Cisco Unified Communications Voice/Fax Network Module

Cisco Unified Communications Voice/Fax Network Modules for the Cisco 2800 and 3800 Series Voice Gateway Routers

The Cisco® Unified Communications voice/fax network modules provide enterprises, managed service providers, and service providers the ability to directly connect the public switched telephone network (PSTN) and traditional telephony equipment (private branch exchange [PBX], key system, analog telephones, fax machines, and so on) to Cisco 2800 Series and 3800 Series voice gateway routers. This set of Cisco Unified Communications voice/fax network modules delivers the most versatile combination of analog and digital voice and data capabilities in a single network module. As a completely integrated component of the Cisco Unified Communications solution including Cisco CallManager, Cisco IP phones, Cisco Unity® unified messaging software, Cisco IP Contact Center (IPCC), and the entire line of Cisco Unified Communications products, the Cisco Unified Communications voice/fax network modules are a cornerstone of Cisco. Service-Oriented Network Architecture (SONA). When used in a Cisco voice gateway router with Cisco Unified CallManager, Survivable Remote Site Telephony (SRST), or Cisco Unified CallManager Express, the Cisco Unified Communications voice/fax network module is a complete unified communications solution for the business branch.

Figure 1 shows the Unified Communications voice/fax network module with one VWIC-2MFT-T1-DI and one VIC-4FXS/DID.

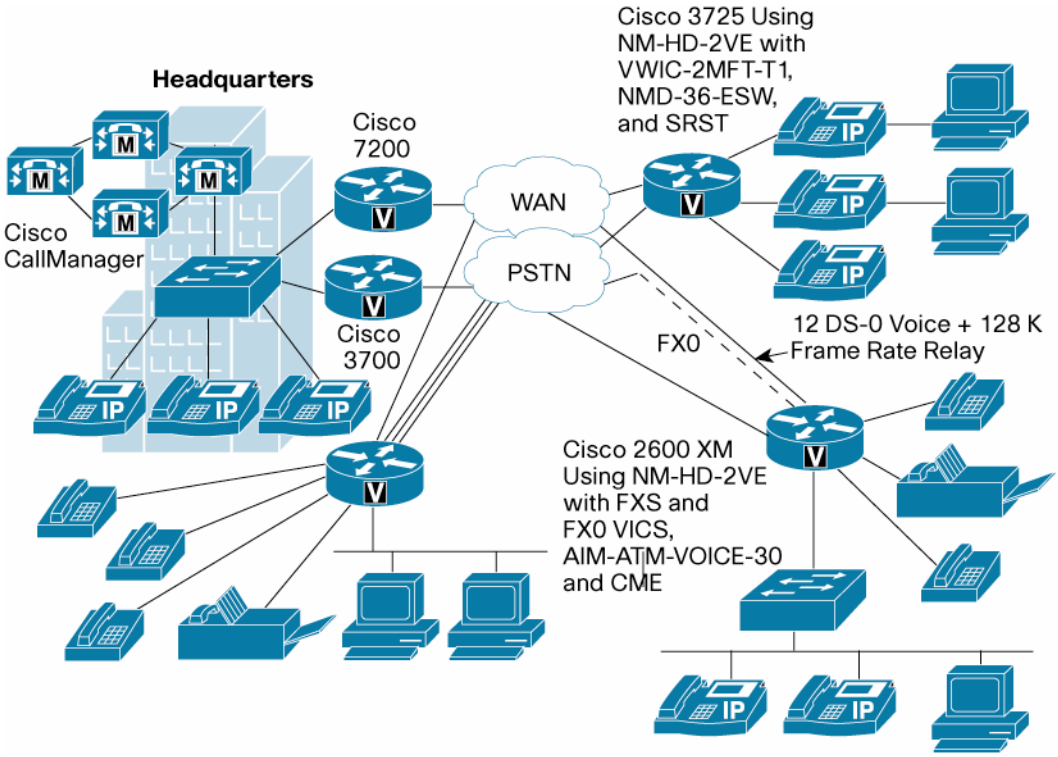
Figure 1. NM-HD-2VE with one VWIC2-2MFT and one VIC3-4FXS/DID

