Cisco 2500 Series

This chapter provides information on the Cisco 2500 series routers. The information is organized into the following sections:

- Product Overview
- Standard Features
- Software Options
- Hardware Options
- Single LAN Routers
- Mission-Specific Routers
- Router/Hub Combinations
- Access Servers
- Dual LAN Routers
- Modular Routers

Note Documentation for the Cisco 2500 series is available in two forms: on a CD-ROM called Cisco Connection Documentation, Enterprise Series, and printed books. A CD and hard-copy installation documentation ship with each chassis, and a configuration note ships with each component ordered. All configuration notes are available on the CD. Additional CDs and a subscription CD update service are also available.

You can also access Cisco technical documentation on the World Wide Web URL http://www.cisco.com. For more information, see the chapter "Documentation" at the end of the catalog.

Product Overview

The Cisco 2500 series routers provide a variety of models designed for small office and remote site environments. Each model supports at least two of the following interfaces:

- Ethernet

- Token Ring

- Synchronous serial

- Asynchronous serial

- ISDN BRI

- Hub

Cisco 2500 routers come with Flash EPROM technology for simplified software maintenance. These systems support a variety of Cisco IOS software feature sets, so you can choose a feature set that supports your specific protocol environment. The software feature sets range from an IP and bridging-only to the full array of Cisco's software functionality, including APPN and RMON.

Mission-specific models contain less memory and less hardware functionality in order to support a subset of protocols. Each mission-specific model can be upgraded to full router capability by downloading a new Cisco IOS software feature set and, if necessary, adding memory.

Cisco 2500 series models can be divided into the following categories:

- Single LAN routers—Models 2501, 2502, 2503, 2504, 2520, 2521, 2522, and 2523

- Mission-specific, entry-level routers—Models 2501CF, 2502CF, 2503I, 2504I, 2520CF, 2520LF, 2521CF, 2521LF, 2522CF, 2522LF, 2523CF, and 2523LF

- Router/hub combinations—Models 2505, 2507, 2516, 2517, 2518, and 2519

- Access servers—Models 2509 to 2512 (refer to the section "Cisco 2500 Series Access Servers" in the chapter "Access Servers" later in the catalog)

- Dual LAN routers—Models 2513, 2514, and 2515

- Modular routers—Models 2524 and 2525

Table 140   Cisco 2500 Series Router Product Numbers

Model	Description	Product Number
Cisco 2501	1 Ethernet, 2 serial, AC power supply	CISCO2501
Cisco 2501-DC	1 Ethernet, 2 serial, DC power supply	CISCO2501-DC
Cisco 2501CF[1]	2 serial, CFRAD software, AC power supply	CISCO2501CF
Cisco 2501LF	1 Ethernet, 2 serial, LAN FRAD software, AC power supply	CISCO2501LF
Cisco 2502	1 Token Ring, 2 serial, AC power supply	CISCO2502
Cisco 2502CF[1]	2 serial, CFRAD software, AC power supply	CISCO2502CF
Cisco 2502LF	1 Token Ring, 2 serial, LAN FRAD software, AC power supply	CISCO2502LF
Cisco 2503	1 Ethernet, 2 serial, 1 ISDN BRI, AC power supply	CISCO2503

Model	Description	Product Number
Cisco 2503-DC	1 Ethernet, 2 serial, 1 ISDN BRI, DC power supply	CISCO2503-DC
Cisco 2503I[1]	1 Ethernet, 1 ISDN BRI, ISDN software, AC power supply	CISCO2503I
Cisco 2503I-DC[1]	1 Ethernet, 1 ISDN BRI, ISDN software, DC power supply	CISCO2503I-DC
Cisco 2504	1 Token Ring, 2 serial, 1 ISDN BRI, AC power supply	CISCO2504
Cisco 2504-DC	1 Token Ring, 2 serial, 1 ISDN BRI, DC power supply	CISCO2504-DC
Cisco 2504I[1]	1 Token Ring, 1 ISDN BRI, ISDN software, AC power supply	CISCO2504I
Cisco 2505	8 Ethernet UTP hub ports, 2 serial, AC power supply	CISCO2505
Cisco 2505-DC	8 Ethernet UTP hub ports, 2 serial, DC power supply	CISCO2505-DC
Cisco 2507	16 Ethernet UTP hub ports, 2 serial, AC power supply	CISCO2507
Cisco 2507-DC	16 Ethernet UTP hub ports, 2 serial, DC power supply	CISCO2507-DC
Cisco 2509[2]	1 Ethernet, 2 serial, 8 async serial, AC power supply	CISCO2509
Cisco 2509-DC[2]	1 Ethernet, 2 serial, 8 async serial, DC power supply	CISCO2509-DC
Cisco 2510[2]	1 Token Ring, 2 serial, 8 async serial, AC power supply	CISCO2510
Cisco 2511[2]	1 Ethernet, 2 serial, 16 async serial, AC power supply	CISCO2511
Cisco 2511-DC[2]	1 Ethernet, 2 serial, 16 async serial, DC power supply	CISCO2511-DC
Cisco 2512[2]	1 Token Ring, 2 serial, 16 async serial, AC power supply	CISCO2512
Cisco 2513	1 Ethernet, 1 Token Ring, 2 serial, AC power supply	CISCO2513
Cisco 2514	2 Ethernet, 2 serial, AC power supply	CISCO2514
Cisco 2514-DC	2 Ethernet, 2 serial, DC power supply	CISCO2514-DC
Cisco 2515	2 Token Ring, 2 serial, AC power supply	CISCO2515
Cisco 2516	14 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2516
Cisco 2516-DC	14 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, DC power supply	CISCO2516-DC
Cisco 2517	11 Token Ring UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISC02517
Cisco 2518	23 Ethernet UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2518
Cisco 2519	23 Token Ring UTP hub ports, 2 sync serial, 1 ISDN BRI, AC power supply	CISCO2519
Cisco 2520	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2520
Cisco 2520-DC	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2520-DC
Cisco 2520CF[1]	2 high-speed sync serial, 2 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2520CF
Cisco 2520LF[1]	1 Ethernet, 2 high-speed sync serial, 2 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2520LF
Cisco 2521	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2521

Model	Description	Product Number
Cisco 2521-DC	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2521-DC
Cisco 2521CF[1]	2 high-speed sync serial, 2 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2521CF
Cisco 2521LF[1]	1 Token Ring, 2 high-speed sync serial, 2 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2521LF
Cisco 2522	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2522
Cisco 2522-DC	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2522-DC
Cisco 2522CF[1]	2 high-speed sync serial, 8 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2522CF
Cisco 2522LF[1]	1 Ethernet, 2 high-speed sync serial, 8 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2522LF
Cisco 2523	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, AC power supply	CISCO2523
Cisco 2523-DC	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, 1 ISDN BRI interface, DC power supply	CISCO2523-DC
Cisco 2523CF[1]	2 high-speed sync serial, 8 low-speed async/sync serial, CFRAD software, AC power supply	CISCO2523CF
Cisco 2523LF[1]	1 Token Ring, 2 high-speed sync serial, 8 low-speed async/sync serial, LAN FRAD software, AC power supply	CISCO2523LF
Cisco 2524	1 Ethernet (AUI or 10BaseT) with 3 slots for WAN modules, AC power supply	CISCO2524
Cisco 2524-DC	1 Ethernet (AUI or 10BaseT) with 3 slots for WAN modules, DC power supply	CISCO2524-DC
Cisco 2525	1 Token Ring (STP or UTP) with 3 slots for WAN modules, AC power supply	CISCO2525

1. Mission-specific router. Mission-specific routers are based on standard Cisco 2500 hardware, but they contain less memory and run reduced Cisco IOS images that diable unused ports and support a subset of protocols. By adding software, and possibly memory, mission-specific routers can be upgraded to full standard router functionality.
2. See the chapter "Access Servers," later in this catalog, for more information.

Standard Features

All the Cisco 2500 series models support the features listed in Table 141.

Table 141   Cisco 2500 Series Summary of Features

Characteristic	Feature
Flash memory	All models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS release that shipped with the system, it might require more memory. Refer to Table 145 and Table 146, later in this chapter, for the minimum Flash memory required for each feature set.[1]
DRAM memory expandability	All models include the minimum DRAM required by the Cisco IOS release that shipped with the system. Refer to Table 145 and Table 146, later in this chapter, for the minimum DRAM required for each feature set.
Processor type	20-MHz 68030
Choice of software feature sets	
Cisco IOS Release 11.1, 11.0, 10.3, and 10.2	IP Routing IP Routing with IBM base functionality IP/IPX Routing IP/IPX Routing with IBM base functionality IP/IPX with IBM base functionality and APPN[2] Desktop Desktop with IBM base functionality Enterprise Enterprise/APPN[2] RMON Mission-specific Cisco 2500 series: application-specific software
Cisco IOS Release 11.2	IP Routing IP Routing Plus IP/IPX with IBM base functionality and APPN Desktop (IP/IPX/Appletalk/DEC) Desktop (IP/IPX/Appletalk/DEC) Plus Enterprise Enterprise Plus Enterprise/APPN/Plus Mission-specific Cisco 2500 series: application-specific software
Dimensions (H x W x D)	Models 2501 to 2516 and 2520 to 2525: 1.75 x 17.5 x 10.56" (4.44 x 44.45 x 26.82 cm) Models 2517 to 2519: 3.0 x 19.0" (7.62 x 48.26 cm)
Weight (average shipping)	Models 2501 to 2516 and 2520 to 2525: 10 lb (4.5 kg) Models 2517 to 2519: 12.5 lb (5.7 kg)
Standard components	Power supply and cord Console cable kit[3] RJ-45-to-DB-9 adapter 19" rack-mount/wall-mount kit

1. For Cisco IOS Release 11.0 and later, if your system requires more than 4 MB of Flash memory, the additional memory must be ordered separately. For Cisco IOS releases prior to 11.0, the system includes the minimum memory required by the Cisco IOS release that shipped with the system.
2. This feature set is available with Cisco IOS Release 11.0 and later releases.
3. The console cable kit includes an RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and an RJ-45-to-DB-9 female DTE adapter.

The environmental specifications for the Cisco 2500 series are listed in Table 142.

Table 142   Cisco 2500 Series Environmental Specifications

Description	Specification
Consumption	For models 2501 to 2525: 40W
Input	For models 2501 to 2516 and 2520 to 2525: 110 to 220 VAC, 50 to 60 Hz –48 VDC For models 2517 to 2519: 90 to 260 VAC, 47 to 63 Hz
Current rating	For models 2501 to 2516 and 2520 to 2525: 1.0 A at 60 Hz, 0.5 A at 50 Hz For models 2517 to 2519: 5.0 A at 60 Hz, 3.5 A at 50 Hz
Operating temperature range	For models 2501 to 2516 and 2520 to 2525: 32 to 104 F (0 to 40 C) For models 2517 to 2519: 50 to 95 F (10 to 35 C)
Nonoperating temperature range	For models 2501 to 2516 and 2520 to 2525: –40 to 185 F (–40 to 85 C) For models 2517 to 2519: –4 to 185 F (–20 to 85 C)
Humidity (noncondensing)	For models 2501 to 2525: 5 to 95%
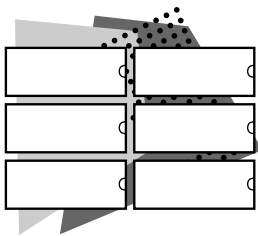
Software Options

The Cisco 2500 series routers support the following software releases:

- Cisco IOS Release 11.2, 11.1, 11.0, 10.3, and 10.2 feature sets (see Table 143)

Note that entry-level, mission-specific models are not listed because software is included with the hardware. For more information about mission-specific software, refer to Table 154.

With the introduction of Cisco IOS Release 11.2, feature sets have been updated to make it easier to select the exact feature sets you need. Feature sets names are simplified and are more consistent across Cisco hardware platforms. In addition, you can add options to the standard feature set offerings. These options provide additional features and value based on the hardware platform selected. Cisco also continues to offer specialized feature sets for key applications.

The Cisco 2500 series offers the following types of feature sets:

- Basic. The basic feature set for the hardware platform.

- Plus. The basic feature set plus additional features.

- Plus 40. The basic feature set, plus features, and 40-bit data encryption.

- Plus 56. The basic feature set, plus features, and 56-bit data encryption.

Cisco IOS images with 40-bit Data Encryption Standard (DES) support may legally be distributed to any party eligible to receive Cisco IOS software. 40-bit DES is not a cryptographically strong solution and should not be used to protect sensitive data.

Cisco IOS images with 56-bit DES are subject to International Traffic in Arms Regulations (ITAR) controls and have a limited distribution. Images to be installed outside the U.S. require an export license. Orders may be denied or subject to delays due to U.S. Government regulations. Contact your sales representative or distributor for more information, or send e-mail to export@cisco.com.

