CDM-750 Advanced High-Speed Trunking Modem

Overview

The CDM-750 Advanced High-Speed Trunking Modem was designed to be the most efficient, highest throughput, point-to-point trunking modem available. The CDM-750 accommodates the most demanding Internet Service Provider (ISP) and telco backhaul links by offering users the most advanced combination of space segment saving capabilities while minimizing the need for unnecessary overhead. With the ability to process packets at line speed, the CDM-750 will not throttle throughput due to processing limitations. Beginning with the most efficient coding and modulation available, the CDM-750 leverages the DVB-S2 EN 302 307 LDPC/BCH standard to provide the best possible combination of coding and forward error correction ensuring that the maximum amount of satellite traffic is transported for a given signal to noise capacity.

Implementing Adaptive Coding and Modulation (ACM) operation (in packet-based applications) allows link margin to be converted to user capacity during non-faded conditions by taking advantage of the actual signal to noise ratio rather than calculated worst case signal to noise. This technology transforms link margin, implementation margin and margin for antenna pointing directly to improved throughput.

By using the best encapsulation methods, the CDM-750 further increases throughput by using minimal overhead. In G.703 synchronous mode, users can implement monitor and control over the satellite with no additional overhead. When using Ethernet bridge mode, less than 1% overhead is used for encapsulation.

The optional K4 GZIP lossless compression engine performs real-time compression of Ethernet traffic and is capable of running at the full rate of the modem. Offering 52% to 59% compression rates at random packet sizes using the Calgary Corpos bitstream, K4 GZIP can greatly increase the throughput of the satellite link, or reduce required bandwidth.

Additionally, the CDM-750 leverages Comtech EF Data's powerful DoubleTalk® Carrier-in-Carrier® "Adaptive Cancellation" technology. With the ability to overlay TX and RX carriers, Carrier-in-Carrier enables the operator to establish the perfect balance between bandwidth and power, enabling the best possible use of the satellite resource and reducing operating expenses (OPEX).

These technologies alone offer enormous savings to the ISP and telco operator. When used in combination, however, the savings are astronomical. The innovative high-performance architecture of the CDM-750 allows efficient networking and transport over satellite links while supporting a wide range of applications and network topologies.

Typical Users
- Mobile Operators
- Telecom Operators
- ISPs
- Government & Military

Common Applications
- IP Trunking
- G.703 Trunking
- High-Speed Content Delivery
- Disaster Recovery & Emergency Communications

Features

- Symbol Rate: 1 – 63 Msps
- Data Rate: 1 – 169 Mbps
- DVB-S2 ETSI EN 302 307 compliant
- DoubleTalk Carrier-in-Carrier bandwidth compression
- ACM and CCM
- GSE – industry standard encapsulation
- K4 GZIP lossless compression
- Modulation: QPSK, 8PSK, 16APSK, 32APSK
- Coding: DVB-S2 LDPC/BCH
- Dual IF: 70/140 MHz, L-Band and L-Band monitor (standard)

- Data Interfaces
  - 2 Gigabit 10/100/1000Base-T interfaces (standard)
  - 1 Optical Gigabit interface (optional)
  - Process > 300,000 pps simplex, > 600,000 pps duplex
  - PIIC optional interface cards
  - G.703 E3/T3/STS-1 (34.368, 44.736, 51.84 Mbps)
  - STM-1 Copper SDH (155.52 Mbps)
  - OC-3 SONET single mode or multi-mode 1300 nm (155.52 Mbps)
- Multistream capable (Multi-Interface mux)
- Management: HTTP, SNMP, Telnet, RS-232/485
- In-band (over satellite) M&C control
- 1:1 redundancy switching available

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 space.

