Overview

The CDM-570A and the CDM-570AL are our next generation satellite modems that provide industry-leading performance and flexibility in a 1 RU package at a very competitive price. With support for VersaFEC® low latency LDPC Forward Error Correction (FEC), the revolutionary DoubleTalk® Carrier-in-Carrier® bandwidth compression, and optimized transmit filter rolloffs, the CDM-570A and CDM-570AL provide significant savings under all conditions. This combination of advanced technologies enables multi-dimensional optimization, allowing satellite communications users to:

- Minimize operating expenses (OPEX)
- Maximize throughput without using additional transponder resources
- Maximize availability (margin) without using additional transponder resources
- Minimize capital expenses (CAPEX) by allowing a smaller BUC/amplifier and/or antenna
- Or, a combination to meet specific business needs

The modems are available with 70/140 MHz or L-Band IF and EIA-530/-422, V.35, sync EIA-232 and G.703 T1/E1 data interfaces.

Typical Users

- Enterprise
- Internet Service Providers
- Satellite Service Providers
- Offshore & Maritime
- Mobile Operators

Common Applications

- Enterprise Networks
- Offshore & Maritime Communications
- Mobile Backhaul
- Communications on-the-Move
- Disaster Recovery & Emergency Communications
- Satellite News Gathering

Features

- DoubleTalk Carrier-in-Carrier bandwidth compression
- Carrier-in-Carrier Automatic Power Control (CnC-APC)
- VersaFEC low latency LDPC (Constant Coding & Modulation Mode)
- 5%, 10%, 15%, 20%, 25% and 35% Transmit Filter Rolloff
- Data rate range from 2.4 kbps to 10.239 Mbps
- CDM-570A: 50 to 90 or 100 to 180 MHz IF range
  CDM-570AL: 950 to 2250 MHz IF range
- Modulation types: BPSK, QPSK, OQPSK, 8PSK, 8-QAM, 16-QAM
- Forward Error Correction (FEC) choices include VersaFEC, Turbo Product Code (TPC), Viterbi, Reed-Solomon, and Trellis Coded Modulation (TCM)
- Data Interfaces: EIA-422/530, V.35, G.703 T1/E1, sync EIA-232
- Standards based management via SNMP, Web, or Telnet
- G.703 clock extension
- Automatic Uplink Power Control (AUPC)
- Embedded Distant-end Monitor and Control (EDMAC/EDMAC2)
- 1:1 and 1:N Redundancy options
- CDM-570A: FSK communications to CSAT-5060 or KST-2000A
- CDM-570AL: 10 MHz reference for BUC, FSK communications and optional BUC power supply
- CDM-570AL: 10 MHz reference and power supply for LNB

Doubletalk Carrier-in-Carrier

DoubleTalk Carrier-in-Carrier, based on patented "Adaptive Cancellation" technology, allows transmit and receive carriers of a duplex link to share the same transponder bandwidth. DoubleTalk Carrier-in-Carrier is complementary to all advances in modem technology, including advanced FEC and modulation techniques. As these technologies approach theoretical limits of power and bandwidth efficiencies, DoubleTalk Carrier-in-Carrier utilizing advanced signal processing techniques provides a new dimension in bandwidth efficiency.

Figure 1 shows the typical full-duplex satellite link, where the two carriers are adjacent to each other.

