



- Fast acquisition demodulator
- Turbo Product Coding
- BPSK, QPSK, OQPSK, 8-PSK, 16-QAM
- USB port for rapid re-flash
- 10/100 Ethernet M&C port
  - Web Server
  - SNMP
  - Telnet
- IP Module
- VMS Integration

### INTRODUCTION

Ideal for optimizing satellite communications, the CDM-570L is designed to meet the needs of low-cost terminals with L-band interfaces to Low Noise Block Converters (LNBs) and Block Up Converters (BUCs).

The CDM-570L includes synchronous EIA-530/422, V.35, EIA-232 and G.703 interfaces. An optional Internet Protocol (IP) Module is available with a 10/100 BaseT Ethernet interface for LAN and network applications.

The architecture is firmware and FPGA-based, and the internal Flash memory allows easy updating via the serial port, or front panel USB port. The modem offers exceptional flexibility and cost-effective performance in a 1RU enclosure.

### FEATURES

- 950 to 1950 MHz IF range
- Fast acquisition demodulator ( $\pm 32$  kHz acquisition range, 64 kbps, Rate 1/2 QPSK: 150 ms average)
- BPSK, QPSK, OQPSK, 8-PSK, 16-QAM modulation types
- Data rate range from 2.4 kbps to 5 Mbps
- Forward Error Correction choices include Turbo Product Coding, Viterbi, Reed-Solomon, and TCM
- Automatic Uplink Power Control (AUPC) and EDMAC
- Asymmetric Loop Timing
- Built-in 1:1 redundancy controller (Y-cables for data, simple and inexpensive external module for RF)
- Operation with LNB and BUC
- BUC 10 MHz reference and FSK communications and optional BUC Power Supplies
- LNB Power Supply and 10 MHz reference
- Backwards compatible with the CDM-500/CDM-550, CDM-550T and CDM-600 and CDM-600L
- Interoperable with SDM-300A, SDM-300L3
- Ethernet M&C interface
- IP Module option
- Vipersat Management System (VMS)

### FEATURE ENHANCEMENTS

Enhancing the CDM-570L's performance is easy. Additional features are added quickly on site, using FAST access codes purchased from Comtech EF Data. To enable these features, simply enter the code at the front panel.

### TURBO PRODUCT CODING

The CDM-570L offers all traditional FEC methods and incorporates an optional Turbo Product Code (TPC). TPC simultaneously offers increased coding gain, lower decoding delay, and significant bandwidth savings. The range of code rates offered spans Rate 5/16 through 0.95, depending on modulation type.

### EDMAC OPERATION

The CDM-570L monitors and controls the distant end of a satellite link using a Comtech EF Data proprietary overhead channel. This framed mode is called EDMAC (Embedded Distant-end Monitor And Control). User data is framed and extra bits are added to pass control, status, and Automatic Uplink Power Control information. This process is completely transparent to the user.

### REMOTE CONTROL

Configuring and monitoring the modem is accomplished from the front panel, or through the remote M&C port. Ten configurations may be stored in the modem. An Event log stores alarm and status information in non-volatile RAM, while the Link Statistics log stores link performance ( $E_b/N_0$  and AUPC performance) for QoS reporting purposes.

In addition to the traditional serial port M&C, the CDM-570L offers a 10/100BaseT Ethernet port for management functions. It incorporates a Web Server (HTTP), SNMP agent, and Telnet capability.

### IP MODULE AND VIPERSAT NETWORKS VMS

When configured with the IP Module, the CDM-570L provides advanced features for maximizing satellite link efficiency in IP networks.

Optionally, the CDM-570L Modem with IP module can be integrated with the Vipersat Management System (VMS) to provide a fully automated network and capacity management tool designed specifically for satellite networks.

Read more about the IP Module and VMS capabilities on page 4.