The new feature set tables use the following conventions to identify features:

-   : the feature is ofered in the basic feature set
- – : the feature is not offered in the feature set
- Plus: the feature is offered in the Plus feature sets
- Encrypt: the feature is offered in the Encryption (Plus 40 and Plus 56) feature sets

Table 143   Cisco IOS Release 11.2, 11.1, 11.0, 10.3, and 10.2 Feature Sets—Cisco 2500 Series

Features	Cisco 2500 Series Feature Sets																			
	IP Routing					IP/IPX/IBM/APPN[1]	IP/IPX Routing[2]				Desktop (IP/IPX/Appletalk/DEC)					Enterprise[3]				
Cisco IOS Release	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
LAN Support																				
Apollo Domain	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
AppleTalk 1 and 2[4]	–	–	–	–	–	–	–	–	–	–										
Banyan VINES	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
Concurrent routing and bridging				–	–				–	–				–	–				–	–
DECnet IV	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
DECnet V	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
GRE																				
Integrated routing and bridging (IRB)[5]		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
IP																				
LAN extension host																				
Multiring				–	–				–	–				–	–				–	–
Novell IPX[6]	–	–	–	–	–															
OSI	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
Source-route bridging[7]	–	–	–	–	–		–	–	–	–	–	–	–	–	–					
Transparent and translational bridging[7]	–	–	–	–	–		–	–	–	–	–	–	–	–	–					
XNS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
WAN Services																				
Combinet Packet Protocol (CPP)		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Dialer profiles		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Frame Relay																				
Frame Relay SVC Support (DTE)		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Frame Relay traffic shaping		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Half bridge/half router for CPP and PPP		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
HDLC																				
IPXWAN 2.0	–	–	–	–	–															

Cisco 2500 Series Feature Sets

Features	IP Routing					IP/IPX/ IBM/ APPN[1]	IP/IPX Routing[2]				Desktop (IP/IPX/Appletalk/DEC)					Enterprise[3]				
Cisco IOS Release	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
ISDN[8]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Multichassis Multilink PPP (MMP)																				
PPP[9]																				
SMDS																				
Switched 56																				
Virtual Private Dial-up Network (VPDN)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
X.25[10]																				
WAN Optimization																				
Bandwidth-on-demand																				
Custom and priority queuing																				
Dial backup																				
Dial-on-demand																				
Header[11], link and payload compression[12]																				
Snapshot routing																				
Weighted fair queuing				–	–				–	–				–	–				–	–
IP Routing																				
BGP																				
BGP4[13]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
EGP																				
Enhanced IGRP																				
Enhanced IGRP Optimizations	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
ES-IS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
IGRP																				
IS-IS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Named IP Access Control List	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Network Address Translation (NAT)	Plus										Plus					Plus				
NHRP					–					–					–					–

Cisco 2500 Series Feature Sets

Features / Cisco IOS Release	IP Routing 11.2	11.1	11.0	10.3	10.2	IP/IPX/IBM/APPN¹ 11.2	IP/IPX Routing² 11.1	11.0	10.3	10.2	Desktop (IP/IPX/Appletalk/DEC) 11.2	11.1	11.0	10.3	10.2	Enterprise³ 11.2	11.1	11.0	10.3	10.2
On Demand Routing (ODR)		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
OSPF		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
OSPF Not-So-Stubby-Areas (NSSA)		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
OSPF On Demand Circuit (RFC 1793)		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
PIM				–	–										–					–
Policy-based routing				–	–				–	–				–	–				–	–
RIP				–	–				–	–				–	–				–	–
RIP Version 2				–	–				–	–				–	–				–	–
Other Routing																				
AURP	–	–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
IPX RIP	–	–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
NLSP¹⁴	–	–	–	–	–		–	–	–	–					–					–
RTMP	–	–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
SMRP	–	–	–	–	–		–	–	–	–				–	–				–	–
SRTP	–	–	–	–	–		–	–	–	–				–	–				–	–
Multimedia and Quality of Service																				
Generic traffic shaping				–	–				–	–		–	–	–	–		–	–	–	–
Random Early Detection (RED)				–	–				–	–		–	–	–	–		–	–	–	–
Resource Reservation Protocol (RSVP)				–	–				–	–		–	–	–	–		–	–	–	–
Management																				
AutoInstall																				
Automatic modem configuration¹⁵				–	–				–	–			–	–	–			–	–	–
HTTP Server		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
RMON events and alarms¹⁶	Plus		–	–	–		–	–	–	–	Plus		–	–	–	Plus		–	–	–
RMON full	Plus		–	–	–		–	–	–	–	Plus		–	–	–	Plus		–	–	–
SNMP																				
Telnet																				

Cisco 2500 Series Feature Sets

Features	IP Routing					IP/IPX/ IBM/ APPN[1]	IP/IPX Routing[2]				Desktop (IP/IPX/Appletalk/DEC)					Enterprise[3]				
Cisco IOS Release	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
Security																				
Access lists																				
Access security																				
Extended access lists																				
Kerberized login		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Kerberos V client support		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Lock and key			–	–	–			–	–	–			–	–	–			–	–	–
MAC security for hubs[17]			–	–	–			–	–	–			–	–	–			–	–	–
MD5 routing authentication				–	–				–	–				–	–				–	–
Network layer encryption (export controlled 40-bit and 56-bit DES)[18]	Encrypt	–	–	–	–	–	–	–	–	–	Encrypt	–	–	–	–	Encrypt	–	–	–	–
RADIUS		–	–	–	–		–	–	–	–		–	–	–	–		–	–	–	–
Router authentication	Encrypt	–	–	–	–	–	–	–	–	–	Encrypt	–	–	–	–	Encrypt	–	–	–	–
TACACS+[19]																				
IBM Support (Optional)																				
APPN (optional)[3]	–										–									
BAN for SNA Frame Relay support	Plus			–	–						Plus			–	–					
Bisync[20]	Plus			–	–						Plus			–	–					
Caching and filtering	Plus										Plus									
DLSw+[21]	Plus				–						Plus				–					
Downstream PU concentration (DSPU)	–										–									
Frame Relay SNA support (RFC 1490)	Plus										Plus									
Native Client Interface Architecture (NCIA) Server	Plus	–									Plus	–								
NetView Native Service Point	Plus			–	–						Plus			–	–					
QLLC[20]	Plus			–	–						Plus			–	–					
Response Time Reporter (RTR)	Plus	–	–	–	–						Plus	–	–	–	–					

Cisco 2500 Series Feature Sets

Features	IP Routing					IP/IPX/ IBM/ APPN[1]	IP/IPX Routing[2]					Desktop (IP/IPX/Appletalk/DEC)					Enterprise[3]				
Cisco IOS Release	11.2	11.1	11.0	10.3	10.2	11.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
SDLC integration	Plus				–							Plus				–					–
SDLC transport (STUN)	Plus				–							Plus				–					–
SDLC-to-LAN conversion (SDLLC)	Plus				–							Plus				–					–
SNA and NetBIOS WAN optimization via local acknowledgment	Plus											Plus									
SRB/RSRB[7,22]	Plus											Plus									–
SRT	Plus											Plus				–					–
TG/COS		–	–	–	–	–	–	–	–	–	–		–	–	–	–					
TN3270		–	–	–	–	–	–	–	–	–	–		–	–	–	–					
Protocol Translation																					
LAT	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
Rlogin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–					
Remote Node[23]																					
ARAP 1.0/2.0	–				–	–	–				–	–				–					–
Asynchronous master interfaces															–				–	–	
ATCP[24]	–				–	–	–				–	–				–					–
CPPP																					
CSLIP																					
DHCP				–	–					–	–				–	–					–
IP pooling				–	–					–	–				–	–				–	–
IPX and ARAP on virtual asynch interfaces	–	–	–	–	–	–	–	–	–	–	–			–		–				–	–
IPXCP[11]	–	–	–	–	–	–	–	–	–	–	–										
MacIP	–	–	–	–	–	–	–	–	–	–	–										
NASI[25]	–	–	–	–	–	–	–	–	–	–	–				–					–	
NetBEUI over PPP				–	–					–	–				–	–				–	–
PPP																					
SLIP																					

Cisco 2500 Series Feature Sets

Features	IP Routing					IP/IPX/IBM/APPN[1]	IP/IPX Routing[2]				Desktop (IP/IPX/Appletalk/DEC)					Enterprise[3]				
Cisco IOS Release	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
Terminal Services[23]																				
LAT[26]	–	–	–	–	–	–	–	–	–	–				–	–					
Rlogin														–	–					
Telnet																				
TN3270	–	–	–	–	–	–	–	–	–	–				–	–					
X.25 PAD														–	–					
Xremote	–	–	–	–	–	–	–	–	–	–				–	–					

1. IP/IPX/IBM/APPN is a new feature set in Cisco IOS Release 11.2. This feature set has no additional options. It offers a low-end APPN solution for this set of hardware platforms.

2. The IP/IPX feature set was discontinued in Cisco IOS Release 11.2. All features in this feature set prior to Cisco IOS Release 11.2 are now available in the Desktop (IP/IPX/Appletalk/DEC)/IBM feature set, except APPN which is available in IP/IPX/IBM/APPN and Enterprise/APPN.

3. Enterprise is available with APPN in a separate feature set. Use the product numbers that specify APPN. In Cisco IOS Release 11.2, APPN includes APPN Central Registration (CRR) and APPN over DLSw+.

4. AppleTalk load balancing is available in Cisco IOS Release 11.2.

5. 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.

6. In Cisco IOS Release 11.2, the Novell IPX feature includes display SAP by name, IPX Access Control List violation logging, and plain-English IPX access lists.

7. See the feature category "IBM Support" for information about source-route bridging (SRB) in Cisco IOS Release 10.3 and later releases. In Cisco IOS Release 11.2, SRB /RSRB and translational bridging are fast switched. This enhancement is on by default, but can be disabled.

8. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.

9. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression. Multilink PPP is available in Cisco IOS Release 11.0(4) and later releases.

10. X.25 includes X.25 switching.

11. IPX header compression (RFC 1553) is available in the feature sets that support IPX in Cisco IOS Release 11.1(1) and later releases.

12. X.25 payload compression is supported in Cisco IOS Release 10.2 and later releases. X.25 and Frame Relay payload compression are supported in Cisco IOS Release 11.0(4) and later releases.

13. BGP4 includes soft configuration, multipath support, and prefix filtering with inbound route maps.

14. NLSP is supported with the Desktop option in Cisco IOS Release 10.3(2) and later releases.

15. Automatic modem configuration is available for all features sets in Cisco IOS Release 11.1(2) and later releases. For the Enterprise feature set, automatic modem configuration is available in Cisco IOS 11.1(1) and later releases.

16. The RMON events and alarms groups are supported on all interfaces in Cisco IOS Release 11.1 and later releases. Separate enhanced RMON feature sets are also available with Cisco IOS Release 11.1. In Cisco IOS Release 11.2, RMON full is available with the plus feature sets.

17. MAC security for hubs is applicable to the following Cisco 2500 series Ethernet hub models: Cisco 2505, Cisco 2507, Cisco 2516, and Cisco 2518.

18. For more details, see the description of the new data encryption options in the section "Software Options" earlier in this chapter,

19. With Cisco IOS Release 11.2, TACACS+ Single Connection and TACACS+ SENDAUTH enhancements are supported.

20. QLLC and Bisync are available in IP/IBM in Cisco IOS Release 11.0(3) and later releases, and in IP/IPX/IBM and Desktop/IBM base in Cisco IOS Release 11.0(2) and later releases.

21. Cisco IOS Release 11.2 introduces several DLSw+ enhancements available in the Plus, Plus-40, and Plus-56 feature sets. See the section "IBM Support" in the chapter "Cisco IOS Software" for more details.

22. In Cisco IOS Release 10.2, RSRB was supported in all feature sets. In Cisco IOS Release 10.3 and later releases, SRB/RSRB is supported in all feature sets.

23. Supported on access severs (with limited support on router auxiliary ports).

24. ATCP and DHCP proxy client is supported in Cisco IOS Release 10.3(3) and later releases.

25. NASI is supported in Cisco IOS Release 11.1(2) and later releases.

26. Use of LAT requires terminal license (FR-L8-10.X= for an 8-user license or FR-L16-10.X= for a 16-user license).

The Remote Monitoring (RMON) MIB (RFC 1757) allows you to monitor all nodes and their interaction on a LAN segment. Standard Cisco IOS Release 11.1 feature sets provide support for the RMON alarm and event groups only. If you prefer more network management support, you can order an enhanced RMON feature set that includes full support for the following nine groups: statistics, history, alarms, hosts, hostTopN, matrix, filter, capture, and events. Table 144 describes the contents of the enhanced IP/RMON, IP/IPX/RMON, and Enterprise/RMON feature sets.

In Cisco IOS Release 11.2, the feature RMON full is available in the Plus feature sets.

