Cisco Residential Wireless Gateway with Digital Voice Model EPC3928

The Cisco® Residential Wireless Gateway with Digital Voice Model EPC3928 is a high-performance home gateway that combines a cable modem, two-line digital voice adapter, router, and 802.11n wireless access point(s) in a single device, providing a cost-effective voice and networking solution for both the home and small office. The Cisco EPC3928 provides a faster connection to the Internet by incorporating eight bonded downstream channels and four bonded upstream channels. These bonded channels can deliver downstream data rates in excess of 440 Mbps and upstream data rates in excess of 120 Mbps. That's up to eight times faster downloads than conventional single-channel EuroDOCSIS™ 2.0 cable modems.

The Cisco EPC3928 (Figure 1) is designed to meet EuroPacketCable™ 1.5 and DOCSIS® 3.0 specifications, as well as offering backward compatibility for operation in EuroPacketCable 1.0 and DOCSIS 2.0, 1.1, and 1.0 networks.

Figure 1. Example of Cisco Residential Wireless Gateway with Digital Voice Model EPC3928

The Cisco EPC3928 integrated router features a Dynamic Host Configuration Protocol (DHCP) server, Network Address Translation (NAT) and Network Address and Port Translation (NAPT), and a Stateful Packet Inspection (SPI) firewall. These features allow the user to share a single high-speed public Internet connection as well as share files and folders between devices in the home network by attaching multiple wired and wireless devices in the active home or office to the wireless residential gateway.

Consumer-friendly features like Wireless Protected Setup (WPS) and user-configured Parental Control can protect the home network from unwelcome intruders and family members from access to undesirable websites.

Features

DOCSIS

- Compliant with EuroDOCSIS 3.0, 2.0, 1.1, and 1.0 standards and EuroPacketCable specifications to deliver high-end performance and reliability

Connections

- Four 10/100/1000BASE-T Ethernet ports to provide wired connectivity
- High-performance broadband Internet connectivity to energize your online experience
- Optional: two USB 2.0 Type 2 connections
- Dual-band concurrent 802.11n Wireless Access Point (WAP) with eight Service Set Identifiers (SSIDs) compatible with 802.11b/g
- WPS, including a pushbutton switch to activate WPS for simplified and secure wireless setup
- Two-line or single-line RJ-11 telephony ports for connecting to in-home wiring or directly to conventional telephones or fax machines

Design and Function

- Attractive, compact design and versatile orientation to stand vertically, lie flat on the desktop or shelf, or mount easily on a wall
- Dual-color LED status indicators on the front panel provide an informative and easy-to-understand display that indicates the cable modem operational status
- TR-068 compliant color-coded interface ports and corresponding cables simplify installation and setup

Management

- User-configurable Parental Control blocks access to undesirable Internet sites
- Advanced firewall technology deters hackers and protects the home network from unauthorized access
- Residential gateway allows automatic software upgrades by your service provider

Documentation

- User guide can be downloaded from Cisco.com.

Front Panel Features

Table 1 lists front panel features for the Cisco EPC3928.

Table 1. Front Panel Features

Feature	Description
Indicators and controls	Power, downstream (DS), upstream (US), Online, Ethernet, USB (optional), Wireless On/Off LED and button, Wireless Setup LED and button, Tel1, Tel2
Color	Black, black lens, silver text
Branding	Cisco and model number

Back Panel Features

Figure 2 shows the back panel, and Table 2 lists back panel features.

