



Doc. No. 78-5029-02, Rev. B0

Release Notes for the Cisco 2500 Series Routers for Cisco IOS Release 11.3

March 2, 1998

These release notes describe the new features and significant software components for Cisco IOS Release 11.3, up to and including Release 11.3(2), for Cisco 2500 series routers and access servers. For detailed information about the features and caveats in these release notes, refer to the *Release Notes for Cisco IOS Release 11.3* publication, which contains features and caveats for all 11.3 platforms. This publication is available on the Documentation CD-ROM and on Cisco Connection Online (CCO), which are described in the section "Online Navigation."

Note The Cisco 2500 Series Routers support a subset of the Cisco IOS features described in these release notes. The Cisco IOS features that are available for the Cisco 2500 Series Routers are listed in the section "Cisco IOS Feature Sets for Cisco 2500 Series Routers and Access Servers" on page 9.

Introduction

These release notes discuss the following topics:

- Determining Your Cisco IOS Software Release on page 2
- Cisco 2500 Series Routers and Access Servers on page 2
- Related Documentation on page 4
- Online Navigation on page 8
- New Software Features in Release 11.3(1) on page 9
- New Hardware Support in Release 11.3(1) on page 9
- Cisco IOS Feature Sets for Cisco 2500 Series Routers and Access Servers on page 9
- Upgrading to a New Software Release on page 18
- Memory Requirements on page 19
- Important Notes on page 20

Corporate Headquarters

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

Copyright © 1998
Cisco Systems, Inc.
All rights reserved.

- Caveats on page 20
- Cisco Connection Online on page 21
- Documentation CD-ROM on page 21

Determining Your Cisco IOS Software Release

To determine which version of Cisco IOS software is running on your Cisco 2500 series router or access server, login to the router, and enter the **show version** user EXEC command:

```
router# show version
```

Output from the command is displayed in the second line, as follows:

```
Cisco Internetwork Operating System Software  
IOS (tm) 2500 Software (C2500-JS-L), Version 11.3(2), RELEASE SOFTWARE
```

Additional command output lines include more information, such as:

- Processor revision numbers
- Memory amounts
- Hardware IDs
- Partition information

Cisco 2500 Series Routers and Access Servers

The following Cisco 2500 series routers and access servers are supported by Release 11.3:

- Single LAN: Cisco 2501, 2502, 2503, and 2504
- Dual LANs: Cisco 2513, 2514, and 2515
- Integrated HUBs: Cisco 2505, 2507, and 2516
- High Density Serial: Cisco 2520, 2521, 2522, and 2523
- Modular Routers: Cisco 2524 and 2525
- Access Servers:
 - Cisco AS2509 and 2509-ET
 - Cisco AS2509-RJ and AS2511-RJ
 - Cisco AS2511 and AS2512

Table 1 and Table 2 summarize the interfaces supported for these devices. “Yes” means that a particular data rate or interface is supported.

Table 1 LAN Interfaces Supported

Interface	Cisco 2500 Series
Ethernet (AUI)	Yes
Ethernet (10BaseT)	Yes (2501, 2503, 2505, 2507, 2513, 2514, 2516, 2518, 2520, 2522, and 2524 only)
4-Mbps Token Ring	Yes
16-Mbps Token Ring	Yes (2502, 2504, 2513, 2515, 2517, 2519, 2521, 2523, and 2525 only)
Synchronous Serial	Yes

Table 2 WAN Data Rates and Interfaces Supported

	Cisco 2500 Series
Data Rate	
56/64 kbps up to 1.536 Mbps	Yes
128 kbps	Yes
Interface	
EIA/TIA-232	Yes
EIA/TIA-449	Yes
EIA-530	Yes
X.21	Yes
V.35	Yes
Serial, synchronous and asynchronous	Yes
ISDN BRI S/T	Yes (2503, 2504, 2516, 2520, 2521, 2522, 2523, 2524, and 2525 only)
ISDN BRI U	Yes (2524 and 2525)

Cisco AS2509-RJ and Cisco AS2511-RJ Access Servers

The Cisco AS2509-RJ and Cisco AS2511-RJ access servers connect asynchronous serial devices to LANs and WANs. The access servers combine the functions of a terminal server, protocol translator, and a router, and perform both synchronous and asynchronous routing of supported protocols.