2114 West 7th St. Tempe, AZ 85281 USA  
Tel. (480) 333-2200 Fax (480) 333-2540  
email: [sales@comtechefdata.com](mailto:sales@comtechefdata.com)  
[www.comtechefdata.com](http://www.comtechefdata.com)

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## SYSTEM SPECIFICATIONS

Frequency Range	950 to 1950 MHz, 100 Hz frequency resolution
Input/Output Impedance and connectors	Transmit: 50Ω (female Type N connector) Receive: 50Ω (female Type N connector)
Data Interfaces	EIA-422/530, V.35, Sync EIA-232, G.703 T1, G.703 E1 balanced or unbalanced
Data Rate Range	(1 bps programmable, and fully independent Tx and Rx rates)
Rate 1/2 BPSK	2.4 kbps to 1.25 Mbps
Rate 1/2 QPSK/OQPSK	4.8 kbps to 2.5 Mbps
Rate 3/4 QPSK/OQPSK	7.2 kbps to 3.75 Mbps
Rate 7/8 QPSK/OQPSK	8.4 kbps to 4.375 Mbps
Rate 0.95 QPSK/OQPSK TPC	9.1 kbps to 4.72 Mbps
Rate 2/3 8-PSK TCM	4.8 kbps to 5 Mbps
Rate 3/4 8-PSK TPC	10.8 kbps to 5 Mbps
Rate 7/8 8-PSK TPC	13.6 kbps to 5 Mbps
Rate 7/8 16-QAM TPC	16.8 kbps to 5 Mbps
Uncoded	4.8 kbps to 5 Mbps
	<i>(See the CDM-570L manual for details)</i>
Scrambling	Mode dependent - ITU V.35, or proprietary externally synchronized
FEC Options	
Viterbi	Rate 1/2 BPSK, QPSK/OQPSK Rate 3/4 and 7/8 QPSK/OQPSK and 16-QAM w/RS
Pragmatic TCM	8-PSK 2/3 (CLOSED NETWORK - NOT IESS-310)
Turbo Product Coding	Rate 21/44 BPSK, 5/16 BPSK, Rate 1/2 QPSK/OQPSK Rate 3/4 and Rate 7/8 QPSK/OQPSK, 8-PSK and 16-QAM Rate 0.95 QPSK/OQPSK and 8-PSK
Reed-Solomon	Proprietary 220/200 and 200/180 modes available
Uncoded	BPSK, QPSK/OQPSK
M&C Interface	EIA-232, EIA-485 (2- or 4-wire), Ethernet 10/100 BaseT
Form C Relays	Tx, Rx traffic alarms and Unit faults

## AVAILABLE OPTIONS

How Enabled	Option
FAST	Variable Rate to 2.048 Mbps
FAST	Variable Rate to 5 Mbps
FAST	8-PSK modulation
FAST	16-QAM modulation
Hardware	Reed Solomon Codec Board
Hardware	Turbo Codec Board
Hardware	Block Up converter (BUC) 24 VDC, 100W Power Supply, AC Input
Hardware	Block Up converter (BUC) 48 VDC, 180W Power Supply, AC Input
Hardware	IP Module
	<b>IP Module Options:</b>
FAST	Header Compression
FAST	Payload Compression
FAST	Quality of Service (QoS) – 3 modes
FAST	3x DES Data Encryption
VMS	Vipersat Management System Integration

## ACCESSORIES

CRS-170 1:1 L-Band Modem Redundancy Switch

## ENVIRONMENTAL AND PHYSICAL

Temperature	Operating: 0 to 50°C (32 to 122°F) Storage: -25 to 85°C (-13 to 185°F)
Power Supply	100 to 240 volts AC, 50/60 Hz
Power Consumption	22W typical (30 W max) without BUC PSU 250W max with 180W BUC PSU
Physical Dimensions	1 U high, 16 inches deep (40.6 cm)
Weight	16 lbs (7.2 kg) including 180W BUC supply
CE Approvals	EN55022 Class B (Emissions) EN50082-1 Part 1 (Immunity) EN60950 (Safety)
FCC Approval	FCC Part 15 Class B



### DEMODULATOR

Input Power Range	(-130 + 10 Log Symbol Rate) dBm minimum (-90 + 10 Log Symbol Rate) dBm maximum
Max Composite Level	+43 dBc, up to -10 dBm
Acquisition Range	Normal mode: $\pm 1$ to $\pm 32$ kHz (1 kHz steps) Wide mode: to $\pm 200$ kHz, symbol rates above 625 Ksym/sec
Acquisition Time	Example: 200 ms average at 64 kbps Rate 1/2 QPSK, and $\pm 32$ kHz acquisition range