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.
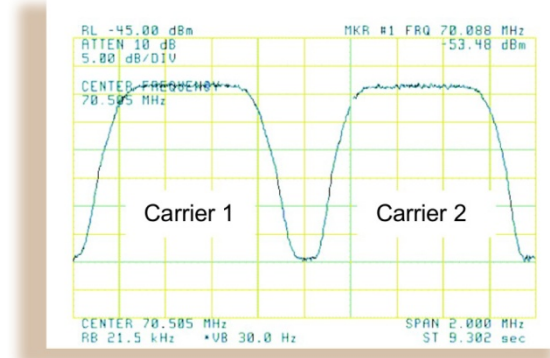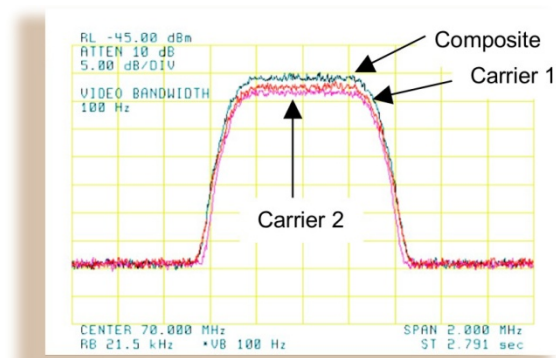

Figure 1: Traditional Full Duplex Link

Figure 2: Duplex Link with DoubleTalk Carrier-in-Carrier

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

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

Specifications

Symbol/Data Rate Range	Programmable in 1 sps increments
DVB-S2	• QPSK 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 to 63 Msps / 112.6 Mbps max. • 8PSK 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 to 63 Msps / 168.7 Mbps max. • 16APSK 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 to 47 Msps / 167.6 Mbps max. • 32APSK 3/4, 4/5, 5/6, 8/9, 9/10 to 38 Msps / 169.2 Mbps max.
FECFrame	Normal (64,800 bits) or short (16,200 bits)
Pilots	On or off
Alpha (Rolloff)	20%, 25% or 35%
Management	Front panel keypad / display RS-232 /485, or 10/100Base-T with SNMP, Telnet, HTTP
Reflash	Ethernet management port
Frequency Stability	Internal, stability ± 0.06 ppm
External Reference Input / Output (BNC Female)	Internal, 1, 2, 5 or 10, MHz for IF and data, internally phase locked. Output: off or internal 10 MHz
Form C	Modulator, demodulator and unit fault
Spectral Sense	Normal and inverted
Configuration Retention	Non-volatile memory; Returns upon power up

Options

Type	Option
FAST	DVB-S2 TX / RX: 8PSK, 16APSK, 32APSK
FAST	Symbol rate options
FAST & Hardware	Carrier-in-Carrier options
FAST & Hardware	K4 GZIP lossless compression
FAST	ACM point to point client / controller
FAST	Optical Gigbit Ethernet enable
Hardware	PIIC optional interface cards G.703 E3/T3/STS-1 (34.368, 44.736, 51.84 Mbps) STM-1 Copper SDH (155.52 Mbps) OC-3 SONET single mode or multi-mode 1300 nm (155.52 Mbps)
Hardware	Rack slides

Modulator (Dual IF)

70/140 MHz	50 to 180 MHz in 100 Hz steps
Impedance / Connector	75 Ω, BNC female. Return loss ≥ 18 dB
Output Power	0 to -25 dBm, 0.1 dB steps (70/140 MHz)
Power Accuracy	± 0.5 dB of nominal at 25°C; Within ± 0.5 dB from 25°C value at same frequency
L-Band	950 to 2150 MHz in 100 Hz steps
Impedance / Connector	50 Ω, Type N female. Return loss ≥ 15 dB
Output Power	0 to -40 dBm, 0.1 dB steps
Power Accuracy	± 0.5 dB of nominal at 25°C ± 0.5 dB from 25°C value at same frequency
L-Band Monitor	Same as L-Band or 900 + 70/140 MHz IF at -27 dBm ± 3 dB
Harmonics and Spurs	< 60 dBc/4kHz, modulated carrier; Excludes spectral mask area
External TX Carrier Off	TTL low signal
Quadrature Phase Error and Amplitude Imbalance	Sideband 35 dB below unmodulated carrier

Demodulator (Dual IF)