These access servers provide the following interfaces and ports:

- 8 (Cisco AS2509-RJ) or 16 (Cisco AS2511-RJ) asynchronous serial ports for connection to modems, terminals, or other asynchronous devices
- One Ethernet attachment unit interface (AUI) port for connection to a LAN
- One synchronous serial port for connection to a WAN
- One EIA/TIA-232 console port for connection to a console terminal
- One EIA/TIA-232 auxiliary port for connection to a terminal or modem

Generated SysObjectIDs

The Generated SysObjectIDs feature generates a unique sysObjectID for each Cisco 2500 series router and its derived partner product. For example, the sysObjectID values for a Cisco 2511, a partner 2511, and another partner 2511 are each different. The sysObjectID Simple Network Management Protocol (SNMP) MIB object is used to identify the device to be managed and make application-specific decisions. In some network management programs, this object determines which graphical element or name to display for a device.

Selective Packet Discard (SPD)

When in severe overload conditions, routers that cannot keep up with the incoming packet stream must drop packets. If no intelligence is applied to choosing which ones to discard, this impacts the stability of routing protocols. This feature applies some simple choices to selectively discard packets likely to be unimportant for routing and interface stability. SPD is enabled by default; there are no commands or configuration tasks required.

Related Documentation

All documents mentioned in this section are available in printed or electronic format. (See the section “Online Navigation” for more information on accessing electronic documentation.)

The following sections describe the documentation related to these release notes:

- Cisco 2500 Series-Specific Documentation
- Cisco IOS Documentation Set and Related Supporting Documents
- Software Configuration Tips on the Cisco TAC Home Page

Cisco 2500 Series-Specific Documentation

The following documents are specific to the Cisco 2500 series routers:

- *Cisco 2524 and Cisco 2525 Public Network Certification*
- *Installing WAN Modules in the Cisco 2524 and Cisco 2525 Routers*
- *Cisco 2524 and Cisco 2525 Router User Guide*
- Product-specific installation, configuration, and maintenance guides
- Router and hub user guides
- *Supporting Documentation for the Cisco 2500 Series*
- *Regulatory and Safety Information for the Cisco 2500 Series*
- *Cisco 2509, 2510, 2511, and 2512 (user guide)*

Cisco IOS Documentation Set and Related Supporting Documents

The following documents apply to the Cisco 2500 series routers:

- *Release Notes for Cisco IOS Release 11.3*
- *Product-Specific Release Notes*
- *Cisco IOS 11.3 Dial Solutions Quick Configuration Guide*

- Cisco IOS Release 11.3 Configuration Guides, Command References
- Cisco IOS 11.3T New Features
- *Cisco IOS 11.3 Command Summary*
- *Cisco IOS 11.3 System Error Messages*
- *Access Services Quick Configuration Guide*
- *Cisco IOS Software Release 11.3 and 11.3T Caveats*
- *CIP Microcode Release Note and Upgrade Instructions*
- *Cisco IOS 11.3 Debug Command Reference*

Note Due to a production problem, many source-route bridging commands were omitted from the printed version of the *Cisco IOS Software Command Summary* (78-4746-01). For complete documentation of all source-route bridging commands, refer to the *Bridging and IBM Networking Command Reference* (78-4743-01). You can also obtain the most current documentation on the Documentation CD-ROM or Cisco Connection Online (CCO).

The Cisco IOS configuration guides, command references, and chapter topics are as follows:

Books	Chapter Topics
• <i>Configuration Fundamentals Configuration Guide</i>	Configuration Fundamentals Overview
• <i>Configuration Fundamentals Command Reference</i>	Cisco IOS User Interfaces File Management Interface Configuration System Management
• <i>Network Protocols Configuration Guide, Part 1</i>	IP Addressing
• <i>Network Protocols Command Reference, Part 1</i>	IP Services IP Routing Protocols
• <i>Network Protocols Configuration Guide, Part 2</i>	AppleTalk
• <i>Network Protocols Command Reference, Part 2</i>	Novell IPX
• <i>Network Protocols Configuration Guide, Part 3</i>	Apollo Domain
• <i>Network Protocols Command Reference, Part 3</i>	Banyan VINES DECnet ISO CLNS XNS
• <i>Wide-Area Networking Configuration Guide</i>	ATM
• <i>Wide-Area Networking Command Reference</i>	Frame Relay SMDS X.25 and LAPB

