CDM-570 & CDM-570L
Satellite Modems

INTRODUCTION

The CDM-570 and the CDM-570L are Comtech EF Data's entry-level satellite modems that provide industry leading performance and flexibility in a 1 RU package at a very competitive price. It is the platform of choice for network operators, enterprise users, service providers, broadcasters and government users for a wide range of applications – cellular backhaul, WAN connectivity, satellite news gathering (SNG), communication-on-the-move, maritime, offshore applications, etc.

Designed to address the market for low-cost terminals, the modems are available with 70/140 MHz or L-band IF and EIA-530/-422, V.35, EIA-232 and G.703 data interfaces.

The advanced FPGA-based architecture along with the internal Flash memory allows for easy field upgrades via the Ethernet port.

KEY FEATURES

- Data rate range from 2.4 kbps to 9.98 Mbps
- CDM-570: 50 to 90 or 100 to 180 MHz IF range
  CDM-570L: 950 to 1950 MHz IF range
- Fast acquisition demodulator (± 32 kHz acquisition range, 64 kbps, Rate 1/2 QPSK: 150 ms average)
- Modulation types: BPSK, QPSK, OQPSK, 8-PSK, 8-QAM, 16-QAM
- Forward Error Correction (FEC) choices include Turbo Product Code (TPC), Viterbi, Reed-Solomon, and Trellis Coded Modulation (TCM)
- Automatic Uplink Power Control (AUPC)
- Embedded Distant-end Monitor and Control (EDMAC)
- Asymmetric Loop Timing
- Built-in 1:1 redundancy controller (Y-cables for data, simple and inexpensive external module for IF and RF)
- 1:1 and 1:10 redundancy switches available
- CDM-570: FSK communications to CSAT-5060 or KST-2000A
- CDM-570L: 10 MHz reference for BUC, FSK communications and optional BUC power supply
- CDM-570L: 10 MHz reference and power supply for LNB
- Backwards compatible with the CDM-500/CDM-550, CDM-550T, CDM-600, and CDM-600L
- Interoperable with SDM-300A and SDM-300L3
- 10/100BaseT Ethernet port for M&C with Web browser, SNMP and Telnet support
- G.703 clock extension

TURBO PRODUCT CODING

The optional Turbo Product Codec delivers significant performance improvement when compared to Viterbi with concatenated Reed-Solomon. It offers increased coding gain, lower decoding delay, and significant bandwidth savings compared to traditional FEC.

EDMAC & AUPC OPERATION

CDM-570/L has the ability to monitor and control the distant end of a satellite link using EDMAC. User data is framed and bits are added to pass control, status, and AUPC information. This is transparent to the user.

MANAGEMENT

The modem can be configured and monitored from the front panel, or through the remote M&C port. Ten complete 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 (Eb/No and AUPC performance) for monitoring and reporting purposes.

The CDM-570/L also offers a 10/100BaseT Ethernet port for management with an embedded Web Server (HTTP), SNMP agent, and Telnet capability.

G.703 CLOCK EXTENSION

Cellular networks require precise synchronization of base stations which is generally derived from the E1/T1 backhaul circuit. If a non-plesiochronous backhaul is used, the timing information is lost and most operators are forced to use GPS-based external equipment for site synchronization.

CDM-570/L offers a G.703 clock extension option that propagates a high stability reference from Hub to the Remote. A high stability E1/T1 reference signal is fed to the hub modem. The remote modem generates a T1/E1 signal synchronized to the reference signal that is then used for synchronizing the remote site. G.703 clock extension can be used with V.35 or EIA-422/530 data interfaces. This process does not require additional bandwidth.

FAST FEATURE ENHANCEMENTS

The FAST codes make it easy to upgrade the modem capability in the field. New features can be added on site, using FAST access codes purchased from Comtech EF Data that can be entered via the front panel.

