



Text Part Number: 78-6742-01

Installing and Removing Packet Voice DSP Modules Configuration Note

Product Numbers: PVDM=

This document describes how to install and remove packet voice digital-signal-processor (DSP) modules (PVDMs) in a high-density voice network module (NM-HDV=) or Cisco 1750 router. To install a high-density voice network module, see the *Cisco Network Modules Hardware Installation Guide* publication. To install a Cisco 1750 router, see the *Cisco 1750 Router Hardware Installation Guide* publication.

The high-density voice network module contains five 72-pin sockets or banks for PVDMs, numbered 0 through 4. Each socket can be filled with a single 72-pin PVDM. The Cisco 1750 router motherboard contains one 72-pin socket for a PVDM. See the “PVDM Location” section on page 6 for locations of the PVDM slots.

For configuration information, refer to the Cisco IOS configuration guides and command references.

Use this document in conjunction with your router installation and configuration guide and the *Regulatory Compliance and Safety Information* document for your router. If you have questions or need help, refer to the “Cisco Connection Online” section on page 14.

This document contains the following sections:

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Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the area clear and dust-free during and after installation.
- Keep tools away from walk areas where you or others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes equipment unsafe.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, may harm you. A warning symbol precedes each warning statement.



Warning Means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur

Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.

¡Advertencia! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

Warning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förekommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrettelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.



Warning Read the installation instructions before you connect the system to its power source.



Warning Only trained and qualified personnel should be allowed to install or replace this equipment.



Warning Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.



Warning Ultimate disposal of this product should be handled according to all national laws and regulations.

Safety with Electricity



Warning The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers.



Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.



Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Both LAN and WAN ports may use RJ-45 connectors. Use caution when connecting cables.



Warning Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first.



Warning Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.



Warning Do not work on the system or connect or disconnect cables during periods of lightning activity.



Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is OFF and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected.

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-OFF switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly shut the power OFF.
- Before working on the router, turn OFF the power and unplug the power cord.
- Disconnect all power before doing the following:
 - Installing or removing a router chassis
 - Working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.

If an electrical accident occurs, proceed as follows:

- Use caution; do not become a victim yourself.
- Turn OFF power to the router.
- If possible, send another person to get medical aid. Otherwise, determine the condition of the victim and then call for help.
- Determine if the victim needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD can occur when printed circuit cards are improperly handled and can result in complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing cards. Ensure that the router chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground. To guard against ESD damage and shocks, the wrist strap and cord must be used properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.



Caution For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohm).

Tools and Equipment Needed

You need the following tools and equipment to remove and install PVDMs in a high-density network module or Cisco 1750 router:

- Number 1 Phillips screwdriver
- ESD-preventive wrist strap
- Antistatic mat

PVDM Location

The PVDM slots on the high-density voice network module are located on top of the card, next to the WIC port. The high-density voice network module contains five 72-pin sockets or banks for PVDMs, numbered 0 through 4. (See Figure 1.) Each socket can be filled with a single 72-pin PVDM.

The PVDM slot on the Cisco 1750 router is located on top of the motherboard, in back of the stacked WIC/VIC slots 0 and 1. The motherboard on the Cisco 1750 router contains one 72-pin socket for a PVDM. (See Figure 2.)

