Cisco 1600 Series

This chapter provides information on the Cisco 1600 series combination routers. Combination routers offer the flexibility of modular routers with the low cost of preset fixed-configuration routers. This information is organized into the following sections:

- Product Overview
- Standard Features
- Hardware
  - WAN Interface Cards
  - Hardware Product Numbers
- Software
  - Software Product Numbers
  - Cisco IOS Feature Set Upgrades

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

Product Overview

The Cisco 1600 series of access routers delivers the next-generation set of features and benefits for small-office Internet and intranet access: WAN flexibility, end-to-end security, end-to-end quality of service, ease of use, deployment, and management. The Cisco 1600 series routers connect small offices with Ethernet LANs to the public Internet and to a company's internal intranet or corporate LAN through several WAN connections such as ISDN, asynchronous serial, and synchronous serial. The Cisco 1600 series routers include the following models: the Cisco 1601, Cisco 1602, Cisco 1603, and Cisco 1604.

All Cisco 1600 series models (see Figure 143) include one Ethernet port, one built-in WAN port, and one WAN interface card expansion slot for additional connectivity and flexibility. The Cisco 1601 (see Figure 144) includes a built-in serial WAN port; the Cisco 1602 (see Figure 145) has an onboard 56-kbps four-wire Channel Service Unit/Data Service Unit (CSU/DSU); the Cisco 1603 (see Figure 146) has an ISDN BRI S/T port; and the Cisco 1604 (see Figure 147) includes an ISDN BRI U interface with a built-in NT1 device.

Figure 143 Cisco 1600 Series Router Front Panel (All Models)

