		Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes
SNMP Inform Requests/SNMP Manager		Yes	Yes	Yes
SNMPv2C		Yes	Yes	Yes
Virtual Profiles		Yes	Yes	Yes
VPDN MIB and Syslog Facility	(3)	Yes	Yes	Yes
Multimedia				
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes	Yes
PIM Version 2	(2)	Yes	Yes	Yes
Stub IP Multicast Routing		Yes	Yes	Yes
Quality of Service				
RTP Header Compression		Yes	Yes	Yes
Security				
AAA Support for MS-CHAP	(3)	Yes	Yes	Yes
Additional Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes
Automated Double Authentication	(3)	Yes	Yes	Yes
Certification Authority Interoperability	(3)	No	No	Yes
Context-Based Access Control	(3)	No	No	No
Double Authentication		Yes	Yes	Yes
Encrypted Kerberized Telnet		No	No	Yes
HTTP Security		Yes	Yes	Yes
Internet Key Exchange Security Protocol	(3)	No	No	Yes
IPSec Network Security	(3)	No	No	Yes
Named Method Lists for AAA Authorization and Accounting	(3)	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes

Table 11 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 3 (continued)

Feature	Feature Set			
	In ¹	Enterprise/APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/DBConn IPSec 56
Reflexive Access Lists		Yes	Yes	Yes
TCP Intercept		Yes	Yes	Yes
Vendor-Proprietary RADIUS Attributes	(3)	Yes	Yes	Yes
Switching				
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs		Yes	Yes	Yes
CLNS and DECnet Fast Switching over PPP		Yes	Yes	Yes
DECnet/VINES/XNS over ISL, includes: — Banyan VINES Routing over ISL Virtual LANs — DECnet Routing over ISL Virtual LANs — XNS Routing over ISL Virtual LANs		Yes	Yes	Yes
Fast-Switched Policy Routing		Yes	Yes	Yes
IPX Routing over ISL Virtual LANs		Yes	Yes	Yes
VIP Distributed Switching Support for IP Encapsulated in ISL		Yes	Yes	Yes
Terminal Services				
Virtual Templates for Protocol Translation		Yes	Yes	Yes
WAN Optimization				
ATM MIB Enhancements		Yes	Yes	Yes
Enhanced ATM VC Configuration and Management	(2)	Yes	Yes	Yes
PAD Enhancements		Yes	Yes	Yes
PAD Subaddressing		Yes	Yes	Yes
WAN Services				
Always on/Direct ISDN (AO/DI)	(3)	Yes	Yes	Yes
Bandwidth Allocation Control Protocol		Yes	Yes	Yes
Dialer Watch	(2)	Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes

Table 11 Feature List by Feature Set for the Cisco 7500/RSP Series, Part 3 (continued)

Feature	Feature Set			
	In ¹	Enterprise/APPN/ DBConn	Enterprise/ APPN/ DBConn 40	Enterprise/ APPN/DBConn IPSec 56
Frame Relay Router ForeSight		Yes	Yes	Yes
ISDN Advice of Charge		Yes	Yes	Yes
ISDN Caller ID Callback		Yes	Yes	Yes
ISDN NFAS	(3)	Yes	Yes	Yes
Layer 2 Forwarding—Fast Switching		Yes	Yes	Yes
Leased Line ISDN at 128 kbps		No	No	No
Microsoft Point-to-Point Compression (MPPC)	(3)	Yes	Yes	Yes
MS Callback	(2)	Yes	Yes	Yes
Multiple ISDN Switch Types	(3)	Yes	Yes	Yes
National ISDN Switch Types for BRI and PRI Interfaces (NI2 Support)	(3)	Yes	Yes	Yes
PPP over ATM		Yes	Yes	Yes
PPP over Frame Relay	(4)	Yes	Yes	Yes
Stackable Home Gateway	(3)	Yes	Yes	Yes
Telnet Extensions for Dialout		No	No	No
X.25 Enhancements		Yes	Yes	Yes
X.25 on ISDN		No	No	No
X.25 Switching between PVCs and SVCs		Yes	Yes	Yes
X.28 Emulation		Yes	Yes	Yes

1 Indicates the maintenance release in which the feature was introduced.

New and Changed Information

The following sections list the new features supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3 T.

There are no new features supported by the Cisco 7000 family in Cisco IOS Release 11.3(5)T and later releases of 11.3 T.

New Hardware Features in Release 11.3(4)T

The following new hardware features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(4)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

PA-2FEISL 100BaseT Fast Ethernet/ISL Port Adapters

The PA-2FEISL 100BaseT Fast Ethernet/Inter-Switch Link (ISL) port adapters (PA-2FEISL-TX and PA-2FEISL-FX) are available for the Cisco 7200 series routers for the second-generation VIP2-15, VIP2-20, and VIP2-40 in all Cisco 7500 series routers, for Cisco 7000 series routers with the Cisco 7000 Series Route Switch Processor (RSP7000) and Cisco 7000 Series Chassis Interface (RSP7000CI).

The 2FEISL-TX or 2FEISL-FX port adapter provides two 100-Mbps, 100BaseT Fast Ethernet/ISL interfaces for VLAN transport over switch-to-switch backbone connections or switch-to-server data center attachments. These port adapters provide an inter-VLAN bridging and routing functionality that network administrators can use to deploy 100-Mbps Token Ring VLAN transport, 100-Mbps Ethernet VLAN transport, and bridging or routing between the mixed LAN types using the same physical ISL trunk links. Both full-duplex and half-duplex operation are supported for the 2FEISL-TX and 2FEISL-FX port adapters. For more information on the PA-2FEISL port adapters, refer to the publication *PA-2FEISL 100BaseT Fast Ethernet/ISL Port Adapter Installation and Configuration*.

New Software Features in Release 11.3(4)T

The following new software features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(4)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

IP Type of Service and Precedence for GRE Tunnels

Before this feature, at generic route encapsulation-based tunnel endpoints, the type of service (ToS) bits (including precedence bits) were not copied to the tunnel or GRE IP header that encapsulates the inner packet. Instead, those bits were set to zero. This was not a problem unless the intermediate routers between two tunnel endpoints honored ToS or precedence bits, in which case those settings were ignored.