Books	Chapter Topics
<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>	Dial Business Solutions and Examples Dial-In Port Setup DDR and Dial Backup Remote Node and Terminal Service Cost-Control and Large-Scale Dial Solutions VPDN
<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 <ul style="list-style-type: none">• Fast Switching• Autonomous Switching• NetFlow Switching• Optimum Switching Virtual LAN (VLAN) Switching and Routing <ul style="list-style-type: none">• Inter-Switch Link Protocol Encapsulation• IEEE 802.10 Encapsulation• LAN Emulation

Books	Chapter Topics
<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 SNA Frame Relay Access Support APPN NCIA Client/Server Topologies IBM Channel Attach
<ul style="list-style-type: none"> • <i>Cisco IOS Software Command Summary</i> • <i>Dial Solutions Quick Configuration Guide</i> • <i>System Error Messages</i> • <i>Debug Command Reference</i> 	
<p>Note The <i>Cisco Management Information Base (MIB) User Quick Reference</i> publication is no longer being published. For the latest list of MIBs supported by Cisco, see the <i>Cisco Network Management Toolkit</i> on Cisco Connection Online. On CCO, go to <i>Software and Support</i>, select <i>Software Center</i>, and click <i>Network Management Products</i>. Next, select <i>Cisco Network Management Toolkit</i>, and click <i>Cisco MIBs</i>.</p>	

Software Configuration Tips on the Cisco TAC Home Page

The following URL contains links to access 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 <http://www.cisco.com/>, and follow this path: *Software & Support*, *Technical Tips* (button on left margin).

“Hot Tips” are 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 access FAX-on-demand and receive documents at your FAX machine from the USA, call 888-50-CISCO (888-502-4726). From other areas, call 415-596-4408.

The following sections are provided from the Technical Tips page:

- **Field Notices**—Designed to provide notification of any critical issues regarding Cisco products. These include problem descriptions, safety or security issues, and hardware defects.
- **Hardware**—Technical Tips related to specific hardware platforms.

- Internetworking Features—Tips on using and deploying Cisco IOS software features and services.
- Sample Configurations—Actual configuration examples complete with topology and annotations.
- Software Products—MultiNet & Cisco Suite 100, Network Management, Cisco IOS Software Bulletins, and CiscoPro Configurations.
- Special Collections—Other Helpful Documents, Frequently Asked Questions, Security Advisories, References & RFCs, Case Studies, and the CiscoPro Documentation CD-ROM.

Online Navigation

The Cisco IOS software documentation set is available as printed manuals or electronic documents. You can access Cisco 2500 series-specific documentation and Cisco IOS software documentation at Cisco Connection Online (CCO) on the World Wide Web and on the Cisco Documentation CD-ROM:

- Cisco 2500 series manuals and configuration notes:
 - Using a web browser, go to <http://www.cisco.com/>, click *Products & Ordering*, select *Cisco Documentation*, and go to *Access Servers and Access Routers*. Use one of the following link paths to find additional documentation:
 - Select *Modular Access Routers* and click *Cisco 2500 Series Modular Routers*
 - or
 - Select *Fixed Configuration Access Routers*, and click *Cisco 2500*. Select your 2500 Series product to access its installation and configuration manual or click of the following links: *Supporting Documentation for the Cisco 2500 Series*, *Regulatory and Safety Information for the Cisco 2500 Series*, or *Cisco 2509, 2510, 2511, and 2512*.
 - On the Documentation CD-ROM, go to *Cisco Product Documentation*, select *Access Servers and Access Routers*, and go to *Access Servers and Access Routers*. Use one of the following link paths to find additional documentation:
 - Select *Modular Access Routers* and click *Cisco 2500 Series Modular Routers*
 - or
 - Select *Fixed Configuration Access Routers*, and click *Cisco 2500*. Select your 2500 Series product to access its installation and configuration manual or click of the following links: *Supporting Documentation for the Cisco 2500 Series*, *Regulatory and Safety Information for the Cisco 2500 Series*, or *Cisco 2509, 2510, 2511, and 2512*.
- Cisco IOS documentation set and supporting documents:
 - On the Documentation CD-ROM, go to *Cisco Product Documentation*, select *Cisco IOS Software Configuration*, and then select *Cisco IOS Release 11.3*.
 - On CCO, go to *Software and Support*, and select *Documentation*. Next, select *Documentation*, click *Cisco IOS Software Configuration*, and then click *Cisco IOS Release 11.3*.