Table 144   Cisco IOS Release 11.1—RMON Platform-Specific Feature Sets

Features	RMON Platform-Specific Feature Sets[1]		
	IP/RMON Routing	IP/IPX/RMON Routing	Enterprise/ RMON
Cisco IOS Release	**11.1**	**11.1**	**11.1**
Platforms Supported			
Cisco 2500 series routers: Ethernet models 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2514, 2516, 2518, 2520, 2522, 2524			
LAN Support			
Apollo Domain	–	–	
AppleTalk 1 and 2	–	–	
Banyan VINES	–	–	
Concurrent routing and bridging			
DECnet IV	–	–	
DECnet V	–	–	
GRE			
IP			
LAN extension host			
Multiring			
Novell IPX	–		
OSI	–	–	
Transparent and translational bridging[2]			
XNS	–	–	
WAN Services			
Frame Relay			
HDLC			
IPXWAN 2.0	–		
ISDN[3]			
PPP[4]			
SMDS			
Switched 56			
X.25[5]			

Features	RMON Platform-Specific Feature Sets[1]		
	IP/RMON Routing	IP/IPX/RMON Routing	Enterprise/ RMON
Cisco IOS Release	**11.1**	**11.1**	**11.1**
WAN Optimization			
Bandwidth-on-demand			
Custom and priority queuing			
Dial backup			
Dial-on-demand			
Header[6], link and payload compression[7]			
Snapshot routing			
Weighted fair queuing			
IP Routing			
BGP			
EGP			
Enhanced IGRP			
ES-IS	–	–	
IGRP			
IS-IS	–	–	
NHRP			
On Demand Routing (ODR)	–	–	–
OSPF			
PIM			
Policy-based routing			
RIP			
RIP Version 2			
Other Routing			
AURP	–	–	
IPX RIP	–		
NLSP	–		
RTMP	–	–	
SMRP	–	–	
SRTP	–	–	
Management			
AutoInstall			
Automatic modem configuration			
RMON nine-group Ethernet[8]			
SNMP			
Telnet			

Features	RMON Platform-Specific Feature Sets[1]		
	IP/RMON Routing	IP/IPX/RMON Routing	Enterprise/ RMON
Cisco IOS Release	**11.1**	**11.1**	**11.1**
Security			
Access lists			
Access security			
Extended access lists			
Kerberized login	–	–	
Lock and key			
MAC security for hubs[9]			
MD5 routing authentication			
RADIUS			
TACACS+			
IBM Support (Optional)[10]			
BAN for SNA Frame Relay support			
Bisync			
Caching and filtering			
DLSw+			
Downstream PU concentration (DSPU)	–	–	
Frame Relay SNA support (RFC 1490)			
NetView Native Service Point			
QLLC			
SDLC integration			
SDLC transport (STUN)			
SDLC-to-LAN conversion (SDLLC)			
SNA and NetBIOS WAN optimization via local acknowledgment			
SRB/RSRB			
SRT			
TG/COS	–	–	
Protocol Translation			
LAT	–	–	
PPP	–	–	
Rlogin	–	–	
Telnet	–	–	
TN3270	–	–	
X.25	–	–	

Features	RMON Platform-Specific Feature Sets[1]		
	IP/RMON Routing	IP/IPX/RMON Routing	Enterprise/ RMON
Cisco IOS Release	**11.1**	**11.1**	**11.1**
Remote Node[11]			
Asynchronous master interfaces			
ATCP	–	–	
CPPP			
CSLIP			
DHCP			
IP pooling			
IPX on virtual asynch interfaces	–		
IPXCP[6]	–		
MacIP	–	–	
NASI[12]	–		
NetBEUI over PPP			
PPP			
SLIP			
Terminal Services[11]			
LAT[13]	–	–	
Rlogin			
Telnet			
TN3270	–	–	
X.25 PAD			
Xremote	–	–	

1. In Cisco IOS Release 11.2, RMON is available in the plus feature sets. It is listed as "RMON full" in the appropriate hardware platform tables. RMON is only available as a separate platform-specific feature set in Cisco IOS Release 11.1.
2. See the category "IBM Support" for information about source-route bridging (SRB).
3. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
4. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, PPP compression, and Multilink PPP.
5. X.25 Includes X.25 switching.
6. IPX header compression (RFC 1553) is available in the feature sets that support IPX with Cisco IOS Release 11.1(1) and later releases.
7. X.25 and Frame Relay payload compression.
8. The RMON events and alarms groups are supported for all interfaces; however, the full none groups are supported for Ethernet interfaces only. For security reasons, packet capture only captures packet headers, not data.
9. MAC security for hubs Applies to the following Cisco 2500 series Ethernet hubs: 2505, 2507, 2516, and 2518.
10. IBM Support is available as a separate Cisco IOS feature set with the IBM base option: IP/IBM base, IP/IPX//IBM base.
11. Remote node and terminal services are supported on access servers (with limited support on router auxiliary ports).
12. NASI is available on Cisco IOS Release 11.1(2) and later releases.
13. Use of LAT requires terminal license (FS-L8-10.X= for an 8-user license or FS-L16-10.X= for a 16-user license).

Table 145 lists the software feature set product numbers and minimum memory requirements for Cisco IOS Release 11.2. Table 146 lists the software feature set product numbers and minimum memory requirements for Cisco IOS Releases 11.1, 11.0, 10.3, and 10.2.

Note All models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS release feature set that you order with the system, it might require more memory. Refer to Table 145 and Table 146 for the minimum Flash memory required for each feature set.

The minimum memory requirements listed were chosen for typical branch and remote office applications. If your network is very large, using complex routing protocols, or using RMON, you may need more memory. Configuration analysis and testing are encouraged.

Table 145   Cisco IOS Product Numbers and Minimum Memory Requirements for Cisco IOS Releases 11.2—Cisco 2500 Series

| | | Minimum Memory Requirements | | |
| | | Cisco IOS Release 11.2 | | |
Description	Product Number[1]	Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519
IP	SF25C-11.2.1 SW25C-11.2.1=	4 MB	2 MB[3]	2 MB
IP Plus	SF25CP-11.2.1 SW25CP-11.2.1=	8 MB	4 MB	6 MB
IP Plus 40	SF25CW-11.2.1 SW25CW-11.2.1=	8 MB	4 MB	6 MB
IP Plus 56	SF25CY-11.2.1 SW25CY-11.2.1	8 MB	4 MB	6 MB
Desktop (IP/IPX/Appletalk/DEC)	SF25B-11.2.1 SW25B-11.2.1=	8 MB	4 MB	6 MB
Desktop (IP/IPX/Appletalk/DEC) Plus	SF25BP-11.2.1 SW25BP-11.2.1=	8 MB	4 MB	6 MB
Desktop (IP/IPX/Appletalk/DEC) Plus 40	SF25BW-11.2.1 SW25BW-11.2.1=	8 MB	4 MB	6 MB
Desktop (IP/IPX/Appletalk/DEC) Plus 56	SF25BY-11.2.1 SW25BY-11.2.1=	8 MB	4 MB	6 MB
Enterprise	SF25A-11.2.1 SW25A-11.2.1=	8 MB	6 MB	6 MB
Enterprise Plus	SF25AP-11.2.1 SW25AP-11.2.1=	8 MB	6 MB	6 MB
Enterprise Plus 40	SF25AW-11.2.1 SW25AW-11.2.1=	8 MB	6 MB	6 MB

Description	Product Number[1]	Minimum Memory Requirements		
		Cisco IOS Release 11.2		
		Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519
Enterprise Plus 56	SF25AY-11.2.1 SW25AY-11.2.1=	8 MB	6 MB	6 MB
Enterprise/APPN Plus	SF25ANP-11.2.1 SW25ANP-11.2.1=	16 MB	8 MB	6 MB
Enterprise/APPN Plus 40	SF25ANW-11.2.1 SW25ANW-11.2.1=	16 MB	8 MB	6 MB
Enterprise/APPN Plus 56	SF25ANY-11.2.1 SW25ANY-11.2.1=	16 MB	8 MB	6 MB
ISDN	SF25I-11.2.1 SW25I-11.2.1=	4 MB	2 MB	–
CFRAD	SF25F-11.2.1 SW25F-11.2.1=	4 MB	2 MB[3]	–
LAN FRAD	SF25LF-11.2.1 SW25LF-11.2.1=	4 MB	4 MB	–

1. Substitute the release number for xx.x.x in the product number (for example, SW-25C-11.2.1=).

2. The total DRAM memory is the total combined primary and shared DRAM memory. See Table 149.

3. The Cisco 2522 and Cisco 2523 require 4-MB DRAM. All other models require 2-MB DRAM.

Table 146 Cisco IOS Product Numbers and Minimum Memory Requirements for Cisco IOS Releases 11.1, 11.0, 10.3, and 10.2—Cisco 2500 Series

Minimum Memory Requirements — Cisco IOS Releases

Description	Product Number[1]	11.1 Flash	11.1 Total DRAM[2] Models 2501–2516 and 2520–2525	11.1 Total DRAM[2] Models 2517–2519	11.0 Flash	11.0 Total DRAM[2] Models 2501–2516 and 2520–2525	11.0 Total DRAM[2] Models 2517–2519	10.3 Flash	10.3 Total DRAM[2] Models 2501–2516 and 2520–2525	10.3 Total DRAM[2] Models 2517–2519	10.2 Flash	10.2 Total DRAM[2] Models 2501–2516 and 2520–2525	10.2 Total DRAM[2] Models 2517–2519
IP	SF25C-xx.x.x SW25C-xx.x.x=	4 MB	2 MB[3]	2 MB	4 MB	2 MB	2 MB	4 MB	2 MB	2 MB	4 MB	2 MB	2 MB
IP with IBM base	SF25CS-xx.x.x SW25CS-xx.x.x=	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB	4 MB	4 MB	4 MB	4 MB	4 MB	4 MB
IP/IPX	SF25D-xx.x.x SW25D-xx.x.x=	8 MB	4 MB	6 MB	4 MB	4 MB	6 MB	4 MB	4 MB	4 MB	4 MB	4 MB	4 MB
IP/IPX with IBM base	SF25DS-xx.x.x SW25DS-xx.x.x=	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB	4 MB	4 MB	4 MB	4 MB	4 MB	4 MB
IP/IPX with IBM base and APPN	SF25DSN-xx.x.x SW25DSN-xx.x.x=	8 MB	8 MB	6 MB	8 MB	8 MB	6 MB	–	–	–	–	–	–
Desktop	SF25B-xx.x.x SW25B-xx.x.x=	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB	4 MB	4 MB	4 MB	4 MB	4 MB	4 MB
Desktop with IBM base	SF25BS-xx.x.x SW25BS-xx.x.x=	8 MB	4 MB	6 MB	8 MB	4 MB	6 MB	8 MB	4 MB	4 MB	4 MB	4 MB	4 MB
Enterprise	SF25A-xx.x.x SW25A-xx.x.x=	8 MB	6 MB	6 MB	8 MB	6 MB	6 MB	8 MB	6 MB	6 MB	8 MB	6 MB	6 MB
Enterprise with APPN	SF25AN-xx.x.x SW25AN-xx.x.x=	16 MB	8 MB	6 MB	8 MB	8 MB	6 MB	–	–	–	–	–	–
IP and RMON	SF25CR-xx.x.x SW25CR-xx.x.x=	4 MB	4 MB	6 MB	–	–	–	–	–	–	–	–	–
IP with IBM and RMON	SF25CSR-xx.x.x SW25CSR-xx.x.x=	8 MB	4 MB	6 MB	–	–	–	–	–	–	–	–	–
IP/IPX and RMON	SF25DR-xx.x.x SW25DR-xx.x.x=	8 MB	4 MB	6 MB	–	–	–	–	–	–	–	–	–

Minimum Memory Requirements

Cisco IOS Releases

Description	Product Number[1]	11.1			11.0			10.3			10.2		
		Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519	Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519	Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519	Flash	Total DRAM[2] Models 2501–2516 and 2520–2525	Total DRAM[2] Models 2517–2519
IP/IPX with IBM and RMON	SF25DSR-xx.x.x SW25DSR-xx.x.x=	8 MB	4 MB	6 MB	–	–	–	–	–	–	–	–	–
Enterprise and RMON	SF25AR-xx.x.x SW25AR-xx.x.x=	8 MB	4 MB	6 MB	–	–	–	–	–	–	–	–	–

1. Substitute the release number for xx.x.x in the product number (for example, SW-25C-11.2.1=).
2. The total DRAM memory is the total combined primary and shared DRAM memory. See Table 149.
3. The Cisco 2522 and Cisco 2523 require 4-MB DRAM. All other models require 2-MB DRAM.

Cisco IOS Feature Set Upgrades

Cisco IOS Release 11.2 for the Cisco 2500 series allows software upgrades that cross multiple feature sets. This will require you to order multiple feature set licenses. The following is an example:

You have a Cisco 2505 router running the Cisco IOS Release 11.2 IP Routing feature set. You want to upgrade to the Cisco IOS Release 11.2 Enterprise Plus feature set. You are crossing two feature sets: one to get from IP to Enterprise, and one to get to the Plus feature set. To complete the upgrade, use the following guidelines:

- If you subscribe to SMARTnet Maintenance, you need to do the following:

    — Order FL25-CA= (IP to Enterprise upgrade license, charged item)

    — Order FL25-P= (Plus upgrade license, charged item)

    — Order DRAM (if you do not have the minimum required DRAM for the new feature set)

    — Download the new software feature set from CCO

- If you do not subscribe to SMARTnet Maintenance, you need to do the following:

    — Order FL25-CA= (IP to Enterprise upgrade license, charged item)

    — Order FL25-P= (Plus upgrade license, charged item)

    — Order DRAM (if you do not have the minimum required DRAM for the new feature set)

    — Order SW25AP-11.2.1= (Cisco 2500 Enterprise Plus software on diskette, charged item)

Feature sets for Cisco IOS Releases 11.2 can be upgraded as described in Table 147.

