

# Understanding the PA-VXA/VXB/VXC Voice Port Adaptors for the Cisco 7200/7300/7400/7500 Voice Gateways

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## Introduction

The PA-VXA/VXB/VXC voice port adaptors for the Cisco 7200/7300/7400/7500 router platforms combine T1/E1 connectivity and onboard digital signal processor (DSP) resources. This provides flexibility and power to directly support voice services on these gateways. These port adaptors can support either T1 or E1 interfaces. Based on the selected model, the port adaptors can support up to 60 simultaneous High Complexity (HC) or 120 simultaneous Medium Complexity (MC) codec algorithm voice calls. Additionally (based on the selected model), it is possible to use the onboard DSPs as a DSP farm to provide voice services to port adaptors such as the PA-MCX-nTE1 series of products. These can support voice Telephony interfaces but have no direct DSP resources of their own.



## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

This document is primarily targeted towards voice port adaptors supported on the Cisco 7200/7300/7400/7500 platforms since Cisco IOS® Software Release 12.1(3)T or later. The older PA-VXB-2TE1 and PA-VXC-2TE1 port adaptors are no longer supported in Cisco IOS Software releases later than 12.1(3)T and are not recognized at router boot-time. Refer to Voice Gateway Hardware Compatibility Matrix (Cisco 7200, 7300, 7400, 7500) for information on these legacy voice port adaptors as well as the current line of voice port adaptors.

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 Cisco Technical Tips Conventions for more information on document conventions.

## Product Numbers

This table lists the PA-VXA/VXB/VXC voice port adaptor models available, their corresponding product numbers, and some model-specific call capacity information.

Port Adaptor Model Number	Description <sup>1</sup>	DSP ID Numbers	Number of MC/HC Codec Calls Supported <sup>2</sup>	Number of DSPs Necessary to Reserve for Native T1/E1 use	Number of DSP Channels Available for DSP farming (assumes DSP resources already reserved for maximum native T1/E1 support)
PA-VXA-1TE1-24+ <sup>3</sup>	Voice port adaptor with selectable T1/E1 support, 1 T1/E1 interface, and seven C549 DSPs. Intended for T1 use.	23, 24, 25, 26, 27, 28, 29	28 MC calls (G.729a, G.729ab, G.726, G.711, and FAX relay) 14 HC calls (G.729, G.729b, G.723.1, G.728, global system for mobile communications/enhanced full rate (GSM/EFR), and MC codecs)	6 DSPs = 24 calls for T1 MC 7 DSPs = 14 calls for T1 HC 7 DSPs = 28 calls for E1 MC or 14 calls for HC	1 DSP remaining = 4 calls for T1 MC No remaining DSP resources for T1 HC or E1 MC and HC
PA-VXA-1TE1-30+ <sup>3</sup>	Voice port Adaptor with selectable T1/E1 support, one T1/E1 interface, and eight C549 DSPs. Intended for E1 use.	22, 23, 24, 25, 26, 27, 28, 29	32 MC calls (G.729a, G.729ab, G.726, G.711, and FAX relay) 16 HC calls (G.729, G.729b, G.723.1, G.728, GSM/EFR, and MC)	6 DSPs = 24 calls for T1 MC 8 DSPs = 16 calls for T1 HC 8 DSPs = 32 calls for E1 MC or 16 calls for HC	2 DSPs remaining = 8 calls for T1 MC No remaining DSP resources for E1 MC and HC
PA-VXB-2TE1+	Voice port adaptor with selectable	18, 19, 20, 21, 22, 23, 24, 25, 26,	32 MC calls (G.729a, G.729ab, G.726, G.711, and FAX relay) 24 HC calls (G.729, G.729b, G.723.1, G.728, GSM/EFR, and MC)	12 DSPs = 48 calls for T1 MC 24 DSPs = 96 calls for E1 MC or 48 calls for HC	No remaining DSP resources for T1 MC and HC

