Cisco PVDM2-12DM, PVDM2-24DM, and PVDM2-36DM Digital Modem Packet Voice Data Modules

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The Cisco digital modem packet voice data modules (Cisco PVDMs), type 2 (Cisco PVDM2s), are high-density PVDMs containing 12, 24, or 36 digital modems. These modems provide direct digital connection to Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) channels, to Basic Rate Interface (BRI) channels, and to channel associated signaling (CAS) digital trunk lines. The PVDM2s are installed in Cisco 2800 series and Cisco 3800 series integrated services routers.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for Digital Modem PVDM2s" section on page 47.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

Contents

CISCO SYSTEMS

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Prerequisites for Cisco Digital Modem PVDM2s

Supported Platforms

The following Cisco integrated services routers are supported for the digital modem PVDM2s:

- Cisco 2811
- Cisco 2821
- Cisco 2851
- Cisco 3825
- Cisco 3845

Network Interfaces

LAN connections are provided through your router's Fast Ethernet or Gigabit Ethernet ports.

For information on how to configure the LAN interfaces on your router, see the Configuring Fast Ethernet and Gigabit Ethernet Interfaces section of *Basic Software Configuration Using the Cisco IOS Command-Line Interface*.

WAN connections are provided through Cisco network modules and interface cards. The digital modem PVDM2s are supported with the following:

- Network modules (supported in Cisco IOS Releases 12.4(9)T and later):
  - NM-1CE1T1-PRI
  - NM-2CE1T1-PRI
- Interface cards (supported in Cisco IOS Releases 12.4(11)XW and later):
  - HWIC-1CE1T1-PRI
  - HWIC-2CE1T1-PRI
  - VIC2-2BRI-NT/TE

For information on how to install Cisco network modules, see the *Cisco Network Module Hardware Installation Guide*.

For information on how to install Cisco interface cards, see the *Cisco Interface Card Hardware Installation Guide*.

PVDM2 Installation

Install the digital modem PVDM2s in the PVDM chassis slots on your router's motherboard.

- To install PVDM2s in Cisco 2800 series routers, see *Installing and Upgrading Internal Modules in Cisco 2800 Series Routers*.
- To install PVDM2s in Cisco 3800 series routers, see *Installing and Upgrading Internal Modules in Cisco 3800 Series Routers*.

Basic Information for Configurations

Make sure that you have the following information:

- Channel-group information and time-slot mapping
- ISDN PRI/BRI configuration parameters
- T1 or E1 information, such as line code and framing type

Restrictions for Cisco Digital Modem PVDM2s

The following restrictions apply to the Cisco digital modem PVDM2s:

- Digital modem PVDM2s can be inserted only into PVDM2 slots on the motherboards of Cisco routers. Initially, these routers are the Cisco 2800 series and Cisco 3800 series integrated services routers named in the "Supported Platforms" section on page 2.
- Initial bootup time to download CSM V12 firmware to the digital modem PVDM2s may be two to four minutes due to architectural limitations.
- Digital modem PVDM2s are supported over ISDN BRI in Cisco IOS Releases 12.4(11)XW and later.
- There is no voice support.

Information About Cisco Digital Modem PVDM2s

This section provides information about digital modem PVDM2s.

PVDM Line Numbering on Cisco Integrated Services Routers

This section describes the PVDM line numbering scheme for Cisco integrated services routers. Table 1 shows the line numbering scheme for digital modem PVDM2s installed in Cisco 2800 series and 3800 series routers.

Table 1 PVDM Line Numbering on Cisco Integrated Services Routers

Platform	PVDM 0	PVDM 1	PVDM 2	PVDM 3
Cisco 2811	322	386	N/A	N/A
Cisco 2821, Cisco 2851	322	386	450	N/A
Cisco 3825	322	386	450	514
Cisco 3845	450	514	578	642

Table 1 gives the line number assigned to the first modem in the PVDM. The remaining modems are assigned successively increasing line numbers. Some examples are:

- A PVDM2-12DM module is installed in the PVDM 0 slot of a Cisco 2811 router. The 12 modems on the module are assigned line numbers 322 to 333.
- A PVDM2-24DM module is installed in the PVDM 1 slot of a Cisco 3825 router. The 24 modems on the module are assigned line numbers 386 to 409.
- A PVDM2-36DM module is installed in the PVDM3 slot of a Cisco 3845 router. The 36 modems on the module are assigned line numbers 642 to 677.

Mixing Digital Modem PVDM2s with Voice PVDMs

There are no restrictions on the mixing of digital modem PVDM2s with Cisco voice PVDMs within the supported platforms.

How to Configure Digital Modem PVDM2s

Complete the following tasks to configure the digital modem PVDM2s.

Tasks Common to All Configurations

Complete the following tasks for all configurations of digital modem PVDM2s.

- Configuring the Loopback Interface, page 5 (required)
- Configuring the Modem Country Code, page 6 (required)
- Configuring Modem Lines for Dial-In and Dial-Out, page 6 (required)
- Configuring the Default IP Pool Information, page 8 (required)
- Creating Group Asynchronous Interfaces, page 8 (required)
- Configuring the Dialer Interface, page 10 (required)
- Configuring Modem Pooling, page 11 (optional)
- Configuring Modem Recovery, page 12 (optional)
- Loading Modem Firmware, page 13 (optional)

Configuring the Loopback Interface

The loopback 0 interface is the interface that dial-in users access when dialing in to the network. Usually, all dial-in users are assigned to a single IP subnet. This subnet can be identified with the loopback 0 interface, a logical interface whose network number can be borrowed by each asynchronous dial-in interface.

To configure the loopback 0 interface, perform the following tasks, beginning in global configuration mode:

SUMMARY STEPS

1. **interface Loopback** *number*
2. **ip address** *ip-address ip-address mask*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**interface Loopback** *number* **Example:** `Router(config)# loopback 0`	Selects the loopback 0 interface.
Step 2	**ip address** *ip-address ip-address mask* **Example:** `Router(config-if)# ip address 127.0.0.1 255.255.0.0`	Assigns an IP address and subnet mask to the loopback 0 interface.

Configuring the Modem Country Code

To configure the modem country code for a bank of V12 modems, use the **modem country v12** command in global configuration mode.

SUMMARY STEPS

1. **modem country v12** *country*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**modem country v12** *country* **Example:** `Router(config)# modem country v12 t1-default`	Configures the modem country code for the bank of V12 modems in your digital modem PVDM2s. Default for T1 connections is *t1-default*. Default for E1 connections is *e1-default*.

Configuring Modem Lines for Dial-In and Dial-Out

The following tasks configure modem lines for dial-in and dial-out.

- Configuring Modems for Dial-In, page 6 (required)
- Configuring Modems for Dial-Out, page 7 (required)

Configuring Modems for Dial-In

Beginning in global configuration mode, follow these steps to configure modem lines for dial-in.

SUMMARY STEPS

1. **line** *start-range end-range*
2. **modem inout**
3. **transport input all**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**line** *start-range end-range* **Example:** `Router(config)# line 334 345`	Selects the modem lines for dial-in and switch to the line configuration mode.
Step 2	**modem inout** **Example:** `Router(config-line)# modem inout`	Configures the line for both incoming and outgoing calls.
Step 3	**transport input all** **Example:** `Router(config-line)# transport input all`	Selects the protocol used to connect to the router. **all** selects all protocols.

Configuring Modems for Dial-Out

To configure the modem lines for dial-out, perform the following tasks, beginning in global configuration mode:

SUMMARY STEPS

1. **line** *start-range end-range*
2. **rotary** *number*
3. **transport input telnet**
4. **modem inout**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**line** *start-range end-range* **Example:** `Router(config)# line 322 333`	Selects the modem lines for dial-out and switch to the line configuration mode.
Step 2	**rotary** *number* **Example:** `Router(config-line)# rotary 1`	Sets the router to use previously-defined rotary group.

	Command or Action	Purpose
Step 3	**transport input telnet** **Example:** `Router(config-line)# transport input telnet`	Configures the router to accept inbound Telnet connections.
Step 4	**modem inout** **Example:** `Router(config-line)# modem inout`	Configures the line for both incoming and outgoing calls.

Configuring the Default IP Pool Information

You need to set a range of IP addresses in the default IP pool. These IP addresses are used for dial-in users. To set the range of addresses, perform the following task in global configuration mode:

SUMMARY STEPS

1. **ip pool local default** *low-ip-address [high-ip-address]*
2. **ip default gateway** *number*
3. **ip classless**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ip pool local default** *low-ip-address [high-ip-address]* **Example:** `Router(config)# ip pool local default 172.16.0.1 172.16.0.36`	Sets the range of addresses in the default IP pool to be assigned to inbound callers.
Step 2	**ip default gateway** *number* **Example:** `Router(config)# ip default gateway 101`	Defines a default gateway (router) when IP routing is disabled.
Step 3	**ip classless** **Example:** `Router(config)# ip classless`	Forwards packets destined for a subnet of a network that has no network default route.