With the advent of virtual private network (VPN) and QoS (quality of service) applications, it is desirable to copy the ToS bits when the router encapsulates the packets using GRE. Thus, intermediate routers between tunnel endpoints can take advantage of the QoS features such as weighted fair queuing (WFQ) and weighted random early detection (WRED).

PPP over Frame Relay

PPP over Frame Relay allows a router to establish end-to-end Point-to-Point (PPP) sessions over Frame Relay. IP datagrams are transported over the PPP link using RFC 1973-compliant Frame Relay framing. This feature is useful for remote users running PPP to access their Frame Relay corporate networks.

Token Ring Inter-Switch Link

The Token Ring Inter-Switch Link (TRISL) feature is a Cisco protocol for interconnecting multiple routers and switches and maintaining VLAN information as traffic goes between routers and switches. The TRISL feature provides a method to transport native Token Ring frames from multiple VLANs across a 100-Mbps Fast Ethernet link.

The TRISL feature provides the following new functions for routers and switches:

- Inter-VLAN routing for fast-switched IP and IPX routing protocols between Token Ring or Ethernet LANs for traffic with or without RIF.
- Source-route bridging (SRB), transparent bridging, source-route transparent bridging (SRT), and source-route translational (SR/TLB) bridging between ISL or TRISL VLANs and interfaces that are enabled for bridging. These interfaces can include Token Ring, Ethernet, FDDI, Token Ring-LANE, Ethernet-LANE, and any other media with encapsulations that support transparent bridging.

New Hardware Features in Release 11.3(3)T

The following new hardware features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(3)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

PA-4R-DTR Dedicated Token Ring Port Adapter

The Dedicated Token Ring port adapter (PA-4R-DTR) is available on Cisco 7500 series routers, Cisco 7200 series routers, and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The PA-4R-DTR provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces. Each Token Ring interface can be set for 4-Mbps or 16-Mbps half-duplex or full-duplex operation and can operate as a standard Token Ring station or as a concentrator port. The default for all interfaces is Token Ring station mode with half-duplex, 16-Mbps operation. The PA-4R-DTR connects over Type 1 lobe or Type 3 lobe cables, with each interface providing an RJ-45 receptacle.

Channel Port Adapter

The Channel Port Adapter (CPA) expands the value of Cisco's Channel Interface Processor (CIP) solution. The CIP continues to be the industry's premier high-performance mainframe channel connect router. The CPA extends the CIP architecture to customers requiring mid-range mainframe channel connectivity.

Note The Cisco Mainframe Channel Connection (CMCC) product family includes the Channel Interface Processor on Cisco 7500 series routers and the CPA on Cisco 7200 series routers.

The CPA is a standard single-width port adapter supporting Enterprise System Connection (ESCON) or parallel (also known as "bus and tag") channel interfaces to IBM and IBM-compatible mainframes.

The CPA comes with a default of 16 MB of RAM. Customers may upgrade to 32 MB of RAM either at the Cisco factory before the CPA is shipped or as a field upgrade after the CPA has been installed.

The only difference between channel software applications (Internet Protocol [IP] Datagram, Cisco Systems Network Architecture [SNA], TCP/IP Offload, TN3270 Server, and Cisco Multi-Path Channel [CMPC]) running on the CIP and CPA is performance. The CIP typically has higher performance and capacity than the CPA because the CIP has more memory (128 MB of RAM compared to 32 MB for the CPA) and a faster internal bus (64-bit bus compared to the 32-bit bus on the CPA).

RJ-45 Interface Support

Cisco 7200 series routers support a new I/O controller with an RJ-45 interface. The optional Fast Ethernet port is configurable for use at 100-Mbps full-duplex or half-duplex operation (half-duplex is the default). The Fast Ethernet port is equipped with either a single MII receptacle or an MII receptacle and an RJ-45 receptacle.

To support this new feature, the **media-type** interface command has been modified. The **media-type** interface command now supports two options:

- **100basex**—Specifies an RJ-45 100BASE-X physical connection
- **mii**—Specifies a media-independent interface

Note When you use the I/O controller that is equipped with an MII receptacle and an RJ-45 receptacle, only one receptacle can be configured for use at a time.

New Software Features in Release 11.3(3)T

The following new software features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(3)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

Always on/Dynamic ISDN (AO/DI)

Always on/Dynamic ISDN (AO/DI) is an on-demand service that optimizes the use of an existing Integrated Services Digital Network (ISDN) signaling channel (D channel) to transport X.25 traffic. The X.25 D channel call is placed from the subscriber to the packet data service provider. Multilink and TCP/IP protocols are encapsulated within the X.25 logical circuit carried by the D channel. The bearer channels (B channels) use the Multilink protocol without the standard Q.922 and X.25 encapsulations, and invoke additional bandwidth as needed. AO/DI takes full advantage of existing packet handlers at the central office by using an existing D channel to transport the X.25 traffic. The link associated with the X.25 D channel packet connection is used as the primary link of the Multilink protocol. The D channel is a connectionless, packet-oriented link between the customer premises equipment (CPE) and the central office. Since the D channel is always available, it is possible to in turn offer “always available” services. On-demand functionality is achieved by using the B channels to temporarily boost data throughput. The B channels are disconnected after use.

Multiple ISDN Switch Types

The Multiple ISDN Switch Types feature allows you to configure more than one ISDN switch type per router. You can apply an ISDN switch type on a per interface basis, thus extending the existing global **isdn switch-type** command to the interface level. This allows Basic Rate Interfaces (BRI) and Primary Rate Interfaces (PRI) to run simultaneously on platforms that support both interface types.

The **isdn tei** command is also extended to the interface level. Terminal endpoint negotiation (TEI) determines when Layer 2 is activated (power up or first-call).