For additional information about the Documentation CD-ROM and CCO, refer to the sections “Cisco Connection Online” and “Documentation CD-ROM” at the end of these release notes.

New Software Features in Release 11.3(1)

Release 11.3 supports features in the following categories:

- IBM Support
- Internet
- LAN Support
- Management
- Multimedia
- Quality of Service
- Security
- Switching
- Terminal Services
- WAN Optimization
- WAN Services

Detailed descriptions of the features are available on the Documentation CD-ROM and on CCO:

- On the Documentation CD-ROM, go to *Cisco Product Documentation*, select *Cisco IOS Software Configuration*, click *Cisco IOS Release 11.3*, and then select *Release Notes for Cisco IOS Release 11.3*. From the bulleted list, select *New Features for Release 11.3*.
- From the CCO web page, go to *Cisco Documentation*, click *Cisco IOS Software Configuration*, select *Cisco IOS Release 11.3*, and then select *Release Notes for Cisco IOS Release 11.3*. From the bulleted list, select *New Features for Release 11.3*.

New Hardware Support in Release 11.3(1)

The following platform enhancement has been added to Release 11.3:

Selective Packet Discard (SPD)—When in severe overload conditions, routers that cannot keep up with the incoming packet stream must drop packets. If no intelligence is applied to choosing which ones to discard, this impacts the stability of routing protocols. This feature applies some simple choices to selectively discard packets likely to be unimportant for routing and interface stability. SPD is enabled by default; there are no commands or configuration tasks required.

Cisco IOS Feature Sets for Cisco 2500 Series Routers and Access Servers

The Cisco IOS software is packaged into “feature sets” (also called “software images”). There are many different feature sets available, and each feature set contains a specific subset of Cisco IOS features. The following conventions are used to identify feature sets:

- Plus: a value-added option that contains a variable set of additional features depending on the hardware platform selected
- Plus 40: a value-added option that contains a variable set of additional features depending on the hardware platform selected, including 40-bit data encryption
- Plus 56: a value-added option that contains a variable set of additional features depending on the hardware platform selected, including 56-bit data encryption

Cisco IOS images with strong encryption (including, but not limited to, 56-bit DES) are subject to U.S. government export controls and have a limited distribution. Images to be installed outside the U.S. require an export license. Customer orders might be denied or subject to delay due to U.S. government regulations. Contact your sales representative or distributor for more information, or send e-mail to export@cisco.com.

The following list shows which feature sets are supported on the Cisco 2500 series routers and access servers. These feature sets only apply to Cisco IOS Release 11.3:

- IP
- IP Plus
- IP Plus 40
- IP Plus 56
- ISDN
- IP/IPX/AT/DEC
- IP/IPX/AT/DEC Plus
- Enterprise Plus
- Enterprise Plus 40
- Enterprise Plus 56
- Enterprise APPN Plus
- Enterprise APPN Plus 40
- Enterprise APPN Plus 56
- Remote Access Server

Feature Set Tables

To determine what features are available with each feature set (software image), see Table 3 and Table 4. The tables summarize the features you can use when running a specific feature set on the Cisco 2500 series routers for Cisco IOS Release 11.3. The feature set tables use the following symbol conventions to identify features:

- Yes: the feature is offered in the feature set
- No: the feature is not offered in the feature set

Table 3 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 1

Feature	Feature Set										
	IP	IP Plus	IP Plus 40	IP Plus 56	ISDN	IP/IPX/AT/DEC	IP/IPX/AT/DEC Plus	IP/IBM/APPN	Enterprise Plus	Enterprise Plus 40	Enterprise Plus 56
IBM Support											
APPN High Performance Routing	No	No	No	No	No	No	No		No	No	No
APPN MIB Enhancements	No	No	No	No	No	No	No		No	No	No
APPN over Ethernet LAN Emulation	No	No	No	No	No	No	No		No	No	No

Table 3 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 1 (Continued)

