



# Release Notes for Cisco 7000 Family for Cisco IOS Release 11.2 P

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April 16, 2001



**Note**

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You can find the most current Cisco IOS documentation on Cisco.com. This set of electronic documents may contain updates and modifications made after the hard-copy documents were printed.

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These release notes for the Cisco 7000 family of routers support Cisco IOS Release 11.2 P, up to and including Cisco IOS Release 11.2(26)P. These release notes are updated as needed.

For a list of the software caveats that apply to Cisco IOS Release 11.2 P, see the *Caveats for Cisco IOS Release 11.2 P* document that accompanies these release notes. The caveats document is updated for every maintenance release and is located on Cisco.com and the Documentation CD-ROM.

Use these release notes with the *Cross-Platform Release Notes for Cisco IOS Release 11.2* on Cisco.com and the Documentation CD-ROM.



**Note**

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Cisco IOS Release 11.2(26)P is the last scheduled maintenance release for Cisco IOS Release 11.2 P. TAC Support will continue to be available. These release notes will be the last release notes published for Cisco IOS Release 11.2 P.

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## System Requirements

This section describes the system requirements for Cisco IOS Release 11.2(26)P and includes the following sections:

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## Memory Requirements

[Table 1](#) describes the memory requirements for the feature sets for the Cisco 7000 family of routers supported by Cisco IOS Release 11.2 P.

Cisco 7200 series routers are shipped with an 8-, 16-, or 20-MB Flash memory card. Cisco 7500 series routers and Cisco 7000 series routers with the RSP7000 and RSP7000CI are shipped with a 16- or 20-MB Flash memory card.

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

**Table 1** Images and Memory Requirements for the Cisco 7000 Family

Platforms	Feature Sets	Image Name	Software Image	Flash Memory Recommended	DRAM Memory Recommended	Runs From
Cisco 7200 Series	IP Standard Feature Set	IP	c7200-is-mz	4 MB	32 MB	RAM
		IP 40	c7200-is40-mz	8 MB	32 MB	RAM
		IP 56	c7200-is56-mz	8 MB	32 MB	RAM
	Desktop/IBM Standard Feature Set	Desktop/IBM	c7200-ds-mz	4 MB	32 MB	RAM
		Desktop/IBM 40	c7200-ds40-mz	4 MB	32 MB	RAM
		Desktop/IBM 56	c7200-ds56-mz	4 MB	32 MB	N/A
	Enterprise Standard Feature Set	Enterprise	c7200-js-mz	8 MB	32 MB	RAM
		Enterprise 40	c7200-js40-mz	8 MB	32 MB	RAM
		Enterprise 56	c7200-js56-mz	8 MB	32 MB	RAM
	Enterprise/APPN Standard Feature Set	Enterprise/APPN	c7200-ajs-mz	8 MB	32 MB	RAM
		Enterprise/APPN 40	c7200-ajs40-mz	8 MB	32 MB	RAM
		Enterprise/APPN 56	c7200-ajs56-mz	8 MB	32 MB	RAM
	Network Layer 3 Switching	Network Layer 3 Switching	c7200-inu-mz	8 MB	32 MB	RAM
Cisco 7500 Series	IP Standard Feature Set	IP	rsp-isv-mz	8 MB	32 MB	RAM
		IP 40	rsp-isv40-mz	8 MB	32 MB	RAM
		IP 56	rsp-isv56-mz	8 MB	32 MB	RAM
	Desktop/IBM Standard Feature Set	Desktop/IBM	rsp-dsv-mz	8 MB	32 MB	RAM
		Desktop/IBM 40	rsp-dsv40-mz	8 MB	32 MB	RAM
		Desktop/IBM 56	rsp-dsv56-mz	8 MB	32 MB	RAM
	Enterprise Standard Feature Set	Enterprise	rsp-jsv-mz	8 MB	32 MB	RAM
		Enterprise 40	rsp-jsv40-mz	8 MB	32 MB	RAM
		Enterprise 56	rsp-jsv56-mz	8 MB	32 MB	RAM
	Enterprise/APPN Standard Feature Set	Enterprise/APPN	rsp-ajsv-mz	8 MB	32 MB	RAM
		Enterprise/APPN 40	rsp-ajsv40-mz	8 MB	32 MB	RAM
		Enterprise/APPN 56	rsp-ajsv56-mz	8 MB	32 MB	RAM

Table 2 lists the standard feature sets supported in Cisco IOS Release 11.2 P by the Cisco 7000 family of routers.

**Table 2 Feature Set Matrix for Cisco 7000 Family of Routers**

Standard Feature Sets <sup>1</sup>	Cisco 7200 Series	Cisco 7500 Series and Cisco 7000 Series with RSP7000
IP Routing	Basic and Encrypt	Basic and Encrypt
Desktop/IBM	Basic and Encrypt	Basic and Encrypt
Desktop/IBM and APPN	Basic	Basic
Enterprise	Basic and Encrypt	Basic and Encrypt
Enterprise and APPN	Basic and Encrypt	Basic and Encrypt
Network Layer 3 Switching	Basic	—
IP Routing/ACIP <sup>2</sup>	—	Basic

1. Basic images for Cisco 7200 series, Cisco 7500 series, and Cisco 7000 series routers with the RSP7000 and RSP7000CI include additional functionality not found in the basic feature sets offered on other hardware platforms.
2. This feature set supports the ATM Cable Interface Processor (ACIP) available on Cisco 7500 series routers.

## Supported Hardware

Cisco IOS Release 11.2(26)P supports the following Cisco 7000 family routers:

- Cisco 7200 series routers (including the Cisco 7202, Cisco 7204, and Cisco 7206)
- Cisco 7500 series routers (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)

For detailed descriptions of the hardware features, see the [“New and Changed Information”](#) section on page 16.

Table 3 lists the interfaces that are supported by the Cisco 7000 family of routers.

**Table 3 Supported Interfaces for the Cisco 7000 Family of Routers**

<b>Interface, Network Module, or Data Rate</b>	<b>Product Description</b>	<b>Supported Platforms</b>
<b>Lan Interfaces</b>	Ethernet (AUI)	All Cisco 7000 family platforms
	Ethernet (10BASE-T)	All Cisco 7000 family platforms
	Ethernet (10BaseFL)	All Cisco 7000 family platforms
	Fast Ethernet (100BaseTX)	All Cisco 7000 family platforms
	Fast Ethernet (100BaseFX)	All Cisco 7000 family platforms
	Token Ring 4-Mbps	All Cisco 7000 family platforms
	Token Ring 16-Mbps	All Cisco 7000 family platforms
	Token Ring full-duplex	All Cisco 7000 family platforms
	FDDI DAS	All Cisco 7000 family platforms
	FDDI SAS	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	FDDI full-duplex	All Cisco 7000 family platforms
	FDDI multimode	All Cisco 7000 family platforms
	FDDI single-mode	All Cisco 7000 family platforms
	ATM Interface	All Cisco 7000 family platforms
	Channel Interface	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	Second-generation Channel Interface	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	Parallel Channel Adapter (Bus and Tag)	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	ESCON Channel Adapter (ECA)	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	Versatile Interface Processor	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	Second-generation Versatile Interface Processor	Cisco 7500 Series and Cisco 7000 Series with RSP7000
MultiChannel Interface (Channelized E1/T1)	All Cisco 7000 family platforms.	
Packet-over-SONET OC-3 Interface	Cisco 7500 Series and Cisco 7000 Series with RSP7000	
100VG-AnyLAN	All Cisco 7000 family platforms	
<b>WAN Data Rates</b>	48/56/64 kbps	All Cisco 7000 family platforms
	1.544/2.048 Mbps	All Cisco 7000 family platforms
	34/45/52 Mbps	All Cisco 7000 family platforms

