Cisco High-Density Packet Voice Digital Signal Processor Modules

This document answers frequently asked questions about the Cisco® High-Density Packet Voice Digital Signal Processor Modules (PVDMs), including the PVDM2, PVDM3, PVDM4 and SM-X-PVDM.

General

Q. What is a PVDM? What function does it provide on the Cisco Integrated Services Routers?

A. A Packet Voice Digital Signal Processor Module (PVDM) is a hardware module that provides digital-signal-processor (DSP) resources to the system. A PVDM module can be populated with one or more DSPs. The DSP resources on a PVDM provide collaboration services including voice sessions, transcoding sessions, conference sessions, and video.

Q. How many types of PVDMs are available?

A. Four PVDM versions are currently supported: the PVDM2, PVDM3, and PVDM4 modules and the SM-X-PVDM service modules. The Cisco 2800 and 3800 Series Integrated Services Routers (ISRs) support only the PVDM2 modules (please note the PVDM2 end-of-sale and end-of-life announcement). The Cisco 2900 and 3900 Series ISRs support both the PVDM2 and PVDM3 modules. The PVDM3 modules provide higher density (up to four times higher) than the PVDM2s. The Cisco 4300 and 4400 Series ISRs support the PVDM4, which has the same density as the PVDM2. PVDM4s are available on T1/E1 network interface modules (NIMs) as well as on the motherboard. On the 4451, 4431, and 4351 routers, which have service- module slots, high-density DSP-Farm PVDM service modules are also available, which can support up to 3080 G.711 transcoding channels.

Q. What are the different PVDMs available for the 3800 and 3900 Series ISRs?

A. Table 1 lists the PVDM3 and PVDM2 modules.

Table 1. PVDM3 and PVDM2 Modules

Name	Description
PVDM3-16	16-channel high-density voice and video DSP module
PVDM3-32	32-channel high-density voice and video DSP module
PVDM3-64	64-channel high-density voice and video DSP module
PVDM3-128	128-channel high-density voice and video DSP module
PVDM3-192	192-channel high-density voice and video DSP module
PVDM3-256	256-channel high-density voice and video DSP module
PVDM2-8	8-channel packet fax/voice DSP module
PVDM2-16	16-channel packet fax/voice DSP module
PVDM2-32	32-channel packet fax/voice DSP module
PVDM2-48	48-channel packet fax/voice DSP module
PVDM2-64	64-channel packet fax/voice DSP module

Q. What are the different PVDMs available on the 4300 and 4400 Series ISRs?

A. Table 2 lists the PVDM4s and SM-X-PVDM service modules.

Table 2. PVDM4 and SM-X-PVDM Modules

Name	Description
PVDM4-32	32-channel high-density voice and video DSP module
PVDM4-64	64-channel high-density voice and video DSP module
PVDM4-128	128-channel high-density voice and video DSP module
PVDM4-256	256-channel high-density voice and video DSP module
SM-X-PVDM-500	768-channel high-density voice and video DSP service module
SM-X-PVDM-1000	1024-channel high-density voice and video DSP service module
SM-X-PVDM-2000	2048-channel high-density voice and video DSP service module
SM-X-PVDM-3000	3080-channel high-density voice and video DSP service module

Q. What codecs do the PVDM2 and PVDM3 support?

A. Table 3 lists supported codecs.

Table 3. Supported Codecs

Codecs	Complexity	PVDM2	PVDM3	PVDM4	SM-X-PVDM
Clear Channel	Low	Y	Y	Y	N
G.711	Low	Y	Y	Y	Y
Fax and Modem Pass-Through	Low	Y	Y	Y	N
G.722	Medium	Y	Y	Y	Y
G.726	Medium	Y	Y	Y	N
G.729A	Medium	Y	Y	Y	Y
G.729AB	Medium	Y	Y	Y	Y
Fax relay	Medium	Y	Y	Y	N
G.723.1	High	Y	N	N	N
G.728	High	Y	Y	Y	N
G.729	High	Y	Y	Y	Y
G.729B	High	Y	Y	Y	Y
iLBC	High	Y	Y	Y	Y
iSAC	High	N	N	Y (transcoding only)	Y (transcoding only)
AMR-WB	High	N	N	Y	N
Modem Relay	High	Y	Y	Y	N

PVDM4

Q. What are the benefits of using the PVDM4s?

A. The PVDM4s offer the following benefits:

- Provide time-division multiplexing (TDM) on T1/E1 modules for digital voice channels.
- Provide IP-based voice services such as conferencing, universal transcoding, and media termination point (MTP).