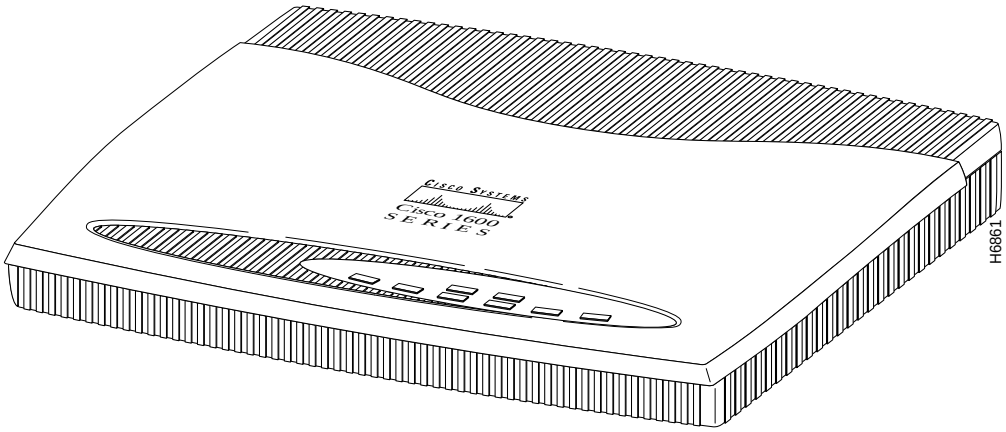


Figure 144 Cisco 1601 Rear Panel

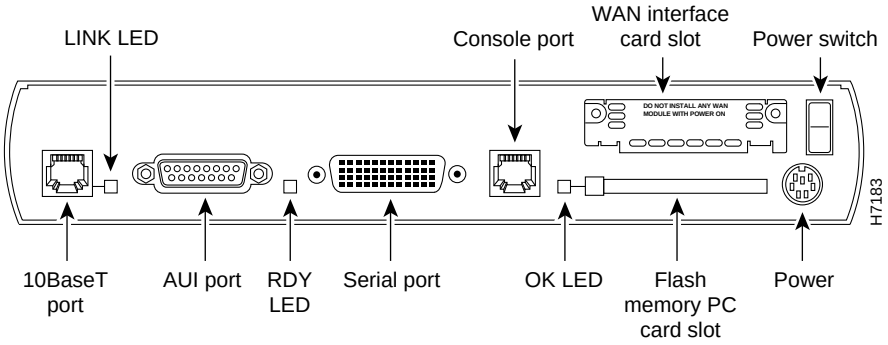


Figure 145 Cisco 1602 Rear Panel

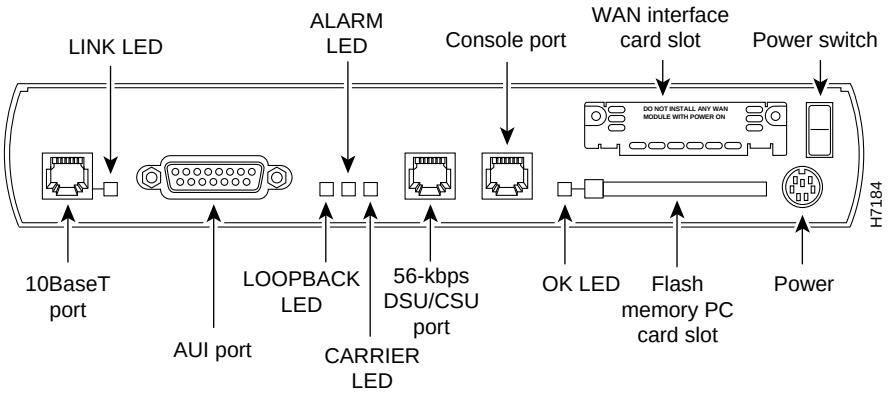


Figure 146 Cisco 1603 Rear Panel

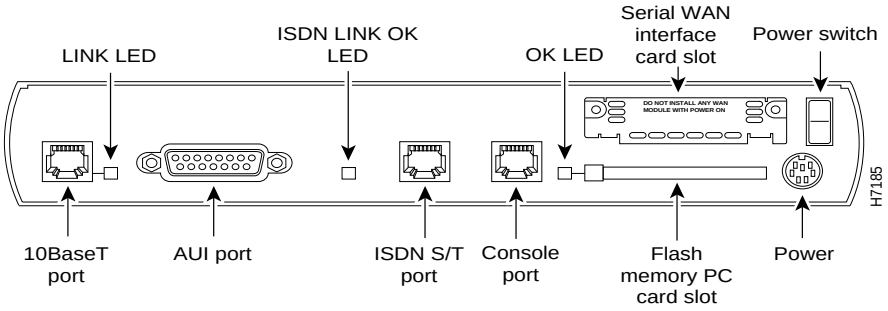
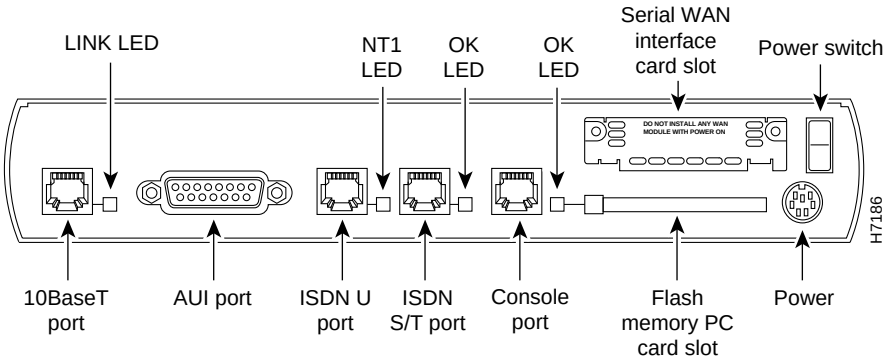


Figure 147 Cisco 1604 Rear Panel



Flexibility and Investment Protection

The WAN-card slot in the Cisco 1600 series allows you to change or add WAN interface cards as your WAN requirements grow or change over time. With this feature, the Cisco 1600 series routers offer you more flexibility and investment protection than any other product in its class.

The Cisco 1600 series routers help protect your investment in an environment of rapid change in WAN requirements and telecommunications. If your business requirements or choices from the service provider change, simply add or change (upgrade) the WAN interface card to use a new WAN technology or service. Most WAN interface cards are interchangeable with any Cisco 1600 and Cisco 3600 series routers. The ISDN WAN interface cards are not supported by the Cisco 1603 and Cisco 1604 routers.