SYSTEM SPECIFICATIONS

Frequency Range	CDM-570: 50 to 90 or 100 to 180 MHz, CDM-570L: 950 to 1950 MHz, 100 Hz frequency resolution
Symbol Rate Range	4.8 ksps to 3.0 Msps
Data Rate Range	Programmable in 1 bps step with fully independent Tx and Rx rates
Modulation & FEC	Data Rate Range (Unframed)
Uncoded	
BPSK	4.8 kbps to 3.000 Mbps
QPSK	9.6 kbps to 5.000 Mbps
Viterbi	
1/2 BPSK	2.4 kbps to 1.500 Mbps
1/2 QPSK/OQPSK	4.8 kbps to 3.000 Mbps
3/4 QPSK/OQPSK	7.2 kbps to 4.500 Mbps
7/8 QPSK/OQPSK	8.4 kbps to 5.250 Mbps
Viterbi + RS	
1/2 BPSK	2.4 kbps to 1.363 Mbps
1/2 QPSK/OQPSK	4.3 kbps to 2.727 Mbps
3/4 QPSK/OQPSK	6.5 kbps to 4.091 Mbps
7/8 QPSK/OQPSK	7.5 kbps to 4.666 Mbps
3/4 16-QAM	13.0 kbps to 4.000 Mbps
7/8 16-QAM	16.8 kbps to 4.666 Mbps
TCM + RS	
2/3 8-PSK	8.7 kbps to 4.400 Mbps
Turbo Product Code	
5/16 BPSK	2.4 kbps to 0.937 Mbps
21/44 BPSK	2.4 kbps to 1.430 Mbps
21/44 QPSK/OQPSK	4.8 kbps to 2.860 Mbps
3/4 QPSK/OQPSK	7.2 kbps to 4.500 Mbps
7/8 QPSK/OQPSK	8.4 kbps to 5.250 Mbps
0.95 QPSK/OQPSK	9.1 kbps to 5.666 Mbps
3/4 8-PSK/8-QAM	10.8 kbps to 6.750 Mbps
7/8 8-PSK/8-QAM	13.6 kbps to 7.875 Mbps
0.95 8-PSK/8-QAM	15.3 kbps to 8.500 Mbps
3/4 16-QAM	14.4 kbps to 9.000 Mbps
7/8 16-QAM	16.8 kbps to 9.980 Mbps
FEC Options	
Viterbi	k=7, per IESS-308/309 Rate 1/2 BPSK, QPSK/OQPSK Rate 3/4 QPSK/OQPSK Rate 7/8 QPSK/OQPSK
Pragmatic TCM	Closed Network – Not IESS-310 8-PSK 2/3
Turbo Product Coding	Rate 5/16 BPSK Rate 21/44 BPSK, QPSK/OQPSK Rate 3/4 QPSK/OQPSK, 8-PSK and 16-QAM Rate 7/8 QPSK/OQPSK, 8-PSK and 16-QAM Rate 0.95 QPSK/OQPSK and 8-PSK
Reed-Solomon	Proprietary 220,200 Outer Code (Transparent Mode) Proprietary 200,180 Outer Code (EDMAC Modes) Interleaver depth = 4 Rate 1/2 BPSK, QPSK/OQPSK Rate 3/4 QPSK/OQPSK Rate 7/8 QPSK/OQPSK Rate 3/4 16-QAM Rate 7/8 16-QAM
Uncoded	BPSK QPSK/OQPSK
Scrambling	Transparent Closed Network Mode, no Reed Solomon or Turbo coding - per ITU V.35 (Intelsat variant) EDMAC Mode, no Reed Solomon coding - externally frame synchronized - proprietary Turbo Product Code Mode - externally frame synchronized - proprietary All Reed Solomon Modes - externally frame synchronized per IESS-308/309/310
Data Interfaces	
25-pin D-sub (female)	EIA-422/EIA-530 DCE (also supports X.21 DCE & DTE) V.35 DCE Synchronous EIA-232 (Rates up to 300 kbps)
15-pin D-sub (female) or BNC (female)	G.703 T1 (Balanced 100Ω) G.703 E1 (Unbalanced 75Ω or Balanced 120Ω)
M&C Interface	EIA-232, EIA-485 (2- or 4-wire), Ethernet 10/100BaseT
Output Impedance	CDM-570: Matched for 50/75Ω, BNC connector CDM-570L: Transmit and Receive 50Ω, female Type N connector
External Reference Input	1, 2, 5, 10 or 20 MHz, BNC connector
Form C Relays	Tx, Rx traffic alarms and Unit faults
Automatic Uplink Power Control (AUPC)	Requires Closed Network Framed mode for transport of Eb/No information from remote modem (EDMAC can be enabled or disabled)
Target Eb/No range	0 to 9.9 dB at remote demod (default is 4.0 dB)
Max AUPC range	0 to 9 dB (default is 3 dB)
Monitor functions	Remote demod Eb/No and Tx power level increase (front panel or via remote control interface)

