



Typical Users

- Mobile Operators / Telecom
- Broadcasters
- ISPs
- Government & Military

Common Applications

- IP & Telco Trunking
- DVB-S2 & S2X Video Delivery
- HTS, GEO and MEO Trunking
- Disaster Recovery & Emergency Communications

Overview

The CDM-780 Modular High-Speed Modem / Mod / Demod can be configured as a modem, up to 3 demods, up to 3 modulators, or a modulator and 2 demods for MEO / LEO make before break connections. This flexibility, extended symbol rate and data rate builds on our family of high-speed, ultra efficient trunking modems. The CDM-780 offers near theoretical performance with minimal implementation loss. The CDM-780 supports HTS, GEO, MEO and LEO mode operation with hitless antenna handover and satellite handover.

The CDM-780 Advanced High-Speed Trunking and Broadcast Modem extends Comtech's legacy of offering the most efficient, highest throughput, modem available. It accommodates the most demanding Internet Service Providers (ISPs), Broadcasters and telco backhaul links by offering users the most advanced combination of space segment saving capabilities while minimizing overhead.

The CDM-780 offers a wide range of symbol rates (10 Msps to 500 Msps) and data rates (10 Mbps to >2.4 Gbps) simplex. In a duplex setting, this is >4.8 Gbps or 1 Gbps. There are two (2) onboard 1GbE / 2.5GbE / 10GbE Ethernet interfaces for user traffic supporting Super Jumbo Frames from 64 Bytes to >10,000 Bytes and will process Ethernet frames at line speed.

The CDM-780 can be configured to run as DVB-S2X (EN 302 307-2) or DVB-S2 (EN 302 307) open standard waveforms. All waveforms are interoperable with Adaptive Coding and Modulation (ACM) and Automatic Uplink Power Control (AUPC). The modem can also be fitted with single or redundant prime power supplies as an option as well as offering 1:1 redundancy.

Implementing Adaptive Coding and Modulation (ACM) operation 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.

By using the best encapsulation methods, the CDM-780 further increases throughput by using minimal overhead. The Ethernet bridge operation uses less than 1% overhead for encapsulation.

DVB-CID ETSI TS 103 129 is the ETSI standard for combating satellite interference and is largely based on Comtech EF Data's award-winning MetaCarrier® technology. MetaCarrier technology embeds and detects a small message and unique ID within a video or data satellite carrier. This embedded message and ID significantly reduce the time to identify and clear interference sources.

These technologies alone offer enormous savings to ISPs, Broadcasters and telco operators. When used in combination, however, the capacity savings cannot be matched. The innovative high-performance architecture of the CDM-780 allows efficient networking and transport over satellite links while supporting a wide range of applications and network topologies.

Features

- Modular design
 - Modem 1TX + 1RX
 - Demodulator only up to 3RX
 - Modulator only up to 3TX
 - Modem for antenna or satellite handover 1TX & 2RX
- Symbol Rate: 10 to 500 Msps
- Data Rate: 10 to >2.4 Gbps (Simplex), >4.8 Gbps (Duplex)
- DVB-S2 ETSI EN 302 307 & DVB-S2X EN 302 307-2 compliant
- ACM and CCM
- Embedded MetaCarrier DVB-CID ETSI TS 103 129

- GSE – low overhead <1% encapsulation
- Automatic Uplink Power Control (AUPC)
- Super Jumbo Frame 64 - 10,240 Byte Support
- Baseband Frames over IP (BB over IP)
- Modulation: QPSK, 8PSK, 16APSK, 32APSK, 64APSK, 128APSK, 256APSK
- L-Band IF
- LNB power and 10MHz reference, BUC 10MHz reference
- Data Interfaces
 - 2 SFP Data Interfaces (RJ45-1GbE, RJ45-10GbE, or Optical)
 - Processes > 4.6M pps simplex, 9.2M pps duplex
- Supports FSS, HTS, GEO, MEO and LEO mode operation
- Management: HTTP, SNMP, Telnet, via (10M/100M) USB-C Serial with In-band (over satellite) M&C control
- 1:1 and 1:N redundancy switching available