	T1/E1 support, two T1/E1 interfaces, and twelve C549 DSPs.	27, 28, 29	calls (G.729, G.729b, G.723.1, G.728, GSM/EFR, and MC codecs)	12 DSPs = 24 calls for 2xT1 HC 12 DSPs = 48 calls for 2xE1 MC or 24 calls for HC	resources for T1 or E1 MC and HC
PA-VXC-2TE1+	Voice port adaptor with selectable T1/E1 support, two T1/E1 interfaces, and thirty C549 DSPs.	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29	120 MC calls (G.729a, G.729ab, G.726, G.711, and FAX relay) 60 HC calls (G.729, G.729b, G.723.1, G.728, GSM/EFR, MC codecs)	12 DSPs = 48 calls for 2xT1 MC 24 DSPs = 48 calls for 2xT1 HC 15 DSPs = 60 calls for 2xE1 MC 30 DSPs = 60 calls for 2xE1 HC	18 DSPs = 72 calls for T1 MC 6 DSPs = 12 calls for T1 HC 15 DSPs = 60 calls for E1 MC No remaining DSP resources for E1 HC

<sup>1</sup> Information about C549 DSP architecture can be found in the Voice Hardware: C542 and C549 Digital Signal Processors (DSPs) documentation.

<sup>2</sup> Information about MC and HC codec selections can be found in the Understanding Codecs: Complexity, Hardware Support, MOS, and Negotiation documentation.

<sup>3</sup> The PA-VXA-1TE1-24+ is intended for T1 connectivity with MC codecs while the PA-VXA-1TE1-30+ is intended for E1 connectivity with MC codecs. You need to consider the PA-VXC-2TE1+ product for T1 or E1 support with HC codecs.

## Features and IOS Support

The features of the PA-VXA/VXB/VXC voice port adaptors include:

Signaling	Minimum Cisco IOS Software Release Required <sup>4</sup>			
	Cisco 7200	Cisco 7300 <sup>5</sup>	Cisco 7400	Cisco 7500 <sup>6</sup>
T1/E1 CAS, Q.SIG, PRI Q.931 User/Network, E1 R2, Transparent-Common Channel Signaling (T-CCS), Non-Facility Associated Signalling (NFAS) PRI	12.1(3)T	12.2(11)YZ, 12.2(13)B,	12.2(2)DD,	12.1(3)T
Feature Group D (FGD)	12.1(5)T	12.3(3), 12.3(11)YZ, 12.3(11), 12.2(13)B,	12.2(4)B, 12.2(2)DD, 12.2(4)B	12.1(5)T

		12.3(3), 12.3(4)T		
Resource Allocation Indication (RAI)	12.2(4)T	12.2(11)YZ, 12.2(13)B, 12.3(3), 12.3(4)T	12.2(2)DD, 12.2(4)B	12.2(4)T
Media Gateway Control Protocol (MGCP)	12.2(2)T	12.2(11)YZ, 12.2(13)B, 12.3(3), 12.3(4)T	12.2(2)DD, 12.2(4)B	12.2(2)T
PA-VXB-2TE1+, PA-VXC-2TE1+	12.1(3)T	12.3(4)T, 12.2(11)YZ, 12.2(13)B, 12.3(3), 12.3(4)T	12.2(2)DD, 12.2(4)B	12.1(3)T
PA-VXA-1TE1-24+, PA-VXA-1TE1-30+ with all the above features	12.2(4)T, 12.2(4)B	Not supported	Not supported	12.2(4)T

<sup>4</sup> The PA-VXA/VXB/VXC voice port adaptors are supported in all Cisco IOS feature-sets except for the Enterprise MCM feature-set.

<sup>5</sup> The Cisco 7301 is the only member of the 7300 platform family which can support Voice Port Adaptors.

<sup>6</sup> Special Route Switch Processor (RSP) and Versatile Interface Processor (VIP) considerations for the Cisco 7500 are described in the Voice Gateway Hardware Compatibility Matrix (Cisco 7200, 7300, 7400, 7500).