National ISDN Switch Types for Basic Rate and Primary Rate Interfaces

National ISDN Switch Types for Basic Rate and Primary Rate Interfaces introduces changes to ISDN switch types for PRI and BRI as follows:

- Adds a new switch type for PRI interfaces (**isdn switch-type primary-ni**).
- Changes the BRI basic-ni1 switch type to basic-ni (**isdn switch-type basic-ni**).
- Removes the ISDN vn2 switch type (**isdn switch-type vn2**) used in France. The existing vn3 switch type (**isdn switch-type vn3**) supports French vn2 switches.
- Removes the ISDN basic-nwnet3 switch type (**isdn switch-type basic-nwnet3**) used in Norway. The basic-net3 switch type (**isdn switch-type basic-net3**) supports Norway NET3 switches.
- Removes the ISDN basic-nznet3 switch type (**isdn switch-type basic-nznet3**) used by New Zealand NET3 switches. The ISDN basic-net3 switch type (**isdn switch-type basic-net3**) supports New Zealand NET3 switches.
- Adds the ability to configure outgoing PRI B channel selection for the T1 controller in ascending order (channel 1 to channel 23) or descending order (channel 23 to channel 1). Previously, the router selected a B channel for outgoing calls from the highest free channel in descending order. The E1 controller channel selection for ascending order is channel 1 to 31, and 31 to 1 for descending order.

Note The command parser still accepts the following switch types: basic-nwnet3, vn2, and basic-net3; however, when you view the NVRAM configuration using either the **show running configuration** or **write terminal** command, the basic-net3 or vn3 switch types are displayed, respectively.

Microsoft Point-to-Point Compression (MPPC)

Microsoft Point-to-Point Compression (MPPC) is a scheme used to compress Point-to-Point Protocol (PPP) packets between Cisco and Microsoft client devices. The MPPC algorithm is designed to optimize processor and bandwidth utilization to support multiple simultaneous connections. The MPPC algorithm uses a Lempel-Ziv (LZ)-based algorithm with a continuous history buffer, called a dictionary.

VPDN MIB and Syslog Facility

The Virtual Private Dialup Network (VPDN) Management Information Base (MIB) feature is intended to support all the tables and objects defined in “Cisco VPDN Management MIB” for the user sessions of the VPDN features. A number of commands provide information and statistics through the command line interface (CLI) but not Simple Network Management Protocol (SNMP); the Cisco VPDN MIB has been created to satisfy the need to provide information and statistics through SNMP.

RIF Passthru in DLSw+

By default, data-link switching (DLSw+) terminates the Routing Information Field (RIF) for Token Ring, terminates the Logical Link Control (LLC) for all media types, and forwards only data across a WAN with DLSw+ and TCP/IP headers. The RIF is a field in source-route bridged frames that indicates the source-route bridging (SRB) path the frame should take when traversing a Token Ring network. In the case of an explorer packet, the RIF is a field of the source-route bridged frame that indicates the SRB path that the SRB explorer has traversed so far. The RIF is limited to seven hop counts by IBM standards. Because DLSw+ terminates the RIF at the virtual ring, the network’s scalability increases because the hop count of the packet starts over, and the packet can traverse seven additional hops. Also, RIF termination simplifies network design because ring numbers no longer have to be unique throughout an entire enterprise.

However, some environments do not function properly if the RIF is terminated. For that reason, DLSw+ now supports the RIF Passthru feature, in which the entire source-route bridged path appears in the RIF.

Certification Authority Interoperability

Certification Authority (CA) interoperability is provided in support of the IP Security (IPSec) standard. CA interoperability permits Cisco IOS devices and CA devices to communicate so that your Cisco IOS device can obtain and use digital certificates from the CA. Although IPSec can be implemented in your network without the use of a CA, using a CA provides manageability and scalability for IPSec.

For background and configuration information for IPSec, see the “IPSec Network Security” feature documentation.

IPSec Network Security

IPSec is a framework of open standards developed by the Internet Engineering Task Force (IETF). IPSec provides security for transmission of sensitive information over unprotected networks such as the Internet. IPSec acts at the network layer, protecting and authenticating IP packets between participating IPSec devices (“peers”) such as Cisco routers.

IPSec provides the following network security services:

- Privacy—IPSec can encrypt packets before transmitting them across a network.
- Integrity—IPSec authenticates packets at the destination peer to ensure that the data has not been altered during transmission.
- Authentication—Peers authenticate the source of all IPSec-protected packets.
- Antireplay protection—Prevents capture and replay of packets; helps protect against denial-of-service attacks.

With IPSec, data can be transmitted across a public network without fear of observation, modification, or spoofing. This secure data transmission allows applications such as virtual private networks (VPNs), extranets, and remote user access.

IPSec services are similar to those provided by Cisco Encryption Technology (CET), a proprietary security solution introduced in Cisco IOS Software Release 11.2. (The IPSec standard was not yet available at Release 11.2.) However, IPSec provides a more robust security solution, and is standards-based.

Internet Key Exchange Security Protocol

Internet Security Association & Key Management Protocol (ISAKMP)/Oakley is a key management protocol that is used in conjunction with the IPSec standard. IPSec is an IP security feature that provides robust authentication and encryption of IP packets. IPSec can be configured without ISAKMP/Oakley, but ISAKMP/Oakley enhances IPSec by providing additional features, flexibility, and ease of configuration for the IPSec standard.

ISAKMP/Oakley is a hybrid protocol that implements the Oakley key exchange inside the ISAKMP framework.

Automated Double Authentication

The automated double authentication feature enhances the existing double authentication feature.

Previously, with the existing double authentication feature, a second level of user authentication is achieved when the user Telnets to a network access server or router and enters a username and password. Now, with automated double authentication, the user does not have to Telnet anywhere but instead responds to a dialog box that requests a username and password or PIN.

(For information about the existing double authentication feature, refer to the “Configuring Authentication” chapter of the Cisco IOS Release 11.3 *Security Configuration Guide*.)

NFAS with D Channel Backup

The DMS100 and NI2 switch types have been added to the existing Non-Facility Associated Signaling (NFAS) with D Channel Backup feature.

ISDN NFAS allows a single D channel to control multiple PRI interfaces. A backup D channel can be configured for use when the primary NFAS D channel fails.

Once the channelized T1 controllers are configured for ISDN PRI, only the NFAS primary D channel must be configured; its configuration is distributed to all the members of the associated NFAS group.

