



## Overview

Comtech EF Data's Advanced VSAT Solutions portfolio provides high-performance satellite-based communication solutions for a diverse range of applications, including mobile backhaul with RAN optimization, IP trunking and backhaul, maritime and offshore networks, corporate and enterprise networks, emergency and disaster recovery. Incorporating advanced technologies developed by Comtech EF Data, AHA Products Group, Memotec and Stampede, the solutions provide unmatched performance, industry-leading bandwidth efficiencies and network optimization – while minimizing Total Cost of Ownership.

Designed for use at remote sites, CDM-840 combines a wide range of advanced technologies in a 1RU platform enabling the most efficient bandwidth utilization for hub-spoke networks:

- DVB-S2 and VersaFEC® low-latency LDPC Forward Error Correction
- Ultra low overhead encapsulation
- Lossless Payload compression
- Header compression
- E1 RAN Optimization

## Features

- Integrated Packet Processor
  - Ultra low overhead Streamline Encapsulation (TX)
  - Low overhead Enhanced Generic Stream Encapsulation (GSE) (RX)
  - Header compression
  - Lossless Payload compression
  - Quality of Service (QoS)
- Integrated E1 RAN Optimization
- Simultaneous IP/Ethernet and E1 operation
- Advanced Forward Error Correction
  - VersaFEC low-latency LDPC transmit
  - DVB-S2 receive
- Adaptive Coding and Modulation (ACM) capable transmit and receive
- Variable Coding and Modulation (VCM) capable receive
- Transmit
  - Data rate: 16 kbps to 15.35 Mbps
  - Symbol rate: 16 ksps to 4.5 Msps
  - Modulation: BPSK, QPSK, 8-QAM, 16-QAM
  - Rolloff : 20%, 25%, 35%
  - Ultra low overhead Streamline Encapsulation
- Receive
  - Frequency: 950 to 2150 MHz
  - Data rate: 1 Mbps to 160 Mbps
  - Symbol rate: 1 Msps to 62 Msps
  - Rolloff : 20%, 25%, 35%
  - Demodulation: QPSK, 8PSK, 16APSK, 32APSK
  - Low overhead enhanced Generic Stream Encapsulation
- Operating Frequency: 950 to 2150 MHz
- Traffic Interfaces:
  - 10/100/1000Base-T Ethernet
  - G.703 E1
- Management Interface: 10/100Base-T Ethernet for web and SNMP
- BUC and LNB support
- 1:1 Redundancy

## Typical Users

- Mobile Operators
- Telecom Operators
- Offshore & Maritime
- Enterprise
- Internet Service Providers (ISPs)

## Common Applications

- Mobile Backhaul with RAN Optimization
- IP Trunking & Internet Access
- Maritime & offshore communications

## Specifications

### Transmit

Data Rate	16 kbps to 15.35 Mbps, in 1 bps step (CCM mode) (Modulation and FEC dependent)
Symbol Rate	16 ksp/s – 4.5Msp/s
FEC	VersaFEC Encoder (ACM and CCM modes)
Modulation & Code Rate	Data Rate Range
BPSK 0.488	16.00 kbps – 2.19 Mbps
QPSK 0.533	17.07 kbps – 4.80 Mbps
QPSK 0.631	20.19 kbps – 5.67 Mbps
QPSK 0.706	22.577 kbps – 6.34 Mbps
QPSK 0.803	25.69 kbps – 7.22 Mbps
8-QAM 0.642	30.83 kbps – 8.67 Mbps
8-QAM 0.711	34.14 kbps – 9.60 Mbps
8-QAM 0.780	37.44 kbps – 10.53 Mbps
16-QAM 0.731	46.80 kbps – 13.16 Mbps
16-QAM 0.780	49.92 kbps – 14.04 Mbps
16-QAM 0.829	53.04 kbps – 14.91 Mbps
16-QAM 0.853	54.60 kbps – 15.35 Mbps
Encapsulation	Ultra low overhead Streamline Encapsulation