Creating Group Asynchronous Interfaces

A group asynchronous interface is a parent interface that applies protocol characteristics to specified, associated asynchronous interfaces. After you create a group asynchronous interface, all associated asynchronous interfaces (called members) can be configured through it. Group asynchronous interfaces can speed configuration time and help you maintain interface configuration consistency.

Beginning in global configuration mode, follow these steps to configure a group asynchronous interface.

SUMMARY STEPS

1. **interface group-async** *number*
2. **ip unnumbered Loopback** *number*
3. **encapsulation ppp**
4. **dialer in-band**
5. **async mode interactive | dedicated**
6. **peer default ip address pool** *name*
7. **no cdp enable**
8. **group-range** *start-range end-range*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**interface group-async** *number* **Example:** `Router(config)#interface group-async 1`	Creates a group asynchronous interface.
Step 2	**ip unnumbered Loopback** *number* **Example:** `Router(config-if)#ip unnumbered Loopback 0`	Enables IP processing on the loopback interface without assigning an explicit IP address to the interface.
Step 3	**encapsulation ppp** **Example:** `Router(config-if)#encapsulation ppp`	Sets the Point-to-Point Protocol (PPP) as the encapsulation method used by this interface.
Step 4	**dialer in-band** **Example:** `Router(config-if)# dialer in-band`	Specifies that dial-on-demand routing (DDR) be supported.
Step 5	**async mode interactive** | **dedicated** **Example:** `Router(config-if)#async mode interactive`	**interactive** enables SLIP and PPP EXEC commands on this interface. **dedicated** disables SLIP and PPP EXEC commands, and sets the encapsulation to what is configured for the interface.
Step 6	**peer default ip address pool** *name* **Example:** `Router(config-if)#peer default ip address pool name`	Specifies an IP address from the defined IP address pool to be returned to a remote peer connecting to this interface.

	Command or Action	Purpose
Step 7	**no cdp enable** **Example:** `Router(config-if)#no cdp enable`	Disables Cisco Discovery Protocol on this interface.
Step 8	**group-range** *start-range end-range* **Example:** `Router(config-if)#group-range 0/322 0/345`	Associates one or more interfaces to the group interface so that all associated interfaces can be configured through the group interface.

Configuring the Dialer Interface

The dialer interface is the parent interface that holds the central protocol characteristics for the dialer-rotary group. To configure the dialer interface, perform the following tasks, beginning in global configuration mode:

SUMMARY STEPS

1. **interface Dialer** *number*
2. **ip unnumbered Loopback** *number*
3. **no ip mroute-cache**
4. **encapsulation ppp**
5. **peer default ip address pool** *name*
6. **dialer in-band**
7. **dialer-group** *number*
8. **no fair-queue**
9. **no cdp enable**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**interface Dialer** *number* **Example:** `Router(config)# interface dialer 101`	Defines a dialer rotary group leader.
Step 2	**ip unnumbered Loopback** *number* **Example:** `Router(config-if)# ip unnumbered loopback 0`	Enables IP processing on the loopback interface without assigning an explicit IP address to the interface.
Step 3	**no ip mroute-cache** **Example:** `Router(config-if)# no ip mroute cache`	Disables IP multicast fast switching.

	Command or Action	Purpose
Step 4	**encapsulation ppp** **Example:** `Router(config-if)# encapsulation ppp`	Sets the PPP as the encapsulation method used by this interface.
Step 5	**peer default ip address pool** *name* **Example:** `Router(config-if)#`	Specifies an IP address from the defined IP address pool to be returned to a remote peer connecting to this interface.
Step 6	**dialer in-band** **Example:** `Router(config-if)# dialer in-band`	Specifies that dial-on-demand routing (DDR) be supported.
Step 7	**dialer-group** *number* **Example:** `Router(config-if)# dialer-group 1`	Assigns this interface to the rotary dialer group.
Step 8	**no fair-queue** **Example:** `Router(config-if)# no fair-queue`	Disables fair weighted queuing for this interface.
Step 9	**no cdp enable** **Example:** `Router(config-if)# no cdp enable`	Disables Cisco Discovery Protocol on this interface.

Configuring Modem Pooling

Modems may be pooled so that specific ranges of the available modems are assigned to the various called numbers handled by your system.

Note Any modem not assigned to a defined modem pool is assigned to the default modem pool.

Restrictions

If you are using modem pooling in a CAS configuration, the following restrictions apply:

- There must be at least one modem in the default modem pool for the modem pooling feature to work for CAS calls. This is because every time a CAS call is made, a modem in the default pool is used to collect the digits of the called number. Once the digits are collected, the call is forwarded to the appropriate modem pool. One of the modems in that pool will be allocated for the call, and the modem in the default pool will then be released. If there are no available modems in the default pool, the call will not go through.
- Whenever signaling type **e&m-fgb** is specified in the **ds0-group** command, it is necessary to configure **dtmf dnis** as part of the signaling type.

  `Router(config)# ds0-group 1 timeslots 1-24 type e&m-fgb dtmf dnis`

When **dtmf dnis** is part of the **ds0-group** command, functions in CSM V12 firmware collect the digits of the called number and match them to the called number in the appropriate modem pool, putting the call through. If **dtmf dnis** is not part of the **ds0-group** command, these functions are never activated and no called number match is made, resulting in a default pool modem being used instead of a modem from the correct pool. The call will not go through in such a case.

SUMMARY STEPS

1. **modem-pool** *name*
2. **pool-range** *modem1-modemN*
3. **called-number** *number* **max-conn** *number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**modem-pool** *name* **Example:** `Router(config)# modem-pool tito`	Assigns a name to the modem pool.
Step 2	**pool-range** *modem1-modemN* **Example:** `Router(config)# pool-range 386-388`	Specifies the range of modem numbers assigned to the modem pool. If the modem pool consists of a single modem, the modem number of that modem is entered by itself, as in **pool-range 386**, for example.
Step 3	**called-number** *number* **max-conn** *number* **Example:** `Router(config)# called-number 5557528 max-conn 3`	Specifies a called number assigned to the modem pool. The variable **max-conn** specifies the maximum number of simultaneous calls that may be connected to the called number.

Configuring Modem Recovery

The modem recovery feature is present to detect bad modems and mark them, saving the user from the task of doing this manually. If there are spare modems in the platform, this process could prevent callers from getting dead air or busy signals.

The modem recovery feature uses two CLI commands. The **modem recovery threshold** command sets the number of consecutive failures that a modem must experience before the recovery process is performed. The **modem recovery action** command defines the action taken on the failed modem. The recovery action will either be “disable”, where the IOS will mark the modem bad, or will be “none”, where nothing will happen to the modem and the threshold counter will be reset.

A modem failure is defined as any time that the CSM assigns a call to a modem, but that modem does not reach steady state. The call would be classed as a “no answer” or as a trainup failure.

To configure modem recovery, enter the following commands in global configuration mode.

SUMMARY STEPS

1. **modem recovery threshold** *failed-calls*
2. **modem recovery action** {**disable** | **none**}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**modem recovery threshold** *failed-calls* **Example:** `Router(config)# modem recovery threshold 10`	Specifies the number of consecutive failure that must occur on a modem before modem recovery action takes place. The range is 0 to 1000. The default value is 30.
Step 2	**modem recovery action** {**disable** | **none**} **Example:** `Router(config)# modem action recovery disable`	Specifies the action to be taken on a modem when its modem recovery threshold is reached. **disable** will cause the IOS to mark the modem as bad and remove it from service. **none** will reset the threshold counter for the modem, but will do nothing else. The modem stays in service.

Example

The following configuration will result in a modem being marked bad by the IOS after 8 consecutive failures.

```
router(config)# modem recovery threshold 8
router(config)# modem recovery action disable
```

Loading Modem Firmware

To load a different version of CSM V12 firmware into the digital modem PVDM2s, use the **modem firmware** command in global configuration mode.

Note It may take two to four minutes for the new version to appear.

SUMMARY STEPS

1. **configure terminal**
2. **modem firmware slot** *slot-number* **location** *ifsfilename*
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters router configuration mode.
Step 2	**modem firmware slot** *slot-number* **location** *ifsfilename* **Example:** `Router(config)# modem firmware slot 0 location flash:V3_08.axf`	Loads a different version of CSM V12 firmware into the digital modem PVDM2s. • *slot-number* specifies the chassis slot that contains the PVDM modules with CSM V12 digital modems. In ISR routers, slot 0, the router's motherboard, is the chassis slot for all digital modem PVDM2s. • *ifsfilename* specifies the Cisco IOS file system (IFS) filename of the CSM V12 firmware to be loaded into the modem.
Step 3	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.

