

# Understanding E&M Voice Interface Cards

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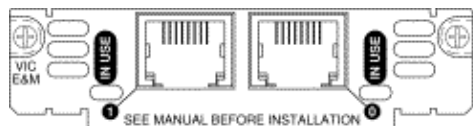
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## Introduction

An Ear and Mouth (E&M) interface supports tie-line facilities or signals between telephone switches. You can use the E&M voice interface card (VIC) to integrate VoIP with the legacy voice solution. The E&M VIC connects the Cisco router to a PBX.

In order to troubleshoot, refer to the TAC Case Collection ( registered customers only) tool.



## Prerequisites

## Requirements

There are no specific requirements for this document.

## Components Used

The information in this document is based on these E&M VICs:

- VIC-2E/M
- VIC2-2E/M

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

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

## Product Numbers

- VIC-2E/M Two-port E&M VIC
- VIC2-2E/M Two-port E&M VIC\*

**Note:** \* VIC2 indicates a next-generation VIC, with component refresh. VIC-2E/M is not supported in the Cisco IP Communications Voice/Fax Network Modules (NM-HD-1V, NM-HD-2V and NM-HD-2VE). VIC2-2E/M should be used with them. Refer to the Voice Hardware Compatibility Matrix for more information.

## Features

### VIC-2E/M

Feature	Description
Voice ports	Two E&M ports
Connections	Supports two-wire and four-wire E&M signaling types I, II, III, and V via RJ-45/RJ48S connectors. Both ports must use the same signaling type. For E&M VIC pinouts, refer to the <i>VIC-2E&amp;M Pinout</i> section of the document <i>E&amp;M Cable Pinouts to Connect Cisco 1750/2600/3600 E&amp;M VIC to Nortel PBX Option 11 E&amp;M Trunk</i> .
Cisco IOS® Software Release	Requires Cisco IOS Software Release 11.3(1)T or later  For Australia, requires Cisco IOS Software Release 11.3(6)T  Requires a "Plus" feature set

### VIC2-2E/M

Feature	Description
Voice ports	Two E&M ports
Connections	Supports two-wire and four-wire, E&M signaling types I, II, III, V via RJ-45/RJ48S connectors. Both ports must use the same signaling type. For E&M VIC pinouts, refer to the <i>VIC-2E&amp;M Pinout</i> section of <i>E&amp;M Cable Pinouts to Connect Cisco 1750/2600/3600 E&amp;M VIC to Nortel PBX Option 11 E&amp;M Trunk</i> .
Cisco IOS	Requires Cisco IOS Software Release

Software Release	12.2(15)ZJ, 12.3(4)T, and later
	Requires a "Plus" feature set

## Configuration

Refer to Voice over IP for the Cisco 3600 Series for the configuration of voice features in Cisco IOS Software.

**Note:** In Cisco IOS Software, use the global configuration command **voice-port slot/VIC slot/unit** to configure the voice port parameters.

Before you configure the VIC E&M, be sure you understand the different interface types and wiring arrangements that an E&M port can have. E&M interface types can be type I, II, III, or V. Cisco platforms do not support type IV. Wiring arrangements can be two or four wires. Refer to Understanding and Troubleshooting Analog E&M Interface Types and Wiring Arrangements for more information.

Also, you need to understand the different types of Start Dial Supervision signaling that an E&M port can have. Start Dial Supervision is the line protocol that defines how the equipment seizes the E&M trunk and passes the address signaling information. The equipment sends dual tone multifrequency (DTMF) digits in order to pass the address information. On E&M circuits, the three main Start Dial Supervision protocols are:

- Immediate Start
- Wink Start
- Delay Dial

Refer to Understanding and Troubleshooting Analog E&M Start Dial Supervision Signaling for more information.