The Cisco Unified Communications voice/fax network modules for the Cisco 2800 and 3800 Series voice gateway routers enable packet voice technologies, including voice over IP (VoIP) (H.323, Media Gateway Control Protocol [MGCP], and Session Initiation Protocol [SIP]), voice over Frame Relay, and voice over ATM (ATM Adaptation Layer 2 [AAL2] and AAL5). Cisco Unified Communications solutions provide the means for integrating voice and data within a single network, allowing users to take advantage of services such as IP telephony, integrated services, and toll-bypass while providing an opportunity to improve productivity. By operating on Cisco IOS® Software, these solutions incorporate advanced quality-of-service (QoS) features, intelligent network queuing, and standards-based encapsulation, providing efficient direct transport of both voice and fax over IP, Frame Relay, and ATM networks. Cisco IOS Software solutions enable time-sensitive voice traffic to be moved across even low-bandwidth WAN connections with the priority and quality that voice and fax demand. Transporting voice over IP networks continues to provide

transport flexibility because IP can be routed across a multitude of WAN technologies (leased lines, Frame Relay, and ATM) along with providing direct connectivity to the desktop.

Figure 2 shows an IP telephony application using Cisco CallManager Express and SRST in a business branch.

Figure 2. IP Telephony Application Using Cisco Unified CallManager Express and SRST in the Business Branch



The Cisco Unified Communications voice/fax network modules support either one or two Cisco voice interface cards (VICs) or Cisco voice/WAN interface cards (VWICs) and install into network module slots for the Cisco 2800 and 3800 Series voice gateway routers. The Cisco VICs are daughter cards that install into the network modules and provide the interface to the PSTN and to telephony equipment (PBX, key systems, fax machines, phones). The Cisco VWICs are daughter cards that provide the interface to the PBX, PSTN, and/or WAN.

VICs include two-port foreign exchange station (FXS), direct inward dial (DID), foreign exchange office (FXO), and Ear and Mouth (E&M) analog interface cards. Also available are four-port FXS and four-port FXO cards and a two-port ISDN Basic Rate Interface (BRI) digital interface card providing –40V phantom power. These cards cover the entire range of analog connectivity options along with user-side and network-side digital BRI connections (Table 1). Cisco VWICs include one- and two-port T1 and E1 interface cards with optional drop-and-insert capability. These cards cover a full range of digital voice and WAN connectivity options and provide connectivity to the world's PBXs, PSTNs, and Post, Telephone, and Telegraph (PTT) organizations.

Cisco Unified Communications voice/fax network modules provide the gateway to Cisco SONA for calls to and from the PSTN and the traditional telephony equipment. Users can deploy networks that take advantage of investments in existing telephony equipment while also deploying and integrating IP telephony immediately or in the future. These network modules enable users to

operate at any point on the integrated voice, video, and data infrastructure spectrum while incrementally adding connections to both traditional telephony and IP telephony.

Table 1. Cisco Voice/WAN Interface Cards

Part Number	Description	Application
NM-HD-2VE	Two-slot IP communications enhanced voice/fax network module.	Supports analog/BRI/T1/E1 voice and data WAN. Supports up to 48 channels of G.711 codec, 24 channels of medium-complexity codec, or 18 channels of any supported codec. Offers maximum investment protection with support for analog/digital voice and data WAN.
VIC3-2FXS/DID	Two-port FXS and DID voice/fax interface card.	FXS port is used to connect directly to phones, fax machines, and key systems. The card generates battery polarity reversal and caller ID. Also provides off-premises DID connection from central office. Serves incoming calls from the PSTN.
VIC3-2FXS-E/DID	Two-port FXS enhanced and DID voice/fax interface card.	Enhanced FXS port is able to connect directly to phones, fax machines, and key systems with loop length up to 11,000 feet (3.3 km). The card generates battery polarity reversal and caller ID. Also provides off-premises DID connection from central office. Serves incoming calls from the PSTN.
VIC3-4FXS/DID	Four-port FXS and DID voice/fax interface card.	FXS port is used to connect directly to phones, fax machines, and key systems. Generates battery polarity reversal and caller ID. Also provides off-premises DID connection from central office. Serves incoming calls from the PSTN.
VIC2-2FXO	Two-port FXO voice/fax interface card [universal card for all countries]. Also supports analog Centralized Automated Message Accounting (CAMA) on any port.	FXO port is used to connect to PBX or key system, or to provide off-premises connections to PSTN or PTT. Supports battery reversal detection and caller ID. These Cisco VICs can be software-configured to work in all countries. Also used to connect to analog CAMA trunk to provide dedicated E-911 service (North America only)
VIC2-4FXO	Four-port FXO voice/fax interface card [universal card for all countries]. Also supports analog CAMA on any port.	FXO port is used to connect to PBX or key system, or to provide off-premises connections to PSTN or PTT. Supports battery reversal detection and caller ID. These Cisco VICs can be software configured to work in all countries. Also used to connect to analog CAMA trunk to provide dedicated E-911 service (North America only)
VIC3-2E/M	Two-port E&M voice/fax interface card.	Used to connect to PBX or key system as tie lines.
VIC2-2BRI-NT/TE	Two-port BRI voice/fax interface card (configurable for either network or terminal side).	Used to connect as network side or user side to PBX or key system as off-premises connections (ISDN voice BRI). Supports patent-pending flexible Layer 2 and Layer 3 configurations.
VWIC2-1MFT-T1/E1	One-port RJ-48 multiflex trunk-T1/E1 (Voice and WAN)	Used to connect to PBX, PSTN, or WAN using T1/E1 standard interface and provide channel drop-and-insert capability.
VWIC2-2MFT-T1/E1	Two-port RJ-48 multiflex trunk-T1/E1 (Voice and WAN)	Used to connect to PBX, PSTN, or WAN using T1/E1 standard interface and provide channel drop-and-insert capability.