Figure 2 shows the typical DoubleTalk Carrier-in-Carrier operation, where the two carriers are overlapping, thus sharing the same spectrum.
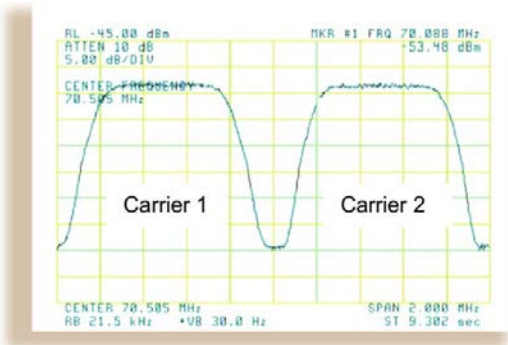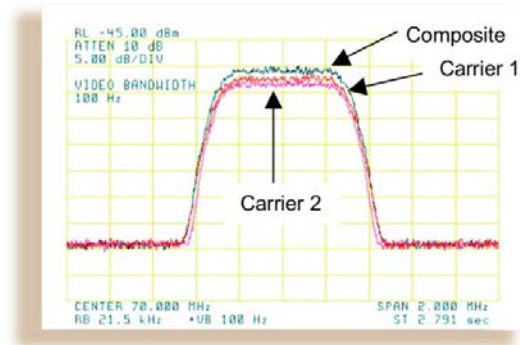

Figure 1

Figure 2

When observed on a spectrum analyzer, only the Composite is visible. Carrier 1 and Carrier 2 are shown in Figure 2 for reference only.

As DoubleTalk Carrier-in-Carrier allows equivalent spectral efficiency using a lower order modulation and/or code rate, it can reduce the power required to close the link thereby reducing CAPEX by allowing a smaller BUC/amplifier and/or antenna. Alternatively, DoubleTalk Carrier-in-Carrier can be used to achieve very high spectral efficiencies E.g., DoubleTalk Carrier-in-Carrier when used with 16-QAM approaches the bandwidth efficiency of 256-QAM.

When combined with VersaFEC or TPC and optimized transmit filter rolloffs, DoubleTalk Carrier-in-Carrier provides unprecedented savings in transponder bandwidth and power utilization. This allows for its successful deployment in bandwidth-limited and power-limited scenarios, as well as reduction in earth station BUC/amplifier power requirements.

Carrier-in-Carrier® is a Registered Trademark of Comtech EF Data
DoubleTalk® is a Registered Trademark of Raytheon Applied Signal Technology
VersaFEC® is a Registered Trademark of Comtech EF Data

Carrier-in-Carrier Automatic Power Control (CnC-APC)

The patent-pending Carrier-in-Carrier Automatic Power Control (CnC-APC) mechanism enables modems on both sides of a CnC link to automatically measure and compensate for rain fade while maintaining the Total Composite Power. In addition to automatically compensating for rain fade, CnC-APC also enables the modems to share link margin, i.e. a modem can effectively transfer excess link margin to a distant end modem experiencing fade, thereby further enhancing overall availability.

VersaFEC Forward Error Correction

VersaFEC is a patent-pending system of high-performance LDPC codes designed to provide maximum coding gain while minimizing latency. CDM-570A/L support Constant Coding & Modulation (CCM) mode of operation.

The Ultra Low Latency (ULL) codes provide even lower latency compared to standard VersaFEC codes.

Optimized Transmit Filter Rolloffs

CDM-570A/L support 5%, 10%, 15%, 20%, 25% and 35% transmit filter rolloff allowing users to further optimize the link. Carrier-in-Carrier combined with VersaFEC and optimized transmit filter rolloffs can provide 50% or more BW savings compared to legacy modems.

EDMAC & AUPC Operation

The CDM-570A/L-IP has the ability to monitor and control the distant end of a point-to-point satellite link using EDMAC or EDMAC2. User data is framed and bits are added to pass control, status, and AUPC information. This is transparent to the user.

Management

The modems support SNMP, web-based and command line interfaces for management. The modems can also be configured and monitored from the front panel, or through the remote M&C port. Ten complete RF 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.

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.

