Cisco Digital Modem Modules for Cisco 2800, 2900, 3800, and 3900 Series

The Cisco® Digital Modem PVDM Modules are a new set of digital dial modems provided in a DSP form-factor for use in the on-board PVDM slots. They are designed to enhance dial access for the Cisco 2800, 2900, 3800, and 3900 Series Integrated Services Routers. The Cisco Digital Modem PVDMs provide the Cisco 2800, 2900 Series with low-density digital dial access, and they provide the Cisco 3800, 39000 Series with a higher-density digital dial platform.

Overview

The Cisco 2800, 2900, 3800 and 3900 Series routers extend Cisco Systems® leadership in multiservice routing, providing customers with high-performance concurrent data, security, voice, dial access, and advanced services-with maximum room for growth. The integrated services routers feature embedded security processing, onboard PVDMs, significant performance and memory enhancements, and new, higher-performance interfaces to meet the needs of the most demanding enterprise branch offices.

The new Cisco Digital Modem Modules are designed in the PVDM form factor for use in the onboard PVDM slots of the Cisco 2800, 2900, 3800 and 3900 Series integrated services routers. This design reduces the number of network modules required to support a digital modem solution. It allows digital modem support in the Cisco 2800, 2900 Series and opens a network module slot on the Cisco 3800 Series that can be used for application services modules or for services not available in other form factors. To provide maximum flexibility to meet different branch size requirements, the Cisco Digital Modem PVDM Modules are available in a variety of densities, listed in Table 1. Figure 1 shows the digital modem modules.

Figure 1. Cisco Digital Modem PVDM Modules

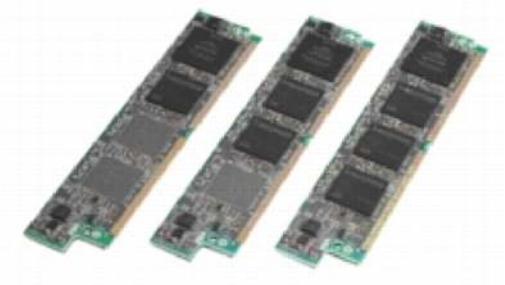


Table 1. Cisco Digital Modem PVDM Modules for the Cisco 2800, 2900, 3800, and 3900 Series

Part Number	Product Description
PVDM2-12DM	Cisco 12-Port Digital Modem Module
PVDM2-24DM	Cisco 24-Port Digital Modem Module
PVDM2-36DM	Cisco 36-Port Digital Modem Module

Note: These digital modem modules must operate in conjunction with a T1/E1 Primary Rate Interface (PRI), Basic Rate Interface (BRI), or T1/E1 CAS.

The Cisco Digital Modem PVDM Modules in combination with the Cisco 2800, 2900, 3800, and 3900 Series routers expand the Cisco dial product portfolio and offer a broad range of dial solutions for various customer segments, including small and medium-sized businesses (SMBs), enterprise customers, and service providers.

Key Features

The Cisco Digital Modem PVDM Modules offer the following main features:

- Designed with Mindspeed CSM V12 multiservice access processors for digital modem DSPs
- Support for 12, 24, and 36 digital modem channels in the following configurations:
  - Three CSM V12 DSPs, supporting 36 digital modem channels
  - Two CSM V12 DSPs, supporting 24 digital modem channels
  - One CSM V12 DSP, supporting 12 digital modem channels
- Supported with the onboard PVDM slots of the Cisco 2800, 2900, 3800 and 3900 Series platforms
- Chipsets that can all be fully upgraded through software
- Support for speeds up to 56 kbps (V.90 and V.92)
- Support for V.42 and V.44 compression algorithms
- Support for onsite installation of additional modules to increase the number of digital modem ports
- Support for PRI channelized T1 (CT1), and R2 signaling
- V.110 support
- Digital modem time-division multiplexing (TDM) connectivity
- Data and fax protocol support
- Ability to coexist with voice PVDMs in the same router

Table 2 lists the digital modem port densities supported by each Cisco 2800, 2900, 3800, and 3900 Series platform through onboard PVDM slots only.