Feature	Feature Set										
	IP	IP Plus	IP Plus 40	IP Plus 56	ISDN	IP/IPX/ AT/ DEC	IP/IPX/ AT/ DEC Plus	IP/ IBM/ APPN	Enterprise Plus	Enterprise Plus 40	Enterprise Plus 56
APPN Scalability Enhancements	No	No	No	No	No	No	No		No	No	No
Bisync Enhancements, includes: — Bisync 3780 Support — BSC Extended Addressing — Block Serial Tunneling (BSTUN) over Frame Relay	No	Yes	Yes	Yes	No	No	Yes		Yes	Yes	Yes
Cisco MultiPath Channel (CMPC)	No	No	No	No	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	No	Yes	Yes	Yes	No	No	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	No	Yes	Yes	Yes	No	No	Yes		Yes	Yes	Yes
SRB over FDDI on Cisco 4000, 4500, and 4700 Series Routers	No	No	No	No	No	No	No		No	No	No
TN3270 LU Nailing	No	No	No	No	No	No	No		No	No	No
TN3270 Server Enhancements	No	No	No	No	No	No	No		No	No	No
Token Ring LANE	No	No	No	No	No	No	No		No	No	No
Tunneling of Asynchronous Security Protocols	No	Yes	Yes	Yes	No	No	Yes		Yes	Yes	Yes

Table 3 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 1 (Continued)

Feature	Feature Set										
	IP	IP Plus	IP Plus 40	IP Plus 56	ISDN	IP/IPX/ AT/ DEC	IP/IPX/ AT/ DEC Plus	IP/ IBM/ APPN	Enterprise Plus	Enterprise Plus 40	Enterprise Plus 56
Internet											
DRP Server Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
IP Routing											
Easy IP (Phase 1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations	No	No	No	No		No	No		No	No	No
IP Enhanced IGRP Route Authentication	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Timestamp	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
LAN Support											
AppleTalk Access List Enhancements	No	No	No	No	No	Yes	Yes		Yes	Yes	Yes
DECnet Accounting	No	No	No	No	No	Yes	Yes		Yes	Yes	Yes
IPX Named Access Lists	No	No	No	No	Yes	Yes	Yes		Yes	Yes	Yes
IPX SAP-after-RIP	No	No	No	No	Yes	Yes	Yes		Yes	Yes	Yes
NLSP Enhancements	No	No	No	No	No	No	No		Yes	Yes	Yes
NLSP Multicast Support	No	No	No	No	No	Yes	Yes		Yes	Yes	Yes
Management											
Cisco Call History MIB Command Line Interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Cisco IOS Internationalization	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Entity MIB, Phase 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
SNMPv2C	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Virtual Profiles	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Multimedia											
IP Multicast Load Splitting across Equal-Cost Paths	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits	No	No	No	No	No	No	No		No	No	No
IP Multicast over Token Ring LANs	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Stub IP Multicast Routing	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Quality of Service											
RTP Header Compression	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes

Table 3 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 1 (Continued)

Feature	Feature Set										
	IP	IP Plus	IP Plus 40	IP Plus 56	ISDN	IP/IPX/ AT/ DEC	IP/IPX/ AT/ DEC Plus	IP/ IBM/ APPN	Enterprise Plus	Enterprise Plus 40	Enterprise Plus 56
Security											
Double Authentication	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Encrypted Kerberized Telnet	No	No	No	No	No	No	No		No	No	Yes
HTTP Security	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Per-User Configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Reflexive Access Lists	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
TCP Intercept	No	No	No	No	No	No	No		Yes	Yes	Yes
Vendor-Proprietary RADIUS Attributes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Switching											
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs	No	No	No	No	No	No	No		No	No	No
CLNS and DECnet Fast Switching over PPP	No	No	No	No	No	No	No		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	No	No	No	No	No	No	No		Yes	Yes	Yes
Fast-Switched Policy Routing	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
IPX Routing over ISL Virtual LANs	No	No	No	No	No	No	No		No	No	No
VIP Distributed Switching Support for IP Encapsulated in ISL	No	No	No	No	No	No	No		No	No	No
Terminal Services											
Virtual Templates for Protocol Translation	No	No	No	No	No	No	No		Yes	Yes	Yes
WAN Optimization											
ATM MIB Enhancements	No	No	No	No	No	No	No		No	No	No
PAD Enhancements	No	No	No	No	No	No	No		Yes	Yes	Yes
PAD Subaddressing	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
WAN Services											
Bandwidth Allocation Control Protocol	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
Enhanced Local Management Interface (ELMI)	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes

Table 3 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 1 (Continued)