Specifications

| | |
|-------------------------|---|
| Symbol Rate Range | 10 Msps to 500 Msps (Simplex) in 1 sps steps (modulation dependent over 64APSK) |
| Modulation Type | DVB-S2/S2X: ETSI EN 302 307 / 302 307-2 compliant |
| FECFrame | Normal (64,800 bits) or Short (16,200 bits) |
| Pilots | On or off |
| Alpha (Rolloff) | 5%, 10%, 15%, 20%, 25%, 35% |
| Management | Front panel keypad / display RS-232 /485, or Dual 10M/100M/1GbE with SNMP, Telnet, HTTP |
| Reflash / FW Updates | Ethernet management port |
| Frequency Stability | Internal, stability ± 0.03 ppm |
| 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 | Symbol rate options |
| FAST | ACM point to point client / controller |
| Hardware | Rack slides |

Modulator

| | |
|--|---|
| L-Band | 950 to 2150 MHz in 100 Hz steps |
| Impedance / Connector | 50 Ω , Type N female. Return loss ≥ 15 dB |
| Output Power | -40 to 0.0 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 |
| 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

| | |
|-----------------------|---|
| L-Band | 950 to 2150 in 100 Hz steps |
| Impedance / Connector | 50 Ω , Type N female. Return loss 10 dB min. |
| Input Power | Desired carrier: Min. = $-70 + 10\text{Log}(SR_{\text{MSPS}})$ dBm Max. = $-20 + 10\text{Log}(SR_{\text{MSPS}})$ dBm or +20 dBm whichever is less. |
| Maximum Composite | +20 dBm or = $43 - 10\text{Log}(SR_{\text{MSPS}})$ dBc (whichever is less) |

| | |
|------------------------------|--|
| 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 | SMA female (L-Band) |
| Ethernet Data Interfaces | 2 x SFP Ports supporting either RJ-45 1GbE or RJ-45 10GbE or Optical Note: All Data GigE interfaces support super jumbo frames with a maximum Ethernet frame size of 10,240 bytes including Ethernet header & CRC |

Test Functions

| | |
|-------------------|---|
| Data Test Pattern | 2 ¹⁰ -1, 2 ¹⁵ -1, 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 50°C (32 to 122°F) |
| Storage | -40 to 70°C (-40 to 158°F) |
| Humidity | 95% maximum, non-condensing |
| Power Supply Input | 100-240 VAC 50/60 Hz 43-60 VDC (48 VDC option) Dual PS (Optional) |
| 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" (48 x 47.4 x 4.4 cm) |
| Weight | 15 lbs (6.8 kg) |
| AC Receptacles | IEC-60320-1, IEC-61058-1 |
| Agency Compliance | CE Mark and FCC part 15 |

Accessories

| Type | Option |
|----------------------|-------------------------|
| 1:1 Modem Redundancy | CRS-170A (L-Band) |
| 1:N Modem Redundancy | CRS-500 L-Band (Future) |