Naming Method Lists for AAA Authorization and Accounting

In earlier Cisco IOS releases, only named authentication method lists were supported under Cisco's Authentication, Authorization, and Accounting (AAA) network security services. With Cisco IOS Release 11.3(3)T, AAA has been extended to support both authorization and accounting named method lists. Named method lists for authorization and accounting function the same way as those for authentication; they allow you to define different methods for authorization and accounting and apply those methods on a per interface or per line basis.

MS-CHAP Support

Microsoft Challenge Handshake Authentication Protocol (MS-CHAP) is the Microsoft version of CHAP. Like the standard version of CHAP, MS-CHAP is used for PPP authentication; in this case, authentication occurs between a PC using Microsoft Windows NT or Microsoft Windows 95 and a Cisco router or access server acting as a network access server (NAS).

MS-CHAP differs from the standard CHAP as follows:

- MS-CHAP is enabled by negotiating CHAP Algorithm 0x80 in Link Control Protocol (LCP) option 3, Authentication Protocol.
- The MS-CHAP Response packet is in a format designed to be compatible with Microsoft Windows NT 3.5 and 3.51, Microsoft Windows 95, and Microsoft LAN Manager 2.x. This format does not require the authenticator to store a clear or reversibly encrypted password.
- MS-CHAP provides an authenticator-controlled authentication retry mechanism.
- MS-CHAP provides an authenticator-controlled change password mechanism.
- MS-CHAP defines a set of "reason-for failure" codes returned in the Failure packet message field.

Depending on the security protocols you have implemented, PPP authentication using MS-CHAP can be used with or without Authentication, Authorization and Accounting (AAA) security services. If you have enabled AAA, PPP authentication using MS-CHAP can be used in conjunction with both TACACS+ and RADIUS.

Additional Vendor-Proprietary RADIUS Attributes

Remote Access Dial-In User Server (RADIUS) is an access server authentication, authorization, and accounting protocol originally developed by Livingston, Inc. Although an Internet Engineering Task Force (IETF) draft standard for RADIUS specifies a method for communicating vendor-proprietary information between a network access server and the RADIUS server, some vendors have extended the RADIUS attribute set in a unique way. In this release, Cisco IOS software introduces support for additional vendor-proprietary RADIUS attributes. Users who have implemented security solutions using a vendor-proprietary implementation of RADIUS can now integrate Cisco access routers into their networks more easily.

New Hardware Features in Release 11.3(2)T

The following new hardware features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(2)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

NPE-200 Network Processing Engine

The NPE-200 for Cisco 7200 series routers is now available. The network processing engine maintains and executes the system management functions for Cisco 7200 series routers. The network processing engine also shares the system memory and environmental monitoring function with the I/O controller. The NPE-200 has an R5000 microprocessor that operates at an internal clock speed of 200 megahertz (MHz), 4 MB of SRAM, and erasable programmable read-only memory (EPROM) for storing sufficient code for booting the Cisco IOS software. For more information on the NPE-200, refer to the publication *Network Processing Engine Replacement Instructions*.

PA-12E/2FE Ethernet Switch 10BaseT and 100BaseTX Port Adapters

The PA-12E/2FE Ethernet switch 10BASE-T and 100BaseTX port adapters are available on Cisco 7200 series routers. The PA-12E/2FE port adapter provides up to twelve 10-Mbps and two 10/100-Mbps switched Ethernet (10BaseT) and Fast Ethernet (100BaseTX) interfaces for an aggregate bandwidth of 435 Mbps, full-duplex. For more information on the PA-12E/2EF port adapter, refer to the publication *PA-12E/2EF Ethernet Switch 10BaseT and 100BaseTX Port Adapter Installation and Configuration* that accompanies the hardware, and the feature module in the *Feature Guide for Cisco IOS Release 11.2*.

New Software Features in Release 11.3(2)T

The following new software features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(2)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

Dialer Watch

Dialer Watch is a backup feature that integrates dial backup with routing capabilities. Prior dial backup implementations used the following conditions to trigger backup:

- Interesting packets were defined at central and remote routers using dial-on-demand routing (DDR).
- Connection loss occurred on a primary interface using a backup interface with floating static routes.
- Traffic thresholds were exceeded using a dialer load threshold.

Prior backup implementations may not have supplied optimum performance on some networks, such as those using Frame Relay multipoint subinterfaces or Frame Relay connections that do not support end-to-end VC status updates.

Dialer Watch provides reliable connectivity without relying solely on defining interesting traffic to trigger outgoing calls at the central router. Dialer Watch uses the convergence times and characteristics of dynamic routing protocols. Integrating backup and routing features enables

Dialer Watch to monitor every deleted route. By configuring a set of watched routes that define the primary interface, you are able to monitor and track the status of the primary interface as watched routes are added and deleted. Monitoring the watched routes is done in the following sequence:

- 1 Whenever a watched route is deleted, Dialer Watch checks to see if there is at least one valid route for any of the watched IP addresses defined.
- 2 If there is no valid route, the primary line is considered down and unusable.
- 3 If there is a valid route for at least one of the defined watched IP addresses, and if the route is pointing to an interface other than the backup interface configured for Dialer Watch, the primary link is considered up.
- 4 If the primary link goes down, Dialer Watch is immediately notified by the routing protocol, and the secondary link is brought up.
- 5 Once the secondary link is up, at the expiration of each idle timeout, the primary link is rechecked.
- 6 If the primary link remains down, the idle timer is indefinitely reset.
- 7 If the primary link is up, the secondary backup link is disconnected. Additionally, a disable timer can be set to create a delay for the secondary link to disconnect, after the primary link is reestablished.

MS Callback

The MS Callback feature provides client-server callback services for Microsoft Windows 95 and Microsoft Windows NT clients. MS Callback supports the Microsoft Callback Control Protocol (MSCB). MSCB is Microsoft's proprietary protocol that is used by Windows 95 and Windows NT clients. MS Callback supports negotiated PPP Link Control Protocol (LCP) extensions initiated and agreed upon by the Microsoft client. MS Callback is added to existing PPP Callback functionality. Therefore, if you configure your Cisco access server to perform PPP Callback using Cisco IOS Release 11.3(2)T or later, MS Callback is automatically available.

MS Callback supports AAA security models using a local database or AAA server.