**Table 147   Cisco IOS Upgrades for Cisco IOS Release 11.2—
            Cisco 2500 Series**

Feature Set Upgrade	Product Number[1, 2]

Plus
  with Enterprise
  with Desktop(IP/IPX/AT/DEC)
  with IP
	FL25-P= and
	  SW25AP-xx.x.x=
	  SW25BP-xx.x.x=
	  SW25CP-xx.x.x=

Plus 40
  with Enterprise
  with Desktop(IP/IPX/AT/DEC)
  with IP
	FL25-W= and
	  SW25AW-xx.x.x=
	  SW25BW-xx.x.x=
	  SW25CW-xx.x.x=

Plus 56
  with Enterprise
  with Desktop(IP/IPX/AT/DEC)
  with IP
	FL25-Y= and
	  SW25AY-xx.x.x=
	  SW25BY-xx.x.x=
	  SW25CY-xx.x.x=

Plus and APPN
  with Enterprise
  with IP/IPX/IBM
	FL25-APPN= and
	  SW25ANP-xx.x.x=
	  SW25DSN-xx.x.x=

Feature Set Upgrade	Product Number[1, 2]
Plus 40 and APPN with Enterprise	FL25-APPN=, FL25-W=, and SW25ANW-xx.x.x=
Plus 56 and APPN with Enterprise	FL25-APPN=, FL25-Y=, and SW25ANY-xx.x.x=
CFRAD to IP	FL25-FC= and SW25C-xx.x.x=
CFRAD to Desktop (IP/IPX/AT/DEC)	FL25-FB= and SW25B-xx.x.x=
CFRAD to Enterprise	FL25-FA= and SW25A-xx.x.x=
LAN FRAD to IP	FL25-LFC= and SW25C-xx.x.x=
LAN FRAD to Desktop (IP/IPX/AT/DEC)	FL25-LFB= and SW25B-xx.x.x=
LAN FRAD to Enterprise	FL25-LFA= and SW25A-xx.x.x=
ISDN to IP	FL25-IC= and SW2525C-xx.x.x=
ISDN to Desktop (IP/IPX/AT/DEC)	FL25-IB= and SW25B-xx.x.x=
ISDN to Enterprise	FL25-IA= and SW25A-xx.x.x=
IP to Desktop (IP/IPX/AT/DEC)	FL25-CB= and SW25B-xx.x.x=
IP to Enterprise	FL25-CA= and SW25A-xx.x.x=
Desktop (IP/IPX/AT/DEC) to Enterprise	FL25-BA= and SW25A-xx.x.x=
IP/IPX to Desktop (IP/IPX/AT/DEC)	FL25-DB= and SW25B-xx.x.x=
IP/IPX to Enterprise	FL25-DA and SW25A-xx.x.x=

1. For Cisco IOS Release 11.2, substitute the release number for xx.x.x in the product number (for example, SW25A-11.2.1=).

2. If you subscribe to SMARTnet Maintenance, you only need to order the upgrade license (FL25 number). If you do not subscribe to SMARTnet Maintenance, you also need to order the upgrade media product number. See the example on the preceeding page.

Feature sets for Cisco IOS Releases 11.1, 11.0, 10.3, and 10.2 can be upgraded as described in Table 148. To order an upgrade, you must use two product numbers; one represents the upgrade license and the other represents the software. For example, to upgrade from an IP feature set to an IP feature set with IBM base functionality, order product number FRAP-CCS= (the upgrade license) and SW25CS-xx.x.x= (the software). To upgrade to a feature set with APPN, you must first purchase the upgrade license for the desired feature set and then purchase the upgrade license and upgrade software for the APPN feature set.

Table 148 Cisco IOS Upgrades for Cisco IOS Release 11.1, 11.0, 10.3, and 10.2—Cisco 2500 Series

Feature Set Upgrade	Product Number[1]
IP to IP with IBM base functionality	FR25-CCS= and SW25CS-xx.x.x=
IP to IP/IPX	FR25-CD= and SW25D-xx.x.x=
IP to IP/IPX with IBM base functionality	FR25-CDS= and SW25DS-xx.x.x=
IP to IP/IPX with IBM base functionality and APPN	FR25-CDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP to Desktop	FR25-CB= and SW25B-xx.x.x=
IP to Desktop with IBM base functionality	FR25-CBS= and SW25BS-xx.x.x=
IP to Enterprise	FR25-CA= and SW25A-xx.x.x=

Feature Set Upgrade	Product Number[1]
IP to Enterprise and APPN	FR25-CA=, FR25-APPN=, and SW25AN-xx.x.x=
IP with IBM base to IP/IPX with IBM base functionality	FR25-CSDS= and SW25DS-xx.x.x=
IP with IBM base to IP/IPX with IBM base functionality and APPN	FR25-CSDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP with IBM base to Desktop with IBM base functionality	FR25-CSBS= and SW25BS-xx.x.x=
IP with IBM base to Enterprise	FR25-CSA= and SW25A-xx.x.x=
IP with IBM base to Enterprise and APPN	FR25-CSA=, FR25-APPN=, and SW25AN-xx.x.x=
IP/IPX to IP/IPX with IBM base functionality	FR25-DDS= and SW25DS-xx.x.x=
IP/IPX to IP/IPX with IBM base functionality and APPN	FR25-DDS=, FR25-APPN=, and SW25DSN-xx.x.x=
IP/IPX to Desktop	FR25-DB= and SW25B-xx.x.x=
IP/IPX to Desktop with IBM base functionality	FR25-DBS= and SW25BS-xx.x.x=
IP/IPX to Enterprise	FR25-DA= and SW25A-xx.x.x=
IP/IPX to Enterprise and APPN	FR25-DA=, FR25-APPN=, and SW25AN-xx.x.x=
IP/IPX with IBM base to Desktop with IBM base functionality	FR25-DSBS= and SW25BS-xx.x.x=
IP/IPX with IBM base to Enterprise	FR25-DSA= and SW25A-xx.x.x=
IP/IPX with IBM base to Enterprise and APPN	FR25-DSA=, FR25-APPN=, and SW25AN-xx.x.x=
IP/IPX with IBM base to IP/IPX with IBM base and APPN	FR25-APPN= and SW25DSN-xx.x.x=
Desktop to Desktop with IBM base functionality	FR25-BBS= and SW25BS-xx.x.x=
Desktop to Enterprise	FR25-BA= and SW25A-xx.x.x=
Desktop to Enterprise and APPN	FR25-BA=, FR25-APPN=, and SW25AN-xx.x.x=
Desktop with IBM base to Enterprise	FR25-BSA= and SW25A-xx.x.x=
Desktop with IBM base to Enterprise and APPN	FR25-BSA=, FR25-APPN=, and SW25AN-xx.x.x=
IP to IP/RMON	FR25-RMON= and SW25CR-x.x.x=
IP to IP/IBM/RMON	FR25-CCS=, FR25-RMON=, and SW25CSR-x.x.x=
IP to IP/IPX/RMON	FR25-CD=, FR25-RMON=, and SW25DR-x.x.x=
IP to IP/IPX/IBM/RMON	FR25-CDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP to Enterprise/RMON	FR25-CA=, FR25-RMON=, and SW25AR-x.x.x=
IP/RMON to IP/IBM/RMON	FR25-CCS= and SW25CSR-x.x.x=
IP/RMON to IP/IPX/RMON	FR25-CD= and SW25DR-x.x.x=
IP/RMON to IP/IPX/IBM/RMON	FR25-CDS= and SW25DSR-x.x.x=
IP/RMON to Enterprise/RMON	FR25-CA= and SW25AR-x.x.x=

Feature Set Upgrade	Product Number[1]
IP/IBM to IP/IBM/RMON	FR25-RMON= and SW25CSR-x.x.x=
IP/IBM to IP/IPX/IBM/RMON	FR25-CSDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP/IBM to Enterprise/RMON	FR25-CSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IBM/RMON to IP/IPX/IBM/RMON	FR25-CSDS= and SW25DSR-x.x.x=
IP/IBM/RMON to Enterprise/RMON	FR25-CSA= and SW25AR-x.x.x=
IP/IPX to IP/IPX/RMON	FR25-RMON= and SW25DR-x.x.x=
IP/IPX to IP/IPX/IBM/RMON	FR25-DDS=, FR25-RMON=, and SW25DSR-x.x.x=
IP/IPX to Enterprise/RMON	FR25-CSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IPX/RMON to IP/IPX/IBM/RMON	FR25-DDS= and SW25DSR-x.x.x=
IP/IPX/RMON to Enterprise/RMON	FR25-DA= and SW25AR-x.x.x=
IP/IPX/IBM to IP/IPX/IBM/RMON	FR25-RMON= and SW25DSR-x.x.x=
IP/IPX/IBM to Enterprise/RMON	FR25-DSA=, FR25-RMON=, and SW25AR-x.x.x=
IP/IPX/IBM/RMON to Enterprise/RMON	FR25-DSA= and SW25AR-x.x.x=
Desktop to Enterprise/RMON	FR25-BA=, FR25-RMON=, and SW25AR-x.x.x=
Desktop/IBM to Enterprise/RMON	FR25-BSA=, FR25-RMON=, and SW25AR-x.x.x=
Enterprise to Enterprise/RMON	FR25-RMON= and SW25AR-x.x.x=

1. For Cisco IOS Release 11.1, 11.0, 10.3, and 10.2, substitute the release number for xx.x.x in the product number (for example, SW25D-11.1.1=).

There are two types of DRAM memory in the Cisco 2500 series routers: primary and shared (packet). Primary memory is used to store the operating configuration, routing tables, caches, queues, and packets. Shared memory is used to store incoming and outgoing packets. In Table 149, the physical configuration column lists the amount of fixed DRAM and DRAM SIMM memory supported. The system usage column lists how the system allocates the total DRAM memory installed.

Table 149   Shared and Primary DRAM Memory—Cisco 2500 Series

Total DRAM Memory	Physical Configuration		System Usage	
	Fixed DRAM[1]	DRAM SIMM	Shared DRAM Memory	Primary DRAM Memory
2 MB	2 MB	–	1 MB	1 MB
4 MB	–	4 MB	2 MB	2 MB
6 MB	2 MB	4 MB	2 MB	4 MB
8 MB	–	8 MB	2 MB	6 MB
10 MB	2 MB	8 MB	2 MB	8 MB

Total DRAM Memory	Physical Configuration		System Usage	
	Fixed DRAM[1]	DRAM SIMM	Shared DRAM Memory	Primary DRAM Memory
16 MB	–	16 MB	2 MB	14 MB
18 MB	2 MB	16 MB	2 MB	16 MB

1. Fixed DRAM is soldered on the system card. Depending on the Cisco IOS feature originally ordered, the system may or may not include fixed DRAM.
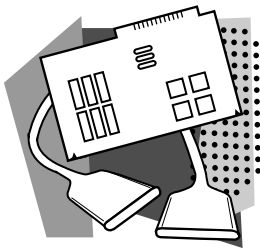
Hardware Options

The hardware options for Cisco 2500 series routers include additional rack-mount kits, memory, and cables. In Table 150 and Table 151, if a product number ends with an equal sign (=), you can order the item as a spare only. If a product number does not end with an equal sign, you can order the item as a spare or as a configurable part of a system order.

All Cisco 2500 models include a minimum of 4 MB of Flash memory; however, depending on the Cisco IOS software release shipped with the system, it might require more memory. Additional Flash memory can be purchased to allow for dual banking or potential future code growth.

The Cisco 2500 series routers also come with a 19-inch rack-mount kit and a console cable kit (which includes a RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and a DB-9 adapter).

Note   For more information, including cable illustrations, refer to the chapter "Cables and Transceivers." The chapter "Power Cords" provides international power cord product numbers.

Table 150   Cisco 2500 Series Hardware Options

Option	Product Number
19" rack-mount kit[1]	ACS-2500RM-19=
24" rack-mount kit	A25-2500RM-24=
Boot ROM upgrade	BOOT-2500=
4-MB DRAM	MEM-1X4D
4-MB DRAM (spare)	MEM-1X4D=
8-MB DRAM	MEM-1X8D
8-MB DRAM (spare)	MEM-1X8D=
16-MB DRAM	MEM-1X16D
16-MB DRAM (spare)	MEM-1X16D=
4-MB Flash SIMM	MEM-1X4F
4-MB Flash SIMM (spare)	MEM-1X4F=
8-MB Flash SIMM	MEM-1X8F
8-MB Flash SIMM (spare)	MEM-1X8F=
4- to 8-MB Flash SIMM upgrade[2]	MEM-1X8F-U

Option	Product Number
4- to 8-MB Flash SIMM upgrade[3]	MEM-1X8F-DFB-U
8-MB dual-bank Flash SIMM[4] (spare)	MEM-1X8F-DFB=
16-MB dual-bank Flash SIMM[5]	MEM-1X16F-DFB
16-MB dual-bank Flash SIMM[5] (spare)	MEM-1X16F-DFB=
2-wire switched 56-kbps CSU/DSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-56K2
4-wire 56/64-kbps DSU/CSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-56K4
Fractional T1/T1 DSU/CSU module (for Cisco 2524 and Cisco 2525 routers only)	SM25-T1
Five-in-one synchronous serial module (for Cisco 2524 and Cisco 2525 routers only)	SM25-5IN1
ISDN BRI module (for Cisco 2524 and Cisco 2525 routers only)	SM25-BRI-S/T
ISDN with integrated network termination 1 (NT1) device module (for Cisco 2524 and Cisco 2525 routers only)	SM25-BRI-U
Blank slot cover (for Cisco 2524 and Cisco 2525 routers only)	SM25-BLANK

1. The 19-inch rack-mount kit can only be ordered as a spare; a 19-inch rack-mount kit is included with all Cisco 2500 series routers. An optional 24-inch rack-mount kit can be ordered from Cisco Systems.
2. Applies to Cisco IOS Release 11.x feature sets that require more than 4-MB Flash memory. Not available as a spare. Supported on the Cisco 2517, 2518, 2519, and AccessPro PC cards.
3. Applies to Cisco IOS Release 11.x feature sets that require more than 4-MB Flash memory. Not available as a spare. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.
4. Dual-bank Flash memory is required for Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers because these models contain only one slot for Flash memory. It can operate as either two banks of 4 MB for dual-Flash bank operation or as 8 MB contiguous. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.
5. Dual-bank Flash memory is required for Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers because these models contain only one slot for Flash memory. It can operate as either two banks of 8 MB for dual-Flash bank operation or as 16 MB contiguous. Supported on the Cisco 2517, 2518, 2519, AccessPro PC cards, and AS5100 access servers.

