

# CDM-700 High-Speed Satellite Modem



## INTRODUCTION

The CDM-700 is a high-speed satellite modem intended for operation with a range of multi-port data interfaces. The modem operates in broadcast, circuit restoration, point-to-point and point-to-multipoint applications with exceptional power and bandwidth efficiency.

## FEATURES

- Compact: 1RU, Chassis
- (Optional) 70/140 MHz or L-Band
- Combines multiple data streams into a single carrier
- Data rate range: 1.5 to 155.52 Mbps within 1 to 64 Msps
- QPSK, 8-PSK, 16-QAM, 64-QAM
- Turbo Product Coding (TPC)
- Two data interface slots
- Data interfaces include:
  - CDI-10: Dual G.703 Interface
  - CDI-50: OC-3 Interface
  - CDI-60: HSSI Interface
  - CDI-70: 1000BaseT (GigE) Ethernet Interface
- Adaptive Equalizer
- Unit Management/M&C, Standard Features
  - Front Panel Keypad and vacuum florescent display
  - Ethernet 10/100 BaseT: SNMP, Telnet or web browser (http) and reflashing
  - RS-232 or RS-485
- Asymmetric data rates
- Standard 1.5 ppm internal reference

## FEATURE ENHANCEMENTS

Enhancing the CDM-700'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. Other features are added with a simple module swap.

## APPLICATION

The CDM-700 provides bandwidth efficient transport of broadband data for satellite links. The powerful Ethernet M&C interface for the modem easily manages point-to-point, earth station and networking environments.

## TURBO PRODUCT CODING (TPC)

The CDM-700 offers Turbo Product Coding. TPC simultaneously offers increased coding gain, lower decoding delay and significant bandwidth savings compared to Viterbi and Reed-Solomon (RS). The TPC rates are:

- Rate 3/4 for QPSK, 8-PSK, 16-QAM, 64-QAM
- Rate 7/8 for QPSK, 8-PSK, 16-QAM, 64-QAM

## REMOTE CONTROL

The operator may configure and monitor the modem from the front panel, or through the remote M&C port. Control and status is provided through the RS-232, RS-485 (2/4 wire) port or 10/100 BaseT Ethernet port.

## SOFTWARE – FLASH UPGRADING

The internal software is both powerful and flexible, permitting storage and retrieval of up to 10 different modem configurations. The modem uses 'flash memory' technology internally, and new firmware can be uploaded to the unit from an external PC. This simplifies software upgrading, and updates can now be sent via the Internet or e-mail. The upgrade can be performed without opening the unit by simply connecting the modem to the Ethernet port of a computer.

## FULLY ACCESSIBLE SYSTEM TOPOLOGY (FAST)

The CDM-700 is extremely flexible and powerful, and incorporates a large number of optional features. Some customers may not require all of these features, and therefore, in order to permit a lower initial cost, the modem may be purchased with only the desired features enabled. If, at a later date, a customer wishes to upgrade the functionality of a modem, CEFD provides a system known as FAST which permits the purchase and installation of options through the use of special authorization codes, entered through the front panel, or remotely.

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## SYSTEM

70 / 140 MHz	52 to 88 and 104 to 176 MHz in 100 Hz steps
Impedance	50 $\Omega$ and optional 75 $\Omega$ , 18 dB min return loss
IF Connectors	BNC female
L-Band	950 to 1950 MHz in 100 Hz steps
Impedance	50 $\Omega$ , 14 dB min return loss
Connectors	Type N Female
Data Rate	1.5 to 155 Mbps within symbol rate range
Overhead	Composite data rate +2.5%
Symbol Rate	1 to 64 Msps
Scrambling	Synchronous or OFF
FEC	
Turbo Product Coding (TPC)	Rate 3/4, 7/8 (20/23 actual) for QPSK, 8-PSK, 16-QAM, 64-QAM
M&C Interface	RS-232, RS-485 (2- or 4-wire)
Network Management	Ethernet 10/100 BaseT port on base modem SNMP (MIBs), Telnet
Management Parameters	Date rate, FEC, IF frequency, Tx Carrier ON/OFF and more
Monitored Parameters	RSL, Eb/No, Alarms, Buffer Fill Status and more
Test Functions	Digital Loopback, IF Loopback, Data Test Patterns, Unmodulated Carrier, SSB Carrier
Alarms, Form C Relays	Tx, Rx traffic alarms and Unit faults
Frequency Stability	Internal $\pm 1.5$ ppm over operating temperature range
External Reference Input	10 MHz input via BNC female connector

## DATA INTERFACE (Optional)

CDI-10	2 independent G.703 interfaces at 75 $\Omega$ unbalanced each programmable to E3/T3/STS-1 34.368/44.736/51.84 Mbps. Line codes are AMI (NONE), HDB3, and B3ZS
CDI-50-1	OC-3 Single Mode Optical STM-1 G.703 Coaxial, BNC-Female Only one of the above active at a time
CDI-60	HSSI to 52 Mbps. Supports TT, ST, SD, RT, RD, TA, CA
CDI-70	10/100/1000 BaseT (GigE) Ethernet Interface

