



The Cisco 1600 Series

The Cisco 1600 Series: **Next-Generation Internet and Intranet Access**



Affordable Small-Office Access for Changing Wide-area Networking Needs

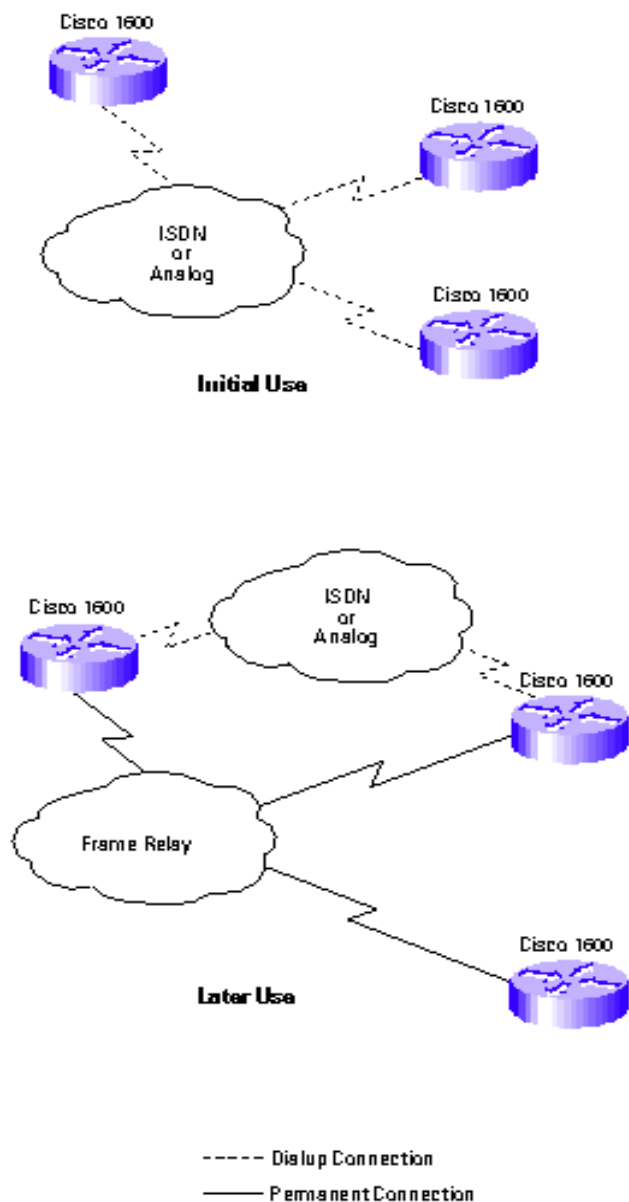


The Internet and the World Wide Web have transformed the landscape of the Information Age. A new class of media-rich applications is stretching the infrastructure of enterprise intranets. Also, telecommunications deregulation, new pricing and services, and ever-evolving WAN technologies continue to shift the very ground upon which businesses operate. These changes present big challenges, but companies that are quick to respond can use them to gain a competitive advantage.

To cope with such constant change, small-office environments need Internet and intranet access solutions that are both affordable and flexible. Basic connectivity is not enough. To conduct business across the wide area, companies have to ensure end-to-end security and data privacy, and quality of service that will deliver an increasing array of time-sensitive applications to remote sites. And all this technology must be easy to deploy, operate, and manage. Requirements such as flexibility, affordability, end-to-end security, quality of service, and ease of deployment and management are just what the Cisco 1600 series of Internet and intranet access routers have been designed to address.

While priced comparably to other small-office solutions, Cisco 1600 series routers offer many of the advanced features found in more powerful and costly enterprise routers. And unlike other products in its class, the Cisco 1600 routers have a modular architecture that makes it easy for customers to change the way their networks are configured. This flexibility enables companies to exploit new WAN technologies as they emerge while protecting existing investments in networking equipment.

