



**Now, with 16-QAM and
Turbo Product Coding
for all modulation
types!**

INTRODUCTION

The CDM-600 is an Open Network modem, fully compliant with Intelsat IESS-308, 309, and 310, with data rates from 2.4 kbps to 20 Mbps. It is available in three data rate ranges - Low-rate variable (2.4 kbps to 5.0 Mbps), Mid-Rate variable (2.4 kbps to 10 Mbps) and High-Rate variable (2.4 kbps to 20.0 Mbps)

The modem includes T1, E1, T2, and E2 G.703 interfaces, in addition to EIA422, V.35, EIA232, and serial LVDS. Full Drop and Insert functionality is available as an option. HSSI is provided by adding the CIC-20 interface converter.

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

FEATURES

- Forward Error Correction choices include Turbo Product Coding, Viterbi, Sequential, Reed-Solomon, and TCM
- Open Network compatible, and backwards compatible with the CDM-500/CDM-550 and CDM-550T
- INTELSAT Intermediate Data Rate (IDR)
- INTELSAT Business Services (IBS)
- 52 to 88 MHz and 104 to 176 MHz IF range
- Data rate range from 2.4 kbps to 20 Mbps
- Software-selectable 50/75Ω IF port impedance
- Automatic Uplink Power Control (AUPC)
- BPSK, QPSK, OQPSK, 8-PSK, 16-QAM modulation types
- Asymmetric Loop Timing
- 1:1 and 1:10 redundancy switches available

FEATURE ENHANCEMENTS

Enhancing the CDM-600'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.

APPLICATION

The CDM-600 provides a cost-effective solution for today's higher data rate satellite circuits, and will replace many older modems currently reaching the end of their life cycle.

TURBO PRODUCT CODING

The CDM-600 offers all traditional FEC methods and incorporates an optional Turbo Product Codec (TPC). TPC is a recent development in FEC techniques that delivers significant performance improvement when compared to Viterbi with concatenated Reed-Solomon. TPC simultaneously offers increased coding gain, lower decoding delay, and bandwidth savings of up to 40%.

Two TPC modes are included that permit operation from exceptionally small antennas, where flux density issues are of concern. (*The Turbo Product Codec is an extra-cost option*)

EDMAC OPERATION

A special feature of the CDM-600 is its ability to monitor and control 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.

Comtech RF transceivers (C-band and Ku-band) may be controlled from the front panel of the modem using a low data rate FSK signal on the Rx IF cable. An RF Transceiver at the distant end of a satellite link may also be controlled and monitored through the EDMAC channel.

REMOTE CONTROL

The operator may configure and monitor the modem 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 QoS reporting purposes.

SatMac, a Windows-based monitor and control program, is available for configuring the local and distant end modems, transceivers, and redundancy switches.



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



System Specifications

Frequency Range	52 to 88 MHz and 104 to 176 MHz
Input/Output Impedance	50 and 75 Ω (Front panel selectable)
IF Connectors	BNC, female
Data Interfaces	EIA-422/530, V.35, Sync EIA-232, G.703 balanced or unbalanced, Low Voltage Differential Signal (LVDS), HSSI (using CIC-20 HSSI/LVDS interface converter)
Data Rate Range (1 bps programmable, and fully independent Tx and Rx rates)	
Rate 1/2 BPSK	2.4 kbps to 5.0 Mbps
Rate 1/2 QPSK/OQPSK	4.8 kbps to 10.0 Mbps
Rate 3/4 QPSK/OQPSK	7.2 kbps to 15 Mbps
Rate 7/8 QPSK/OQPSK	8.4 kbps to 17.5 Mbps
Rate 2/3 8PSK	4.8 kbps to 20.0 Mbps
Uncoded	4.8 kbps to 20.0 Mbps
Rate 21/44 BPSK Turbo	4.8 kbps to 3.2 Mbps (to 4.7 Mbps with High Speed option)
Rate 5/16 BPSK Turbo	4.8 kbps to 2.048 Mbps (to 3.1 Mbps with High Speed option)
Rate 3/4 QPSK Turbo	7.2 kbps to 5.0 Mbps (to 15 Mbps with High Speed option)
Rate 3/4 8-PSK Turbo	10.8 kbps to 5.0 Mbps (to 20 Mbps with High Speed option)
Rate 3/4 16-QAM Turbo	14.4 kbps to 5.0 Mbps (to 20 Mbps with High Speed option)
Scrambling	Mode dependent - ITU V.35 (Intelsat IESS-308), or externally synchronized, (Intelsat IESS-309/310, or proprietary)
FEC Options	
Viterbi	Rate 1/2 (BPSK, QPSK and OQPSK) Rate 3/4 and 7/8 (QPSK, OQPSK and 16-QAM w/RS)
Sequential	Rate 1/2, (BPSK, O/QPSK) 3/4, and 7/8 (O/QPSK)
Pragmatic TCM	8PSK 2/3
Turbo Product Coding (TPC)	Rate 3/4 QPSK, OQPSK, 8-PSK and 16-QAM Rate 21/44 BPSK, 5/16 BPSK (More rates to be added in the future – consult factory)
Reed-Solomon	Intelsat compliant, and proprietary modes available
Uncoded	BPSK, QPSK and OQPSK
M&C Interface	EIA-232, EIA-485 (2- or 4-wire)
Form C Relays	Tx, Rx traffic alarms and Unit faults Backward alarms for IDR and IBS