## MODULATOR

70 / 140 MHz	
Output Power	0 to -20 dBm, 0.1 dB steps
Power Accuracy	$\pm 0.5$ dB nominal at 25°C. Within $\pm 0.5$ dB of 25°C value over frequency and temperature range.
L-Band	
Output Power	-5 to -25 dBm, 0.1 dB steps
Power Accuracy	$\pm 0.5$ dB over frequency and temperature $\pm 0.5$ dB from 25°C value at same frequency
Output Spectrum/filtering	25%, 35% Rolloff factor
Spurious	-55 dBc/ 4k Hz, 20 to 250 MHz (800 to 2500 L-Band) with modulated carrier
Phase Noise	< 1° RMS 100 Hz to 1 MHz

## REDUNDANCY SUPPORT

1:1	CRS-180 (70/140 MHz) CRS-170A (L-Band)
1:N	CRS-300 (70/140 or L-Band)

## DEMODULATOR

70 / 140 MHz or L-Band	
Input Power, Minimum	-58 dBm + 10 Log (Symbol Rate in MHz) -58 dBm at 1 Msps, -39.9 dBm at 64 Msps
AGC	45 dB above minimum input power
Max Composite Level	+20 dBc (70/140) or +30 dBc (L-Band) up to +10 dBm
Acquisition Range	To $\pm 100$ kHz, programmable in 1 kHz steps
Adaptive Equalizer	Up to 3 dB tilt across symbol rate bandwidth

### BER Performance with two like modulated adjacent carriers each 7 dB higher

(Typical in parenthesis)	3/4	7/8
QPSK TPC	10 <sup>-5</sup> 3.9 (3.4) 10 <sup>-8</sup> 4.2 (3.7) 10 <sup>-10</sup> 4.4 (3.9)	4.4 (3.9) 4.6 (4.1) 4.9 (4.4)
8-PSK TPC	10 <sup>-5</sup> 6.7 (6.2) 10 <sup>-8</sup> 7.0 (6.5) 10 <sup>-10</sup> 7.2 (6.7)	7.3 (6.8) 7.6 (7.1) 7.8 (7.3)
16-QAM TPC	10 <sup>-5</sup> 7.7 (7.2) 10 <sup>-8</sup> 8.0 (7.5) 10 <sup>-10</sup> 8.2 (7.7)	8.3 (7.8) 8.5 (8.0) 8.8 (8.3)
64-QAM TPC	10 <sup>-5</sup> 12.0 (11.5) 10 <sup>-8</sup> 12.3 (11.8) 10 <sup>-10</sup> 12.5 (12.0)	12.6 (12.1) 12.9 (12.4) 13.3 (12.8)

## ENVIRONMENTAL AND PHYSICAL

Temperature	Operating: 0 to 50°C (32 to 122°F) Storage: -25 to 85°C (-13 to 185°F)
Power Supply Input	100 to 240 AC 50/60 Hz
Power Consumption	80 Watts, 81.5 VA maximum 67 Watts 87 VA maximum 1.6 Amps, 77 Watts maximum
Physical Dimensions (1RU)	1.75H x 19.0W x 18 D inch, (4.4H x 48W x 47.4D cm), approximate
Weight	15 lbs (7.0 kg), approx
Agency Approvals	CE: EN55022 Class A (Emissions), EN50082-1 Part 1 (Immunity), EN60950 (Safety), FCC: Part 15 Class B

## AVAILABLE OPTIONS

How Enabled	Option	How Enabled	Option
FAST	QPSK & 8-PSK to 15, 22.5, 30, 37.5, 45 Msps or 64 Msps (155.52 Mbps)	Hardware	Duplex 70/140 Duplex L-Band Rx Only 70/140 or L-Band
FAST	QPSK, 8-PSK & 16-QAM to 15, 22.5, 30, 37.5, 45 Msps or 155.52 Mbps	Hardware	50 or 75 $\Omega$ IF Rx Impedance (70/140 MHz)
FAST	QPSK, 8-PSK, 16-QAM and 64-QAM to 155.52 Mbps		

## OPTIONAL DATA INTERFACE COMBINATIONS (Hardware)

Slot 1	Slot 2
CDI-10 Dual G.703	None, CDI-10 Dual G.703, CDI-60 HSSI, CDI-70 Gigabit
CDI-50-1 Optical (Single Mode Only)	None
CDI-60 HSSI	None, CDI-60 HSSI, CDI-70 Gigabit
CDI-70 Gigabit	None, CDI-70 Gigabit
None	CDI-10 Dual G.703, CDI-60 HSSI, CDI-70 Gigabit



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