

# Voice Hardware: C542 and C549 Digital Signal Processors (DSPs)

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## Introduction

This document provides an overview to the C542 and C549 digital signal processors (DSPs) used in Cisco voice platforms such as the Cisco 1750, 2600, 3600, and VG-200 voice network modules, as well as the Cisco AS5300 voice feature cards.

In Cisco IOS<sup>®</sup> Software Release earlier than 12.0(5)T, Cisco Voice over IP (VoIP) gateways only supported the G.729 and G.711 coder-decoders (codecs) and only one voice/fax-relay call per DSP. With the introduction of Cisco IOS Software Release 12.0(5)T, Cisco VoIP gateways support a larger number of International Telecommunication Union Telecommunication Standardization Sector (ITU-T) codecs and DSP modules that can support up to four voice/fax relay calls per DSP.

**Note:** ITU-T codecs describe voice coding and compression techniques. Refer to Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation for more information on ITU-T codecs.

## Prerequisites

### Requirements

Readers of this document should be knowledgeable of these topics:

- All Cisco IOS Software Releases
- All Cisco voice platforms, modules, and cards

### Components Used

This document is not restricted to specific software and hardware versions.

### Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

## C542 DSP Features and Support

- C542 technology is medium complexity and supports *one voice or fax-relay call* per DSP.
- The C542 is based on a 50 MHz processor and operates at 50 Million of Instructions Per Second (MIPS).
- The C542 DSP is supported on these voice platforms:
  - ◆ The AS5300 single-density Voice Feature Card (VFC)
  - ◆ The 2600/3600/VG-200 Voice Network Modules (NM-1V and NM-2V) that support these Voice Interface Cards (VICs) are listed here:
    - ◇ The receive and transmit (E&M) VIC
    - ◇ Foreign Exchange Office (FXO) VIC
    - ◇ Foreign Exchange Station (FXS) VIC
    - ◇ Basic Rate Interface (BRI) VIC
  - ◆ The MC3810 VCM (Voice Compression Module)

Refer to Voice Hardware Compatibility Matrix (Cisco 175x, 1760, 2600, 3600, 3700, VG200, Catalyst 4000, Catalyst 6000) for more information on the voice network modules and VICs.

Refer to Voice over IP Enhancements for the Cisco AS5300/Gateway for more information on the AS5300 single-density VFC.

## C549 DSP Features and Support

- C549 DSPs introduce the *Codec Complexity* concept that determines the numbers of voice/fax-relay calls that can be made per DSP.
  - ◆ C549 technology is available to support either medium complexity codecs or high complexity codecs.
  - ◆ C549 voice cards support *four* voice/fax-relay calls per DSP with *medium complexity* codecs.
  - ◆ C549 voice cards support *two* voice/fax-relay calls per DSP with *high complexity* codecs.
- The C549 is based on a 100 MHz processor and operates at 100 MIPS.
- The C549 DSP is supported on these voice platforms:
  - ◆ Cisco AS5800
  - ◆ Cisco AS5300 double-density VFC
  - ◆ Cisco 2600/3600/VG-200 Digital T1/E1 High Density Voice Network Module
  - ◆ Cisco 7200/7500 Digital T1/E1 High Capacity Voice port adapter (PA)
  - ◆ Cisco 1750, 1751, and 1760 routers
  - ◆ Cisco MC3810 HCM (High-density Compression Module)

**Note:** In the AS5300 voice feature card, the high/medium codec complexity VCware image is denoted by the initials "mc" or "hc" (for example, vcw-vfc-mz.c549.mc.4.10.bin).

**Note:** Starting with Cisco VCware release 8.06, the AS5300 voice feature card no longer supports the "mc" (medium complexity) release.

Refer to Voice Hardware Compatibility Matrix (Cisco 175x, 1760, 2600, 3600, 3700, VG200, Catalyst 4000, Catalyst 6000) document for more information on the high density voice network modules and VICs. Refer to High-Density Voice over IP Support for the Cisco AS5300/Gateway for more information on the AS5300 single-density VFC.

Use the **show voice dsp** command to view DSPs information. See the Sample **show voice dsp** Command Output section of this document for more information.

**Note:** On the AS5300, the DSPM-549 and DSPM-542 modules cannot be mixed on the same voice feature card.

## DSP IDs on the NM-HDV PVDM-12 (Packet Voice DSP Module)

When you configure **ds0-group** or **pri-group**, the timeslots are assigned DSP channels dynamically. The IDs of the DSPs are listed here (for socket numbering refer to the diagram in Understanding High Density Voice Network Modules):

- The DSPs on the PVDM-12 on SIMM socket 4 have an id= 1,2,3
- The DSPs on the PVDM-12 on SIMM socket 3 have an id= 4,5,6
- The DSPs on the PVDM-12 on SIMM socket 2 have an id= 7,8,9
- The DSPs on the PVDM-12 on SIMM socket 1 have an id= 10,11,12
- The DSPs on the PVDM-12 on SIMM socket 0 have an id= 13,14,15

Use the **show voice dsp** command to view DSP ID information. See the Sample **show voice dsp** Command Output section of this document for more information.