| DVB-S2X Normal Block, Pilot ON, QEF (FER 1E-5) | | | | | | | | | |
|---|---------|------------------|------------------|------------------|------------------|-------------------------|-----------|-----------|--|
| Performance measured using 30Msps operation, 20% ROF and AWGN noise | | | | | | | | | |
| MOD | FEC | Min SR (Msps) | Max SR (Msps) | Min DR (Mbps) | Max DR (Mbps) | Spec Eff (Bits / Hz) | QEF Eb/No | QEF Es/No | |
| QPSK | 1/4 | 10 | 500 | 4.8 | 240.0 | 0.48 | 1.1 | -2.1 | |
| QPSK | 13/45 | 10 | 500 | 5.5 | 277.1 | 0.55 | 0.7 | -1.9 | |
| QPSK | 1/3 | 10 | 500 | 6.4 | 320.0 | 0.64 | 0.9 | -1.0 | |
| QPSK | 2/5 | 10 | 500 | 7.7 | 385.0 | 0.77 | 1.0 | -0.1 | |
| QPSK | 9/20 | 10 | 500 | 8.7 | 434.0 | 0.87 | 0.9 | 0.3 | |
| QPSK | 1/2 | 10 | 500 | 9.7 | 482.5 | 0.97 | 1.5 | 1.3 | |
| QPSK | 11/20 | 10 | 500 | 10.6 | 531.3 | 1.06 | 1.3 | 1.6 | |
| QPSK | 3/5 | 10 | 500 | 11.6 | 580.0 | 1.16 | 1.9 | 2.5 | |
| QPSK | 2/3 | 10 | 500 | 12.9 | 645.5 | 1.29 | 2.2 | 3.3 | |
| QPSK | 3/4 | 10 | 500 | 14.5 | 726.0 | 1.45 | 2.7 | 4.3 | |
| QPSK | 4/5 | 10 | 500 | 15.5 | 774.5 | 1.55 | 3.0 | 4.9 | |
| QPSK | 5/6 | 10 | 500 | 16.2 | 807.5 | 1.62 | 3.3 | 5.4 | |
| QPSK | 8/9 | 10 | 500 | 17.2 | 862.0 | 1.72 | 4.0 | 6.4 | |
| QPSK | 9/10 | 10 | 500 | 17.5 | 873.0 | 1.75 | 4.2 | 6.6 | |
| 8PSK | 5/9-L | 10 | 500 | 16.1 | 804.9 | 1.61 | 2.7 | 4.8 | |
| 8PSK | 26/45-L | 10 | 500 | 16.8 | 837.3 | 1.67 | 3.0 | 5.2 | |
| 8PSK | 3/5 | 10 | 500 | 17.4 | 870.0 | 1.74 | 3.7 | 6.1 | |
| 8PSK | 23/36 | 10 | 500 | 18.5 | 926.6 | 1.85 | 3.5 | 6.2 | |
| 8PSK | 2/3 | 10 | 500 | 19.4 | 968.0 | 1.94 | 3.6 | 6.5 | |
| 8PSK | 25/36 | 10 | 500 | 20.2 | 1007.7 | 2.02 | 4.1 | 7.1 | |
| 8PSK | 13/18 | 10 | 500 | 21.0 | 1048.2 | 2.10 | 4.4 | 7.6 | |
| 8PSK | 3/4 | 10 | 500 | 21.8 | 1089.0 | 2.18 | 4.8 | 8.2 | |
| 8PSK | 5/6 | 10 | 500 | 24.2 | 1211.0 | 2.42 | 5.8 | 9.6 | |
| 8PSK | 8/9 | 10 | 500 | 25.9 | 1293.0 | 2.59 | 6.9 | 11.0 | |
| 8PSK | 9/10 | 10 | 500 | 26.2 | 1309.0 | 2.62 | 7.1 | 11.3 | |
| 16A PSK | 1/2-L | 10 | 500 | 19.3 | 962.7 | 1.93 | 3.4 | 6.2 | |
| 16A PSK | 8/15-L | 10 | 500 | 20.6 | 1027.4 | 2.05 | 3.6 | 6.7 | |
| 16A PSK | 5/9-L | 10 | 500 | 21.4 | 1070.6 | 2.14 | 3.7 | 7.0 | |
| 16A PSK | 26/45 | 10 | 500 | 22.3 | 1113.7 | 2.23 | 4.2 | 7.7 | |
| 16A PSK | 3/5 | 10 | 500 | 23.1 | 1156.9 | 2.31 | 4.4 | 8.0 | |
| 16A PSK | 3/5-L | 10 | 500 | 23.1 | 1156.9 | 2.31 | 4.0 | 7.6 | |
