

Cisco 1760 Modular Access Router

Introduction

The Cisco 1760 Modular Access Router offers small and medium-sized businesses and enterprise small branch offices a 19-inch rack-mount access solution designed to enable them to grow their e-business capabilities. The two different versions of the Cisco 1760 Modular Access Router, the base version Cisco 1760 router and the preconfigured multiservice-ready Cisco 1760-V router, address the needs of customers who want to deploy e-business applications—now or in the future.

The Cisco 1760 router, as a modular platform in a 19-inch rack-mount form factor, offers customers secure Internet and intranet access, as well as the capability to implement a variety of e-business and

voice applications. This includes voice over IP (VoIP), virtual private network (VPN) access, and business-class digital subscriber line (DSL) as required (refer to Figure 1).

The Cisco 1760 router is part of a broad portfolio of access routers optimized to deliver intelligent services such as quality of service (QoS), manageability, availability, and security.

The two different versions of the Cisco 1760 Modular Access Router, the base version Cisco 1760 router and the Cisco 1760-V router, address the needs of customers who want to deploy transformation technologies such as converged voice and data, IP telephony, or videoconferencing.

Figure 1
Cisco 1760 Modular
Access Router





Key Benefits and Features

The key benefits and features of the Cisco 1760 Modular Access Router are listed in Table 1.

Table 1 Key Benefits and Features of Cisco 1760 Modular Access Router

Key Benefits	Key Features
Investment protection	<ul style="list-style-type: none"> • Offers field-upgradable WICs and VICs¹ • Provides Cisco IOS[®] Software upgradable feature sets
Flexibility	<ul style="list-style-type: none"> • Provides full Cisco IOS Software support, including multiprotocol routing (IP, IPX², Apple Talk, IBM/SNA³) and bridging • Provides customization through wide range of WICs and VICs • Offers modular data and voice slots
Lower cost of ownership	<ul style="list-style-type: none"> • Combines optional functions, including a voice gateway, dynamic firewall, VPN tunnel server, DSU/CSU⁴ (56 or 64 kbps or T1/FT1) and ISDN NT1⁵ device • Supports remote management applications such as CiscoView (part of CiscoWorks2000)
Security	<ul style="list-style-type: none"> • Offers Cisco IOS Firewall • Provides VPN IPSec (DES⁶ and 3DES⁷) • Enables wire-speed (T1/E1) encryption using optional VPN module
Voice traffic migration to data networks	<ul style="list-style-type: none"> • Supports IP telephony • Interoperates with next-generation voice-enabled applications such as integrated messaging and Web-based call centers • Works with the existing telephone infrastructure: phones, fax machines, KTS⁸ units, and PBX⁹ (including digital PBXs)
Business-class broadband access for value-added services such as voice over broadband	<ul style="list-style-type: none"> • Supports ADSL¹⁰ and symmetric single pair high bit rate digital subscriber line (G.shdsl) support • Provides efficient utilization of bandwidth • Offers prioritization of voice traffic
Ideal for small/medium-sized businesses and small enterprise branch offices to deploy transformational technologies such as converged data and voice applications	<ul style="list-style-type: none"> • Provides greater analog voice port density (four slots) than Cisco 1751 (three slots), enabling more connections to analog end stations, PBXs, key switches, and basic telephone service (POTs) lines • Supports maximum 30 digital DSD channels through T1/E1 VWICs • 19-inch rack-mount form factor

1. WAN interface cards and voice interface cards

2. Internetwork Packet Exchange

3. Systems Network Architecture

4. Data/channel service unit

5. Network Termination 1

6. Digital Encryption Standard

7. Triple DES

8. Key telephone system

9. Private branch exchange

10. Asymmetric DSL



Cisco 1700 Series Routers

The Cisco 1700 Series routers enables a cost-effective, seamless network infrastructure for the small and medium-sized business and small enterprise branch office.

The Cisco 1700 Series of access routers includes the Cisco 1710, 1721, 1751 (includes a base model, the Cisco 1751, and a multiservice-ready model, the Cisco 1751-V), and Cisco 1760 (includes the base version, Cisco 1760, and the multiservice-ready version, Cisco 1760-V). Table 2 compares the Cisco 1760 and Cisco 1760-V routers.

The Cisco 1710 Security Access Router features comprehensive security with VPNs, a Cisco IOS Firewall, and advanced routing functionality in an all-in-one device.

The Cisco 1721 router is a modular device optimized for data-only connections. The Cisco 1751 and Cisco 1760 modular access routers are optimized for multiservice data and voice solutions.

The Cisco 1760 router is the preferred multiservice data and voice solution when a 19-inch rack-mount form factor is required. Compared to the Cisco 1751 router, it offers an additional VIC slot.

Table 2 Cisco 1760 Modular Access Router—Two Versions

Cisco 1760	Cisco 1760-V
Base version	Multiservice-ready version
Includes everything for data networking	Includes all the features needed for <i>immediate</i> integration of voice and data
32-MB Flash memory (on board)	32-MB Flash memory (16 MB on board, 16 MB in Flash SIMM ¹ socket)
64-MB DRAM (on board)	96-MB DRAM (64 MB on board, 32 MB in DRAM DIMM ² socket)
Cisco IOS IP Software Feature Set	Cisco IOS IP/Voice Plus feature set
Two DSP ³ module slots available DSPs available separately	Two DSP module slots available Comes with one DSP (PVDM-256K-4) inserted in one DSP module slot DSPs available separately for further upgrades
VICs available separately	VICs available separately
Flash memory and DRAM upgrades available separately	Flash memory and DRAM upgrades available separately
WICs available separately	WICs available separately

1. Single in-line memory module

2. Double in-line memory module

3. Digital signal processor



High-Performance Architecture

Cisco IOS Software features and a robust RISC architecture enables the Cisco 1760 router to support applications as shown in Figures 2 and 3.