Table 2. Digital Modem Port Densities Supported through Onboard PVDM Slots

Platform	Port Density
Cisco 2811, 2911, 2821, 2921, and 2851, 2951 Integrated Services Routers	60 channels
Cisco 3825, 3925, 3845, and 3945 Integrated Services Routers	144 channels

The Cisco 2800, 2900, 3800, and 3900 Series routers installed with the Cisco Digital Modem PVDMs offer dial access solutions with outstanding flexibility, scalability, manageability, and performance. The Cisco Digital Modem PVDMs are designed to be used in conjunction with the following interface modules:

- NM-1CE1T1-PRI (1-Port Channelized E1/T1/ISDN-PRI Network Module)
- NM-2CE1T1-PRI (2-Port Channelized E1/T1/ISDN-PRI Network Module)
- HWIC-1CE1T1-PRI (1-Port Channelized E1/T1/ISDN-PRI HWIC)
- HWIC-2CE1T1-PRI (2-Port Channelized E1/T1/ISDN-PRI HWIC)
- VIC2-2BRI-NT/TE (2-port Voice Interface Card-BRI (NT and TE))

The Cisco Digital Modem PVDM Modules are available with 12, 24, and 36 modems per module, which can be installed in any PVDM slot, and they can also be upgraded at the customer premises as easily as upgrading computer memory. This design approach gives customers maximum flexibility to expand their dial-in solutions as the number of remote users increases and business needs change.

Support for 56K modem technology allows users to achieve maximum data transfer rates while still having access to V.34 technologies, providing fast downloads of Web pages and files. The modems are software upgradeable and can support future standards as they become available.

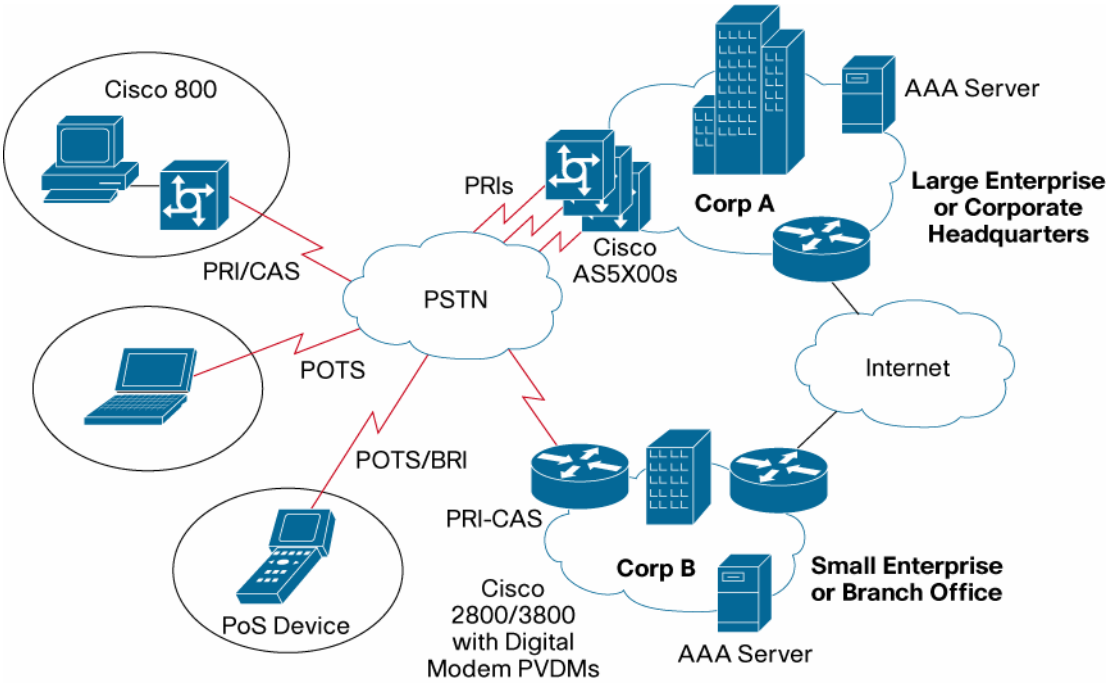
Digital Modem Applications

Historically, branch-office connectivity has been synonymous with connecting the local LAN to a regional or central site. With the rapid growth in mobile computing and telecommuting, increasing numbers of branch offices need to provide user-to-LAN access with remote-access capabilities.

Using ISDN PRI/BRI or LAN interfaces and ISDN PRI/BRI interface modules coupled with Cisco Digital Modem PVDMs, the Cisco 2800, 2900, 3800, and 3900 Series routers provide the ideal dial access platforms for branch and enterprise offices.

Figure 2 shows a typical configuration using Cisco Digital Modem PVDM Modules in a remote-access configuration.