### EXAMPLE BER PERFORMANCE

Met with two adjacent carriers 7 dB higher  
Guaranteed  $E_b/N_o$ , in dB (Typical values in parentheses)

#### Viterbi

(B, QPSK/OQPSK)	<u>1/2</u>	<u>3/4</u>	<u>7/8</u>
10 <sup>-5</sup>	5.4 (4.9)	6.8 (6.3)	7.7 (7.2)
10 <sup>-7</sup>	6.7 (6.2)	8.2 (7.7)	9.0 (8.6)

#### Viterbi and concatenated Reed-Solomon 220/200 or 200/180

(B, QPSK/OQPSK)	<u>1/2</u>	<u>3/4</u>	<u>7/8</u>
10 <sup>-5</sup>	4.3 (4.0)	5.6 (4.7)	6.5 (6.0)
10 <sup>-7</sup>	4.5 (4.2)	6.0 (5.2)	6.9 (6.5)

#### Turbo Product Codec

(QPSK/OQPSK)	<u>1/2</u>	<u>3/4</u>	<u>7/8</u>	<u>0.95</u>
10 <sup>-6</sup>	2.9 (2.6)	3.8 (3.4)	4.3 (4.0)	6.4 (6.0)
10 <sup>-8</sup>	3.3 (2.8)	4.4 (4.0)	4.5 (4.2)	6.9 (6.5)

#### 8-PSK TCM/RS

#### (Closed Network RS)

(See the CDM-570L manual for a complete listing of the performance of all FEC types, Code Rates, and Modulation types.)

Receive Buffer	512, 1024, 2048, 4096, 8182, or 16384 bits
Receive Clock Options	Rx Satellite, Tx Terrestrial, Internal Reference
Clock Tracking	$\pm 100$ ppm minimum
External Reference	Female BNC connector 1, 2, 5, 10, or 20 MHz
Input	
Monitor Functions	$E_b/N_o$ , Frequency Offset, BER, Buffer fill status, Rx receive signal level

### MODULATOR

Output	Meets IESS-308/309 power spectral mask
Spectrum/filtering	
Frequency Stability	$\pm 0.06$ ppm, 0 to 50°C (32 to 122°F)
Harmonics and Spurious	< -55 dBc/4 kHz (Typically < -60 dBc/4 kHz)
Transmit On/Off Ratio	55 dB minimum
Phase Noise	< 1.2 degrees RMS double-sided, 100 Hz to 1 MHz
Output Power	0 to -40 dBm, 0.1 dB steps
Accuracy	$\pm 1.0$ dB over frequency and temperature
External Tx Carrier Off	By TTL LOW signal, or RTS
Tx Clock options	Internal (SCT), External (TT), Loop timing

### LOW-NOISE BLOCK CONVERTER (LNB) SUPPORT

LNB Voltage	+13 volts, +18 volts and +24 volts DC at 500 mA max
10 MHz Reference	-3 dBm $\pm$ 3dB via Rx center conductor
Power Level	

### BLOCK UPCONVERTER (BUC) SUPPORT

BUC Voltage	24 VDC, 4 amps, 100W (Internally-fitted Option) 48 VDC, 3 amps, 180W (Internally-fitted Option)
10 MHz Reference	0 dBm $\pm$ 3dB via Tx center conductor
Power Level	
FSK support	Via Tx center conductor with FSK BUCs



## INTRODUCTION

With an innovative architecture to support IP networking, an IP-Module equipped CDM-570L meets many customer requirements for Point-to-Point and Point-to-Multi-Point applications. When configured with the IP Module, the CDM-570L provides advanced features for improving satellite link efficiency in IP networks:

## STANDARD FEATURES

- easyConnect™ for set up with minimal configuration
- Static IP routing for unicast and multicast
- Powerful network management via SNMP, Web, or Telnet
- IGMP v1 and v2
- Symmetric as well as asymmetric operation for maximum bandwidth efficiency
- Point-to-Point or Point-to-Multi-Point configuration