Figure 2. Example of Cisco EPC3928 Back Panel

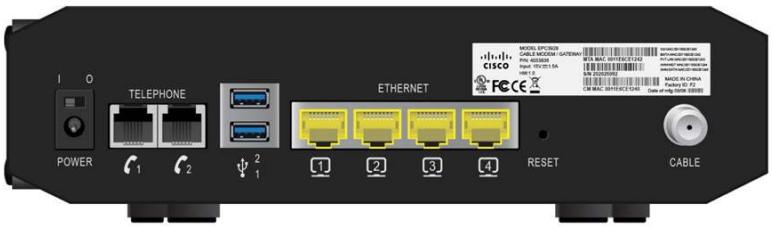

Table 2. Back Panel Features

Feature	Description
Power switch	Switches power to the unit (power switch provided only on products carrying the CE mark)
Power connector **Color: black**	Connects modem to the DC output of the AC power adapter
Telephone 1 and 2 **Color: gray**	RJ-11 telephone ports connect to home telephone wiring and to conventional telephones or fax machines
USB connectors **Color: blue**	Optional (1): Each Type 2 USB 2.0 port connects to a USB port on a printer or another USB device
Ethernet (1-4) connectors **Color: yellow**	Four RJ-45 Ethernet ports with LED indicators connect to the Ethernet port on a PC or home network
MAC address label	Displays the MAC address of the cable modem
Reset	Power cycles the EPC3928
Cable connector **Color: white**	F-connector connects to an active cable signal from a service provider
Antennas	2 internal antennas provide a communication connection for the built-in 802.11n wireless; up to 6 external antennas depending upon the product model

Product Specifications

Table 3 lists product specifications for the Cisco EPC3928.

Table 3. Product Specifications

Specification	Value
Voice	
Call signaling protocol	• MGCP/NCS including configurable IPsec encryption • Configurable to support RFC 2833 event signaling • Supports Bell103 detection: Improves alarm panel and Point of Sale (POS) interoperability by optimizing DSP for Bell103 protocol • Software upgradeable to support Session Initiation Protocol (SIP) • The following SIP standards are supported ◦ RFC 2617 HTTP Authentication: Basic and Digest Access Authentication ◦ RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals ◦ RFC 2976 The SIP INFO Method ◦ RFC 3261 SIP: Session Initiation Protocol ◦ RFC 3262 Reliability of Provisional Responses in Session Initiation Protocol ◦ RFC 3263 Session Initiation Protocol: Offer/Answer Model with the Session Description Protocol (SDP) ◦ RFC 3264 Session Initiation Protocol (SIP): Locating SIP Servers

Specification	Value
	◦ RFC 3265 Session Initiation Protocol (SIP) - Specific Event Notification ◦ RFC 3420 Internet Media Type message/sipfrag ◦ RFC 3428 Session Initiation Protocol (SIP) for Instant Messaging ◦ RFC 3489 STUN - Simple Traversal of User Datagram Protocol (UDP) Through Network Address Translators (NATs) ◦ RFC 3515 The Session Initiation Protocol (SIP) Refer Method ◦ RFC 3842 A Message Summary and Message Waiting Indication Event Package for the Session Initiation Protocol (SIP) ◦ RFC 3892 The Session Initiation Protocol (SIP) Referred-By Mechanism ◦ RFC 3903 Session Initiation Protocol Extension for Event State Publication ◦ Draft-ietf-mmusic-sdescription-09 Session Description Protocol Security Descriptions for Media Streams ◦ Draft-ietf-mmusic-sdp-new-24 SDP: Session Description Protocol Replacement for RFC 2327 ◦ Draft-ietf-sip-replaces-02 The Session Initiation Protocol (SIP) "Replaces" Header ◦ Draft-ietf-sip-session-timer-08 The SIP Session Timer ◦ Draft-ietf-sipping-cc-transfer-01 Session Initiation Protocol Call Control - Transfer ◦ Draft-ietf-sipping-realtimefax-01 SIP Support for Real-time Fax: Call Flow Examples and Best Current Practices ◦ Draft-johnston-sipping-rtcp-summary-07 SIP Service Quality Reporting Event ◦ Draft-rosenberg-sipping-acr-code-00 Rejecting Anonymous Requests in the Session Initiation Protocol (SIP)
Basic configuration (per line)	• SIP Signaling Port (local receive and source port) • SIP Registrar • SIP Proxy • SIP Outbound Proxy • Username • Password • Authentication name
Provisioning modes	• Basic, Secure, and Hybrid provisioning • Full PacketCable secure provisioning • Kerberos support with NVRAM ticket caching • Configurable PacketCable-lite (MTA config file provisioning without security) • Configurable for non-PacketCable (MTA configuration using DOCSIS config file)
Voice codec support	Negotiate codec to use based on ordered list
Codecs	Standard: G.711, T.38 Fax Relay, iLBC and BV16 Software upgradeable to support other CODEC combinations including: • G.711 and G.728 • G.711 and G.729 • G.711 and G.729 a/e • G.711 and BV16 and BV32 (High fidelity - near CD quality) • G.711 and G.723 • G.711 and G.726
Line diagnostics	GR-909
Codec packetization levels	10, 20, or 30 mS
Codec synchronization	Codec synchronization to UGS time clock allows slip-free end-to-end sync to PSTN clock (minimizes frame slips that can cause fax and analog modem call failures)
Codec encryption	Configurable to support AES-128 encryption or no encryption modes
Hearing impaired services support	TDD support including detection of V.18 including Annex A
Fax and analog modem support	DSP based modem and fax tone detection and support for Voice Band Data Mode with auto-codec negotiation and autocontrol of echo canceller, jitter buffer, and voice activity detection (VAD)
Jitter buffer support	Adaptive dynamically controlled
Latency control	Configurable minimum and maximum jitter buffer size