| 16A PSK | 28/45 | 10 | 500 | 24.0 | 1200.0 | 2.40 | 4.5 | 8.3 | |
| 16A PSK | 23/36 | 10 | 500 | 24.7 | 1232.4 | 2.46 | 4.6 | 8.5 | |
| 16A PSK | 2/3-L | 10 | 500 | 25.7 | 1286.3 | 2.57 | 4.5 | 8.6 | |
| 16A PSK | 2/3 | 10 | 500 | 25.8 | 1287.5 | 2.58 | 5.4 | 9.5 | |
| 16A PSK | 25/36 | 10 | 500 | 26.8 | 1340.3 | 2.68 | 5.2 | 9.5 | |
| 16A PSK | 13/18 | 10 | 500 | 27.9 | 1394.2 | 2.79 | 5.4 | 9.9 | |
| 16A PSK | 3/4 | 10 | 500 | 29.0 | 1448.0 | 2.90 | 6.0 | 10.6 | |
| 16A PSK | 7/9 | 10 | 500 | 30.0 | 1502.1 | 3.00 | 6.0 | 10.8 | |
| 16A PSK | 4/5 | 10 | 500 | 30.9 | 1545.0 | 3.09 | 6.5 | 11.4 | |
| 16A PSK | 5/6 | 10 | 500 | 32.2 | 1611.0 | 3.22 | 6.9 | 12.0 | |
| 16A PSK | 77/90 | 10 | 500 | 33.1 | 1653.1 | 3.31 | 7.0 | 12.2 | |
| 16A PSK | 8/9 | 10 | 500 | 34.4 | 1720.0 | 3.44 | 7.8 | 13.2 | |
| 16A PSK | 9/10 | 10 | 500 | 34.8 | 1741.5 | 3.48 | 8.1 | 13.5 | |
| 32A PSK | 2/3-L | 10 | 500 | 32.2 | 1609.2 | 3.22 | 6.3 | 11.4 | |
| 32A PSK | 32/45 | 10 | 500 | 34.3 | 1717.2 | 3.43 | 6.6 | 12.0 | |
| 32A PSK | 11/15 | 10 | 500 | 35.4 | 1771.2 | 3.54 | 7.0 | 12.5 | |
| 32A PSK | 3/4 | 10 | 500 | 36.2 | 1811.5 | 3.62 | 7.6 | 13.2 | |
| 32A PSK | 7/9 | 10 | 500 | 37.6 | 1879.1 | 3.76 | 7.6 | 13.3 | |
| 32A PSK | 4/5 | 10 | 500 | 38.7 | 1933.0 | 3.87 | 8.1 | 14.0 | |
| 32A PSK | 5/6 | 10 | 500 | 40.3 | 2015.5 | 4.03 | 8.7 | 14.8 | |
| 32A PSK | 8/9 | 10 | 500 | 43.0 | 2151.5 | 4.30 | 9.9 | 16.2 | |
| 32A PSK | 9/10 | 10 | 500 | 43.6 | 2178.5 | 4.36 | 10.1 | 16.5 | |
| 64A PSK | 32/45-L | 10 | 500 | 41.1 | 2055.6 | 4.11 | 8.3 | 14.4 | |
| 64A PSK | 11/15 | 10 | 500 | 42.4 | 2120.3 | 4.24 | 8.9 | 15.2 | |
| 64A PSK | 7/9 | 10 | 500 | 45.0 | 2249.5 | 4.50 | 9.4 | 15.9 | |
| 64A PSK | 4/5 | 10 | 500 | 46.3 | 2314.1 | 4.63 | 9.6 | 16.3 | |
| 64A PSK | 5/6 | 10 | 500 | 48.2 | 2411.1 | 4.82 | 10.1 | 16.9 | |
| 128A PSK | 3/4 | 10 | 450 | 50.5 | 2272.5 | 5.05 | 11.8 | 18.8 | |
| 128A PSK | 7/9 | 10 | 450 | 52.3 | 2353.5 | 5.23 | 12.4 | 19.6 | |
| 256A PSK | 29/45-L | 10 | 400 | 49.6 | 1984.0 | 4.96 | 11.1 | 18.1 | |
| 256A PSK | 2/3-L | 10 | 400 | 51.3 | 2052.0 | 5.13 | 10.9 | 18.1 | |
| 256A PSK | 31/45-L | 10 | 400 | 53.0 | 2120.0 | 5.30 | 12.1 | 19.3 | |
| 256A PSK | 32/45 | 10 | 400 | 54.7 | 2188.0 | 5.47 | 12.3 | 19.7 | |
| 256A PSK | 11/15-L | 10 | 400 | 56.4 | 2256.0 | 5.64 | 12.4 | 19.9 | |
| 256A PSK | 3/4 | 10 | 400 | 57.7 | 2308.0 | 5.77 | 13.2 | 20.8 | |

