Cisco 1600 Series — Modular Desktop Access Routers

Product Overview

The Cisco 1600 series have become the proven choice for data access for small branch offices and small businesses because they offer a range of features specifically designed for such applications:

- Modular design for wide-area network (WAN) choice and flexibility
- Advanced security, including optional integrated firewall, encryption, and virtual private network (VPN) software
- End-to-end quality of service (QoS) and multimedia support
- Integrated data service unit/channel service unit (DSU/CSU) with up to T1 speed and integrated Network Termination (NT1)
- Low cost of ownership through WAN bandwidth optimization
- Ease of use, deployment, and management

The Cisco 1700 series routers build on the success of the Cisco 1600 routers, delivering multiservice capabilities, as well as greater modularity, security, and integration to small offices.

Cisco 1600 Series Modular Routers

Cisco 1600 series routers connect small offices with Ethernet LANs to WANs through Integrated Services Digital Network (ISDN), asynchronous serial, and synchronous serial connections.

The five basic configurations of the Cisco 1600 product family offer the following ports:

- Cisco 1601 R — one Ethernet, one serial, one WAN interface
- Cisco 1602 R — one Ethernet, one serial with integrated 56-kbps DSU/CSU, one WAN interface card slot
- Cisco 1603 R — one Ethernet, one ISDN Basic Rate Interface (BRI) (S/T interface), one WAN interface card slot
- Cisco 1604 R — one Ethernet, one ISDN BRI with integrated NT1 (U interface), one S-bus port for ISDN phones, one WAN interface card slot
- Cisco 1605 R — two Ethernet slots, one WAN interface card slot

The serial WAN port on the Cisco 1601 R router supports asynchronous serial connections of up to 115.2 kbps and synchronous serial connections — such as Frame Relay, leased lines, Switched 56, Switched Multimegabit Data Service (SMDS), and X.25 — of up to 2.048 Mbps. The Cisco 1602 R router integrates a 56-kbps four-wire DSU/CSU, and it supports the same synchronous serial connections as the Cisco 1601 R router (except SMDS). The ISDN BRI port on the Cisco 1603 R router has an S/T interface, while the Cisco 1604 R includes an integrated NT1 with a U interface. The Cisco 1605 R router provides a 10BaseT and an AUI port on the first Ethernet interface and a 10BaseT port on the second Ethernet interface.

Run From RAM Architecture

The 1601 R-1605 R routers have a “run-from-RAM” architecture; the “R” suffix designates run from “RAM”. The Cisco IOS software image is stored in Flash memory (in compressed form), but is loaded into RAM before being executed by the router.

The Run-from-RAM models offer the following benefits:

1. Greater Performance — The Cisco 1600 R models deliver greater performance for memory-intensive applications such as encryption and compression.

2. Easier Upgradability — The Cisco 1600 R routers permit software upgrades over any interface while the router is running

3. Lower Cost — Because the Cisco 1600 R models store the software in compressed form in Flash memory, less flash memory is required to run advanced feature sets (such as Cisco 1600 series IOS IP Plus). The new Cisco 1600 R routers (1601 R, 1602 R, 1603 R, and 1604 R) are essentially the same as the original models (1601-1604), but they are “run-from-

RAM" routers, similar to the Cisco 1605 R model introduced in late 1997. The new Cisco 1600 R models deliver all the features and benefits of the original models, including the same interfaces, the same functionality, the same feature sets, and the same versions of Cisco IOS (R) software and have the same physical dimensions.