Specification	Value
Audio gain levels	Independently configurable transmit and receive audio gains
Silence suppression	Configurable VAD with comfort noise generation
Packet loss concealment	ANSI T1.521-1999
Call connection quality monitoring	RTCP, RFC 1889, RFC 1890, Simple Network Management Protocol (SNMP) MIB for last call quality statistics
Dialing modes	DTMF and configurable pulse dial support
DTMF relay	RFC 2833 including fast (40mS) DTMF relay for alarm system signaling compatibility
Layer 2 quality of service (QoS)	• Full PacketCable secure dynamic QoS (DQOS) with GateID including UGS and UGS/AD • DQOS-lite support including UGS and UGS/AD
Layer 3 quality of service	Configurable DiffServe and TOS support for Signaling, RTP, and RTCP flows
Payload header suppression (PHS)	• Supported for RTP and RTCP packet flows to reduce per-call network bandwidth • Advanced support for Dynamic Payload Header Suppression using Propane Technology
Management	SNMPv3, SNMPv2, SNMPv1, Telnet and SSH with configurable user ID and password, internal log, and external Syslog support
Echo cancellation	• G.168 with extended echo tail support • 32 mS max tail length
VAD	Voice activity detection
CNG	Comfort noise generation
Voice band data	Machine tone detection used to autoswitch to data optimized codec configuration
T.38 fax	Support for V.29 and V.17 modems
Call feature support	• Caller ID • Call Waiting with Caller ID • Cancel Call Waiting • Call Conferencing (3-way calls) • Configurable Hook-Flash Support • Distinctive Ringing (Configurable for up to 11 ring patterns per phone line) • Ring Splash • Stutter Dial Tone • Of- hook Warning Tone • Open Switch Interval support to enhance answering machine compatibility • Configurable Star Codes • Euro and U.S. Hook-Flash Type • Call Transfer • Message Waiting Indicator • Warm Line • Call Forwarding Unconditional • Call Forwarding on Busy • Call Forwarding No Answer • Call Return • Redial Call • Automatic Redial • Other call features available with compliant CMS or gateway
Networking (noncall) services	• Known Good Proxy • Proxy Failover • Registration Control • UDP, TCP • TLS • DNS • DQoS-lite • STUN • Static NAT • NAT Keep Alive