Table 2 shows the maximum number of Cisco Unified Communications voice/fax network modules allowed per Cisco platform.

Table 2. Number of Cisco Unified Communications Voice/Fax Network Modules Allowed Per Cisco Platform

Cisco Platform	Maximum Number of Network Modules Allowed
Cisco 2811/2821/2851 Integrated Services Routers	1
Cisco 3825 Integrated Services Router	2
Cisco 3845 Integrated Services Router	4

Table 3 summarizes the features and benefits of Cisco Unified Communications voice/fax network modules.

Table 3. Features and Benefits

Feature	Description and Benefits
IP Telephony Voice Gateway	• **Integrates all Cisco Unified Communications** solutions by providing flexible and reliable connectivity to public or private switched telephone networks around the world. • **Provides gateway for Cisco IP phones** to PSTN or traditional PBXs and private automatic branch exchanges (PABXs). • **Provides gateway to PSTN** for traditional PBXs, phones, fax machines, and key communication systems connected to a voice, data, and video infrastructure. • **Interoperable within Cisco SONA** and Cisco Unified Communications solutions.
Toll Bypass	• **Reduces or eliminates toll charges** assessed by long distance and local carriers by transporting voice and fax traffic across the enterprise intranet, LAN, metropolitan-area network (MAN), or WAN. • **Works with existing phones**, faxes, PBXs, and key systems. • **Connection trunks** create a permanent tie-line replacement structure (digital-to-digital, digital-to-analog, or analog-to-analog capabilities). • **Interoperates end-to-end** with Cisco IP phones, analog phones, fax machine connections, and PBX or PABX connections to and from other Cisco voice-enabled products.
Voice over Packet Transport	• **Voice/Fax over IP**—VoIP traffic at Layer 3 can travel over any Layer 1 or Layer 2 media, including ISDN, leased lines, serial connections, Frame Relay, Ethernet, Token Ring, and ATM. • **Voice/Fax over Frame Relay**—Voice over Frame Relay is supported using FRF.11 and FRF.12 standards. This solution also uses features found only in Cisco IOS Software for maintaining voice quality. • **Voice over ATM** is supported using AAL2 or AAL5 encapsulation. Uses existing ATM networks as a direct transport method for voice. Requires ATM interfaces such as T1/E1 ATM, Inverse Multiplexing over ATM (IMA), DS3/E3 or OC-3, or DSL WICs. • **Compressed Real-Time Protocol (cRTP)** offers RTP header compression and packet fragmentation techniques that allow toll-quality voice and fax transmissions over any WAN connection. • **Call Admission Control and PSTN Fallback** uses Service Assurance Agent (SAA) to determine latency, delay and jitter and provide real-time Calculated Planning Impairment Factor (ICPIF) calculations before establishing a call across an IP infrastructure. SAA packets emulate voice packets receiving the same priority as voice throughout the entire network. • **Advanced QoS Mechanisms**—These configurable Cisco IOS Software features reserve appropriate bandwidth and prioritize voice and fax traffic to help ensure transparent delivery of toll-quality voice and fax. They include Resource Reservation Protocol (RSVP), queuing techniques (such as Low Latency Queuing), IP Precedence, and differentiated services code points (DSCPs).
Call Control Signaling	Supports H.323 V1/V2/V3/V4, MGCP 0.1/1.0, and SIP call control protocols. Also supports Cisco Unified CallManager using MGCP or H.323.
International Telecommunications Union (ITU) Standard Voice Codecs	**G.711, G.729, G.729a/b, G.723.1, G.726, G.728, and GSM**—These are standards-based compression technologies allowing transmission of voice across IP, Frame Relay, and ATM. The G.711 standard employs 64 kbps PCM modulation using either u-law or A-law. Other codecs employ lower bit rates.
Telephony Interface Signaling Support	Supports the following signaling protocols: • FXO/FXS loop-start and ground-start signaling • E&M (wink, immediate, delay) • Inbound signaling (such as dual-tone multifrequency [DTMF], multifrequency support) • T1 and E1 channel associated signaling (CAS) • T1 and E1 PRI Q.931 user side and network side • T1 and E1 PRI QSIG • E1 MelCAS • E1 R2 CAS • T1 and E1 Transparent common channel signaling (CCS) (with multiple-D channel) • Country-specific signaling