Figure 2
The Cisco 1760 router enables a multiservice solution

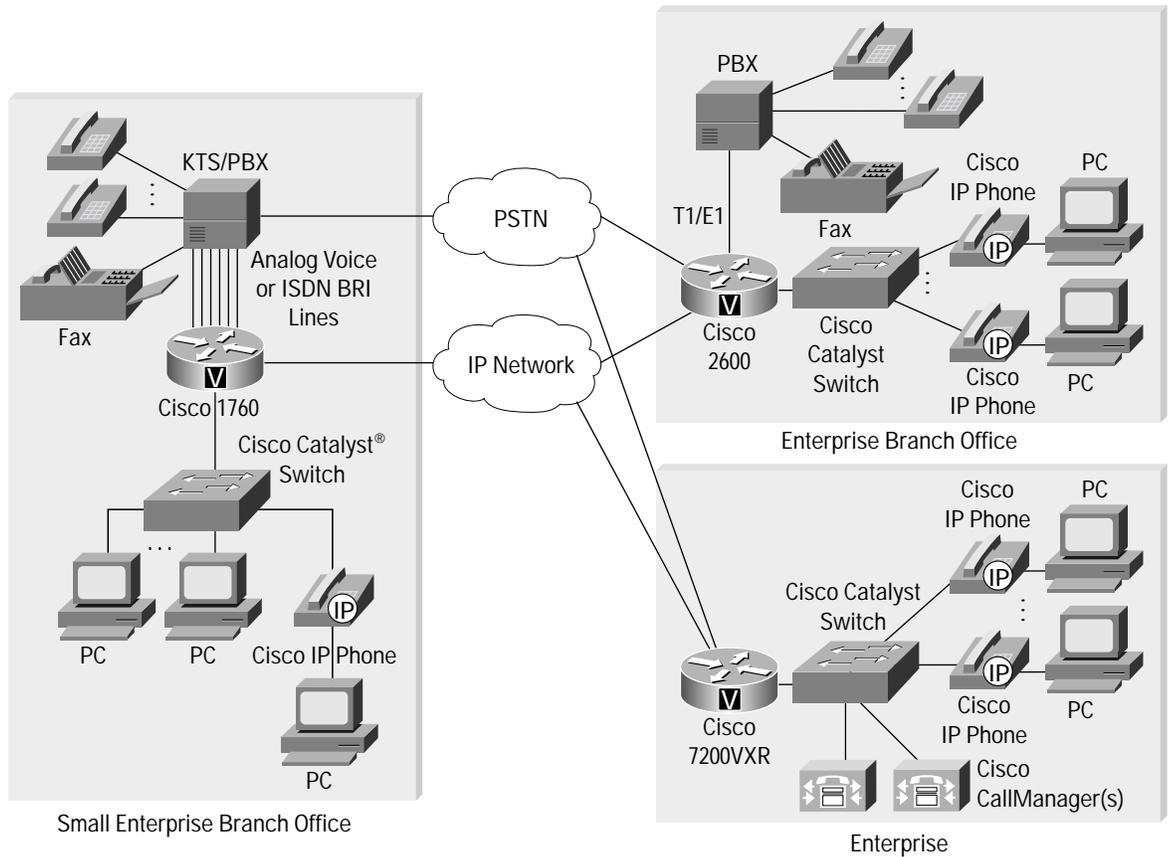
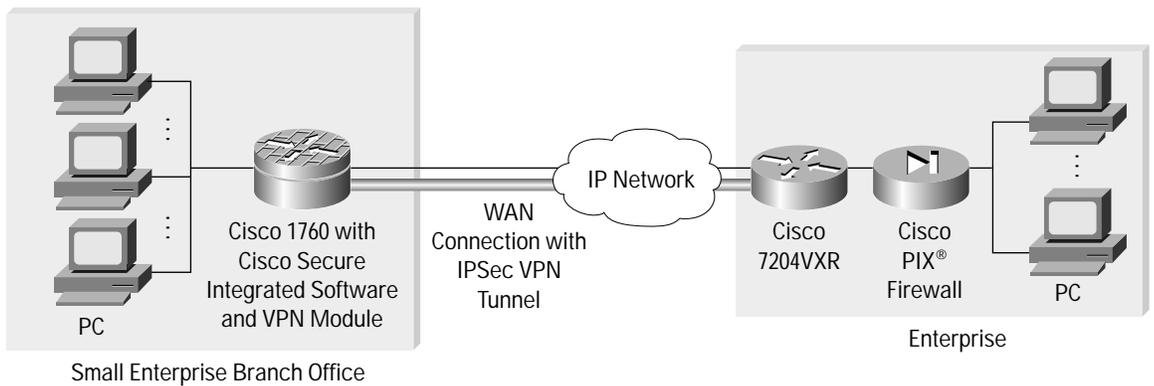


Figure 3
The Cisco 1760 router provides secure connectivity





Comprehensive Feature Set and Benefits

The Cisco 1760 router offers a broad feature set designed to allow businesses not only to attain maximum benefit on their investment but also to easily deploy e-business and voice solutions.

The following tables and figures provide details on the Cisco 1760 router features. Table 3 gives a comprehensive list of features and benefits, and Table 4 gives information on the physical architecture of the Cisco 1760 router. Physical interfaces, including WAN support, voice interface cards, and memory are delineated in Tables 5 through 7. The modular slots and router appearance are detailed in Figure 4.

Table 3 Benefits and Features of Cisco 1760 Modular Access Router

Benefits	Features
Cisco IOS Software support	
<ul style="list-style-type: none"> • Provides the industry's most robust, scalable, and feature-rich internetworking software support • Uses the industry-accepted standard networking software for the Internet and private WANs • Improves network reliability and enables scalability to large networks • Offers part of the Cisco end-to-end network solution 	<ul style="list-style-type: none"> • Offers multiprotocol routing (IP, IPX, AppleTalk, IBM/SNA) and bridging • Dial-on-demand routing • Dual-bank Flash memory • Scalable routing protocols such as OSPF¹, EIGRP², and HSRP³
Voice	
Integrated voice and data networking	
<ul style="list-style-type: none"> • Reduces long-distance toll charges because data network carries interoffice voice and fax traffic • Provides easy deployment of IP telephony solutions • Eliminates the need for costly phone-equipment upgrade • Allows expandability to support additional voice channels • Enables unified messaging 	<ul style="list-style-type: none"> • Offers integrated voice and data networking • Cisco 1760 Router chassis accepts both WICs and VICs • Supports IP telephony • Works with existing handsets, key units, and PBXs • Provides dual DSP slots
Voice support	
<ul style="list-style-type: none"> • Transmits data, voice, and video across a single IP network 	<ul style="list-style-type: none"> • Supports VoIP and VoFR⁴ (FRF.11) • Supports SRST⁵
Gateway signaling	
<ul style="list-style-type: none"> • Connects to H.323 networks and devices • Provides open standards-based voice signaling 	<ul style="list-style-type: none"> • Supports H.323 Versions 1 and 2 • Supports SIP⁶ version 2.0 and MGCP⁷ Version 1.0
Codec⁸ support	
<ul style="list-style-type: none"> • Interoperates with a range of CPE⁹ • Supports various compression algorithms 	<ul style="list-style-type: none"> • Supports G.711 • Supports G.723 • Supports G.726 • Supports G.728 • Supports G.729 (interoperates with G.729a) • Supports G.729.b (interoperates with G.729ab)