**Note:** The Cisco IOS Software releases provided are typically the minimum release required to support the platform, module, or feature in question. To find out a complete list of Cisco IOS Software releases a feature, module, interface card, or chassis is supported in, use the Software Advisor (registered customers only) tool.

- The PA-VXA supports one software-selectable T1 or E1 interface. The PA-VXB and PA-VXC support two software-selectable T1 or E1 interfaces; both interfaces must be the same.
- T1 interface features include:
  - ◆ DS1 100-ohm interface with RJ-48C connectors
  - ◆ D4 superframe (SF) or extended superframe (ESF) framing
  - ◆ Alternate Mark Inversion (AMI) or Binary 8-Zero Substitution (B8ZS) line encoding
  - ◆ Full Facilities Data Link (FDL) support and FDL performance monitoring compliant with ANSI T1.403 or AT&T TR 54016
  - ◆ Software-selectable DSX-1 cable length in increments from 0 to 655 feet
  - ◆ Software-selectable DS1 CSU line build-out settings for 0 dB, -7.5 dB, -15 dB, and 2.5 dB
  - ◆ Software-selectable DS1 CSU receiver gain settings for 26 dB or 36 dB
  - ◆ DS1 line protection per UL1459/1950, FCC part 68
  - ◆ Full support for DSX-1 MIB RFC 1406, including alarm detection and reporting
  - ◆ DSX-1 MIB remote access is supported
  - ◆ DS0 Drop-and-Insert (D&I)
- E1 interface features include:
  - ◆ E1 120-ohm (G.703) with RJ-48C connectors
  - ◆ Software-configurable E1 national bits

- ◆ CRC4 or non-CRC4 framing
- ◆ HDB3 or AMI line encoding
- ◆ Full support for E1 MIB, RFC 1406, including alarm detection and reporting
- ◆ DS0 Drop-and-Insert (D&I)
- The PA-VXA/VXB/VXC Voice Port Adaptors use Texas Instruments C549 DSPs. Each DSP:
  - ◆ Runs up to four voice calls in MC codec mode (G.711, G.729a, G.729ab, G.726, and FAX relay).
  - ◆ Runs up to two voice calls in HC codec mode (G.729, G.729b, G.728, G.723.1, GSM/EFR, + all MC codecs).
  - ◆ FAX support includes T.30 FAX protocol with relay, V.17, V.29, V.27, T.38 FAX protocol with relay.
  - ◆ Software Echo Cancellation up to 32 ms coverage compliant with ITU-T G.165, until Cisco IOS Software Release 12.2(13)T when 64 ms coverage becomes available with the Enhanced ITU-T G.168 Echo Cancellation feature.
  - ◆ DTMF/R2/MF/SF/CP tone detection and generation
  - ◆ Dial-pulse detection and generation
  - ◆ Energy-based Voice Activity Detection (VAD) and codec-specific VAD implementations
  - ◆ Comfort-noise generation for silence intervals
  - ◆ Modem relay support starting in Cisco IOS Software Release 12.2(11)T with the Modem Relay Support on VoIP Platforms feature
  - ◆ Refer to Troubleshooting DSPs on the PA-VXA/PA-VXB/PA-VXC Voice Port Adaptors for Cisco 7200/7300/7400/7500 Series Routers in order to diagnose DSP-related problems with the PA-VXA/VXB/VXC voice port adaptors.

Refer to Enhanced Digital Voice Port Adapters for the Cisco 7000 Series for more information about the PA-VXA/VXB/VXC voice port adaptors.

## Related Information

- **Voice Gateway Hardware Compatibility Matrix (Cisco 7200, 7300, 7400, 7500)**
- **Troubleshooting DSPs on the PA-VXA/PA-VXB/PA-VXC Voice Port Adaptors for Cisco 7200/7300/7400/7500 Series Routers**
- **Voice Technology Support**
- **Voice and Unified Communications Product Support**
- **Troubleshooting Cisco IP Telephony** 
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