- Provide voice-quality management such as compression, voice-activity detection, jitter management, and echo cancellation.
- Provide a power-saver mode for motherboard PVDM when not in use. In power-saver mode, each PVDM4 can save up to 5 watts of power.

Q. Where can the PVDM4 be installed?
A. The PVDM4 can be installed on the motherboard and T1/E1 NIMs on 4300 and 4400 Series ISRs. Each router has only one PVDM4 slot on the motherboard. Each NIM has one PVDM4 slot.

Q. What are the differences between a PVDM4 installed on the motherboard and on T1/E1 NIMs?
A. When installed on the T1/E1 NIM, a PVDM4 can be used for TDM voice applications. If there are extra DSP resources left, they can be pooled in a DSP farm for IP-based voice services such as conferencing, transcoding, and MTP. When installed on the motherboard, a PVDM4 can be used only for IP-based voice services, and it can't be used for TDM voice channels.

Q. Can a PVDM4 installed on one T1/E1 NIM be used for TDM voice channels on another T1/E1 module?
A. No. Each T1/E1 NIM module requires a dedicated PVDM4. When purchasing a T1/E1 NIM, please also purchase the required PVDM4, which is offered separately.

Q. Do analog voice modules (FXO, FXS, E/M, and BRI NIMs) need a PVDM4?
A. No. Analog voice modules for 4000 Series ISRs contain a built-in, nonconfigurable DSP and do not require additional PVDMs for voice packetization.

Q. Are PVDM4s hot-swappable?
A. If installed on a T1/E1 NIM, a PVDM4 is hot-swappable; the T1/E1 NIM supports online insertion and removal. But if installed on the motherboard, it is not hot-swappable.

Q. Can the PVDM2 and PVDM3 be installed on the 4000 Series ISR motherboard or T1/E1 NIM?
A. No. The 4000 Series supports only the PVDM4.

PVDM3

Q. What are the benefits of using PVDM3s?
A. PVDM3s offer the following benefits:

- Increased density and more processing power than PVDM2s, thus allowing additional future rich-media applications.
- Investment protection and field-upgrade capabilities.
- Up to four times the channel density of PVDM2s.
- Analog and digital voice connection support.
- Support for voice connections, universal any-to-any transcoding, G.711-to-any transcoding, and conferencing services on the same DSP with a single DSP image.
- Support for more conferences and more participants (up to 64) per conference than the PVDM2s.
- Perform compression, voice-activity-detection, jitter-management, and echo-cancellation functions.

- Integration with a multigigabit fabric (MGF) on the Cisco 2900 and 3900 Series ISRs to provide higher IP throughput within the system.
- Provide power-saving options when the DSPs are not in use.
- Introduce support for fast-busy-tone broadcast for DSP oversubscription.

Q. Which Cisco platforms or voice network modules support the PVDM3s? Which Cisco IOS® Software release do I need?

A. You can install PVDM3s in the DSP slots on the motherboard of the Cisco 2900 and 3900 Series ISRs starting with Cisco IOS Software Release 15.0.1(M).

Q. What do the numbers 16, 32, 64, etc. in the PVDM3 product number mean?

A. The numbers indicate the maximum number of G.711 voice calls that a particular PVDM3 model can support.

Q. Where is a PVDM3 installed?

A. You can install PVDM3s in the PVDM3 slots on the motherboard of the Cisco 2900 and 3900 Series routers.

Q. Are PVDM3s supported in a High-Density Digital Voice or Fax Network Module (NM-HDV2)?

A. No. You cannot install PVDM3s directly in the PVDM slots of an NM-HDV2. The NM-HDV2 supports only the PVDM2s. However, an NM-HDV2 that has no PVDMs installed at all can share PVDM3 DSP resources from the router motherboard PVDM slots across the chassis backplane.