Table 151   Cisco 2500 Series Cables

Cables	Product Number
EIA/TIA-232 male DTE interface, 10' (3 m)	CAB-232MT
EIA/TIA-232 female DCE interface, 10' (3 m)	CAB-232FC
EIA/TIA-449 male DTE interface, 10' (3 m)	CAB-449MT
EIA/TIA-449 female DCE interface, 10' (3 m)	CAB-449FC
EIA-530 male DTE interface, 10' (3 m)	CAB-530MT
V.35 male DTE interface, 10' (3 m)	CAB-V35MT
V.35 female DCE interface, 10' (3 m)	CAB-V35FC
X.21 male DTE interface, 10' (3 m)	CAB-X21MT
X.21 female DCE interface, 10' (3 m)	CAB-X21FC
Ethernet AUI adapter cable	CAB-3CE18=
Auxiliary/console cable kit[1]	ACS-2500ASYN
RJ-45-to-DB-25 management card console cable[2]	CAB-MGMT-RH

Cables	Product Number
Shielded power cable, United States[2]	CABS-AC
Shielded power cable, Australia[2]	CABS-ACA
Shielded power cable, Italy[2]	CABS-ACI
Shielded power cable, Europe[2]	CABS-ACE
Shielded power cable, United Kingdom[2]	CABS-ACU

1. The auxiliary/console cable kit includes a RJ-45-to-RJ-45 roll-over console cable, an RJ-45-to-DB-25 male DCE adapter, an RJ-45-to-DB-25 female DTE adapter, and an RJ-45-to-DB-9 adapter.
2. Applies to the Cisco 2517, Cisco 2518, and Cisco 2519 router/hubs only.

Single LAN Routers

Models 2501, 2502, 2503, 2504, 2520, 2521, 2522, and 2523 contain the common Cisco 2500 series features listed in Table 141. In addition, these models support the network interfaces listed in Table 152.

Note This section discusses standard models. The mission-specific models are described in the section "Mission-Specific Routers," later in this chapter.

Table 152   Single LAN Router Network Interfaces

Model	Ethernet	Token Ring	Low-Speed Serial[1]	Serial[2]	ISDN BRI
2501	1	0	0	2	0
2502	0	1	0	2	0
2503	1	0	0	2	1
2504	0	1	0	2	1
2520	1	0	2	2	1
2521	0	1	2	2	1
2522	1	0	8	2	1
2523	0	1	8	2	1

1. Synchronous and asynchronous.
2. Synchronous.

Figure 54   Cisco 2501 Rear Panel
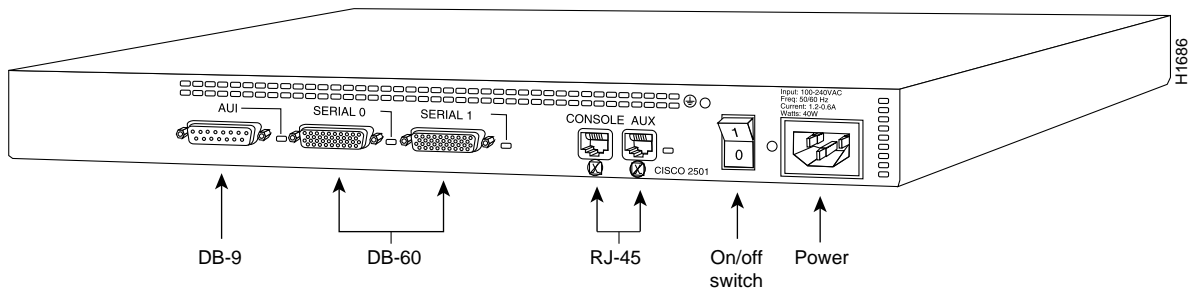
Figure 55   Cisco 2502 Rear Panel
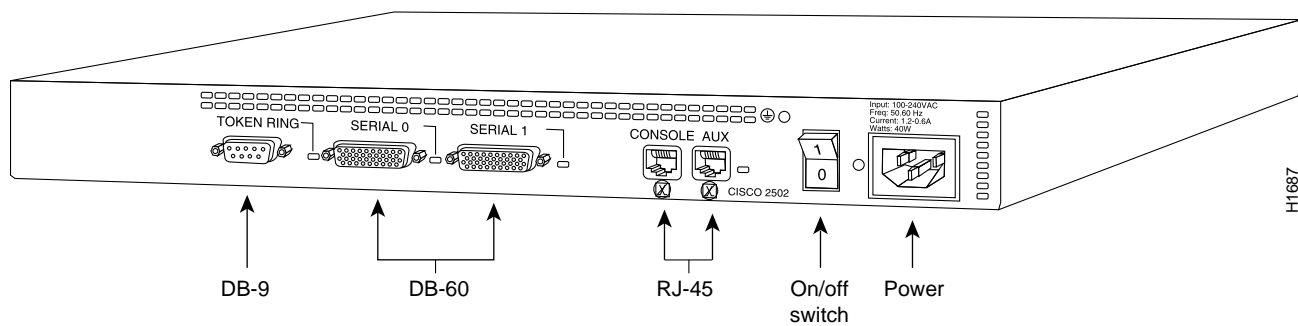
Figure 56   Cisco 2503 Rear Panel
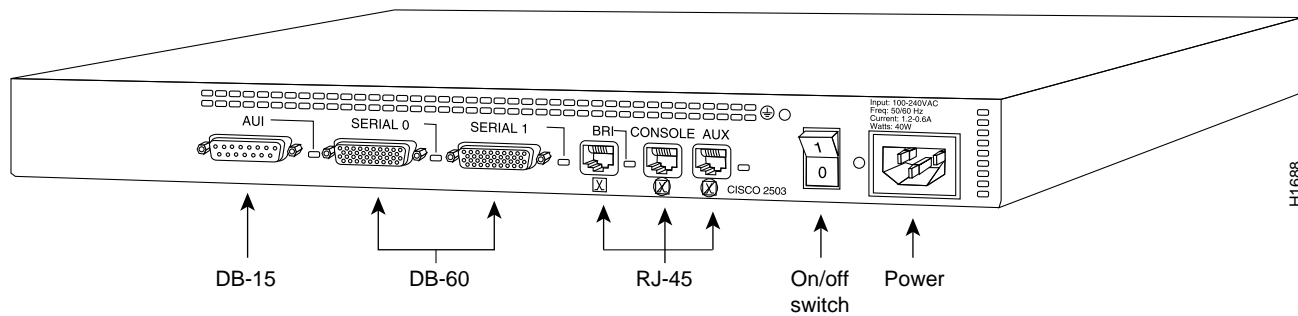
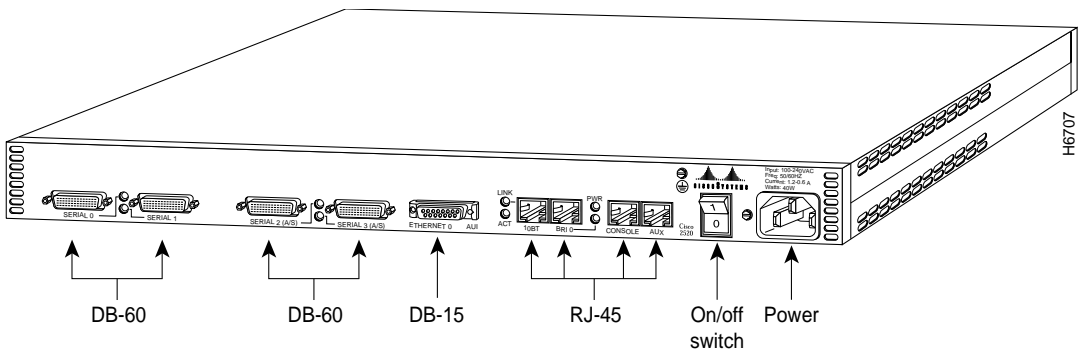**Figure 57   Cisco 2504 Rear Panel**
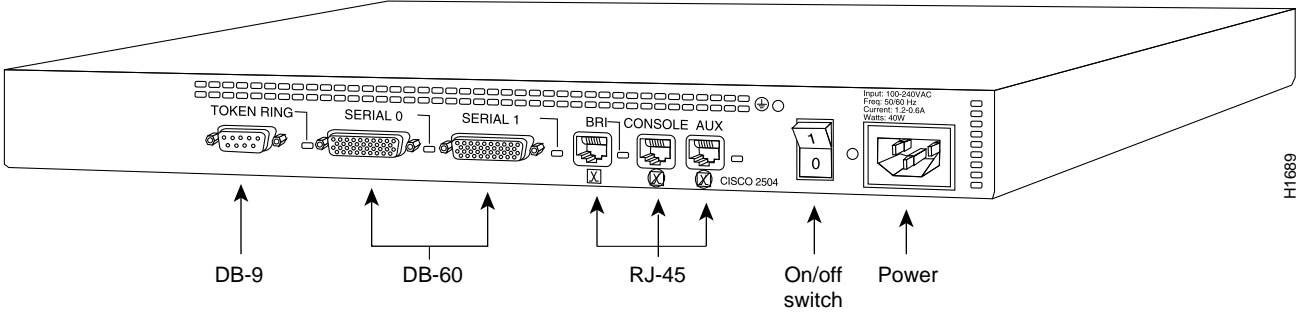
Figure 58   Cisco 2520 Rear Panel
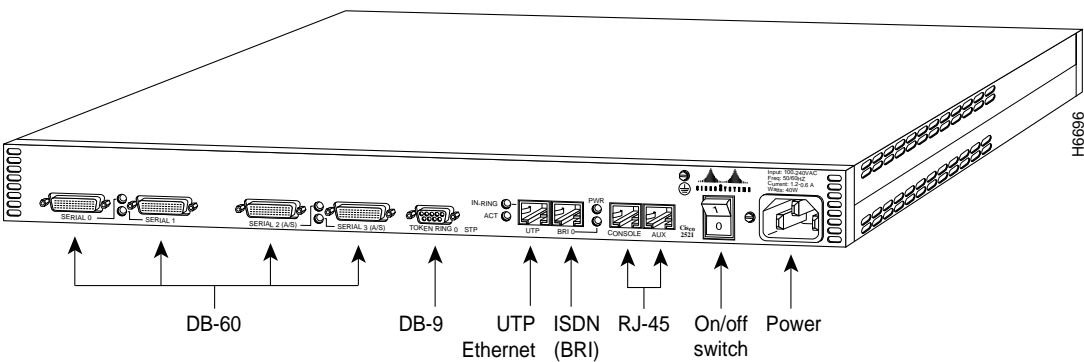

Figure 59   Cisco 2521 Rear Panel
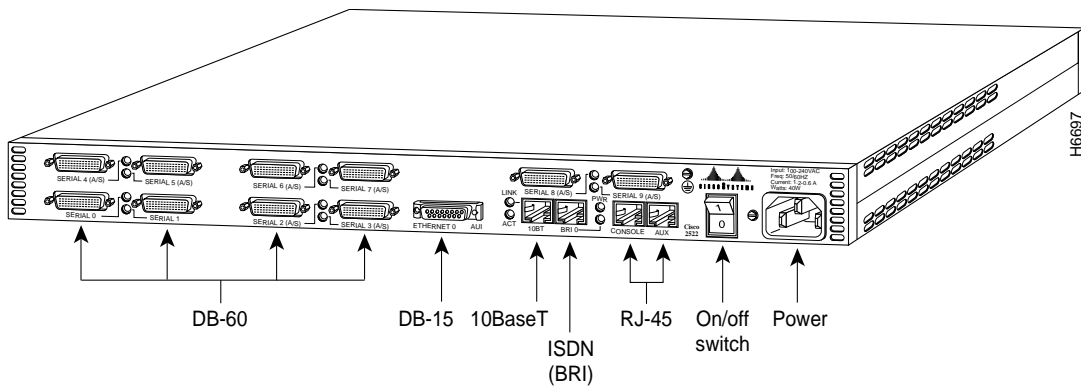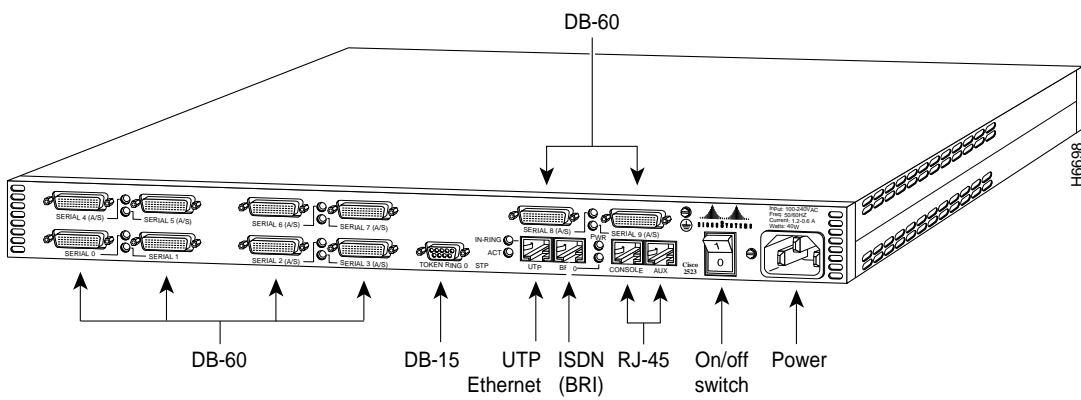
Figure 60   Cisco 2522 Rear Panel

DB-60   DB-15   10BaseT   RJ-45   On/off   Power
                                              switch

ISDN
(BRI)

Figure 61   Cisco 2523 Rear Panel

DB-60

DB-60   DB-15   UTP   ISDN   RJ-45   On/off   Power
                  Ethernet (BRI)   switch

Mission-Specific Routers

Mission-specific routers are entry-level routers that are based on standard Cisco 2500 hardware. However, mission-specific routers contain less memory than standard models and run reduced software images designed for CFRAD, LAN FRAD, and ISDN applications. These reduced software images disable unused ports. Mission-specific routers can be upgraded to full standard model functionally by purchasing additional software and memory.