Specifications

Data Rate Range (See user manual for details)	2.4 kbps to 10.239 (depending on modulation, FEC and framing), 1 bps step with fully independent TX and RX rates
Symbol Rate	4.8 ksps to 3.0 Msps
Frequency Range	CDM-570A: 50 to 90 or 100 to 180 MHz, 100 Hz resolution CDM-570AL: 950 to 2250 MHz, 100 Hz resolution
Data Interfaces	EIA-422/-530 DCE, V.35 DCE, Sync EIA-232, G.703 T1 balanced, G.703 E1 balanced or unbalanced

Modulation & FEC Options	Data Rate Range
VersaFEC	
BPSK 0.488	2.4 kbps to 1.462 Mbps
QPSK 0.533	5.2 kbps to 3.200 Mbps
QPSK 0.631	6.1 kbps to 3.785 Mbps
QPSK 0.706	6.8 kbps to 4.233 Mbps
QPSK 0.803	7.8 kbps to 4.818 Mbps
8-QAM 0.576 (ECCM)	8.3 kbps to 5.179 Mbps
8-QAM 0.642	9.3 kbps to 5.782 Mbps
8-QAM 0.711	10.3 kbps to 6.401 Mbps
8-QAM 0.780	11.3 kbps to 7.021 Mbps
16-QAM 0.644 (ECCM)	12.4 kbps to 7.726 Mbps
16-QAM 0.731	14.1 kbps to 8.776 Mbps
16-QAM 0.780	15 .0 kbps 9.361 Mbps
16-QAM 0.829	16.0 kbps to 9.946 Mbps
16-QAM 0.853	16.4 kbps to 10.239 Mbps
VersaFEC Ultra Low Latency (ULL) Codes	
BPSK 0.493 (ULL)	2.4 kbps to 1.479 Mbps
QPSK 0.493 (ULL)	4.8 kbps to 2.959 Mbps
QPSK 0.654 (ULL)	6.3 kbps to 3.923 Mbps
QPSK 0.734 (ULL)	7.0 kbps to 4.405 Mbps
TPC	
BPSK 5/16	2.4 kbps to 0.937 Mbps
BPSK 21/44	2.4 kbps to 1.430 Mbps
QPSK/OQPSK 21/44	4.8 kbps to 2.860 Mbps
QPSK/OQPSK 3/4	7.2 kbps to 4.500 Mbps
QPSK/OQPSK 7/8	8.4 kbps to 5.250 Mbps
QPSK/OQPSK 0.95	9.1 kbps to 5.666 Mbps
8PSK/8-QAM 3/4	10.8 kbps to 6.750 Mbps
8PSK/8-QAM 7/8	13.6 kbps to 7.875 Mbps
8PSK/8-QAM 0.95	15.3 kbps to 8.500 Mbps
16-QAM 3/4	14.4 kbps to 9.000 Mbps
16-QAM 7/8	16.8 kbps to 9.980 Mbps
Viterbi	
BPSK 1/2	2.4 kbps to 1.500 Mbps
QPSK/OQPSK 1/2	4.8 kbps to 3.000 Mbps
QPSK/OQPSK 3/4	7.2 kbps to 4.500 Mbps
QPSK/OQPSK 7/8	8.4 kbps to 5.250 Mbps
Viterbi + Reed Solomon	
BPSK 1/2	2.4 kbps to 1.363 Mbps
QPSK/OQPSK 1/2	4.3 kbps to 2.727 Mbps
QPSK/OQPSK 3/4	6.5 kbps to 4.090 Mbps
QPSK/OQPSK 7/8	7.5 kbps to 4.666 Mbps
16-QAM 3/4	13.0 kbps to 4.000 Mbps
16-QAM 7/8	16.8 kbps to 4.666 Mbps
TCM + Reed Solomon	
2/3 8PSK TCM (Closed network)	8.7 kbps to 4.400 Mbps
Uncoded	
Uncoded BPSK	4.8 kbps to 3.000 Mbps
Uncoded QPSK/OQPSK	9.6 kbps to 5.000 Mbps