Figure 2. Remote-Access Configuration Using Cisco Digital Modem PVDM Modules



Cisco 2800, 2900, 3800, and 3900 Series with Cisco Digital Modem PVDM Modules

For basic telephone users, including mobile workers and people working from hotel rooms, both 33.6K and 56K modem calls can be terminated through a PRI-to-channel associated signaling (CAS) connection in a Cisco Digital Modem Module. For teleworkers with access to PRI, the same phone number can be used to connect to the same Cisco 2800, 2900, 3800, and 3900 Series routers, achieving throughput of 64 kbps uncompressed or, with Multilink Point-to-Point Protocol (MLPPP), 128 kbps.

Single Solution for Modem and ISDN Callers

The Cisco 2800, 2900, 3800, and 3900 Series routers with Cisco Digital Modem PVDM Modules installed can accept incoming ISDN or voice calls and automatically switch them to the appropriate internal circuitry. The PRI switching is based on Q.931 messaging in the ISDN D channel. This out-of-band signaling channel provides a means for the telephone network to label each call according to its type. Specifically, when an incoming call is labeled "voice" by the telephone network, the Cisco router directs it to one of the router's modems. When a call is labeled "ISDN data,"

it is directed to one of the router's High-Level Data Link Control (HDLC) controllers. This approach provides the benefit of one phone number for both modem and ISDN users. R2 and CT1 interfaces also support this switching ability.

Modem Protocol Support

The Cisco Digital Modem PVDMs support a wide array of modem data protocols, including, the V.92 and V.44 standards. See the "Hardware Specifications" section for a complete list of protocols. V.92 and V.44 provide network users and teleworkers with a high-performance dialup experience. V.92 encompasses numerous specifications, including Quick Connect, which dramatically improves the speed with which users can connect with their ISP or a branch office, and Modem on Hold, which allows users to suspend and reactivate their dialup connection to either receive or initiate a telephone call, increasing productivity for teleworkers because they do not have to waste valuable time dialing back into a central site every time they receive a phone call.

V.44 technology provides a new standard for compressing data. When compared to the V.42 compression algorithm, V.44 increases throughput by 20 to 60 percent because it uses a new compression algorithm that is optimized for typical Web content. V.44 is one standard that speeds the delivery of Web pages to the end user.

Ease of Management

The Cisco 2800, 2900, 3800, and 3900 Series routers provide complete, centrally managed modem capabilities, crucial requirements for branches and enterprises building dial-in pools. The Cisco Digital Modem PVDM Modules installed in Cisco 2800, 2900, 3800, and 3900 Series routers can be managed using the same Simple Network Management Protocol (SNMP)-based tools used to manage the rest of the network, providing network managers with centralized management capability. Network managers can collect modem statistics, perform real-time call-in-progress monitoring, view modem activity logs, monitor modem hard and soft busy out events, and upgrade modem firmware.

Network users can use the installed modems for dial-out and fax-out applications, using third-party applications. The modems can be assigned for dial in or dial out, or both. Dial-out support allows network users to use the modems during business hours for outgoing calls and then use the same modems after business hours for incoming calls from home or another remote location.

Increasing numbers of remote users can be easily accommodated by the support for multichassis MLPPP, allowing dial-in pools of lines to span numerous Cisco 2800, 2900, 3800, and 3900 Series routers. Through the use of Layer 2 Forwarding (L2F) technology and the Stack Group Bidding Protocol (SGBP) exclusive to Cisco, the Cisco 2800, 2900, 3800, and 3900 Series routers can expand to meet the requirements of fast-growing and frequently changing dial environments. Because the essential component is a relatively small investment, enterprises and branch offices can scale from very small to larger installations.

The Cisco IOS® Software can help maximize dial bandwidth through features such as bandwidth on demand and protocol spoofing. These software features directly reduce line use and the costs associated with a remote-access solution.

Lower operating costs can be achieved with the centralized management capabilities of CiscoWorks management software. In addition, Cisco configuration management capabilities provide network managers with complete control over network statistics and the ability to configure and tune network operations from a central location. Finally, comprehensive debugging tools in the Cisco IOS Software substantially reduce the time and cost associated with problem isolation and correction.

Software Support

Refer to Table 4 below for supported Cisco IOS Software Releases. The IP Base image supports the Cisco Digital Modem PVDM Modules and Cisco IOS Software features in the Cisco 2800, 2900, 3800, and 3900 Series routers.

Platform Support

The Cisco Digital Modem PVDM Modules are supported in the onboard PVDM slots of the modular Cisco 2800, 2900, 3800, and 3900 Series routers. Table 3 summarizes the platform support details.

Table 3. Platform Support Details

Cisco Integrated Services Router Platforms	Maximum Number of Cisco Digital Modem PVDMs Supported*
Cisco 2811, 2911	2
Cisco 2821, 2911, 2851, and 2951	3
Cisco 3825, 3925, 3845, and 3945	4

* Onboard support for the PVDM2 modules in the 2911, 2921, 2951, 3925, and 3945 platforms will be via the PVDM adapter, PVDM2-ADPTR.