Complete Functionality for the Small Office

The Cisco 1600 series routers offer the most complete set of internetworking software features for a small-office Internet or intranet access device. Cisco's Internetwork Operating System (Cisco IOS) software and its suite of protocol and applications support differentiates the Cisco 1600 from the competition in the following areas:

- Multiprotocol routing (IP, IPX, AppleTalk) and transparent bridging over leased ISDN lines, Frame Relay, Switched Multimegabit Data Service (SMDS), Switched 56, and X.25
- End-to-end security and firewall features such as access lists, lock and key, PAP/CHAP, and 40- or 56-bit encryption prevent unauthorized access to the network. Encryption features are offered in Cisco IOS Release 11.2.
- End-to-end quality of service features enable simultaneous data, voice, and video over the same WAN line and support emerging multimedia applications such as real-time desktop video conferencing
- WAN optimization features such as dial-on-demand routing (DDR), bandwidth-on-demand (BOD), and Open Shortest Path First (OPSF)-on-demand circuit, snapshot routing, compression, filtering, and spoofing to reduce WAN costs.

Easy to Use

The Cisco 1600 series routers are designed to be plug-and-play devices—installation can be performed by nontechnical personnel while ongoing administration can be performed through a centralized site. Preconfigured software can be loaded into a PC Flash memory card at a central site and then sent to remote sites, where users can simply perform plug-and-play installation. The Cisco 1600 also comes with a variety of easy, user-friendly installation features such as Web browser based ClickStart for initial configuration. AutoInstall allows you to download software upgrades and configuration modifications from a central site over the Frame Relay or leased line WAN. Additionally, the Cisco 1600 allows for centralized administration/management using SNMP, Telnet, or through the console port. These features combine to give the lowest total-cost-of-ownership (the sum of deployment costs, administrative costs, and WAN costs).

Standard Features

Table 169 lists the features common to all Cisco 1600 series routers.

Table 169 Cisco 1600 Series Summary of Features

Characteristic	Description
Flash memory	4 MB of Flash memory, which is expandable to 12 MB. Depending on the Cisco IOS release that shipped with the system, more memory might be required. Refer to Table 174, later in this chapter, for the minimum Flash memory required for each feature set.
DRAM memory	2 MB of DRAM memory, which is expandable to 18 MB. Refer to Table 174, later in this chapter, for the minimum DRAM required for each feature set.
Processor type	Motorola 68360 33-MHz CPU
Choice of software feature sets[1] Cisco IOS Release 11.2 and 11.1	IP IP Plus IP/IPX IP/IPX Plus IP/AppleTalk IP/AppleTalk Plus IP/IPX/AppleTalk IP/IPX/AppleTalk Plus
Dimensions (H x W x D)	All models—9.5 x 7.5 x 1.6 in. (24 x 19 x 4 cm)
Weight (average shipping)	All models—1.65 lb (0.75 kg) to 1.80 lb (0.82 kg)
Standard hardware components	External power supply and cord Console port (RJ-45 connector) 10BaseT port (RJ-45 connector) AUI port (DB-15 connector) Flash memory PCMCIA Type 2-compatible Slot for a WAN interface card RJ-45-to-DB-9 adapter
Router management options	Router management through the console port Router management over the network using SNMP AutoInstall for downloading configuration files automatically over a WAN ClickStart, a World Wide Web (WWW) browser-based tool for initial router configuration

1. The Plus feature sets include 40- and 56-bit encryption options in Cisco IOS Release 11.2.

Table 170 lists the environmental specifications for the Cisco 1600 series.