Figure 18-49: Cisco 1601 R Rear View

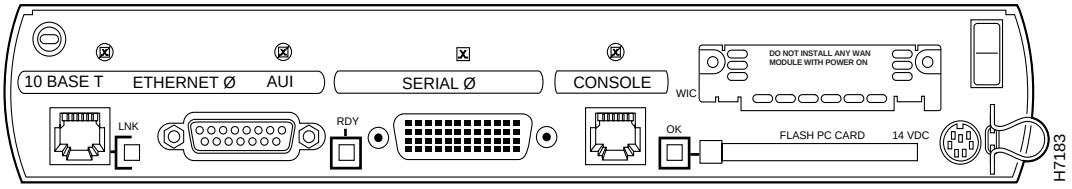


Figure 18-50: Cisco 1602 R Rear View

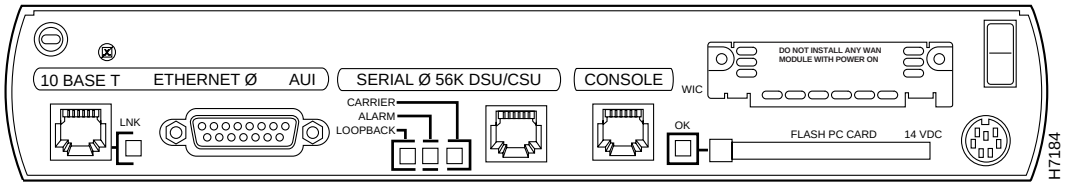


Figure 18-51: Cisco 1603 R Rear View

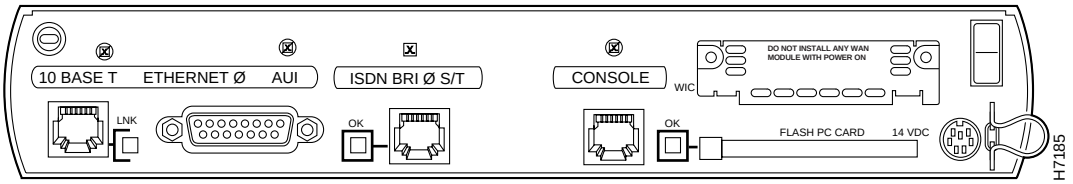


Figure 18-52: Cisco 1604 R Rear View

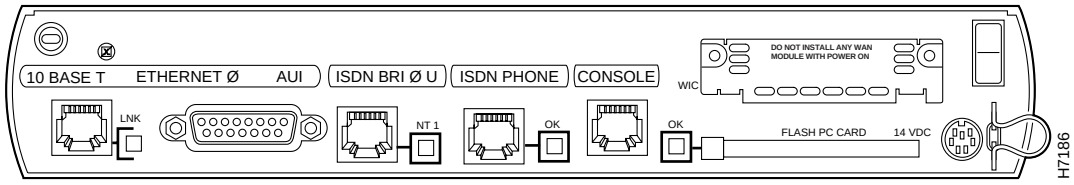
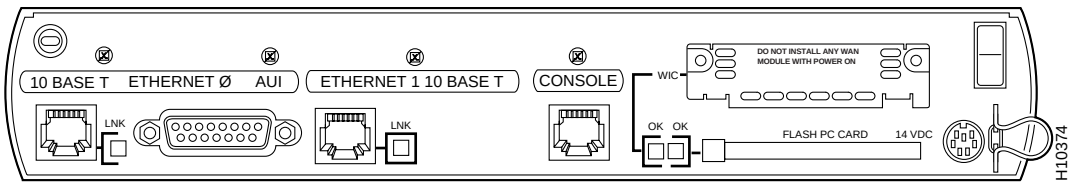


Figure 18-53: Cisco 1605 R Rear View



Options for Cisco 1600 Series

Key Features and Benefits

Flexibility and Investment Protection

The WAN interface card slot allows customers to change or add WAN interface cards as their requirements grow or change. With this feature, the Cisco 1600 series offers more flexibility and investment protection than any other product in its class. What's more, the ability to use the same WAN interface cards in Cisco 1600, 1700, 2600, and 3600 routers reduces requirements for spare parts inventory and protects investments in existing routers.