Feature	Feature Set										
	IP	IP Plus	IP Plus 40	IP Plus 56	ISDN	IP/IPX/ AT/ DEC	IP/IPX/ AT/ DEC Plus	IP/ IBM/ APPN	Enterprise Plus	Enterprise Plus 40	Enterprise Plus 56
Frame Relay Enhancements	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
Frame Relay MIB Extensions	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
Frame Relay Router ForeSight	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
ISDN Advice of Charge	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
ISDN Caller ID Callback	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
ISDN NFAS	No	No	No	No	No	No	No		No	No	No
Layer 2 Forwarding—Fast Switching	No	Yes	Yes	Yes	No	No	Yes		Yes	Yes	Yes
Leased Line ISDN at 128 kbps	No	No	No	No	No	No	No		No	No	No
PPP over ATM	No	No	No	No	No	No	No		No	No	No
Telnet Extensions for Dialout	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
X.25 Enhancements	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
X.25 on ISDN	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
X.25 Switching between PVCs and SVCs	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes
X.28 Emulation	Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	Yes	Yes

Table 4 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 2

Feature	Feature Set			
	Enterprise/ APPN Plus	Enterprise/ APPN Plus 40	Enterprise/ APPN Plus 56	Remote Access Server
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

Table 4 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 2 (Continued)

Feature	Feature Set			
	Enterprise/ APPN Plus	Enterprise/ APPN Plus 40	Enterprise/ APPN Plus 56	Remote Access Server
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
SRB over FDDI on Cisco 4000, 4500, and 4700 Series Routers	No	No	No	No
TN3270 LU Nailing	No	No	No	No
TN3270 Server Enhancements	No	No	No	No
Token Ring LANE	No	No	No	No
Tunneling of Asynchronous Security Protocols	Yes	Yes	Yes	No
Internet				
DRP Server Agent	Yes	Yes	Yes	No
IP Routing				
Easy IP (Phase 1)	Yes	Yes	Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL in Virtual LAN Configurations	No	No	No	No
IP Enhanced IGRP Route Authentication	Yes	Yes	Yes	Yes
TCP Enhancements, includes: — TCP Selective Acknowledgment — TCP Timestamp	Yes	Yes	Yes	Yes

Table 4 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 2 (Continued)

Feature	Feature Set			
	Enterprise/ APPN Plus	Enterprise/ APPN Plus 40	Enterprise/ APPN Plus 56	Remote Access Server
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	No
Management				
Cisco Call History MIB Command Line Interface	Yes	Yes	Yes	No
Cisco IOS Internationalization	Yes	Yes	Yes	Yes
Entity MIB, Phase 1	Yes	Yes	Yes	Yes
SNMPv2C	Yes	Yes	Yes	Yes
Virtual Profiles	Yes	Yes	Yes	Yes
Multimedia				
IP Multicast Load Splitting across Equal-Cost Paths	Yes	Yes	Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits	No	No	No	No
IP Multicast over Token Ring LANs	Yes	Yes	Yes	Yes
Stub IP Multicast Routing	Yes	Yes	Yes	Yes
Quality of Service				
RTP Header Compression	Yes	Yes	Yes	Yes
Security				
Double Authentication	Yes	Yes	Yes	Yes
Encrypted Kerberized Telnet	No	No	Yes	No
HTTP Security	Yes	Yes	Yes	Yes
Per-User Configuration	Yes	Yes	Yes	Yes
Reflexive Access Lists	Yes	Yes	Yes	Yes
TCP Intercept	Yes	Yes	Yes	No
Vendor-Proprietary RADIUS Attributes	Yes	Yes	Yes	Yes

Table 4 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 2 (Continued)

Feature	Feature Set			
	Enterprise/ APPN Plus	Enterprise/ APPN Plus 40	Enterprise/ APPN Plus 56	Remote Access Server
Switching				
AppleTalk Routing over ISL and IEEE 802.10 in Virtual LANs	No	No	No	No
CLNS and DECnet Fast Switching over PPP	Yes	Yes	Yes	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
Fast-Switched Policy Routing	Yes	Yes	Yes	Yes
IPX Routing over ISL Virtual LANs	No	No	No	No
VIP Distributed Switching Support for IP Encapsulated in ISL	No	No	No	No
Terminal Services				
Virtual Templates for Protocol Translation	Yes	Yes	Yes	Yes
WAN Optimization				
ATM MIB Enhancements	No	No	No	No
PAD Enhancements	Yes	Yes	Yes	Yes
PAD Subaddressing	Yes	Yes	Yes	Yes
WAN Services				
Bandwidth Allocation Control Protocol	Yes	Yes	Yes	No
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	Yes	Yes	Yes	No
ISDN Caller ID Callback	Yes	Yes	Yes	No
ISDN NFAS	No	No	No	No
Layer 2 Forwarding—Fast Switching	Yes	Yes	Yes	Yes
Leased Line ISDN at 128 kbps	No	No	No	No
PPP over ATM	No	No	No	No
Telnet Extensions for Dialout	Yes	Yes	Yes	Yes