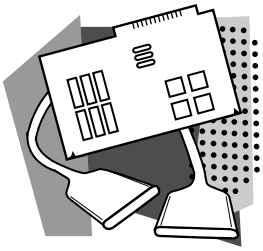
Table 170 Cisco 1600 Series Environmental Specifications

Description	Specification
Output	27W maximum
AC input voltage	100 to 240 VAC[1]
AC input current	0.2 to 0.4 amps
Frequency	50 to 60 Hz
Operating temperature range	All models: –32 to 104 F (0 to 40 C)

Description	Specification
Nonoperating temperature range	All models: –4 to 149 F (–20 to 65 C)
Operating humidity	All models: 10 to 85% noncondensing and operating, 5 to 95%, noncondensing and not operating

1. VAC = volts alternating current.

Hardware



Available hardware for the Cisco 1600 series routers is described in the following sections:

- WAN Interface Cards
- Hardware Product Numbers

WAN Interface Cards

A WAN interface card slides in to a WAN interface card slot, which is located on the rear panel connector of a Cisco 1600 series chassis, as shown in Figure 148.

Figure 148 WAN Interface Cards in the Cisco 1600 Series Routers

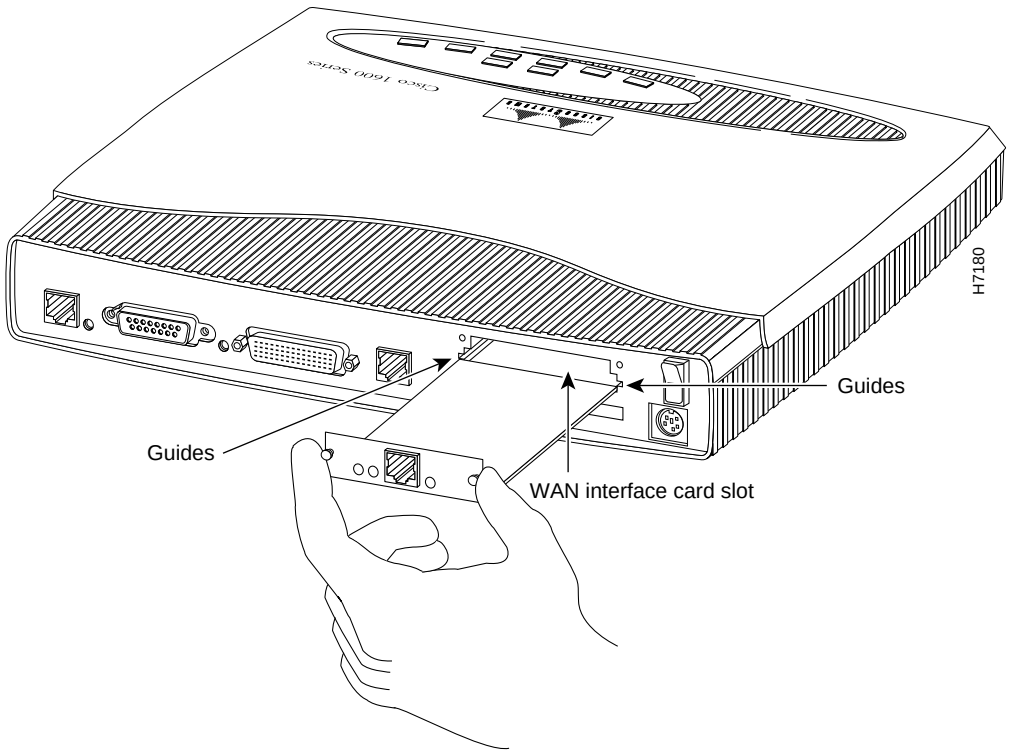


Table 171 lists the LAN interfaces, fixed WAN interfaces, and WAN interface cards supported on each Cisco 1600 series router.