Feature	Description and Benefits
Voice Features	• **Echo Cancellation**—Cancels echo on tail circuits up to 32 msec (configurable tail length). • **Silence suppression, voice activity detection (VAD)**—Bandwidth is used only when someone is speaking. During silent periods of a phone call, bandwidth is available for data traffic. • **Comfort Noise Generation**—This feature reassures the phone user that the connection is being maintained, even when no voice packets are being transmitted. • **Private Line Automatic Ring-Down (PLAR)**—Provides a direct connection to another digital or analog voice port by lifting a telephone handset on one end. Includes "Trader Turret" PLAR. • **Local/Advanced Voice Busy-Out**—Automatically busies out any desired voice trunk line to a PBX or PSTN when a direct WAN or LAN connection to the router or any part of the network to the destination port is down. • **Caller ID Support**—Per-port configurable caller ID (with per call un-blocking) over analog FXS, FXO and DID interfaces. • **Hunt Groups Across Cards**—Calls can be forwarded automatically to the first available line. • **Integrated Add and Drop Multiplexer (Drop and Insert)**—Performs add and drop multiplexing for voice within a dual-port voice network module. Eliminates the requirement, maintenance, support, and expense of using an external add and drop multiplexer. • **Channel Bank**—Supports the conversion of analog voice ports into digital voice traffic using DS-0 channels on a T1 or E1 interface (only supported on NM-HD-2VE). • **Dial Plan Mapping**—Simplifies configuration and management through automatic mapping of dialed phone numbers to IP addresses. • **Interactive Voice Response (IVR) Support**—Provides automated attendant, voice-mail support, and call routing based on desired service. • **Hoot and Holler over IP**—Delivers superior quality Hoot and Holler multicast voice services and multicast conferencing over the WAN using existing end-points.
Voice Port Interfaces	Support FXS, FXO (includes CAMA), DID, E/M, BRI (S/T, NT/T), T1, and E1. (T1 and E1 only supported on NM-HD-2VE)
Voice Port-Specific Features	• **FXS and FXO**—Provide battery polarity reversal detection and initiation for disconnect supervision and far-end answer supervision. • **ISDN BRI Network Side and Phantom Power**—The VIC2-2BRI-NT/TE provides the ability to connect a PBX or PABX configured as user side directly to the router. Also provides phantom power to accommodate equipment that requires it. • **Analog CAMA Trunk Connection**—The VIC2-2FXO and VIC2-4FXO provide the ability to connect to analog CAMA trunks which provide dedicated E-911 services. Each Cisco VIC port can be individually configured as an FXO or a CAMA port via Cisco IOS Software. • **Per Port Disable**—Allows disabling of any single port without affecting any other port on the same VIC or network module. • **LED indicators** for voice-processing resources and port status.
Fax and Modem	• **Fax and Modem Pass-Through**—Allows fax and modem traffic to pass through a voice port. • **Fax Relay**—Provides a more robust protocol for fax transmission over packet networks. Also supports the T.37 and T.38 fax protocols.
Data Features (Only Supported on NM-HD-2VE)	• Support serial data WAN access using T1/E1 or fractional T1/E1 network interface. • N X 64 Kbps or N X 56 Kbps channel group data rates (T1:N=1 to 24, E1:N=1 to 31). • Supports up to 32 data channel groups with a total bandwidth of up to 2 Mbps. • Supports integrated data WAN access and DS-0 voice channels on the same T1/E1.
High-Performance Flexible Digital Signal Processor (DSP) Architecture	• **Channel Capacity**—Supports up to 48 voice channels. See network module specifications below for further details. • **Flexible DSP Architecture**—There is no need to specify codec complexity at configuration. An appropriate codec is dynamically selected when a call is established, while allocating DSP resources optimally. • **Feature Upgrades**—The DSP architecture allows for addition of new features through simple code updates.