| DVBS2, Normal Block, Pilot ON, QEF (PER 1E-7) | | | | | | | | | | |
|---|------|------------------|------------------|------------------|------------------|-------------------------|------|-------|-----|-------|
| Performance measured using 30MSPS operation, 20% ROF and AWGN noise | | | | | | | | | | |
| MOD | FEC | Min SR (MSPS) | Max SR (MSPS) | Min DR (Mbps) | Max DR (Mbps) | Spec Eff (Bits / Hz) | QEF | Eb/No | QEF | Es/No |
| QPSK | 1/4 | 10 | 500 | 4.8 | 239.5 | 0.48 | 1.1 | -2.1 | | |
| QPSK | 1/3 | 10 | 500 | 6.4 | 320.5 | 0.64 | 0.9 | -1.0 | | |
| QPSK | 2/5 | 10 | 500 | 7.7 | 385.5 | 0.77 | 1.0 | -0.1 | | |
| QPSK | 1/2 | 10 | 500 | 9.7 | 482.5 | 0.97 | 1.5 | 1.3 | | |
| QPSK | 3/5 | 10 | 500 | 11.6 | 580.0 | 1.16 | 1.9 | 2.5 | | |
| QPSK | 2/3 | 10 | 500 | 12.9 | 645.5 | 1.29 | 2.2 | 3.3 | | |
| QPSK | 3/4 | 10 | 500 | 14.5 | 726.0 | 1.45 | 2.7 | 4.3 | | |
| QPSK | 4/5 | 10 | 500 | 15.5 | 774.5 | 1.55 | 3.0 | 4.9 | | |
| QPSK | 5/6 | 10 | 500 | 16.2 | 807.5 | 1.62 | 3.3 | 5.4 | | |
| QPSK | 8/9 | 10 | 500 | 17.2 | 862.0 | 1.72 | 4.0 | 6.4 | | |
| QPSK | 9/10 | 10 | 500 | 17.5 | 873.0 | 1.75 | 4.2 | 6.6 | | |
| 8PSK | 3/5 | 10 | 500 | 17.4 | 870.0 | 1.74 | 3.7 | 6.1 | | |
| 8PSK | 2/3 | 10 | 500 | 19.4 | 968.0 | 1.94 | 3.6 | 6.5 | | |
| 8PSK | 3/4 | 10 | 500 | 21.8 | 1089.0 | 2.18 | 4.8 | 8.2 | | |
| 8PSK | 5/6 | 10 | 500 | 24.2 | 1211.0 | 2.42 | 5.8 | 9.6 | | |
| 8PSK | 8/9 | 10 | 500 | 25.9 | 1293.0 | 2.59 | 6.9 | 11.0 | | |
| 8PSK | 9/10 | 10 | 500 | 26.2 | 1309.0 | 2.62 | 7.1 | 11.3 | | |
| 16APSK | 2/3 | 10 | 500 | 25.8 | 1287.5 | 2.58 | 5.4 | 9.5 | | |
| 16APSK | 3/4 | 10 | 500 | 29.0 | 1448.0 | 2.90 | 6.0 | 10.6 | | |
| 16APSK | 4/5 | 10 | 500 | 30.9 | 1545.0 | 3.09 | 6.5 | 11.4 | | |
| 16APSK | 5/6 | 10 | 500 | 32.2 | 1611.0 | 3.22 | 6.9 | 12.0 | | |
| 16APSK | 8/9 | 10 | 500 | 34.4 | 1720.0 | 3.44 | 7.8 | 13.2 | | |
| 16APSK | 9/10 | 10 | 500 | 34.8 | 1741.5 | 3.48 | 8.1 | 13.5 | | |
| 32APSK | 3/4 | 10 | 500 | 36.2 | 1811.5 | 3.62 | 7.6 | 13.2 | | |
| 32APSK | 4/5 | 10 | 500 | 38.7 | 1933.0 | 3.87 | 8.1 | 14.0 | | |
| 32APSK | 5/6 | 10 | 500 | 40.3 | 2015.5 | 4.03 | 8.7 | 14.8 | | |
| 32APSK | 8/9 | 10 | 500 | 43.0 | 2151.5 | 4.30 | 9.9 | 16.2 | | |
| 32APSK | 9/10 | 10 | 500 | 43.6 | 2178.5 | 4.36 | 10.1 | 16.5 | | |



CDM-780 Back Panel