Table 171 Cisco 1600 Series Router Models

Model	LAN Interface	Fixed WAN Interface	WAN Interface Cards Supported
Cisco 1601	10BaseT (RJ-45), AUI (DB-15)	Serial interface (DB-60),[1] which supports asynchronous analog connections up to 115.2 kbps, and synchronous connections, such as digital leased lines, Frame Relay, switched-56, SMDS, and X.25, up to 2.048 Mbps.	Serial,[1]synchronous, and asynchronous ISDN BRI S/T ISDN BRI U
Cisco 1602	10BaseT (RJ-45), AUI (DB-15)	Synchronous serial with integrated 56 kbps four-wire CSU/DSU interface (RJ-48S), which supports permanent and switched 56 kbps and dataphone digital service (DDS) connections.	Serial, synchronous, and asynchronous ISDN BRI S/T ISDN BRI U
Cisco 1603	10BaseT (RJ-45), AUI (DB-15)	ISDN BRI with an S/T interface (RJ-45), which supports one ISDN BRI connection. (An ISDN BRI connection consists of two 64-kbps B channels and one 16-kbps D channel.)	Serial, synchronous, and asynchronous
Cisco 1604	10BaseT (RJ-45), AUI (DB-15)	ISDN BRI U interface (RJ-45) with an integrated NT1, 1 ISDN S/T-bus port (RJ-45), which supports one additional ISDN nondata device (such as an ISDN telephone or fax) on the same ISDN line as the router.	Serial, synchronous, and asynchronous

1. Supports EIA/TIA-232, V.35, X.21, EIA/TIA-499, and EIA-530.

Figure 149 through Figure 151 show the WAN interface cards available for the Cisco 1600 series routers.

Figure 149 Serial WAN Interface Card

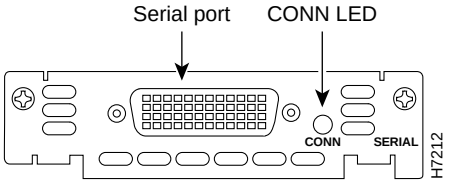


Figure 150 SDN BRI S/T WAN Interface Card

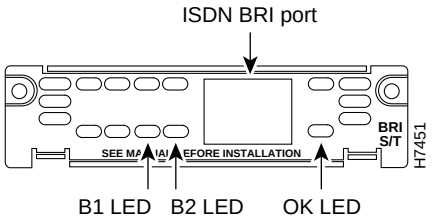
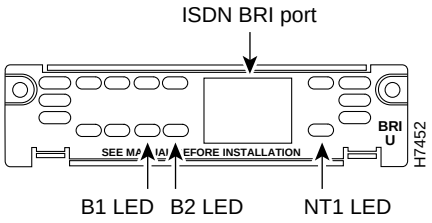


Figure 151 ISDN BRI U WAN Interface Card



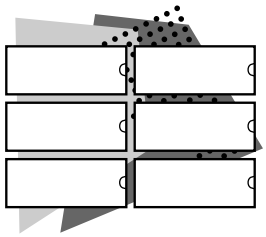
Hardware Product Numbers

Table 172 lists the hardware product numbers for the Cisco 1600 series routers. If a product number ends with an equal sign (=), the item can be ordered only as a spare. If a product number does not end with an equal sign, the item can be ordered as a spare or as a configurable part of a system order.

Table 172 Cisco 1600 Series Hardware Product Numbers

Description	Product Number
Base Router Models	
Cisco 1601 Ethernet and serial modular router	CISCO1601
Cisco 1602 Ethernet and serial modular router with 56 kbps DSU (4-wire)	CISCO1602
Cisco 1603 Ethernet and ISDN BRI modular router	CISCO1603
Cisco 1604 Ethernet and ISDN BRI modular router with NT1	CISCO1604
WAN Interface Cards	
1-port serial	WIC-1T
1-port ISDN BRI with S/T interface	WIC-1B-ST
1-port ISDN BRI with NT-1 and U interface	WIC-1B-U
DRAM Memory Options	
2-MB DRAM SIMM	MEM1600-2D=
4-MB DRAM SIMM	MEM1600-4D=
8-MB DRAM SIMM	MEM1600-8D=
16-MB DRAM SIMM	MEM1600-16D=
2-MB to 4-MB DRAM upgrade	MEM1600-2U4D
2-MB to 6-MB DRAM upgrade	MEM1600-2U6D
2-MB to 10-MB DRAM upgrade	MEM1600-2U10D
2-MB to 18-MB DRAM upgrade	MEM1600-2U18D
Flash Memory Options	
4-MB Flash card	MEM1600-4F=
6-MB Flash card	MEM1600-6F=
8-MB Flash card	MEM1600-8F=
12-MB Flash card	MEM1600-12F=
4-MB to 6-MB Flash upgrade	MEM1600-4U6FC