Q. Do the PVDM2s work with the Cisco 2900 and 3900 Series ISRs?

A. Yes. You can install PVDM2s in the motherboard PVDM slots using special adapter cards (PVDM2-ADPTR). You can also insert an NM-HDV2 with PVDM2 modules into the service-module slot of the Cisco 2900 and 3900 Series routers using the network-to-server module adapter card (SM-NM-ADPTR).

Q. Can PVDM2s and PVDM3s coexist on the Cisco 2900 and 3900 Series routers?

A. Yes, they can coexist as long as they are not both installed in the same domain. The motherboard PVDM slots form one domain, and each service-module slot forms a separate domain. The motherboard domain can contain either all PVDM2s or all PVDM3s. A service-module domain can contain only PVDM2s housed by the NM-HDV2 carrier card. If a mix of PVDM2s and PVDM3s are detected in the motherboard slots, the PVDM2s will be deactivated, allowing only the PVDM3s to be used actively. If PVDM2s are detected in service-module slots and PVDM3s are installed on the motherboard, both will continue to function in their own domain and coexist.

Q. Can I replace a PVDM2 with the PVDM3 in a Cisco 2800 or 3800 Series router?

A. No, the PVDM3s are supported only on the Cisco 2900 and 3900 Series routers.

Q. Do the PVDM3s have feature parity with the PVDM2s?

A. Yes, all features supported by the PVDM2s are supported on the PVDM3s, with the exception of Cisco Fax Relay and G.723. Cisco Fax Relay and G.723 are no longer supported on the PVDM3s. Customers can still use PVDM2s to obtain G.723 codec support or use the G.729 codec on PVDM3 as an alternative.

Q. Can conferencing, transcoding, and voice calls be supported on a single DSP?

A. Yes. The PVDM3s have a universal firmware image that allows the sharing of DSP resources between transcoding, voice, and conference calls. On the PVDM2s you can use the same DSP for voice and transcoding calls, but a different DSP firmware image is required for conference calls, requiring a DSP to be dedicated when conferencing is configured.

Q. Can I configure conferencing and transcoding profiles on Cisco 2900 and 3900 Series routers that have PVDM2s and PVDM3s?

A. Yes. Allocation of DSP resources follows a round-robin algorithm starting from the DSP resources on the motherboard. No distinction is made regarding the type of DSP (PVDM2 or PVDM3) installed in those slots while resources are allocated.

Q. How many voice sessions does each PVDM3 support?

A. Table 4 lists the maximum number of supported voice channels on each PVDM3 module.

Table 4. Number of Voice Channels Supported

Complexity	PVDM3-16	PVDM3-32	PVDM3-64	PVDM3-128	PVDM3-192	PVDM3-256
Low-complexity voice	16	32	64	128	192	256
Medium-complexity voice	12	21	42	96	138	192
High-complexity voice	10	14	28	60	88	120

Q. How many conferences do the PVDM3s support?

A. The PVDM3s can support:

- Up to 96 G.711 conferences
- Up to 42 G.729, G.729A, or G.722 conferences
- Up to 30 iLBC conferences

Q. How many conference participants do the PVDM3s support?

A. The PVDM3s can support:

- Up to 64 participants per G.711 conference
- Up to 32 participants per G.729, G.729A, G.722, or iLBC conference

Q. How many secure conference participants do the PVDM3s support?

A. The PVDM3s can support:

- Up to 8 participants per G.711, G.727A, G.722, or iLBC secure conference

Q. Are the PVDM3s field-upgradable?

A. Yes. PVDM3s connect through a dual-inline-memory-module (DIMM) slot on the motherboard. They are easy to plug in or remove. However, please note that you must shut down the router and take the motherboard out to plug them in or remove them. Please refer to your service contract warranty information, or contact the Cisco Technical Assistance Center (TAC) before you perform these tasks.