Verification of Firmware Loading

Use the **show modem version** command to verify that the new firmware version has been downloaded to the modems. In the example shown here, the router has a PVDM2-24DM module with 24 digital modems (channel numbers 386 to 409). Version 3.07 of the firmware is replaced with version 3.08. Version 3.08 is stored in the file *flash:V3_08.axf* in the router's flash memory.

Before the download takes place, the **show modem version** command shows the following:

```
Router#show modem version
Slot 0:
PVDM 1: PVDM2-24DM - HW Version 1, FPGA Version 3.2, NiOS(2) 5.0.1
 Modem 0/386-0/397:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3.07
 Modem 0/398-0/409:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3.07

Router#
```

Download the firmware as follows:

```
Router>configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#modem firmware slot 0 location flash:V3_08.axf
This command will disconnect any active calls.
Proceed with firmware upgrade? [confirm]
 Modem Slot 0: Started firmware download.
 Modem 0/386 - 0/409 ...
 Modem Slot 0: Completed firmware download

Router(config)#exit
Router#
```

After the download takes place, the **show modem version** command shows the following:

```
Router#show modem version
Slot 0:
PVDM 1: PVDM2-24DM - HW Version 1, FPGA Version 3.2, NiOS(2) 5.0.1
 Modem 0/386-0/397:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3.08
 Modem 0/398-0/409:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3.08

Router#
```

Configuration Using NM-xCE1T1-PRI Network Modules

To configure NM-CE1T1 network modules for PRI operation or CAS operation, perform the following procedures.

- Configuring the T1/E1 Network Module, page 15 (required)
- Configuring ISDN Digital Modem Calls (PRI), page 16 (optional)
- Configuring Digital Trunk Calls (CAS), page 18 (optional)

Configuring the T1/E1 Network Module

The first step in configuring a digital modem interface is to configure the channelized T1 or E1 network module. The Cisco NM-1CE1T1-PRI network module has one port; The Cisco NM-2CE1T1-PRI network module has two ports. If the network module installed in your router has two ports, you need to do the following procedure on both ports.

SUMMARY STEPS

1. **card type** {**t1** | **e1**} *slot*
2. **network-clock-participate slot** *slot-number*
3. **network-clock-select** *priority* {**t1** | **e1**} *slot/port*
4. **controller** {**t1** | **e1**} *slot/port*
5. **framing** {**sf** | **esf** | **crc4** | **no crc4**}
6. **linecode** {**ami** | **b8zs** | **hdb3**}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**card type** {**t1** | **e1**} *slot* **Example:** `Router(config)# card type t1 1`	Specifies the network module type in the named slot.
Step 2	**network-clock-participate slot** *slot-number* **Example:** `Router(config-if)# network-clock-participate slot 1/0`	Allows the ports on a specified network module to use the network clock for timing.
Step 3	**network-clock-select** *priority* {**t1** | **e1**} *slot/port* **Example:** `Router(config-if)# network-clock-select 1 t1 1/0`	Specifies the clocking configuration for the selected port.
Step 4	**controller** {**t1** | **e1**} *slot/port* **Example:** `Router(config-if)# controller t1 1/0`	Allows configuration of the selected T1 or E1 controller.
Step 5	**framing** {**sf** | **esf** | **crc4** | **no crc4**} **Example:** `Router(config-if)# framing esf`	Specifies frame type for a T1 or E1 connection. • **sf** selects super frame type for T1. • **esf** selects extended super frame type for T1. • **crc4** selects crc4 frame type for E1. • **no crc4** selects no crc4 frame type for E1.
Step 6	**linecode** {**ami** | **b8zs** | **hdb3**} **Example:** `Router(config-if)# linecode b8zs`	Selects the linecode type for a T1 or E1 connection. • **ami** specifies ami linecode type. Valid for T1 and E1. Default value for T1. • **b8zs** specifies b8zs linecode type. Valid for T1 only. • **hdb3** specifies linecode type hdb3. Default value for E1.

Configuring ISDN Digital Modem Calls (PRI)

Perform the following procedures to complete the configuration of digital modem PVDM2s for ISDN digital data calls.

- Configuring the ISDN Switch Type and PRI Group, page 17 (required)
- Configuring the ISDN D-Channel Serial Interface, page 17 (required)

Configuring the ISDN Switch Type and PRI Group

Perform the following steps to properly connect with the ISDN central office and to define the group of timeslots used.

SUMMARY STEPS

1. **isdn switch-type** *switch-type*
2. **pri-group timeslots** *timeslot-range*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**isdn switch-type** *switch-type* **Example:** `Router(config)# isdn switch-type primary-qsig`	Specifies the central office switch type on the ISDN interface. See the Cisco IOS Release 12.4 Master Commands List for a complete listing of supported signaling methods.
Step 2	**pri-group timeslots** *timeslot-range* **Example:** `Router(config)# pri-group timeslots 1-24`	Specifies an ISDN PRI group on a channelized T1 or E1 controller. *timeslot-range* specifies the time slots that are included in the PRI group. For T1 ports, time slots range from 1 to 24. For E1 ports, time slots range from 1 to 31.

Configuring the ISDN D-Channel Serial Interface

When you configure ISDN PRI on a channelized E1 or channelized T1 controller, you create a corresponding D-channel serial interface used to carry signaling messages for that PRI group. For E1 modules, channel 15 is the D-channel. For T1 modules, channel 23 is the D-channel. You must configure this signaling interface in order to receive incoming and modem calls.

The PRI network modules and interface cards for your router can have either one or two ports; therefore you might have multiple D-channels to configure.

To configure the ISDN D-channel serial interface for E1 or T1 controllers, perform the following tasks, beginning in global configuration mode:

SUMMARY STEPS

1. **interface Serial** *slot/port:channel*
2. **no ip address**
3. **encapsulation ppp**
4. **isdn incoming-voice modem**
5. **no fair-queue**
6. **no cdp enable**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**interface Serial** *slot/port:channel* **Example:** `Router(config)# interface Serial 1/0:23`	Specifies the D-channel of the first PRI line and switch to the interface configuration mode. • For E1 controllers, *channel* = 15 • For T1 controllers, *channel* = 23
Step 2	**no ip address** **Example:** `Router(config-if)# no ip address`	Disables IP processing on this interface.
Step 3	**encapsulation ppp** **Example:** `Router(config-if)# encapsulation ppp`	Sets the Point-to-Point Protocol (PPP) as the encapsulation method used by this interface.
Step 4	**isdn incoming-voice modem** **Example:** `Router(config-if)# isdn incoming-voice modem`	Configures all incoming voice calls to go to the modems.
Step 5	**no fair-queue** **Example:** `Router(config-if)# no fair-queue`	Disables fair weighted queuing for this interface.
Step 6	**no cdp enable** **Example:** `Router(config-if)# no cdp enable`	Disables Cisco Discovery Protocol on this interface.

Configuring Digital Trunk Calls (CAS)

Perform the following step to complete the configuration of digital modem PVDM2s for CAS digital trunk calls.

SUMMARY STEPS

1. **ds0-group** *group-number* **timeslots** *list* **type** *type*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ds0-group** *group-number* **timeslots** *list* **type** *type* **Example:** `Router(config)# ds0-group 1 timeslots 1-24 type e&m-immediate-start`	Specifies the DS0 time slots that make up a port. *list* specifies the time slots that are included in the DS0 group. For T1 ports, time slots range from 1 to 24. For E1 ports, time slots range from 1 to 31. Refer to Cisco IOS Release 12.4 Master Commands List for a complete listing of supported signaling methods.

Configuration Using HWIC-xCE1T1-PRI

To configure T1/E1HWICs for PRI operation, perform the following tasks:

SUMMARY STEPS

1. **network-clock-participate** [**slot** *slot-number* | **wic** *wic-slot*]
2. **controller** {**t1** | **e1**} *slot*/*subslot*/*port*
3. **framing** {**sf** | **esf**}

   or

   framing {**crc4** | **no-crc4**}
4. **linecode** {**ami** | **b8zs**}

   or

   linecode {**ami** | **hdb3**}
5. **pri-group** *timeslot-range*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**network-clock-participate** [**slot** *slot-number*	**wic** *wic-slot*] **Example:** `Router(config)# network-clock-participate wic 0`	TDM group configuration only. Allows the ports on a specified network module or interface card to use the network clock for timing.
Step 2	**controller** {**t1**	**e1**} *slot*/*subslot*/*port* **Example:** `Router(config)# controller t1 1/0`	Enters controller configuration mode.

