

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

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Introduction

This document addresses how to troubleshoot the basic functionality of the digital signal processor (DSP) from a hardware and software perspective. This allows you 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 the transfer of analog to digital signals, as well as digital to analog signals. The DSP also sets the gain and attenuation parameters, voice activity detection (VAD), compression, and more.

Note: Refer to Understanding High Density Voice Network Modules for more information on the NM–HDV.

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® Software Release 12.3(7)T and later. For information on the Cisco IOS support for platforms which support the NM–HDV, refer to the "Platform Support Matrix for NM–HDV" section of Understanding High Density Voice Network Modules.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to the Cisco Technical Tips Conventions for more information on document conventions.

Problem

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

- 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. Issue the **show voice dsp** command from the router in order 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 is suppressed.
```

```
gwa-1#
```

Note: In this output, the DSPWare version 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. **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 can select different DSP channels for the timeslots.

Note: Before you issue 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 is blank. In order to configure the ds0-group/PRI to associate 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 enable mode, issue the **test dsp <slot number>** command (hidden) in order 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 Systems, Inc.

```
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
```

If you select option **1** from the menu, you trigger the Cisco IOS software to **ping** and then wait for a response from the DSP. If a response is received, then a message is generated that declares the DSP is **ALIVE**. 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. If you select other options, you cause the router to reload or other problems to occur.

Note: If you console to the gateway, **Logging console** must be enabled in order to see the command output. If you Telnet to the router, **terminal monitor** must be enabled in order to see the command output.

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

Note: As part of the Cisco 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 in order to recover the cause of the timeout. This happens because most of the time, the timeout occurs on the NM–HDV when the DSP does not respond.

If the same DSP still does not respond after the appropriate software upgrades, then this is a hardware issue. In this case, you need to replace the Packet Voice DSP Module (PVDM–12) on the NM–HDV where the faulty DSP is located. Alternatively, you can 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= 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.

If you run Cisco IOS software that has the fix for Cisco bug ID CSCdu53333 (registered customers only) and you still notice that the DSPs do not respond or do not show 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 an operation status of down.

There is an issue on the NM–HDV on the Cisco 3660 router. This issue is addressed in Cisco bug ID CSCdw55105 (registered customers only) . After the router is reloaded, some channels stick in EM_PENDING mode. This issue could be related to the DSP. If the router appears with this problem, this issue does not happen again. This issue is seen on the Cisco IOS Software Releases earlier than 12.2(9.3)T. If you upgrade the Cisco IOS image to Cisco IOS Software Release 12.2(9.3)T or later, the issue is usually resolved. Also check for the related known Cisco bug ID CSCdw55169 (registered customers only) .

Note: The **show diag EXEC** CLI command for the NM–HDV voice Network Module might not indicate how many PVDM–12 DSP cards are installed. This issue is documented in Cisco bug ID CSCef45173 (registered customers only) . For more details on any of the commands in this document, use the Command Lookup Tool (registered customers only) .

Platform Support and Software Requirements

Cisco Enhanced Conferencing and Transcoding for Voice Gateway Routers provides this platform support and requires this software:

| Product | Cisco 2600XM | Cisco 2691 | Cisco 3700 |
|---------|--------------|------------|------------|
| | | | |

| | | | |
|----------------|---------------------------------------|---------------------------------------|---------------------------------------|
| NM-HDV2 | | | |
| NM-HDV2-1T1/E1 | | | |
| NM-HDV2-2T1/E1 | | | |
| PVDM2-8 | | | |
| PVDM2-16 | | | |
| PVDM2-32 | 12.3(7)T | 12.3(7)T | 12.3(7)T |
| PVDM2-48 | 12.3(8)T for conferencing/transcoding | 12.3(8)T for conferencing/transcoding | 12.3(8)T for conferencing/transcoding |
| PVDM2-64 | IP Plus images and later | IP Plus images and later | IP Plus images and later |

Determine the Required DSP Resources

32 MB DRAM

128 MB DRAM

Cisco has published a [DSP Calculator](#) on Cisco.com. This tool simplifies the calculation of DSP resources. The tool requires information such as the platform type, Cisco IOS release number, Voice Interface Card (VIC) slot configuration, and the type of codecs to be used on these interfaces. The tool then displays the number of DSPs required to run the configuration and generates the configuration required in order to start the system. Refer to the DSP Calculator (registered customers only) in order to see the DSP Resource Calculator application.

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](#)
- [Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation](#)
- [DSP on NM-HDV2 Functionality Verification for 2600XM/2691/2800/3700/3800 Platforms](#)
- [Troubleshooting Codec and Voice Card Complexity](#)
- [Technical Support – Cisco Systems](#)

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