MSCB uses LCP callback options with suboption type 6. The Cisco MS Callback feature supports clients with a user-specified callback number and server-specified (preconfigured) callback number.

MS Callback does not affect non-Microsoft systems that implement standard PPP LCP extensions as described in RFC 1570. In this scenario, MS Callback is transparent.

PIM Version 2

Protocol-Independent Multicast (PIM) Version 2 includes the following improvements over PIM Version 1:

- A single, active rendezvous point (RP) exists per multicast group, with multiple backup RPs. This compares to multiple active RPs for the same group in PIM Version 1.
- A bootstrap router provides a fault-tolerant, automated RP discovery and distribution mechanism. Thus, routers dynamically learn the group-to-RP mappings.
- Sparse mode and dense mode are properties of a group, as opposed to an interface. We strongly recommend sparse-dense mode, as opposed to either sparse mode or dense mode only.
- PIM Join and Prune messages have more flexible encodings for multiple address families.
- A more flexible Hello packet format replaces the Query packet to encode current and future capability options.

- Register messages to an RP indicate whether they were sent by a border router or a designated router.
- PIM packets are no longer inside IGMP packets; they are standalone packets.

PIM Version 1, together with the Auto-RP feature, can perform the same tasks as the PIM Version 2 bootstrap router. However, Auto-RP is a standalone protocol, separate from PIM Version 1, and is Cisco-proprietary. PIM Version 2 is a standards track protocol in the Internet Engineering Task Force (IETF).

Cisco's PIM Version 2 implementation allows good interoperability and transition between Version 1 and Version 2. You can upgrade to PIM Version 2 incrementally. PIM Versions 1 and 2 can be configured on different routers within one network. Internally, all routers on a shared media network must run the same PIM version. Therefore, if a PIM Version 2 router detects a PIM Version 1 router, the Version 2 router downgrades itself to Version 1 until all Version 1 routers have been shut down or upgraded.

PIM uses the bootstrap router to discover and announce RP-set information for each group prefix to all the routers in a PIM domain. This is the same function accomplished by Auto-RP, but the bootstrap router is part of the PIM Version 2 specification. The bootstrap router mechanism interoperates with Auto-RP.

To avoid a single point of failure, you can configure several candidate bootstrap routers in a PIM domain. A bootstrap router is elected among the candidate bootstrap routers automatically; they use bootstrap messages to discover which bootstrap router has the highest priority. This router then announces to all PIM routers in the PIM domain that it is the bootstrap router.

Routers that are configured as candidate RPs then unicast to the bootstrap router the group range for which they are responsible. The bootstrap router includes this information in its bootstrap messages and disseminates it to all PIM routers in the domain. Based on this information, all routers will be able to map multicast groups to specific RPs. As long as a router is receiving the bootstrap message, it has a current RP map.

Enhanced ATM VC Configuration and Management

The Enhanced ATM Virtual Circuit (VC) Configuration and Management feature set includes new and enhanced capabilities that allow you to create and manage ATM permanent virtual circuits (PVCs) and switched virtual circuits (SVCs) with more ease and improved integrity. This feature set includes the following five subfeatures:

- **New VC Configuration**

The New VC Configuration subfeature allows you to create ATM PVCs, SVCs, static maps, and associated VC parameters more easily and with fewer errors using new ATM commands in new VC command modes.
- **VC Integrity Management**

The VC Integrity Management subfeature allows you to manage your ATM PVCs and SVCs so that your router receives immediate notification when these VCs go down in your network. Upon notification, protocols can reroute packets and prevent unpredictable and relatively long timeout periods.
- **PVC Discovery**

The PVC Discovery subfeature allows you to make your router automatically assign (or discover) PVCs on an ATM interface or subinterface using information from an attached adjacent switch.

- Multiprotocol Inverse ARP

The Multiprotocol Inverse ARP subfeature allows you to enable dynamic protocol mapping between an ATM PVC and a network address by configuring Inverse Address Resolution Protocol (Inverse ARP) on ATM PVCs running IP or IPX.

- Rate Queue Tolerance

The Rate Queue Tolerance subfeature allows you to configure a range of peak rates on a single rate queue, thereby improving ATM rate queue usage.

Cisco Database Connection

The Cisco Database Connection feature enables Cisco routers to implement IBM's Distributed Relational Database Architecture (DRDA) level 3 over TCP/IP. The Cisco router with Database Connection exists in the TCP/IP network, and clients use the Database Connection IP address and port on the router to connect to the IBM host system that exists in the SNA network.

When Database Connection is configured on a router, client-based Open Database Connectivity (ODBC) applications can connect to IBM's family of IBM D2 relational databases, which include:

- DB2 for OS/390 (MVS)
- DB2 for Virtual Machine (VM)
- DB2 for Virtual Storage Extended (VSE) (SQL/DS)
- DB2 for OS/400
- DB2 Universal Server (AIX, HP-UX, UNIX, Solaris, Windows NT, Windows 95, OS/2, SCO OpenServer)

The router with Database Connection converts DRDA packets over TCP/IP to DRDA packets over Advanced Program-to-Program Communication (APPC) (LU 6.2) and then routes them to DB2 databases. Database Connection runs as a TCP/IP daemon on the router, accepting DRDA client connections over TCP/IP. When a client connects to the database on an IBM mainframe host, Database Connection allocates an APPC conversation over SNA to an IBM server, and acts as a gateway between DRDA over TCP/IP and DRDA over APPC.

DRP Server Agent Enhancements

The Director Response Protocol (DRP) Server Agent enhancements are as follows:

- DistributedDirector can use Border Gateway Protocol (BGP) Multi-Exit Discriminators in traffic redirection decisions.
- The DRP Server can measure client-to-server link latency (round-trip time) for use in traffic redirection decisions.

New Software Features in Release 11.3(1)T

The following new software features are supported by the Cisco 7000 family of routers in Cisco IOS Release 11.3(1)T. For easy online access, these feature descriptions are linked to the applicable Cisco IOS feature module if one exists. Click on the link to open the feature module.