Table 18-142: Optional WAN Interface Cards Available

WAN Interface Card	1601 R	1602 R	1603 R	1604 R	1605 R
Serial, asynchronous and synchronous	Yes	Yes	Yes	Yes	Yes
T1/Fractional T1 DSU/CSU	Yes	Yes	Yes	Yes	Yes
56/64-kbps four-wire DSU/CSU	Yes	Yes	Yes	Yes	Yes
ISDN BRI with S/T interface (dial & leased line)	Yes	Yes			Yes
ISDN BRI with integrated NT1, U interface (dial & leased line)	Yes	Yes			Yes
ISDN BRI leased line (S/T interface)			Yes	Yes	

The ISDN BRI Leased Line S/T card is designed specifically for the Cisco 1603 R and 1604 R routers. It is intended for users who require a dial-up ISDN BRI line (from the Cisco 1603 R or 1604 R router's fixed-WAN port) and an ISDN leased line (from the ISDN BRI Leased Line card inserted into the Cisco 1603 R or 1604 R router). This card is automatically configured only in ISDN leased line mode.

Device Integration

Cisco 1600 routers deliver a complete solution for remote access for small businesses and small branch offices. They provide not only advanced routing capabilities but also the option to integrate DSU/CSU and ISDN network T1 device (NT1), as well as firewall, encryption, and VPN functionality. This integration reduces deployment time and expense because fewer devices and cables need to be installed and configured. An integrated product also saves space and increases reliability because fewer stand alone devices are required to build the solution. The Cisco 1600 routers simplify ongoing support of small branch offices from a central site through remote configuration, monitoring, and troubleshooting of all integrated functions in the router.

Advanced Security

To leverage the unprecedented opportunities offered by communications and commerce over the Internet, private information must remain secure. Cisco IOS security services provide many technologies to build a custom security solution. The elements of security services include perimeter security, firewalls, encryption, and VPNs.

Perimeter Security

Perimeter security refers to the control of traffic entry and exit between network boundaries, such as between private networks, intranets, extranets, or the Internet. Cisco IOS perimeter security technologies provide a highly flexible, superior solution with features such as:

- Standard and extended access control lists (ACLs)
- Lock and Key (dynamic ACLs)
- Router/route authentication, authorization, and accounting (such as PAP/CHAP, TACACS+, and RADIUS)

Firewall

The optional Cisco IOS Firewall Feature Set, available on all Cisco 1600 models, provides formidable firewall functionality, including:

- Context-based access control (CBAC)
- Java blocking
- Attack detection and prevention
- Improved logging and alerts

CBAC provides stateful application-layer security by examining traffic sessions on a per-application basis and allowing return traffic through the firewall. When a session is initiated internally, CBAC writes a temporary, session-specific ACL entry and deletes the ACL entry upon session termination.

The Cisco 1605 R router — which supports one WAN slot, two Ethernet ports, and the Cisco IOS Firewall Feature Set — makes an ideal integrated and flexible firewall for small offices. This integrated router/firewall effectively segments an internal, secure LAN from a perimeter LAN exposed to an untrusted network (such as the Internet), thus creating a "demilitarized zone."

See the Cisco IOS Firewall Feature Set data sheet for further details.

Virtual Private Networks (VPNs) and Encryption

The Cisco 1600 series routers may be deployed as an entry-level VPN access solution, supporting DES encryption at rates of up to 128 kbps. The Cisco 1720 router is recommended for VPN applications that require greater performance or 3DES or both. Cisco IOS software for the Cisco 1600 series provides a comprehensive set of VPN features, including not only perimeter security and firewalls but also the following key technologies:

- IPSec tunneling with data encryption standard (DES)
- Layer 2 Forwarding (L2F) and Layer 2 Tunneling Protocol (L2TP)
- VPN management tools such as support for VPN policy configuration in Cisco ConfigMaker

Cisco IOS Software Features for Small Office Data Access

Cisco 1600 series routers offer small businesses and small branch offices a complete set of internetworking software features. In addition to the features mentions earlier, Cisco IOS software differentiates the Cisco 1600 series from the competition with:

- Multiprotocol routing (IP, IPX, AppleTalk), IBM/SNA, and transparent bridging over ISDN, asynchronous serial, and synchronous serial such as leased lines, Frame Relay, SMDS, Switched 56, X.25, and X.25 over D
- Network Address Translation (NAT), which eliminates the need to re-address all hosts with existing private network addresses and hides internal addresses from public view
- Easy IP — a combination of NAT, Point-to-Point Protocol/Internet Control Protocol (PPP/IPCP) and Dynamic Host Configuration Protocol (DHCP) server — which enables the router to dynamically negotiate its own IP address and dynamically allocate local IP addresses to the remote LAN hosts, simplifies deployment, and minimizes Internet access costs
- End-to-end QoS features such as Resource Reservation Protocol (RSVP), IP Multicast, WFQ, and AppleTalk Simple Multicast Routing Protocol (SMRP), which support multimedia applications such as desktop video conferencing, distance learning, and voice/data integration
- WAN optimization features such as dial-on-demand routing (DDR), bandwidth-on-demand (BOD), and Open Shortest Path First (OSPF)-on-demand circuit, Snapshot routing, compression, filtering, and spoofing to reduce WAN costs

Easy to Use

The Cisco 1600 series includes a variety of easy, user-friendly installation and configuration features such as color coded ports, removable Flash memory PC cards for easy software deployment, the Cisco ConfigMaker configuration tool and the Cisco Fast Step software tool. These features combine to give the lowest total cost of ownership of any small office router.

Each Cisco 1600 series router includes the Cisco Fast Step easy-to-use Windows 95, 98, and NT 4.0-based software tool that simplifies the setup, monitoring, and troubleshooting of Cisco routers. The Cisco Fast Step setup application leads users through simple, step-by-step, wizards-based procedures to configure Cisco routers connected to an Internet service provider and remote corporate network. Cisco Fast Step software includes the Cisco Fast Step monitor application, which provides users with router LAN and WAN performance statistics, fault alarms, and troubleshooting assistance.

The Cisco ConfigMaker application is appropriate for advanced configuration of the Cisco 1600 series routers. A Windows 95, 98, and NT 4.0-based software tool, Cisco ConfigMaker is designed to configure a small network of Cisco routers, switches, hubs, and other network devised from a single PC. Cisco ConfigMaker is designed for resellers and network administrators of small and medium-sized businesses who are proficient in LAN and WAN fundamentals and basic network design. Cisco ConfigMaker includes support for the Cisco IOS Firewall Feature Set (which provides integrated enhanced security capabilities), Network Address Translation (NAT), and Cisco Easy IP software.

In addition to easy-to-use software, the hardware for the Cisco 1600 routers is designed to be "plug-and-play" in four notable areas. First, each of the ports on the Cisco 1600 routers and WAN interface cards is color coded, and optional color-coded cables can be purchased from Cisco. Second, preconfigured software may be loaded into a Flash memory PC card at a central site, and then a user at remote site may deploy the router by simply inserting the Flash card, plugging in cables, and turning on the power. Third, once the router is running, software upgrades and configuration modifications can be downloaded over the WAN from a central site. And finally, the Cisco 1600 series allows for centralized administration and management via Simple Network Management Protocol (SNMP) or Telnet or through the console port.

Specifications

Hardware

Table 18-143: Technical Specifications for Cisco 1600 Series

Feature	Cisco 1601 R	Cisco 1602 R	Cisco 1603 R	Cisco 1604 R	Cisco 1605 R
First Built-in Interface (LAN)	Ethernet: 10Base-T (RJ-45) and AUI (DB-15)	Ethernet: 10Base-T (RJ-45) and AUI (DB-15)	Ethernet: 10Base-T (RJ-45) and AUI (DB-15)	Ethernet: 10Base-T (RJ-45) and AUI (DB-15)	Ethernet: 10Base-T (RJ-45) and AUI (DB-15)
Second Built-in Interface (WAN or LAN)	Serial sync/async DB-60	56K 4 wire DSU/CSU: RJ-48S	ISDN BRI S/T RJ-45	ISDN BRI U with NT1: RJ-45	Ethernet: 10Basse-T (RJ-45) only
Optional WAN Interface Cards, please see Table on page 3.					
Processor	Motorola 68360 at 33MHz				
Memory Architecture	Run-from-RAM				
DRAM: Default	8 MB				
DRAM: Maximum	24 MB				
Flash Memory: Default	4 MB				
Flash Memory: Maximum	16 MB				
Console Port	RJ-45				