**Table 3** Supported Interfaces for the Cisco 7000 Family of Routers (continued)

Interface, Network Module, or Data Rate	Product Description	Supported Platforms
WAN Interfaces	EIA/TIA-232	All Cisco 7000 family platforms
	X.21	All Cisco 7000 family platforms
	V.35	All Cisco 7000 family platforms
	EIA/TIA-449	All Cisco 7000 family platforms
	EIA-530	All Cisco 7000 family platforms
	EIA/TIA-613 (HSSI)	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	ISDN BRI	Cisco 7200 Series
	ISDN PRI	All Cisco 7000 family platforms
	E1-G.703/G.704	Cisco 7500 Series and Cisco 7000 Series with RSP7000 <sup>1</sup>
	Channelized T1	All Cisco 7000 family platforms
	Channelized E1	All Cisco 7000 family platforms
	Channelized T3	Cisco 7500 Series and Cisco 7000 Series with RSP7000
	Serial	All Cisco 7000 family platforms

1. These interfaces are supported on Cisco 7200 series routers in Cisco IOS Release 11.1 CA/

## Determining the Software Version

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

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-JS-MZ), Version 11.2(26)P, RELEASE SOFTWARE
```

## Upgrading to a New Software Release

For general information about upgrading to a new software release, see *Cisco IOS Upgrade Ordering Instructions* located at:

[http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/957\\_pp.htm](http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/957_pp.htm)

## 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 version for the Cisco 7000 family.

**Table 4** Current Microcode Versions for the Cisco 7000 Family

Processor or Module	Current Bundled Route Switch Processor (RSP) Microcode Version	Minimum Version Required
AIP (ATM Interface Processor)	20.18	20.8
EIP (Ethernet Interface Processor)	20.6	20.2
FEIP (Fast Ethernet Interface Processor)	20.8	20.3
FIP (FDDI Interface Processor)	20.4	20.1
FSIP (Fast Serial Interface Processor)	20.9	20.4
HIP (HSSI Interface Processor)	20.2	20.0
MIP (MultiChannel Interface Processor)	22.3	22.0
POSIP	20.0	20.0
TRIP (Token Ring Interface Processor)	20.2	20.0
VIP (Versatile Interface Processor)	22.20	22.20
VIP2	22.20	22.20

## 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 11.2(26)P supports the same feature sets as Cisco IOS Release 11.2(25).



### Caution

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

[Table 5](#) and [Table 6](#) list the features and feature sets supported by the Cisco 7000 family of routers and uses the following conventions:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.
- Encrypt—This feature is offered in the encryption feature sets, which consist of 40-bit (Plus 40) or 56-bit (Plus 56) data encryption feature sets.

**Note**

These feature set tables might not be a cumulative or list all the features in each image. You can find the most current Cisco IOS documentation on Cisco.com. These electronic documents may contain updates and modifications made after the hard-copy documents were printed. If you have a Cisco.com login account, you can find image and release information regarding features prior to Cisco IOS Release 11.2(26)P by using the Feature Navigator tool at: <http://www.cisco.com/go/fn>.

**Table 5 Feature List by Feature Set for the Cisco 7000 Family**

Features	Software Images by Feature Sets			
	Network Layer 3 Switching	IP Routing	Desktop/IBM <sup>1</sup>	Enterprise <sup>1</sup>
<b>LAN Support</b>				
Apollo Domain	No	No	No	Yes
AppleTalk 1 and 2 (includes AppleTalk load balancing)	No	No	Yes	Yes
Banyan VINES	No	No	No	Yes
Concurrent Routing and Bridging (CRB applies to transparent bridging, not source-route bridging)	Yes	Yes	Yes	Yes
DECnet IV	No	No	Yes	Yes
DECnet V	No	No	No	Yes
GRE	No	Yes	Yes	Yes
Integrated Routing and Bridging (IRB) <sup>2</sup>	Yes	Yes	Yes	Yes
IP	Yes	Yes	Yes	Yes
LAN extension host	Yes	Yes	Yes	Yes
Multiring	Yes	Yes	Yes	Yes
Novell IPX <sup>3</sup>	Yes	No	Yes	Yes
OSI	No	No	No	Yes
Transparent and translational bridging	Yes	Yes	Yes	Yes
VLANs (ISL and IEEE 802.10)	Yes	Yes	Yes	Yes
XNS	No	No	No	Yes
<b>WAN Services</b>				
ATM LAN emulation: DECnet routing, XNS routing, and Banyan VINES support	Yes	Yes	Yes	Yes
ATM LAN emulation: Hot Standby Router Protocol (HSRP) and Simple Server Redundancy Protocol (SSRP)	Yes	Yes	Yes	Yes
ATM: UNI 3.1 signaling for ATM	Yes	Yes	Yes	Yes
Combinet Packet Protocol (CPP)	Yes	Yes	Yes	Yes
Dialer profiles	Yes	Yes	Yes	Yes
Half-bridge/half-router for CPP and PPP	Yes	Yes	Yes	Yes
HDLC	Yes	Yes	Yes	Yes

**Table 5 Feature List by Feature Set for the Cisco 7000 Family (continued)**

Features	Software Images by Feature Sets			
	Network Layer 3 Switching	IP Routing	Desktop/IBM <sup>1</sup>	Enterprise <sup>1</sup>
IPXWAN 2.0	Yes	No	Yes	Yes
ISDN <sup>4</sup>	No	Yes	Yes	Yes
Multichassis Multilink PPP (MMP)	No	No	No	Yes
PPP <sup>5</sup>	No	Yes	Yes	Yes
Virtual private dial-up network (VPDN)	No	No	Yes	Yes
Web Cache Communication Protocol (WCCP)	Yes	Yes	Yes	Yes
<b>WAN Optimization</b>				
Bandwidth-on-demand	No	Yes	Yes	Yes
Custom and priority queuing	No	Yes	Yes	Yes
Dial backup	No	Yes	Yes	Yes
Dial-on-demand	No	Yes	Yes	Yes
Header <sup>6</sup> , link, and payload compression <sup>7</sup>	No	Yes	Yes	Yes
Snapshot routing	Yes	Yes	Yes	Yes
Weighted fair queuing	No	Yes	Yes	Yes
<b>IP Routing</b>				
Enhanced IGRP	Yes	Yes	Yes	Yes
Enhanced IGRP Optimizations	Yes	Yes	Yes	Yes
ES-IS	No	No	No	Yes
IGRP	Yes	Yes	Yes	Yes
IS-IS	No	No	No	Yes
Named IP access control list <sup>8</sup>	No	Yes	Yes	Yes
NHRP	Yes	Yes	Yes	Yes
Network Address Translation (NAT)	Yes	Yes	Yes	Yes
On-Demand Routing (ODR)	Yes	Yes	Yes	Yes
OSPF	Yes	Yes	Yes	Yes
OSPF not-so-stubby-areas (NSSA)	Yes	Yes	Yes	Yes
OSPF over Demand Circuit (RFC 1793)	Yes	Yes	Yes	Yes
PIM	Yes	Yes	Yes	Yes
Policy-based routing	Yes	Yes	Yes	Yes
RIP	Yes	Yes	Yes	Yes
RIP Version 2	Yes	Yes	Yes	Yes
<b>Other Routing</b>				
AURP	No	No	Yes	Yes
IPX RIP	Yes	No	Yes	Yes

Table 5 Feature List by Feature Set for the Cisco 7000 Family (continued)

Features	Software Images by Feature Sets			
	Network Layer 3 Switching	IP Routing	Desktop/IBM <sup>1</sup>	Enterprise <sup>1</sup>
NLSP	Yes	No	Yes	Yes
RTMP	Yes	Yes	Yes	Yes
SMRP	No	No	Yes	Yes
S RTP	No	No	No	Yes
<b>Multimedia and Quality of Service</b>				
Generic traffic shaping	Yes	Yes	Yes	Yes
Random early detection (RED)	Yes	Yes	Yes	Yes
Resource Reservation Protocol (RSVP)	Yes	Yes	Yes	Yes
<b>Management</b>				
AutoInstall	Yes	Yes	Yes	Yes
HTTP Server	Yes	Yes	Yes	Yes
RMON events and alarms	Yes	Yes	Yes	Yes
SNMP	Yes	Yes	Yes	Yes
Telnet	Yes	Yes	Yes	Yes
<b>Security</b>				
Access lists	Yes	Yes	Yes	Yes
Access security	Yes	Yes	Yes	Yes
Extended access lists	Yes	Yes	Yes	Yes
Kerberized login	No	No	No	Yes
Kerberos V client support	No	No	No	Yes
Lock and key	Yes	Yes	Yes	Yes
MD5 routing authentication	Yes	Yes	Yes	Yes
Network layer encryption (40-bit or export-controlled 56-bit DES)	Encrypt	Encrypt	Encrypt	Encrypt
RADIUS	Yes	Yes	Yes	Yes
Router authentication	Encrypt	Encrypt	Encrypt	Encrypt
TACACS+ (TACACS+ Single Connection and SENDAUTH enhancements)	Yes	Yes	Yes	Yes
<b>IBM Support</b>				
APPN (optional) <sup>1</sup>	No	No	Yes	Yes
BAN for SNA Frame Relay support	No	No	Yes	No
Caching and filtering	No	No	Yes	Yes
DLSw+ (TACACS+ Single Connection and SENDAUTH enhancements) <sup>9</sup>	No	No	Yes	Yes

**Table 5 Feature List by Feature Set for the Cisco 7000 Family (continued)**

Features	Software Images by Feature Sets			
	Network Layer 3 Switching	IP Routing	Desktop/IBM <sup>1</sup>	Enterprise <sup>1</sup>
Downstream PU concentration (DSPU)	No	No	Yes	Yes
Frame Relay SNA support (RFC 1490)	No	No	Yes	Yes
Native Client Interface Architecture (NCIA) Server	No	No	Yes	Yes
NetView Native Service Point	No	No	Yes	Yes
QLLC	No	No	Yes	Yes
Response Time Reporter (RTR)	No	No	Yes	Yes
SDLC integration	No	No	Yes	Yes
SDLC transport (STUN)	No	No	Yes	Yes
SDLC-to-LAN conversion (SDLLC)	No	No	Yes	Yes
SNA and NetBIOS WAN optimization through local acknowledgment	No	No	Yes	Yes
SRB/RSRB <sup>10</sup>	Yes	No	Yes	Yes
SRT	Yes	No	Yes	Yes
TG/COS	No	No	No	Yes

1. Desktop/IBM and Enterprise are available with APPN in a separate feature set. Use the product numbers that specify APPN. APPN includes APPN Central Registration (CRR) and APPN over DLSw+.
