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Tech Notes

# Understanding High-Density Analog Voice/Fax Network Modules (NM-HDA)

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## Introduction

The analog voice/fax network modules provide standard analog interface to the telephony equipment and Public Switched Telephone Network (PSTN). The high-density analog voice/fax network modules (NM-HDA) serve up to 16 analog ports, or four times the number of ports that the low-density analog voice/fax network modules (NM-2V) support. The ports can be in these combinations:

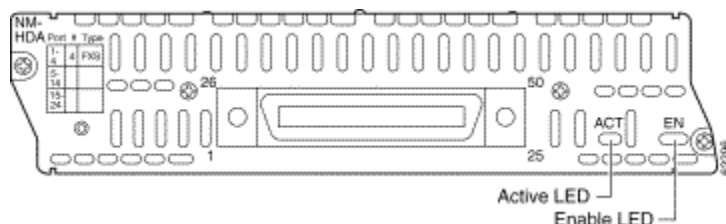
- 4 Foreign Exchange Station (FXS) ports
- 12 FXS ports
- 4 FXS and 4 Foreign Exchange Office (FXO) ports
- 4 FXS and 8 FXO ports
- 12 FXS and 4 FXO ports

The base card supports 4 FXS ports.

- The addition of an 8-port FXS expansion module (EM) can increase the capacity to 12 FXS ports.

- The addition of two 4-port FXO EMs can increase the capacity to 8 FXO ports along with 4 FXS ports.
- The addition of one each of the FXS and FXO EMs can increase the capacity to 12 FXS ports and 4 FXO ports.

This diagram shows the NM-HDA:



## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

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

### Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Product Numbers

Product	Description	Notes
<a href="#">NM-HDA-4FXS</a>	NM-HDA with 4 FXS ports	Base module
<a href="#">EM-HDA-8FXS</a>	8-port voice/fax EM—FXS	Expansion module
<a href="#">EM-HDA-4FXO</a>	4-port voice/fax EM—FXO	Expansion module
<a href="#">DSP-HDA-16</a>	16-channel DSP <sup>1</sup> module for NM-HDA	DSP module (required for some configurations)

<sup>1</sup> DSP = Digital Signal Processor

**Note:** You cannot use two EM-HDA-8FXS modules on an NM-HDA base board. All other

combinations are valid.

## Features

- Voice, fax relay, fax pass-through, and modem pass-through are supported.
- Ground-start and loop-start are supported on both FXS and FXO ports.
- DSPs are on the base module board and the DSP EM (DSP-HDA-16).
  - The base module has two built-on C5421 DSPs.
  - The DSP-HDA-16 has two C5421 DSPs.
  - Each C5421 DSP has two C549 DSPs at its core. Refer to the documents [Voice Hardware: C542 and C549 Digital Signal Processors \(DSPs\)](#) and [Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation](#) for more information about how coder-decoder (codec) complexity settings affect the number of DSP channels that are available to process calls.
  - NM-HDA-4FXS (base module) supports 8 high-complexity or 16 medium-complexity voice channels. Refer to the document [Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation](#) for more information.
  - DSP-HDA-16 supports an additional 8 high-complexity or 16 medium-complexity voice channels. This totals 16 high-complexity channels or 32 medium-complexity channels.
  - Install a DSP-HDA-16 if you need more than eight ports of high-complexity codecs.
  - All channels on NM-HDA must use the same complexity.
  - Fax relay is supported in both medium-complexity and high-complexity modes.
- Uses a standard telephone company (telco) RJ-21 amphenol connector, which is not provided with the network module. For pinout and additional information, refer to the document [Connecting High-Density Analog Telephony Network Modules](#).
- Some recommended RJ-21 cables are:
  - 253PP10GYADI male-to-male cable and 253PC10GYADI male-to-female cable from Gray Bar.
  - AT125-SM patch panel, which supports both male and female connection, from Gray Bar.
- Port numbers are statically allocated to each slot in the NM-HDA and do not change based on the module that is plugged into that slot.
  - Base module (FXS): x/0/0-x/0/3