Flexibility for Migration Cisco 1600 series routers provide flexibility for migration from one WAN service to another. WAN interface cards in the expansion slot can be changed as services are changed. Here is one example:



Modularity

In Cisco's comprehensive lineup of remote access products, the Cisco 1600 series of small-office Internet/intranet access routers is positioned between the Cisco 760 and 2500 families. The Cisco 760 series is a low-cost solution targeted specifically at dialup telecommuters. The Cisco 2500 products are aimed at larger enterprise branch offices, offering a range of features—including integrated hubs, additional serial connectivity, dual LAN ports, and more comprehensive protocol support that extends beyond the small-office functionality offered by typical Internet and intranet access products.

Modularity for Flexibility and Investment Protection

An important advantage of the Cisco 1600 series is the flexibility to add, upgrade, or change WAN services through software or hardware changes—quickly and with minimal additional cost. To upgrade or change from any one of the following serial WAN services—analogue asynchronous, Frame Relay, leased line, Switched 56, X.25, or Switched Multimegabit Data Service (SMDS)—to a different WAN service in this group, only software reconfiguration is needed. To upgrade or change from Integrated Service Digital Network (ISDN) to one of these serial WAN services, or vice versa, a WAN interface card offering the appropriate WAN service can be installed, without having to replace the router.

Small offices benefit from this flexibility in several ways. For example, they may initially choose lower-speed, dialup links such as basic analog phone lines or ISDN. Later, traffic requirements may grow to a point where a higher-speed Frame Relay link or leased line becomes necessary. The Cisco 1600 series allows for this upgrade either through software reconfiguration or the addition of a serial WAN interface card for the higher-speed line. If a WAN interface card is installed, the initial dialup link can still be used as a backup or secondary WAN connection.

Alternatively, suppose ISDN is chosen initially, but later a different WAN service, such as Frame Relay, becomes more attractive (in price and service guarantee) because of deregulation or competition in the local telecommunications market. A serial WAN interface card (which supports a variety of serial services, including Frame Relay) can be installed, eliminating the expense of replacing the router. With every Cisco 1600 series router, the second WAN slot, which accepts a WAN interface card, means that customers pay only for the initial WAN service of choice and benefit

from the flexibility to change or upgrade to a different WAN service when the need arises. This scenario lowers initial investment and protects it from obsolescence.

Cisco IOS Software Functionality

The flexibility of the Cisco 1600 series is augmented by the most complete set of internetworking software features and functions available today in a small-office Internet/intranet access device.

The Cisco Internetwork Operating System (Cisco IOS™) software—the native intelligence at the heart of all of Cisco's internetworking products and application solutions—provides unsurpassed functionality. The Cisco IOS software supports all of today's popular WAN protocols and offers the broadest array of bandwidth optimization capabilities in the industry.

Integrated Cisco IOS software enables the Cisco 1600 series to support multiprotocol routing (IP, IPX, AppleTalk) and transparent bridging over analog phone lines, ISDN, digital leased lines, Frame Relay, SMDS, Switched 56, and X.25 WAN connections. This wealth of connectivity options further enhances the router family's complete set of end-to-end security and encryption features, end-to-end quality-of-service support (including support for data, voice, and video multimedia applications), and WAN optimization capabilities. Combined with ease of use, deployment, and management, these features enable the Cisco 1600 series to provide superior performance and functionality while lowering the total cost of Internet/ intranet access for small offices.

Quick and Easy Rear view of Cisco 1600 series router with the interchangeable WAN interface card and the Flash Memory PC card enabling quick and easy configuration deployment.



Security

End-to-End Security and Privacy

End-to-end security and data privacy are ensured through a combination of firewall features and encryption technologies built into the Cisco IOS software. The Cisco IOS security features let network managers determine precisely which users have access to specific resources, all the way down to the individual or machine level. Thanks to advanced access lists, router/route authentication, Lock-and-key features, virtual private network (VPN) technology, and data encryption, interactions between users and networks are kept confidential, even when passing through a public network.