The commands to configure the voice port are:

```
Router(config-voiceport)# ?
  busyout           Configure busyout monitoring parameters
  comfort-noise     Use fill-silence option
  connection        Specify Trunking Parameters
  cptone            Configure voice call progress tone locale
  dial-type         Configure type of dialer for voice
  echo-cancel       Echo-cancellation option
  impedance         Specifies the terminating impedance of the interface
  input             Configure input gain for voice
  music-threshold   Threshold for Music on Hold
  non-linear        Use non-linear processing during echo cancellation
  operation         Specify the operation of the E&M signal
  output            Configure output attenuation for voice
  shutdown          Take voice-port offline
  signal            Configure signal parameters
  snmp              Modify SNMP voice port parameters
  timeouts          Configure voice timeout parameters
  timing            Configure voice timing parameters
  type              Specifies the E&M interface type
```

The most important parameters are:

- cptone
- dial-type
- ◆ dtmf touch-tone dialer

- ◆ pulse pulse dialer
- impedance
  - ◆ 600c
  - ◆ 600r
  - ◆ 900c
  - ◆ complex1
  - ◆ complex2
- operation
  - ◆ two-wire operation
  - ◆ four-wire operation
- signal
  - ◆ delay-dial
  - ◆ immediate
  - ◆ wink-start
- type
  - ◆ E&M type I
  - ◆ E&M type II
  - ◆ E&M type III
  - ◆ E&M type V

The commands to configure VoIP on Cisco routers are very similar on all the router platforms that the Platform Support section of this document shows. Refer to the Command Lookup Tool (registered customers only) for more information on the commands in this document.

Refer to the *Fine-Tuning E&M Voice Ports* section of Configuring Voice Ports for Voice over IP to fine-tune E&M voice ports.

Refer to Analog E&M Troubleshooting Guidelines (Cisco IOS Platforms) in order to troubleshoot.

## Platform Support

### VIC-2E/M

The table in this section shows the platforms that support the various E&M VICs. The table includes Cisco IOS Software release support selection.

**Note:** The original VIC works in Cisco NM-1V and NM-2V network modules, and VIC2 works in NM-HD-1V, NM-HD-2V, NM-HD-2VE, and NM-HDV2. These are not interchangeable.

Cisco IOS Software Support <sup>1</sup>	1750, 1751, 1760	ICS 7700/7750	VG200	2600, 2600XM, 2650XM, 2691	3620, 3640 <sup>2</sup>	3660 <sup>2</sup>	3725, 3745
<b>Carrier Module</b>	<b>Not</b>	<b>Not</b>	<b>NM-1V/</b>	<b>NM-1V/</b>	<b>NM-1V /</b>	<b>NM-1V/</b>	<b>NM-1V/</b>
VIC-2E/M <sup>1</sup>	<b>Required</b> All Cisco IOS Software	<b>Required</b> Cisco IOS Software Release	<b>NM-2V</b> All Cisco IOS Software	<b>NM-2V</b> All Cisco IOS Software	<b>NM-2V</b> Cisco IOS Software Release	<b>NM-2V</b> All Cisco IOS Software	<b>NM-2V</b> All Cisco IOS Software

	releases	12.2(8)YL, 12.2(8)YM, 12.2(8)YN, 12.2(11)YU, 12.2(11)YV, 12.2(13)ZH, 12.2(15)ZL, 12.3(2)XA	releases	releases	11.3(1)T, 12.0(1)T, 12.0(1), 12.0(2)T, 12.0(3)T, 12.0(7)T, 12.1(1)T, 12.1(1), 12.1(5)YB, 12.2(1), 12.2(2)T, 12.2(15)ZJ, 12.3(1)	releases	releases
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<sup>1</sup>Voice requires a Cisco IOS "Voice" feature set on the Cisco 1700 series and "Plus" feature set on the Cisco 2600/3600/3700 series.

<sup>2</sup>The 3631 does not support voice. Neither the Cisco Catalyst 4500/4000 or Catalyst 6500/6000 series switches support VIC-2E/M.