### Receive

Receive Data Rate (Pilots On)	QPSK	0.479 – 108.255 Mbps
	8PSK	1.740 – 160.0 Mbps
	16APSK	2.575 – 160.0 Mbps
	32APSK	3.623 – 160.0 Mbps
Receive Symbol Rate	QPSK	1 to 62 Msp/s
	8PSK	1 to 62 Msp/s
	16APSK	1 to 47 Msp/s
	32APSK	1 to 37 Msp/s
FEC	DVB-S2 Decoder (ACM, CCM and VCM modes) Short Frame, Normal frame	

### Modulation & FEC

	Data Rate Range (Normal FEC frame, pilots On)
QPSK 1/4	0.479 – 29.672 Mbps
QPSK 1/3	0.641 – 39.731 Mbps
QPSK 2/5	0.771 – 47.779 Mbps
QPSK 1/2	0.965 – 59.850 Mbps
QPSK 3/5	1.160 – 71.922 Mbps
QPSK 2/3	1.291 – 80.029 Mbps
QPSK 3/4	1.452 – 90.029 Mbps
QPSK 4/5	1.549 – 96.064 Mbps
QPSK 5/6	1.615 – 100.148 Mbps
QPSK 8/9	1.724 – 106.914 Mbps
QPSK 9/10	1.746 – 108.255 Mbps
8PSK 3/5	1.740 – 107.853 Mbps
8PSK 2/3	1.936 – 120.011 Mbps
8PSK 3/4	2.178 – 135.007 Mbps
8PSK 5/6	2.422 – 150.181 Mbps
8PSK 8/9	2.586 – 160.000 Mbps
8PSK 9/10	2.618 – 160.000 Mbps
16APSK 2/3	2.575 – 121.007 Mbps
16APSK 3/4	2.896 – 136.127 Mbps
16APSK 4/5	3.090 – 145.253 Mbps
16APSK 5/6	3.222 – 151.428 Mbps
16APSK 8/9	3.440 – 160.000 Mbps
16APSK 9/10	3.483 – 160.000 Mbps
32APSK 3/4	3.623 – 134.063 Mbps
32APSK 4/5	3.866 – 143.051 Mbps
32APSK 5/6	4.031 – 149.132 Mbps
32APSK 8/9	4.303 – 159.207 Mbps
32APSK 9/10	4.357 – 160.000 Mbps
Pilots	On
Encapsulation	Low overhead Enhanced GSE

### Modulator Specifications

Operating Frequency	950 to 2150 MHz L-Band, 100 Hz frequency resolution										
Frequency Stability	± 0.06 ppm (± 6 x 10 <sup>-8</sup> ), 0° to 50°C (32° to 122° F)										
Frequency Reference	Internal										
Scrambling	Comtech, disabled										
Spectral Inversion	Normal or inverted										
Transmit Filtering	Per IESS-308/-309 spectral mask										
Transmit Filter Rolloff (Alpha)	20%, 25% and 35%										
Output Power	0 to -40 dBm, in 0.1 dB steps										
Power Accuracy	± 1.0 dB over frequency, data rate, modulation type and temperature range of 0 to 50° C										
Transmit On/Off Ratio	-60 dBc minimum										
Harmonics and Spurious	Better than -60 dBc/4 kHz (typically < -65 dBc/4KHz) Measured from Fo +/- 300 MHz										
Output Phase Noise	< 1° rms double sided, 100 Hz to 1MHz (minimum of 6 dB better overall than the Intelsat IESS-308/309 requirement)										
	<table border="1"> <thead> <tr> <th>dB/Hz</th> <th>Frequency Offset</th> </tr> </thead> <tbody> <tr><td>-66.0</td><td>100 Hz</td></tr> <tr><td>-76.0</td><td>1 kHz</td></tr> <tr><td>-86.0</td><td>10 kHz</td></tr> <tr><td>-96.0</td><td>100 kHz</td></tr> </tbody> </table>	dB/Hz	Frequency Offset	-66.0	100 Hz	-76.0	1 kHz	-86.0	10 kHz	-96.0	100 kHz
dB/Hz	Frequency Offset										
-66.0	100 Hz										
-76.0	1 kHz										
-86.0	10 kHz										
-96.0	100 kHz										
	Fundamental AC line spurious is -42 dBc or lower The sum of all other single sideband spurious, from 0 to 0.75 x symbol rate, is -48 dBc or lower										
Connector	Type N (female)										
Impedance	50 Ω										
Return Loss	20 dB, minimum										
External TX Carrier Off	By TTL 'low' signal										
Test Modes	CW, 1/0 pattern, 2 <sup>N</sup> 23-1 and 2047 patterns										
BUC Reference (10 MHz)	Via TX IF center conductor, 10.0 MHz ± 0.06 ppm, selectable on/off, 0.0 dBm ± 3 dB										
BUC Power Supply (HW Option)	24 VDC, 4.17 Amps max., 90 W @ 50° C 48 VDC, 3.125 Amps max., 150 W @ 50° C Supplied through TX IF center conductor and selectable on/off via M&C control										