Specification	Value
SIP header control	• User-Agent Header Control • Server Header Control • Accept Language Header Control • Proxy Require Header Control • FQDN in URI Control • To-tag Matching Control • Escape Star Character in URI Field
Administrative features	• Call Data Record • Call Statistics Agent • Debug Console Logging • Debug Logger
Telephone ring loading	Full 5 ringer equivalence number (REN) support on each phone line (10 REN total)
Ring signal	Configurable balanced ring with configurable DC offset
Maximum phone line distance	Support for up to 1000 ft of AWG26 wire (0.4 mm) on each phone line; support for operation with typical in-home telephone wiring
Country-specific telephone parameters supported	Australia, United States, Japan, United Kingdom, Germany, France, Belgium, Netherlands, Finland, Italy, Switzerland, Sweden, Denmark, Brazil, Poland, Czech, Hungary, Romania, ETSI 101 909-18
IPV6	dual IPV4/IPV6 CM and EDVA
Residential Gateway	
Gateway configuration management	• TR-069 and subset of TR-098 data model (optional) • Extensive custom SNMP MIB for the gateway • Provisioning with SNMP • HNAP server 1.2+
Independent Computer Security Association (ICSA) firewall compliant	• Web filtering: pop-ups, cookies, Java, and ActiveX scripts • Intrusion detection and prevention: WAN ping blocking, IP fragment blocking, port scan detection, TCP Port Probe, UDP Port Probe • DoS Protection: inbound, outbound, WAN interface, LAN interface, SYN flood, Ping of Death, Smurf, Bonk, Jolt, Land, Nestea, Newtear, Syndrop, Teardrop, WinNuke/OOBNuke (Invalid TCP urgent pointer), x1234, Saihyousen, Oshare, ARP flood, TCP Hijacking, Christmas Tree, SYN/FIN (jackal), BackOffice (UDP 32337), NetBus, ICMP Flooding • IP address, port number, MAC address filtering • TCP flags, ICMP types fragmentation • Connection creation and teardown • Timestamps and payload modification
Parental Controls	• Per-user policies • Keyword blocking • Domain name blocking • Time of day filters • MAC address filtering
Advanced event logging	• Filtering activity • Session tracking • User notification by email alert and SNMP traps
Routing features	• NAPT, NAT, and Pass-through (Layer 2) Operational Modes • RFC3489 (STUN) "Port-restricted cone NAT" behavior • RIP v1/v2, with MD5 • Static Routes • Port Forwarding • Port Triggering • UPnP IGD 1.0 • IPSec Pass-through • L2TP Pass-through • PPTP Pass-through • ALG support: mIRC, PIRCH, MS NetMeeting, Net2phone, AOL and MSN Messenger, Yahoo Messenger, Go2Call, Hotline Server, Visual IRC, CuSeeme, AT&T Instant, Messenger Anywhere, Active Worlds, Buddy Phone Calista IP Phone, Delta Three PC to Phone, Dial Pad, Dwyco Video Conferencing, OrbitRC, Xircon, Netscape Chat, FTP, H.323, ICQ

Specification	Value
Wireless Access Point	

802.11 b/g/n	• Available hardware options for wireless access point:
	  ◦ 2x2 MIMO, 2.4 GHz single band
	  ◦ 2x2 MIMO, 2.4 GHz and 5 GHz dual band concurrent
	  ◦ 3x3 MIMO, 2.4 GHz and 5 GHz dual band concurrent
	• 2, 4 or 6 internal antennas (antenna configuration depends on the hardware options)
	• DFS certified operation for models with 5 GHz option for maximum spectrum utilization and reduced interference
	• Wi-Fi compliant security (WPA2-Enterprise, WPA2-PSK, WPA-Enterprise, WPA-PSK, WEP)
	• WMM-QoS (Wireless Multi Media - Quality of Service)
	• WMM Power Save
	• WPS
	• Wireless Bridging - WDS (Wireless Distribution System) - allows connection to “Range Extender Products”
	• RADIUS Authentication (Client, EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-MD5)
	• MBSSID (8 SSIDs with unique NAT scopes)
	• Wi-Fi "Hot Spot" support (Static DHCP IP Scope over tunnel