Description	Product Number
4-MB to 8-MB Flash upgrade	MEM1600-4U8FC
4-MB to 12-MB Flash upgrade	MEM1600-4U12FC
Options and Spares	
Console cable	CAB-1600-CON=
AC power supply, which offers world wide support	1600-WW1=
AC power supply for North America	PWR-1600-NA1=
AC power supply for the United Kingdom	PWR-1600-UK1=
AC power supply for Europe	PWR-1600-EU1=
AC power supply for Japan	PWR-1600-JP1=
Ethernet AUI adapter cable, 18 in.	CAB-3CE18=
Cable Options	
V.35 cable, DTE, male, 10 ft	CAB-V35MT=
V.35 cable, DCE, female, 10 ft	CAB-V35FC=
EIA/TIA-232 cable, DTE, male, 10 ft	CAB-232MT=
EIA/TIA-232 cable, DCE, female, 10 ft	CAB-232FC=
EIA/TIA-449 cable, DTE, male, 10 ft	CAB-449MT=
EIA/TIA-449 cable, DCE, female, 10 ft	CAB-449FC=
X.21 cable, DTE, male, 10 ft	CAB-X21MT=
X.21 cable, DCE, female, 10 ft	CAB-X21FC=
EIA-530 cable, DTE, male, 10 ft	CAB-530MT=
SMARTnet Maintenance	
Cisco 1600 series SMARTnet maintenance	See the chapter “Service and Support,” later in the catalog.



Software

The Cisco 1600 series routers support Cisco IOS Release 11.2 and 11.1. (See Table 173.)

The following types of feature sets are offered:

- Basic. The basic feature set.
- 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.

Note Plus 40 or Plus 56 encryption feature sets are not available for Cisco IOS Release 11.1.

Note 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. and Canada require an export license. Orders may be denied or be subject to delays due to U.S. Government regulations. Please contact your sales representative or distributor for more information, or send e-mail to export@cisco.com.

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

- : the feature is offered 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 feature sets

Table 173 Cisco IOS Release 11.2 and 11.1 Feature Sets—Cisco 1600 Series

	Cisco 1600 Feature Sets							
Features	**IP Routing**		**IP/IPX Routing**		**IP/AppleTalk Routing**		**IP/IPX/AppleTalk Routing**	
Cisco IOS Releases[1]	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**
LAN Support								
AppleTalk 1 and 2[2]	–	–	–	–				
Integrated routing and bridging (IRB)[3]		–		–		–		–
IP								
Novell IPX[4]	–	–			–	–		
Transparent bridging								
WAN Services								
Asynchronous								
Frame Relay								
Frame Relay SVC support (DTE)	Plus	–	Plus	–	Plus	–	Plus	–
Frame Relay traffic shaping[5]		–		–		–		–
HDLC								
ISDN [6]								
PPP[7]								
SMDS								
Switched 56								
X.25								
SLIP asynchronous only								