Figure 1 PVDM Slot Locations on a High-Density Voice Network Module

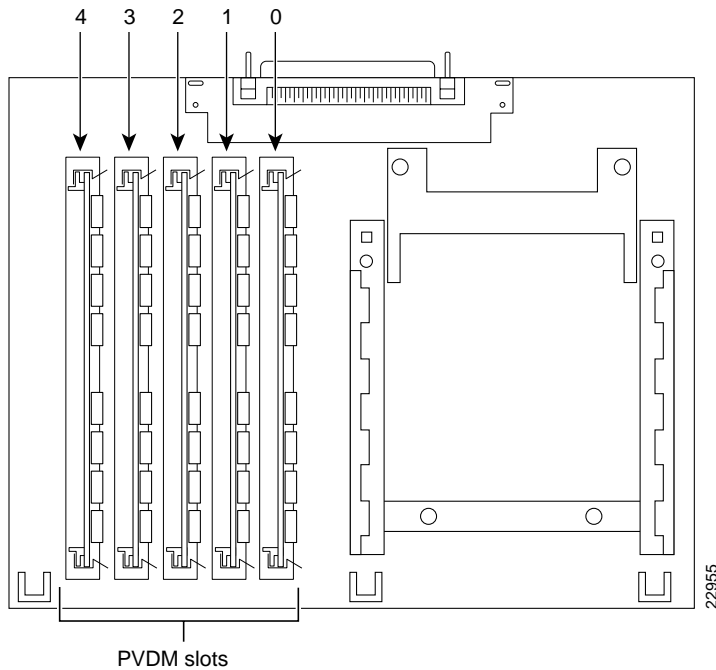
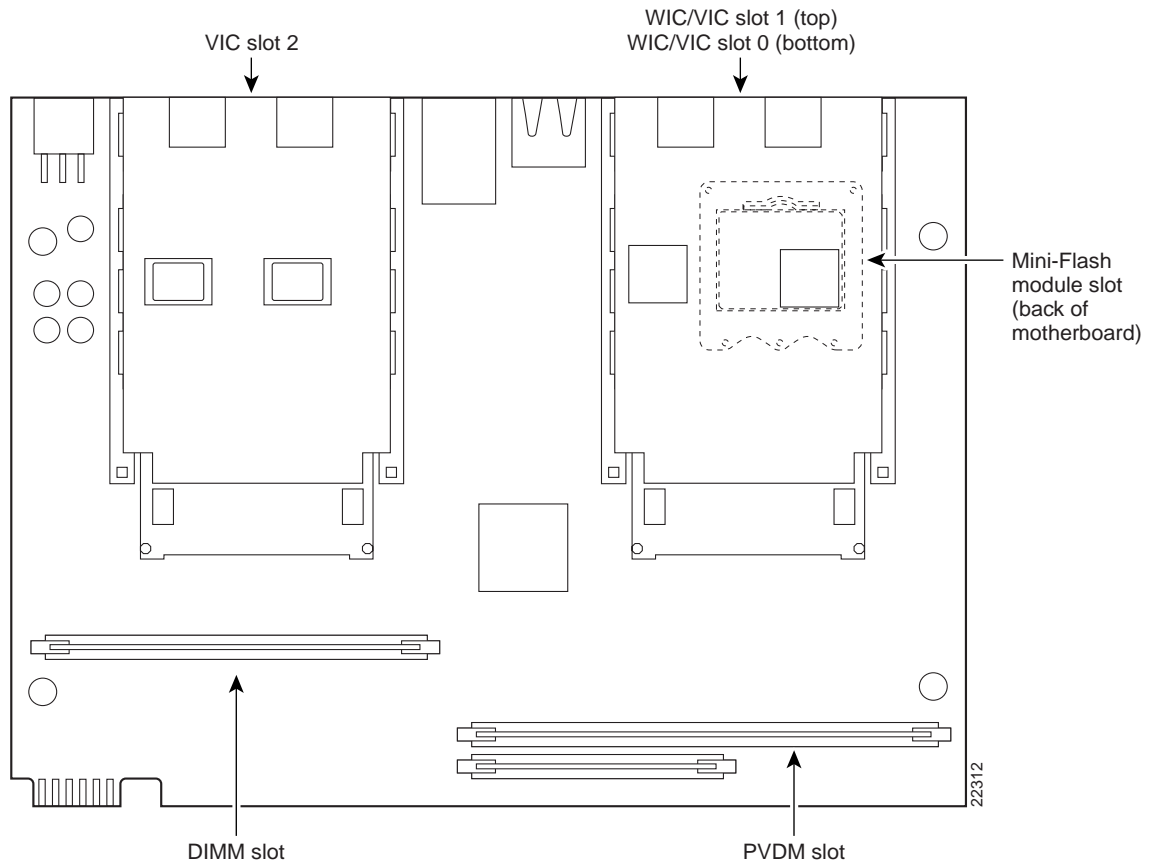


