Cisco Model DPC3216 DOCSIS 3.0 16x4 Cable Modem with Embedded Digital Voice Adapter

Get a faster connection to the Internet with a cable modem designed with 16 bonded downstream channels that deliver over 500 Mbps and four bonded upstream channels that deliver over 120 Mbps. That's up to 16 times faster than conventional single-channel DOCSIS® 2.0 cable modems. And it's all available with the Cisco® Model DPC3216 DOCSIS 3.0 16x4 Cable Modem (DPC3216) with embedded digital voice adapter.

The Cisco DPC3216 (Figure 1) uses advanced line interface technology to provide multi-country, toll-quality telephone service using existing in-home wiring. The Cisco DPC3216 features single-line or two RJ-11 telephone ports for voice, and it supports a total of 10 ringer equivalence number (REN) loading, 5 REN per phone line.

Figure 1. Cisco DPC3216 DOCSIS 3.0 16x4 Cable Modem with Embedded Digital Voice Adapter (Image May Vary from Actual Product and Specification)

The Cisco DPC3216 is designed to meet PacketCable™ 1.5 and DOCSIS 3.0 specifications and is backward compatible with DOCSIS 2.0, 1.1, and 1.0 networks. It fully supports the CODECs specified in PacketCable 1.5. Additional CODECs are available through a software upgrade that includes a high-fidelity CODEC option for toll-quality-plus service. Standard VoIP call signaling is compliant with PacketCable Media Gateway Control Protocol/Network-based Call Signaling (MGCP/NCS) specifications. Software upgrades are available to support Session Initiation Protocol (SIP) call signaling.

Features

DOCSIS

- Sixteen (16) bonded downstream channels with data rates that can be faster than 500 Mbps
- Four (4) bonded upstream channels with data rates that can be faster than 120 Mbps
- Designed to meet DOCSIS 3.0 specifications as well as backward compatibility with existing DOCSIS 2.0, 1.1, and 1.0 networks
- DOCSIS-compliant support for IPv6/IPv4
- Expanded tuning range, 88-1002 MHz
- Some hardware configurations provide battery powered backup on loss of AC power

Embedded Digital Voice Adapter

- Two-line embedded digital voice adapter for wired telephony service
- Toll-quality, high-compression, and high-fidelity (exceeding toll quality) CODEC options

Connections

- One 10/100/1000BASE-T Ethernet ports to provide wired connectivity
- High-performance broadband Internet connectivity to energize your online experience

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 indicate cable modem operational status
- TR-068-compliant color-coded connectors and cables simplify installation and setup

Management

- Software upgradeable by network download
- Remote manageability using SNMP V1/V2 and V3

Software and Documentation

- User guide can be downloaded from Cisco.com

Figure 2. Cisco DPC3216 Front Panel (Image May Vary from Actual Product and Specification)

Table 1. Front Panel Features

Feature	Description
Indicators	POWER, DS, US, ONLINE, LINK, TEL1, TEL2, and BATTERY (on select models)
Color	Black, black lens, silver text
Branding	Cisco logo and model number

Figure 3. Cisco DPC3216 Back Panel (Image May Vary from Actual Product and Specification)

Table 2. Back Panel Switch and Connections

Feature	Description
Power connector **Color: black**	Connects modem to the AC power via the power cord (supplied)
Telephone 1 and 2 **Color: gray**	One RJ-14 and one RJ-11 telephone jack connect to home telephone wiring and to conventional telephones or fax machines
ETHERNET **Connector Color: Yellow**	RJ-45 Ethernet port connects to the Ethernet port on your PC or your home network
Reset	Recessed button on the back panel which performs a reset of the EPC3940
Cable connector	F-connector connects to an active cable signal from your service provider