Additional Features

Cisco IOS Software and Platform Support

- Fully supported via Cisco IOS Software command-line interface (CLI) including device configuration, monitoring, link status, network security, Layer 2 and 3 protocol configuration and management, and call history
- Supported on all Cisco 2800 Series and 3800 Series voice gateway routers

Traditional Circuit-Switched PBX Support

- Verified PBX interoperability with Lucent Definity series (G3r), Nortel Meridian series (Option 11), Siemens HICOM 330E, NEC NEAX 2400, Alcatel 4400, and Ericsson MD110. Other PBXs continue to be tested.

Network Management Support

- Cisco Unified CallManager
- Simple Network Management Protocol (SNMP) compliant
- Manageable via a Management Information Base (MIB) browser
- CiscoView interface for configuration
- Cisco ConfigMaker
- Cisco Netsys supported

Software and Memory Requirements

Table 4 shows the software and memory requirements for the Cisco Unified Communications voice/fax network modules and Cisco voice interface cards.

Table 4. Software and Memory Requirements for Voice/Fax Network Modules and Voice Interface Cards

	Cisco IOS Software Version	
Product	**Cisco 2800 Series**	**Cisco 3800 Series**
NM-HD-1V NM-HD-2V NM-HD-2VE	• Cisco IOS Software • Release 12.3(8)T4 • "IP Voice" images	• Cisco IOS Software • Release 12.3(11)T • "IP Voice" images
VIC2-2FXO VIC2-4FXO VIC2-2BRI-NT/TE	• Cisco IOS Software • Release 12.3(8)T4 • "IP Voice" images	• Cisco IOS Software • Release 12.3(11)T • "IP Voice" images
VWIC2-xMFT-xx	• Cisco IOS Software • Release 12.3(14)T • "IP Voice" images	• Cisco IOS Software • Release 12.3(14)T • "IP Voice" images
VIC3-2E/M	• Cisco IOS Software • Release 12.4(15)XW or 12.4(20)T • "IP Voice" images	• Cisco IOS Software • Release 12.4(15)XW or 12.4(20)T • "IP Voice" images
VIC3-2FXS/DID VIC3-2FXS-E/DID VIC3-4FXS/DID	• Cisco IOS Software • Release 12.4(15)XZ or 12.4(20)T • "IP Voice" images	• Cisco IOS Software • Release 12.4(15)XZ or 12.4(20)T • "IP Voice" images

Note: Use Cisco CallManager Version 3.3(3) for MGCP support.

Note: Please refer to the Cisco IOS Software release notes for determining the minimum flash and dynamic RAM (DRAM) requirements.

Technical Specifications

Environmental Specifications (Same for All Modules)

- Operating temperature: 32 to 104°F (0 to 40º C)
- Storage temperature: -13 to 158°F (-25 to +70º C)
- Relative humidity: 5 to 85 percent noncondensing operating; 5 to 95 percent noncondensing, nonoperating

Network Module Specifications

Table 5 lists specifications for Cisco Unified Communications voice/fax network modules.