SNMP Manager

The SNMP Manager feature allows a router to serve as an SNMP manager. As an SNMP manager, the router can send SNMP requests to agents and receive SNMP responses and notifications from agents. When the SNMP manager process is enabled, the router can query other SNMP agents and process incoming SNMP traps.

SNMP Inform Requests

The SNMP Inform Requests feature allows routers to send inform requests to SNMP managers. Routers can send notifications to SNMP managers when particular events occur. For example, an agent router might send a message to a manager when the agent router experiences an error condition.

SNMP notifications can be sent as traps or inform requests. Traps are unreliable because the receiver does not send any acknowledgment when it receives a trap. The sender cannot determine if the trap was received. However, an SNMP manager that receives an inform request acknowledges the message with an SNMP response protocol data unit (PDU). If the manager does not receive an inform request, it does not send a response. If the sender never receives a response, the inform request can be sent again. Thus, informs are more likely to reach their intended destination.

Because they are more reliable than traps, informs consume more resources in the router and in the network. Unlike a trap, which is discarded as soon as it is sent, an inform request must be held in memory until a response is received or the request times out. Also, traps are sent only once, whereas an inform request may be retried several times. The retries increase traffic and contribute to a higher overhead on the network. Thus, traps and inform requests provide a trade-off between reliability and resources. If it is important that the SNMP manager receive every notification, use inform requests. On the other hand, if you are concerned about traffic on your network or memory in the router and you do not need to receive every notification, use traps.

x Digital Subscriber Line Bridge Support

The x Digital Subscriber Line Bridge Support feature enables you to configure a router for intelligent bridge flooding for x digital subscriber line and other bridge applications.

Limitations and Restrictions

This section contains important information about limitations and restrictions of Cisco IOS Release 11.3 T software. The following information describes the changes in release number for Release 11.3 T.

Release 11.3(3a)T Fixes Caveats CSCdk01707 and CSCdk08772

The Cisco 7500 series RSP2 and RSP4 products in Cisco IOS Release 11.3(3)T were deferred because of a severe defect. It was determined that this caveat was significant enough to merit a software rebuild. The rebuild includes the caveat fix and is renumbered to Release 11.3(3a)T.

The defect is CSCdk01707 and is described as follows:

- When the system gets an Error interrupt, a 4-byte software data area is accidentally overwritten. Because of this, the system might reload with a “Bus Error Exception” message. The error interrupt may be caused by events like a high system availability (HSA) slave state transition on HSA systems, fatal system errors (like a parity error), or nonfatal errors (like a QAERROR with Null/reuse link error).

Software releases affected: This caveat affects all systems configured with dual Route Switch Processors (RSPs) (HSA feature). All “v” images for the following Cisco IOS Releases have been deferred: 11.1(18.1)CA through 11.1(18.2)CA, 11.1(16.3)CC through 11.1(17.4)CC, 11.1(17)CT, 11.2(12.3)P through 11.2(13.4)P, 11.3(1) through 11.3(3), and 11.3(1)T through 11.3(3)T.

Solution: To eliminate the problems mentioned in the preceding section, we strongly recommend that you download and install one of the following Cisco IOS software release updates: 11.1(18)CA, 11.1(18)CC, 11.1(18)CT, 11.2(14)P, 11.3(3a), or 11.3(3a)T.

[CSCdk01707]

CSCdk08772 is a duplicate of CSCdk01707 and is described as follows:

- Dual RSPs in a high system availability (HSA) configuration in a Cisco 7500 series router crash and reload in cycles during bootup when using the RSP-DSV Desktop/Plus/VIP image for versions later than Release 11.2(12a)P. [CSCdk08772]

CSCdk01707 was introduced by the fix for CSCdj36366, which is described as follows:

- On RSP-based platforms, the message that reports a write bus error may report an incorrect value for the address of the bad access. [CSCdj36366]

Release 11.3(3a)T and all subsequent releases of Cisco IOS Release 11.3 T software include the fix for this caveat.

Release 11.3(2a)T Fixes Caveat CSCdj52309

The Cisco 7500 series products in Cisco IOS software release 11.3(2)T were deferred because of a catastrophic defect. It was determined that this caveat was significant enough to merit a software rebuild. The rebuild includes the caveat fix and is renumbered to Release 11.3(2a)T.

The defect is CSCdj52309 and is described as follows:

- A catastrophic problem has been identified that affects all Cisco 7500 series and Catalyst 5000 series RSM users. The problem occurs when you use packet tunneling in combination with certain timing conditions, packet sizes, and buffer usages. Affected images are being deferred and special images are being built.

Tunneling is being used as an abbreviation in this context to refer to a specific fast-switch to process-level code path traversed by translational bridging (TLB), source-route bridging (SRB), and remote source-route bridging (RSRB).

When the packet tunneling logic on RSP- or Route Switch Module (RSM)-equipped systems causes datagrams to be copied from SRAM to DRAM, an arithmetic error results in more bytes being copied than are remembered for cleanup processing. Reuses of the tunneling logic, in certain rare combinations of timing, packet sizes, and buffer usages, may result in those unaccounted bytes causing several anomalous system behaviors, including packet errors.

This software defect is exposed to all RSP and RSM images in the following Cisco IOS software releases: 11.2, 11.2 P, 11.2 BC, 11.3, and 11.3 T.

Solution: To eliminate the problems mentioned in the preceding section, we strongly recommend that you download and install one of the following Cisco IOS software release updates: 11.2(12a), 11.2(12a)P, 11.3(2a), or 11.3(2a)T.

Workarounds: There are two possible workarounds. CSCdj33812 provides a configuration command to avoid the software defect. This workaround is available in the following Cisco IOS Releases: 11.2(11.5), 11.2(11.5)P, 11.2(11.5)BC, 11.3(2.1), and 11.3(2.1)T. If you are using an earlier release, use the second workaround.

Note The two workarounds reduce performance down to process switching levels.

— Workaround 1:

CSCdj33812 incorporated a configurable command that is stored in NVRAM.