2. Cisco IOS Releases 11.2(1) through 11.2(3) do not support IRB. In a later maintenance release IRB supports IP, IPX, and AppleTalk; it is supported for transparent bridging, but not for SRB; it is supported on all media-type interfaces except X.25 and ISDN bridged interfaces; and IRB and CRB cannot operate at the same time.
3. The Novell IPX feature includes display SAP by name, IPX access control list violation logging, and plain-English IPX access lists.
4. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
5. PPP includes support for LAN protocols supported by the feature set, address negotiation PAP, and CHAP authentication, and PPP compression.
6. IPX header compression (RFC 1553) is available in the feature sets that support IPX.
7. X.25 and Frame Relay payload compression.
8. This feature can only be used by packet and route filters; it is not backward-compatible with earlier Cisco IOS releases, and is not supported with Distributed Fast Switching (DFS).
9. Cisco IOS Release 11.2 introduces several DLSw+ enhancements.
10. SRB/RSRB is fast switched. This enhancement is enabled by default, but can be disabled.

**Table 6 Feature List by Feature Set for the Cisco 7500 Series and Cisco 7000 Series with RSP7000**

Features	Feature Sets		
	IP Routing	Desktop/IBM <sup>1</sup>	Enterprise <sup>1</sup>
<b>LAN Support</b>			
Apollo Domain	No	No	Yes
AppleTalk 1 and 2 (includes AppleTalk load balancing)	No	Yes	Yes
Banyan VINES	No	No	Yes
Concurrent Routing and Bridging (CRB applies to transparent bridging, not source-route bridging)	Yes	Yes	Yes
DECnet IV	No	Yes	Yes
DECnet V	No	No	Yes
GRE	Yes	Yes	Yes
Integrated Routing and Bridging (IRB) <sup>2</sup>	Yes	Yes	Yes
IP	Yes	Yes	Yes
LAN extension host	Yes	Yes	Yes
Multiring	Yes	Yes	Yes
Novell IPX <sup>3</sup>	No	Yes	Yes
OSI	No	No	Yes
Transparent and translational bridging	Yes	Yes	Yes
VLANs (ISL and IEEE 802.10)	Yes	Yes	Yes
XNS	No	No	Yes
<b>WAN Services</b>			
ATM LAN emulation: DECnet routing, XNS routing, and Banyan VINES support	Yes	Yes	Yes
ATM LAN emulation: Hot Standby Router Protocol (HSRP) and Simple Server Redundancy Protocol (SSRP)	Yes	Yes	Yes
ATM: Rate queues for SVC per subinterface	Yes	Yes	Yes
ATM: UNI 3.1 signaling for ATM	Yes	Yes	Yes
Combinet Packet Protocol (CPP)	Yes	Yes	Yes
Dialer profiles	Yes	Yes	Yes
Half-bridge/half-router for CPP and PPP	Yes	Yes	Yes
HDLC	Yes	Yes	Yes
IPXWAN 2.0	No	Yes	Yes
ISDN <sup>4</sup>	Yes	Yes	Yes
Multichassis Multilink PPP (MMP)	No	No	Yes
PPP <sup>5</sup>	Yes	Yes	Yes
Virtual private dial-up network (VPDN)	No	Yes	Yes

**Table 6 Feature List by Feature Set for the Cisco 7500 Series and Cisco 7000 Series with RSP7000 (continued)**

Web Cache Communication Protocol (WCCP)	Yes	Yes	Yes
<b>WAN Optimization</b>			
Bandwidth-on-demand	Yes	Yes	Yes
Custom and priority queuing <sup>6</sup>	Yes	Yes	Yes
Dial backup	Yes	Yes	Yes
Dial-on-demand	Yes	Yes	Yes
Header <sup>7</sup> , link, and payload compression <sup>8</sup>	Yes	Yes	Yes
Named IP Access Control List	Yes	Yes	Yes
Snapshot routing	Yes	Yes	Yes
Weighted fair queuing <sup>6</sup>	Yes	Yes	Yes
<b>IP Routing</b>			
Enhanced IGRP	Yes	Yes	Yes
Enhanced IGRP Optimizations	Yes	Yes	Yes
ES-IS	No	No	Yes
IGRP	Yes	Yes	Yes
IS-IS	No	No	Yes
Named IP Access Control List <sup>9</sup>	Yes	Yes	Yes
NHRP	Yes	Yes	Yes
Network Address Translation (NAT)	Yes	Yes	Yes
On-Demand Routing (ODR)	Yes	Yes	Yes
OSPF	Yes	Yes	Yes
OSPF not-so-stubby-areas (NSSA)	Yes	Yes	Yes
OSPF over Demand Circuit (RFC 1793)	Yes	Yes	Yes
PIM	Yes	Yes	Yes
Policy-based routing	Yes	Yes	Yes
RIP	Yes	Yes	Yes
RIP Version 2	Yes	Yes	Yes
<b>Other Routing</b>			
AURP	No	Yes	Yes
IPX RIP	No	Yes	Yes
NLSP	No	Yes	Yes
RTMP	No	Yes	Yes
SMRP	No	Yes	Yes
SRTP	No	No	Yes

**Table 6 Feature List by Feature Set for the Cisco 7500 Series and Cisco 7000 Series with RSP7000 (continued)**

<b>Multimedia and Quality of Service</b>			
Generic traffic shaping	Yes	Yes	Yes
Random early detection (RED)	Yes	Yes	Yes
Resource Reservation Protocol (RSVP)	Yes	Yes	Yes
<b>Management</b>			
AutoInstall	Yes	Yes	Yes
Automatic modem configuration	Yes	Yes	Yes
HTTP Server	Yes	Yes	Yes
RMON events and alarms	Yes	Yes	Yes
SNMP	Yes	Yes	Yes
Telnet	Yes	Yes	Yes
<b>Security</b>			
Access lists	Yes	Yes	Yes
Access security	Yes	Yes	Yes
Extended access lists	Yes	Yes	Yes
Kerberized login	No	No	Yes
Kerberos V client support	No	No	Yes
Lock and Key	Yes	Yes	Yes
MD5 routing authentication	Yes	Yes	Yes
Network layer encryption (40-bit or export-controlled 56-bit DES)	Encrypt	Encrypt	Encrypt
RADIUS	Yes	Yes	Yes
Router authentication	Encrypt	Encrypt	Encrypt
TACACS+ (TACACS+ Single Connection and SENDAUTH enhancements)	Yes	Yes	Yes
<b>IBM Support</b>			
APPN (optional) <sup>1</sup>	No	Yes	Yes
BAN for SNA Frame Relay support	No	Yes	Yes
Caching and filtering	No	Yes	Yes
DLSW+ (DLSw+ over TCP/IP is supported) <sup>10</sup>	No	Yes	Yes
Downstream PU concentration (DSPU)	No	Yes	Yes
Frame Relay SNA support (RFC 1490)	No	Yes	Yes
Native Client Interface Architecture (NCIA) Server	No	Yes	Yes
NetView Native Service Point	No	Yes	Yes
QLLC	No	Yes	Yes
Response Time Reporter (RTR)	No	Yes	Yes
SDLC integration	No	Yes	Yes
SDLC transport (STUN)	No	Yes	Yes

**Table 6 Feature List by Feature Set for the Cisco 7500 Series and Cisco 7000 Series with RSP7000 (continued)**

SDLC-to-LAN conversion (SDLLC)	No	Yes	Yes
SNA and NetBIOS WAN optimization through local acknowledgment	No	Yes	Yes
SRB/RSRB <sup>11</sup>	No	Yes	Yes
SRT	No	Yes	Yes
TG/COS	No	No	Yes
TN3270 Server (CIP only)	No	Yes	Yes
<b>VIP and HSA</b>			
VIP and HSA (Cisco IOS Release 11.1(2) or later)	Yes	Yes	Yes
VIP2 (Cisco IOS Release 11.1(5) or later)	Yes	Yes	Yes

1. Desktop/IBM and Enterprise are available with APPN in a separate feature set. In Cisco IOS Release 11.2, APPN includes APPN Central Registration (CRR) and APPN over DLSw+.
2. IRB supports IP, IPX, and AppleTalk; it is supported for transparent bridging, but not for SRB; it is supported on all media-type interfaces except X.25 and ISDN bridged interfaces; and IRB and concurrent routing and bridging (CRB) cannot operate at the same time.
3. The Novell IPX feature includes display SAP by name, IPX access control list violation logging, and plain-English IPX access lists.
4. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features. Asynchronous ISDN Access (V.120) is only supported in the Enterprise feature set.
5. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression.
6. Custom priority and queuing is not currently supported on SMIP or MIP cards.
7. IPX header compression (RFC 1553) is available in the feature sets that support IPX.
8. X.25 and Frame Relay payload compression.
9. This feature can only be used by packet and route filters; it is not backward-compatible with earlier Cisco IOS releases, and is not supported with distributed fast switching (DFS).
10. Cisco IOS Release 11.2 introduces several DLSw+ enhancements.
11. SRB/RSRB is fast switched. This enhancement is enabled by default, but can be disabled.

**Note**

In addition to the feature sets available for the Cisco 7000 family, some features are available through a special license. For example, NetFlow is only available if you purchase a NetFlow switching license. For information on features that require a special license, refer to the Pricing Tool available on Cisco.com under **Ordering: Ordering Information and Assistance: Pricing Tool**. The Pricing Tool is only available for customers who have a Cisco.com login account. For information on obtaining a Cisco.com login account, refer to the [“Obtaining Documentation”](#) section on page 38.

## New and Changed Information

The following sections list new hardware and software features supported by the Cisco 7000 family for Cisco IOS Release 11.2 P. There are no new features supported by Cisco IOS Release 11.2P for the Cisco 7000 family after Cisco IOS Release 11.2(15)P.

### New Hardware Features in Cisco IOS Release 11.2(15)P

The following new hardware feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(15)P:

#### Second-Generation Fast Ethernet Interface Processors

The FEIP2-DSW second-generation Fast Ethernet Interface Processor is a replacement for the FEIP2-2TX and FEIP2-2FX, which are available on Cisco 7500 series routers, and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The FEIP2-DSW is a dual-port, fixed configuration interface processor that provides two 100BaseTX or two 100BaseFX Ethernet interfaces. The FEIP2-DSW is supported on Cisco IOS Release 11.2(6)P or later releases of 11.2 P.