Table 5. Specifications for Unified Communications Voice/Fax Network Modules

	NM-HD-1V	NM-HD-2V	NM-HD-2VE
Description	One-slot Cisco Unified Communications voice/fax network module	Two-slot Cisco Unified Communications voice/fax network module	Two-slot Cisco Unified Communications enhanced voice/fax network module
Cisco IOS Software Release	12.2.(15)ZJ "Plus" Image	12.2.(15)ZJ "Plus" Image	12.2.(15)ZJ "Plus" Image
Cisco Part Number	800-21590-01	800-21591-01	800-20164-01
FCC Specifications	FCC Class B device	FCC Class B device	FCC Class B device
Spare	NM-HD-1V=	NM-HD-2V=	NM-HD-2VE=
Voice Channel Capacity	Four channels (any complexity codec)	Six channels (any complexity codec) or eight channels (medium-complexity codec)	18 channels (any complexity), 24 channels (medium-complexity), or 48 channels (G.711)
Mean Time Between Failure (MTBF)	1,605,514 hours	1,312,760 hours	1,092,352 hours
Cisco VICs and VWICs Required	Requires one Cisco VIC: • VIC3-2FXS/DID • VIC3-2FXS-E/DID • VIC3-4FXS/DID • VIC2-2FXO • VIC2-4FXO • VIC3-2E/M • VIC2-2BRI-NT/TE	Requires at least one Cisco VIC (maximum of two): • VIC3-2FXS/DID • VIC3-2FXS-E/DID • VIC3-4FXS/DIDVIC2-2FXO • VIC2-4FXO • VIC3-2E/M • VIC2-2BRI-NT/TE	Requires at least one Cisco VIC or VWIC (maximum of two): • VIC3-2FXS/DID • VIC3-2FXS-E/DID • VIC3-4FXS/DID • VIC2-2FXO • VIC2-4FXO • VIC3-2E/MVIC2-2BRI-NT/TE • Any VWIC-xMFT-xx and VWIC2-xMFTxx (except VWIC-xMFT-G703)

VIC Specifications

Tables 6 through 11 show the specifications for the Cisco Voice Interface Cards (VIC).

Table 6. VIC3-2FXS/DID Specifications. 2-Port FXS Voice/Fax Interface Card (for on-premise use only)

Feature	Description
Interface Type	FXS (on-premise connection only) and DID trunk
Cisco IOS Software Release	12.4(15)XZ or 12.4(20)T
Cisco Part Number	800-30501-01
Compliance	FCC Class B device, CE
Safety Conformance	UL1950
Spare	VIC3-2FXS/DID=
Address Signaling Formats	In-band DTMF Out-of-band pulse (8–12 pps)
Signaling Modes	FXS: Loop-start, ground-start DID: Immediate, Delay-dial, WinkStart
DID Loop Resistance	Up to 1800 ohms (including terminal equipment)
FXS Loop Resistance	Up to 600 ohms (including phone or terminal equipment)
On-Hook Voltage	–44V
Off-Hook Loop Current	25 mA (max)
Ringing Tone	Configurable for different country requirements

Feature	Description
Ringing Voltage	45 Vrms into 5REN at zero loop length (balanced)
Ringing Frequencies	20 Hz, 25 Hz, 30 Hz, 50 Hz
REN Loading	5 REN/port, 8 REN/VIC (max)
Disconnect Supervision	Power denial (Calling Party Control, far-end disconnect)
Caller ID	On-hook transmission of frequency-shift-keying (FSK) data
Loop Length	<1500 ft (450 m) 24 AWG Category 5 twisted pair cable
Physical Connector	RJ-11
Number of Connectors/Ports	Two
MTBF	2,298,695 hours

Table 7. VIC3-2FXS-E/DID Specifications for Two-Port FXS Enhanced and DID Voice/Fax Interface Card

Feature	Description
Interface Type	FXS (on-premise connection only) and DID trunk
Cisco IOS Software Release	12.4(15)XZ or 12.4(20)T
Cisco Part Number	800-27471-02
Compliance	FCC Class B device, CE
Safety Conformance	UL1950
Spare	VIC3-2FXS-E/DID=
Address Signaling Formats	In-band DTMF Out-of-band pulse (8–12 pps)
Signaling Modes	FXS: loop-start, ground-start DID: Immediate, delay dial, wink start
DID Loop Resistance	Up to 1800 ohms (including terminal equipment)
FXS Loop Resistance	Up to 1400 ohms (including phone or terminal equipment)
On-Hook Voltage	–44V
Off-Hook Loop Current	35 mA for FXS and 25 mA for DID (max)
Ringing Tone	Configurable for different country requirements
Ringing Voltage	62 Vrms into 2 REN at zero loop length (balanced)
Ringing Frequencies	20 Hz, 25 Hz, 30 Hz, 50 Hz
REN Loading	2 REN / port (max)
Ringing DC Offset Options	10V, 20V, 24V, 30V and 35V DC (reduces ringing amplitude), Default = 0V (balanced)
Disconnect Supervision	Power denial (Calling Party Control, far-end disconnect)
Caller ID	On-hook transmission of frequency-shift-keying (FSK) data
Loop Length	Up to 11,000 feet (3.3 KM) 24 AWG Category 5 twisted pair cable
Physical Connector	RJ-11
Number of Connectors/Ports	Two
MTBF	2,298,695 hours