End-to-End Quality of Service

To date, file transfers and transaction-oriented traffic have comprised the majority of traffic on the Internet and on corporate networks. But we are seeing a new breed of media-rich, time-sensitive network traffic that requires quality of service, that is, guaranteed bandwidth and sophisticated delay contracts. Cisco IOS software supports this multimedia traffic by allowing integrated data, voice, and video to be transported simultaneously over the same WAN. Efficient bandwidth utilization is ensured through support of the Resource Reservation Protocol (RSVP), Weighted Fair Queuing (WFQ), Real-Time Transport Protocol (RTP) support, IP multicast, and AppleTalk Simple Multicast Routing Protocol (SMRP). These important standards enable the broadcast of video and voice over data networks and pave the way for the integration of data, voice, and video technology.

The Cisco 1600 Series Router Next-generation functionality and modularity are offered in a sleek compact design. Front and rear panel LEDs provide a quick snapshot of status and diagnostics.



Enhanced Internet/Intranet Access Features

Network address translation takes a private IP addressing scheme on the customer's internal network and converts it to a public IP address inside the router. With this feature, users can keep their current IP addresses when they first connect to the Internet or when they change Internet service providers. This feature optimizes address space by requiring only a single IP address for each remote office. Additionally, network address translation enhances firewall security protection because IP addresses on the internal network are hidden from outside connections, preventing hackers from accessing an inside host. Generic routing encapsulation (GRE) tunneling enhances the creation of VPNs and intranets over the public Internet by tunneling traffic between networks.

“Cisco worked hard on the
“ilities” of this little router;
it has great scalability, flexibility,
and affordability. This device is
ready to meet the wave of
increased frame-relay
connectivity. You can use your V.35
port for a FRAD connection, so
you can have both ISDN and
frame-relay WAN links.”

Frank Derfler

Management

Ease of Deployment, Use, and Management

Small offices need technologies that are easy to deploy and manage. Cisco's ClickStart™ software enables users to do a quick installation and initial configuration of Cisco 1600 routers with a point-and-click, Web browser-based user interface—a useful feature in small offices where internetworking expertise may be minimal. Or, preconfigured software can be loaded into a Flash memory PC card at a central site and then sent to remote sites where nontechnical users can simply insert the Flash card and plug in WAN, LAN, and power cables. The Flash memory cards can also be used to upgrade flash memory without opening the router to add or replace memory chips.

The AutoInstall feature allows administrators to download software upgrades and configuration modifications over the Frame Relay and leased-line WAN from the central site.

The Cisco 1600 series supports a wide range of platforms and applications for monitoring and managing company-wide data networks. CiscoWorks™ and CiscoView™ applications, running on Windows 95, Windows NT, and UNIX network management platforms, provide network administrators with comprehensive configuration and security management, performance and fault monitoring, and Web browser/hypertext markup language (HTML) support.

Establishing ISDN Service

Establishing ISDN service can be a time-consuming and unwieldy process. Cisco's ISDN Support provides a single point-of-contact for setting up your Cisco equipment with an ISDN connection. Support representatives, serving as a single-point-of-contact, work closely with you to capture information for your Internet Service Provider and long distance carrier, while helping to make the transition to ISDN easy. This service is provided free-of-charge.

WAN Optimization: Reduced Cost of Ownership

The Cisco IOS software provides a wide range of bandwidth optimization features that help contain and reduce recurring WAN charges. These features include compression, dial-on-demand routing (DDR), bandwidth-on-demand

routing (BOD), Open Shortest Path First (OSPF) on-demand circuit routing, advanced filtering and spoofing, and snapshot routing.

“As a service provider, it is absolutely vital to us that our Cisco access routers provide flexibility and modularity to move from one WAN service, or technology to another. As user needs change and WAN technology and services evolve, investment protection must

Applications for Small Offices

Internetworking for Small Offices

Cisco 1600 routers can be used to connect geographically dispersed small offices through public or private networks. These offices typically contain PCs and Macintosh computers that are used to exchange e-mail and data files, access the Internet and corporate intranet, query databases, and send print jobs to high-end output devices at the central site.