The network interfaces for the Cisco 2500 series mission-specific routers are listed in Table 153.

Table 153   Mission-Specific Router Network Interfaces

Model	Ethernet	Token Ring	Serial	Low-Speed Serial	ISDN BRI
2501CF	Software disabled	0	2	0	0
2501LF	1	0	2	0	0
2502CF	0	Software disabled	2	0	0
2502LF	0	1	2	0	0
2503I	1	0	Software disabled	0	1
2504I	0	1	Software disabled	0	1
2520CF	Software disabled	0	2	2	Software disabled
2520LF	1	0	2	2	Software disabled
2521CF	0	Software disabled	2	2	Software disabled
2521LF	0	1	2	2	Software disabled
2522CF	Software disabled	0	2	8	Software disabled
2522LF	1	0	2	8	Software disabled
2523CF	0	Software disabled	2	8	Software disabled
2523LF	0	1	2	8	Software disabled

The CFRAD, LAN FRAD, and ISDN platform-specific protocols are listed in Table 154.

Table 154   CFRAD, LAN FRAD, and ISDN Platform-Specific Feature Sets

Features	Cisco 2500 Series Platform-Specific Feature Sets														
	ISDN					CFRAD[1]					LAN FRAD[2]				
Cisco IOS Releases	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
Platforms Supported															
Cisco 2500 series routers: models 2501, 2502, 2505, 2507, 2509-2515, 2524	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cisco 2503I, Cisco 2504I						–	–	–	–	–	–	–	–	–	–
Cisco 2501CF, Cisco 2502CF, Cisco 2520CF-2523CF[1]	–	–	–	–	–						–	–	–	–	–
Cisco 2501LF, Cisco 2502LF, Cisco 2520LF-2523LF	–	–	–	–	–	–	–	–	–	–				–	–
LAN Support															
AppleTalk 1 and 2[3]		–	–	–	–	–	–	–	–	–	–	–	–	–	–
GRE						–	–	–	–	–					
Integrated routing and bridging (IRB)[4]		–	–	–	–	–	–	–	–	–		–	–	–	–
IP						–	–	–	–	–				–	–
Multiring						–	–	–	–	–				–	–
Novell IPX[5]															
Transparent bridging[6]	–	–	–	–	–	–	–	–	–	–				–	–
Transparent and translational bridging[6]						–	–	–	–	–	–	–	–		
WAN Services															
Combinet Packet Protocol (CPP)		–	–	–	–	–	–	–	–	–		–	–	–	–
Dialer profiles		–	–	–	–	–	–	–	–	–		–	–	–	–
Frame Relay	–	–	–	–	–									–	–
Frame Relay traffic shaping	–	–	–	–	–	–	–	–	–	–		–	–	–	–
Half bridge/half router for CPP and PPP		–	–	–	–	–	–	–	–	–		–	–	–	–
IPXWAN 2.0	–	–	–	–	–	–	–	–	–	–				–	–
ISDN[7]						–	–	–	–	–	–	–	–	–	–
PPP[8]														–	–
WAN Optimization															
Bandwidth-on-demand[9]						–	–	–	–	–	–	–	–	–	–
Custom and priority queuing														–	–
Dial backup						–	–	–	–	–	–	–	–	–	–
Dial-on-demand						–	–	–	–	–	–	–	–	–	–
Header[10], link and payload compression[11]	–	–	–	–	–									–	–
Header[11] and link compression						–	–	–	–	–	–	–	–	–	–
Snapshot routing						–	–	–	–	–	–	–	–	–	–
Weighted fair queuing														–	–

	Cisco 2500 Series Platform-Specific Feature Sets														
Features	**ISDN**					**CFRAD**[1]					**LAN FRAD**[2]				
Cisco IOS Releases	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
IP Routing															
BGP						−	−	−	−	−	−	−	−	−	−
BGP4[12]		−	−	−	−	−	−	−	−	−	−	−	−	−	−
EGP						−	−	−	−	−	−	−	−	−	−
Enhanced IGRP															
Enhanced IGRP Optimizations		−	−	−	−		−	−	−	−		−	−	−	−
IGRP														−	−
NHRP						−	−	−	−	−	−	−	−	−	−
On Demand Routing (ODR)		−	−	−	−		−	−	−	−		−	−	−	−
OSPF						−	−	−	−	−	−	−	−	−	−
OSPF Not-So-Stubby-Areas (NSSA)		−	−	−	−	−	−	−	−	−	−	−	−	−	−
OSPF On Demand Circuit (RFC 1793)		−	−	−	−	−	−	−	−	−	−	−	−	−	−
PIM						−	−	−	−	−	−	−	−	−	−
Policy-based routing						−	−	−	−	−	−	−	−	−	−
RIP														−	−
RIP Version 2			−	−	−			−	−	−			−	−	−
Other Routing															
AURP						−	−	−	−	−	−	−	−	−	−
IPX RIP						−	−	−	−	−				−	−
NLSP	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
RTMP						−	−	−	−	−	−	−	−	−	−
Multimedia and Quality of Service															
Generic traffic shaping		−	−	−	−		−	−	−	−		−	−	−	−
Random Early Detection (RED)		−	−	−	−		−	−	−	−		−	−	−	−
Resource Reservation Protocol (RSVP)		−	−	−	−		−	−	−	−		−	−	−	−
Management															
AutoInstall	−	−	−	−	−									−	−
HTTP Server		−	−	−	−		−	−	−	−		−	−	−	−
RMON events and alarms[13]			−	−	−	−	−	−	−	−	−	−	−	−	−
SNMP														−	−
Telnet														−	−
Security															
Access lists														−	−
Access security														−	−
Extended access lists														−	−
Lock and Key			−	−	−			−	−	−			−	−	−

Features	Cisco 2500 Series Platform-Specific Feature Sets														
	ISDN					CFRAD[1]					LAN FRAD[2]				
Cisco IOS Releases	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2	11.2	11.1	11.0	10.3	10.2
MD5 routing authentication				–	–			–	–	–				–	–
RADIUS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TACACS+[14]														–	–
IBM Support (Optional)															
BAN for SNA Frame Relay support	–	–	–	–	–		–	–				–	–	–	–
Bisync[15]	–	–	–	–	–			–	–					–	–
Caching and filtering	–	–	–	–	–									–	–
DLSw+[16]	–	–	–	–	–									–	–
Frame Relay SNA support (RFC 1490)	–	–	–	–	–									–	–
Native Client Server Architecture (NCIA)	–	–	–	–	–		–	–	–	–	–	–	–	–	–
NetView Native Service Point	–	–	–	–	–			–	–					–	–
Polled asynch (ADT, ADPLEX)	–	–	–	–	–			–	–					–	–
QLLC[15]	–	–	–	–	–			–	–					–	–
RFC 1795	–	–	–	–	–			–	–					–	–
RSRB	–	–	–	–	–						–	–	–	–	–
SDLC integration	–	–	–	–	–									–	–
SDLC transport (STUN)	–	–	–	–	–									–	–
SDLC-to-LAN conversion (SDLLC)	–	–	–	–	–									–	–
SNA and NetBIOS WAN optimization via local acknowledgment	–	–	–	–	–									–	–
SRB/RSRB[17]	–	–	–	–	–	–	–	–	–	–				–	–
SRT	–	–	–	–	–	–	–	–	–	–				–	–

1. Cisco IOS Release 10.3 and 10.2 CFRAD software is available on the Cisco 2501CF and 2502CF models only.
2. Cisco IOS Release 11.0(5) and LAN FRAD software is available with the following models: 2501LF, 2502LF, 2520LF, 2521LF, 2522LF, and 2523LF.
3. Appletalk load balancing is available in Cisco IOS Release 11.2.
4. 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.
5. In Cisco IOS Release 11.2, the Novell IPX feature includes display SAP by name, IPX Access Control List violation logging, and plain-English IPX access lists.
6. See the category "IBM Support" for information about source-route bridging (SRB) in Cisco IOS Release 10.3 and later releases.
7. ISDN support includes calling line identification (ANI), X.25 over the B channel, ISDN subaddressing, and applicable WAN optimization features.
8. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression. Multilink PPP is available in Cisco IOS Release 11.0(4) and later releases.
9. Bandwidth-on-demand means two B channels calls to the same destination.
10. IPX header compression (RFC 1553) is available in the feature sets that support IPX.
11. X.25 and Frame Relay payload compression.
12. BGP4 includes soft configuration, multipath support, and prefix filtering with inbound route maps.
13. RMON events and alarms is supported on all interfaces.
14. With Cisco IOS Release 11.2, TACACS+ Single Connection and TACACS+ SENDAUTH enhancements are supported.
15. QLLC and Bisync are available in IP/IBM in Cisco IOS Release 11.0(3) and later releases, and in IP/IPX/IBM and Desktop/IBM base in Cisco IOS Release 11.0(2) and later releases.
16. Cisco IOS Release 11.2 introduces several DLSw+ enhancements available in the Plus, Plus 40, and Plus 56 feature sets. See the section "IBM Support" in the chapter "Cisco IOS Software" for more details.
17. With Cisco IOS Release 11.2, SRB/RSRB is fast switched. This enhancement is on by default, but can be disabled.

Mission-specific routers can be upgraded to run Cisco IOS feature sets by using the product numbers listed in Table 147, for Cisco IOS Release 11.2, and Table 155 for Cisco IOS Release 11.1, 11.0, 10.3, and 10.2. Note that you must order two product numbers: an upgrade path plus the release-specific software for Cisco IOS Release 11.1, 11.0, 10.3, and 10.2. For example, to upgrade a Cisco 2501CF to the IP routing feature set, order FR25-FC= to upgrade from mission-specific software to the IP feature set and also order SW25C-xx.x.x= to obtain the Cisco IOS IP routing software.

Table 155   Mission-Specific Router Software Upgrades—Cisco IOS Release 11.1, 11.0, 10.3, and 10.2

Upgrade to Feature Set	CFRAD Product Number[1,2]	ISDN Product Number[1,3]
IP routing	FR25-FC= and SW25C-xx.x.x=	FR25-IC= and SW25C-xx.x.x=
IP with IBM base functionality	FR25-FCS= and SW25CS-xx.x.x=	FR25-ICS= and SW25CS-xx.x.x=
IP/IPX	FR25-FD= and SW25D-xx.x.x=	FR25-ID= and SW25D-xx.x.x=
IP/IPX with IBM base functionality	FR25-FDS= and SW25DS-xx.x.x=	FR25-IDS= and SW25DS-xx.x.x=
IP/IPX/IBM/APPN	FR25-FDS=, FR25-APPN=, and SW25DSN-xx.x.x=	FR25-IDS=, FR25-APPN=, and SW25DSN-x.x.x=
Desktop	FR25-FB= and SW25B-xx.x.x=	FR25-IB= and SW25B-xx.x.x=
Desktop with IBM base functionality	FR25-FBS= and SW25BS-xx.x.x=	FR25-IBS= and SW25BS-xx.x.x=
Enterprise	FR25-FA= and SW25A-xx.x.x=	FR25-IA= and SW25A-xx.x.x=
IP/RMON	FR25-FC=, FR25-RMON=, and SW25CR-x.x.x=	FR25-IC=, FR25-RMON=, and SW25CR-x.x.x=
IP/IBM/RMON	FR25-FCS=, FR25-RMON=, and SW25CSR-x.x.x=	FR25-ICS=, FR25-RMON=, and SW25CSR-x.x.x=
IP/IPX/RMON	FR25-FD=, FR25-RMON, and SW25DR-x.x.x=	FR25-ID=, FR25-RMON=, and SW25DR-x.x.x=
IP/IPX/IBM/RMON	FR-FDS=, FR25-RMON=, and SW25DSR-x.x.x=	FR25-IDS=, FR25-RMON=, and SW25DSR-x.x.x=
Enterprise/RMON	FR25-FA=, FR25-RMON=, and SW25DSR-x.x.x=	FR25-IA=, FR25-RMON=, and SW25AR-x.x.x=

1. For Cisco IOS Release 11.1, 11.0, 10.3, and 10.2 upgrades, substitute the release number for xx.x.x in the product number (for example, SW25C-11.2.1=).
2. Applies to the Cisco 2501CF and 2502CF only.
3. Applies to the Cisco 2503I and 2504I only.

Router/Hub Combinations

Models 2505, 2507, and 2516 to 2519 support integrated hub functionality as well as all the common features listed in Table 141. In addition, these models support the interfaces listed in Table 156.