Table 3 Benefits and Features of Cisco 1760 Modular Access Router

Benefits	Features
Security	
<p>Cisco IOS Software security</p> <ul style="list-style-type: none"> • Enables secure access to the Internet with per-application-based, dynamic access control • Prevents unauthorized access to the internal LAN • Enables creation of VPNs by providing industry-standard data privacy, integrity, and authenticity as data traverses the Internet or a shared public network • Supports up to 168-bit encryption • Simplifies router and security configuration through smart wizards, enabling customers to quickly and easily deploy, configure, and monitor a Cisco access router without requiring knowledge of IOS Command Line Interface (CLI). 	<ul style="list-style-type: none"> • Simplifies VPN deployment through elimination of complex remote-side configurations • Accepts VPN connections from Cisco VPN Software clients and Cisco Easy VPN Remote devices • Provides Cisco IOS Firewall feature set context-based access control for dynamic firewall filtering, denial-of-service detection and prevention, Java blocking, real-time alerts, IDS¹⁰, and encryption • Offers IPSec¹¹ DES, and 3DES support • Offers Cisco Easy VPN Remote support • Offers Cisco Easy VPN Server support as of Q2 CY '02 • Offers Cisco Security Device Manager (SDM) support
<p>Hardware-accelerated VPN encryption</p> <ul style="list-style-type: none"> • Supports wire-speed encryption up to T1/E1 speeds 	<ul style="list-style-type: none"> • Offers hardware-based encryption using optional VPN module
<p>Device authentication and key management</p> <ul style="list-style-type: none"> • Ensures proper identity and authenticity of devices and data • Enables scalability to very large IPSec networks through automated key management 	<ul style="list-style-type: none"> • Supports IKE¹², X.509v3 digital certification, and CEP¹³ with certification authorities such as Verisign and Entrust
<p>User authentication</p> <ul style="list-style-type: none"> • Supports all leading user-identity verification schemes 	<ul style="list-style-type: none"> • Supports PAP/CHAP¹⁴, RADIUS¹⁵, and TACACS+
<p>VPN tunneling</p> <ul style="list-style-type: none"> • Offers choice of standards-based tunneling methods to create VPNs for IP and non-IP traffic • Allows standards-based IPSec or L2TP¹⁶ client to interoperate with Cisco IOS tunneling technologies • Interoperates with public certification authorities and IPSec standards-based products • Fits as part of the scalable Cisco end-to-end VPN solution portfolio 	<ul style="list-style-type: none"> • Supports IPSec, GRE¹⁷, L2TP, and L2F¹⁸
Business-class DSL	
<ul style="list-style-type: none"> • Delivers business-class broadband access • Enables voice and video over DSL 	<ul style="list-style-type: none"> • Supports ADSL WAN and G.shdsl interface card with following QoS features: <ul style="list-style-type: none"> – LFI¹⁹ using MLP²⁰ over ATM – LLQ²¹ (also called PQ/CBWFQ) – WRED²² – CAR²³ – Differentiated services (class-based marking)



Table 3 Benefits and Features of Cisco 1760 Modular Access Router

Benefits	Features
QoS	
<ul style="list-style-type: none"> Allocates WAN bandwidth to priority applications for improved performance 	<ul style="list-style-type: none"> CAR Policy routing WFQ²⁴ LLQ (also called PQ/CBWFQ) WRED GTS²⁵ RSVP²⁶ DSCP²⁷ FRF.12²⁸ FRTS²⁹ cRTP³⁰ RSVP + H.323v2 (with fast connect)
Modular architecture	
<ul style="list-style-type: none"> Provides flexibility and investment protection Reduces cost of maintaining inventory Lowers training costs for support personnel Protects investments through reuse on various platforms Simplifies migration to Fast Ethernet performance in the office Enables expansion of hardware-assisted encryption support at T1/E1 speeds 	<ul style="list-style-type: none"> Accepts an array of WICs and VICs Shares WICs with Cisco 1700, 2600, and 3600 routers Offers autosensing 10/100 Fast Ethernet Provides three Ethernet connections (one 10/100 on board and support for two Ethernet WICs 10BASE-T) Provides expansion slot on motherboard
WAN support	
<ul style="list-style-type: none"> Simplifies deployment and reduces Internet access costs Provides easy migration between WAN technologies 	<ul style="list-style-type: none"> Supports Cisco IOS Easy IP Supports asynchronous serial interfaces on serial WICs Supports interface speed up to 115.2 kbps Supports asynchronous serial protocols: PPP³¹ and SLIP³² Supports PPPoE³³ Supports asynchronous/synchronous interfaces Supports ISDN WICs Supports ADSL and G.shdsl WICs Supports ISDN dialup and IDSL³⁴ at 64 and 128 kbps Supports Frame Relay and PPP
LAN support	
<ul style="list-style-type: none"> Enables traffic separation Provides better bandwidth utilization Alleviates scaling issues by logically segmenting the physical LAN infrastructure into different subnets Simplifies deployment 	<ul style="list-style-type: none"> Supports IEEE 802.1Q VLAN Provides DHCP³⁵ server Supports NAT/PAT³⁶



Table 3 Benefits and Features of Cisco 1760 Modular Access Router

Benefits	Features
Traffic management	
<ul style="list-style-type: none"> • Application of QoS features through traffic classification 	<ul style="list-style-type: none"> • Supports NBAR³⁷
Network management	
<ul style="list-style-type: none"> • Simplifies deployment • Reduces deployment time and costs • Allows quick diagnostics and troubleshooting • Allows central monitoring, configuration, and diagnostics for all functions integrated in the Cisco 1760 Router • Reduces management time and costs 	<ul style="list-style-type: none"> • Supports Cisco Configmaker v.2.6 • Provides SETUP configuration utility, AutoInstall, color-coded ports/cables, LED status indicators, graphical LAN/VPN policy configurator, command-line interface, context-sensitive configuration questions, and straightforward cabling • Manageable via SNMP³⁸ • Supports CiscoView and Telnet, and provides console port
Device integration	
<ul style="list-style-type: none"> • Reduces costs and simplifies management 	<ul style="list-style-type: none"> • Offers integrated router, voice gateway, firewall, encryption, VPN tunnel server, DSU/CSU, and NT1 in a single device