Table 4 Cisco IOS Software Feature Sets for the Cisco 2500 Series Routers, Part 2 (Continued)

Feature	Feature Set			
	Enterprise/ APPN Plus	Enterprise/ APPN Plus 40	Enterprise/ APPN Plus 56	Remote Access Server
X.25 Enhancements	Yes	Yes	Yes	Yes
X.25 on ISDN	Yes	Yes	Yes	No
X.25 Switching between PVCs and SVCs	Yes	Yes	Yes	Yes
X.28 Emulation	Yes	Yes	Yes	Yes

Upgrading to a New Software Release

If you are upgrading to Cisco IOS Release 11.3 from an earlier Cisco IOS software release, you should save your current configuration file before configuring your access server with the Cisco IOS Release 11.3 software. An unrecoverable error could occur during download or configuration.

Note Before downloading a software upgrade, read Product Bulletin #703, *Cisco IOS Software Release Upgrade Paths and Packaging Simplification*. The information in this bulletin supersedes the following instructions.

For instructions on downloading a current Cisco IOS release from the CCO Trivial File Transfer Protocol (TFTP) server, go to the following URL. (This URL is subject to change without notice.)

<http://www.cisco.com/kobayashi/sw-center>

The Software Center window is displayed.

- Step 1** Click **Cisco IOS Software**. The Cisco IOS Software window is displayed.
- Step 2** Click **Cisco IOS 11.3**. The Cisco 11.3 Software Upgrade Planner window is displayed.
- Step 3** Click **Download Cisco IOS 11.3 Software**. The Software Checklist window is displayed.
- Step 4** Select the appropriate information in each section of the Software Checklist window.
 - Hardware
 - Release
 - Software and hardware release
- Step 5** Click **Execute**. The software release is downloaded to your desktop computer.
- Step 6** Transfer the software release to a local TFTP server on your network, using a terminal emulation application such as TCP Connect.
- Step 7** Log onto your router. Copy the software release from your TFTP server to your router, using the **copy tftp** command.

Memory Requirements

Table 5 through Table 6 describe the memory requirements for the Cisco 2500 series platform feature set supported by Cisco IOS Release 11.3. Beginning with Cisco IOS Release 10.3, some software image sizes exceed 4 MB and, when compressed, exceed 2 MB. Also, some systems now require more than 1 MB of main system memory for data structure tables.

For Cisco routers to take advantage of the Release 11.3 features, you must upgrade the code or main system memory. Some platforms have specific chip or architecture requirements that affect what can be upgraded and in what increments.

Table 5 Release 11.3 Memory Requirements

Platform/Feature Set	Image Name	Minimum Required Code Memory	Required Main Memory	Release 11.3 Runs from
IP	c2500-i-1	8 MB Flash	4 MB DRAM	Flash
IP Plus	c2500-is-1	8 MB Flash	4 MB DRAM	Flash
IP Plus 40	c2500-is40-1	8 MB Flash	4 MB DRAM	Flash
IP Plus 56	c2500-is56-1	8 MB Flash	4 MB DRAM	Flash
ISDN	c2500-g-1	8 MB Flash	4 MB DRAM	Flash
IP/IPX/AT/DEC	c2500-d-1	8 MB Flash	4 MB DRAM	Flash
IP/IPX/AT/DEC Plus	c2500-ds-1	8 MB Flash	6 MB DRAM	Flash
Enterprise Plus	c2500-js-1	16 MB Flash	6 MB DRAM	Flash
Enterprise Plus 40	c2500-js40-1	16 MB Flash	8 MB DRAM	Flash
Enterprise Plus 56	c2500-js56-1	16 MB Flash	8 MB DRAM	Flash
Enterprise/APPN Plus	c2500-ajs-1	16 MB Flash	8 MB DRAM	Flash
Enterprise/APPN Plus 40	c2500-ajs40-1	16 MB Flash	8 MB DRAM	Flash
Enterprise/APPN Plus 56	c2500-ajs56-1	16 MB Flash	8 MB DRAM	Flash
Remote Access Server (RAS)	c2500-c-1	8 MB Flash	4 MB DRAM	Flash

Table 6 Cisco AS2509-RJ and Cisco AS2511-RJ—Memory Requirements

Feature Set	Required Flash Memory	Required DRAM Memory	Release 11.3 Runs from ¹
IP	8 MB Flash	4 MB DRAM	Flash
Remote Access Server	8 MB Flash	4 MB DRAM	Flash

1. When a system is running from Flash memory, you cannot update the system while it is running. You must use the Flash load helper.