Figure 2 PVDM Slot Location on a Cisco 1750 Router Motherboard



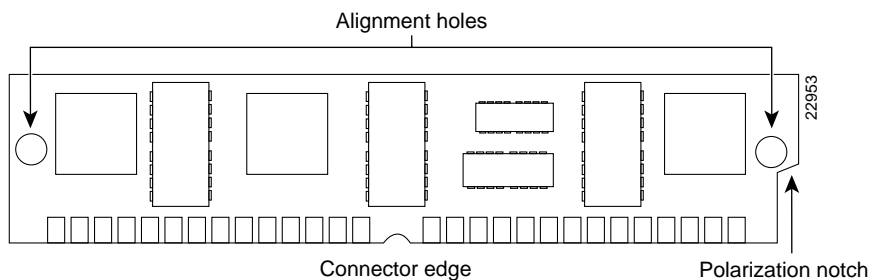
PVDM Orientation

PVDMs are manufactured with a polarization notch to ensure proper orientation and alignment holes to ensure proper positioning. Figure 3 shows the polarization notch and alignment holes on a PVDM card. PVDM cards are installed with the connector edge down, the polarization notch near the front of the board, and the component side facing the right side of the board.



Caution To avoid damaging ESD-sensitive components, observe all ESD precautions. To avoid damaging the high-density voice network module, avoid using excessive force when you remove or replace PVDMs.

Figure 3 PVDM Orientation



Accessing the High-Density Voice Network Module

If you are going to remove or install PVDMs on high-density voice network modules that are already installed in your router, you must remove the high-density voice network module from the router.

Follow this procedure to install a network module:

Step 1 Turn OFF electrical power to the router. However, to channel ESD voltages to ground, do not unplug the power cable. Remove all network interface cables, including telephone cables, from the rear panel.

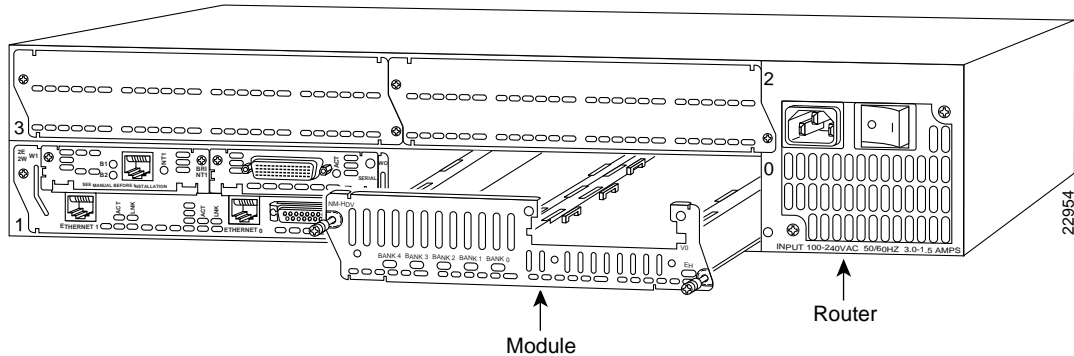
The following warning applies to routers that use a DC power supply:



Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Step 2 Locate the high-density voice network module in your router. (See Figure 4.)

Figure 4 Removing a Voice Network Module from a Router (Typical)



Step 3 Disconnect any cables from the voice interface card installed in the high-density voice network module.

Step 4 Loosen the module's captive mounting screws using the Phillips or flat-blade screwdriver.

Step 5 Slide the high-density voice network module out of the router. The voice interface card does not need to be removed.