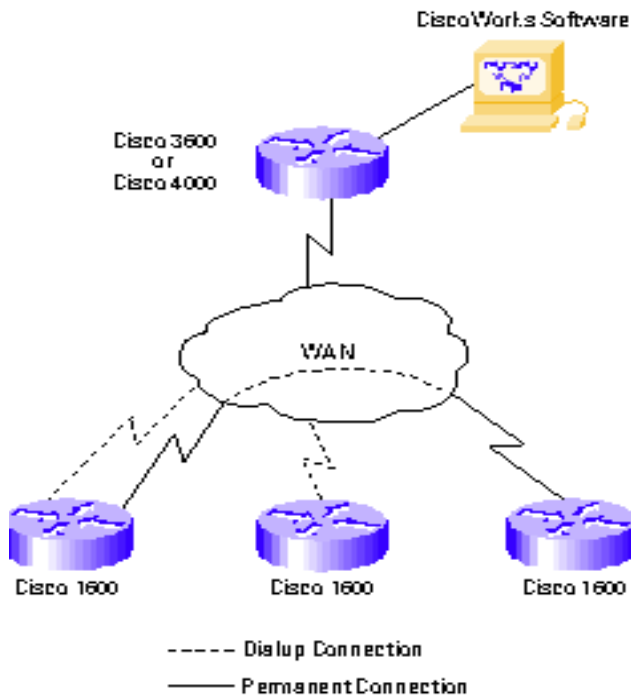
Cisco 1600 series routers support a variety of WAN options so that users can change services as bandwidth needs or prices dictate. Designed for small offices, Cisco 1600 series routers complement Cisco's portfolio of powerful central site routers and dialup access servers, providing end-to-end integrated solutions with the Cisco IOS software as the common thread that runs throughout.

The figure shows a number of small sites, each with a Cisco 1600 router. One of the sites might be a large central office, such as corporate or regional headquarters, with a Cisco 4000 series router or a Cisco 3600 series access server. Larger sites and those with more WAN traffic use higher-bandwidth Frame Relay or leased-line connections. Smaller sites and sites with low or infrequent WAN traffic requirements use dialup connections such as ISDN, analog phone lines, or Switched 56. As small sites grow and generate more WAN traffic, they can upgrade their WAN links either by software reconfiguration or by installing new interface cards in the Cisco 1600 routers.

The Cisco 1600 series offers advanced features that make it an ideal small-office solution. Multiprotocol routing of IP, IPX, and AppleTalk—and bridging of other protocols—accommodate the LAN protocol needs of mixed PC/Macintosh environments. Small offices also need to reduce WAN costs, and the Cisco 1600 series has features that maximize the use of WAN bandwidth. These features

include dial on demand; bandwidth on demand; snapshot routing; OSPF on-demand circuit routing; header, link, and payload compression; and filtering and spoofing.

Internetworking for Small Offices A Cisco 1600 router at each small office connects these offices to each other and to a central site with a Cisco 3600 or Cisco 4000 router. A complete range of WAN services is supported, with leadership WAN optimization features to reduce WAN costs.