ISDN PRI/BRI Requirements

The Cisco Digital Modem PVDM Modules operate in conjunction with the following Cisco HWICs, VICs and Network Modules.

Table 4. Platform Support Details

PVDM2 Digital Modem Supported Modules	Minimum Cisco IOS Cisco 2800, 3800	Minimum Cisco IOS Cisco 2900, 3900
PVDM2-ADPTR	Not Applicable	15.0(1)M
NM-1CE1T1-PRI	12.4(09)T	15.0(1)M
NM-2CE1T1-PRI	12.4(09)T	15.0(1)M
HWIC-1CE1T1-PRI	12.4(20)T	15.0(1)M
HWIC-2CE1T1-PRI	12.4(20)T	15.0(1)M
VIC2-2BRI-NT/TE	12.4(20)T	15.0(1)M

Hardware Specifications

Table 5 lists the hardware specifications for the Cisco Digital Modem PVDM Modules.

Table 5. Specifications for the Cisco Digital Modem PVDM Modules

Specification	Data
Hardware Platform Compatibility	Cisco 2800, 2900, 3800, and 3900 Series
Modem Data Protocols	• ITU-T V.90 (28000 to 56000 in 1333 bps increments) • V.92 Modem on Hold • V.92 Quick Connect • K56Flex • ITU-T V.34 • ITU-T V.34bis • ITU-T V.32 up to 9600 bps • ITU-T V.32bis up to 14400bps • ITU-T V.22A/B • ITU-T V.22bis at 2400 bps • ITU-T V.23 at 75/1200 bps • ITU-T V.21 at 300 bps • Bell 103 and 212A
Fax Data Protocols	• ITU-T V.17 • ITU-T V.33 • ITU-T V.29 • ITU-T V.27ter • ITU-T V.21 channel 2 • Group 3 fax class 2 • Fax auto detection

Specification	Data
ISDN Support	• HDLC • Link Access Procedure, Balanced (LAPB) • Rate adaptation (V.110) • V.120 incoming • X.75
Error Correction Link Access Protocols	• ITU-T V.42 Link Access Procedure for Modems (LAPM) • Microcom Network Protocol (MNP) 2-4
Data Compression Protocols	• V.42bis (with 2-KB dictionaries) • V.44 • MNP-5
Environment Specification	European ETSI 300-019
Dimensions	• Width 3.08 in. (6.93 cm) • Height 0.75 in. (1.91 cm) • Depth 4.38 in. (9.86 cm)
Weight	2.4 oz (68 g)

Part Number and Ordering Information

Table 6 lists the part numbers for the Cisco Digital Modem PVDM Modules.

Table 6. Cisco Digital Modem PVDM Module Part Numbers

Part Number	Product Description
PVDM2-12DM	Cisco 12-Port Digital Modem Module (system)
PVDM2-12DM=	Cisco 12-Port Digital Modem Module (spare)
PVDM2-24DM	Cisco 24-Port Digital Modem Module (system)
PVDM2-24DM=	Cisco 24-Port Digital Modem Module (spare)
PVDM2-36DM	Cisco 36-Port Digital Modem Module (system)
PVDM2-36DM=	Cisco 36-Port Digital Modem Module (spare)

Cisco 2800, 2900, 3800, and 3900 Series Regulatory Approvals

When installed in the Cisco 2800 and 3800 Series routers, the Cisco Digital Modem PVDM Modules do not change the router standards (regulatory compliance, safety, EMC, and telecom).

Refer to the platform-specific data sheets for the regulatory compliance, safety, EMC, and telecom standards.

- For Cisco 2800 Series routers: http://www.cisco.com/en/US/products/ps5854/ index.html
- For Cisco 3800 Series routers: http://www.cisco.com/en/US/products/ps5855/ index.html
- For Cisco 2900 Series routers: http://www.cisco.com/en/US/products/ps10537/index.html
- For Cisco 3900 Series routers: http://www.cisco.com/en/US/products/ps10536/index.html

Country Availability

For the latest information about country-specific approvals for the Cisco Digital Modem PVDM Modules, contact your local Cisco representative.

Environmental Operating Ranges

- **Operating temperature:** 32 to 104ºF (0 to 40ºC)
- **Nonoperating temperature:** 4 to 149ºF (-20 to 65ºC)
- **Relative humidity:** 10 to 85 percent noncondensing operating; 5 to 95 percent noncondensing, nonoperating safety

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