1. Open Shortest Path First
2. Enhanced Interior Gateway Routing Protocol
3. Hot Standby Router Protocol
4. Voice over Frame Relay
5. Survivable Remote Site Telephony
6. Session Initiation Protocol
7. Media Gateway Control Protocol
8. Coder/decoder
9. Customer premises equipment
10. Intrusion detection system
11. IP Security
12. Internet Key Exchange
13. Certificate Enrollment Protocol
14. Password Authentication Protocol/Challenge Handshake Authentication Protocol
15. Remote Access Dial-In User Service
16. Layer 2 Tunneling Protocol
17. Generic routing encapsulation
18. Layer 2 Forwarding
19. Link fragmentation and interleaving
20. Multilink PPP
21. Low-latency queuing
22. Weighted Random Early Detection
23. Committed Access Rate
24. Weighted Fair Queuing
25. Generic traffic shaping
26. Resource Reservation Protocol
27. Differentiated services code point
28. Frame Relay Fragmentation
29. Frame Relay traffic shaping
30. Compressed Real-Time Transport Protocol
31. Point-to-Point Protocol
32. Serial Line Internet Protocol
33. PPP over Ethernet
34. ISDN leased line
35. Dynamic Host Configuration Protocol
36. Network Address Translation/Port Address Translation
37. Network-based application recognition
38. Simple Network Management Protocol



Figure 4 shows the four modular slots on the front panel view of the Cisco 1760 Modular Access Router. Two slots are for VICs and two slots are either for VICs or for WICs.

Figure 4
Cisco 1760 Modular Access Router Front Panel View

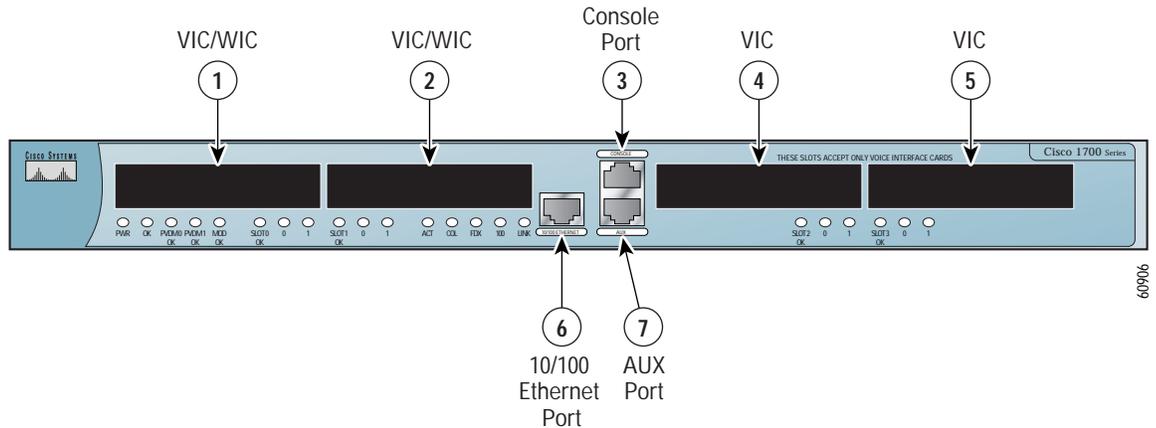


Table 4 Architecture and Physical Interfaces Support

Item	Description
Physical interfaces	
One 10/100BASE-T Fast Ethernet port (RJ-45)	Automatic speed detection; automatic duplex negotiation; VLAN ¹ support
Four slots: • Two slots can be used for either WICs or VICs or a combination of both • Two slots can be used for VICs	Supports VICs with two ports per card; supports any combination of up to two WICs or VICs
Supports Ethernet WICs	Supports PPPoE; operates in full- and half-duplex modes
One auxiliary (AUX) port	RJ-45 jack with EIA/TIA-232 interface (plug compatible with Cisco 2500 Series AUX port); asynchronous serial DTE ² with full modem controls (CD ³ , DSR ⁴ , RTS ⁵ , CTS ⁶); asynchronous serial data rates up to 115.2 kbps
One console port	RJ-45 jack with EIA/TIA-232 interface (plug compatible with Cisco 1600 and 2500 Series console ports); asynchronous serial DTE; transmit/receive rates up to 115.2 kbps (default 9600 bps, not a network data port); note: no hardware handshaking such as RTS/CTS
One internal expansion slot	Supports hardware-assisted services such as encryption (up to T1/E1)

1. Virtual LAN
2. Data terminal equipment
3. Carrier Detect
4. Data set ready
5. Request to Send
6. Clear to Send



Table 5 WAN Support for the Cisco 1760 Router

Module	Description
WIC-1T	One-port serial, async and sync (T1/E1)
WIC-2T	Two-port serial, async and sync (T1/E1)
WIC-2A/S	Two-port low-speed serial (up to 128 kbps), async and sync
WIC-1B-S/T	One-port ISDN BRI ¹ S/T
WIC-1B-U	One-port ISDN BRI U interface with integrated NT1
WIC-1DSU-56K4	One-port integrated 56/64-kbps, four-wire DSU/CSU
WIC-1DSU-T1	One-port integrated T1/fractional T1 DSU/CSU
WIC-1ADSL	One-port ADSL interface
WIC-1ENET	One-port 10BASE-T Ethernet interface
WIC-1SHDSL	One-port G.shdsl interface
WIC-1AM	One-port V.90 analog modem WIC
WIC-2AM	Two-port V.90 analog modem WIC
WIC-1ADSL-I-DG	1-port ADSLoISDN Wan Interface Card
WIC-1ADSL-DG	1-port ADSLoPOTS WIC with Dying Gasp
WIC-1B-U-V2	1-Port ISDN BRI NT-1 WIC for 1700, 2600, 3600 and 3700 series