### New Software Features in Cisco IOS Release 11.2(15)P

The following new software feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(15)P:

#### Web Cache Communication Protocol Command Enhancements

The **ip wccp group-list** command was added to the Web Cache Communication Protocol (WCCP) feature to let you specify a standard IP access list for the source addresses of the cache engines that are to be part of the group.

### New Hardware Features in Cisco IOS Release 11.2(14)P

The following new hardware feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(14)P:

#### Second-Generation Fast Ethernet Interface Processors

The second-generation Fast Ethernet Interface Processors (FEIP2-2TX and FEIP2-2FX) are available on Cisco 7500 series routers and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

This feature was introduced in Cisco IOS Release 11.2(6)P.

## New Software Features in Cisco IOS Release 11.2(14)P

The following new software feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(14)P:

### Web Cache Communications Protocol Command Enhancements

The following changes were made to Web Cache Communication Protocol (WCCP) commands:

- The **ip wccp** command is now called the **ip wccp enable** command.
- The **ip wccp redirect-list** command was added.
- The output of the **show ip wccp** command was modified to include access list information.

This feature was introduced in Cisco IOS Release 11.2(13)P.

## New Features in Cisco IOS Release 11.2(13)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(13)P.

## New Features in Cisco IOS Release 11.2(12)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(12)P.

## New Hardware Features in Cisco IOS Release 11.2(11)P

The following new hardware feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(11)P:

### 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 MHz, has 4 MB of SRAM, and contains erasable programmable read-only memory (EPROM) for storing sufficient code for booting the Cisco IOS software.

## New Software Features in Cisco IOS Release 11.2(11)P

The following new software feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(11)P:

### RJ-45 Interface Support

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

<b>100basex</b>	Specifies an RJ-45 100BaseX physical connection.
<b>mii</b>	Specifies a media-independent interface.



#### Note

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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.

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## New Hardware Features in Cisco IOS Release 11.2(10)P

The following new hardware feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(10)P:

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

The PA-12E/2FE Ethernet switch 10BaseT 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/2FE port adapter, refer to the publication *PA-12E/2FE 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 P*.

## New Software Features in Cisco IOS Release 11.2(10)P

The following new software features are supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(10)P:

### Encryption over Frame Relay on VIP

You can use any type of encapsulation with IP encryption, except as follows: If you have a second-generation Versatile Interface Processor (VIP2) with a serial interface, encryption does not work for traffic on the serial interface unless you use the Point-to-Point Protocol (PPP), High-Level Data Link Control (HDLC) protocol, or Frame Relay protocol. For example, you cannot use encryption if you have X.25 or SMDS configured for the serial interface of a VIP2.

This feature was introduced in Cisco IOS Release 11.2(7)P. Encryption over Frame Relay on a VIP2 is available in Cisco IOS Release 11.2(7)P or a later release of 11.2 P.

### POS Command Enhancements

The following commands have been added to support new features for the Packet-over-SONET (POS) interface:

- The **pos internal-clock** interface command has been replaced by the **clock source** interface configuration command.
- The new interface command **pos scramble-atm** enables SONET payload scrambling on a POS interface. SONET payload scrambling applies a self-synchronous scrambler ( $x^{43+1}$ ) to the synchronous payload envelope (SPE) of the interface to ensure sufficient bit transition density.

### Web Cache Communication Protocol

Using the Web Cache Communication Protocol (WCCP) feature you can use a Cisco Cache Engine to handle Web traffic, thus reducing transmission costs and downloading time. This traffic includes user requests to view pages and graphics on World Wide Web servers, whether internal or external to your network, and the replies to those requests.

When a user (client) requests a page from a Web server, the router sends the request to a Cisco Cache Engine. If the cache engine has a copy of the requested page in storage, the engine sends the user that page. Otherwise, the engine gets the requested page and the objects on that page from the Web server, stores a copy of the page and its objects (caches them), and forwards the page and objects to the user.

WCCP transparently redirects HTTP requests from the intended server to a Cisco Cache Engine. End users do not know that the page came from the cache engine rather than from the originally requested Web server.

The publication *Using the Cisco Cache Engine* contains detailed information about the Cisco Cache Engine and discusses alternative network configurations. For more information on WCCP, refer to the feature module in the *Feature Guide for Cisco IOS Release 11.2 P*.

## New Features in Cisco IOS Release 11.2(9)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(9)P.

## New Hardware Features in Cisco IOS Release 11.2(8)P

The following new hardware feature is supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(8)P:

### ATM Cable Interface Processor on Cisco 7500 Series Routers

The ATM Cable Interface Processor (ACIP) is available on Cisco 7500 series routers. The ACIP provides a single, full-duplex ATM network interface for connection to a TeraLink 1000 cable headend, or through a Cisco LightStream 1010 ATM switch or other external ATM network equipment at data rates up to 155 Mbps bidirectionally. The ACIP has one multimode duplex SC-type connector or two single SC-type connectors that support Synchronous Digital Hierarchy/Synchronous Optical Network (SDH/SONET) multimode fiber-optic cable (STS-3C or STM-1).

The ACIP supports the following features:

- IP
- Multiple rate queues
- Reassembly of up to 512 buffers simultaneously (each buffer represents a packet)
- Up to 2,048 virtual circuits (VCs)
- Transfer rates per virtual path identifier (VPI) limited to fixed values provided by the cable headend
- Exception queue used for event reporting such as CRC errors
- Raw queue used for all raw traffic over the ATM network (raw traffic includes Operation, Administration, and Maintenance [OAM] cells and Interim Local Management Interface [ILMI] cells) (ATM signaling cells are not considered raw traffic.)

## New Hardware Features in Cisco IOS Release 11.2(7)P

The following new hardware features are supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(7)P:

### PA-8B-ST and PA-4B-U Basic Rate Interface Port Adapters

Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) port adapters (PA-8B-ST and PA-4B-U) are available on Cisco 7200 series routers.

The PA-8B-ST port adapter provides up to eight S/T-type BRI interfaces used to connect to an ISDN wide-area network through an external network terminator 1 (NT1) device. The PA-4B-U provides up to four BRI interfaces used to connect to an ISDN wide-area network through its internal NT1 device. Each PA-8B-ST and PA-4B-U interface consists of two bearer (B) channels that can transmit and receive data at the rate of 64 kbps, full-duplex, and one data (D) channel that can transmit and receive data at the rate of 16 kbps, full-duplex. The interfaces use an RJ-45 receptacle and standard straight-through twisted-pair cable.