	Command or Action	Purpose
Step 3	**framing** {**sf** | **esf**} or **framing** {**crc4** | **no-crc4**} **Example:** `Router(config-controller)# framing esf`	In T1 configurations, specifies super frame (**sf**) or extended super frame (**esf**) as the frame type for data lines. Default is **esf**. In E1 configurations, specifies cyclic. redundancy check 4 (**crc4**) or **no-crc4** as the frame type for data lines. Default is **crc4**.
Step 4	**linecode** {**ami** | **b8zs**} or **linecode** {**ami** | **hdb3**} **Example:** `Router(config-controller)# linecode b8zs`	In T1 configurations, specifies alternate mark inversion (AMI) or b8zs as the linecode. Default is **b8zs**. In E1 configurations, specifies AMI or high-density bipolar 3 (hdb3) as the linecode. Default is **hdb3**.
Step 5	**pri-group** *timeslot-range* **Example:** `Router(config-controller)# pri-group timeslots 1-24`	Configures specified timeslots on T1 or E1 interfaces for PRI for transporting ISDN data.

Configuration Using VIC2-2BRI-NT/TE

To configure VIC2-2BRI VICs for BRI operation, perform the following steps.

SUMMARY STEPS

1. **configure terminal**
2. **isdn switch-type** {**basic-net3** | **basic-qsig**}
3. **interface bri** <*slot*/*port*>
4. **no ip address**
5. **end**

DETAILED STEPS

	Command	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters the global configuration mode.
Step 2	**isdn switch-type {basic-net3 | basic-qsig}** **Example:** `router(config)# isdn switch-type basic-net3`	Specifies the ISDN switch type.
Step 3	**interface bri** *<slot/port>* **Example:** `router(config)# interface bri 0/0`	Changes to interface configuration mode for a given port in a designated slot.
Step 4	**no ip address** **Example:** `router(config-if)# no ip address`	Specifies that there is no IP address for this interface.
Step 5	**end** **Example:** `router(config-if)# end`	Exits configuration mode.

Configuration Examples for Digital Modem PVDM2s

This section provides the following configuration examples:

Configuring a T1 Controller for CAS Digital Trunk Calls: Example

The following example shows the T1 CAS configuration for a PVDM2-36DM module in PVDM slot 0 of a Cisco 2851 router.

```
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
card type t1 1
!
no aaa new-model
!
resource policy
!
network-clock-participate slot 1
network-clock-select 1 T1 1/0
!
modem country v12 t1-default
!
ip cef
!
no ip domain lookup
!
controller T1 1/0
 framing esf
 linecode b8zs
 ds0-group 1 timeslots 1-24 type e&m-immediate-start
!
controller T1 1/1
 framing esf
 linecode b8zs
!
interface Loopback0
 ip address 10.0.0.1 255.255.255.255
!
interface GigabitEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
!
interface Dialer101
 ip address 10.101.0.1 255.255.0.0
 encapsulation ppp
 dialer pool 1
 dialer idle-timeout 2147483
 dialer string 101
```

```
 dialer-group 1
 no cdp enable
 no ppp authentication
!
interface Group-Async1
 no ip address
 encapsulation ppp
 load-interval 30
 dialer in-band
 dialer pool-member 1
 async mode dedicated
 no peer default ip address
 no ppp authentication
 group-range 0/322 0/357
!
no ip http server
!
dialer-list 1 protocol ip permit
!
control-plane
!
line con 0
 exec-timeout 0 0
line aux 0
 exec-timeout 0 0
line 0/322 0/357
 modem InOut
 transport input all
line vty 0 4
 password *****
 login
!
scheduler allocate 20000 1000
!
end
```

Configuring a T1 Controller for ISDN Digital Modem Calls: Example

The following example shows the T1 PRI (ISDN) configuration for a PVDM2-36DM module in PVDM slot 0 of a Cisco 2851 router.

```
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
card type t1 1
!
no aaa new-model
!
resource policy
!
network-clock-participate slot 1
network-clock-select 1 T1 1/0
!
modem country v12 t1-default
!
ip cef
!
no ip domain lookup
!
isdn switch-type primary-qsig
```

```
!
controller T1 1/0
 framing esf
 linecode b8zs
 pri-group timeslots 1-24
!
controller T1 1/1
 framing esf
 linecode b8zs
!
interface Loopback0
 ip address 10.0.0.1 255.255.255.255
!
interface GigabitEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
!
interface Serial1/0:23
 no ip address
 encapsulation ppp
 isdn switch-type primary-qsig
 isdn incoming-voice modem
 no cdp enable
!
interface Dialer101
 ip address 10.101.0.1 255.255.0.0
 encapsulation ppp
 dialer pool 1
 dialer idle-timeout 2147483
 dialer string 101
 dialer-group 1
 no cdp enable
 no ppp authentication
!
interface Group-Async1
 no ip address
 encapsulation ppp
 load-interval 30
 dialer in-band
 dialer pool-member 1
 async mode dedicated
 no peer default ip address
 no ppp authentication
 group-range 0/322 0/357
!
no ip http server
!
dialer-list 1 protocol ip permit
!
control-plane
!
line con 0
 exec-timeout 0 0
line aux 0
 exec-timeout 0 0
line 0/322 0/357
 modem InOut
 transport input all
```

```
line vty 0 4
 password *****
 login
!
scheduler allocate 20000 1000
!
end
```

Additional References

The following sections provide references related to digital modem PVDM2s.

Related Documents

Related Topic	Document Title
Installation instructions for PVDMs in Cisco 2800 series routers	Installing and Upgrading Internal Modules in Cisco 2800 Series Routers
Installation instructions for PVDMs in Cisco 3800 series routers	Installing and Upgrading Internal Components in Cisco 3800 Series Routers
Cisco IOS Command Reference	Cisco IOS Master Commands List, Release 12.4
Modem Pooling - PRI	DNIS and Modem Pooling with a PRI Line
Modem Pooling - CAS	DNIS and Modem Pooling Using a CAS T1 Line

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents new commands only.

New Commands

- **debug pvdm2dm**
- **modem country v12**
- **show modem configuration (pvdm2)**
- **show modem log (pvdm2)**
- **show modem operational-status (pvdm2)**
- **show modem version (pvdm2)**

debug pvdm2dm

To view contents of packets flowing through PVDMII-xxDM digital modem devices, use the **debug pvdm2dm** command in privileged EXEC mode. To disable debug activity, use the **no** form of this command.

debug pvdm2dm packet <modem | pvdm> <*slot*>/<*port* | *pvdm slot*>

no debug pvdm2dm

Syntax Description

packet	Debugs packets
modem	Debugs modem packets
pvdm	Debugs PVDM packets
slot	Router slot for pvdms/modems
port	Modem number
pvdm slot	PVDM number

Command Default

Disabled

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(9)T	This command was introduced.

Usage Guidelines

To debug the contents of modem packets for a specific modem, use the following command:

- **debug pvdm2dm packet modem** <*slot*>/<*port*>

By removing the specific modem number at the end, one can enable packet debugging for all the modems available on the router:

- **debug pvdm2dm packet modem**

The following command enables packet debugging for all packets flowing through a particular PVDMII-xxDM device:

- **debug pvdm2dm packet pvdm** <*slot*>/<*pvdm slot*>

The following command enables debugging of packets flowing through any PVDMII-xxDM device:

- **debug pvdm2dm packet pvdm**

The following command enables debugging of packets flowing through any PVDMII-xxDM device and any PVDMII-xxDM-based modem channel:

- **debug pvdm2dm packet**

To see what debug flags are set, and to view the contents of debugged packets, use the **show debugging** command.

Examples

The following example sets debugging for a specific modem. The following **show debugging** command displays the debug flag that is set, and gives a typical printout for one debugged packet:

```
Router# debug pvdm2dm packet modem 0/322
Router# show debugging
PVDM2 DM:
  Modem 0/322 packet debugging is on
Router#
May 24 17:35:16.318: pvdm2_dm_tx_dsp_pak_common: bay 0, dsp 0 May 24 17:35:16.318:
pvdm2_dm_dump_pak_hex: pak: 43E1F6FC size 8 May 24 17:35:16.318: 00 08 00 00 00 1C 00 00
May 24 17:35:16.322:
```

The following example sets debugging for all PVDMII-xxDM modems available on the router.

```
Router# debug pvdm2dm packet
Router# show debugging
PVDM2 DM:
  Modem 0/322 packet debugging is on
  Modem 0/323 packet debugging is on
  Modem 0/324 packet debugging is on
  .
  .
  .
  Modem 0/355 packet debugging is on
  Modem 0/356 packet debugging is on
  Modem 0/357 packet debugging is on
Router#
```

The following example sets debugging for a particular PVDMII-xxDM device.

```
Router# debug pvdm2dm packet pvdm 0/0
Router# show debugging
PVDM2 DM:
  PVDM2 0/0 packet debugging is on
Router#
```

The following example sets debugging for all PVDMII-xxDM devices in the router.

```
Router# debug pvdm2dm packet pvdm
Router# show debugging
PVDM2 DM:
  PVDM2 0/0 packet debugging is on
  PVDM2 0/1 packet debugging is on
  PVDM2 0/2 packet debugging is on
Router#
```

In all of these examples, the output describing the debugged packets is similar to that of the first example, except that the packet contents will vary.