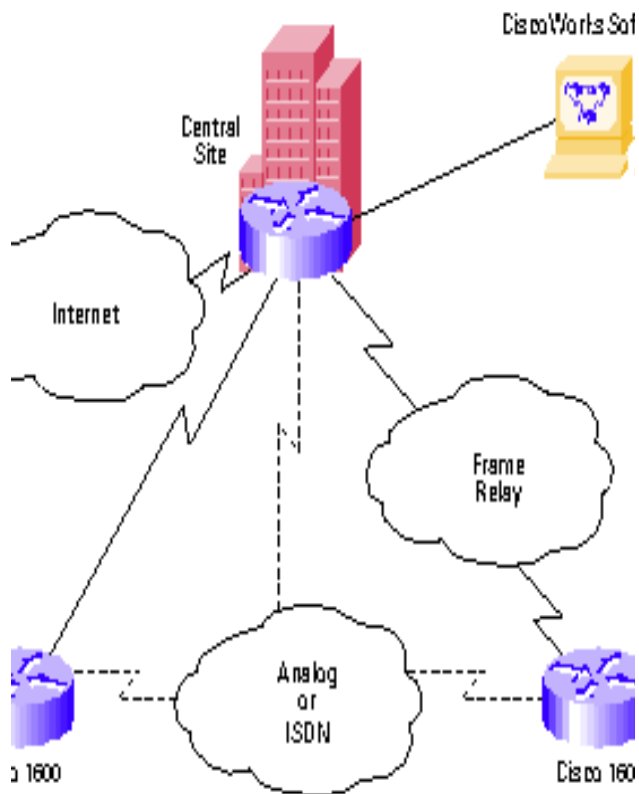
Intranet Access for Small Offices

The Cisco 1600 series is ideal for providing small, remote offices with access to corporate intranets. Deployment of emerging multimedia applications, such as distance learning and desktop videoconferencing, is greatly enhanced by Cisco's industry-leading, end-to-end, quality-of-service features such as RSVP, IP multicast, and AppleTalk SMRP multicast.

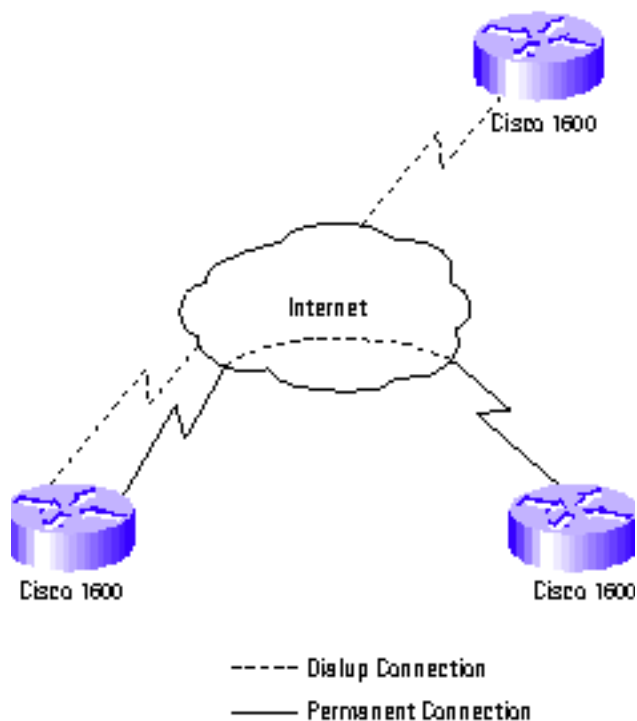
The figure shows multiple Cisco 1600 series routers at remote sites route IP, IPX, and AppleTalk protocols, and bridge other protocols, to a Cisco 4000 or Cisco 7000 series router at a central site. Sites that have little traffic or that require infrequent access are connected via a dialup WAN link such as ISDN, analog phone lines, or Switched 56. A WAN interface card can be installed when connectivity needs increase. Sites with more traffic or more frequent connectivity requirements are connected with permanent WAN links such as leased lines, Frame Relay, X.25, or SMDS. These sites might also have ISDN or dialup connection as backup.

Using CiscoWorks management applications, administrators at central sites can locally manage both the Cisco central site routers and the remote site Cisco 1600 routers, thereby reducing administrative, deployment, and installation time and costs.