## Sample show voice dsp Command Output

This table describes the command history for the **show voice dsp** command:

Release	Modification
11.3 MA	This command was introduced on the Cisco MC3810 series.
12.0(7)XK	This command was first supported on the Cisco 2600 and 3600 series routers, and the display format was modified.
12.1(2)T	This command was implemented in Cisco IOS Software Release 12.1(2)T.

**Note:** When you use an NM-HDV (High Density Voice Module), configure the T1/E1 controller with the **pri-group** or **ds0-group** in order to see the DSPs information with the **show voice dsp** command.

```

!--- This router has the following voice equipment installed:
!--- a) One NM-HDV (High Density Voice Module) with two PVDM-12 (C549 DSPs) and
!--- one T1 VWIC MFT (Voice Wan Interface Card).
!--- b) One NM-2V (C542 DSPs) with one FXS and one FXO VIC (Voice Interface Card).

cisco-router# show voice dsp

          BOOT
TYPE DSP CH CODEC  VERS STATE STATE  RST AI PORT  TS ABORT  TX/RX-PAK-CNT
=====
!--- Medium codec complexity is configured on the NM-HDV.

C549 010 00 {medium} 3.4 IDLE idle      0 0 3/0:23  1  0          1/819
      01 {medium} .35 IDLE idle      0 0 3/0:23  7  0           0/0
      02 {medium}      IDLE idle      0 0 3/0:23 13  0           0/0
  
```

		03	{medium}		IDLE	idle	0	0	3/0:23	19	0	0/0
C549	011	00	{medium}	3.4	IDLE	idle	0	0	3/0:23	2	0	0/820
		01	{medium}	.35	IDLE	idle	0	0	3/0:23	8	0	0/0
		02	{medium}		IDLE	idle	0	0	3/0:23	14	0	0/0
		03	{medium}		IDLE	idle	0	0	3/0:23	20	0	0/0
C549	012	00	{medium}	3.4	IDLE	idle	0	0	3/0:23	3	0	0/819
		01	{medium}	.35	IDLE	idle	0	0	3/0:23	9	0	0/0
		02	{medium}		IDLE	idle	0	0	3/0:23	15	0	0/0
		03	{medium}		IDLE	idle	0	0	3/0:23	21	0	0/0
C549	013	00	{medium}	3.4	IDLE	idle	0	0	3/0:23	4	0	5/840
		01	{medium}	.35	IDLE	idle	0	0	3/0:23	10	0	0/0
		02	{medium}		IDLE	idle	0	0	3/0:23	16	0	0/0
		03	{medium}		IDLE	idle	0	0	3/0:23	22	0	0/0
C549	014	00	{medium}	3.4	IDLE	idle	0	0	3/0:23	5	0	0/840
		01	{medium}	.35	IDLE	idle	0	0	3/0:23	11	0	0/0
		02	{medium}		IDLE	idle	0	0	3/0:23	17	0	0/0
		03	{medium}		IDLE	idle	0	0	3/0:23	23	0	0/0
C549	015	00	{medium}	3.4	IDLE	idle	0	0	3/0:23	6	0	0/0
		01	{medium}	.35	IDLE	idle	0	0	3/0:23	12	0	0/0
		02	{medium}		IDLE	idle	0	0	3/0:23	18	0	0/0
		03	{medium}		IDLE	idle	0	0	3/0:23	24	0	0/0

*!--- These are the DSPs for the FXO and FXS VICs.*

C542	001	01	g711ulaw	3.4	IDLE	idle	0	0	1/0/0		0	536/541
				.35								
C542	002	01	g711ulaw	3.4	IDLE	idle	0	0	1/0/1		0	529/526
				.35								
C542	003	01	g711ulaw	3.4	IDLE	idle	0	0	1/1/0		0	533/542
				.35								
C542	004	01	g711ulaw	3.4	IDLE	idle	0	0	1/1/1		0	529/526
				.35								

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## Related Information

- **Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation**
  - **Voice Over IP – Per Call Bandwidth Consumption**
  - **Voice Technology Support**
  - **Voice and IP Communications Product Support**
  - **Troubleshooting Cisco IP Telephony**
  - **Technical Support – Cisco Systems**
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