Table 8. VIC2-2FXO and VIC2-4FXO Specifications for Two- or Four-Port FXO Voice/Fax Interface Card with Battery Reversal Detection and Caller ID (for all countries).

Note: Includes support for North American analog CAMA trunk interface (user side).

Feature	Description
Interface Type	FXO
Cisco IOS Software Release	12.2.(15)ZJ
Cisco Part Number	VIC2-2FXO: 800-21597-01, VIC2-4FXO: 800-21589-01

Feature	Description
Compliance	FCC Class B device, CE
Safety Conformance	UL1950
Spare	VIC2-2FXO=, VIC2-4FXO=
Signaling Modes	Loop-start, ground-start
Address Signaling Formats	In-band DTMF Out-of-band pulse (10/20 pps)
Tone Disconnect Supervision	Call disconnect on progress tone of less than 600 Hz
Battery Polarity Reversal Detection	Detection of disconnect supervision and far-end answer supervision via battery polarity reversal
Power Interrupt Disconnect	Call disconnect on power interrupt of > 600 ms
Physical Connector	RJ-11
Number of Connectors/Ports	Two for VIC2-2FXO, four for VIC2-4FXO
MTBF	2,043,450 hours for VIC2-2FXO; 1,245,152 hours for VIC2-4FXO

Table 9. VIC3-2E/M Specifications for Two-Port E&M Voice/Fax Interface Card

Feature	Description
Interface Type	E&M (for PBX trunking, hoot phones, or radio systems)
Cisco IOS Software Release	12.4(15)XW or 12.4(20)T
Cisco Part Number	800-27470-03
Compliance	FCC Class B device, CE
Safety Conformance	UL 1950
Spare	VIC3-2E/M
Address Signaling Formats	In-band DTMF Out-of-band pulse (10/20 pps)
Signaling Modes	Immediate, delay dial, wink start
Signaling Types	I, II, III, and V
E-Lead Current Limit	100 mA
M-Lead Sensitivity	> 3 mA
Pulse Distortion	< 2 percent
Physical Connector	four-wire and two-wire
Number of Connectors/Ports	Two
MTBF	1,450,540 hours

Table 10. VIC2-2BRI-NT/TE Specifications for Two-Port BRI Voice/Fax Interface Card (user or network side)

Feature	Description
VIC2-2BRI-NT/TE	Two-port BRI voice/fax interface card (user or network side)
Interface Type	ISDN BRI
Cisco IOS Software Release	12.2.(15)ZJ
Cisco Part Number	800-21861-01
Compliance	• FCC Part 68 • CS03 • CTR3 • TS-031 • JATE Green Book
Safety Conformance	UL1950, CAN/CSA-C22.2, IEC 950, EN60950
Spare	VIC2-2BRI-NT/TE=
ITU Compliance	ITU-T Q.920, Q.921, Q.930, Q.931

Feature	Description
Interface	Four-wire user side S/T or network-side NT (software-configurable)
ISDN Digital Access	BRI 2B+D
Physical Connector	RJ-45
Number of Connectors/Ports	Two
Phantom Power	30 mA at 40V maximum per port
MTBF	2,682,752 hours

Table 11. VIC3-4FXS/DID Specifications for Four-Port FXS or DID Voice/Fax Interface Card

Note: The DID feature is supported starting with Cisco IOS Software Release 12.3(14)T.