- EM in slot 0 (FXS): x/0/4-x/0/11
- EM in slot 0 (FXO): x/0/4-x/0/7
- EM in slot 1 (FXS): x/0/14-x/0/21
- EM in slot 1 (FXO): x/0/14-x/0/17
- FXS and FXO battery polarity reversal disconnect are supported.
- FXO Answer and Disconnect Supervision are supported.
- The FXO Power Failure feature is a hardware feature that is built into the FXO cards. The feature allows connectivity to an analog phone that is patched into the right pair of wires to be activated by a relay if power to the router that contains the NM-HDA fails.
- These are supported:
  - VoIP H.323, VoIP session initiation protocol (SIP), and VoIP Media Gateway Control Protocol (MGCP) with Call Agent
  - Voice over Frame Relay (VoFR)
  - Voice over ATM (VoATM)
  - VoATM adaptation layer 5 (VoAAL5)
  - Trunked ATM adaptation layer 2 (AAL2)
- VoIP H.323 and MGCP with Cisco CallManager are supported.
- There is hookflash support. For the configuration, refer to the NM-HDA [Timing Commands](#) section of the document [Cisco High-Density Analog Voice and Fax Network Module](#).
- Caller ID is supported on FXS and FXO ports.

For software and memory requirements, specifications, and homologation of NM-HDA, refer to the document [IP Communications High Density Analog Voice/Fax Network Modules](#).

For information on how to add port EMs, DSP EMs, and network module LEDs, refer to the document [Connecting High-Density Analog Telephony Network Modules](#).

## Configuration

For the configuration of voice features in Cisco IOS® Software, refer to the document [Voice over IP for the Cisco 3600 Series](#).

**Note:** In Cisco IOS Software, issue the **voice-port slot/VIC-slot/unit** global configuration command in order to configure the voice port parameters. The middle digit of the port number for the NM-HDA is

always "0".

## Platform Support

Cisco IOS Software Support <sup>1</sup>	2600	2600XM	3640, 3660	2691, 3725, 3745
Maximum Number of Modules	1	1	3640 - 3 3660 - 6	2691 - 1 3725 - 2 3745 - 4
NM-HDA	Cisco IOS Software Releases 12.2(2) XT, 12.2(8)T, 12.2(11)YT, 12.3(1)	Cisco IOS Software Releases 12.2(8)T1, 12.2(11)T, 12.2(11)YT, 12.2(15)ZJ, 12.3(1), 12.3(2)T	Cisco IOS Software Releases 12.2(2) XT, 12.2(8)T, 12.2(11)YT, 12.2(15)ZJ, 12.3(1), 12.3(2)T	Cisco IOS Software Releases 12.2(8) T1, 12.2(11)YT, 12.2(15) ZJ, 12.3(1), 12.3(2)T, 12.3(4) XD

<sup>1</sup> The module requires the Cisco IOS Software "Plus" feature set. The NM-HDA module is not supported on:

- Cisco 1700 series routers
- Cisco 3620 router
- Catalyst 4500/4000 series switches
- Catalyst 6500/6000 series switches

Voice is not supported on the Cisco 3631 router.

**Note:** This module is not supported in the Cisco IOS Software "Enterprise Basic" (-j1s3) feature set. It may not be supported in other basic feature sets for these routers:

- Cisco 261x (non-XM model)
- Cisco 262x (non-XM model)
- Cisco 3620 routers

For more information, refer to [Field Notice: Cisco 2600 and 3600 IOS Software Feature Changes for 12.2\(8\)T](#) and Table 3 of [Cisco 2600/3620 Associated Feature Image and Memory Updates](#).

**Note:** The Cisco IOS Software releases that this document names are typically the minimum versions that are required in order to support the platform, module, or feature in question. For a complete list of Cisco IOS Software releases in which a feature, module, interface card, or chassis is supported, refer to the [Software Advisor](#) ([registered](#) customers only) tool.

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## Related Information

- [Connecting High-Density Analog Telephony Network Modules](#)
- [IP Communications High Density Analog Voice/Fax Network Modules](#)
- [Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation](#)
- [Voice Hardware Compatibility Matrix \(Cisco 17/26/28/36/37/38xx, VG200, Catalyst 4500/4000, Catalyst 6xxx\)](#)
- [Voice Technology Support](#)
- [Voice and Unified Communications Product Support](#)
- **Recommended Reading:** [Troubleshooting Cisco IP Telephony](#) 
- [Technical Support & Documentation - Cisco Systems](#)

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