Related Commands

Command	Description
show debugging	Displays information about the type of debugging enabled for your router.

modem country v12

To configure the modem country code for a bank of V12 modems, use the **modem country v12** command in global configuration mode. To remove a country code from service, use the **no** form of this command.

modem country v12 *country*

no modem country v12 *country*

Syntax Description

country	Country name. See Usage Guidelines for a list of the supported country names.

Command Default

Command is disabled.

Command Modes

Global configuration

Command History

Release	Modification
12.4(9)T	This command was introduced.

Usage Guidelines

The supported codes for the *country* argument are as follows:

- **australia**
- **austria**
- **belgium**
- **china**
- **cyprus**
- **czech-republic** (Czech/Slovak Republic)
- **denmark**
- **e1-default** (Default E1, a-law)
- **finland**
- **france**
- **germany**
- **hong-kong**
- **india**
- **ireland**
- **israel**
- **italy**
- **japan**

- **malaysia**
- **netherlands**
- **new-zealand**
- **norway**
- **poland**
- **portugal**
- **russia**
- **singapore**
- **south-africa**
- **spain**
- **sweden**
- **switzerland**
- **t1-default** (Defaults T1, u-law)
- **taiwan**
- **thailand**
- **turkey**
- **united-kingdom**
- **usa**

Examples

The following example sets the V12 modems for operation in Sweden:

```
modem country v12 sweden
```

show modem configuration (pvdm2)

To display the current modem configuration for digital modems on PVDM2-xxDM devices, use the **show modem configuration** command in privileged EXEC mode.

show modem configuration [*slot/modem number*]

Syntax Description

slot/modem number	(Optional) Slot and modem number. If this number is not specified, statistics for all connected modems are displayed. You must type in the forward slash (*/*).

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(11)XW	This command was introduced.

Examples

The following is sample output from the **show modem configuration** command for a V12 modem. A specific modem, 0/322, is designated.

```
Router# show modem configuration 0/322
Modem (0/322) Configuration Status:

  S-Reg   Value   Meaning
 -------|-------|-----------------------------------------------
    S00 = 0       Auto Answer disabled
    S01 = 0       Ring Counter is 0
    S02 = 43      escape character is 0x2B or '+'
    S03 = 13      carriage return character is 0xD
    S04 = 10      line feed character is 0xA
    S05 = 8       backspace character is 0x8
    S06 = 2       pause 2 seconds before blind dialing
    S07 = 70      wait up to 70 seconds for carrier after dialing
    S08 = 2       comma adds 2 second dial delay
    S09 = 6       0.6 second Carrier detect response time
    S10 = 14      1.4 second delay for hangup after carrier loss
    S11 = 95      0.095 second DTMF Tone Duration
    S11 = 50      Escape Prompt Delay (in .02s)
    S14 = 138     Command echo enabled (E1), Send result codes (Q0),
                  Result codes is verbose (V1), Tone (T), Originate,
    S16 = 0       Local analog loopback disabled
                  Local digital loopback disabled
                  Remote digital loopback not in progress RDL not requested
                  RDL with self test disabled
                  Local analog loopback with self test disabled
    S18 = 0       Test Timer = 0x0, test will not terminate if zero
    S21 = 52      Set by &J0 command but ignored otherwise,
                  CTS always on (&R1), DTR behavior &D2 selected,
                  RLSD (DCD) behavior &C1 selected,
                  DSR behavior &S0 selected Long space disconnect Y0,
    S22 = 119     Speaker/Results 0x77 not supported
    S23 = 54      RDL not allowed (&T5), DTE Rate 2400 bps,
                  Assumed DTE parity none, Guard tone none (&G0),
```

```
S24 = 0         0 second Sleep Inactivity Timer
S25 = 5         Delay 5 (sec for async; 0.01 sec otherwise) to ignore DTR
S26 = 1         Delay 0.01 seconds RTS to CTS Delay
S27 = 73        Sync./Async. selection &Q5 Dial up line (&L0),
                Internal clock (&X0), Bell mode (B1),
S28 = 0         39%-61% make/break ratio at 10 pulses per second (&P0)
S29 = 70        Flash Dial Modifier Time is 700 ms
S30 = 0         No Disconnect Inactivity Timer
S31 = 6         Single line connect message controlled by S95, Wn and Vn
                Auto line speed detection enabled(N1)
                Error correction progress messages full reporting (W1)
S32 = 17        XON character is 0x11
S33 = 19        XOFF character is 0x13
S36 = 7         Attempt MNP connection, if fails, Normal mode
S37 = 0         Attempt automode connection
S38 = 20        20 seconds Delay Before Forced Hang Up
S39 = 3         RTS/CTS (&K3)
S40 = 88        Disable extended services(-K0)
                Break Handling (\Kn) not supported
                NMP block size 128 chars (\A1)
S41 = 139       Compression selection is MNP 5 and V.42 bis
                Retrain and fallback/fall forward disabled
S46 = 138       Execute error correction protocol with compression
S48 = 7         V.42 negotiation enabled
S82 = 128       Break Handling Options/LAPM Break Control = 0x80
S82 = 21
S91 = 13        -13 dBm Transmit Level in analog modulations
S92 = 13        -13 dBm Transmit Level for the fax mode
S95 = 0         CONNECT result code indicates DTE speed
                Not append/ARQ to CONNECT 'rate' in error-correction
                Disable CARRIER 'rate' result code
                Disable PROTOCOL 'identifier' result code
                Disable COMPRESSION 'type' result code
S200 = 223      Enable K56Plus
S202 = 2        K56Plus protocol follows the setting of ATNn
                Enables V.90 digital pad compensation
                Disable Display Tx and Rx HNDSHK states
                No automatic CX802xx/CX803xx status response
                K56flex Tx level is -12 dBm V90 Tx level is -12 dBm
                Disable V.42 selective reject
S210 = 13       2400,2800,3000,3200,3429 V.34 asymmetric rates enabled
S220 = 11       Duration of Answer Tone is 0xB (in units of 450ms)
S221 = 50       500 ms Duration of Billing Delay
S222 = 0
S223 = 23       -12 dBm V.90 PCM Transmit Level
S224 = 0        Digital detect timer (100ms per unit)
```

Table 2 describes the S register fields shown in the display.

Table 2 show modem configuration Field Descriptions for V12 Modems

S Register	Field	Description
S00	Rings to Auto-Answer	0 to 255. Default is 0.
S01	Ring Counter	0 to 255. Default is 0.
S02	Escape Character	Default is 43.
S03	Carriage Return Character	Default is 13.
S04	Line Feed Character	Default is 10.
S05	Backspace Character	Default is 8.