Configure with the **memory cache-policy io uncached** command to work around CSCdj52309. To determine what memory cache policies are currently configured on your router, use the **show rsp** command.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#memory cache-policy io uncached
Router(config)#end

Router# show rsp
Throttle count 0, DCL timer count 0
active 0, configured 1
netint usec 4000, netint mask usec 200
DCL spurious 0

Caching Strategies:
Processor private memory: write-back
Kernel memory view: uncached
IO (packet) memory: uncached
Buffer header memory: uncached
```

To restore the MEMD caching policy to the original write-through policy, issue the **memory cache-policy io write-through** command.

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#memory cache-policy io write-through
Router(config)#end
Router#show rsp
Throttle count 0, DCL timer count 0
active 0, configured 1
netint usec 4000, netint mask usec 200
DCL spurious 0
Caching Strategies:
```

```
Processor private memory: write-back
Kernel memory view: write-back
IO (packet) memory: write-through
Buffer header memory: uncached
```

— Workaround 2:

If operating with images that do not have the CSCdj33812 support, use the **test rsp cache memd-fastswitch uncache** command.

You need to enter the above command after every router reload.

Other considerations: Cisco IOS Releases 10.3, 11.0, and 11.1 major and early deployment (ED) releases are not exposed to CSCdj52309. Though these releases share the same arithmetic problem, the tunneling software is different, and there is no known or predicted combination of timing, packet sizes, and buffer usages that results in the same or different anomalous behaviors associated with Cisco IOS Releases 11.2, 11.2 P, 11.2 BC, 11.3 and 11.3 P. Cisco is using CSCdj52309 to repair the arithmetic problem in 10.3, 11.0, and 11.1 releases; however, no special images are being created because the anomalous behaviors are not present in those releases.

[CSCdj52309]

Release 11.3(2a)T and all subsequent releases of Cisco IOS software include the fix for this caveat.

New TACACS+ Attribute-Value Pair

A new authorization feature was added in Release 11.3(1) that allows for separate configuration and authorization of Multilink PPP. This can cause Multilink PPP authorization to fail in Terminal Access Controller Access Control System Plus (TACACS+) servers that do not include the relevant authorization permissions in the configuration. For TACACS+, the following attribute-value (AV) pair should be added for all users who are allowed to negotiate Multilink PPP:

```
service = ppp protocol = multilink {
```

Removed bridge *group* multicast-source Command

As of Release 11.3(2)T, the **bridge group multicast-source** command is no longer available. This command was removed to comply with the source-route transparent (SRT) bridging implementation.

Encryption Feature Sets

Encryption feature sets (for example IP 40 and IP 56) are not available in Cisco IOS Releases 11.3(1)T and 11.3(2)T. These feature sets are available in Release 11.3(3)T and later 11.3 T releases.

Important Notes

The following sections contain important notes about Cisco IOS Release 11.3 T and can apply to the Cisco 7000 family of routers.

Cisco IOS Release 11.3, 11.3 NA, and 11.3 T End of Sales and End of Engineering

End of Engineering (EOE) means there are no more regularly scheduled maintenance releases. The last maintenance release scheduled on the EOE date is only available through CCO and Field Service Operations—not through manufacturing:

- Cisco IOS Releases 11.3, 11.3 NA, and 11.3 T are scheduled to reach End of Sales (EOS) status with maintenance Releases 11.3(10), 11.3(10) NA, and 11.3(10)T.
- Cisco IOS Releases 11.3, 11.3 NA, and 11.3 T are scheduled to reach EOE with Releases 11.3(11), 22.3(11) NA and 11.3(11)T.

EOS and EOE releases are subject to change. For the most up-to-date information on the status of EOS or EOE, refer to the *End of Sales and End of Engineering for Cisco IOS Software Releases* located on CCO.

Ongoing support for functionality in Release 11.3 T is available in Cisco IOS Release 12.0(3)T and later maintenance releases of Cisco IOS Release 12.0 on CCO at:

Service & Support: Technical Documents: Product Bulletins: Software

Under **Cisco IOS 11.3**, click **End of Sales and End of Engineering for Cisco IOS Software Releases 11.3 and 11.3 T (#847: 12/98)** or **Cisco IOS Software 11.3 NA EoS and EoE (#849:12/98)**

Image Deferral, Cisco IOS Release 11.3(9)T

Several versions of Cisco IOS Release 11.3T, up to and including 11.3(9)T, were deferred on all c5rsm and rsp software images because of the following caveat:

- CSCdm23824—RSM LLC traffic causes DMAC corruption.

For additional information on Release 11.3 deferrals, including the Release 11.3(9)T deferral, see the *What's Hot for Cisco IOS Software Release 11.3* document on CCO. To reach the *What's Hot for Cisco IOS Software Release 11.3* document, log in to CCO and click this path:

Service & Support: Software Center: Cisco IOS Software: Cisco IOS 11.3: What's Hot for Cisco IOS Software Release 11.3

A field notice providing information on CSCdm23824 is located at the following URL:

http://www.cisco.com/warp/customer/770/fn4548_06301999.shtml

For more information on this caveat, refer to Bug Navigator II. Bug Navigator II is available at <http://www.cisco.com/support/bugtools>. On CCO, click this path:

Service & Support: Online Technical Support: Software Bug Toolkit: Bug Navigator II

Image Deferral, Cisco IOS Release 11.3(8)T

Cisco IOS Release 11.3(8)T was deferred to Release 11.3(8)T1 on all software images to incorporate corrections to the following caveats:

- CSCdk86294—The D channel is always in the shutdown state when non-facility associated signaling (NFAS) is configured.
- CSCdk80809—Enhanced Interior Gateway Routing Protocol (EIGRP) has difficulty converging on certain routes.

The deferral to Release 11.3(8)T1 on Cisco 7200 software images incorporated corrections to the following caveat:

- CSCdk68517—T1/E1 driver difficulties on Cisco 7200 series routers.

For more information on these caveats, refer to Bug Navigator II. Bug Navigator II is available at <http://www.cisco.com/support/bugtools>. On CCO, click this path:

Service & Support: Online Technical Support: Software Bug Toolkit: Bug Navigator II

Caveats

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

For information on caveats in Cisco IOS Release 11.3 T, see *Caveats for Cisco IOS Release 11.3 T* on CCO and the Documentation CD-ROM.

All caveats in Release 11.3 are also in Release 11.3 T.