1. Basic Rate Interface

Table 6 Voice Support for the Cisco 1760 Router

Module	Description
VIC-2E/M	Two-port E&M ¹ voice/fax interface card for voice/fax network module
VIC-2FXO	Two-port FXO ² voice/fax interface card for voice/fax network module
VIC-2FXS	Two-port FXS ³ voice/fax interface card for voice/fax network module
VIC-2FXO-M1	Two-port FXO voice/fax interface card for North America
VIC-2FXO-M2	Two-port FXO voice/fax interface card for Europe
VIC-2FXO-M3	Two-port FXO voice/fax interface card for Australia
VIC-2DID	Two-port analog DID ⁴ voice interface card
VIC-2FXO-EU	Two-port FXO voice/fax interface card for Europe
VIC-2BRI-NT/TE	Two-port network-side ISDN BRI VIC
VIC-4FXS/DID ⁵	Four-port FXS and DID voice/fax interface card
VWIC-1MFT-T1	One-port FJ-48 multiflex trunk - T1



Table 6 Voice Support for the Cisco 1760 Router

Module	Description
VVIC-2MFT-T1	Two-port RJ-48 multiflex trunk - T1
VVIC-2MFT-T1-DI	Two-port RJ-48 multiflex trunk - T1 with drop and insert
VVIC-1MFT-E1	One-port RJ-48 multiflex trunk - E1
VVIC-2MFT-E1	Two-port RJ-48 multiflex trunk - E1
VVIC_2MFT-E1-DI	Two-port RJ-48 multiflex trunk - E1 with drop and insert
VVIC-1MFT-G.703	One-port RJ-48 multiflex trunk - E1 G.703
VVIC-2MFT-G.703	Two-port RJ-48 multiflex trunk - E1 G.703
VIC2-2FXS	Two-port Voice Interface Card - FXS
VIC2-2FXO	Two-port Voice Interface Card - FXO (Universal)
VIC2-4FXO	Four-port Voice Interface Card - FXO (Universal)
VIC2-2E/M	Two-port Voice Interface Card - E and M
VIC2-2BRI-NT/TE	Two-port Voice Interface Card - BRI (NT and TE)

1. Ear and mouth
2. Foreign exchange office
3. Foreign exchange station
4. Direct-inward-dial
5. The Cisco 1760 can support four VIC-4FXS/DID cards with a maximum of eight port in DID mode

Table 7 Cisco 1760 Router Memory—Defaults and Maximum

Model Number	Flash Memory (in megabytes)		DRAM (in megabytes)	
	Default	Maximum	Default	Maximum
Cisco 1760	32	64	64	128
Cisco 1760-V	32	64	96	128

VPN and Security

The Cisco 1760 router is part of the end-to-end Cisco VPN solution. VPNs create secure connections via the Internet to connect geographically dispersed offices, business partners, and remote users while providing security, traffic prioritization, management, and reliability equal to that of private networks.

By supporting industry standards IPSec, L2TP, and DES and 3DES, the Cisco 1760 router delivers robust VPN solutions to ensure data privacy, integrity, and authenticity.

The optional Cisco VPN Hardware Encryption Module for the Cisco 1760 router further optimizes VPN encryption performance. By offloading encryption tasks to the VPN module, the router processor is freed up to handle other operations. The VPN module accelerates the rate at which encryption occurs, speeding the process of transmitting secure data—a critical factor when using 3DES encryption.



The Cisco 1760 router offers integrated security features, including stateful inspection firewall functionality and IDS as an optional Cisco IOS Software feature. By deploying Cisco IOS Software firewall functionality, customers do not need to purchase or manage multiple devices, thus simplifying network management and reducing capital costs. Additionally, remote management applications, such as Cisco Security Device Manager (SDM), make it easier than ever to deploy and monitor VPN and Cisco IOS Firewall on your Cisco 1760 router.

Cisco IOS Software firewall security features include access control lists (ACLs) and user authentication, authorization, and accounting (such as PAP/CHAP, TACACS+, and RADIUS). These security features provide the optimal level of firewall protection to customers.

Voice Implementation

The Cisco 1760 Modular Access Router supports FXO, FXS, E&M, ISDN BRI VICs, and T1/E1 multiflex V/WICs.

The FXO interface allows an analog connection to the central office of the Public Switched Telephone Network (PSTN). The FXS interface connects basic telephone service phones (home phones), fax machines, key sets, and PBXs through ring voltage and dial tone. The E&M interface allows connection for PBX trunk lines (tie lines). The ISDN-BRI NT/TE VIC is used to connect to the PSTN or a PBX/KTS, whereas the T1/E1 multiflex V/WIC (multiflex V/WIC) supports both data and voice services.

The multiservice-ready Cisco 1760-V router version includes all the features needed for immediate integration of data and voice services:

- One DSP—support for up to two voice channels
- 32-MB Flash memory
- 96-MB DRAM
- Cisco IOS IP/Voice Plus feature set

VICs and WICs are available separately.

The Cisco 1760 and Cisco 1760-V routers have two DSP module slots on the motherboard, each of which supports a DSP module with up to five DSPs to allow additional voice-channel support. A maximum of ten DSPs are supported.

DSP Requirements

Cisco 1760 series routers support 3 types of DSP images: high complexity (HC), medium complexity (MC) and Flexi-6. HC and MC are used for analog¹ VICs; Flexi-6 is used for T1/E1 VWICs² and BRI VIC. MC is introduced in Cisco 1760 series starting from Cisco IOS 12.2(8)YN release, which will merge into 12.3(2)T. Therefore, please make sure to use Cisco 12.2(8) YN or later releases when using MC. In addition, starting from 12.2(8)YN release, the default DSP image for BRI VIC is changed from HC to Flexi-6. BRI VIC cannot be configured to HC or MC through CLI, however. If any DSP resources used for analog are left, BRI VIC can automatically take use of those resources by using HC or MC. Table 8 lists the default images for each type of VICs; Table 9 lists IOS support for each DSP image. Table 10 lists the number of channels supported by one DSP (PVDM-256K-4) for each codec type.