Modulator

Output Spectrum/filtering	Meets IESS-308/309 power spectral mask
Frequency Stability	
Standard	± 1.5 ppm, 0 to 50°C (32 to 122°F)
Option	± 0.02 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	< 0.75 degrees RMS double-sided, 100 Hz to 1 MHz
Output Power	0 to -20 dBm, 0.1 dB steps
Accuracy	± 0.5 dB over frequency and temperature
External Tx Carrier Off	By TTL LOW signal
Tx Terrestrial	Internal (SCT), EXT TT, Loop
Clock Options	Timing from Satellite, and EXT REF

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	35 W typical (40 W maximum)
Physical Dimensions	1 U high, 12 inches deep (30 cm)
Weight	11 lbs (5.0 kg)
CE Approvals	EN55022 Class B (Emissions) EN50082-1 Part 1 (Immunity) EN60950 (Safety)
FCC Approval	FCC Part 15 Class B

Demodulator

Input Power Range	-30 to -60 dBm
Max Composite Level	+35 dBc, up to -5 dBm
Acquisition Range	± 1 to ± 32 kHz (1 kHz steps)
Acquisition Time	Dependent on data rate, FEC and acquisition range
BER performance	Met with two adjacent carriers 7 dB higher Guaranteed E_b/N_0, in dB (Typical values in parentheses)
Viterbi	1/2 3/4 7/8
10 ⁻⁵	5.4 (4.9) 6.8 (6.3) 7.7 (7.2)
10 ⁻⁶	6.0 (5.5) 7.4 (6.9) 8.4 (7.9)
10 ⁻⁷	6.7 (6.2) 8.2 (7.7) 9.0 (8.6)
Sequential (64 kbps)	1/2 3/4 7/8
10 ⁻⁵	4.8 (4.2) 5.8 (5.3) 7.0 (6.6)
10 ⁻⁶	5.2 (4.5) 6.4 (5.8) 7.5 (7.2)
10 ⁻⁷	5.6 (4.8) 6.9 (6.3) 8.0 (7.7)
Viterbi and concatenated Reed-Solomon 220/200 or 200/180	1/2 3/4 7/8
10 ⁻⁵	4.3 (4.0) 5.6 (4.7) 6.5 (6.0)
10 ⁻⁶	4.4 (4.1) 5.8 (4.8) 6.7 (6.2)
10 ⁻⁷	4.5 (4.2) 6.0 (5.2) 6.9 (6.5)
Turbo Product Codec	3/4 (Q) 21/44 (B) 5/16 (B) 3/4(8) 3/4 (16)
10 ⁻⁵	3.9 (3.5) 2.8 (2.5) 2.3 (2.0) 7.7(7.3) 7.8(7.9)
10 ⁻⁶	4.1 (3.7) 3.1 (2.8) 2.6 (2.3) 7.9(7.5) 8.2(7.7)
10 ⁻⁷	4.3 (4.0) 3.3 (3.0) 2.8 (2.5) 8.3(7.8) 8.6(8.2)
Receive Buffer	64 to 262144 bits, in 16 bit increments
Receive Clock Options	Rx Satellite, Tx Terrestrial, EXT REF, Insert
Clock Tracking	± 100 ppm minimum
External Reference Input	BNC connector, 2.4 kHz to 20 MHz
Monitor Functions	E_b/N_0 , Frequency Offset, BER, Buffer fill status, Rx receive signal level

Drop and Insert

Electrical interface	G.703 (T1 or E1)
Frame formats supported	D4 or ESF for T1, CCS or CAS for E1
Available nx64 kbps Data Rates	1 to 6, 8, 10, 12, 15, 16, 20, 24 or 30

ESC Specifications

IDR (Total Overhead 96 kbps)	
Voice Orderwire	2 ADPCM (input: 4-wire VF), or 64 kbps data
Data Orderwire	8 kbps (EIA-422 interface)
Backward Alarms	Form C contacts, hardware or software mapped
IBS (Total Overhead 1/15 x data rate)	
ASYNC Data Orderwire	1/2000 x data rate
Backward Alarm	Form, C contacts

Available Options

How Enabled	Option
FAST	Variable data rate to 10 Mbps
FAST	Variable data rate to 20 Mbps
FAST	8PSK modulation
FAST	16QAM modulation
FAST	IBS Operation
FAST	IBS with High Rate IBS ESC Operation
FAST	IDR Operation
FAST	Drop & Insert Operation
FAST	2 Audio IBS Operation
Hardware	Turbo Codec Board – Low Rate 5 Mbps
Hardware	Turbo Codec Board – High Rate 20 Mbps
Hardware	High-stability Internal Reference (2×10^{-8})
Hardware	CIC-20 HSSI Interface Converter



Comtech EF Data reserves the right to make changes to specifications of products described in this data sheet at any time without notice and without obligation to notify any person of such changes.