MODULATOR

	CDM-570	CDM-570L
Frequency Stability	±1 ppm, 0º to 50ºC (32º to 122ºF)	±0.06 ppm, 0º to 50ºC (32º to 122ºF)
Output Power	0 to –25 dBm, 0.1 dB steps	0 to –40 dBm, 0.1 dB steps
Accuracy	± 0.5 dB over frequency and temperature	± 1.0 dB over frequency and temperature
Phase Noise	< 0.75 degrees RMS double-sided, 100 Hz to 1 MHz	< 1.2 degrees RMS double-sided, 100 Hz to 1 MHz
Output Spectrum/ Filtering	Meets IESS-308/-309 power spectral mask	
Harmonics and Spurious	< -55 dBc/4 kHz (Typically < -60 dBc/4 kHz)	
Transmit On/Off Ratio	55 dB minimum	
External Tx Carrier Off	By TTL LOW signal, or RTS	

Tx Clock Options	Internal (SCT) External (TT) Loop timing with Symmetric or Asymmetric Operation

DEMODULATOR

	CDM-570	CDM-570L
Input Power Range	-30 to -60 dBm	-130 + 10 Log Symbol Rate, dBm (minimum) -90 + 10 Log Symbol Rate, dBm (maximum)
Max Composite Level	+35 dBc, up to -5 dBm absolute max.	+40 dBc, up to -10 dBm absolute max.
Acquisition Range	± 1 to ± 32 kHz, 1 kHz step	± 1 to ± 32 kHz, 1 kHz step, Symbol Rate <= 625 ksps ±1 to ± 200 kHz, 1 kHz step, Symbol Rate > 625 ksps
Acquisition Time	Highly dependent on data rate, FEC rate, and demodulator acquisition range. Examples: 120 ms average at 64 kbps, Rate 1/2 QPSK, ±10 kHz acquisition sweep range, 6dB Eb/No 3.5 s average at 9.6 kbps, R1/2 QPSK, ±10 kHz, 6dB Eb/No	
Receive Buffer	512, 1024, 2048, 4096, 8182, or 16384 bits	
Receive Clock Options	Buffer Disabled (Rx Satellite) Buffer Enabled (Symmetric or Asymmetric Operation)	
Clock Tracking	± 100 ppm minimum	
Monitor Functions	E_b/N_o BER Frequency Offset Buffer fill status Rx signal level	

EXAMPLE BER PERFORMANCE

For symbol rates up to 2.5 Msps (See CDM-570/L User Manual for higher symbol rates).
Guaranteed E_b/N_o, in dB (typical values in parentheses) with two adjacent carriers 7 dB higher
(See the CDM-570/L User Manual for a complete listing of the performance of all FEC types, code rates, and modulation types.)

Viterbi

BPSK, QPSK/OQPSK	1/2	3/4	7/8
10^{-5}	5.4 (4.9)	6.8 (6.3)	7.7 (7.2)
10^{-7}	6.7 (6.2)	8.2 (7.7)	9.0 (8.6)

Viterbi & Concatenated Reed-Solomon 220/200 or 200/180

BPSK, QPSK/OQPSK	1/2	3/4	7/8
10^{-5}	4.3 (4.0)	5.6 (4.7)	6.5 (6.0)
10^{-7}	4.5 (4.2)	6.0 (5.2)	6.9 (6.5)