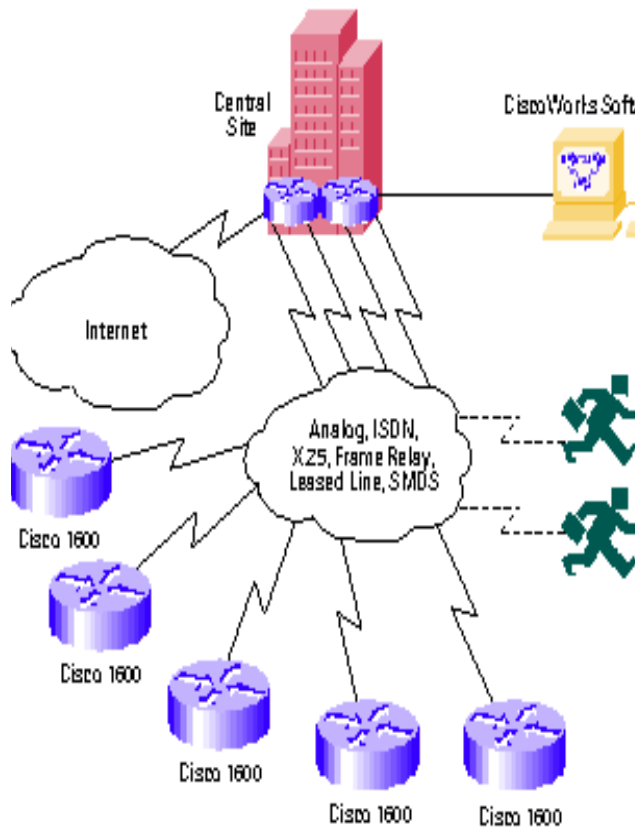
Intranet Access for Small Offices Remote sites with a Cisco 1600 router connect to the corporate intranet. Cisco's end-to-end quality-of-service features enhance the use of multimedia applications. CiscoWorks software simplifies network management of routers at central and remote sites.



A Virtual Private Network over the Internet Small offices with a Cisco 1600 router can form a VPN over the Internet, resulting in low WAN costs with highest levels of security. Cisco IOS software provides leadership firewall security from one end of the network to the other.



Deployment Benefits for Service Providers Cisco 1600 series routers provide deployment flexibility, investment protection, and end-to-end security for service providers and their customers.



Creating Internet Virtual Private Networks

With the help of advanced capabilities in the Cisco IOS software, Cisco 1600 routers can be used to create low-cost VPNs over the Internet. GRE tunneling, data encryption, firewall, and lock-and-key features allow customers to build secure end-to-end networks over the public Internet infrastructure. They get the benefits of a private network for the low cost of the Internet. The figure shows a VPN formed by Cisco 1600 routers at each small office communicating with one another and the outside world through the Internet using IP, IPX, or AppleTalk. Privacy is ensured by Cisco IOS end-to-end security.

The Cisco 1600 series simplifies the Internet and intranet access process for small offices, saving time and money. Network address translation allows privately addressed networks at each of these sites to access the Internet—a public registered network—without requiring a registered subnet address. There is no need to readdress end stations and network devices when small offices initially connect to the Internet or to new service providers. In addition, network address translation uses port-level IP address multiplexing so that only one IP address is required for the entire subnet. This setup significantly conserves address space for both service providers and private businesses.

Competitive Advantage For Service Providers

The figure shows a service provider deploying Cisco 1600 routers to connect remote small offices to the Internet and corporate intranet. The unique features of the Cisco 1600 series can give service providers a competitive advantage when they provision managed access router services or resell routers. By supporting all popular WAN services and offering both a fixed WAN port and a modular WAN expansion slot, the Cisco 1600 router maximizes deployment flexibility.

while protecting investments. Competitive products typically support only one WAN service, such as Frame Relay or ISDN.

Exploiting such Cisco IOS features as firewalls, data encryption, and encrypted GRE tunneling, service providers can build very secure networks for clients. Network address translation greatly simplifies provisioning by eliminating the need to change existing end-station addresses. This feature uses only a single IP address for the entire LAN, significantly conserving address space for service providers.