The B channels are used for transmitting user data. The D channel is used for call setup control and network connection teardown, and provides the communication from the router to the ISDN switch. The B and D channels are presented to the system as serial interfaces that support High-Level Data Link Control (HDLC) and Point-to-Point Protocol (PPP) encapsulation. The PA-8B-ST and PA-4B-U port adapters also support dial-on-demand routing (DDR).

## Half-Duplex and Bisync for Synchronous Serial Port Adapters on Cisco 7200 Series Routers

The synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) on Cisco 7200 series routers support half-duplex and binary synchronous communications (Bisync). Bisync is a character-oriented data link layer protocol for half-duplex applications. In half-duplex mode, data is sent in one direction at a time. Direction is controlled by handshaking the Request To Send (RTS) and Clear To Send (CTS) control lines.

## Next-Generation Route Switch Processor on Cisco 7500 Series Routers

The next-generation Route Switch Processor (RSP4) provides improved performance on Cisco 7500 series routers. The RSP4 uses a 200-MHz R5000 processor with twice the primary cache and a 512-KB secondary cache for greatly improved performance. The biggest increases in performance are in process-level switching and other process-level tasks (for example, route calculations), in which the RSP4 is between two and four times faster than an RSP2. Fast-switching performance is also improved. The RSP4 supports the high system availability (HSA) feature and can be used in combination with an RSP2 or another RSP4.

## Packet OC-3 Interface Processor

The Packet OC-3 Interface Processor (POSIP) is available on Cisco 7500 series routers and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The POSIP is a fixed-configuration interface processor that uses second-generation Versatile Interface Processor (VIP2) technology. The POSIP provides a single 155.520-Mbps, OC-3 physical layer interface for packet-based traffic. This OC-3 interface is fully compatible with SONET and SDH network facilities and is compliant with RFC 1619, *PPP over SONET/SDH*, and RFC 1662, *PPP in HDLC-like Framing*. The Packet-over-SONET specification is primarily concerned with the use of the PPP encapsulation over SDH/SONET links.

## Channelized T3 Interface Processor Feature Enhancements

You can perform the following tasks on the Channelized T3 Interface Processor (CT3IP) available on Cisco 7500 series routers and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI):

- Configure Maintenance Data Link (MDL) messages
- Enable performance monitoring through Facility Data Link (FDL) per ANSI T1.403
- Generate bit error rate testing (BERT) patterns
- Enable remote FDL loopbacks
- Support SNMP MIB per RFC 1406 and RFC 1407

## 100VG-AnyLAN Port Adapter

The 100VG-AnyLAN port adapter (PA-100VG) 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-100VG provides a single interface compatible with IEEE 802.12 specifications to support 100 Mbps over Category 3 or Category 5 unshielded twisted-pair (UTP) cable with RJ-45 terminators. The PA-100VG supports 802.3 Ethernet packets and can be monitored with the IEEE 802.12 Interface MIB.

## PA-4R-FDX Token Ring Full-Duplex Port Adapter

The Token Ring full-duplex port adapter (PA-4R-FDX) 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-FDX provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces that can be set for 4- or 16-Mbps half-duplex or full-duplex operation and early token release. The default for all interfaces is half-duplex 4-Mbps operation with early token release disabled. The PA-4R-FDX connects over Type 1 lobe or Type 3 lobe cables and provides a DB-9 (PC-type) receptacle.

## PA-A1-OC3MM and PA-A1-OC3SM ATM Port Adapters

ATM port adapters (PA-A1-OC3MM and PA-A1-OC3SM) are 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 ATM port adapter provides a single SDH/SONET OC-3 full-duplex interface (either multimode or single-mode intermediate reach) and supports data rates of up to 155 Mbps bidirectionally. The ATM port adapter connects to a SDH/SONET multimode or SONET/STC-3C single-mode optical fiber cable (STS-3C or STM-1 physical layer) to connect the router to an external DSU (an ATM network). The ATM port adapter supports the following features:

- Segmentation and reassembly (SAR) of up to 512 buffers simultaneously, where each buffer represents a packet
- Up to 256 transmit buffers for simultaneous fragmentation
- Up to 2,048 SAR virtual circuits (VCs)
- ATM adaptation layer (AAL) 5
- Operation, Administration, and Maintenance (OAM) cells

## PA-2CE1/PRI-75, PA-2CE1/PRI-120, and PA-2CT1/PRI Channelized E1 and T1 Port Adapters

Channelized E1 and T1 Primary Rate Interface (PRI) Integrated Services Digital Network (ISDN) port adapters (PA-2CE1/PRI-75, PA-2CE1/PRI-120, and PA-2CT1/PRI) are 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-2CE1/PRI-120 (balanced 120-ohm) and PA-2E1/PRI-75 (unbalanced 75-ohm) provide up to two channelized E1 interfaces to connect to channel service units (CSUs) and can transmit and receive data bidirectionally at the E1 rate of 2.048 Mbps. The PA-2CT1/PRI provides up to two channelized T1 interfaces to connect to CSUs, and can transmit and receive data bidirectionally at the T1 rate of 1.544 Mbps. The interfaces use a 15-pin, D-shell receptacle. The PA-2CE1/PRI-75 and PA-2E1/PRI-120 use G.703 serial interface cables, and the PA-2CT1/PRI uses standard serial cables (null-modem and straight-through).

## Data Encryption Service Adapter

The data encryption service adapter (ESA) 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 ESA requires a VIP2 model VIP2-40.

The ESA provides encryption processing to offload some of the encryption processing from the router's main processor and to improve performance. Encryption and authentication are provided by a software service called a crypto engine. The ESA provides the encryption mechanisms required to perform data encryption using a 40-bit or 56-bit Data Encryption Standard (DES) configured through the crypto engine. The ESA uses Public Key (PK) technology based on the concept of the Protected Entity (PE) and employs DES and the Digital Signature Standard (DSS) to ensure that secure data and information can be transferred between similarly equipped hosts on your network.

For detailed information on encryption, refer to the "Configuring Network Data Encryption with Router Authentication" chapter in the *Security Configuration Guide*.

## New Software Features in Cisco IOS Release 11.2(7)P

The following new software features are supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(7)P:

### Particle-Based Transparent Bridging on Cisco 7200 Series Routers

Particle-based transparent bridging (TRB) adds scatter-gather capability to transparent bridging by default to improve performance on Cisco 7200 series routers.

Particles represent a communications data packet as a collection of noncontiguous buffers. The traditional Cisco IOS packet has a packet-type control structure and a single, contiguous data buffer. A particle packet has the same packet-type control structure but also maintains a queue of particle-type structures, each of which manages its own block.

This scatter-gather architecture provides the following advantages:

- Allows drivers to use memory more efficiently (especially when using media that has a large maximum transmission unit [MTU]). For example, Token Ring buffers could be 512 bytes rather than 16 KB.
- Allows concurrent use of the same region of memory. For example, on IP multicast a single packet is received and sent out on multiple interfaces simultaneously.
- Allows insertion or deletion of memory at any location in a packet (not just at the beginning or end).

## Fast-Switched Fragmented IP Packets on Cisco 7200 Series Routers

Fragmented IP packets are now fast-switched rather than process-switched by default to improve performance on Cisco 7200 series routers.

## Fast-Switched SMRP Packets on Cisco 7200 Series Routers

Simple Multicast Routing Protocol (SMRP) packets are now fast-switched rather than process-switched by default to improve performance on Cisco 7200 series routers.