Turbo Product Code

BPSK	5/16	21/44		
10^{-6}	2.4 (2.1)	2.8 (2.5)		
10^{-7}	2.6 (2.3)	3.1 (2.8)		
10^{-8}	2.7 (2.4)	3.3 (2.9)		
QPSK/OQPSK	21/44	3/4	7/8	0.95
10^{-6}	2.9 (2.6)	3.8 (3.4)	4.3 (4.0)	6.4 (6.0)
10^{-7}	3.1 (2.7)	4.1 (3.7)	4.4 (4.1)	6.7 (6.3)
10^{-8}	3.3 (2.8)	4.4 (4.0)	4.5 (4.2)	6.9 (6.5)
8-PSK	3/4	7/8	0.95	
10^{-6}	6.2 (5.8)	7.0 (6.6)	9.3 (8.9)	
10^{-7}	6.4 (6.0)	7.1 (6.7)	9.8 (9.4)	
10^{-8}	6.8 (6.3)	7.2 (6.8)	10.3 (9.9)	
8-QAM	3/4	7/8	0.95	
10^{-6}	6.5 (6.1)	6.6 (6.2)	9.6 (9.2)	
10^{-7}	6.8 (6.4)	6.7 (6.3)	10.1 (9.7)	
10^{-8}	7.2 (6.8)	6.8 (6.4)	10.6(10.2)	
16-QAM	3/4	7/8		
10^{-6}	7.4 (7.0)	8.1 (7.7)		
10^{-7}	7.8 (7.3)	8.2 (7.8)		
10^{-8}	8.2 (7.7)	8.3 (7.9)		

LOW-NOISE BLOCK CONVERTER (LNB) SUPPORT (CDM-570L Only)

LNB Voltage	+13, +18, and +24 VDC @ 500 mA maximum
LNB Reference	10 MHz via Rx center conductor, -3 dBm ± 3 dB

BLOCK UP CONVERTER (BUC) SUPPORT (CDM-570L Only)

BUC Voltage	24 VDC, 90 W @ 50°C, 100 W @ 30°C (internally fitted option) 48 VDC, 150 W @ 50°C, 180 W @ 30°C (internally fitted option)
BUC Reference	10 MHz via Tx center conductor, 0 dBm ± 3 dB
FSK Support	Via Tx center conductor with FSK BUCs

ENVIRONMENTAL AND PHYSICAL

Temperature	Operating: 0 to 50ºC (32 to 122ºF)
	Storage: -25 to 85ºC (-13 to 185ºF)
Power Supply	100 to 240 VAC, 50/60 Hz
Power Consumption (See Manual)	CDM-570: 29 W typical (32 W max) CDM-570L: 29 W typical (32 W max) w/o BUC
Physical Dimensions	CDM-570: 1RU high, 12 inches deep (30.5cm) CDM-570L: 1RU High, 16 inches deep (40.6 cm)
Weight	CDM-570: 7 lbs (3.2 kg) CDM-570L: 16 lbs (7.2 kg) including 150 W BUC power supply

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OPERATIONS & MAINTENANCE

Configuration and management	
Front Panel	
Remote Port – EIA-232 or EIA-485 (2- or 4-wire)	
SNMP with MIB II and private, modem-specific MIB	
Telnet	
Web Browser (http)	
Software/firmware upgrade via FTP	
Faults and alarms	

REGULATORY

CE Mark	EMC, Safety (CDM-570) EN55022 Class B (Emissions) EN50082-1 Part 1 (Immunity) EN60950 (Safety) (CDM-570L)
FCC Approval	FCC Part 15 Class B (CDM-570L)

AVAILABLE OPTIONS

How Enabled	Option
FAST	Variable Rate to 2.048 Mbps
FAST	Variable Rate to 5 Mbps
FAST	Variable Rate to 9.98 Mbps
FAST	8-PSK, 8-QAM modulation (8-QAM with TPC only)
FAST	16-QAM modulation
FAST	G.703 Clock Extension
Hardware	Reed-Solomon Codec Board
Hardware	Turbo Codec Board
Hardware	CDM-570: Power Supply, AC Input
Hardware	CDM-570: Power Supply, -48 DC Input
Hardware	CDM-570L: 24 VDC, 100 W (@ 30°C) BUC power supply AC Input or 48 VDC Input
Hardware	CDM-570L: 48 VDC, 180 W (@ 30°C) BUC power supply AC Input or 48 VDC Input

ACCESSORIES

CRS-170A	CDM-570L: 1:1 Modem Redundancy IF Switch
CRS-180	CDM-570: 1:1 Modem Redundancy IF Switch
CRS-280	CDM-570: 1:N Modem Redundancy IF Switch Module
CRS-280L	CDM-570L: 1:N Modem Redundancy IF Switch Module
CRS-300	1:N Modem Redundancy Switch

CDM-570 Satellite Modem Back Panel

CDM-570L Satellite Modem Back Panel

2114 West 7th Street, Tempe, Arizona 85281 USA Voice 1 480 333 2200 Fax 1 480 333 2540 Email sales@comtechefdata.com