The following warning applies to routers that use a DC power supply:



Warning After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

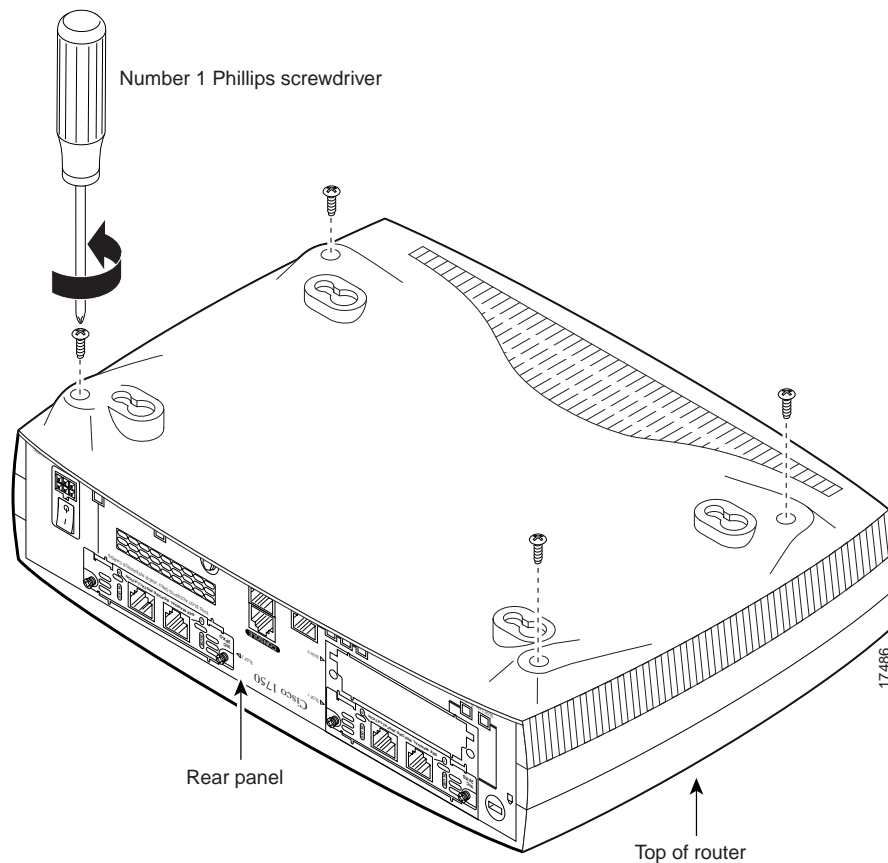
Accessing the Cisco 1750 Router Motherboard

If you are going to remove or install PVDMs on the Cisco 1750 router motherboard, you must open the chassis. Opening the chassis requires a number 1 Phillips screwdriver.

Follow these steps to open the chassis:

- Step 1** Make sure the router is turned OFF and is disconnected from the power supply.
- Step 2** Turn the router upside down, and rest the top of the router on a flat surface.
- Step 3** Use the Phillips screwdriver to remove the four screws that hold the top and bottom of the chassis together. (See Figure 5.)
- Step 4** Turn the router back to its original position (right-side up).

Figure 5 Removing the Cisco 1750 Router Chassis Screws



- Step 5** Gently pull the top of the router (which is facing up toward you) up and away from the bottom of the router (which is resting on the flat surface).

At this point, disconnect the fan, which is inside the top of the router chassis, from the motherboard. Do this by disconnecting the fan cable from the connector (labeled FAN) on the motherboard.

- Step 6** Place the router bottom on an antistatic mat and locate the PVDM slot. (See Figure 2.)

Removing PVDMs

Follow these steps to remove PVDMs:

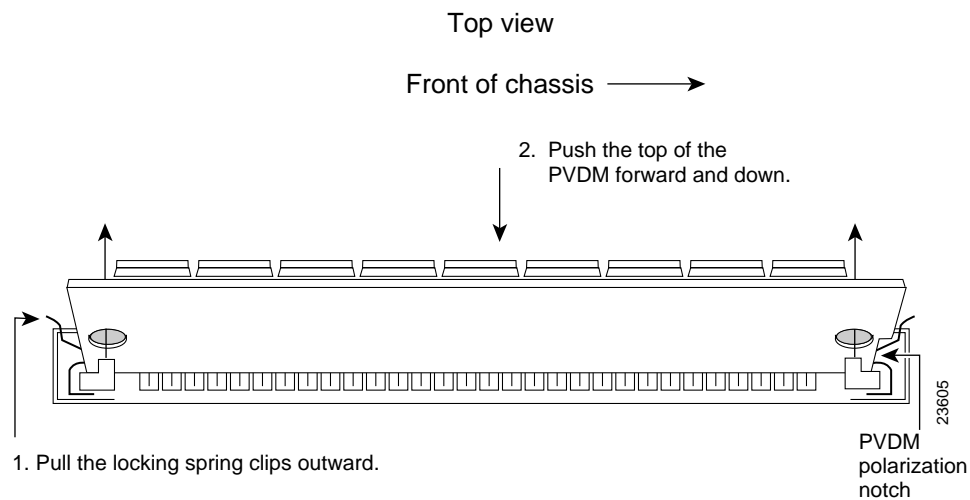
Step 1 Find the PVDM sockets on the high-density voice network module (see Figure 1) or on the Cisco 1750 router motherboard (see Figure 2).



Caution Handle PVDMs by the card edges only. PVDMs are ESD-sensitive components and can be damaged by mishandling.

Step 2 In a high-density voice network module, remove one PVDM at a time, beginning with the PVDM in bank 4. In a Cisco 1750 router, remove the one PVDM. To lift the PVDM out of its socket, pull the locking spring clips on both sides outward and tilt the PVDM toward the right side of the board, free of the clips. (See Figure 6.)

Figure 6 Removing PVDMs



Step 3 Hold the PVDM by the edges with your thumb and index finger and lift it out of the socket. Place the removed PVDM in an antistatic bag to protect it from ESD damage.

Step 4 Repeat Step 2 and Step 3 for each PVDM.

Installing PVDMs

Follow this procedure to install PVDMs:

Step 1 Find the PVDM slots on the high-density voice network module (see Figure 1) or on the Cisco 1750 router motherboard (see Figure 2).



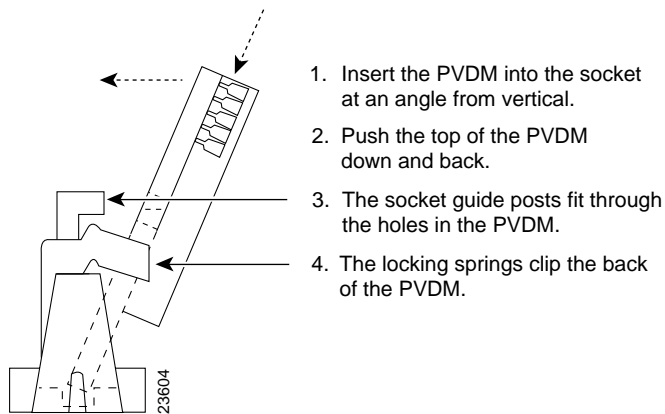
Caution Handle PVDMs by the card edges only. PVDMs are ESD-sensitive components and can be damaged by mishandling.

Step 2 Hold the PVDM with the polarization notch on the right, near the front of the board, and the component side away from you, with the connector edge at the bottom. (See Figure 6.)

- Step 3** Beginning with band 0, insert the PVDM into the connector slot at an angle, tilted toward the right side of the board. In a high-density voice network module. Align or move the PVDM into a vertical position (see Figure 7), using the minimum amount of force required. When the PVDM is properly seated, the socket guide posts fit through the alignment holes, and the connector springs click into place.
- Step 4** Ensure that each PVDM is straight and that the alignment holes (as shown in Figure 6) line up with the plastic guides on the socket.

Figure 7 Installing PVDMs

View from front of board



Caution It is normal to feel some resistance, but do not use excessive force on the PVDM, and do not touch the surface components.

- Step 5** Repeat Step 2 through Step 4 for each PVDM.

Inserting the High-Density Voice Network Module into the Chassis

Follow this procedure to install a network module:

- Step 1** Turn OFF electrical power to the router. However, to channel ESD voltages to ground, do not unplug the power cable. Remove all network interface cables, including telephone cables, from the rear panel.