Scrambling	Mode dependent – ITU V.35, or proprietary externally synchronized
M&C Interface	Ethernet 10/100Base-T, EIA-232, EIA-485
Input/Output Impedance	CDM-570A: matched for 50/75 Ω, 17 dB minimum return loss, BNC connector CDM-570AL: transmit and receive 50 Ω, > 17 dB (950 MHz to 2250 MHz) and >19 dB (1000 MHz to 1900 MHz) minimum return loss, female Type N connector
External Reference Input	1, 2, 5, or 10 MHz, BNC connector
Form C Relays	TX, RX traffic alarms and unit faults

Modulator

	CDM-570A	CDM-570AL
Frequency Stability (With Internal Reference)	±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	
Alpha (Rolloff)	5%, 10%, 15%, 20%, 25% and 35%	
Harmonics and Spurious	-60 dBC/4 kHz from 600 to 2600 MHz (L-Band), from 1 to 400 MHz (IF)	
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 (data interface dependent)	

Demodulator

	CDM-570A	CDM-570AL
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. Example: 120 ms average at 64 kbps, Rate 1/2 QPSK, ± 10 kHz acquisition sweep range, 6dB Eb/No	
Plesiochronous/ Doppler Buffer	±128, 256, 512, 1024, 2048, 4096, 8192, 16384 or 32768 bits	
Receive Clock Options	Buffer disabled (RX satellite), buffer enabled (symmetric or asymmetric operation) (data interface dependent)	
Clock Tracking	± 100 ppm minimum	
Monitor Functions	E_b/N_o, frequency offset, BER, buffer fill status, RX signal level	

DoubleTalk Carrier-in-Carrier

Delay Range	0 to 330 ms
Power Spectral Density Ratio (Interferer to Desired)	-7 dB to +7 dB
Maximum Symbol Rate Ratio	3:1 (TX:RX or RX:TX)
Eb/No Degradation	0 dB Power Spectral Density Ratio BPSK/QPSK/OQPSK: 0.3 dB 8-QAM: 0.4 dB 8PSK: 0.5 dB 16-QAM: 0.6 dB +10 dB power spectral density ratio Additional 0.3 dB
Satellite Restrictions	Satellite in "loop-back" mode (i.e., the transmit station can receive itself) "Non-processing" satellite (i.e., does not demodulate or remodulate the signal)

Low-Noise Block Converter (LNB) Support (CDM-570AL)

LNB Voltage	13 and18 VDC
LNB Reference	10 MHz via RX center conductor,

Block Up Converter (BUC) Support (CDM-570AL)

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, not available with -24 VDC input)
BUC Reference	10 MHz via TX center conductor,
FSK Support	Via TX center conductor with FSK BUCs

Environmental & 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 VAC, 50/60 Hz -24 VDC (HW option) -48 VDC (HW option)
Power Consumption (See Manual)	CDM-570A: 29 W typical (32 W max.) CDM-570AL: 29 W typical (32 W max.) w/o BUC
Dimensions (height x width x depth)	CDM-570A: 1.75" x 19" x 13" (4.4 x 48.3 x 330 cm) CDM-570AL: 1.75" x 19" x 16" (4.4 x 48.3 x 40.6 cm)
Weight	CDM-570A: 6.3 lbs (2.84 kg) CDM-570AL: 7.2 lbs (3.27 kg) (without BUC P/S)

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	
Configuration backup and restoral	