Table 156   Router/Hub Interface Options

Model	Ethernet 10BaseT	Ethernet AUI	Token Ring	Token Ring Ring In/ Ring Out	Serial	Hub Ports	BRI
2505	1	0	0	0	2	8	0
2507	1	0	0	0	2	16	0
2516	1	0	0	0	2	14	1
2517	0	0	1	0	2	11	1
2518	1	1	0	0	2	23	1
2519	0	0	1	1	2	23	1

Figure 62   Cisco 2505 Rear Panel
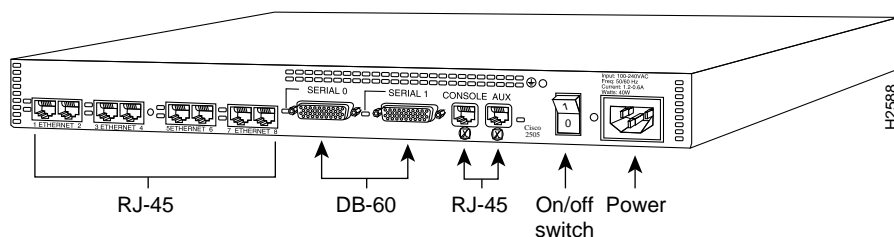
Figure 63   Cisco 2507 Rear Panel
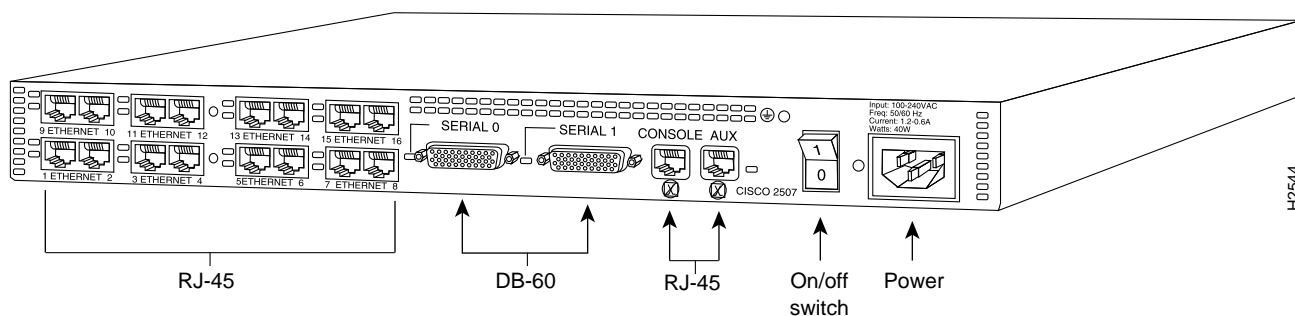
Figure 64   Cisco 2516 Rear Panel
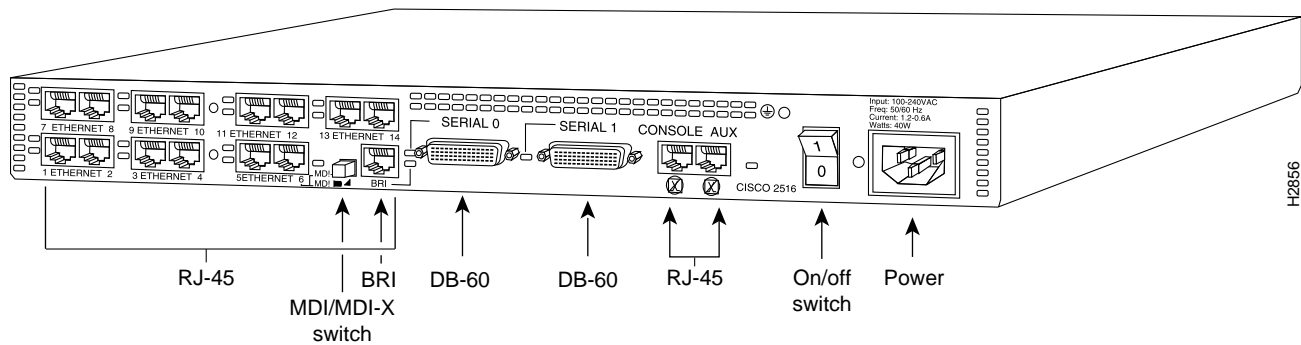
Figure 65   Cisco 2517 Rear Panel
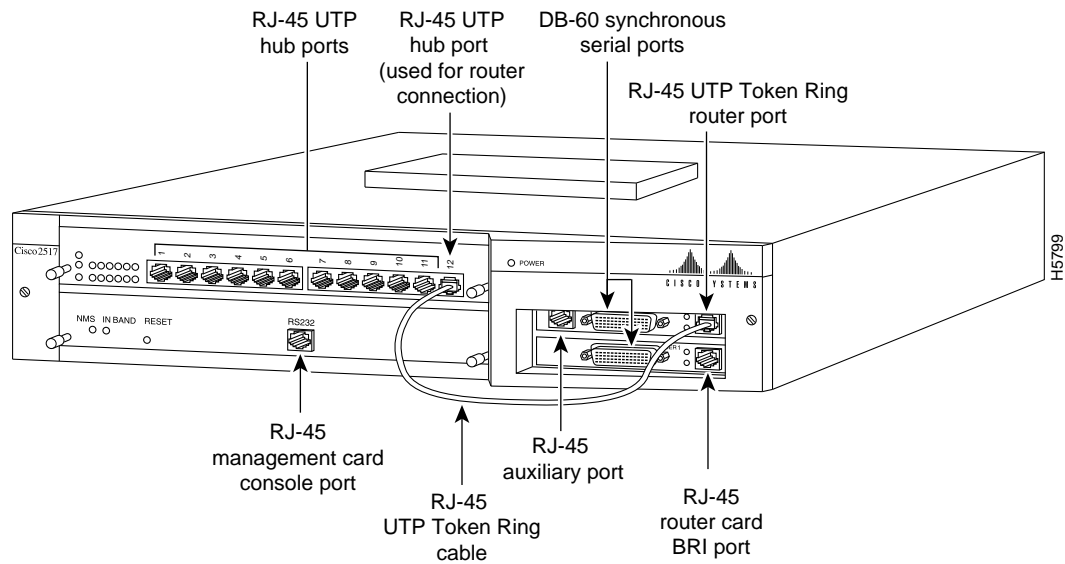
Figure 66   Cisco 2518 Rear Panel

Ethernet AUI

RJ-45 UTP hub ports

RJ-45 UTP hub port (used for router connection)

DB-60 synchronous serial ports

RJ-45 UTP Ethernet router port

POWER

CISCO SYSTEMS

H5800

NMS IN BAND RESET

RS232

RJ-45 management card console port

RJ-45 UTP Ethernet cable

RJ-45 auxiliary port

RJ-45 router card BRI port
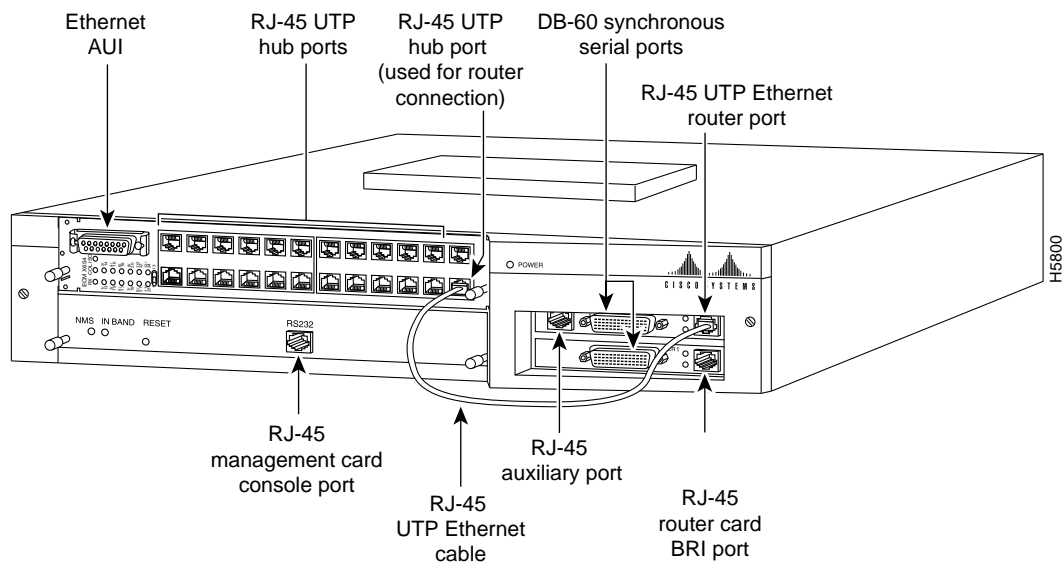
Figure 67   Cisco 2519 Rear Panel

Ring out

Ring in

RJ-45 UTP hub ports

RJ-45 UTP hub port (used for router connection)

DB-60 synchronous serial ports

RJ-45 UTP Token Ring router port

POWER

CISCO SYSTEMS

H5801

NMS IN BAND RESET

RS232

RJ-45 management card console port

RJ-45 UTP Token Ring cable

RJ-45 auxiliary port

RJ-45 router card BRI port
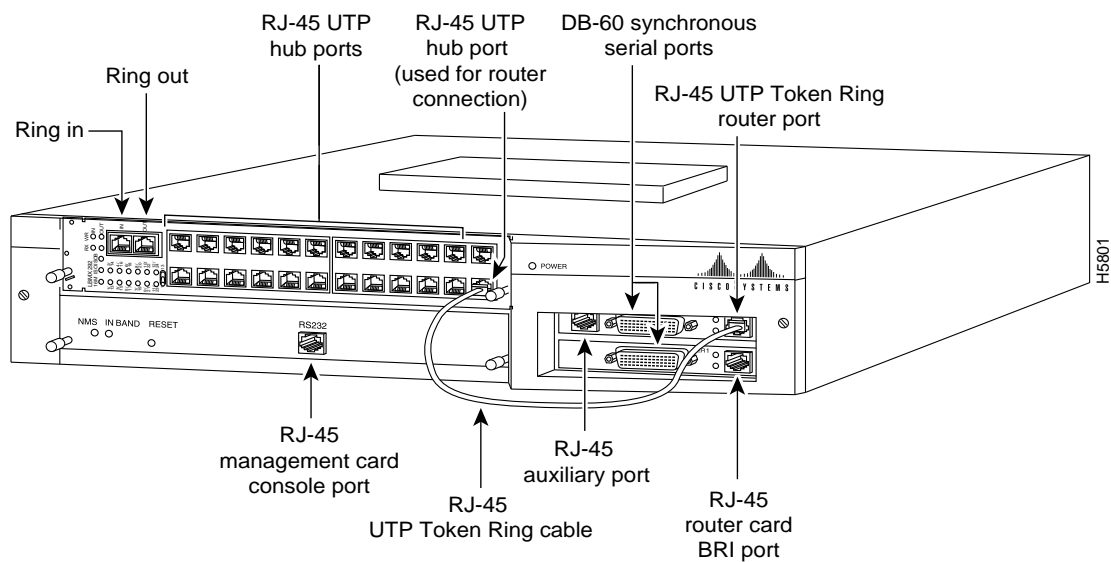
Access Servers

Models 2509, 2510, 2511, and 2512 are designed to function as access servers for remote node and asynchronous/synchronous routing. For complete information, refer to the chapter "Access Servers" later in the catalog.

Dual LAN Routers

Models 2513, 2514, and 2515 provide higher density LAN support and include all the common features listed in Table 141. In addition, these models support the interfaces listed in Table 157.