70/140 MHz	50 to 180 MHz in 100 Hz steps
Impedance / Connector	75 Ω, BNC female. Return loss 15 dB min.
Input Power	Desired carrier = -58 + 10Log (symbol rate in Msps) dBm min. and -18 dBm max.
Max. Composite Power	The lesser of 20 dBc -10Log (symbol rate in Msps) or -3 dBm
L-Band	950 to 2150 MHz in 100 Hz steps
Impedance / Connector	50 Ω, Type N female. Return loss 10 dB min.
Input Power	Desired carrier = -65 + 10 Log (Symbol rate in Msps) dBm min. and -25 dBm max.
Maximum Composite	The lesser of 30 dBc – (normal frame) 10 Log (symbol rate in Msps) or -10 dBm

Guaranteed Es/No per DVB-S2 QEF specification PER 1E-7

Mod / Cod	Es/No	Mod / Cod	Es/No
QPSK - 1/2	1.4	16APSK - 2/3	9.9
QPSK - 3/5	2.7	16APSK - 3/4	11.2
QPSK - 2/3	3.4	16APSK - 4/5	12.0
QPSK - 3/4	4.6	16APSK - 5/6	12.4
QPSK - 4/5	5.1	16APSK - 8/9	13.8
QPSK - 5/6	5.6	16APSK - 9/10	14.0
QPSK - 8/9	6.7	32APSK - 3/4	14.6
QPSK - 9/10	6.8	32APSK - 4/5	15.8
8PSK - 3/5	6.4	32APSK - 5/6	16.6
8PSK - 2/3	7.4	32APSK - 8/9	19.1
8PSK - 3/4	8.5	32APSK - 9/10	19.5
8PSK - 5/6	10.0		
8PSK - 8/9	11.3		
8PSK - 9/10	11.6		

Doubletalk Carrier-In-Carrier

Delay Range	0 to 400 ms (factory default 230 – 290 ms)
CnC Ratio	+7 dB to -7 dB interferer to desired
Es/No degradation (dB) measured at 0.0 dB CnC Ratio	QPSK: 0.3 dB 8PSK: 0.3 dB 16APSK: 0.6 dB 32APSK: 1.0 dB
Symbol Rate Ratio	Max 3:1 TX/RX or RX/TX
Satellite Configuration	Transmit station sees own carrier. Non-processing satellite.

Base Unit Connectors

Alarm Connector (DB-15 Male)	Form C: TX, RX and unit faults External TX carrier off IQ test point
Unit Management	DB-9 male with RS-232 and RS-485 2-wire / 4-wire RJ-45 Ethernet (maximum Ethernet packet size 1536 bytes including Ethernet header & CRC)
TX & RX IF Connectors	BNC female (70/140 MHz) Type-N female (L-Band)
L-Band Monitor	SMA female
Traffic Data Interface	2 x RJ-45 10/100/1000Base-T Ethernet 1 x Optical Gigabit Ethernet (optional) Note: All Data GigE interfaces have a maximum Ethernet packet size of 1632 bytes including Ethernet header & CRC

Test Functions

Data Test Pattern	2047 and 2^23-1 compatible with BERT on TX data on applicable interfaces
CW	Modulation disabled and CW signal is transmitted
SSB Carrier	Provides suppressed carrier and suppressed sideband
Loopback	Full-duplex only

Environmental and Physical

Temperature	
Operating	0 to 50ºC (32 to 122ºF)
Storage	-40 to 70ºC (-40 to 158ºF)
Humidity	95% maximum, non-condensing
Power Supply Input	100-240 VAC 50/60 Hz 43-60 VDC (48 VDC option)
Power Consumption	
120 VAC at 60 Hz	88 W, 93 VA typical
230 VAC at 50 Hz	88 W, 133 VA typical
48 VDC	85 W typical
Dimensions (1RU) (height x width x depth)	1.75" x 19" x 18.65" (48 x 47.4 x 4.4 cm)
Weight	15 lbs (6.8 kg)
AC Receptacles	Includes restraint for standard IEC-320 inlet
Agency Compliance	CE Mark and FCC part 15

Accessories

Type	Option
1:1 Modem Redundancy	CRS-170A (L-Band), CRS-180 (70/140 MHz)

CDM-750 Rear Panel