Applications Support (optional, supported on select hardware)	
Applications	• Supports DLNA 1.5 • Samba server for file sharing (GPLv2) • External NAS drives using USB 2.0 host ports
RF Downstream	
Operating frequency range	108 to 1002 MHz
Tuner frequency range	108 to 1002 MHz
Tuner	1 frequency agile block tuner, full-band capture
Demodulation	8 demodulators, each demodulator: 64 QAM or 256 QAM
Maximum data rate	8 downstream channels, each 6 MHz channel: • 55.62 Mbps for 256 QAM and 41.71 Mbps for 64 QAM
Bandwidth	6 or 8 MHz
Operating level range	+43 to +73 dBµV for 64 QAM +47 to +77 dBµV for 256 QAM
Input impedance	75 ohms
RF Upstream	
Operating frequency range	5 to 65 MHz (optional: 5 to 85 MHz)
Upstream transmission	4 upstream channels
Modulation	QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM/ATDMA, 128 QAM/SCDMA
Maximum data rate per channel	**Modulation** / **Channel Bandwidth (MHz)** / **Raw Data Rate (Mbps)** QPSK / 1.6 / 2.56 16 QAM / 1.6 / 5.12 QPSK / 3.2 / 5.12 16 QAM / 3.2 / 10.2 32 QAM / 3.2 / 12.8 64 QAM / 3.2 / 15.4 16 QAM / 6.4 / 20.5 32 QAM / 6.4 / 25.6 64 QAM / 6.4 / 30.7
Bandwidth	200 kHz to 6.4 MHz

Specification	Value			
Maximum operating level	**Modulation**	**1 Channel**	**2 Channels**	**3 or 4 Channels**
TDMA	QPSK	+121 dBµV	+118 dBµV	+115 dBµV
	8 QAM	+118 dBµV	+115 dBµV	+112 dBµV
	16 QAM	+118 dBµV	+115 dBµV	+112 dBµV
	32 QAM	+117 dBµV	+114 dBµV	+111 dBµV
	64 QAM	+117 dBµV	+114 dBµV	+111 dBµV
SCDMA	QPSK	+116 dBµV	+113 dBµV	+113 dBµV
	8 QAM	+116 dBµV	+113 dBµV	+113 dBµV
	16 QAM	+116 dBµV	+113 dBµV	+113 dBµV
	32 QAM	+116 dBµV	+113 dBµV	+113 dBµV
	64 QAM	+116 dBµV	+113 dBµV	+113 dBµV
	128 QAM	+116 dBµV	+113 dBµV	+113 dBµV
	* Up to +3dB power increase in extended upstream power mode with CMTS support.			
Electrical				
Input voltage	15 VDC			
Power consumption (modem module)	Models without application support: 15W nominal Models with application support: 20W nominal			
Data ports	Gigabit Ethernet (Auto-negotiate with Auto-MDIX): RJ-45 Ethernet (4) Optional with some part numbers: USB 2.0, USB Type 2 (2)			
RF	Female F-type			
Output impedance	75 ohms			
Mechanical				
Dimensions (H x D x W)	5.4 cm x 14.5 cm x 19.6 cm (2.13 in. x 5.71 in. x 7.72 in.)			
Weight	0.430 kg (15.17 oz)			
Operating temperature	0 to 40˚ C (32 to 104˚ F)			
Operating humidity	0 to 95% RH noncondensing			
Storage temperature	-20 to 70˚ C (-4 to 158˚ F)			
Standards				
Standards	EuroDOCSIS 3.0, EuroPacketCable 1.5 IEEE 802.11n WPA2, WPA, and WEP WMM, WPS			
Regulatory Compliance				
Regulatory and safety approvals	As required per country where the EPC3928 will be used			

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

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

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