## OPTIONAL FEATURES

- Header Compression (IP/TCP and IP/UDP/RTP)
- Payload Compression
- 3x DES Data Encryption
- Quality of Service (QoS)

## HEADER COMPRESSION OPTION

Configurable on a per route basis, header compression reduces the required Voice over Internet Protocol (VoIP) bandwidth by as much as 60%. Example: A G.729 voice codec, operating at 8 kbps, will occupy 32 kbps once encapsulated into IP framing on a LAN. Using IP/UDP/RTP Header Compression, the same traffic only needs 10.8 kbps total WAN satellite bandwidth to cross the link. Normal Web/HTTP traffic can be reduced an additional 10% via IP/TCP header compression.

## PAYLOAD COMPRESSION OPTION

Compressing payload reduces both the data frame size and satellite bandwidth required to transmit across the link. Configurable on a per route basis, Payload Compression optimizes traffic and reduces bandwidth up to 40%.

## DATA ENCRYPTION OPTION

The IP Module provides 3xDES data encryption to prevent unauthorized access to data over the satellite link, and is configurable on a per route basis.

## QUALITY OF SERVICE OPTION

The IP Module supports multi-level QoS to reduce jitter and latency for real time traffic, provides priority treatment to mission critical applications and allows non-critical traffic to use the remaining bandwidth. Three modes are available, Max/Priority, Min/Max and DiffServ.

- Max/Priority - Assign a maximum bandwidth that any traffic flow can utilize combined with 8 levels of prioritization
- Min/Max - Set the minimum and maximum bandwidth for user-defined classes of traffic to ensure that a certain level of bandwidth is always applied
- DiffServ - Provide higher priority to some applications over others; Industry-standard method of adding network-wide QoS enabling seamless co-existence in networks that already have DiffServ

## NETWORKING PROTOCOLS

RFC 768 – UDP	RFC 2045 – MIME
RFC 791 – IP	RFC 2236 – IGMP v2
RFC 792 – ICMP	RFC 2474 – Diffserv
RFC 793 – TCP	RFC 2475 – Diffserv
RFC 826 – ARP	RFC 2578 – SMI
RFC 856 – Telnet	RFC 2597 – AF PHB
RFC 862 – Ping	RFC 2598 – Expedite Forwarding
RFC 894 – IP	RFC 2616 – HTTP
RFC 959 – FTP	RFC 2821 – SMTP
RFC 1112 – IP Multicast	RFC 3412 – SNMP
RFC 1213 – SNMP MIB II	RFC 3416 – SNMPv2
RFC 1812 – IPv4 Routers	RFC 3418 – SNMP MIB

## OPERATIONS & MAINTENANCE

Configuration and management  
Console interface  
SNMP with MIB II and private, modem-specific MIB  
Telnet  
HTTP  
Software / firmware (IP Module) upgrade via FTP  
Traffic management statistics  
Faults and alarms  
Configuration backup and restore

## SECURITY

Password Protection  
Access List

## CONSOLE PORT

Interface EIA-232 (RJ-12 connector)

## REMOTE PORT

Interface EIA-232 or EIA-485 (2- or 4-wire)

## VMS NETWORK AND BANDWIDTH MANAGEMENT

Vipersat Networks' VMS provides traditional monitor and control functions more efficiently than other M & C protocols, and allows enhanced capacity and bandwidth management capabilities for the CDM-570L. VMS gives satellite service providers and enterprise operators the ability to dynamically adjust bandwidth based on application, load or schedule.

VMS also allows the CDM-570L to switch from shared to dedicated mode. Inbound transmissions from remotes can be switched from a shared Selective Time Division Multiple Access (STDMA) mode to a dedicated Single Carrier Per Channel (SCPC) connection manually or automatically, triggered by application or load, or on a scheduled basis. This enables the network to more effectively handle connection-oriented applications and reduces both latency and network congestion. Through VMS, dynamic point-to-point mesh connections can be established between remotes. The result is an economical and flexible network, enabling bandwidth to be shared and directed where it is needed for any mix of IP voice, video or data traffic.



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