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# Troubleshooting the DSP on NM–HDV for Cisco 2600/3600/3700/VG200 Series Routers

Document ID: 19066

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## Introduction

### Prerequisites

Requirements

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### Related Information

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## Introduction

This document addresses troubleshooting the basic functionality of the digital signal processor (DSP) from a hardware and software perspective to ensure that calls can be established correctly. The main issues on the DSP are seen on the High Density Voice Network Module (NM–HDV). The DSP is the main piece in VoIP and is responsible for transferring analog to digital signals, as well as digital to analog signals, for setting the gain and attenuation parameters, voice activity detection (VAD), compression, and more.

**Note:** For more information on the NM–HDV, refer to Understanding High Density Voice Network Modules.

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

This document is applicable for these hardware devices:

- Cisco 2600 Series Multiservice Routers
- Cisco 3600 Series Multiservice Routers except for Cisco 3631 platforms
- Cisco 3700 Series Multiservice Routers
- Cisco VG200 Series Gateway

The current document is tested on Cisco IOS 12.3(7)T. For information on the Cisco IOS support for the above platforms supporting the NM–HDV, refer to Platform Support Matrix for NM–HDV.

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

## Conventions

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

## Problem

Some of the symptoms that can be attributed to DSP hardware or software issues are:

- No audio heard, or dead air on the voice path after the call is connected
- Call setup failure
- Channels are stuck in the PARK state and cannot be used

## Solution

Software issues are related to the DSPWare. The DSPWare is embedded within Cisco IOS® software. From the router, issue the **show voice dsp** command to see your DSPWare version.

```
gwa-1# show voice dsp
```

DSP TYPE	DSP NUM	CH	CODEC	DSPWARE VERSION	CURR STATE	BOOT STATE	RST	AI	VOICEPORT	TS	PAK ABORT	TX/RX PACK COUNT
=====	====	==	=====	=====	=====	=====	===	==	=====	==	=====	=====
C549	001	01	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	01	0	0/0
		02	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	02	0	0/0
		03	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	03	0	0/0
		04	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	04	0	0/0
C549	002	01	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	05	0	0/0
		02	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	06	0	0/0
		03	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	07	0	0/0
		04	{medium}	4.3.14	IDLE	idle	0	0	2/0:23	08	0	0/0

```
!---Output Suppressed.
```

```
gwa-1#
```

In the above output, the version of DSPWare is 4.3.14.

The **show voice dsp** command provides information on which timeslot is associated with which DSP and on which particular channel of that DSP. The command also provides the current state, **CURR STATE**, of the DSP channels. For example, **IDLE** indicates there is no call on that channel, and **BAD** indicates that there is something wrong with that DSP channel.

Once you configure the **ds0-group** command and reload the router on the NM-HDV, the timeslots of the **ds0-group** command are associated to the channels on the NM-HDV. However, if you reload the router, the router might select different DSP channels for the timeslots.

**Note:** Before issuing the **show voice dsp** command, ensure that the DSPs are associated with the voice ports (T1/E1). Unless you do so, the output of the **show voice dsp** command will be blank. To configure the ds0-group/PRI for associating the voice ports with the DSPs, refer to Implementing T1 CAS for VoIP or the "Configure Channelized E1 ISDN PRI" section of Configuring Channelized E1 and Channelized T1, respectively.

From the enable mode, issue the **test dsp <slot number>** command (hidden) to test the DSP. The slot number is where your NM-HDV resides and is the same as the voice-card value seen in the configuration. This command output is from the **test dsp <slot number>** command (hidden):

**Note:** A hidden command is one that cannot be parsed with a "?" and the Tab key cannot be used to auto-complete the command. Hidden commands are not documented and some of the output is used strictly for engineering purposes. Hidden commands are not supported by Cisco.

```
Router# test dsp 2

Section:
1 - Query dsp resource and status
2 - Display voice port's dsp channel status
3 - Print dsp data structure info
4 - Change dsprm test Flags
5 - Modify dsp-tdm connection
6 - Disable DSP Background Status Query
7 - Enable DSP Background Status Query
8 - Enable DSP control message history
9 - Disable DSP control message history
a - Show alarm stats
b - Enable dsprm alarm monitor
c - Disable dsprm alarm monitor
q - Quit
```