**Note:** On the 175x/1760, you need a packet voice/fax digital signal processor (DSP) module (PVDM) in order to support the VIC-2E/M. The PVDMs hold DSPs that make the card fully functional. You install these PVDMs on the motherboard within the 175x/1760. The 1750 requires a PVDM-4 for one VIC-2E/M and a PVDM-8 for two VIC-2E/Ms. On the 1751/1760 platforms, you need a second generation of PVDM:

- PVDM-256K-4 for one VIC-2E/M or VIC2-2E/M
- PVDM-256K-8 for two VIC-2E/Ms or VIC2-2E/Ms

The 1750 platforms do not support PVDM-256K-xx. Refer to Troubleshooting Unrecognized Voice Interface Cards on Cisco 1750, 1751, and 1760 Routers for more information about 1700 series voice gateway DSP resource requirements.

On the Cisco VG200, 2600, and 3600, the NM-1Vs and NM-2Vs come with the DSPs installed on the module.

**Note:** The Cisco IOS Software releases that the table provides are typically the minimum version that you need to support the platform, module, or feature in question. For a complete list of Cisco IOS Software releases that support a feature, module, interface card, or chassis, use the Software Advisor ( registered customers only) tool.

## VIC2-2E/M

<b>Cisco IOS Software Support</b>	<b>1751, 1760</b>	<b>ICS 7700/7750</b>	<b>2600XM, 2650XM</b>	<b>2691</b>	<b>3640, 3640A</b>
<b>Carrier Module</b>	<b>Not Required</b>	<b>Not Required</b>	<b>NM-HD-1V/NM-HD-2V, NM-HD-2VE , NM-HDV2 1</b>	<b>NM-HD-1V/NM-HD-2V, NM-HD-2VE , NM-HDV2 1</b>	<b>NM-HD-1V NM-HD-2V</b>
VIC2-2E/M	Cisco IOS Software Release 12.2(15)ZL,	Cisco IOS Software Release 12.2(15)ZL,	Cisco IOS Software Release 12.2(15)ZJ, 12.3(4)T	Cisco IOS Software Release 12.2(15)ZJ, 12.3(4)T, 12.3(4)XD	Cisco IOS S 12.2(15)ZJ,

	12.3(2)XC, 12.3(4)T, 12.3(5)	12.3(2)XA		
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<sup>1</sup>For NM–HDV2, there is support in Cisco IOS Software Release 12.3(7)T and later.

**Note:** These platforms do not support the new VIC2–2E/M in any special Cisco IOS Software release:

- 1750
- VG200
- 2600 (non–XM)
- 3620
- Catalyst 4500/4000 series
- Catalyst 6500/6000 series

Also, Cisco IOS Software Release 12.3T will not support the new VIC2–2E/M.

## Known Issues

One known problem is the result of Cisco bug ID CSCdj82747 (registered customers only). The VIC–2E/M module changes port designation on its own after the configuration of a port parameter. The resolution of this bug is in Cisco IOS Software Release 11.3(2.2)T and later releases.

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Voice & Video: IP Telephony
Voice & Video: IP Phone Services for End Users
Voice & Video: Unified Communications
Voice & Video: IP Phone Services for Developers
Voice & Video: General

## Related Information

- **Voice Hardware Compatibility Matrix (Cisco 17/26/28/36/37/38xx, VG200, Catalyst 4500/4000, Catalyst 6xxx)**
- **E&M Cable Pinouts to Connect Cisco 1750/2600/3600 E&M VIC to Nortel PBX Option 11 E&M Trunk**
- **E&M Cable Pinouts Connecting Cisco 1750/2600/3600 E&M VIC to Lucent PBX G3R E&M Trunk**
- **Understanding and Troubleshooting Analog E&M Interface Types and Wiring Arrangements**
- **Voice Technology Support**
- **Voice and IP Communications Product Support**

- **Recommended Reading: Troubleshooting Cisco IP Telephony**
  - **Technical Support & Documentation – Cisco Systems**
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