### Demodulator Specifications

Operating Frequency	950 to 2150 MHz L-Band, 100 Hz frequency resolution
Connector	Type N (female)
Impedance	50 Ω
Input Power Range, Desired Carrier	-65 dBm + 10 log (symbol rate in MHz) to -25 dBm
Maximum Composite Operating Level	-5 dBm total composite power 20 dBc within 10 MHz band from the desired carrier for QPSK, 8PSK, and 16APSK 10 dBc within 10 MHz band from the desired carrier for 32APSK 30 dBc outside of 10 MHz from carrier
Absolute Maximum, No Damage	-10 dBm
Rolloff	20%, 25%, 35%
Acquisition Range	+/- 100 kHz
Adaptive Equalizer	Corrects up to 3 dB tilt
Return Loss	12 dB, minimum (typical 15 dB)
LNB Reference (10 MHz)	Via RX IF center conductor, 10.0 MHz ± 0.06 ppm Selectable on/off, -3.0 dBm ± 3 dB

LNB Voltage	Selectable on/off, 13 VDC, 18 VDC, 24 VDC
LNB Current	500 mA, maximum
Monitor Functions	Es/No estimate, receive signal level, frequency offset
Es/No Monitor Accuracy	+/- 0.3 dB
Receiver Signal Level Monitor Accuracy	+/- 6 dB (typical)

### Packet Processor

#### Supported Protocols

RFC 768 – UDP	RFC 1812 – IPv4 Routers
RFC 791 – IP	RFC 2045 – MIME
RFC 792 – ICMP	RFC 2474 – Diffserv
RFC 793 – TCP	RFC 2475 – Diffserv
RFC 826 – ARP	RFC 2578 – SMI
RFC 856 – Telnet	RFC 2597 – AF PHB
RFC 862 – Ping	RFC 2598 – Expedite Forwarding
RFC 894 – IP	RFC 2616 – HTTP
RFC 959 – FTP	RFC 3412 – SNMP
RFC 1112 – IP Multicast	RFC 3416 – SNMPv2
RFC 1213 – SNMP MIB II	RFC 3418 – SNMP MIB
Statistics	Detailed packet and throughput stats

### Connectors

L-Band Transmit and Receive	2 x N-type (female)
10/100Base-T Ethernet interface (IEEE 802.3u)	RJ-45
10/100/1000Base-T Ethernet interface (IEEE 802.3ab)	RJ-45
G.703 E1, 2.048 Mbps (Unbalanced 75 Ω)	BNC (female)
Console	9-pin D-sub (male)
Redundancy Interface	9-pin D-sub (female)
TX, RX traffic alarms and unit faults	
Summary Alarms (Note: Not available on older versions)	15-pin D-sub (male)

### Available Options

Option	Type
-48 VDC, Primary Power Supply	Hardware
24 VDC, 90 W @ 50° C BUC Power Supply	Hardware
48 VDC, 150 W @ 50° C BUC Power Supply	Hardware
Transmit Data Rate	FAST
E1 RAN Optimization	FAST
G.703 Clock Extension	FAST

### Physical, Power & Environmental

Dimensions (1RU) (height x width x depth)	1.75" x 19.0" x 16.1" (4.4 x 48 x 40.8 cm) approximate
Power Supply	100-240 VAC, 47Hz-63Hz IEC 320 input -48 VDC (HW option)
Operating Temperature	0° to 50°C
Storage temperature	-20° to 70°C
Humidity	95% maximum, non-condensing

### Accessories

CRS-170A	1:1 Modem Redundancy Switch
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### 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



CDM-840 Back Panel



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U.S. Patents 7,353,444, 7,415,659 and other patents pending

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