Table 2 show modem configuration Field Descriptions for V12 Modems (continued)

S Register	Field	Description
S06	Wait Time Before Blind Dialing	2 to 255 seconds. Default/minimum is 2.
S07	Wait Time for Carrier, Silence, or Dial Tone	1 to 255 seconds. Default is 50.
S08	Pause Time for Dial Delay	0 to 255 seconds. Default is 2.
S09	Carrier Detect Response Time	1to 255 in 100 ms increments. Default is 6 (0.6 seconds).
S10	Lost Carrier to Hangup Delay	1 to 255 in 100 ms increments. Default is 14 (1.4 seconds).
S11	DTMF Tone Duration	Returns OK. Default is 95 (0.095 seconds).
S12	Escape Prompt Delay (EPD)	Returns OK. Default is 50 (1.00 seconds).
S14	General Bit Mapped Options Status	Sets/resets command echo, quiet mode, result codes, tone/pulse, originate/answer.
S16	General Bit Mapped Test Options Status	Status of analog and digital loopback tests.
S18	Test Timer	Length of test before returning to command mode. 0 to 255 seconds. Default is 0.
S21	V24/General Bit Mapped Options Status	Status of behavior of CTS, DTR, DCD, and DSR.
S22	Speaker/Results Options Status	Not supported.
S23	General Bit Mapped Options Status	Status of RDL, DTE rate, DTE parity, and guard tone.
S24	Sleep Inactivity Timer	0 to 255 seconds. Default is 0 (no sleep).
S25	Delay to DTR	0 to 255 in 10 ms increments (or full seconds for synchronous modes). Default is 5.
S26	RTS to CTS Delay	0 to 255 in 10 ms increments. Default is 1.
S27	Bit Mapped Options Status	Sync/async selection, leased line control, clock select, CCITT/Bell mode select.
S28	Bit Mapped Options Status	Pulse dialing make/break ratio. Default is 39 - 61% at 10 pulses/second.
S29	Flash Dial Modifier Time	0 to 255 in 10 ms increments. Default is 70 (0.7 seconds).
S30	Disconnect Inactivity Timer	0 to 255 in 10 second increments (0 to 2550 seconds). Default is 0 (disabled).
S31	Bit Mapped Options Status	Single line connect message, auto line speed detect, error correction progress message.
S32	XON Character	Default is 0x11.
S33	XOFF Character	Default is 0x17.
S36	LAPM Failure Control	Indicates activity on a LAPM failure.
S37	Desired Line Connection Speed	Default is 0 (automode connection).
S38	Delay Brfore Forced Hangup	0 to 255 seconds. Default is 20.

Table 2 show modem configuration Field Descriptions for V12 Modems (continued)

S Register	Field	Description
S39	Flow Control Bit Mapped Options Sta'tus	Status of flow control.
S40	General Bit Mapped Options Status	MNP extended services, block size, and break handling.
S41	General Bit Mapped Options Status	Compression selection, auto retrain, fallback/fall forward.
S46	Error Correction Protocol	Default is 138 (execute protocol with compression).
S48	V42 Negotiation	Default is 7 (negotiate).
S82	Break Handling Options	LAPM Break Control.
S86	Call Failure Reason Code	Default is 21 (clear previous reason value).
S91	PSTN Transmit Attenuation Level in Analog Modulations	0 to 20 (0 to -20 dBm transmit level). Default is 10 (-10 dBm).
S92	Fax Transmit Attenuation Level	10 to 15 (-10 to -15 dBm transmit level). Default is 10 (-10 dBm).
S95	Extended Result Codes	Indicates overriding of Wn command options.
S200	Disable K56Plus Protocol	Default is 223 (enables).
S202	CSM Bit Mapped Control Register	Controls K56flex/V90 Tx level and automatic CX802xx/CX803xx status response.
S210	Symbol Rate Limit	V34 symbol rate limit, symmetric or asymmetric.
S220	Duration of Answer Tone	Command is in units of 450 ms. Default is 11 (4950 ms).
S221	Duration of Billing Delay	0 to 255 in 10 ms increments. Default is 50 (500 ms).
S222	General Purpose Register	Status of Lucent negotiation with V.8bis.
S223	V.90 PCM Transmit Level Adjust	0 to -16 dBm. Default is 23 (-12 dBm).
S224	Digital Detect Timer	Autodetects incoming call from ISDN V110/V120 or analog modem. 0 to 100 in 100 ms increments. Default is 0.

Related Commands

Command	Description
show modem log (pvdm2)	Displays the modem history event status performed on a manageable modem or group of modems.
show modem operational-status (pvdm2)	Displays the current modem operational status for V12 digital modems on PVDM2-xxDM devices.

show modem log (pvdm2)

To display the modem history event status performed on a manageable modem on a PVDM2-xxDM device, use the **show modem log** command in privileged EXEC mode.

show modem log *slot/modem number*

Syntax Description

slot/modem number	(Optional) Slot and modem number. If this number is not specified, statistics for all connected modems are displayed. (Include the forward slash (**/**) when entering this variable.)

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(11)XW	This command was introduced.