Important Notes

This section describes noteworthy issues about using the Cisco IOS Release 11.3 software.

Missing Source-Route Bridging Commands

Due to a production problem, many source-route bridging commands were omitted from the printed version of the *Cisco IOS Software Command Summary* (78-4746-01). For complete documentation of all source-route bridging commands, refer to the *Bridging and IBM Networking Command Reference* (78-4743-01). You can also obtain the most current documentation on the Documentation CD-ROM or Cisco Connection Online (CCO).

Caveats

A complete list of the caveats, including descriptions and possible workarounds, is available on the Documentation CD-ROM and on CCO:

- On the Documentation CD-ROM, go to *Cisco Product Documentation*, select *Cisco IOS Software Configuration*, click *Cisco IOS Release 11.3*, then select *Release Notes for Cisco IOS Release 11.3*. From the bulleted list, select *Important Notes and Caveats for Release 11.3*.
- On CCO, go to *Software and Support*, and select *Documentation*. Next, go to *Cisco Documentation*, click *Cisco IOS Software Configuration*, select *Cisco IOS Release 11.3*, and then select *Release Notes for Cisco IOS Release 11.3*. From the bulleted list, click *Important Notes and Caveats for Release 11.3*.

Each of the following sections lists the areas where caveats exist for a specific software release.

Caveats for Release 11.3(2)

Possibly unexpected behavior in Cisco IOS Release 11.3(2) exists in the following areas:

- Basic System Services
- IBM Connectivity
- Interfaces and Bridging
- IP Routing Protocols
- ISO CLNS
- Novell IPX, XNS, and Apollo Domain
- Wide-Area Networking

Caveats for Release 11.3(1)

Possibly unexpected behavior in Cisco IOS Release 11.3(1) exists in the following areas:

- AppleTalk
- Basic System Services
- IBM Connectivity
- Interfaces and Bridging
- IP Routing Protocols

- Novell IPX, XNS, and Apollo Domain
- TCP/IP Host-Mode Services
- VINES
- Wide-Area Networking

Cisco Connection Online

Cisco Connection Online (CCO) is the 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 customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

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

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

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

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 the Cisco Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

Documentation CD-ROM

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

If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** in the toolbar, select **Documentation**, and click **Enter the feedback form**. 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 Cisco IOS Release 11.3 configuration guides and command references.

AccessPath, AtmDirector, the CCIE logo, CD-PAC, Centri, Centri Bronze, Centri Gold, Centri Security Manager, Centri Silver, the Cisco Capital logo, Cisco IOS, the Cisco IOS logo, *CiscoLink*, the Cisco NetWorks logo, the Cisco Powered Network logo, the Cisco Press logo, ClickStart, ControlStream, Fast Step, FragmentFree, IGX, JumpStart, Kernel Proxy, LAN²LAN Enterprise, LAN²LAN Remote Office, MICA, Natural Network Viewer, NetBeyond, Netsys Technologies, *Packet*, PIX, Point and Click Internetworking, Policy Builder, RouteStream, Secure Script, SMARTnet, StrataSphere, StrataSphere BILLder, StrataSphere Connection Manager, StrataSphere Modeler, StrataSphere Optimizer, Stratm, StreamView, SwitchProbe, *The Cell*, TrafficDirector, VirtualStream, VlanDirector, Workgroup Director, Workgroup Stack, and XCI are trademarks; Empowering the Internet Generation and The Network Works. No Excuses. are service marks; and BPX, Catalyst, Cisco, Cisco Systems, the Cisco Systems logo, EtherChannel, FastHub, FastPacket, ForeSight, IPX, LightStream, OptiClass, Phase/IP, StrataCom, and StrataView Plus are registered trademarks of Cisco Systems, Inc. in the U.S. and certain other countries. All other trademarks mentioned in this document are the property of their respective owners.

Copyright © 1998, Cisco Systems, Inc.
All rights reserved. Printed in USA.
9802R