	Cisco 1600 Feature Sets							
Features	**IP Routing**		**IP/IPX Routing**		**IP/AppleTalk Routing**		**IP/IPX/AppleTalk Routing**	
Cisco IOS Releases[1]	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**
WAN Optimization								
Bandwidth-on-demand [8]								
Custom and priority queuing								
Dial backup								
Dial-on-demand								
Header, link and payload compression								
Header and link compression								
Snapshot routing								
Weighted fair queuing								
IPX and SPX spoofing	–	–			–	–		
IP Routing								
AppleTalk SMRP Multicast	–	–	–	–				
Enhanced IGRP								
IGRP								
IP Multicast (PIM)								
Network Address Translation (NAT)	Plus	–	Plus	–	Plus	–	Plus	–
On Demand Routing (ODR)		–		–		–		–
OSPF	Plus	Plus	Plus	Plus	Plus	Plus	Plus	Plus
OSPF On Demand Circuit (RFC 1793)	Plus	Plus	Plus	Plus	Plus	Plus	Plus	Plus
PIM	Plus	Plus	Plus	Plus	Plus	Plus	Plus	Plus
RIP								
RIP Version 2								
Other Routing								
IPX RIP	–	–			–	–		
RTMP	–	–	–	–				
NLSP	–	–	Plus	Plus	–	–	Plus	Plus
Multimedia and Quality of Service								
Generic traffic shaping	Plus	–	Plus	–	Plus	–	Plus	–
Random Early Detection (RED)	Plus	–	Plus	–	Plus	–	Plus	–
Resource Reservation Protocol (RSVP)	Plus	–	Plus	–	Plus	–	Plus	–
Management								
SNMP								
Telnet								
Console port								

	Cisco 1600 Feature Sets							
Features	**IP Routing**		**IP/IPX Routing**		**IP/AppleTalk Routing**		**IP/IPX/AppleTalk Routing**	
Cisco IOS Releases[1]	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**	**11.2**	**11.1**
Security								
Access lists								
Access security								
Extended access lists								
GRE tunneling								
Lock and key								
Network layer encryption, 40-bit (Plus 40) and 56-bit (Plus 56)	Encrypt	–	Encrypt	–	Encrypt	–	Encrypt	–

1. Cisco IOS Release 11.2(5) P is required with Release 11.2 orders. Cisco IOS Release 11.1(7) AA is required with Release 11.1 orders.
2. AppleTalk load balancing is available in Cisco IOS Release 11.2.
3. 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.
4. 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.
5. Frame Relay traffic shaping is not available in Cisco IOS Release 11.2.1. This feature will be available in a subsequent maintenance release of Cisco IOS Release 11.2.
6. ISDN support includes calling line identification (CLI/ANI), ISDN subaddressing, and applicable WAN optimization features.
7. PPP includes support for LAN protocols supported by the feature set, address negotiation, PAP and CHAP authentication, and PPP compression. Multilink PPP is included with Cisco IOS Release 11.0(4) and later releases.
8. Bandwidth-on-demand means two B channel calls to the same destination.

Software Product Numbers

Table 174 lists the software product numbers and minimum memory requirements for the Cisco 1600 series Cisco IOS Release 11.2 and 11.1 feature sets. If a product number ends with an equal sign (=), the item can be ordered only as a spare. If a product number does not end with an equal sign, the item can be ordered as a spare or as a configurable part of a system order.

Note Adding a feature set might require you to purchase additional memory. The minimum memory requirements listed are chosen for typical remote office applications. If your network is very large, using complex routing protocols, or using RMON, you might need more memory. Configuration analysis and testing are encouraged.

Table 174 Software Product Numbers and Minimum Memory Requirements for Cisco IOS Release 11.2 and 11.1—Cisco 1600 Series