Table 157   Dual LAN Router Interface Options

Model	Ethernet	Token Ring	Serial	ISDN BRI
2513	1	1	2	0
2514	2	0	2	0
2515	0	2	2	0

Figure 68   Cisco 2513 Rear Panel
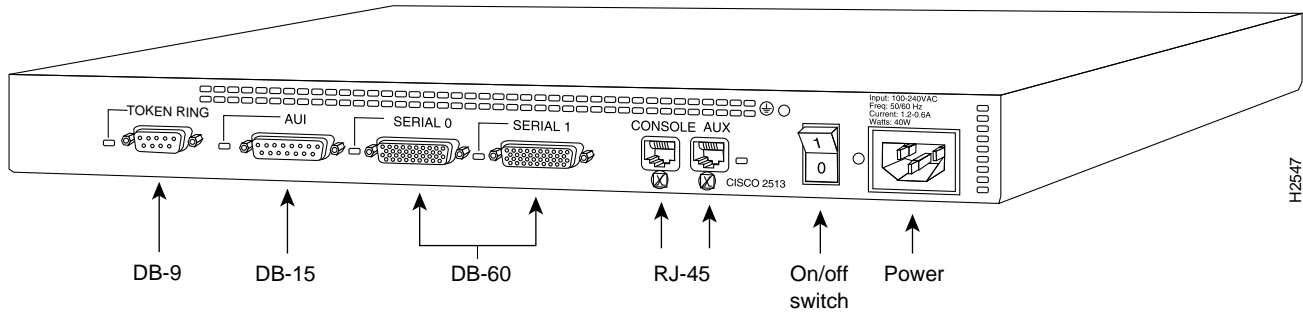
Figure 69   Cisco 2514 Rear Panel
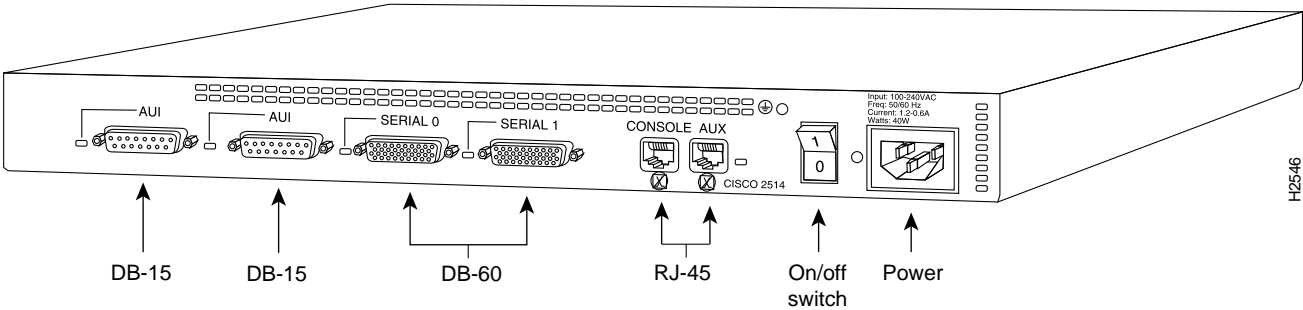
Figure 70   Cisco 2515 Rear Panel
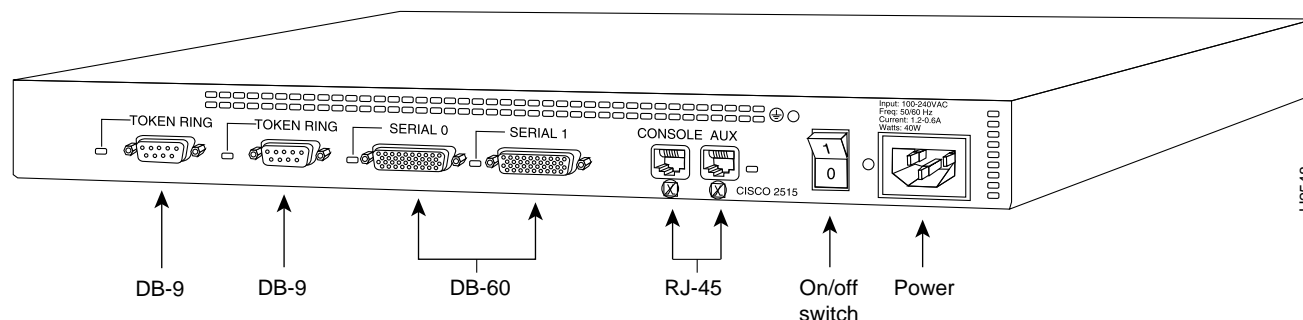
Modular Routers

Models 2524 and 2525 provide LAN and WAN access in a low-cost modular router platform that can grow with your internetworking needs. The Cisco 2524 offers an Ethernet (AUI or 10BaseT) LAN connection, and the Cisco 2525 offers a Token Ring (STP or UTP) LAN connection. Both routers can accommodate up to three WAN modules—two synchronous serial and one ISDN.

The choice of synchronous serial WAN modules is as follows:

- 2-wire switched 56-kbps DSU/CSU

- 4-wire 56/64-kbps DSU/CSU

- Fractional T1/T1 DSU/CSU

- Five-in-one synchronous serial

Note   The five-in-one synchronous serial WAN module gets its name from the five types of signaling it supports, which include the following: EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA-530. You can order from Cisco Systems a DB-60 shielded serial transition cable. The router end of the cable has a DB-60 connector; the other end of the cable has the appropriate connector for the standard interface you specify.

The choice of ISDN WAN modules is as follows:

- ISDN BRI

- ISDN with integrated NT1 device

The ISDN WAN modules are keyed so that you cannot insert them into the synchronous serial WAN slots. A blank slot cover is installed over unused slots.

Figure 71 shows the rear panel of the Cisco 2524 router, and Figure 72 shows the rear panel of the Cisco 2525 router.

Figure 73 through Figure 78 show the WAN modules. Figure 79 shows the blank slot cover.
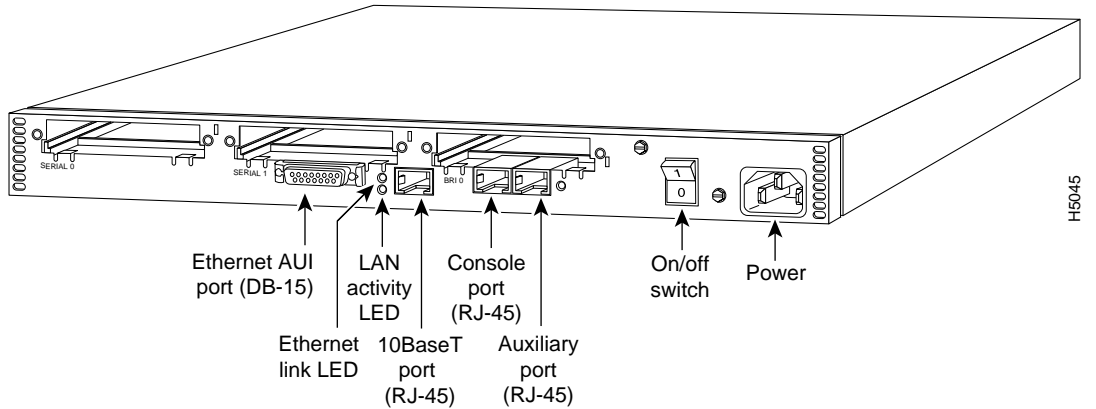
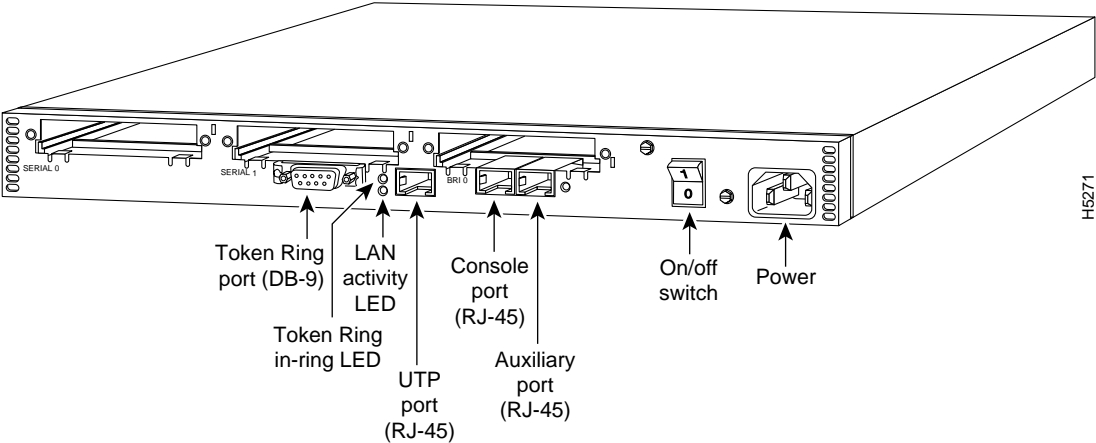**Figure 71   Cisco 2524 Rear Panel**

Figure 72   Cisco 2525 Rear Panel

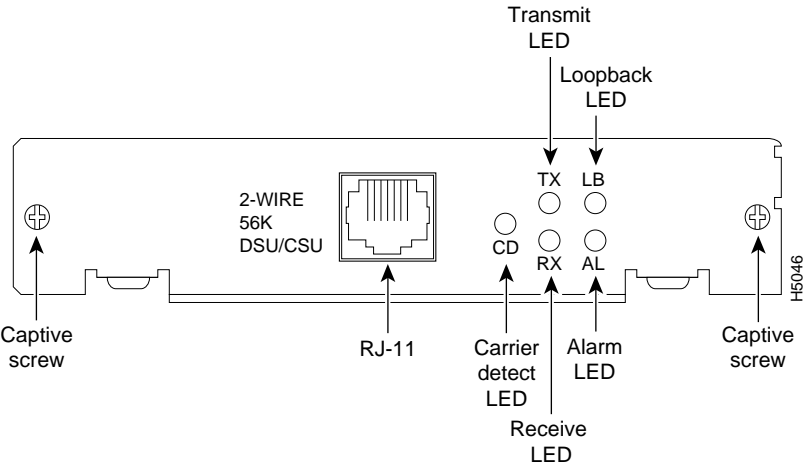**Figure 73   2-Wire Switched 56-kbps DSU/CSU WAN Module**
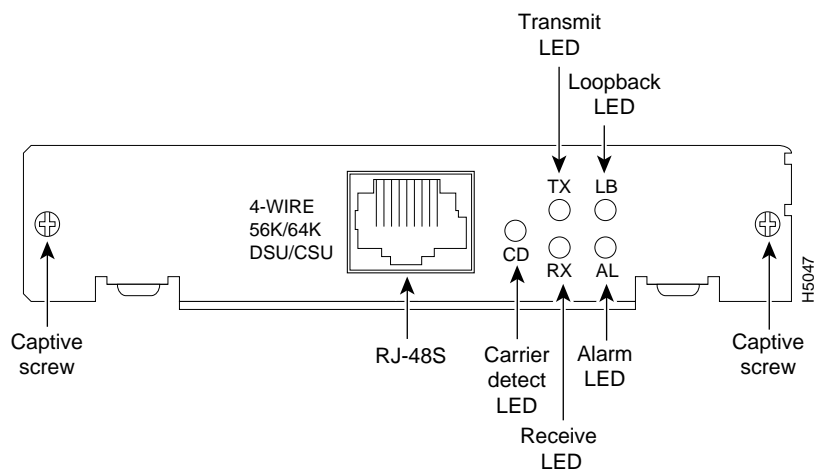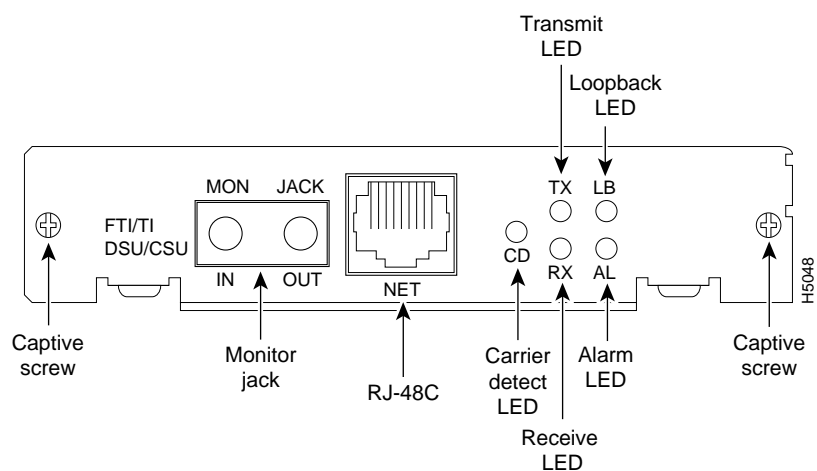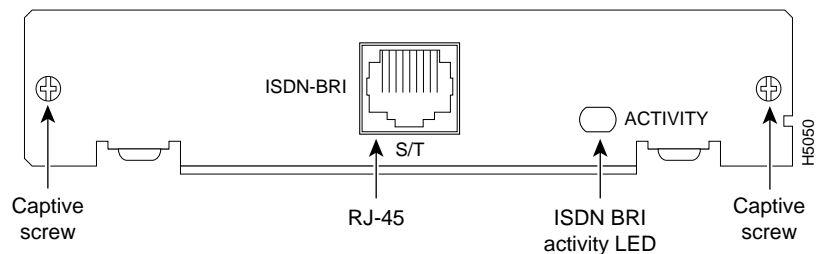
Figure 74   4-Wire 56/64-kbps DSU/CSU WAN Module

Figure 75   Fractional T1/T1 DSU/CSU WAN Module

Figure 76   ISDN BRI WAN Module
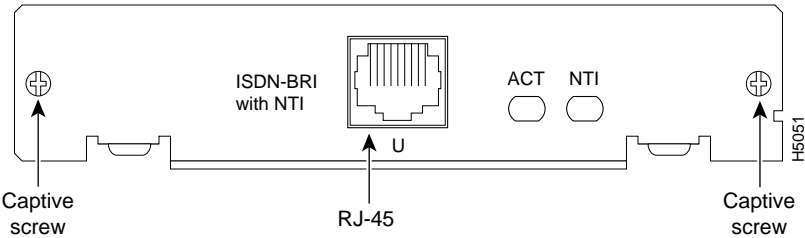
Figure 77   ISDN BRI with Integrated NT1 WAN Module

ISDN-BRI
with NTI

ACT   NTI

U

H5051

Captive
screw

RJ-45

Captive
screw

Figure 78   Five-in-One Synchronous Serial WAN Module
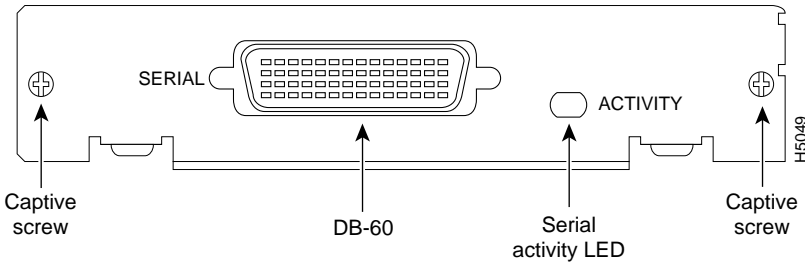
SERIAL

ACTIVITY

H5049

Captive
screw

DB-60

Serial
activity LED

Captive
screw

Figure 79   Blank Slot Cover

BLANK

Do not plug/unplug modules with power on.

H5052

Captive
screw

Captive
screw