



Cisco Virtual Digital Signal Processor for Unified Collaboration

Contents

Overview.....	2
Use cases	2
Licensing model	3
Codec support and capacity	4
Cisco platform availability and performance.....	5

Overview

The Cisco® Virtual Digital Signal Processor (vDSP) is a software-based solution that extends rich-media capabilities to Cisco Secure Routers. Replacing traditional hardware Packet Voice Digital Signal Processor (PVDM) modules for IP-IP media services, vDSP delivers voice connectivity, conferencing, transcoding, media optimization, transrating, and secure voice for Cisco Unified Communications solutions. Available as a software feature, vDSP simplifies deployment and offers required scales with a dramatically reduced physical footprint.

Use cases

The PVDMs support digital voice connections, conferencing, universal transcoding, and media optimization services:

- **Scalable Voice Conferencing at the Edge:** Enable flexible and scalable ad-hoc and meet-me conferences with diverse codec support. vDSP seamlessly integrates with both on-premises (e.g., Cisco Unified Communications Manager) and cloud-based call control platforms (e.g., Webex® Calling), processing media locally at the branch for optimized performance, reduced WAN bandwidth consumption, and a superior user experience.
- **Codec Interoperability:** Ensure seamless communication between disparate voice networks and endpoints. vDSP performs universal transcoding, converting between any supported codecs, and transrating, repacketizing codecs for different network requirements. This capability is crucial for bridging diverse telephony environments and ensuring all endpoints can communicate effectively.
- **Bandwidth Optimization for Challenging Networks (e.g., LEO Satellite):** Significantly reduce bandwidth consumption over networks characterized by high latency and low bandwidth, such as Low Earth Orbit (LEO) satellite connections. vDSP is capable of converting to low-bandwidth codecs and optimizes media before transmission, ensuring efficient and reliable voice communications over constrained links.
- **Reliable Automated Telephony Interaction (DTMF):** Guarantee robust interaction with Interactive Voice Response (IVR) systems, voicemail, and other automated telephony applications through reliable Dual Tone Multi-Frequency (DTMF) detection and generation, supporting various standards including RFC 2833 and SIP INFO.

The vDSP is a software-based solution designed for IP-based voice media services. For Time-Division Multiplexing (TDM) digital voice modules, such as T1/E1 connectivity, dedicated hardware DSPs as a physical daughter card on the module are still required. The vDSP does not fulfill the role of hardware PVDMs for T1/E1 voice packetization.

The analog voice modules (Foreign Exchange Subscriber, Foreign Exchange Office, and Ear and Mouth/Receive and Transmit [FXS, FXO, and E/M]) and Basic Rate Interface (BRI) digital voice modules contain built-in, nonconfigurable Digital Signal Processors (DSPs) and do not require any additional PVDMs for voice packetization.

Licensing model

- **Cisco Smart Licensing:** All vDSP licenses are registered to the organization's Cisco Smart Licensing account for simplified management and compliance.
- **Routing Advantage Requirement:** Routing Advantage is mandatory for vDSP to function.
- **Perpetual License:** vDSP is available as a perpetual license, providing continuous access to its software-defined DSP functionalities on supported platforms.
- **Scale-Based SKUs:** Licenses are provided through scale-based Stock Keeping Units (SKUs), enabling customers to choose the appropriate capacity for their needs. Each supported platform has a maximum vDSP scale it can support, with further details provided in subsequent sections.
- **Non-SD-WAN Mode Only:** vDSP is designed to operate solely in non-SD-WAN mode configurations. It is not available or supported with WAN subscription licensing (WAN Essential and WAN Advantage tiers).

Table 1. Cisco vDSP Part Numbers

Part Number	Description
V-DSP-32	32-channel density voice DSP
V-DSP-64	64-channel density voice DSP
V-DSP-256	256-channel density voice DSP
V-DSP-512	512-channel density voice DSP
V-DSP-1024	1024-channel density voice DSP
V-DSP-2048	2048-channel density voice DSP



Codec support and capacity

The Cisco Virtual Digital Signal Processor supports a wide range of codecs and media processing capabilities. Details on supported codecs, channel densities, and media-enhancement features will be provided in the tables below.

Table 2. Channel Densities vDSP for Transcoding

	Number of Channels		
SKU	Low Complexity (G.711)	Medium Complexity (G.722, G.729a, G.729ab)	High Complexity (Opus , G.729, G.729b, iLBC, iSAC)
V-DSP-32	32	14	8
V-DSP-64	64	28	16
V-DSP-256	256	112	64
V-DSP-512	512	224	128
V-DSP-1024	1024	448	256
V-DSP-2048	2048	896	512

Table 3. Media-Enhancement Features

Feature	vDSP
Noise reduction	Yes
Acoustic shock prevention	Yes
Call Progress Analysis (CPA)	Yes

Cisco platform availability and performance

The Cisco Virtual Digital Signal Processor is supported on Cisco 8000 Series Secure Routers. These platforms provide the necessary compute resources to run vDSP as a software-defined service. Specific details on platform availability, supported vDSP scale, and performance metrics for transcoding and conferencing are provided in the following tables.

Table 4. Platform-based vDSP limits

Secure Router Platforms	Maximum vDSP Support
C8375-E-G2	V-DSP-2048
C8355-G2	V-DSP-1024
C8235-E-G2	V-DSP-256
C8231-E-G2	V-DSP-256
C8235-G2	V-DSP-256
C8231-G2	V-DSP-256

Table 5. Platform-based Transcoding and Conferencing Performance

Platform	Transcoding (G.711 <-> G.711)	Conferencing G.711 (8-Party)
C8375-E-G2	2048	512 sessions [4096 endpoints]
C8355-G2	1024	256 sessions [2048 endpoints]
C8235-E-G2	256	64 sessions [512 endpoints]
C8231-E-G2	256	64 sessions [512 endpoints]
C8235-G2	256	64 sessions [512 endpoints]
C8231-G2	256	64 sessions [512 endpoints]