Table 18-144: Serial Interfaces Supported by the Cisco 1601 R and 1602 R Routers and Serial WAN Interface Cards

	Cisco 1601 R On-board WAN	Cisco 1602 R On-board WAN	WIC-1T Card	WIC-1DSU-56K4 Card	WIC-1DSU-T1 Card (New)
Asynchronous serial connection over basic analog telephone	Up to 115.2 kbps	Not supported	Up to 115.2 kbps	Not supported	Not supported
Synchronous serial connections					
Leased Line / Digital Data Service (DDS)	Up to 2.0 Mbps with external DSU/CSU	56 kbps	Up to 2.0 Mbps with external DSU/CSU	56 or 64 kbps	See footnote[1]
Switched 56	56 Kbps with external DSU/CSU	56 kbps	56 Kbps with external DSU/CSU	56 Kbps	Not applicable

1. Line must be provisioned as T1 or fractional T1, that is N x 64 or N x 56 (N=1 through 24) unchannelized and clocked at 1.544 Mbps. A dedicated 64Kbps leased line would not be supported if clocked at 64Kbps, for example, but would be supported if provisioned as fractional T1 (in other words, clocked at 1.544 Mbps).

Note For detailed information about network modules (NMs) and WAN interface cards (WICs) see the

- Asynchronous serial protocols: Point-to-Point Protocol (PPP), Serial Line Internet Protocol (SLIP)
- Asynchronous interface: EIA/TIA-232
- Synchronous serial WAN services: Frame Relay, X.25, SMDS
- Synchronous serial protocols: PPP, HDLC, LAPB, IBM/SNA
- Synchronous serial interfaces supported on Cisco 1601 R and WIC-1T card: EIA/TIA-232, V.35, X.21, EIA/TIA-449, EIA-530

Table 18-145: ISDN Interfaces for Cisco 1600 Series

Feature	Cisco 1603 R/1604 R On-board WAN	WIC-1B-S/T card	WIC-1B-U card	WIC-1B-S/T-LL card
ISDN dialup	Yes	Yes	Yes	Not supported
ISDN Leased Line 64 kbps	Rel 11.1	Rel 11.1	Rel 11.1	Rel 11.2(9)P
ISDN Leased Line 128 kbps	Rel 11.3(1)	Rel 11.3(1)	Rel 11.3(1)	11.3(3)T
Frame Relay encapsulation over ISDN Leased Line	Yes	Yes	Yes	Yes
PPP encapsulation over ISDN Leased Line	Yes	Yes	Yes	Yes
PPP compression (up to 4:1)	Yes	Yes	Yes	Yes

Table 18-146: Power Requirements for Cisco 1600 Series

Description	Specification
Output	27W max.
AC input - Voltage	100 to 240 VAC
AC input - Current	0.2 to 0.4A
Frequency	50 to 60 Hz

Table 18-147: Physical and Environmental Specifications for Cisco 1600 Series

Description	Cisco 1600 Series	WAN Interface Cards
Dimensions (W x H x D)	11.15 x 2.19 x 8.67 in. (28.32 x 5.56 x 22.02 cm)	3.1 x 0.8 x 4.8 in. (7.9 x 2.1 x 12.2 cm)

Description	Cisco 1600 Series	WAN Interface Cards
Weight (min.)	1.65 lb. (0.75 kg)	0.13 lb (57 g)
Weight (max.)	1.80 lb. (0.82 kg)	0.19 lbs (85 g)
Temperature	Operating	–32 to 104˚F (0 to 40˚C)
	Storage	–4 to 149˚F (–20 to 65˚C)
Humidity	Operating	0 to 85%
	Storage	5 to 95%

Software

All software part descriptions and part numbers for Cisco products can be accessed using the online Cisco Pricing Tool at http://www.cisco.com/cgi-bin/order/pricing_root.pl

Ordering Information

Product Part Numbers

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