Please use the following rules for calculating DSP requirements on the Cisco 1760 series routers:

1. Analog VICs include VIC-2FXS, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-2FXO-EU, VIC-2E/M, VIC-2DID, VIC-4FXS/DID

2. T1/E1 VWICs include VWIC-1MFT-T1, VWIC-2MFT-T1, VWIC-2MFT-T1-DI, VWIC-1MFT-E1, VWIC-2MFT-E1, VWIC-2MFT-E1-DI, VWIC-1MFT-G703, VWIC-2MFT-G703



1. For 12.2T releases:
 - a. Each 2-port analog VIC requires 1 DSP (PVDM-256K-4)
 - b. Each VIC-2BRI-NT/TE requires 2 DSPs (PVDM-256K-8)
 - c. For VWICs, refer to Table 10. For example, 12 G.711 digital T1/E1 voice calls require two DSPs; 12 G.729 calls require four DSPs
 - d. Total DSP requirement is the sum of a, b and c. The DSP resources can not be shared between analog VICs and VWICs
2. For the Early Deployment (ED) releases: Cisco IOS 12.2(8)YN or later (Note: not include 12.2(11)YT) or 12.3T train releases or later, please always refer to the DSP Calculator in the following link:

http://www.cisco.com/cgi-bin/Support/DSP/cisco_prodsel.pl

The DSP calculator optimizes the DSP resources for your configuration and suggests CLI configurations.

Table 8 DSP Firmware for each type of VICs

VIC Type	Firmware Support
2-port Analog VICs	HC (default), MC (starting from 12.2(8)YN)
4-port Analog VIC	HC, MC (default, starting from 12.2(8)YN)
VIC-2BRI-NT/TE	HC (default for ED releases prior to 12.2(8)YN or T train releases prior to 12.3(2)T); Flexi-6 (default for ED releases 12.2(8)YN or later or T train releases 12.3(2)T or later)
T1/E1 VWICs	Flexi-6 (default)

Table 9 Cisco IOS Support for DSP firmware

Firmware Support	IOS Release Support
HC	In all orderable IOS Releases
MC	ED Releases: Cisco IOS 12.2(8)YN or later ¹ T Train Releases: Cisco IOS 12.3(2)T or later
Flexi-6	For T1/E1 VWICs: <ul style="list-style-type: none"> • ED Releases: Cisco IOS 12.2(4)YB or later² • T Train Releases: 6th releases of 12.2(15)T or later For VIC-2BRI-NT/TE: <ul style="list-style-type: none"> • ED Releases: Cisco IOS 12.2(8)YN or later³ • T Train Releases: Cisco IOS 12.3(2)T or later

1. It doesn't include Cisco 12.2(11)YT. 12.2(11)YT doesn't support MC.
 2. It doesn't include Cisco 12.2(11)YT. 12.2(11)YT doesn't support Flexi-6.
 3. It doesn't include Cisco 12.2(11)YT. 12.2(11)YT doesn't support Flexi-6.



Table 10 The number of channels supported by one DSP (PVDM-256K-4) per codec type

Firmware			
Codec	HC (for analog)	MC (for analog)	Flexi 6 (for VWICs & BRI VIC ¹)
G.711	2	4	6
G.729 ² /G.729a	2	4	3
G.726	2	4	3
G.723	2	-	2
G.728	2	-	2
Fax Relay	2	4	3

1. BRI VIC support in Flexi-6 starts from 12.2(8)YN or 12.3(2)T.
2. G.729 and G.729b is not supported in MC or Flexi-6 images

Table 11 DSP Modules Available on Cisco 1760

Modules	DSPs
PVDM-256K-4	1 DSP Module
PVDM-256K-8	2 DSP Modules
PVDM-256K-12	3 DSP Modules
PVDM-256K-16HD	4 DSP Modules
PVDM-256K-20HD	5 DSP Modules

Table 12 Cisco 1760 Router Voice Call Support

Maximum Number of Voice Calls Supported	
Analog Calls	Digital Calls
<ul style="list-style-type: none"> • 12 calls (with three 4-port FXS/DID Voice Interface Cards leaving one slot for WAN access) 	<ul style="list-style-type: none"> • 30 calls (for example with one VWIC-1MTF-E1)

Cisco IOS Technology

The Cisco 1760 Modular Access Router benefits from the power of Cisco IOS Software. For example, through Cisco IOS Software, the Cisco 1760 router delivers QoS capabilities, including RSVP, WFQ, CAR, and DSCP Precedence. These features enable businesses to prioritize traffic on their networks by user, application, traffic type, and other parameters to ensure that business-critical data and delay-sensitive voice are appropriately prioritized.

Further, for businesses that are increasingly accessing the Internet via DSL, QoS features are necessary to ensure highest voice quality. For DSL services with QoS features, the Cisco 1760 router can be deployed with the ADSL or the G.shdsl WAN Interface Card.

The advanced DSL QoS features include the following:

- LFI using MLP over ATM



- Low-latency queuing (also called PQ/CBWFQ)
- Weighted Random Early Detection (WRED)
- Committed Access Rate (CAR)
- Differentiated services (DiffServ) (class-based marking)

Cisco IOS Software Feature Sets

The Cisco 1760 router supports a choice of Cisco IOS Software feature sets with rich data features as well as a combined data and voice feature set. Tables 10 and 11 list these feature sets, including the memory requirements.

The Cisco 1760 router was first released on the Cisco IOS 12.2(2)XK release. The Cisco 1760 router will be supported on the 12.2T release in Q3 2002.

Table 13 Cisco 1760 Router Cisco IOS Data Software Feature Sets and Memory Requirements

Cisco 1760 Data Software Feature Sets for Cisco IOS Release 12.2(2)XK				
Software Product Description	Software Image	Recommended Flash Memory	Recommended DRAM Memory	Runs from
Cisco 1700 Cisco IOS IP/ADSL/IPX/AT/IBM/FW/IDS PLUS IPSEC 56	c1700-bk8no3r2sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL/IPX/AT/IBM/FW/IDS PLUS IPSEC 3DES	c1700-bk9no3r2sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL/IPX/AT/IBM PLUS	c1700-bnr2sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/IPX/AT/IBM	c1700-bnr2y-mz	8	32	RAM
Cisco 1700 Cisco IOS IP/ADSL/FW/IDS PLUS IPSEC 56	c1700-k8o3sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL PLUS IPSEC 56	c1700-k8sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL/FW/IDS PLUS IPSEC 3DES	c1700-k9o3sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL PLUS IPSEC 3DES	c1700-k9sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/ADSL/IPX/FW/IDS PLUS	c1700-no3sy7-mz	16	48	RAM
Cisco 1700 Cisco IOS IP/IPX	c1700-ny-mz	8	24	RAM
Cisco 1700 Cisco IOS IP/FW/IDS	c1700-o3y-mz	8	24	RAM
Cisco 1700 Cisco IOS IP/ADSL PLUS	c1700-sy7-mz	8	32	RAM
Cisco 1700 Cisco IOS IP/ADSL	c1700-y7-mz	8	24	RAM
Cisco 1700 Cisco IOS IP	c1700-y-mz	8	24	RAM