Security

Password protection for web, ftp and telnet
Access list

Accessories
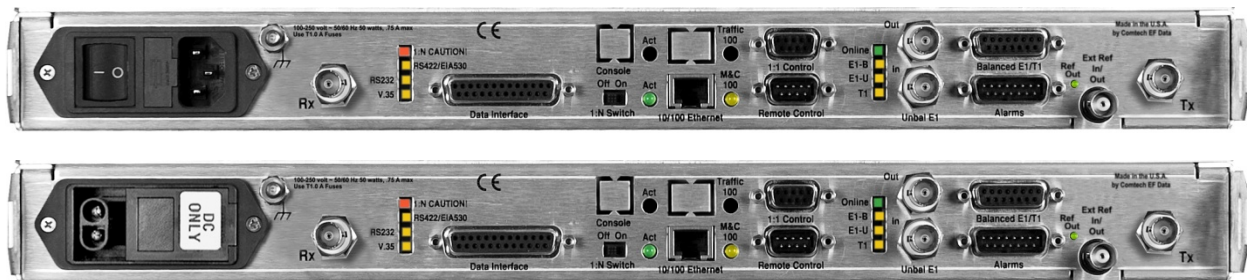
CRS-170A	CDM-570AL: 1:1 Modem Redundancy IF Switch
CRS-180	CDM-570A: 1:1 Modem Redundancy IF Switch
CRS-280	CDM-570A: 1:10 Modem Redundancy IF Switch Module
CRS-280L	CDM-570AL: 1:10 Modem Redundancy IF Switch Module
CRS-300	CDM-570A & CDM-570AL: 1:10 Modem Redundancy Switch

Available Options

How Enabled	Option
Hardware	Power supply, AC input
Hardware	Power supply, -24 VDC input
Hardware	Power supply, -48 VDC input
Hardware	24 VDC, 90 W @ 50°C (100 W @ 30°C) BUC power supply, AC input, -24 or -48 VDC input
Hardware	48 VDC, 150 W @ 50°C (180 W @ 30°C) BUC power supply, AC input or -48 VDC input
Hardware	DoubleTalk Carrier-in-Carrier board
Hardware	Turbo Codec board (Required for Rate 0.95. Rate 5/16, 21/44, 3/4 and 7/8 can be supported with or without the TPC board)
FAST	Modem data rate to 1.1 Mbps for CCM operation
FAST	Modem data rate to 2.5 Mbps for CCM operation
FAST	Modem data rate to 5 Mbps for CCM operation
FAST	Modem data rate to 10.239 Mbps for CCM operation (Maximum data rate limited to 9.98 Mbps in CDM-570 Compatibility/Legacy mode. Maximum data rate limited to 9.98 Mbps when using TPC codec, 5.25 Mbps when using Viterbi, 4.666 Mbps when using Viterbi+RS, 4.4 Mbps when using TCM+RS)
FAST	8PSK, 8-QAM modulation (8PSK requires TPC codec or Reed-Solomon, 8QAM Requires VersaFEC codec or TPC codec)
FAST	16-QAM modulation (16-QAM requires VersaFEC codec or TPC codec or Reed Solomon)
FAST	Optimized Transmit Filter Rolloffs (5%, 10%, 15%, 20% and 25%) – 512 kbps, 1.1 Mbps, 2.5 Mbps, 5 Mbps or 10.239 Mbps
FAST	VersaFEC Codec Data rate (CCM) – 512 kbps, 1.1 Mbps, 2.5 Mbps, 5 Mbps or 10.239 Mbps
FAST	TPC Codec (CCM) for Rate 5/16, 21/44, 3/4 and 7/8 (Rate 5/16, 21/44, 3/4 and 7/8 can be supported with or without the TPC board) Not required if TPC board is present.
FAST	DoubleTalk Carrier-in-Carrier Data Rate (full) – 512 kbps, 1.1 Mbps, 2.5 Mbps, 5 Mbps, 10.239 Mbps (Requires DoubleTalk Carrier-in-Carrier board
FAST	DoubleTalk Carrier-in-Carrier Data Rate (fractional) – 2.5 Mbps, 5 Mbps, 10.239 Mbps (Requires DoubleTalk Carrier-in-Carrier board
FAST	DoubleTalk Carrier-in-Carrier Automatic Power Control (CnC-APC) (Requires DoubleTalk Carrier-in-Carrier)
FAST	Reed Solomon Codec
FAST	G.703 clock extension

Regulatory

CE Mark	EN 301 489-1 (ERM) EN55022 (Emissions) EN55024 (Immunity) EN 61000-3-2 EN 61000-3-3 EN60950 (Safety)
FCC	FCC Part 15, Subpart B