Select option **1** from the menu. This triggers the Cisco IOS software to **ping** and then wait for a response from the DSP. If a response is received, then a message declaring the DSP is ALIVE is generated. If the Cisco IOS software did not receive a response, the message `dsp is not responding` is generated. This is the command output generated after you select option 1 from the menu:

```
Select option: 1

Dsp firmware version: 4.3.14
Maximum dsp count: 15
On board dsp count: 6
Jukebox available
Total dsp channels available 24
Total dsp channels allocated 0
Total dsp free channels 24
Querying dsp status.....
*Mar  4 16:58:09.743: dsp 0 is ALIVE
*Mar  4 16:58:09.747: dsp 1 is ALIVE
*Mar  4 16:58:09.747: dsp 2 is ALIVE
*Mar  4 16:58:09.747: dsp 6 is ALIVE
*Mar  4 16:58:09.747: dsp 7 is ALIVE
*Mar  4 16:58:09.747: dsp 8 is not responding

Router#
```

**Note:** In some of the earlier Cisco IOS releases, you can only use option 1 from the **test dsp <slot number>** command. Selecting other options cause your router to reload or other problems to occur.

**Note:** If you are consoling to the gateway, `Logging console` must be enabled to see the command output. If you are telnetting to the router, `terminal monitor` must be enabled to see the command output.

In the above output, all of the DSPs are `ALIVE` except DSP number 8, which shows `not responding`. This indicates that the DSP is faulty, and can be due to either a hardware or software issue.

If you are running Cisco IOS software prior to release 12.2(6a), or your Cisco IOS software has a DSP version prior to 3.4.49, then the problem can be either hardware or a DSPWare issue related to bug ID CSCdu53333 (registered customers only). If this is the case, you need to upgrade your software.

**Note:** As part of the CSCdu53333 (registered customers only) fix, a recovery code is included. When a voice telephony security parameter (VTSP) timeout message is generated by Cisco IOS, the DSP resets to recover the cause of the timeout, since most of the time the timeout occurs on the NM-HDV when the DSP is not responding.

If the same DSP is still not responding after the appropriate software upgrades, then this is a hardware issue and you need to replace the Packet Voice DSP Module (PVDM-12) on the NM-HDV where the faulty DSP is located, or simply replace the whole NM-HDV.

NM-HDV has five SIMM sockets (called Banks) that hold the PVDM-12 cards. Each PVDM-12 card contains three TI 549 DSPs. Each Bank has a LED in the back of the NM-HDV. When there is a PVDM-12 card installed in the SIMM, the LED is solid green.

The DSP IDs on the NM-HDV PVDM-12 (Packet Voice DSP Module) are:

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

If you are running Cisco IOS software that has the fix for bug ID CSCdu53333 (registered customers only) and you still notice that the DSPs are not responding or not showing up, open a case with Cisco Technical Support and request an engineer troubleshoot the problem. In some cases when the DSP is faulty, the **show voice port summary** command shows the operation status as down.

There is an issue on the NM-HDV on the Cisco 3660 router. It is addressed in bug ID CSCdw55105 (registered customers only). After the router is reloaded, some channels stick in `EM_PENDING` mode. It might be related to the DSP. If the router appears with this problem, it will not happen again. This issue has been seen on the Cisco IOS release prior to 12.2(9.3)T. Upgrading the Cisco IOS image to 12.2(9.3)T and later should resolve the issue. Also check for the related known bug ID CSCdw55169 (registered customers only).

**Note:** For more details on any of the above commands, use the Command Lookup Tool (registered customers only).

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## Related Information

- **Voice Hardware: C542 and C549 Digital Signal Processors (DSPs)**
- **Troubleshooting DSP Farm Registration**
- **Cisco DSP Resources for Transcoding, Conferencing, and MTP**
- **Understanding High Density Voice Network Modules**

- **Bug Tool Kit ( registered customers only)**
  - **Voice Technology Support**
  - **Voice and IP Communications Product Support**
  - **Voice, Telephony and Messaging TAC eLearning Solutions**
  - **Recommended Reading: Troubleshooting Cisco IP Telephony**
  - **Technical Support – Cisco Systems**
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