Feature	Description
Interface Type	FXS and DID trunk
Cisco IOS Software Release	12.4(15)XZ or 12.4(20)T
Cisco Part Number	800-27473-02
Compliance	FCC Class B device, CE
Safety Conformance	UL1950
Spare	VIC3-4FXS/DID
Address Signaling Formats	In-band DTMF Out-of-band pulse (8–12 pps)
Signaling Modes	FXS: loop-start, ground-start DID: Immediate, Delay-dial, WinkStart
DID Loop Resistance	Up to 1800 ohms (including terminal equipment)
FXS Loop Resistance	Up to 600 ohms (including phone or terminal equipment)
On-Hook Voltage	–44V
Off-Hook Loop Current	25 mA (max)
Ringing Tone	Configurable for different country requirements
Ringing Voltage	45 Vrms into 5 REN at zero loop length (balanced)
Ringing Frequencies	20 Hz, 25 Hz, 30 Hz, 50 Hz
REN Loading	5 REN/port, 8 REN/VIC (max) and 2 REN/port with mixed mode FXS/DID ports
Disconnect Supervision	Power denial (Calling Party Control, far-end disconnect)
Caller ID	On-hook transmission of frequency-shift-keying (FSK) data
Loop Length	<1500 ft (450 m.) 24 AWG Category 5 twisted pair cable
Physical Connector	RJ-11
Number of Connectors/Ports	Four
MTBF	1,390,019 hours

VWIC Specifications

Table 12 shows the Cisco VWIC specifications. Table 13 shows the TI Network Interface specifications, and Table 14 shows the specifications for the EI Network Interface.

Table 12. VWIC Specifications

Cisco Product Number	Description
VWIC2-1MFT-T1/E1	One-port RJ-48 Multiflex trunk-T1/E
VWIC2-2MFT-T1/E1	Two-port RJ-48 Multiflex trunk-T1/E1
CAB-E1-RJ45BNC	E1 cable RJ-45 to dual BNC (unbalanced)
CAB-E1-RJ45TWIN	E1 cable RJ-45 to Twinax (balanced)

Table 13. T1 Network Interface

Feature	Description
Transmit Bit Rate	1.544 Mbps ± 50 bps/32 PPM
Receive Bit Rate	1.544 Mbps ± 50 bps/32 PPM
Line Code	AMI, B8ZS
AMI Ones Density	Enforced for N x 56 Kbps channels
Framing Format	D4 (SF) and ESF
Output Level (LBO)	0, -7.5, or -15 dB
Input Level	+1dB0 down to -24 dB0
Data Terminal Equipment (DTE) Interface (WIC mode)	Fractional service
DTE Interface (VIC mode)	G.704/structured
Data Circuit-Terminating Equipment (DCE) Interface	G.704/structured

Table 14. E1 Network Interface

Feature	Description
Transmit Bit Rate	2.048 Mbps ± 100 bps/50 PPM
Receive Bit Rate	2.048 Mbps ± 100 bps/50 PPM
Data Rate	1.984 Mbps (framed mode) per E1 port
Clocking	Internal and loop (recovered from network)
E1 National Bits	Fixed (nonconfigurable)
Encoding	HDB3
DTE Interface (WIC mode)	Fractional service
DTE Interface (VIC mode)	G.704/structured
DCE Interface	G.704/structured

Homologation

Table 15 shows the Cisco VICs that are approved for the countries listed. The approvals are for off-premise and on-premise connections, unless stated otherwise.

For the latest country approval status of these cards, visit: http://tools.cisco.com/cse/prdapp/jsp/externalsearch.do?action=externalsearch&page=EXTERNAL_SEARCH

For the approval status of Cisco VWIC cards, please see the data sheet for “Cisco One and Two Port T1/E1 Multiflex Voice/WAN Interface Cards.”

Table 15. Cisco Voice Interface Card Approval by Country

VIC2-2FXO	VIC2-4FXO	VIC3-2FXS/DID (on Premise Only)	VIC3-2FXS-E/DID (on Premise Only)	VIC3-4FXS/DID (on Premise Only)	VIC3-2E/M (on Premise Only)	VIC2-2BRI - NT/TE
E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card	E&M Voice/Fax Interface Card
• Canada • CE countries* • Australia • Japan • Hungary • Poland • Croatia • Singapore	• Canada • CE countries* • Australia • Japan • Hungary • Poland • Croatia • Singapore	• Canada • CE countries* • Australia • Japan • Hungary • New Zealand	• Canada • CE countries* • Australia • Japan	• Canada • CE countries* • Australia • Japan	• Canada • CE countries* • Australia • Japan • Hungary • Singapore	• Canada • CE countries * • Japan • Hungary • Poland

* European Community countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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