## Turbo Flooding of UDP Datagrams on Cisco 7200 Series Routers

Turbo flooding is now supported on Cisco 7200 series routers. Turbo flooding speeds up flooding of User Datagram Protocol (UDP) datagrams using the spanning-tree algorithm. This feature is useful for quickly downloading periodic updates from a server to multiple clients in an environment where updates are frequent and speed and latency are primary considerations.

## Clock Rate Command Enhancements

The **clock rate** interface command has been enhanced for the synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) 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). For these port adapters, a nonstandard clock rate can be used. The clock rate you enter is rounded (if needed) to the nearest value that your hardware can support.

## New Features in Cisco IOS Release 11.2(6)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(6)P.

## New Hardware Features in Cisco IOS Release 11.2(5)P

The following new hardware features are supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(5)P:

### SA-Comp/1 and SA-Comp/4 Data Compression Service Adapters

The SA-Comp/1 and SA-Comp/4 data compression service adapters (CSAs) are 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 CSA requires a VIP2 model VIP2-40.

These service adapters provide high-performance, hardware-based data compression capabilities through simultaneous Stacker compression data compression algorithms with independent full-duplex compression and decompression capabilities on Point-to-Point Protocol (PPP) encapsulated packets.

### Channelized T3 Interface Processor

The Channelized T3 Interface Processor (CT3IP) is available on Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The CT3IP is a fixed-configuration interface processor based on the second-generation Versatile Interface Processor (VIP2). The CT3IP has four T1 connections through DB-15 connectors and one DS3 connection through BNC connectors. Each DS3 interface can provide up to 28 T1 channels (a single T3 group). Each channel is presented to the system as a serial interface that can be configured individually. The CT3IP can transmit and receive data bidirectionally at the T1 rate of 1.536 Mbps. The four T1 connections use 100-ohm, twisted-pair serial cables to external channel service units (CSUs) or to a MultiChannel Interface Processor (MIP) on the same router or on another router. For wide-area networking, the CT3IP can function as a concentrator for a remote site.

### FDDI Full-Duplex Single-Mode and Multimode Port Adapters

Fiber Distributed Data Interface (FDDI) full-duplex single-mode and multimode port adapters (PA-F/FD-SM and PA-F/FD-MM) are 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).

These port adapters provide an interface for both single-mode and multimode fiber-optic cable. Two physical ports are available with either single-mode SC-type or multimode MIC receptacles. Each port adapter's FDDI connection allows a maximum aggregate bandwidth of 200 Mbps per the FDDI standard.

### High-Speed Serial Interface Port Adapters

The High-Speed Serial Interface (HSSI) port adapter (PA-H Rev. B) 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-H provides one high-speed synchronous serial interface.

Although the PA-H was introduced in Cisco IOS Release 11.2(5)P, the minimum Cisco IOS release required by the PA-H is Cisco IOS Release 11.2(7)P or Cisco IOS Release 11.1(12)CA.

For additional information on the PA-H and PA-2H (the PA-2H provides two high-speed synchronous serial interfaces) port adapters, refer to the *Field Notice: PA-H and PA-2H Revised HSSI Port Adapters* publication on Cisco.com at the following location:

<http://www.cisco.com/warp/customer/770/fn-pa-upgrade.shtml>

## Synchronous Serial Port Adapters

The synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) are 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-8T-V35, PA-8T-X21, and PA-8T-232 port adapters provide up to eight synchronous serial interfaces, and the PA-4T+ provides up to four synchronous serial interfaces. Each port on the PA-4T+ supports any of the available interface types: Electronics Industries Association/Telecommunications Industries Association (EIA/TIA)-232, EIA/TIA-449, V.35, X.21, and EIA-530.

## New Software Features in Cisco IOS Release 11.2(5)P

The following new software features are supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(5)P:

### RSP Fragmented IP Packets Optimum-Switched or Flow-Switched

To improve performance, fragmented IP packets are now optimum-switched or flow-switched (depending on which switching method is enabled) rather than being process-switched on Cisco 7500 series routers and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

### Selective Packet Discard

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

## New Features in Cisco IOS Release 11.2(4)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(4)P.

## New Features in Cisco IOS Release 11.2(3)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(3)P.

## New Features in Cisco IOS Release 11.2(2)P

There are no new features supported by the Cisco 7000 family of routers for Cisco IOS Release 11.2(2)P.

## MIBs

### Current MIBs

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

### Deprecated and Replacement MIBs

Old Cisco MIBs will be replaced in a future release. Currently, OLD-CISCO-\* MIBs are being converted into more scalable MIBs without affecting existing Cisco IOS products or network management system (NMS) applications. You can update from deprecated MIBs to the replacement MIBs as shown in [Table 7](#).

**Table 7** *Deprecated and Replacement MIBs*

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1234-MIB
OLD-CISCO-CHASSIS-MIB	ENTITY-MIB
OLD-CISCO-CPUK-MIB	To be determined
OLD-CISCO-DECNET-MIB	To be determined
OLD-CISCO-ENV-MIB	CISCO-ENVMON-MIB
OLD-CISCO-FLASH-MIB	CISCO-FLASH-MIB
OLD-CISCO-INTERFACES-MIB	IF-MIB CISCO-QUEUE-MIB
OLD-CISCO-IP-MIB	To be determined
OLD-CISCO-MEMORY-MIB	CISCO-MEMORY-POOL-MIB
OLD-CISCO-NOVELL-MIB	NOVELL-IPX-MIB
OLD-CISCO-SYS-MIB	(Compilation of other *OLD MIBs)
OLD-CISCO-SYSTEM-MIB	CISCO-CONFIG-COPY-MIB
OLD-CISCO-TCP-MIB	CISCO-TCP-MIB
OLD-CISCO-TS-MIB	To be determined
OLD-CISCO-VINES-MIB	CISCO-VINES-MIB
OLD-CISCO-XNS-MIB	To be determined

## Important Notes

The following sections contain important notes about Cisco IOS Release 11.2 P and may apply to the Cisco 7000 family of routers.

### Image Obsolescence, Cisco IOS Release 11.1(25a)P

All Cisco 7200 series and Cisco 7500 series images in Cisco IOS Releases 11.2(25)P have been obsoleted from manufacturing due to the following caveats:

- CSCdp11863—napai ILMI community string valid but hidden
- CSCdr54230—BGP: attribute length truncated + command to limit AS\_PATH size

These images are now available in Cisco IOS Release 11.2(25a)P.



**Note**

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Disclaimer: In order to increase network availability, Cisco recommends that you upgrade affected IOS images with the suggested replacement software images. Cisco will discontinue manufacturing shipment of affected IOS images. Any pending order will be substituted by the replacement software images. **PLEASE BE AWARE THAT FAILURE TO UPGRADE THE AFFECTED IOS IMAGES MAY RESULT IN NETWORK DOWNTIME.** The terms and conditions that governed your rights and obligations and those of Cisco, with respect to the deferred images, will apply to the replacement images.

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### Image Obsolescence, Cisco IOS Release 11.2(22)P

Cisco IOS Release 11.2(22)P was obsoleted to Cisco IOS Release 11.2(22a)P on all software images to incorporate corrections to the following caveat:

CSCdr36952—`http://router-ipaddr/%%` crashes router hard

A Cisco router may reload or pause indefinitely when the **ip http server** is configured and a browser connects to `http://<router-ip>/%%`. This may be exploited to produce a denial of service (DoS) attack.

Workaround 1: Disable the ip http server with the **no ip http server** command.

Workaround 2: Block port 80 connections to the router using access lists or other firewall methods.

For further information, refer to the Security Advisory located at the following URL:

<http://www.cisco.com/warp/public/707/advisory.html>

### Image Deferral, Cisco IOS Release 11.2(19)P

Cisco IOS Release 11.2(19)P was deferred to Cisco IOS Release 11.2(19)P1 on all software platforms because of the following caveats:

- CSCdm71734—BRI stuck in Dialer state is call being disconnected.
- CSCdm60960—No ARP reply for HSRP address when bridging with access type list.

For additional information on Cisco IOS Release 11.2 deferrals, including the Cisco IOS Release 11.2(19)P deferral, see the *What's Hot for Cisco IOS Software Release 11.2* document on Cisco.com. To reach the *What's Hot for Cisco IOS Software Release 11.2* document, log in to Cisco.com and click this path:

**Service & Support: Software Center: Cisco IOS Software: Cisco IOS 11.2: What's Hot for Cisco IOS Software Release 11.2**



**Note**

To view *What's Hot for Cisco IOS Release 11.2*, you must log in to Cisco.com. If you do not have a Cisco.com account and you purchased your product from a reseller, you can access Cisco.com as a guest. Cisco.com is Cisco Systems' primary real-time support channel. Your reseller offers programs that include direct access to Cisco.com services.

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

**Service & Support: Software Center: Cisco IOS Software: Cisco IOS Bug Toolkit: Cisco IOS Bug Navigator II**

## Cisco IOS Release 11.2(15a) and 11.2(15a)P

After the release of Cisco IOS Release 11.2(15) and Release 11.2(15)P, a serious defect (caveat CSCdk33475) was identified that affects Enhanced IGRP for Cisco IOS Releases 11.2(14.1) through 11.2(15.2) and Cisco IOS Releases 11.2(14.1)P through 11.2(15.2)P. This defect was significant enough to merit a software rebuild. The rebuild includes the caveat fix and is renumbered to Cisco IOS Releases 11.2(15a) and Cisco IOS Release 11.2(15a)P.

Caveat CSCdk33475 causes a router to fail after the command **show ip eigrp events** is issued. Although this **show** command is not required for normal operation, it is used often enough by the Technical Assistance Center (TAC) personnel and customers causing major problems for customers who are running images with this defect. Cisco IOS Release 11.2(15a) and Cisco IOS Release 11.2(15a)P and all subsequent releases of Cisco IOS software, including Cisco IOS Release 11.2(16) and Cisco IOS Release 11.2(16)P, include the fix for this caveat.

## Cisco IOS Release 11.2(13)P1 Reintroduces Caveat CSCdj79433

Cisco IOS Release 11.2(13)P was deferred because of a severe defect introduced by the fix for caveat CSCdj79433. A software rebuild removes the fix for CSCdj79433 and is renumbered to Cisco IOS Release 11.2(13)P1. This deferral applies to all images except RSP and RSM.

## Some 40-Bit Encryption Images Are Unavailable

We are conducting an internal review of the build and distribution processes associated with 40-bit Cisco IOS cryptographic products. So that we may provide you with seamless access to Cisco IOS 40-bit encryption capability, we will provide access to the most current 40-bit encryption images, beginning with Cisco IOS Releases 11.2 (12), 11.2(12)P, and 11.3(2). The following 40-bit encryption images are indefinitely unavailable:

- Cisco IOS Releases 11.2(1)–11.2(11.2)
- Cisco IOS Releases 11.2(2)P–11.2(11.1)P

- Cisco IOS Releases 11.2(1)F–11.2(4)F
- Cisco IOS Releases 11.3(1)

This review is not related to any new or previously unreported bugs. The information gathered in the review will be used to implement new automated development and order-processing applications.

## Cisco IOS Release 11.2(12a)P Fixes Caveat CSCdj52309

The Cisco 7500 products in Cisco IOS software Cisco IOS Release 11.2(12)P 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 Cisco IOS Release 11.2(12a)P.

Caveat CSCdj52309: affects all Cisco 7500 and Catalyst 5000 RSM users. The problem occurs when packet tunneling is used 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 (TLB), source route (SRB), and remote source-route bridging (RSRB).

When the packet tunneling logic on RSP or 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, 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), 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 software 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.

The two workarounds will drop performance down to process-switching levels.

**Workaround 1:**

CSCdj33812 incorporated a configurable command that will be 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 CSCdj33812 support, use the **test rsp cache memd-fastswitch uncache** command.

The above command needs to be entered after every 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 Cisco IOS Releases 10.3, 11.0, and 11.1; however, no special images are being created because the anomalous behaviors are not present in those releases. [CSCdj52309]

Cisco IOS Release 11.2(12a)P and all subsequent releases of Cisco IOS software include the fix for this caveat.

## Cisco IOS Release 11.2(7a)P

Cisco IOS Release 11.2(7a)P is an early deployment release of software to support Cisco 7200 series routers. Cisco IOS Release 11.2(7a)P is the same as Cisco IOS Release 11.2(7)P except the following defects have been resolved in Cisco IOS Release 11.2(7a)P—CSCdj24132 and CSCdj19118.

## Cisco IOS Release 11.2(6)P2

Cisco IOS Release 11.2(6)P2 is an early deployment release of software to support Cisco 7200 series routers, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI. Cisco IOS Release 11.2(6)P2 is the same as Cisco IOS Release 11.2(6)P except the following defects have been resolved in Cisco IOS Release 11.2(6)P2—CSCdj060068, CSCdj10028, CSCdj19231, and CSCdi67315. Cisco IOS Release 11.2(6)P and Cisco IOS Release 11.2(6)P1 software images were not released.

## Caveats

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious. Severity 3 caveats are moderate caveats, and only select severity 3 caveats are included in the caveats document.

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

For information on caveats in Cisco IOS Release 11.2(26)P, see the *Caveats for Cisco IOS Release 11.2 P*.

All caveats in Cisco IOS Release 11.2 are also in Cisco IOS Release 11.2 P.

For information on caveats in Cisco IOS Release 11.2, see the “Caveats” section in the *Cross-Platform Release Notes for Cisco IOS Release 11.2* which lists severity 1 and 2 caveats. The *Cross-Platform Release Notes for Cisco IOS Release 11.2* is located on Cisco.com and the Documentation CD-ROM.

**Note**

If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, log in to Cisco.com and click **Software Center: Cisco IOS Software: Bug Toolkit: Bug Navigator II**. Another option is to go to <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 guides and command references, system error messages, feature modules, and other documents.

Documentation is available as printed manuals or electronic documents, except for feature modules, which are available online on Cisco.com and the Documentation CD-ROM.

Use these release notes with these documents:

- [Release-Specific Documents, page 33](#)
- [Platform-Specific Documents, page 34](#)
- [Cisco IOS Software Documentation Set, page 35](#)

## Release-Specific Documents

The following documents are specific to Cisco IOS Release 11.2 and are located on Cisco.com and on the Documentation CD-ROM:

- *Release Notes for Cisco IOS Release 11.2*

On Cisco.com at:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Release Notes for Cisco IOS Release 11.2**

On the Documentation CD-ROM at:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Release Notes for Cisco IOS Release 11.2**

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

On Cisco.com at:

**Technical Documents**

- *Caveats for Cisco IOS Release 11.2 P*

On Cisco.com at:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Product Specific Release Notes for Cisco IOS Release 11.2: Caveats for Cisco IOS Release 11.2 P**

On the Documentation CD-ROM at:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Product Specific Release Notes for Cisco IOS Release 11.2: Caveats for Cisco IOS Release 11.2 P**