Q. Are the PVDM3s hot-swappable?

A. No. The router must be shut down to insert or remove a PVDM3.

Q. Can I configure analog-to-digital cross-connect on the Cisco 2900 and 3900 Series routers using PVDM3s?

A. Yes. The PVDM3s support analog-to-digital cross-connection functions. In addition, you can cross-connect analog ports on PVDM2s with digital ports on PVDM3s, and conversely.

Q. Can I synchronize the clocks of ports that run different types of DSPs (PVDM2s and PVDM3s)?

A. Yes. The clock-synchronization features are independent of the DSPs used.

PVDM2

Q. Do the PVDM2s work with the Cisco 2900 and 3900 Series routers?

A. Yes. You can install PVDM2s in the motherboard PVDM slots using special adapter cards (PVDM2- ADPTR). You can also insert an NM-HDV2 with PVDM2s into the service-module slot of the Cisco 2900 and 3900 Series routers using the network-to-server module adapter card (SM-NM-ADPTR).

Q. How many voice channels does each PVDM2 support?

A. Table 7 lists the number of voice channels supported by the PVDM2 models.

Table 5. Number of Voice Channels Supported

Name or complexity	PVDM2-8	PVDM2-16	PVDM2-32	PVDM2-48	PVDM2-64
Low-complexity voice or transcoding	8	16	32	48	64
Medium-complexity voice or transcoding	4	8	16	24	32
High-complexity voice or transcoding	4	6	12	18	24

Q. Is there a tool to help me calculate the PVDM2 resources I need for a configuration?

A. Yes, please refer to the DSP Calculator at http://www.cisco.com/cgi-bin/Support/DSP/dsp-calc.pl.

Q. Is the PVDM2 field-upgradable?

A. Yes. The PVDM2 connects to the host through an 80-pin SIMM interface. It is easily plugged in or removed.

Q. Is the PVDM2 hot-swappable?

A. No. The router must be shut down to insert or remove a PVDM2.

Q. Can conferencing, transcoding, and voice calls be supported on a single DSP?

A. No. Conferencing requires a dedicated DSP resource. If a DSP is assigned for a conferencing session, it cannot be used for transcoding or voice calls at the same time. Transcoding and voice calls can share the resources of a single DSP, however. Note that conferencing needs a dedicated DSP, but not a dedicated PVDM2. For example, the PVDM2-64 contains four DSPs; if you use one of them for conferencing, the other three can be used for other purposes.

Q. Do the PVDM2s work with the Cisco 2900 and 3900 Series routers?

A. Yes. You can install PVDM2s on the motherboard using special PVDM adapter cards (PVDM2- ADPTR). You can insert the existing NM-HDV2s with PVDM2s into the service-module slots of the Cisco 2900 and 3900 Series routers using network adapter cards (SM-NM-ADPTR).

Q. Which Cisco access routers or voice network modules support the PVDM2s? Which Cisco IOS Software releases and feature sets do the PVDM2s require?

A. The PVDM2s are supported in the motherboard PVDM slots of the Cisco 2800 and 3800 Series ISRs in all releases available on these platforms, in IP Voice and higher images. The PVDM2s are additionally supported in the NM-HDV2, NM-HDV2-1T1/E1, and NM-HDV2-2T1/E1 network modules starting with Cisco IOS Software Release 12.3(7)T, in classic images IP Plus and higher, and in the cross-platform images in IP Voice and higher. The NM-HDV2s are supported on the Cisco 2600XM and 3700 Series Multiservice Access Routers as well as on the Cisco 2800 and 3800 Series ISRs.

Q. Do the PVDM2s support echo cancellation?

A. Yes. The PVDM2s support echo cancellation with a 64-ms tail length, compliant with ITU-T G.168.

For More Information

For more information about the Cisco High-Density Packet Voice DSP Modules, please visit http://www.cisco.com/en/US/products/hw/modules/ps3115/prod_module_series_home.html.

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