The following warning applies to routers that use a DC power supply:

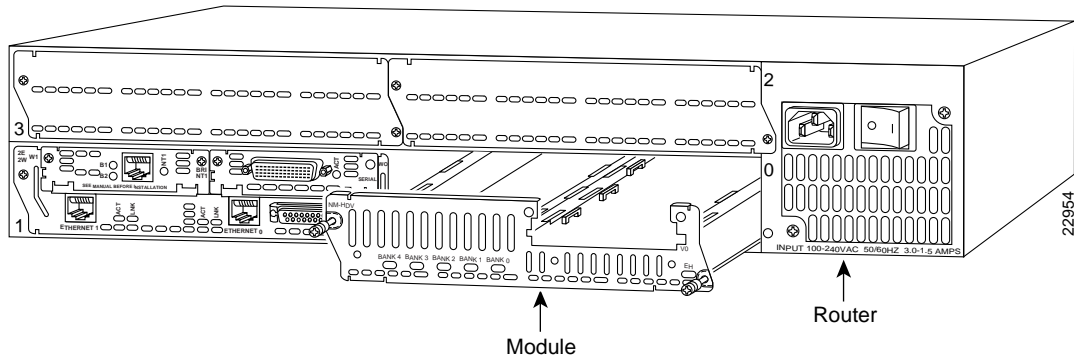


Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

- Step 2** Using either a number 1 Phillips screwdriver or a small flat-blade screwdriver, remove the blank filler panel from the chassis slot where you plan to install the module. Save the blank panel for future use.

- Step 3** Align the network module with the guides in the chassis and slide it gently into the slot. (See Figure 8.)

Figure 8 Installing a Voice Network Module in a Router (Typical)



- Step 4** Push the module into place until you feel its edge connector mate securely with the connector on the motherboard.
- Step 5** Fasten the module's captive mounting screws into the holes in the chassis, using the Phillips or flat-blade screwdriver.
- Step 6** To install a voice interface card in the module, see the *Cisco WAN Interface Cards Hardware Installation Guide* publication. If you do not need to install a voice interface card, and if the router was previously running, reinstall the network interface cables and turn ON power to the router.

The following warning applies to routers that use a DC power supply:



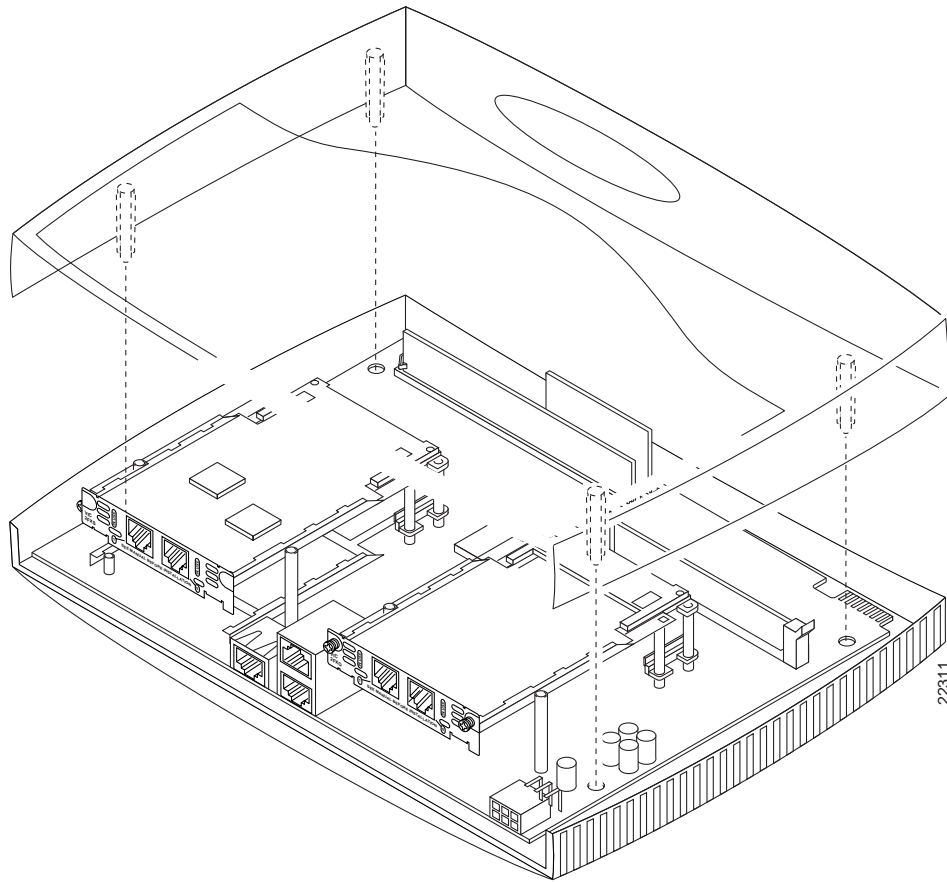
Warning After wiring the DC power supply, remove the tape from the circuit breaker switch handle and reinstate power by moving the handle of the circuit breaker to the ON position.