For information on caveats in Cisco IOS Release 11.3, see the “Important Notes and Caveats for Release 11.3” section in the *Cross-Platform Release Notes for Cisco IOS Release 11.3* on CCO and the Documentation CD-ROM. These release notes list severity 1 and 2 caveats affecting all maintenance releases.

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

Related Documentation

The following sections describe the documentation available for the Cisco 7000 family of routers. 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 52
- Platform-Specific Documents, page 53
- Feature Modules, page 53
- Cisco IOS Software Documentation Set, page 53

Release-Specific Documents

The following documents are specific to Release 11.3 and are located on CCO and the Documentation CD-ROM.

- *Cross-Platform Release Notes for Cisco IOS Release 11.3*

On CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Release Notes for Cisco IOS Release 11.3

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Release Notes for Cisco IOS Release 11.3

- Product bulletins, field notices, and other release-specific documents

To reach these documents from CCO, click on this path:

Service & Support: Technical Documents

- *Caveats for Cisco IOS Release 11.3 T*

As a supplement to the caveats listed in the “Caveats” section in these release notes, see *Caveats for Cisco IOS Release 11.3 T*, which contains caveats applicable to all platforms for all maintenance releases of Cisco IOS Release 11.3 T.

On CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Product-Specific Release Notes for Cisco IOS Release 11.3: Caveats for Cisco IOS Release 11.3 T

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Caveats for Cisco IOS Release 11.3 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

Numerous documents are available for the Cisco 7000 family on CCO and the Documentation CD-ROM.

On CCO at:

Service and Support: Documentation Home Page: Cisco Documentation: Core/High-End Routers

On the Documentation CD-ROM at:

Cisco Product Documentation: Core/High-End Routers

Feature Modules

Feature modules describe new features supported by Release 11.3 T and are 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 at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS Release 11.3 T New Features

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 contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference.

On CCO and the Documentation CD-ROM, two master hot-linked documents provide information for the Cisco IOS software documentation set.

You can reach these documents on CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS Release 11.3 Configuration Guides, Command References: Configuration Guide Master Index or Command Reference Master Index

You can reach these documents on the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS Release 11.3 Configuration Guides, Command References: Configuration Guide Master Index or Command Reference Master Index

Release 11.3 Documentation Set

Table 12 describes the contents of the Cisco IOS Release 11.3 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.

You can reach the Cisco IOS documentation set from CCO at:

Service & Support: Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3

You can reach the Cisco IOS documentation set on the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3

Table 12 Cisco IOS Software Release 11.3 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 Interface Configuration System Management
<ul style="list-style-type: none"> • <i>Network Protocols Configuration Guide, Part 1</i> • <i>Network Protocols Command Reference, Part 1</i> 	IP Addressing IP Services RSVP On-Demand Routing RIP IGRP OSPF IP Enhanced IGRP Integrated IS-IS BGP IP Routing Protocol-Independent Features IP Multicast Routing
<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

Table 12 Cisco IOS Software Release 11.3 Documentation Set (continued)

Books	Chapter Topics
<ul style="list-style-type: none"> • <i>Network Protocols Configuration Guide, Part 3</i> • <i>Network Protocols Command Reference, Part 3</i> 	Apollo Domain Banyan VINES DECnet ISO CLNS XNS
<ul style="list-style-type: none"> • <i>Wide-Area Networking Configuration Guide</i> • <i>Wide-Area Networking Command Reference</i> 	ATM Frame Relay SMDS X.25 and LAPB
<ul style="list-style-type: none"> • <i>Security Configuration Guide</i> • <i>Security Command Reference</i> 	AAA Security Services Security Server Protocols Traffic Filtering Network Data Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options
<ul style="list-style-type: none"> • <i>Dial Solutions Configuration Guide</i> • <i>Dial Solutions Command Reference</i> 	Business Applications and Scenarios Dial-In Port Setup Dial-In Terminal Services and Remote Note Configuration Dial Authentication Dial-on-Demand Routing (DDR) Dial Backup Dial-Out Modem Pooling Large-Scale Dial Solutions Cost-Control Solutions Network Traffic over ISDN Channels Virtual Private Dialup Networks Network Address Translation Easy IP
<ul style="list-style-type: none"> • <i>Cisco IOS Switching Services Configuration Guide</i> • <i>Cisco IOS Switching Services Command Reference</i> 	Switching Paths for IP Networks NetFlow Switching Virtual LAN (VLAN) Switching and Routing LAN Emulation
<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 Remote Source-Route Bridging DLSw+ STUN and BSTUN LLC2 and SDLC IBM Network Media Translation DSPU and SNA Service Point Support SNA Frame Relay Access Support APPN NCIA Client/Server Topologies IBM Channel Attach
<ul style="list-style-type: none"> • <i>Configuration Guide Master Index</i> • <i>Command Reference Master Index</i> 	
<ul style="list-style-type: none"> • <i>Cisco IOS Software Command Summary</i> • <i>Cisco IOS System Error Messages</i> • <i>Debug Command Reference</i> • <i>Dial Solutions Quick Configuration Guide</i> 	

Note The *Cisco Management Information Base (MIB) User Quick Reference* publication is no longer published. For the latest list of MIBs supported by Cisco, see *Cisco Network Management Toolkit* on Cisco Connection Online. From CCO, click on the following path: **Service & Support: Software Center: Network Mgmt Products: Cisco Network Management Toolkit: Cisco MIB**.

Service and Support

For service and support for a product purchased from a reseller, contact the reseller. Resellers offer a wide variety of Cisco service and support programs that are described in the “Service and Support” section of the *Cisco Information Packet* 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 the Cisco TAC Home Page

If you have a CCO login account, you can access the following URL, which contains links and helpful 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:

- Configuration Cookbooks—Contain common configurations or recipes for configuring various access routes and dial technologies.
- Field Notices—Notifies you of any critical issues regarding Cisco products. These notices include 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 and deploying Cisco IOS software features and services, including sections on Access & Security, LAN & Workgroup, Router Management, Routing Protocols, SNA Features, Voice and Multimedia Technologies, and WAN Features.

- 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 Appliances and Software, Network Management, Network Protection Software and 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 reach 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 that 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 52.

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