Examples

The following is sample output from the **show modem log** command issued on a Cisco PVDMII-xxDM device with V12 digital modems. A specific modem, 0/323, is designated.

```
Router# show modem log 0/323
Modem 0/322 V12: Event Log contains 72 Events:
 00:15:31.116 CSM: Incoming call from Unknown to 223
 00:15:31.116 CSM: event-ISDN_CALL New State-IC_MODEM_RESERVED
    CSM: status-1 dchan-0/3 bchan-0
 00:15:31.068 Cmd: PCMENCODE
 00:15:31.068 Cmd: CMDDAT Config Change ATS
 5B 0D DF 17
 00:15:31.068 CSM: event-ISDN_CONNECTED New State-WAIT_FOR_CARRIER
 00:15:31.036 CSM: event-CSM_EVENT_MODEM_SETUP New State-WAIT_FOR_CARRIER
 00:15:31.036 Ntf: PCMENCODE
 00:15:31.032 Ntf: CMDDAT Config Acknowledge ATS
 Pass Pass
 00:15:31.032 Ntf: CMDREQ
 00:15:31.012 Cmd: LINECON
 00:15:31.012 Ntf: ANSDET
 00:15:14.092 Cmd: CMDDAT Statistic--Data Transfer Information

 00:15:14.092 CSM: event-MODEM_CONNECTED New State-CONNECTED_STATE
 00:15:14.092 Ntf: CHANCON
 00:15:14.088 Ntf: CMDDAT Statistic--Data Transfer Information
 Error correction               77    LAP-M
 Data compression               68    V44
 Modulation type                206   V.34
 receive speed                  16    33600
 transmit speed                 16    33600
 error correction frames sent   0
 error correction frames rcvd   0
 characters transmitted         0
 characters received            0
 synchronous frames sent        0
 synchronous frames rcvd        0
 bad synchronous frames rcvd    0
```

```
reject frames sent              0
reject frames rcvd              0
total retransmissions           0

00:15:16.080 Ntf: CMDREQ
00:15:16.076 Ntf: DCERPT
00:15:16.076 Cmd: SETSYNC
00:15:16.072 Ntf: CONFIGACK
00:15:13.844 Cmd: ACCMTX
00:15:13.844 Cmd: ACCMRX
00:15:13.840 Ntf: CONFIGACK
00:15:13.840 Ntf: CONFIGACK
00:15:13.600 Cmd: ACCMTX
00:15:13.600 Cmd: ACCMRX
00:15:13.600 Ntf: CONFIGACK
00:15:13.596 Ntf: CONFIGACK
00:13:24.384 Cmd: CMDDAT Statistic--Data Transfer Information


00:13:24.380 Ntf: CMDDAT Statistic--Data Transfer Information
Error correction                77    LAP-M
Data compression                68    V44
Modulation type                 206   V.34
receive speed                   16    33600
transmit speed                  16    33600
error correction frames sent    7
error correction frames rcvd    12
characters transmitted          218
characters received             487
synchronous frames sent         7
synchronous frames rcvd         12
bad synchronous frames rcvd     0
reject frames sent              0
reject frames rcvd              0
total retransmissions           0

00:13:44.996 Ntf: CMDREQ
00:13:44.996 Cmd: CMDDAT Statistic--Call Summary Information

00:13:44.992 Ntf: CMDDAT Statistic--Call Summary Information
Disconnect reason               21    Clears previous disconnect reason
Retrain/rate renegotiate reason 0     None
Connection time (hours)         0
Connection time (minutes)       1
Connection time (seconds)       53
Initial receive speed           16    33600
Initial transmit speed          16    33600
Maximum receive speed           16    33600
Maximum transmit speed          16    33600
Minimum receive speed           16    33600
Minimum transmit speed          16    33600
Max retransmit for one frame    1
Total retransmit during connect 0
Minimum EQM                     17
Maximum EQM                     24
Negative EQMs                   0
Minimum SNR                     27    31 dB
Maximum SNR                     27    31 dB
Retrains requested locally      0
Retrains requested remotely     0
Rate renegotiation req locally  0
Rate renegotiation req remotely 0

00:13:47.140 Ntf: CMDREQ
```

```
 00:13:45.436 Cmd: CMDDAT Statistic--DSP Information

 00:13:45.432 Ntf: CMDDAT Statistic--DSP Information
Raw AGC value                   94
 Last EQM                       20
 Transmit symbol rate           5     3429
 Receive symbol rate            5     3429
 Transmit carrier frequency     0     1959 (low)
 Receive carrier frequency      0     1959 (low)
 Minimum AGC reading            94
 Maximum AGC reading            94
 Transmit level                 13
 Remote req tx level reduction  2
 SNR                            27    31 dB
 Transmit non-linear encoding   1     On
 Receive non-linear encoding    1     On
 Transmit precoding             1     On
 Receive precoding              1     On
 Transmit shaping               16
 Receive shaping                16
 Trellis mapping                0     16-state
 Transmit pre-emphasis index    0
 Raw round trip delay           424
 EQM sum low                    0
 EQM sum medium                 0
 EQM sum high                   0

 00:14:18.796 Ntf: CMDREQ
 00:14:17.396 Cmd: CMDDAT Statistic--Digital Impairments

 00:14:17.392 Ntf: CMDDAT Statistic--Digital Impairments
 Ditital pad detected           0
 RBS pattern                    0
 Rate drop due to RBS           255
 V.90 minimum distance (high)   0
 V.90 minimum distance (low)    0
 Raw V.90 digital pad val (high) 255
 Raw V.90 digital pad val (low)  255

 00:14:17.392 Ntf: CMDREQ
 00:14:17.392 Cmd: CMDDAT Statistic--V.8bis(proprietary flex) Information

 00:14:17.388 Ntf: CMDDAT Statistic--V.8bis(proprietary flex) Information
 Negotiation status             74    RLSD on
                                      K56flex/K56Plus negotiation failed
                                      V.90 negotiation not tried
                                      V.90/K56flex negotiation failed
 Non-standard V.8bis Octet 13   148   K56flex (generic)
 Non-standard V.8bis Octet 14   129   Conexant Conexant-based
 Non-standard V.8bis Octet 15   131   K56flex capable, Last byte,
 Non-standard V.8bis Octet 16   66    flex version 0x2, Not prototype,
                                      Server, Not last byte,
 Non-standard V.8bis Octet 17   0     Not last byte,
                                      Conexant data pump revision 0x0
 Non-standard V.8bis Octet 18   0     u-law, x-law not forced,
                                      Not last byte,
                                      Conexant controller revision 0x0

 00:14:18.884 Ntf: CMDREQ
 00:12:09.636 Cmd: CMDDAT Statistic--Data Transfer Information

 00:12:09.632 Ntf: CMDDAT Statistic--Data Transfer Information
 Error correction               77    LAP-M
 Data compression               68    V44
```

```
Modulation type                 206   V.34
receive speed                   16    33600
transmit speed                  16    33600
error correction frames sent    7
error correction frames rcvd    12
characters transmitted          218
characters received             487
synchronous frames sent         7
synchronous frames rcvd         12
bad synchronous frames rcvd     0
reject frames sent              0
reject frames rcvd              0
total retransmissions           0

00:12:10.664 Ntf: CMDREQ
00:12:35.372 Cmd: CMDDAT Statistic--Call Summary Information

00:12:35.368 Ntf: CMDDAT Statistic--Call Summary Information
Disconnect reason               21    Clears previous disconnect reason
Retrain/rate renegotiate reason 0     None
Connection time (hours)         0
Connection time (minutes)       4
Connection time (seconds)       5
Initial receive speed           16    33600
Initial transmit speed          16    33600
Maximum receive speed           16    33600
Maximum transmit speed          16    33600
Minimum receive speed           16    33600
Minimum transmit speed          16    33600
Max retransmit for one frame    1
Total retransmit during connect 0
Minimum EQM                     17
Maximum EQM                     25
Negative EQMs                   0
Minimum SNR                     27    31 dB
Maximum SNR                     27    31 dB
Retrains requested locally      0
Retrains requested remotely     0
Rate renegotiation req locally  0
Rate renegotiation req remotely 0

00:12:36.400 Ntf: CMDREQ
00:12:35.596 Cmd: CMDDAT Statistic--DSP Information

00:13:01.796 Ntf: CMDDAT Statistic--DSP Information
Raw AGC value                   94
Last EQM                        19
Transmit symbol rate            5     3429
Receive symbol rate             5     3429
Transmit carrier frequency      0     1959 (low)
Receive carrier frequency       0     1959 (low)
Minimum AGC reading             94
Maximum AGC reading             94
Transmit level                  13
Remote req tx level reduction   2
SNR                             27    31 dB
Transmit non-linear encoding    1     On
Receive non-linear encoding     1     On
Transmit precoding              1     On
Receive precoding               1     On
Transmit shaping                16
Receive shaping                 16
Trellis mapping                 0     16-state
Transmit pre-emphasis index     0
```

```
Raw round trip delay            424
EQM sum low                     0
EQM sum medium                  0
EQM sum high                    0

00:13:02.832 Ntf: CMDREQ
00:13:01.792 Cmd: CMDDAT Statistic--Digital Impairments

00:13:01.788 Ntf: CMDDAT Statistic--Digital Impairments
Ditital pad detected            0
RBS pattern                     0
Rate drop due to RBS            255
V.90 minimum distance (high)    0
V.90 minimum distance (low)     0
Raw V.90 digital pad val (high) 255
Raw V.90 digital pad val (low)  255

00:13:02.784 Ntf: CMDREQ
00:13:01.748 Cmd: CMDDAT Statistic--V.8bis(proprietary flex) Information

00:13:01.744 Ntf: CMDDAT Statistic--V.8bis(proprietary flex) Information
Negotiation status              74    RLSD on
                                      K56flex/K56Plus negotiation failed
                                      V.90 negotiation not tried
                                      V.90/K56flex negotiation failed
Non-standard V.8bis Octet 13    148   K56flex (generic)
Non-standard V.8bis Octet 14    129   Conexant Conexant-based
Non-standard V.8bis Octet 15    131   K56flex capable, Last byte,
Non-standard V.8bis Octet 16    66    flex version 0x2, Not prototype,
                                      Server, Not last byte,
Non-standard V.8bis Octet 17    0     Not last byte,
                                      Conexant data pump revision 0x0
Non-standard V.8bis Octet 18    0     u-law, x-law not forced,
                                      Not last byte,
                                      Conexant controller revision 0x0

00:13:02.776 Ntf: CMDREQ
00:06:19.580 Cmd: CMDDAT Statistic--Data Transfer Information

00:06:21.296 Ntf: CMDDAT Statistic--Data Transfer Information
Error correction                77    LAP-M
Data compression                68    V44
Modulation type                 206   V.34
receive speed                   16    33600
transmit speed                  16    33600
error correction frames sent    7
error correction frames rcvd    12
characters transmitted          218
characters received             487
synchronous frames sent         7
synchronous frames rcvd         12
bad synchronous frames rcvd     0
reject frames sent              0
reject frames rcvd              0
total retransmissions           0

00:06:21.300 Ntf: CMDREQ
00:06:21.300 Cmd: CMDDAT Statistic--Call Summary Information

00:06:21.296 Ntf: CMDDAT Statistic--Call Summary Information
Disconnect reason               21    Clears previous disconnect reason
Retrain/rate renegotiate reason 0     None
Connection time (hours)         0
Connection time (minutes)       10
```

```
Connection time (seconds)       51
Initial receive speed           16    33600
Initial transmit speed          16    33600
Maximum receive speed           16    33600
Maximum transmit speed          16    33600
Minimum receive speed           16    33600
Minimum transmit speed          16    33600
Max retransmit for one frame    1
Total retransmit during connect 0
Minimum EQM                     17
Maximum EQM                     25
Negative EQMs                   0
Minimum SNR                     27    31 dB
Maximum SNR                     27    31 dB
Retrains requested locally      0
Retrains requested remotely     0
Rate renegotiation req locally  0
Rate renegotiation req remotely 0

00:07:22.856 Ntf: CMDREQ
00:07:21.828 Cmd: CMDDAT Statistic--DSP Information

00:07:21.824 Ntf: CMDDAT Statistic--DSP Information
Raw AGC value                   94
Last EQM                        21
Transmit symbol rate            5     3429
Receive symbol rate             5     3429
Transmit carrier frequency      0     1959 (low)
Receive carrier frequency       0     1959 (low)
Minimum AGC reading             94
Maximum AGC reading             94
Transmit level                  13
Remote req tx level reduction   2
SNR                             27    31 dB
Transmit non-linear encoding    1     On
Receive non-linear encoding     1     On
Transmit precoding              1     On
Receive precoding               1     On
Transmit shaping                16
Receive shaping                 16
Trellis mapping                 0     16-state
Transmit pre-emphasis index     0
Raw round trip delay            424
EQM sum low                     0
EQM sum medium                  0
EQM sum high                    0

00:07:23.216 Ntf: CMDREQ
00:07:22.180 Cmd: CMDDAT Statistic--Digital Impairments

00:07:22.176 Ntf: CMDDAT Statistic--Digital Impairments
Ditital pad detected            0
RBS pattern                     0
Rate drop due to RBS            255
V.90 minimum distance (high)    0
V.90 minimum distance (low)     0
Raw V.90 digital pad val (high) 255
Raw V.90 digital pad val (low)  255

00:07:22.176 Ntf: CMDREQ
00:07:23.208 Cmd: CMDDAT Statistic--V.8bis(proprietary flex) Information

00:07:24.824 Ntf: CMDDAT Statistic--V.8bis(proprietary flex) Information
Negotiation status              74    RLSD on
```

```
                                        K56flex/K56Plus negotiation failed
                                        V.90 negotiation not tried
                                        V.90/K56flex negotiation failed
 Non-standard V.8bis Octet 13    148    K56flex (generic)
 Non-standard V.8bis Octet 14    129    Conexant Conexant-based
 Non-standard V.8bis Octet 15    131    K56flex capable, Last byte,
 Non-standard V.8bis Octet 16    66     flex version 0x2, Not prototype,
                                        Server, Not last byte,
 Non-standard V.8bis Octet 17    0      Not last byte,
                                        Conexant data pump revision 0x0
 Non-standard V.8bis Octet 18    0      u-law, x-law not forced,
                                        Not last byte,
                                        Conexant controller revision 0x0

 00:07:25.856 Ntf: CMDREQ

Router#
```

Table 3 describes the major fields shown in the display.