Product Specifications

Table 3. Product Specifications

Specification	Value
Voice Specifications	
Call Signaling Protocol	• MGCP/NCS including configurable IPsec encryption • Configurable to support RFC2833 event signaling • Supports 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 2976 The SIP INFO Method ◦ RFC 3261 SIP: Session Initiation Protocol ◦ RFC 3262 Reliability of Provisional Responses in Session Initiation Protocol (SIP) ◦ RFC 3263 Session Initiation Protocol (SIP): Locating SIP Servers ◦ RFC 3264 An Offer/Answer Model with Session Description Protocol (SDP) ◦ RFC 3265 Session Initiation Protocol (SIP)-Specific Event Notification ◦ RFC 3420 Internet Media Type message/sipfrag ◦ RFC 3428 Session Initiation Protocol (SIP) Extension for Instant Messaging ◦ 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 (SIP) Extension for Event State Publication ◦ Draft-ietf-mmusic-sdp-new-24 SDP: Session Description Protocol (Replacement for RFC 2327) ◦ Draft-ietf-sipping-cc-transfer-01 Session Initiation Protocol Call Control - Transfer ◦ Draft-ietf-sip-session-timer-08 The SIP Session Timer ◦ Draft-ietf-sipping-realtimefax-01 SIP Support for Real-time Fax: Call Flow Examples and Best Current Practices ◦ Draft-ietf-mmusic-sdescription-09 Session Description Protocol Security ◦ Descriptions for Media Streams ◦ Draft-ietf-sip-replaces-02 The Session Initiation Protocol (SIP) "Replaces" HeaderProvisioning Modes
Provisioning Modes	• Full PacketCable secure provisioning mode • 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) CODECs
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 **Note:** Other codec combinations can be downloaded as required.
CODEC Packetization Intervals	10, 20, and 30 ms
CODEC Synchronization	CODEC synchronization to UGS time clock allows slip-free end-to-end sync to PSTN clock (reduces frame slips that can cause Fax/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/Fax Tone detection and support for Voice Band Data Mode with auto-CODEC negotiation and auto-control of echo canceller, jitter buffer, and Voice Activation Detection (VAD)

Specification	Value
Jitter Buffer Support	Adaptive dynamically controlled
Latency Control	Configurable min/max jitter buffer size
Audio Gain Levels	Independently configurable Tx and Rx audio gains
Silence Suppression	Configurable VAD with comfort noise generation
Packet Loss Concealment	ANSI T1.521-1999
Call Connection Quality Monitoring	RTCP, RFC1889, RFC1890, SNMP MIB for last call quality statistics
Dialing Modes	DTMF and configurable pulse dial support
DTMF Relay	RFC2833 including fast (40mS) DTMF Relay for alarm system signaling compatibility
Layer 2 Quality of Service	• Full PacketCable highly secure DQOS with GateID including UGS and UGS/AD • DQOS Lite support including UGS and UGS/AD
Layer 3 Quality of Service	Configurable DiffServe/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, and SNMPv1, Telnet/SSH with configurable user ID and password, internal log, and external Syslog support
Echo Cancellation	G.168 with extended echo tail support
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 • Off hook warning tone • Open Switch Interval support to enhance answering machine compatibility • Configurable star codes • Euro/US 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
Telephone Ring Loading	Full 5 REN support on each phone line (10 REN total)
Ring Signal	Configurable balanced ring with configurable DC offset
Max Phone Line Distance	Supports up to 1000 ft of 26 AWG (0.4mm) wire on each phone line. Supports operation with typical in-home telephone wiring
Country-Specific Telephone Parameters Supported	United States, Japan, United Kingdom, Germany, France, Belgium, Netherlands, Finland, Italy, Switzerland, Sweden, Denmark, Brazil, Australia, Poland, Czech Republic, Hungary, Romania, ETSI 101 909-18
RF Downstream	
Operating frequency range	108 to 1002 MHz
Tuner frequency range	88 to 1002 MHz
Tuner	1 GHz full-band capture tuner that eliminates restrictions on downstream channel frequency plan
Demodulation	16 demodulators, each demodulator: 64 QAM or 256 QAM