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**Note** If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, log in to Cisco.com and click **Software Center: Cisco IOS Software: Bug Toolkit: Bug Navigator II**. Another option is to go to <http://www.cisco.com/support/bugtools>.

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- *What's Hot for Cisco IOS Release 11.2*

On Cisco.com at:

**Service & Support: Software Center: Cisco IOS Software: Cisco IOS 11.2: What's Hot for Cisco IOS Software Release 11.2**




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**Note** To view *What's Hot for Cisco IOS Release 11.2*, you must log in to Cisco.com. If you do not have a Cisco.com account and you purchased your product from a reseller, you can access Cisco.com as a guest. Cisco.com is Cisco Systems' primary real-time support channel. Your reseller offers programs that include direct access to Cisco.com services.

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## Platform-Specific Documents

These documents are available for the Cisco 7000 family on Cisco.com and the Documentation CD-ROM:

- All 7000 family platform-specific documents  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers**
- Cisco 7202 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7202**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7202**
- Cisco 7204 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7204**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7204**
- Cisco 7206 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7206**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7206**
- Cisco 7505 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7505**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7505**
- Cisco 7507 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7507**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7507**

- Cisco 7513 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7513**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7513**
- Cisco 7576 routers  
On Cisco.com at:  
**Technical Documents: Documentation Home Page: Cisco Product Documentation: Core/High-End Routers: Cisco 7576**  
On the Documentation CD-ROM at:  
**Cisco Product Documentation: Core/High-End Routers: Cisco 7576**

## Feature Modules

Feature modules describe new features supported by Cisco IOS Release 11.2 P 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 Cisco.com at:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Feature Guide for Cisco IOS Release 11.2 P**

On the Documentation CD-ROM at:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Feature Guide for Cisco IOS Release 11.2 P**

## 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. The Cisco IOS software documentation set is 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 one or more configuration guides and one or more corresponding command references. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality, and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference.

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

On Cisco.com at:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2: Cisco IOS Release 11.2 Configuration Guide/Command References**

On the Documentation CD-ROM at:

**Cisco IOS Software Configuration: Cisco IOS Release 11.2: Cisco IOS Release 11.2 Configuration Guides/Command References**

## Cisco IOS Release 11.2 Documentation Set Contents

Table 8 lists the contents of the Cisco IOS Release 11.2 software documentation set, which is available in electronic form and also in printed form if ordered.



**Note**

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

On Cisco.com at:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2**

On the Documentation CD-ROM at:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.2**

**Table 8 Cisco IOS Release 11.2 Documentation Set**

<b>Books</b>	<b>Major Topics</b>
<ul style="list-style-type: none"> <li><i>Configuration Fundamentals Configuration Guide</i></li> <li><i>Configuration Fundamentals Command Reference</i></li> </ul>	User Interfaces Images and Configuration Files ClickStart, AutoInstall, and Setup System Management ASCII Platform Support
<ul style="list-style-type: none"> <li><i>Network Protocols Configuration Guide, Part 1</i></li> <li><i>Network Protocols Command Reference, Part 1</i></li> </ul>	IP IP Routing Protocols IP Commands IP Routing Protocols Commands
<ul style="list-style-type: none"> <li><i>Network Protocols Configuration Guide, Part 2</i></li> <li><i>Network Protocols Command Reference, Part 2</i></li> </ul>	AppleTalk Novell IPX
<ul style="list-style-type: none"> <li><i>Network Protocols Configuration Guide, Part 3</i></li> <li><i>Network Protocols Command Reference, Part 3</i></li> </ul>	Apollo Domain Banyan VINES DECnet ISO CLNS XNS

**Table 8 Cisco IOS Release 11.2 Documentation Set (continued)**

<b>Books</b>	<b>Major Topics</b>
<ul style="list-style-type: none"> <li>• <i>Wide-Area Networking Configuration Guide</i></li> <li>• <i>Wide-Area Networking Command Reference</i></li> </ul>	ATM DDR Frame Relay ISDN LAN Emulation (LANE) PPP for Wide-Area Networking SMDS X.25 and LAPB X.25 Facility Handling
<ul style="list-style-type: none"> <li>• <i>Security Configuration Guide</i></li> <li>• <i>Security Command Reference</i></li> </ul>	Network Access Security Terminal Access Security Accounting and Billing Traffic Filters Router Access Network Data Encryption with Router Authentication
<ul style="list-style-type: none"> <li>• <i>Access Services Configuration Guide</i></li> <li>• <i>Access Services Command Reference</i></li> </ul>	Terminal Lines and Modem Support Making Connections to Network Devices AppleTalk Remote Access SLIP and PPP XRemote LAT Telnet TN3270 Protocol Translation Modem Support and Chat Scripts X.3 PAD Regular Expressions

**Table 8 Cisco IOS Release 11.2 Documentation Set (continued)**

Books	Major Topics
<ul style="list-style-type: none"> <li>• <i>Bridging and IBM Networking Configuration Guide</i></li> <li>• <i>Bridging and IBM Networking Command Reference</i></li> </ul>	Transparent Bridging Source-Route Bridging Remote Source-Route Bridging Data-Link Switching Plus STUN and BSTUN LLC2 and SDLC Parameters IBM Network Media Translation DSPU and SNA Service Point Support SNA Frame Relay Access Support Advanced Peer-to-Peer Networking NCIA Client/Server Topologies IBM Channel Attach Ethernet Type Codes
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Software Command Summary</i></li> <li>• <i>System Error Messages</i></li> <li>• <i>Debug Command Reference</i></li> <li>• <i>Access Services Quick Configuration Guide</i></li> <li>• <i>Cisco Management Information Base (MIB) User Quick Reference</i></li> </ul>	

## Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

### World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- <http://www.cisco.com>
- <http://www-china.cisco.com>
- <http://www-europe.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 is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

## Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:  
[http://www.cisco.com/cgi-bin/order/order\\_root.pl](http://www.cisco.com/cgi-bin/order/order_root.pl)
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:  
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

## Documentation Feedback

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

You can e-mail your comments to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

To submit your comments by mail, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

Cisco Systems, Inc.  
Document Resource Connection  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

## Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

<http://www.cisco.com>

## Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

### Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

<http://www.cisco.com/tac>

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

<http://www.cisco.com/register/>

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

<http://www.cisco.com/tac/caseopen>

### Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

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This document is to be used in conjunction with the documents listed in the [“Related Documentation”](#) section on page 32.

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