Table 3 show modem log Field Descriptions for V12 Modems

Field	Description
CSM	PVDM2-xxDM internal state machine commands.
Cmd	Commands sent from Cisco IOS software to V12 modems.
Ntf	Notifications sent from V12 modems to Cisco IOS software.

Related Commands

Command	Description
show modem configuration (pvdm2)	Displays the current modem configuration for V12 digital modems on PVDM2-xxDM devices.
show modem operational-status (pvdm2)	Displays the current modem operational status for V12 digital modems on PVDM2-xxDM devices.
show modemcap	Displays the values set for the current modem and lists the modems for which the router has entries.

show modem operational-status (pvdm2)

To display performance statistics for individual digital modems on PVDM2-xxDM devices, use the **show modem operational-status** command in privileged EXEC mode.

show modem operational-status [*slot*/*port*]

Syntax Description

slot/*modem number*	(Optional) Location of the slot and modem number. If these numbers are not specified, statistics for all connected modems are displayed. You must include the slash mark.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(11)XW	This command was introduced.

Examples

The following example shows details for a V12 digital modem on a PVDMII-xxDM device. A specific modem, 0/322, is designated.

```
Router# show modem operational-status 0/322
Modem (0/322) Operational Status:

 Error correction               77    LAP-M
 Data compression               68    V44
 Modulation type                206   V.34
 receive speed                  16    33600
 transmit speed                 16    33600
 error correction frames sent   7
 error correction frames rcvd   12
 characters transmitted         218
 characters received            487
 synchronous frames sent        7
 synchronous frames rcvd        12
 bad synchronous frames rcvd    0
 reject frames sent             0
 reject frames rcvd             0
 total retransmissions          0

 Disconnect reason              21    Clears previous disconnect reason
 Retrain/rate renegotiate reason 0    None
 Connection time (hours)        0
 Connection time (minutes)      19
 Connection time (seconds)      15
 Initial receive speed          16    33600
 Initial transmit speed         16    33600
 Maximum receive speed          16    33600
 Maximum transmit speed         16    33600
 Minimum receive speed          16    33600
 Minimum transmit speed         16    33600
 Max retransmit for one frame   1
 Total retransmit during connect 0
```

```
 Minimum EQM                     17
 Maximum EQM                     26
 Negative EQMs                   0
 Minimum SNR                     27    31 dB
 Maximum SNR                     27    31 dB
 Retrains requested locally      0
 Retrains requested remotely     0
 Rate renegotiation req locally  0
 Rate renegotiation req remotely 0

 Raw AGC value                   94
 Last EQM                        21
 Transmit symbol rate            5     3429
 Receive symbol rate             5     3429
 Transmit carrier frequency      0     1959 (low)
 Receive carrier frequency       0     1959 (low)
 Minimum AGC reading             94
 Maximum AGC reading             94
 Transmit level                  13
 Remote req tx level reduction   2
 SNR                             27    31 dB
 Transmit non-linear encoding    1     On
 Receive non-linear encoding     1     On
 Transmit precoding              1     On
 Receive precoding               1     On
 Transmit shaping                16
 Receive shaping                 16
 Trellis mapping                 0     16-state
 Transmit pre-emphasis index     0
 Raw round trip delay            424
 EQM sum low                     0
 EQM sum medium                  0
 EQM sum high                    0

 Ditital pad detected            0
 RBS pattern                     0
 Rate drop due to RBS            255
 V.90 minimum distance (high)    0
 V.90 minimum distance (low)     0
 Raw V.90 digital pad val (high) 255
 Raw V.90 digital pad val (low)  255

 Negotiation status              74    RLSD on
                                       K56flex/K56Plus negotiation failed
                                       V.90 negotiation not tried
                                       V.90/K56flex negotiation failed
 Non-standard V.8bis Octet 13    148   K56flex (generic)
 Non-standard V.8bis Octet 14    129   Conexant Conexant-based
 Non-standard V.8bis Octet 15    131   K56flex capable, Last byte,
 Non-standard V.8bis Octet 16    66    flex version 0x2, Not prototype,
                                       Server, Not last byte,
 Non-standard V.8bis Octet 17    0     Not last byte,
                                       Conexant data pump revision 0x0
 Non-standard V.8bis Octet 18    0     u-law, x-law not forced,
                                       Not last byte,
                                       Conexant controller revision 0x0

Router#
```

Related Commands

Command	Description
show modem configuration (pvdm2)	Displays the current modem configuration for digital V12 modems on PVDM2-xxDM devices.
show modem log (pvdm2)	Displays the modem history event status performed on a manageable modem or group of modems.

show modem version (pvdm2)

To display version information about the modem firmware, controller, and boot code, use the **show modem version** command in Privileged EXEC mode.

show modem version

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(11)XW	This command was introduced.

Usage Guidelines

This command is useful for verifying the version of modem firmware running on the system before or after a modem firmware upgrade. If there is a "-/-" in the DSP REV field, you cannot use the **spe** configuration commands for firmware download on that modem.

Examples

The following example displays modem version information about PVDM2-xxDM digital modems. This example specifically shows information about a Cisco 2821 router with three PVDM2-36DMs, high-density pvdms holding 36 digital modems each.

```
Router# show modem version
Slot 0:
PVDM 0: PVDMII-36DM - HW Version 1, FPGA Version 3.3, NiOS(2) 5.0.1
 Modem 0/322-0/333:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09
 Modem 0/334-0/345:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09
 Modem 0/346-0/357:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09

PVDM 1: PVDMII-36DM - HW Version 1, FPGA Version 3.3, NiOS(2) 5.0.1
 Modem 0/386-0/397:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09
 Modem 0/398-0/409:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09
 Modem 0/410-0/421:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09

PVDM 2: PVDMII-36DM - HW Version 1, FPGA Version 3.3, NiOS(2) 5.0.1
 Modem 0/450-0/461:
    PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
    Firmware: V3_09
```

```
Modem 0/462-0/473:
   PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
   Firmware: V3_09
Modem 0/474-0/485:
   PCI Classid: 0x07800001 Bootrom Rev: 0x00005601 Diag Result: 0x0000007F
   Firmware: V3_09
```

Table 4 describes the significant fields shown in the displays of the **show modem version** command.

Table 4 show modem version Field Descriptions

Field	Description
PVDM	PVDM slot number where PVDM2-xxDM is present.
HW Version	Hardware revision number of PVDM2-xxDM.
FPGA Version	FPGA version loaded in the PVDM2-xxDM.
NiOS	The version number of the NiOS core soft processor in PVDM2-xxDM.
Modem	Slot and port number for the specified modem.
PCI Classid	PCI class id of the CSM V12 chipset present in PVDM2-xxDM.
Bootrom Rev	Bootrom revision number of PVDM2-xxDM.
Diag Result	Internal diagnostics result.
Firmware	CSM V12 Firmware version

Feature Information for Digital Modem PVDM2s

Table 5 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 5 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 5 Feature Information for Digital Modem PVDM2s

Feature Name	Releases	Feature Information
PVDM2-12DM, PVDM2-24DM, PVDM2-36DM	12.4(9)T	This feature consists of digital modems in a PVDM2 package. Three models are available with different numbers of modems in the package: 12 modems, 24 modems, and 36 modems.
Digital Modem Support and Modem Resource Pooling	12.4(11)XW 12.4(20)T	Provides support on certain HWIC and VIC interface cards. Provides modem pooling and modem recovery features. The following section provides information about HWIC and VIC support: • Network Interfaces, page 2 The following section provides information about the modem pooling feature: • Configuring Modem Pooling, page 11 The following section provides information about the modem recovery feature: • Configuring Modem Recovery, page 12