Specification	Value			
Maximum data rate	16 downstream channels, each 8 MHz channel: 42.88 Mbps for 256 QAM and 30.34 Mbps for 64 QAM			
Bandwidth	6 MHz			
Operating level range	-15 to +15 dBmV			
Input impedance	75 ohms			
RF Upstream				
Operating Frequency Range	5 to 42 MHz			
Transmitter Frequency Range	5 to 42 MHz			
Upstream Transmission	4 upstream channels			
Modulation	QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM at ATDMA mode QPSK, 8 QAM, 16 QAM, 32 QAM, 64 QAM, 128 QAM at SCDMA mode			
Maximum Data Rate per Channel	**Modulation**	**Channel Bandwidth (MHz)**	**Raw Data Rate (Mb/s)**	
	QPSK	1.6	2.56	
	16 QAM	1.6	5.12	
	QPSK	3.2	5.12	
	16 QAM	3.2	10.24	
	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	30.72	
Bandwidth	200 kHz to 6.4 MHz			
Maximum Operating Level (± 2dB)	**Modulation**	**1 Channel**	**2 Channels**	**3 or 4 Channels**
TDMA	QPSK	+61 dBmV	+58 dBmV	+55 dBmV
	8 QAM	+58 dBmV	+55 dBmV	+52 dBmV
	16 QAM	+58 dBmV	+55 dBmV	+52 dBmV
	32 QAM	+57 dBmV	+54 dBmV	+51 dBmV
	64 QAM	+57 dBmV	+54 dBmV	+51 dBmV
SCDMA	QPSK	+56 dBmV	+53 dBmV	+53 dBmV
	8 QAM	+56 dBmV	+53 dBmV	+53 dBmV
	16 QAM	+56 dBmV	+53 dBmV	+53 dBmV
	32 QAM	+56 dBmV	+53 dBmV	+53 dBmV
	64 QAM	+56 dBmV	+53 dBmV	+53 dBmV
	128 QAM	+56 dBmV	+53 dBmV	+53 dBmV
Electrical				
Input Voltage	12VDC (external power supply)			
Power Consumption (Modem Module)	~ 6.7 watts			
Data Ports	Ethernet 10/100/1000BASE-T (Auto-sensing with Auto-MDIX); RJ-45 Ethernet (1)			
RF	Female "F" type			
Impedance	75 ohms			
Mechanical				
Dimensions (W x D x H) (Approximate; not including "F" connector)	Non-Battery Enclosure: 181mm x 120mm x 64mm Battery Enclosure: 154mm x 139mm x 86mm			

Specification	Value
Weight (Approximate; not including battery cartridge)	285g (Non-Battery Enclosure) 419g (Battery Enclosure)
Battery Type and Capacity	1 cartridge, Li-Ion, 2-Cell 3000mAh
Operating Temperature	0 to 40˚ C (32 to 104˚ F)
Operating Humidity	0 to 95% RH non-condensing
Storage Temperature	-20 to 70˚ C (-4 to 158˚ F)
Standards and Approvals	
Designed to Comply with the Following Standards	PacketCable 1.5, 1.0 DOCSIS 3.0, 2.0, 1.1, 1.0
Regulatory and Safety Approvals	As required per country where the DPC3216 will be used

Ordering Information

Table 4. Ordering Information

Description	Part Number
Enclosure with One (1) Battery Bay 5-42/54-1002 MHz Diplex Filter	
DPC3216C DOCSIS 3.0 Cable Modem with Embedded Digital Voice Adapter Includes: • 100-240 VAC/50-60 Hz, External power Supply • One (1) 3000mAh Li-Ion Battery provided • Ethernet Cable • Installation Sheet • Safety Sheet	DPC3216C-VCM-K9
Enclosure with No Battery Bay 5-42/54-1002 MHz Diplex Filter	
DPC3216 DOCSIS 3.0 Cable Modem with Embedded Digital Voice Adapter Includes: • 100-240 VAC/50-60 Hz, External power Supply • Ethernet Cable • Installation Sheet • Safety Sheet	DPC3216-VCM-K9

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