Features that make the Cisco 1600 series easy to install and upgrade result in low cost-per-unit deployment. The ClickStart Web browser interface lets nontechnical users quickly enter a few critical configuration parameters that will get the Cisco 1600 router connected to a central site; a detailed configuration can then be downloaded over the WAN. Alternatively, the service provider can deploy the Cisco 1600 series as “plug-and-play” devices: preconfigured software can be loaded into a Flash memory PC card at a central site and sent to remote sites where users simply insert the card and plug in WAN, LAN, and power cables.

Broad support of WAN options, upgradability, security, address-space conservation, and simplified and reduced deployment time and cost give service providers a big advantage in a very competitive market.

Cisco 1600 Series Features and Benefits Summary

Feature	Function	Benefit
Slot for Modular WAN Interface Cards	- Allows addition or substitution of WAN cards to support additional WAN functionality - Allows last-minute product configuration	- Protects investment - Provides flexibility/freedom of WAN choice
Ethernet AUI and 10BaseT Ports	- AUI allows support of any Ethernet cable type (using external transceiver) - Uses low-cost, industry-standard 10BaseT wiring - Connects 10BaseT port to hub or directly to PC's Ethernet port (with crossover cable)	- Provides flexibility - Reduces costs
Flash Memory PC Card	- Supports remote download of new software - Software can be preconfigured before being sent to remote site, allowing plug and play installation	- Reduces administrative costs - Reduces deployment costs and time
Multiprotocol Routing (IP,IPX,AppleTalk) and Bridging	Routes most common protocols used in small offices and bridges other protocols	Ensures high applications availability
End-to-End Security and Data Privacy (Extended Access Lists, Lock and Key, PAP/CHAP, Data Encryption, Encrypted VPN Tunnels)	- Prevents unauthorized access to network - Ensures privacy of data - Promotes electronic commerce	Protects valuable information
End-to-End Quality of Service (RSVP, WFQ, IP Multicast [PIM], AppleTalk SMRP)	Enables Internet/intranet multimedia applications such as Web surfing, voice/data integration, and desktop videoconferencing to efficiently utilize LAN/WAN bandwidth and ensure quality of service.	- Improves organizational productivity - Reduces WAN costs

Feature	Function	Benefit
Enhanced Internet/Intranet Access Features (Network Address Translation, IPX-to-IP Gateway, GRE Tunneling)	• Allows privately addressed network to access Internet without requiring a registered subnet address • Allows same IP address range to be used in multiple intranets • Allows users on a NetWare LAN to access Internet without installing IP • Allows all users on one LAN to share the same IP address • Enhances creation of VPNs over public Internet	• Reduces configuration, management, and deployment cost and time • Reduces WAN costs
Easy, User-Friendly Installation Feature (ClickStart, Software AutoInstall)	• Allows easy point-and-click initial configuration of router • Allows software upgrades and configuration modifications to be downloaded over the WAN from a central site	• Reduces administrative costs • Reduces deployment costs and time
WAN Bandwidth Optimization Features (DDR, BOD, OSPF On Demand, Snapshot, Compression)	• Reduces WAN traffic, connection time, and frequency	• Reduces WAN costs
Manageable via SNMP (Using CiscoWorks Software or other SNMP Management Stations), Telnet, and through Console Port	• Allows centralized administration	• Reduces administrative costs
Front and Rear Panel LEDs	• Allows quick diagnostics and troubleshooting • Activity and status lights on front; connectivity lights on rear	• Reduces administrative costs • Provides ease of use
Compact Design	• Requires minimal horizontal surface area or mounts on wall	• Reduces space requirement

Cisco Access for Success

For more information, contact your local Cisco sales office, listed on the back of this brochure. You can also visit Cisco's site on the World Wide Web at <http://www.cisco.com>. Or call Cisco today at (800) 553-NETS (6387) or (408) 526-4000.

Also, the Access Product Selection Tool is available on the World Wide Web. This is an interactive tool that users can access to obtain product recommendations based on their specific needs.

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