	Product Numbers and Minimum Memory Requirements				
		Cisco IOS Releases			
		11.2		11.1	
Feature Set	Product Number[1]	Total DRAM	Flash	Total DRAM	Flash
IP	SF160C-xx.x.x SW160C-xx.x.x=	2 MB	4 MB	2 MB	4 MB
IP Plus	SF160CP-xx.x.xx SW160CP-xx.x.x=	4 MB	6 MB	4 MB	6 MB
IP Plus 40[2]	SF160CW-xx.x.x SW160CW-xx.x.x=	4 MB	6 MB	–	–
IP Plus 56[2]	SF160CY-xx.x.x SW160CY-xx.x.x=	4 MB	6 MB	–	–
IP/IPX	SF160B-xx.x.x SW160B-xx.x.x=	2 MB	4 MB	2 MB	4 MB
IP/IPX Plus	SF160BP-xx.x.x SW160BP-xx.x=	4 MB	6 MB	4 MB	6 MB
IP/IPX Plus 40[2]	SF160BW-xx.x.x SW160BW-xx.x.x=	4 MB	6 MB	–	–
IP/IPX Plus 56[2]	SF160BY-xx.x.x SW160BY-xx.x.x=	4 MB	6 MB	–	–
IP/AT	SF160E-xx.x.x SW160E-xx.x.x=	2 MB	4 MB	2 MB	4 MB
IP/AT Plus	SF160EP-xx.x.x SW160EP-xx.x.xx=	4 MB	6 MB	2 MB	4 MB
IP/AT Plus 40[2]	SF160EW-xx.x.x SW160EW-xx.x.x=	4 MB	6 MB	–	–
IP/AT Plus 56[2]	SF160EY-xx.x.x SW160EY-xx.x.x=	4 MB	6 MB	–	–
IP/IPX/AT	SF160A-xx.x.x SW160A-xx.x.x=	4 MB	6 MB	4 MB	6 MB
IP/IPX/AT Plus	SF160AP-xx.x.x W160AP-xx.x.x=	4 MB	6 MB	–	–
IP/IPX/AT Plus 40[2]	SF160AW-xx.x.x SW160AW-xx.x.x=	4 MB	6 MB	–	–
IP/IPX/AT Plus 56[2]	SF160AY-xx.x.x SW160AY-xx.x.x=	4 MB	6 MB	–	–

1. Substitute the release number for xx.x.x in the product number (for example, SW160BP-11.2.xx= becomes SW160BP-11.2.4.P=).
2. The Plus 40 and Plus 56 feature sets are only available with Cisco IOS Release 11.2 and later releases.

Cisco IOS Feature Set Upgrades

Cisco IOS Release 11.2 and 11.1 for the Cisco 1600 series allow software upgrades that cross multiple feature sets. You can upgrade your software in the following three ways:

- Feature set upgrades (for example, IP to IP/IPX)
- Basic feature set to Plus feature set upgrades (for example, IP to IP Plus)
- Major version or maintenance release upgrades (for example, 11.1(7) AA to 11.1(8) AA)

These upgrades require you to order multiple feature set licenses as shown in the following example:

You have a Cisco 1600 router running the Cisco IOS Release 11.1(7) AA IP routing (basic) feature set. You want to upgrade to the Cisco IOS Release 11.1(8) AA IP/IPX/AppleTalk Plus feature set. You are crossing two feature sets: one to get from IP to IP/IPX/AppleTalk, and one to get to IP/IPX/AppleTalk Plus (basic to Plus). To complete the upgrade, use the following guidelines:

- Order FL160C-A= (IP to IP/IPX/AppleTalk upgrade license, charged item).
- Order FL160-P= (Plus upgrade license, charged item).
- Order additional DRAM and Flash card memory (if you do not have the minimum required DRAM and Flash card memory for the new feature set). See Table 174.
- Order SW160AP-11.1.8A= (Cisco 1600 IP/IPX/AppleTalk software on diskette, charged item).

Table 175 lists the feature set upgrades for Cisco IOS Release 11.2 and 11.1.

Table 175 Cisco IOS Upgrades for Cisco IOS Release 11.2 and 11.1—Cisco 1600 Series

Upgrade Scheme	Product Numbers[1]
Plus upgrade	FL160-P=
Plus 40 upgrade	FL160-W=
Plus 56 upgrade	FL160-Y=
IP to IP/IPX upgrade	FL160C-B= and SW160B-xx.x.x=
IP to IP/AppleTalk upgrade	FL160C-E= and SW160EP-xx.x.x=
IP to IP/IPX/AppleTalk upgrade	FL160C-A= and SW160A-xx.x.x=
IP/IPX to IP/IPX/AppleTalk upgrade	FL160B-A= and SW160A-xx.x.x=
IP/AppleTalk to IP/IPX/AppleTalk upgriade	FL160E-A= and SW160A-xx.x.x=

1. Substitute the release number for xx.x.x in the product number (for example, SW160CP-11.1.8A=).