Table 14 Cisco 1760 Router Cisco IOS Data & Voice Software Feature Sets and Memory Requirements

Cisco 1760 Data and Voice Software Feature Sets for Cisco IOS Release 12.2(2)XK					
Cisco 1700 Cisco IOS IP/ADSL/IPX/AT/IBM/VOICE/FW/IDS PLUS IPSEC 56	c1700-bk8no3r2sv3y7-mz	32	64	RAM	
Cisco 1700 Cisco IOS IP/ADSL/IPX/AT/IBM/VOICE/FW/IDS PLUS IPSEC 3DES	c1700-bk9no3r2sv3y7-mz	32	64	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE/FW/IDS PLUS IPSEC 56	c1700-k8o3sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE PLUS IPSEC 56	c1700-k8sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE/FW/IDS PLUS IPSEC 3DES	c1700-k9o3sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE PLUS IPSEC 3DES	c1700-k9sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/IPX/VOICE/FW/IDS PLUS	c1700-no3sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE/FW/IDS PLUS	c1700-o3sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/ADSL/VOICE PLUS	c1700-sv3y7-mz	16	48	RAM	
Cisco 1700 Cisco IOS IP/VOICE PLUS	c1700-sv3y7-mz	16	48	RAM	

Cisco IOS IP base feature sets include NAT, OSPF, RADIUS, and Next Hop Resolution Protocol (NHRP).

Cisco IOS IP Plus feature sets contain L2TP, L2F, the Border Gateway Protocol (BGP), IP Multicast, Frame Relay switched virtual circuit (SVC), RSVP, the NetWare Link Services Protocol (NLSP), AppleTalk Simple Multicast Routing Protocol (SMRP), the Web Cache Control Protocol (WCCP), and the Network Timing Protocol (NTP).

Encryption is offered in special encryption feature sets (Plus IPsec 56, and Plus IPsec 3DES). The VPN encryption module requires a Cisco IOS IP Plus IPsec image.

DSL is supported in the base IP/DSL Cisco IOS image. In addition, the Cisco IOS IP Plus feature sets support DSL.

Network Management and Ease-of-Installation Tools

The Cisco 1760 router supports a range of network-management and ease-of-installation tools.

Cisco Security Device Manager (SDM) is an intuitive, web-based device management tool embedded within the Cisco IOS access routers. SDM simplifies router and security configuration through smart wizards to enable customers to quickly and easily deploy, configure and monitor a Cisco access router without requiring knowledge of Cisco IOS Command Line Interface (CLI). For more information visit <http://www.Cisco.com/go/sdm>.

Cisco ConfigMaker is a Microsoft Windows wizard-based tool designed to configure a small network of Cisco routers, switches, hubs, and other network devices from a single PC. This tool makes it easy to configure value-add security features such as the Cisco IOS Firewall feature set, IPsec encryption, Network Address Translation (NAT), the Dynamic-Host-Configuration-Protocol (DHCP) server, and to establish VPN policies (including QoS and security).

Cisco ConfigMaker 2.6 is supported on the Cisco 1760 Modular Access Router.



CiscoView, a member of the CiscoWorks2000 Family, is a Web-based device-management application that provides dynamic status, monitoring, and configuration information for the broad range of Cisco internetworking products. CiscoView displays a physical view of a device chassis, with color-coding of modules and ports for at-a-glance status. Monitoring capabilities display performance and other statistics. Configuration capabilities allow comprehensive changes to devices, given that requisite security privileges are granted.

Additional features include:

- Real-time monitoring of key information that relates to device performance, traffic, and usage, with metrics such as utilization percentage, frames transmitted and received, errors, and a variety of other device-specific indicators
- The ability to change device configurations such as IP route, VLAN, and duplex settings
- On-demand access to Cisco.com, Cisco's Web site, for new and updated device support
- A Web-based application that allows multiuser access to a single CiscoView server

CiscoView is supported on the Cisco 1760 router.

CiscoWorks 2000 Resource Manager Essentials, a member of the CiscoWorks2000 family of network management products, is a powerful suite of Web-based applications offering network management solutions for Cisco switches, access servers, and routers. The Resource Manager Essentials browser interface allows easy access to information critical to network uptime and simplifies time-consuming administrative tasks. The Management Connection feature in Resource Manager Essentials adds Web-level integration of other management tools from Cisco and partner companies, thereby enabling utilization of these tools and applications to create a seamless, central point of network administration. Comprising six applications and optional add-on packages such as CiscoWorks for Switched Internetworks Campus, Resource Manager Essentials includes:

- Inventory Manager
- Change Audit
- Device Configuration Manager
- Software Image Manager
- Availability Manager
- Syslog Analyzer
- Cisco Management Connection

CiscoWorks2000 Resource Manager Essentials version 3.3 is supported on the Cisco 1760 router.

Device Fault Manager (DFM) provides real-time fault analysis for devices and alerts network managers of critical conditions within the network. DFM provides:

- Real-time fault analysis for Cisco devices
- Intelligent Cisco trap generation for integration with enterprise management systems
- No rules to write—ever

Device Fault Manager support on the Cisco 1760 router is targeted for Q3CY2002.



Service and Support

Technical Support Services

Technical Support Services for the Cisco 1760 router are available through Cisco SMARTnet™ and SMARTnet Onsite service programs. Cisco SMARTnet support augments the resources of your operations staff; it provides them access to a wealth of expertise, both on line and via telephone, the ability to refresh their system software at will, and a range of hardware Advance Replacement options. Table 12 details the features and benefits of Cisco SMARTnet offerings.

Cisco SMARTnet Onsite provides all SMARTnet services and complements the hardware Advance-Replacement feature by adding the services of a field engineer, offering support that can be critical for those locations where staffing is insufficient or unavailable to perform parts-replacement activities.

Table 15 Cisco SMARTnet Features and Benefits

Technical Support Services	Benefits	Features
Cisco SMARTnet Support Cisco SMARTnet Onsite Support	<ul style="list-style-type: none"> Enables proactive or expedited issue resolution Lowers cost of ownership by utilizing Cisco expertise and knowledge Minimizes network downtime 	<ul style="list-style-type: none"> Access 24 x 7 to software updates Web access to technical repositories Telephone support through the Technical Assistance Center (TAC) Advance Replacement of hardware parts

Technical Support Services Delivery

Cisco SMARTnet support is available to customers from both Cisco directly and through Cisco's channel partners. Partners purchasing directly from Cisco may offer Cisco Branded Resale of Cisco SMARTnet Software. Partners purchasing through distribution may offer Packaged Cisco SMARTnet Software.