Closing the Chassis on a Cisco 1750 Router

If you have installed a PVDM on a Cisco 1750 router motherboard, close the chassis by following these steps:

- Step 1** If you disconnected the fan from the motherboard as described in the “Accessing the Cisco 1750 Router Motherboard” section on page 9, reconnect the fan cable to the connector labeled FAN on the motherboard.
- Step 2** Locate the posts that protrude from the inside of the chassis cover and the corresponding openings on the chassis bottom.
- Step 3** Line up the posts with the corresponding openings (see Figure 9), and carefully slide the posts into the openings. Be careful not to damage the router motherboard with the posts.
- Step 4** Replace the screws that you removed when opening the chassis. (See Figure 5.)
- Step 5** To install a voice interface card in the chassis, see the *Cisco WAN Interface Cards Hardware Installation Guide* publication. If you do not need to install a voice interface card, and if the router was previously running, reinstall the network interface cables and turn ON power to the router.

Figure 9 Closing the Cisco 1750 Router Chassis



Configuring PVDMs on an HDV Network Module

The number of channels that an HDV network module can support depends on the number of PVDMs that are installed and the complexity level of the codecs (vocoders) needed to support the required compression method. The HDV network module supports the following number of channels:

- Up to 6 channels per PVDM (up to 30 channels for cards with 5 PVDMs installed) for high complexity codecs (vocoders) that support the following services: G.711, G.726, G.729, G.723.1, G.728, and fax relay
- Up to 12 channels per PVDM (up to 60 channels for cards with 5 PVDMs installed) for medium complexity codecs (vocoders) that support the following services: G.711, G.726, G.729a, and fax relay

Each HDV network module can support only one type of compression complexity (either high or medium), although HDV network modules with different compression complexity types can be installed in the same router.

Use the following procedure to configure the codec (vocoder) complexity on your HDV network module.

Table 1 Configuring Codec Complexity

Step	Command	Purpose
1	Router> enable Password: <password> Router#	Enter enable mode. Enter the password. You have entered enable mode when the prompt changes to Router#.
2	Router# configure terminal Enter configuration commands, one per line. End with CNTL/Z. Router(config)#	Enter global configuration mode. You have entered global configuration mode when the prompt changes to Router(config)#.
3	Router(config)# voice-card {0-4}	Select the voice card to configure. Refer to Figure 1 for locations of the PVDM slots.
4	Router(config-voicecard)# codec complexity {high medium}	Specify the compression complexity for the voice card. One complexity type is allowed per router.
5	Router(config-voicecard)# exit	Exit back to global configuration mode. Return to Step 3 if your router has more than one voice card that you need to configure.
6	Router(config-if)# Ctrl-z Router#	When you finish configuring interfaces, return to enable mode.

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

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You can access CCO in the following ways:

- WWW: <http://www.cisco.com>
- WWW: <http://www-europe.cisco.com>
- WWW: <http://www-china.cisco.com>
- Telnet: cco.cisco.com
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.

Documentation CD-ROM

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