For partners supporting the Cisco 1760 router with their own service and support infrastructure, Cisco System Integrator Support 98 (SIS98) is available.

Contact your Cisco account manager for appropriate delivery options.

Technical Specifications

Dimensions

- Dimensions (H x W x D): 1.7 x 17.5 x 12.8 in. (4.32 x 44.5 x 32.5 cm)
- Weight (maximum): 9.4 lb (4.3 kg) fully loaded with WAN/voice interface cards, PVDMs, DRAM module, VPN module, single in-line memory module (SIMM)
- Weight (minimum): 8.2 lb (3.7 kg)

Power

The Cisco 1760 router has one universal internal power supply (applicable to all countries) and no external power brick. It has no locking connector on the power cord.

- AC Input Voltage: 100 to 240 V
- Frequency: 50-60 Hz



- AC Input Current: 1.5A maximum
- Power Output: 50W maximum
- No redundant power supply option

Environmental

- Operating Temperature: 32 to 104 F (0 to 40 C)
- Nonoperating Temperature: -4 to 149 F (-20 to 65 C)
- Relative Humidity: 10 to 85% noncondensing operating; 5 to 95% noncondensing, nonoperating

Regulatory Approvals (Safety, EMC, and Telecom Compliance)

Safety

- UL 60950, 3rd Edition (includes Czech Republic)
- CSA 22.2 No 60950, 3rd Edition
- EN60950, 3rd Edition
- TS001-1997
- AS/NZS 3260 with A1 through A4
- IEC 60950, 3rd Edition and all country deviations
- ETSI 300-047 GOST-R

EMC

- EN55022 (CISPR22) Class A
 - EN55022/EN50082
- CFR47 part 15 Class A
- ICES 003, issue 2 Class A
- VCCI Class A
- AS/NZS 3548: Class A
- EN55024 (CISPR24) Immunity:
 - a) EN61000-4-2 ESD
 - b) EN61000-4-3 Radiated immunity
 - c) EN61000-4-4 Electrical fast transients
 - d) EN61000-4-5 Surge
 - e) EN61000-4-6 Conducted RF immunity
 - f) EN61000-4-11 AC dips and sags
 - g) EN61000-3-2 AC harmonics and flicker
- GOST-R

Telecom

- Europe: CTR2, CTR3, TBR21
- Canada: CS-03 Part I, II, VI, VIII
- United States: TIA-IS-968



- Japan: JATE
- Australia/New Zealand: TS002, TS003, TS006, S.043, TS031
- Brazil: Anatel
- China: GB-514-92, YD-514-92; Hong Kong: HKTA 2011, 2014, 2015, 2017
- Hungary ETR328 (T)
- Mexico: CFT
- Singapore: IDA
- Poland PB-TE rev. 2 (T)
- South Africa: ICASA
- South Korea: MIC

Product Numbers and Descriptions

For ordering information, Table 13 lists the product part numbers with the respective part descriptions for the two versions, Cisco 1760 and Cisco 1760-V routers, the memory options, the DSP modules, the VPN module and bundled offerings.

This is not a comprehensive list. For further information, please contact your Cisco account manager or your local sales office.

Table 16 Cisco 1760 Router Product Numbers and Descriptions

Product Number	Description
CISCO1760	10/100 Modular Access Router with 2WIC/2VIC, 2VIC slots, 19-inch chassis
CISCO1760-V	10/100 Modular Router with Voice, IP/VOICE Plus, 19-inch chassis
Memory and Memory Upgrades	
MEM1700-64U128D	Cisco 1700 64 MB to 128 MB DRAM Factory Upgrade
MEM1700-64U96D	Cisco 1700 64 MB to 96 MB DRAM Factory Upgrade
MEM1700-32U64MFS	Cisco 1760 32 MB to 64 MB Flash SIMM Factory Upgrade
MEM1700-8MFS=	Cisco 1760 8 MB Flash SIMM-Spare
MEM1700-16MFS=	Cisco 1760 16 MB Flash SIMM-Spare
MEM1700-32MFS=	Cisco 1760 32 MB Flash SIMM-Spare
MEM1700-64MFS=	Cisco 1760 64 MB Flash SIMM-Spare
MEM1700-16D=	Cisco 1700 16 MB DRAM DIMM-Spare
MEM1700-32D=	Cisco 1700 32 MB DRAM DIMM-Spare
MEM1700-64D=	Cisco 1700 64 MB DRAM DIMM-Spare
DSP Modules and Upgrades	
PVDM-256K-4U8	Cisco 1760-V 4 Channel to 8 Channel PVDM Factory Upgrade
PVDM-256K-4U12	Cisco 1760-V 4 Channel to 12 Channel PVDM Factory Upgrade

Table 16 Cisco 1760 Router Product Numbers and Descriptions

Product Number	Description
PVDM-256K-4U16	Cisco 1760-V 4 Channel to 16 Channel PVDM Factory Upgrade
PVDM-256K-4U20	Cisco 1760-V 4 Channel to 20 Channel PVDM Factory Upgrade
PVDM-256K-4	4-Channel Packet Voice/Fax DSP Module
PVDM-256K-8	8-Channel Packet Voice/Fax DSP Module
PVDM-256K-12	12-Channel Packet Voice/Fax DSP Module
PVDM-256K-16	16-Channel Packet Voice/Fax DSP Module
PVDM-256K-20	20-Channel Packet Voice/Fax DSP Module
VPN Module	
MOD1700-VPN	Cisco 1700 Series VPN Module
Bundle Offering	
CISCO1760-ADSL	1760 bundle with ADSLoPOTS WIC, IP/ADSL, 32MB FL/64MB DR
CISCO1760-SHDSL	1760 bundle with WIC-1SHDSL, IP/ADSL, 32MB FL/64MB DR
CISCO1760-VPN/K9	1760 VPN bundle with VPN module, 96MB DRAM, 32MB Flash, IP Plus/FW/3DES
CISCO1760-VPN/K9-A	1760 VPN bundle with ADSL WIC, VPN Module, 96MB DR, 32MB FL, IP+/FW/3DES
CISCO1760-V-SRST	Cisco 1760-V with 24-user SRST Feature License, 32F/128D



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